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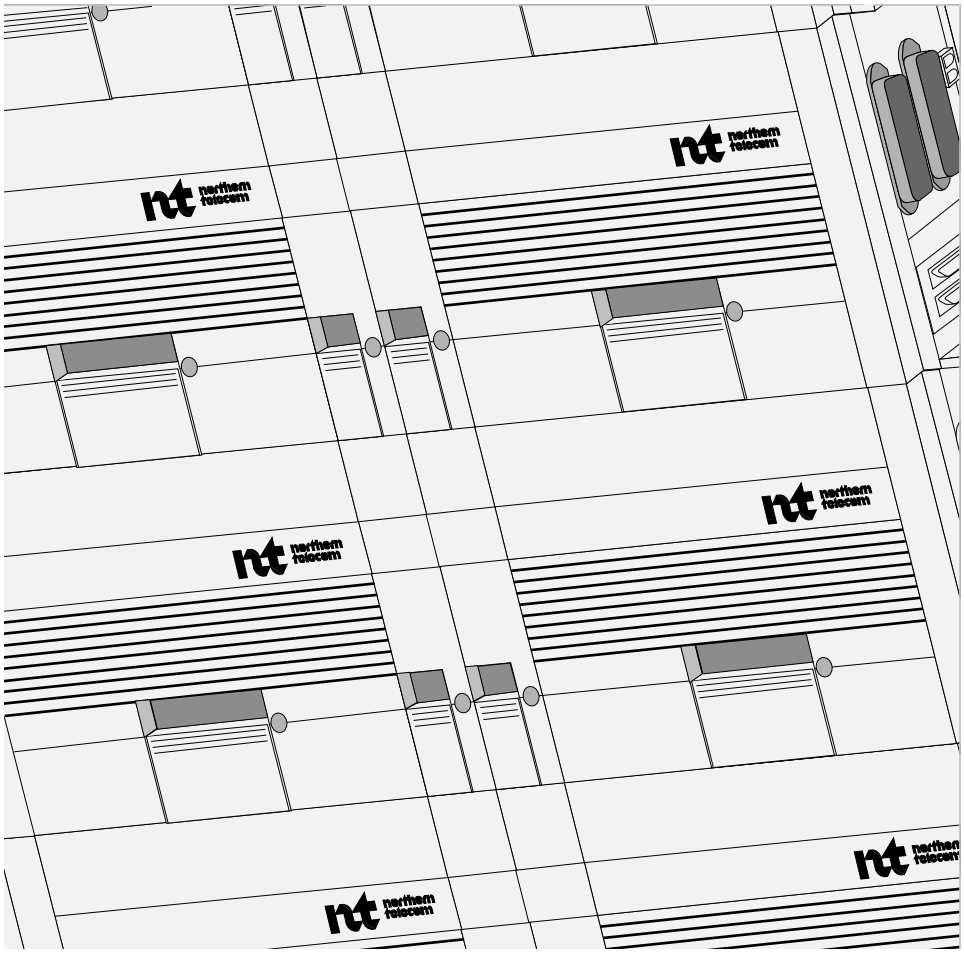
SONET Products

AccessNode

Modular Business Package Cabinet Installation Manual

Issue 1.0 February 1999



NORTEL NETWORKS™

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Modular Business Package Cabinet Installation Manual

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Release-independent standard issue of the document, Issue 1.0.

> ***Note:*** With the February 1999 release, references to the software release number (such as AN15 or AN16) have been deleted, making this document release-independent. This document will be rereleased only when technical changes occur.

June 1998

Release-independent Standard 01.01 release of the document.

September 1997

Standard 01.01 release of the document. For this release, the following information has been added:

- alarm point connections added to Chapter 2
- references to star washers removed from Chapter 7

July 1996

AN12 Standard 01.01 release of the document for external review.

November 1995

AN11 Standard 02.01 release of the document.

May 1995

Updated Standard AN10 1.02 release of the document to include document version and issue numbers.

April 1995

Standard AN10 release of the document.

December 1994

Standard AN08 release of the document.

November 1994

Reissue of AN07 standard.

April 1994

Standard AN07 release of the document.

May 1993

Standard FWP06 release of the document.

Contents

About this document

This document contains instructions for performing the following installation activities:

- installing Modular Business Package (MBP) cabinets and Modular Power Package (MPP) cabinets
- connecting a customer-supplied battery rack to an MPP cabinet
- adding a field expansion module (FEM) to an existing installation
- adding copper-distribution shelves to increase the number of subscribers
- adding a DSX-1 shelf and a T1 repeater shelf to an existing installation
- adding a second rectifier shelf to an existing MPP cabinet

Installing the circuit packs and provisioning services for the AccessNode equipment in the MBP and MPP cabinets are detailed in *Commissioning and Testing*, Volume 3.

Before using this document

Users of this document should be familiar with communications equipment and the operation of the tools required to complete the installation tasks.

Before using this document to install AccessNode equipment in MBP or MPP cabinets, you should already have considered the following list of requirements and developed a floor plan.

- fire protection and safety requirements
- equipment room requirements
- seismic requirements
- grounding and power requirements
- cabling requirements
- circuit and card provisioning requirements

Specifications for these requirements, and for developing an equipment room floor plan, are provided in *Site Installation Planning and Engineering, Addendum 1 (MBP),* 323-3001-200.

> ***Note:*** This document does not contain procedures for installing circuit packs. See *Commissioning and Site Testing*, Volume 3.

How to use this document

Before you begin installing or adding to the MBP and MBP cabinets, read Chapter 1, “Safety guidelines and warnings”.

Perform the procedures in the order in which they are listed. If you cannot successfully complete these procedures, contact your next level of support.

Chapter task lists

From among the headings on the following pages, look up the heading that represents the equipment you are installing. Each heading is followed by a table that lists the tasks to be performed to complete the installation.

Installing a multiplexer configuration, no MPP cabinet

The following chapters contain the procedures for installing a system that consists of a single MBP cabinet configured to operate as a multiplexer, with or without a DSX-1 shelf and a T1 repeater shelf.

Task	See
Marking and drilling the floor	page 3-1
Unpacking the cabinet	page 4-1
Remove the equipment covers and side panels	page 5-1

Task	See
Installing the cabinet	page 6-1
Connecting the power and ground cables	page 7-1
Installing the external signal cables	page 9-1
Installing the equipment covers and panels	page 16-1

Installing a multiplexer configuration, with an MPP cabinet

The following chapters contain the procedures for installing a system that consists of an MPP cabinet, and a single MBP cabinet, configured to operate as a multiplexer, with or without a DSX-1 shelf and a T1 repeater shelf.

Task	See
Marking and drilling the floor	page 3-1
Unpacking the cabinet	page 4-1
Removing the equipment covers and side panels	page 5-1
Installing the cabinet	page 6-1
Connecting the power and ground cables	page 7-1
Connecting the signal cables between cabinets	page 8-1
Installing the external signal cables	page 9-1
Installing the equipment covers and panels	page 16-1

Installing a 96-line to 480-line single-cabinet configuration, no MPP cabinet

The following chapters contain the procedures for installing a system that consists of a single MBP cabinet. This cabinet contains from one to five copper-distribution shelves (96 lines to 480 lines), with or without a DSX-1 shelf and a T1 repeater shelf.

Task	See
Marking and drilling the floor	page 3-1
Unpacking the cabinet	page 4-1
Removing the equipment covers and side panels	page 5-1
Installing the cabinet:	page 6-1

Task	See
Connecting the power and ground cables	page 7-1
Installing the external signal cables	page 9-1
Installing the equipment covers and panels	page 16-1

Installing a 96-line to 480-line single-cabinet configuration, with an MPP cabinet

The following chapters contain the procedures for installing a system that consists of an MPP cabinet, and a single MBP cabinet that contains from one to five copper-distribution shelves (96 lines to 480 lines), with or without a DSX-1 shelf and a T1 repeater shelf.

Task	See
Marking and drilling the floor	page 3-1
Unpacking the cabinets	page 4-1
Removing the equipment covers and side panels	page 5-1
Installing the cabinets	page 6-1
Connecting the power and ground cables	page 7-1
Connecting the signal cables between cabinets	page 8-1
installing the external signal cables	page 9-1
Installing the equipment covers and panels	page 16-1

Installing a 384-line to 672-line two-cabinet configuration, no MPP cabinet

The following chapters contain the procedures for installing a system that consists of two MBP cabinets. The two cabinets contain from four to seven copper-distribution shelves (384 lines to 672 lines), with or without a DSX-1 shelf and a T1 repeater shelf.

Task	See
Marking and drilling the floor	page 3-1
Unpacking the cabinets	page 4-1
Removing the equipment covers and side panels	page 5-1
Installing the cabinets	page 6-1
Connecting the power and ground cables	page 7-1

Task	See
Connecting the signal cables between cabinets	page 8-1
Installing the external signal cables	page 9-1
Installing the equipment covers and panels	page 16-1

Installing a 384-line to 672-line two-cabinet configuration, with an MPP cabinet

The following chapters contain the procedures for installing a system that consists of an MPP cabinet, a master MBP cabinet, and an expansion MBP cabinet. The master and expansion cabinets contain from four to seven copper-distribution shelves, with or without a DSX-1 shelf and a T1 repeater shelf.

Task	See
Marking and drilling the floor	page 3-1
Unpacking the cabinets	page 4-1
Removing the equipment covers and side panels	page 5-1
Installing the cabinets	page 6-1
Connecting the power and ground cables	page 7-1
Connecting the signal cables between cabinets	page 8-1
Installing the external signal cables	page 9-1
Installing the equipment covers and panels	page 16-1

Adding a FiberManager Compact/8 fiber patch panel

The following chapters contain the procedures for adding a FiberManager Compact/8 fiber patch panel to an existing system. In addition to the information contained in these chapters, you will also need a copy of *FiberManager Compact/8 Installation and Maintenance Documentation Package*. This package is shipped with the fiber patch panel.

Task	See
Removing the equipment covers and side panels	page 5-1
Adding the FiberManager Compact/8 fiber patch panel	page 10-1
Installing the equipment covers and panels	page 16-1

Adding an MPP cabinet

The following chapters contain the procedures for adding an MPP cabinet to an existing system that consists of one or two MBP cabinets.

Task	See
Marking and drilling the floor	page 3-1
Unpacking the cabinet	page 4-1
Removing the equipment covers and side panels	page 5-1
Installing the cabinet	page 6-1
Connecting the power and ground cables	page 7-1
Connecting the signal cables between cabinets	page 8-1
Installing the external signal cables	page 9-1
Installing the equipment covers and panels	page 16-1

Adding an expansion cabinet

The following chapters contain the procedures for adding an expansion cabinet that contains one or both of the following items:

- up to four copper-distribution shelves for increasing the number of voice lines up to 672 lines
- a DSX-1 shelf and a T1 repeater shelf

Task	See
Marking and drilling the floor	page 3-1
Unpacking the cabinet	page 4-1
Removing the equipment covers and side panels	page 5-1
Installing the cabinet	page 6-1
Connecting the power and ground cables	page 7-1
Connecting the signal cables between cabinets	page 8-1
Installing the external signal cables	page 9-1
Installing the equipment covers and panels	page 16-1

Adding a copper-distribution shelf to an existing single equipment module

The following chapters contain the procedures for installing one or more copper-distribution shelves in a vacant shelf position of a single equipment module in an existing system.

Task	See
Removing the equipment covers and side panels	page 5-1
Adding a copper-distribution shelf	page 11-1
Adding the field expansion module	page 12-1
Connecting the copper-distribution shelf	page 13-1
Connecting the signal cables between cabinets	page 8-1
Installing the equipment covers and panels	page 16-1

Adding a field expansion module that contains copper-distribution shelves

The following chapters contain the procedures for adding a field expansion module that contains one or two copper-distribution shelves to the top of an existing MBP cabinet.

Task	See
Remove the equipment covers and side panels	page 5-1
Add the field expansion module	page 12-1
Connect the copper-distribution shelf	page 13-1
Install the equipment covers and panels	page 16-1

Adding a field expansion module that contains a DSX-1 shelf and a T1 repeater shelf

The following chapters contain the procedures for adding a field expansion module that contains a DSX-1 shelf and a T1 repeater shelf to the top of an existing MBP cabinet.

Task	See
Remove the equipment covers and side panels	page 5-1
Add the field expansion module	page 12-1
Connect the DSX-1 shelf and the T1 repeater shelf	page 14-1
Install the equipment covers and panels	page 16-1

Adding a second rectifier shelf to an MPP cabinet

The following chapters contain the procedures for adding a second rectifier shelf to a Modular Power Package (MPP) cabinet.

Task	See
Remove the equipment covers and side panels	page 5-1
Install the second rectifier shelf	page 15-1
Install the equipment covers and panels	page 16-1

Adding OC-3 tributaries to an existing system

The following chapters contain the procedures for adding OC-3 tributaries to the ABM shelf in an existing MBP cabinet.

Task	See
Remove the equipment covers and side panels	page 5-1
Install the fiber patch cords	page 9-1
Install the equipment covers and panels	page 16-1

Note: When adding OC-3 tributaries, you may need remove existing circuit packs in the common-equipment shelf. Any existing services on circuit packs that need to be removed for OC-3 tributaries will require re-provisioning and commissioning. The document *Commissioning and Testing*, Volume 3, explains how to install circuit packs and how to re-assign the new services.

Abbreviations for the colors of conductor insulation in cables

In this document, a uniform system of abbreviations is used to represent the colors of the conductor insulation used in equipment cables. These abbreviations take the form:

<pair_color> <group_marker_type> <group_marker_color>

Item	Abbreviation		
<pair_color>	This is the background color of the conductor insulation which indicates the pair color.		
	BL	blue	(pair 1 of the binder group)
	O	orange	(pair 2 of the binder group)
	G	green	(pair 3 of the binder group)
	BR	brown	(pair 4 of the binder group)
	S	slate	(pair 5 of the binder group)
<group_marker_type>	This is the type of group marker used on the conductor insulation.		
	1	single dots spaced about 18 mm (3/4 in.) apart	
	2	two dots spaced about 3 mm (1/8 in.) apart with about 18 mm (3/4 in.) between each pair of dots	
	3	dashes about 3 mm (1/8 in.) long spaced about 18 mm (3/4 in.) apart	
	none	one colored stripe on conductor jacket	
<group_marker_color>	This the color of the dot, dots or the stripe used as the group marker on the conductor insulation.		
	W	white	(binder group 1)
	R	red	(binder group 2)
	BK	black	(binder group 3)
	Y	yellow	(binder group 4)
	V	violet	(binder group 5)

For example, the abbreviation BL 2W (representing Pair 1 of the second 25-pair binder) means that the conductor has a blue insulation background with two white dots spaced 18 mm (3/4 in.) apart. The abbreviation BL W (representing Pair 1 of the first 25-pair binder) means that the conductor has a blue insulation background with a single white stripe.

Safety guidelines and warnings

This chapter contains warnings and precautions for personal safety, and for the correct handling and operation of equipment while it is being installed.

Warnings and safety notices

This document contains notices that are designed to alert you about the risk of personal injury, or of damage to equipment.

Samples of the formats for dangers and caution notices used in this document are as follows:

DANGER
Risk of personal injury
A danger notice warns you about a risk of personal injury.

CAUTION
Risk to service or equipment
A caution notice warns you about a risk of service interruption or of equipment damage.

To avoid personal injury, follow all danger warnings provided with this product, along with the safety procedures established by your company.

To avoid damage to equipment, or service interruptions, follow all cautions and warnings provided with this product, as well as the procedures established by your company.

Radio frequency emissions notice

The following regulatory notice applies to AccessNode equipment:

“This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a normal commercial environment. This

equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case the user is required to correct the interference at his own expense."

Optical fiber cables

AccessNode equipment and associated optical test sets use laser sources that emit light energy into fiber cables. This energy lies within the infrared (invisible) regions of the electromagnetic spectrum.

Laser products are subject to federal and state or provincial regulations, and local practices. Regulation 21 CFR 1040 of the U.S. Bureau of Radiological Health requires manufacturers to certify each laser product as Class I, Class II, III, or Class IV, depending on the characteristics of the laser radiation that is emitted. In terms of health and safety, Class I products represent the least hazard (none at all), while Class IV products represent the greatest hazard.

Although Nortel Networks optical products have a Class I certification, hazardous exposure to laser radiation could occur when fibers that interconnect system components are disconnected, broken, or are installed while equipment is under power. Certain procedures carried out during installation or testing require the handling of optical fibers without dust caps, and therefore increase the risk of exposure. Exposure either to visible or invisible laser light could cause eye damage under certain conditions.

The caution label at the right appears on the optical interface card, near the optical connection, and must be complied with.

Caution

Avoid direct exposure to beam. Invisible light can blind. Keep all optical connectors capped.

DANGER

Risk of eye injury

At all times when handling optical fibers, follow the safety procedures recommend by your company.

Read and follow the precautions in the following paragraphs to reduce the risk of exposure to laser radiation.

Handing optical fibers

During the installation, service, repair, or removal of optical fiber cables or equipment, follow these rules:

- Avoid direct exposure to fiber ends or optical connections ends, where the laser signal is present.
- Wear safety glasses when handling optical fibers to avoid eye injury from flying glass fragments.
- Small bits of glass fiber are almost invisible on the fingers. Therefore, always wipe your hands on a tissue or on a clean absorbent cloth before making any contact with your eyes, or the area around your eyes.

DANGER
Risk of eye injury
If you suspect that you may have a glass chip in the eye, seek medical attention immediately.

- Handle optical fibers carefully, and always position them in a safe and secure location during the installation procedures.
- Do not handle broken or cut pieces of fiber with your bare fingers. Use tweezers or the sticky side of adhesive tape to pick up and discard loose fiber ends.
- Place all fiber cuttings or ends in a plastic bottle marked “Danger, Sharp Objects”.
- Protect optical fiber connectors with dust caps at all times.

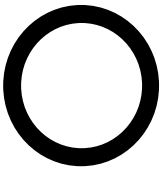
International electrical symbols on equipment

A number of International Electrotechnical Commission (IEC) symbols are used on AccessNode equipment. The labels and their meanings are as follows:

Power on

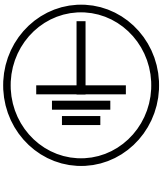
This symbol indicates that a main power on/off switch is in the on position.

Power off



This symbol indicates that a main power on/off switch is on the off position.

Protective grounding terminal



This symbol indicates the location of a terminal that must be connected to earth ground before you make any other connections to the equipment.

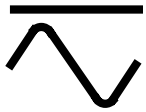
Alternating current

This symbol indicates the location of a terminal that supplies alternating current or to which a source of alternating current is applied.

Direct current

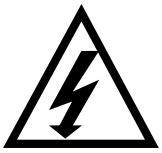
This symbol indicates the location of a terminal that supplies direct current or to which a source of direct current is applied.

Direct current and alternating current



This symbol indicates the location of a terminal that supplies direct current or alternating current, or to which a source of direct current or alternating current is applied.

Dangerous voltage



This symbol indicates the presence of a dangerous voltage inside an equipment enclosure. This voltage may be of sufficient magnitude to constitute a risk of electric shock to persons working on the equipment.

Introduction to equipment and cable configurations

This chapter describes the equipment, configurations and cabling for the AccessNode Modular Business Package (MBP) and Modular Power Package (MPP) cabinets.

Chapter contents

This chapter contains the following information:

Types of cabinets

The AccessNode Modular Business Package (MBP) standard cabinet system is available for the equipment rooms of business buildings at a remote site. An equipment room is a common space used for telecommunications equipment such as private branch exchanges, mainframe computers, or video switches that are shared by the occupants of a building.

The standard MBP cabinet system (NT4K06) used in AccessNode releases consists of from one to three cabinets as follows:

- one MBP master cabinet (see Figure 2-1 on page 2-4). As a minimum, a system contains a master cabinet which contains an access bandwidth manager (ABM) shelf, a local craft access panel (LCAP), and one or more shelves of peripheral modules.
- one MBP expansion cabinet (optional, see Figure 2-1 on page 2-4). The expansion cabinet can be added to the MBP system to house extra peripheral modules when needed.
- one modular power package (MPP) cabinet (optional, see Figure 2-2 on page 2-5). The MPP converts a supply of 220/240 V ac to supplies of 48 V dc for powering the equipment inside the master and expansion MBP cabinets.

In a line-up of cabinets, the order of the cabinets as viewed from the front of the line-up is as follows: an MPP cabinet, a master MBP cabinet, and an expansion MBP cabinet.

Additional cabinet configurations

This document covers only the installation of the MBP/MPP standard cabinet system. Other configurations of the MBP/MPP and the appropriate AccessNode documentation are listed below.

- *Modular Business Package VTBM Ring Installation Guide*
- *Modular Business Package VTBM Ring User Guide*

For a description and overview of all the MBP/MPP cabinet configurations, refer to *Modular Business Package Description*, 323-3001-110.

Installation in restricted areas and unrestricted areas

The Underwriter's Laboratory (UL) and the Canadian Standards Association (CSA) have approved modular business package (MBP) cabinets and Modular Power Package (MPP) cabinets for use in unrestricted and restricted areas.

In an unrestricted area, the equipment room remains unlocked and is accessible to all personnel. In a restricted area, the equipment room is kept locked and only authorized personnel have keys to open the room. Protection against shock hazards has to be greater in an unrestricted area than in a restricted area.

Unrestricted areas

In an unrestricted area, the MPP cabinet must be physically attached to the master MBP cabinet by means of a cable duct called an expansion kit, and all power cables that run between the cabinets must pass through this expansion kit. For an illustration of an unrestricted access system, see Figure 2-3 on page 2-6.

Restricted areas

In a restricted area, the MPP cabinet can attached to the master cabinet or installed up to about 7.6 m (25 ft) away. When the MPP cabinet is attached to the master cabinet, power cables pass through the expansion kit. When the MPP cabinet is installed remotely from the master cabinet, power cables that run between the MPP cabinet and the master MBP cabinet can pass under the floor (in raised floor applications) or overhead in a cable rack (in concrete floor applications). In raised floor applications, local electrical codes may require that the power cables under the floor be contained in conduit. The undersides of MBP and MPP cabinets are equipped with knockouts for the entry of cable conduits. For an illustration of a restricted access system, see Figure 2-4 on page 2-7.

Figure 2-1
MBP master and expansion cabinets

FW-10807

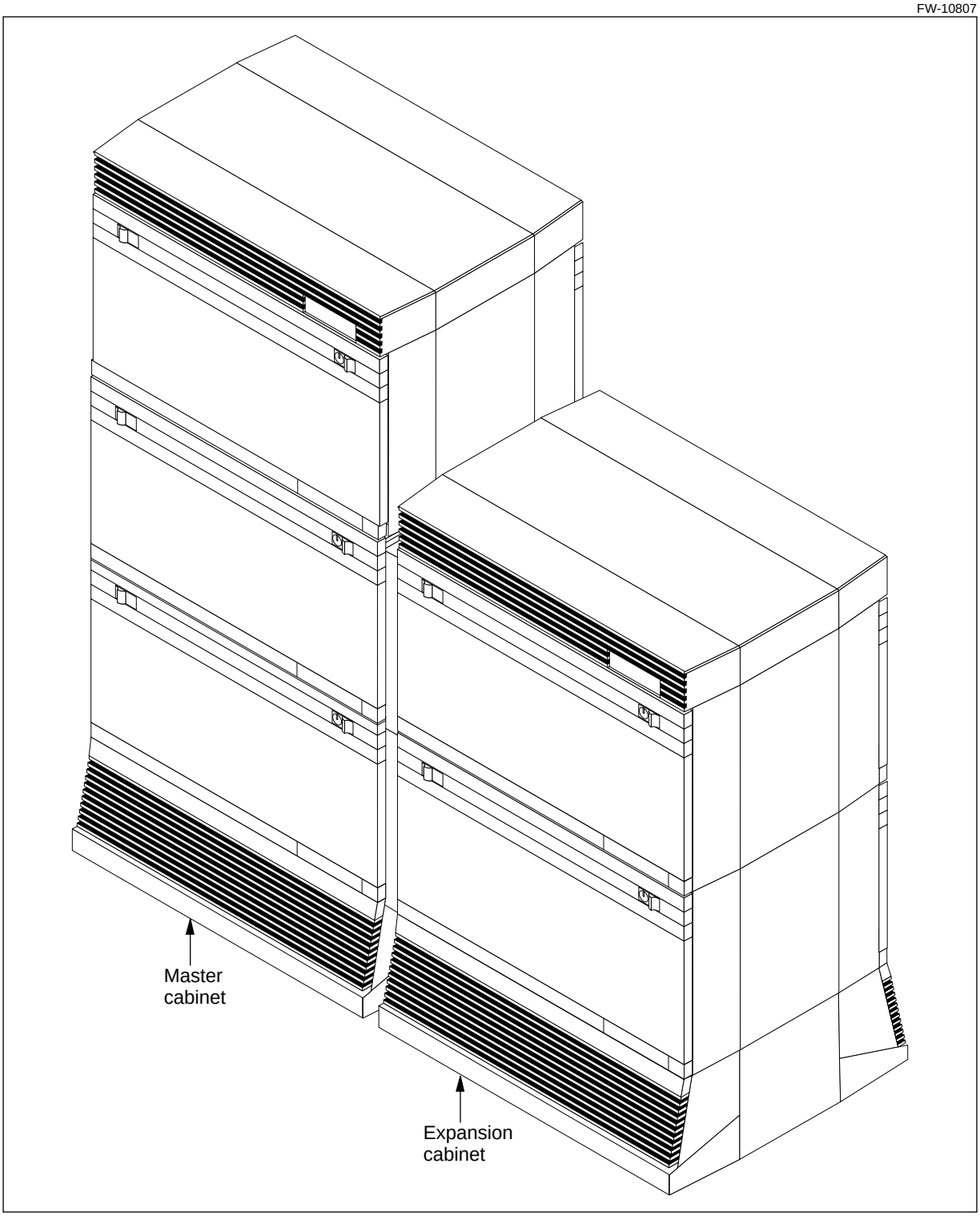


Figure 2-2
MPP cabinet

FW-10826

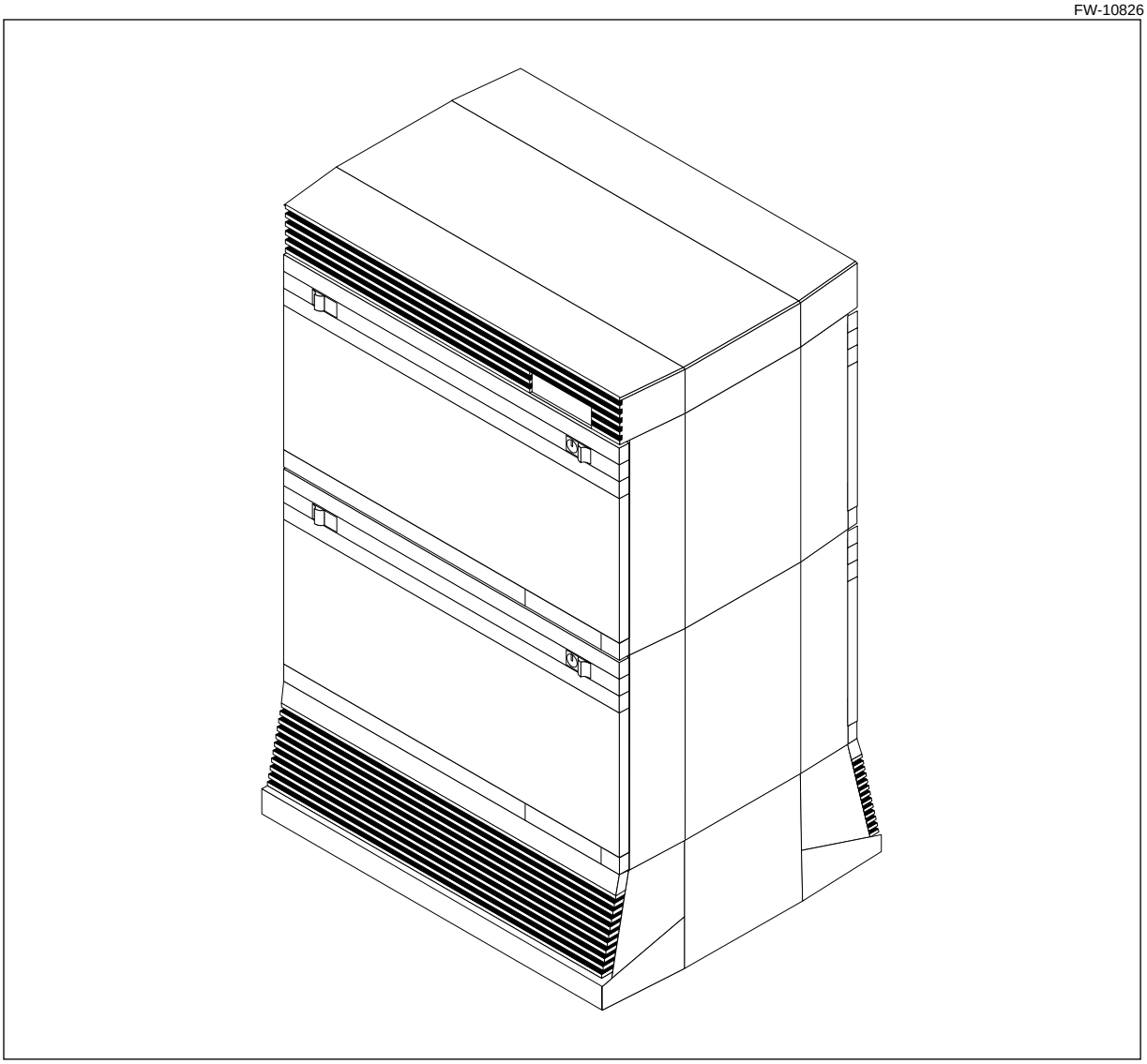


Figure 2-3
Three-cabinet MBP system arrangement for use in an unrestricted access area

FW-15319

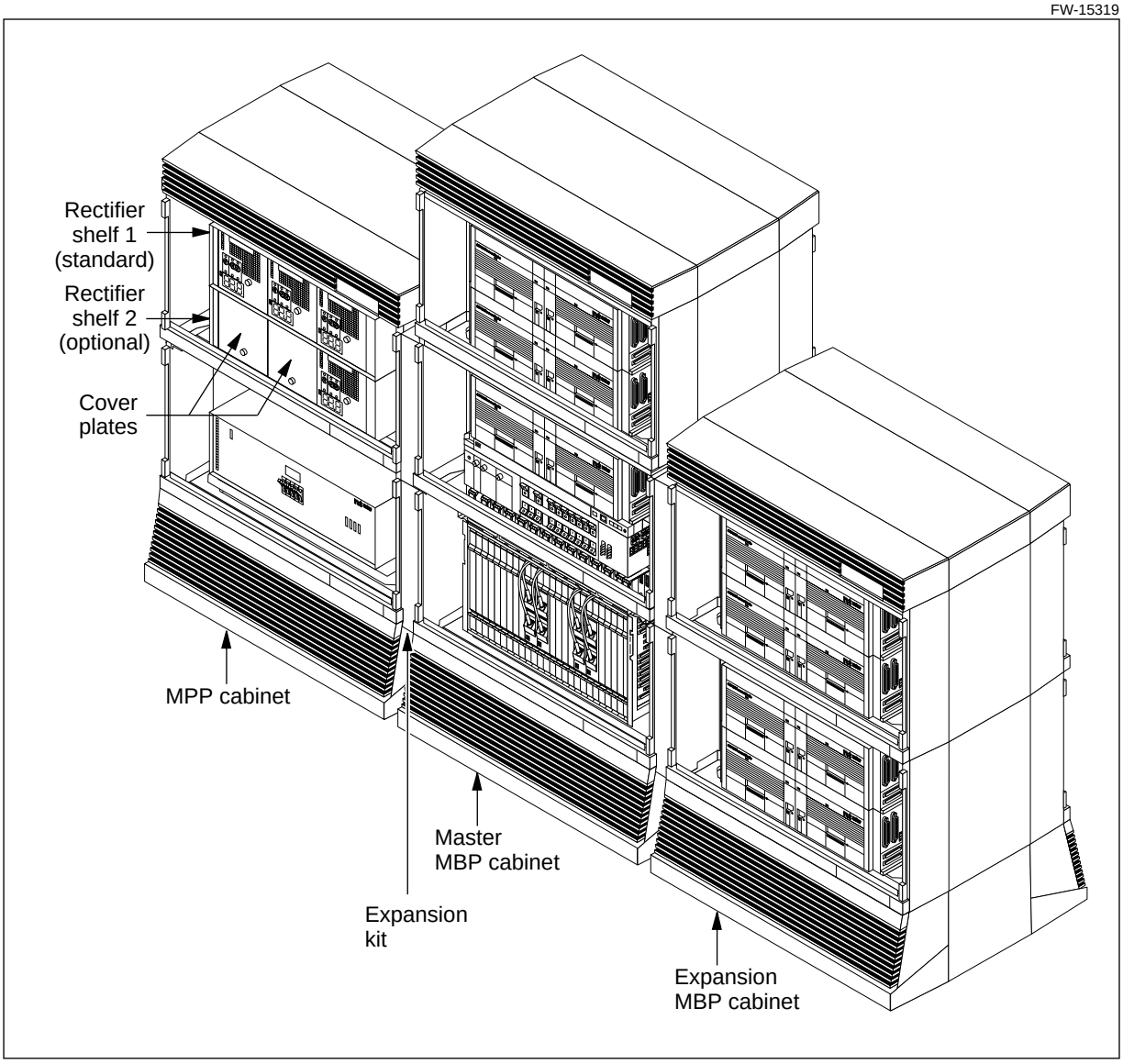
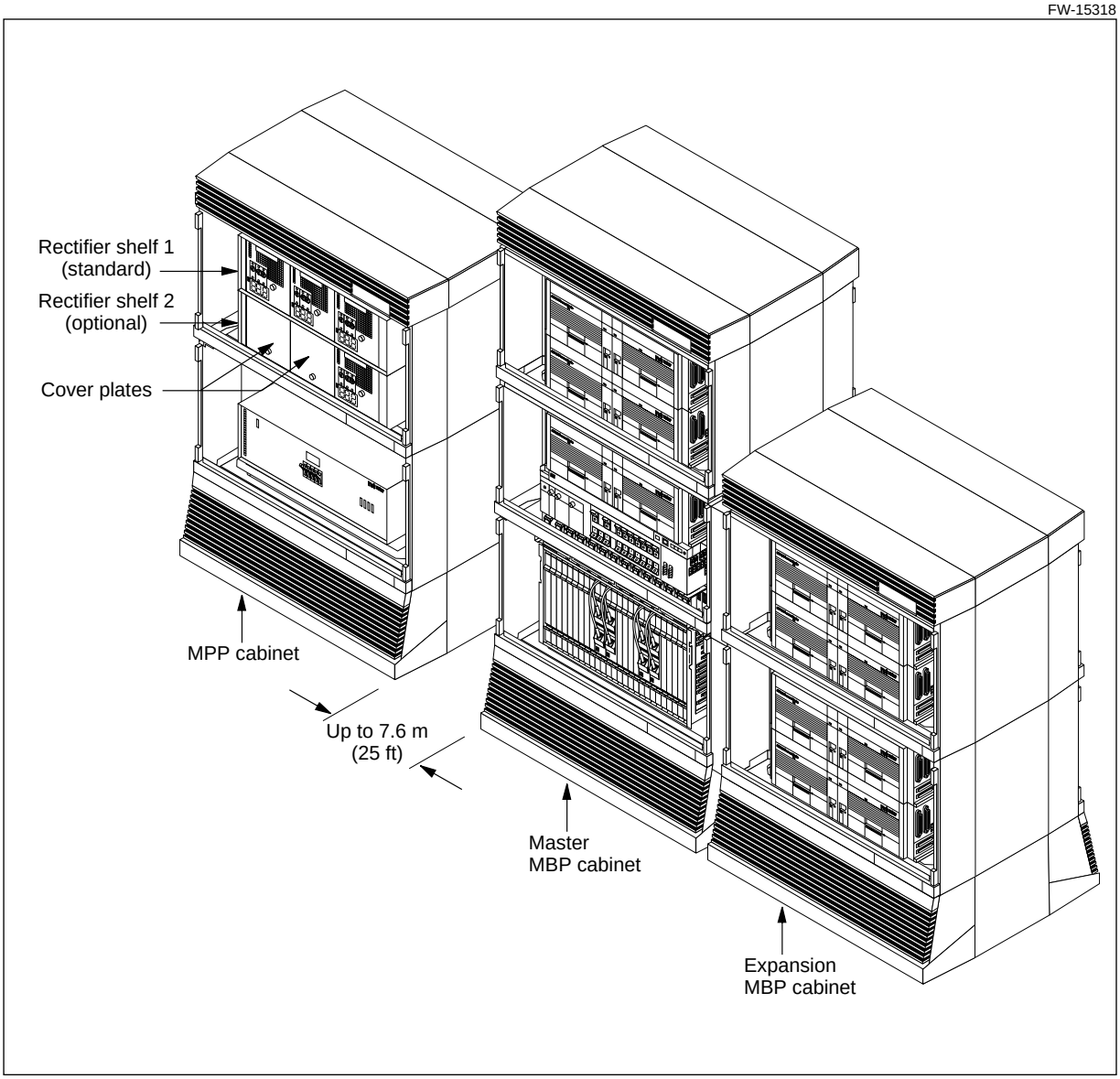


Figure 2-4
Three-cabinet MBP system arrangement for use in a restricted area

FW-15318



Common features of MBP and MPP cabinets

Modular Business Package (MBP) cabinets and Modular Power Package (MPP) cabinets share the common features described in the following paragraphs.

Types of covers

MBP cabinets and MPP cabinets can be purchased with three types of covers: key-lockable covers that can be locked with a common key, tool-lockable covers that can be opened and closed with an NSQ2000L tool or an ATT216 tool, and safety locking covers that can be opened and closed without tools.

The Access Bandwidth Manager (ABM) shelf located inside the master MBP cabinet is equipped with a cover that can be installed or removed with a screwdriver that has a flat blade 1/4 in. wide.

Anchoring and seismic kits

MBP and MPP cabinets are suitable for installation on concrete floors and on raised floors.

The NT4K065x kits contain the material required to firmly secure the cabinet equipment modules to each other. The NT4K0602 and NT4K0605 anchor kits contain the material required to secure the cabinet to the floor.

> ***Note:*** Seismic kits are not available for cabinets that are more than four modules high. A single equipment module is considered to be one module in height and a dual equipment module is considered to be two modules in height.

Raised floors

MBP and MPP cabinets can be installed on raised floors in non-seismic applications. If you require the installation of special hardware to secure the cabinets in place in non-seismic installations, such hardware must be site-engineered, with assistance from Nortel Networks. This special anchoring hardware is not supplied because of numerous variations in the construction of raised floors.

Expandability

Existing MBP cabinets and the MPP cabinets are readily expanded. The system can be expanded from a multiplexer (MUX) configuration to a configuration that supports up to 672 voice lines in the following ways:

- by adding provisionable circuit packs to the system
- by adding field expansion modules (FEMs) to an existing MBP cabinet
- by adding an expansion cabinet that contains copper-distribution shelves

OC-3 tributaries can be added to a system by:

- adding fiber optic cabling or patchcords
- re-provisioning services for any traffic-bearing common-equipment card that must be removed or relocated
- adding OC-3 tributary optical cards into the common-equipment shelf

The voice lines can be added in increments of 96-line capacities.

A FEM or an expansion cabinet that contains a DSX-1 cross-connect shelf and a T1 repeater self can also be added to any existing configuration.

The topmost rectifier shelf (rectifier shelf 1), equipped with three rectifiers, is standard equipment in the MPP. An additional rectifier shelf (rectifier shelf 2) equipped with one rectifier only can also be installed into the MPP to provide n+1 rectifier redundancy for a fully equipped 672-line system.

MBP cabinet configurations

As a minimum, a system contains a master Modular Business Package (MBP) cabinet. Depending on the number of equipment shelves in the system, an expansion cabinet is added to the system.

AccessNode equipment in MBP cabinets can be purchased in a multiplexer configuration, or in configurations that support from 96 to 672 voice lines. These configurations can also be equipped with a DSX-1 cross connect shelf and a T1 repeater shelf.

The following paragraphs describe in more detail the configurations in which the equipment can be ordered from the factory.

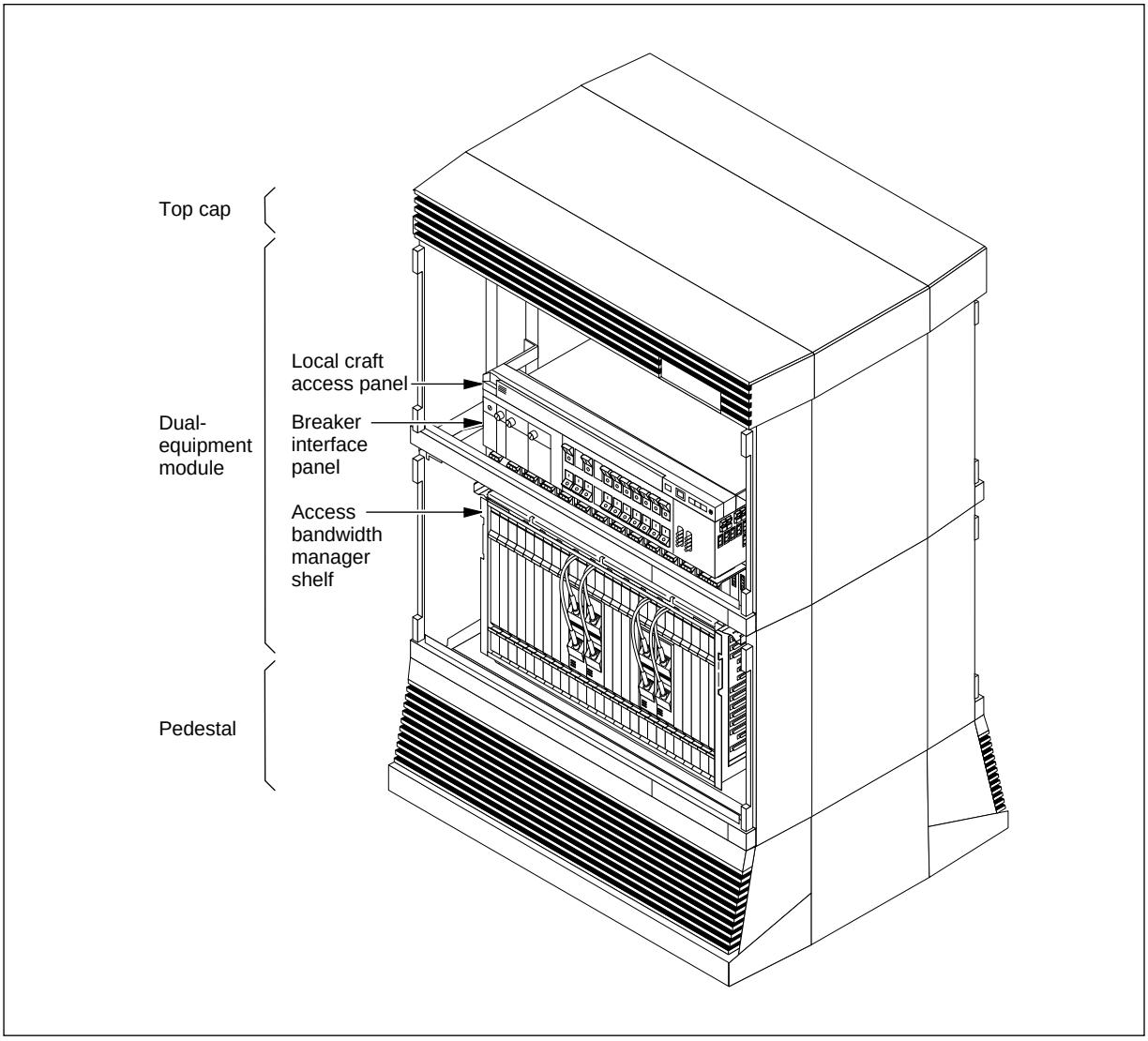
Multiplexer configuration

When used as a multiplexer (MUX), the AccessNode equipment is packaged in a master MBP cabinet, as shown in Figure 2-5. This cabinet contains the following items:

- a top cap kit and a grille kit
- a dual equipment module (DEM) that contains a local craft access panel (LCAP), a breaker interface panel (BIP), and an Access Bandwidth Manager (ABM) shelf
- a pedestal that contains a power distribution unit, a blower unit, and an air filter assembly

Figure 2-5
Multiplexer configuration in a master MBP cabinet

FW-15320



96-line configuration

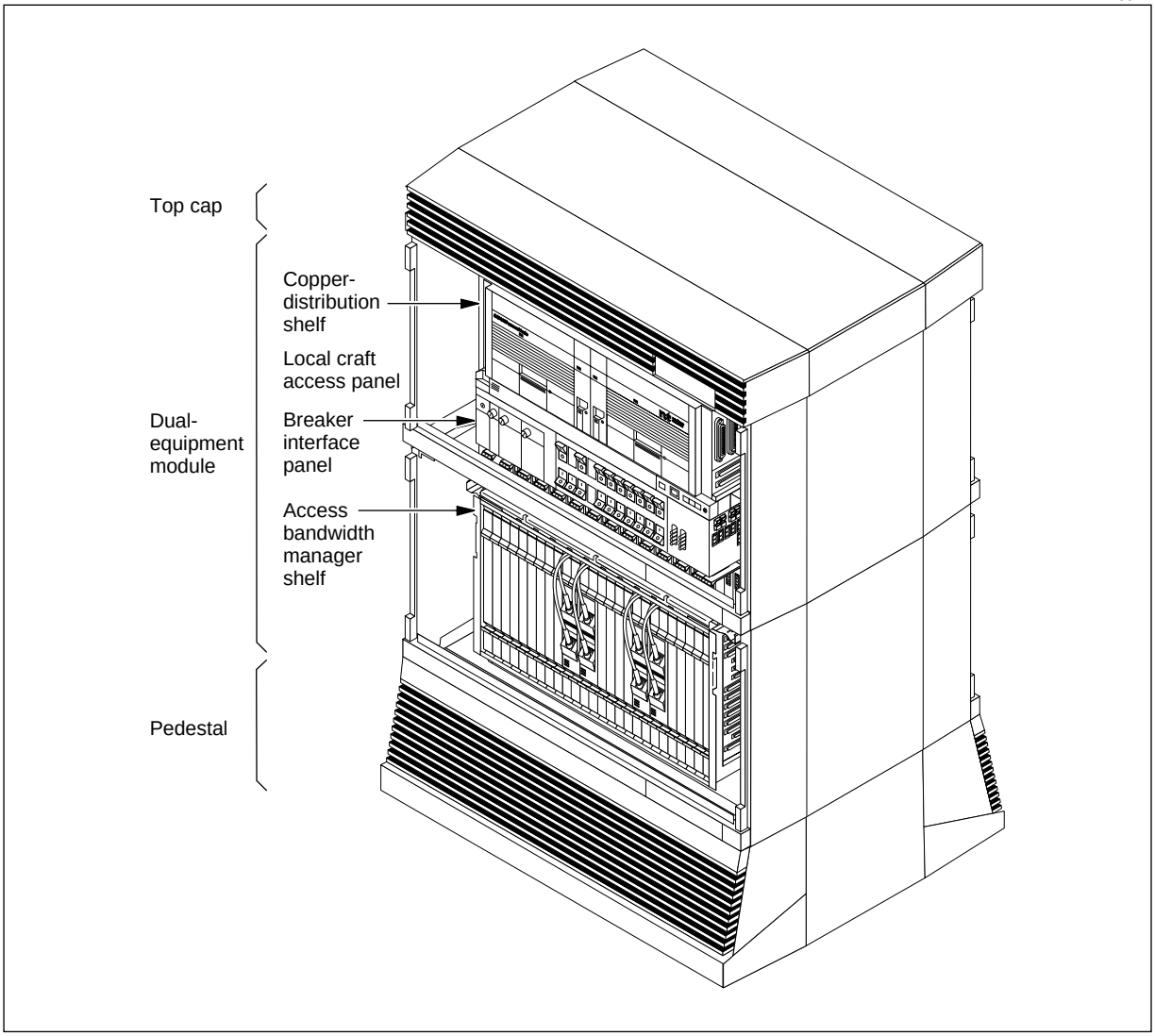
The 96-line configuration is contained in a single cabinet (the master MBP cabinet), and is similar to the multiplexer configuration, except for:

- cabling changes
- the addition of a plenum duct
- the addition of one copper-distribution shelf.

The copper-distribution shelf installs in the dual equipment module (DEM) above the LCAP, as shown in Figure 2-6.

Figure 2-6
96-line configuration in a single MBP cabinet

FW-15321



192-line to 672-line configurations

The modular construction of MBP cabinets allows considerable flexibility in constructing configurations that support from 192 to 672 subscriber voice lines. These configurations are constructed at the factory by adding single equipment modules (SEMs) to the system. Each SEM can contain one copper-distribution shelf (adds 96 subscriber voice lines) or two copper-distribution shelves (add 192 subscriber voice lines).

Up to two SEMs can be included in a master cabinet. With the two SEMs, the master cabinet can contain up to five copper-distribution shelves and support up to 480 subscriber voice lines, as follows:

- two copper-distribution shelves in each of the two SEMs
- one copper-distribution shelf in the DEM

Figure 2-7 on page 2-13 contains an illustration of a single cabinet configuration with 480 subscriber voice lines.

A third SEM containing up to two copper-distribution shelves can be included in the system to bring the number of copper-distribution shelves to seven, and allow the system to support up to 672 subscriber voice lines. This SEM is contained in an expansion cabinet that attaches to the master MBP cabinet. Figure 2-8 on page 2-14 shows a typical 672-line configuration in two MBP cabinets that is equipped with five copper-distribution shelves in the master cabinet, and two copper-distribution shelves in the expansion cabinet.

Other arrangements of the SEMs (see Figure 2-9 on page 2-15) are possible. It is not necessary for the master cabinet to contain two SEMs. In one of many possible alternate arrangements, the master cabinet contains only one SEM, which gives the master cabinet a capacity of 288 subscriber voice lines. The copper-distribution shelves that provide the system with its full 672-line capacity are contained in two SEMs installed in an adjacent expansion cabinet.

In constructing alternate arrangements the two following main rules apply:

- No cabinet can be more than four modules high. A SEM is considered to be one module high, and a dual equipment module is considered to be two modules high.
- Cabinets for installation on concrete floors in Zone 4 seismic areas can only be three modules high, because the Zone 4 seismic kit is not approved for use on cabinets that are four modules high.

Figure 2-7
480-line configuration in a single MBP cabinet

FW-15322

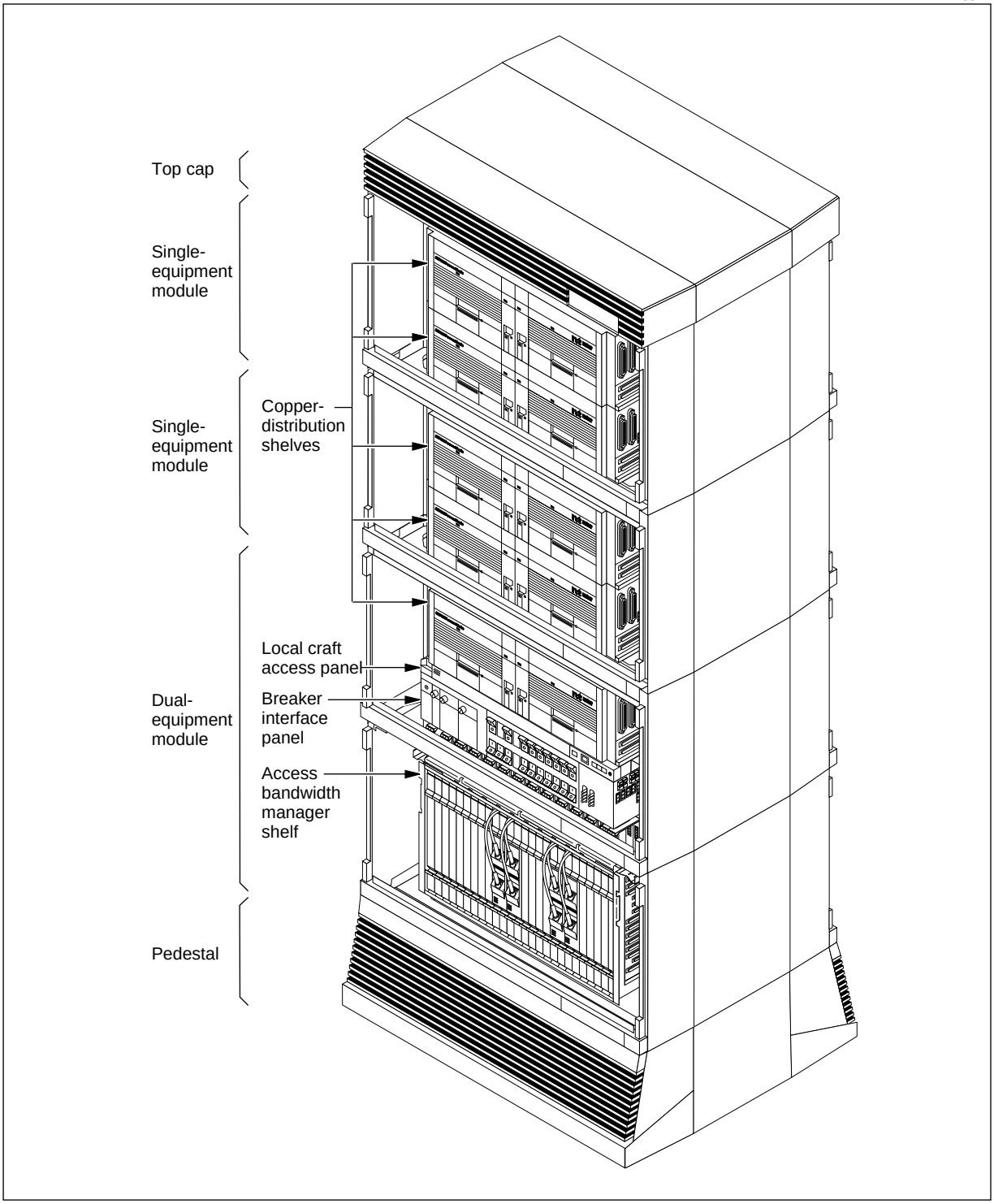


Figure 2-8
Typical 672-line configuration in two MBP cabinets

FW-15324

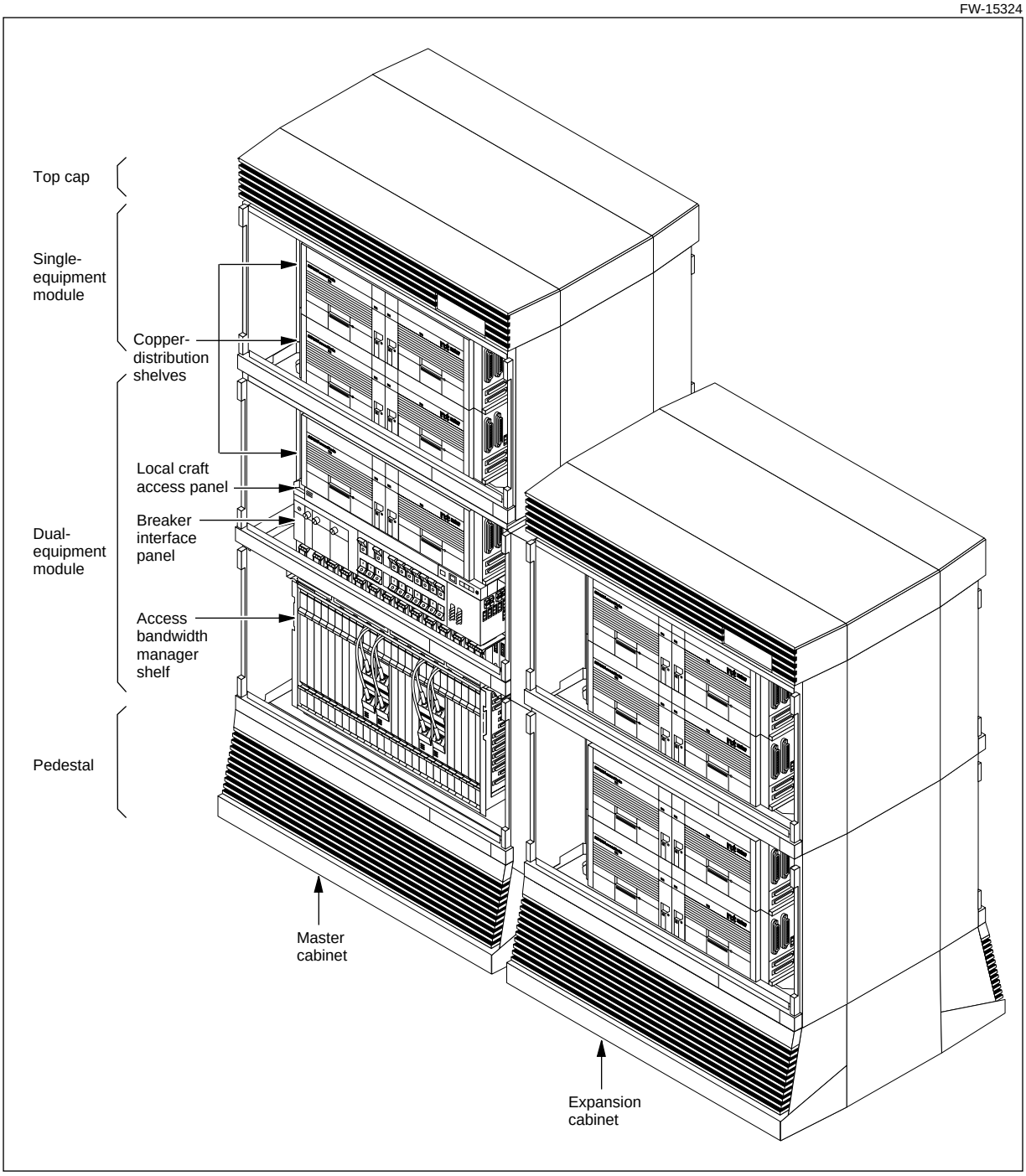
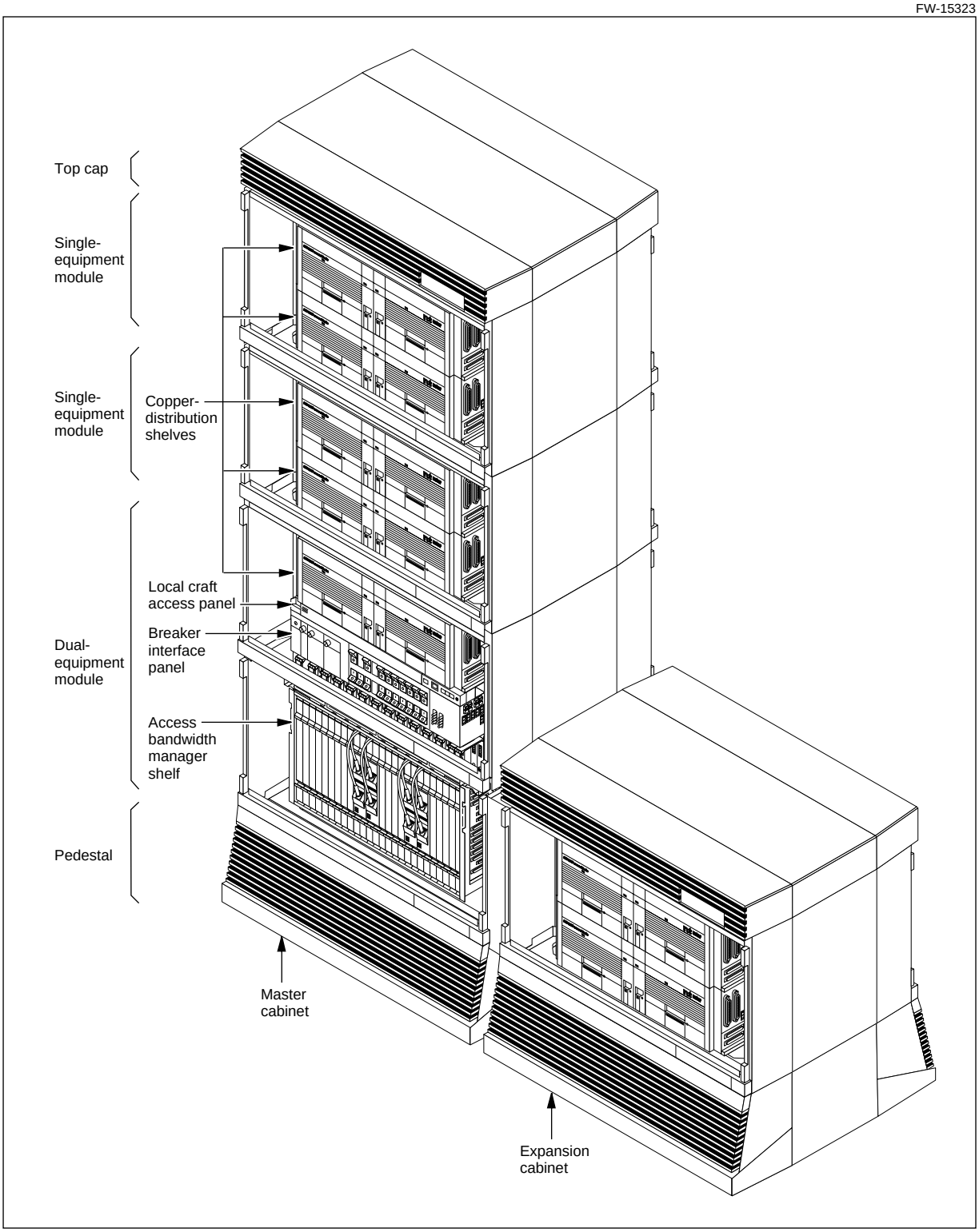


Figure 2-9
Alternate 672-line configuration in two cabinets

FW-15323



OC-3 tributaries

AccessNode software supports OC-3 tributaries in single-ended and point-to-point ABM systems using OC-12 optical feeder links.

In-service systems can be re-configured to support OC-3 tributaries while the system remains in-service. However, those services supported by the circuit packs in the slots that are to be used to accommodate OC-3 tributary circuit packs will be interrupted for the duration of the re-configuration.

Equipping rules

Installing the OC-3 tributaries into RFT enclosures requires compliance to special equipping rules and mounting location restrictions for the OC-3 tributaries. Follow these equipping rules when installing the OC-3 tributaries in the AccessNode RFT enclosures:

- No orderwire is provided on OC-3 tributaries.
- No support for OC-3 tributaries on an OC-3 FCOT or RFT is provided.
- OC-3 tributaries can be configured in protected or unprotected mode.
- The OC-12 network element (NE) containing the OC-3 tributary may not take its timing from the tributary.
- For an ABM shelf, the OC-3 tributaries may be installed in slots 1, 3, 5, and 7 where slots 3 and 7 are the protection slots (see the note below).
- A single-ended AccessNode off an RFT must be in the same span-of-control as the RFT.
- A DS1 feeder AccessNode can not support OC-3 tributaries.

Note: For typical OC-3 card mounting positions and typical ABM shelf layouts and configurations for FCOT and RFT enclosures, refer to *Mapper Layouts Planning Guide*, 323-3001-154, in the *Engineering, Configuration, and Ordering Guide*, Volume 1.

DSX-1 shelf and a T1 repeater shelf

A DSX-1 cross connect shelf and a T1 repeater shelf can be installed in a SEM and included in the system. The DSX-1 cross connect shelf is used for connecting external DS1 cables to the system, and the T1 repeaters are used to compensate for signal losses on the external DS1 cables. Up to 14 repeaters can be provisioned in the repeater shelf to support a maximum of 14 DS1s.

When the system is shipped from the factory with a DSX-1 cross-connect shelf, the SEM that contains them is installed at the top of the master MBP cabinet or at the top of the expansion MBP cabinet.

The T1 repeater shelf and the LEDs on the DSX-1 shelf can be powered in one of three ways:

- from the dc distribution harnesses that are connected to the breaker interface panel (BIP) in the master MBP cabinet
- from an MPP cabinet
- from an external power source that is supplied by the customer

In systems containing from one to six copper-distribution shelves, the repeaters and LEDs are powered from the dc distribution harnesses connected to the BIP. But, in systems containing seven copper-distribution shelves, the power for the repeaters and LEDs must be provided by an external source.

This external power source can be obtained by connecting a power cable to terminal blocks in an MPP cabinet. These terminal blocks contain feeds to an auxiliary power connector on the rear of the dc distribution shelf that can be used for powering the DSX-1 shelf and the T1 repeater shelf. In systems that are not equipped with an MPP cabinet, the external power source must be provided by the customer.

Figure 2-10 on page 2-18 shows a typical two cabinet configuration that contains a DSX-1 cross-connect shelf and a T1 repeater shelf.

Connections for 48 V dc power

Four 48 V dc power feeds are required to supply power to the MBP cabinets. These four power feeds attach to a terminal block installed at the rear of the master MBP cabinet. The power feeds between this terminal block and the internal equipment are prewired at the factory.

Fiber patch panel

The MBP cabinets can be purchased with an optional FiberManager Compact/8 fiber patch panel. This panel stores up to eight fiber splices and extra fiber for the fiber leads that connect to the ABM shelf. When equipped, this panel mounts inside the rear of the DEM in the master MBP cabinet, as shown in Figure 2-11 on page 2-19.

Figure 2-10
Typical two cabinet configuration that contains a DSX-1 shelf and a T1 repeater shelf

FW-15325

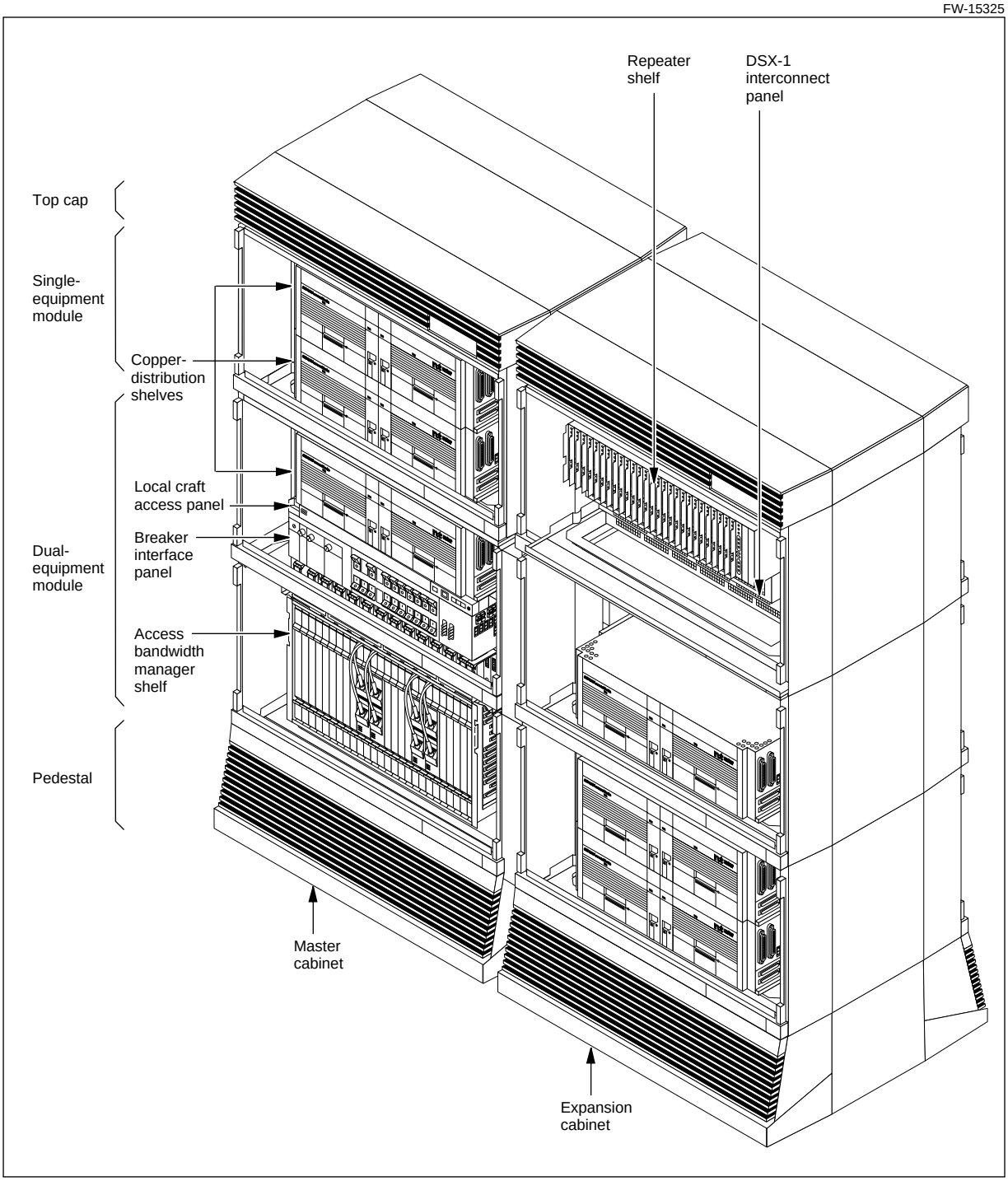
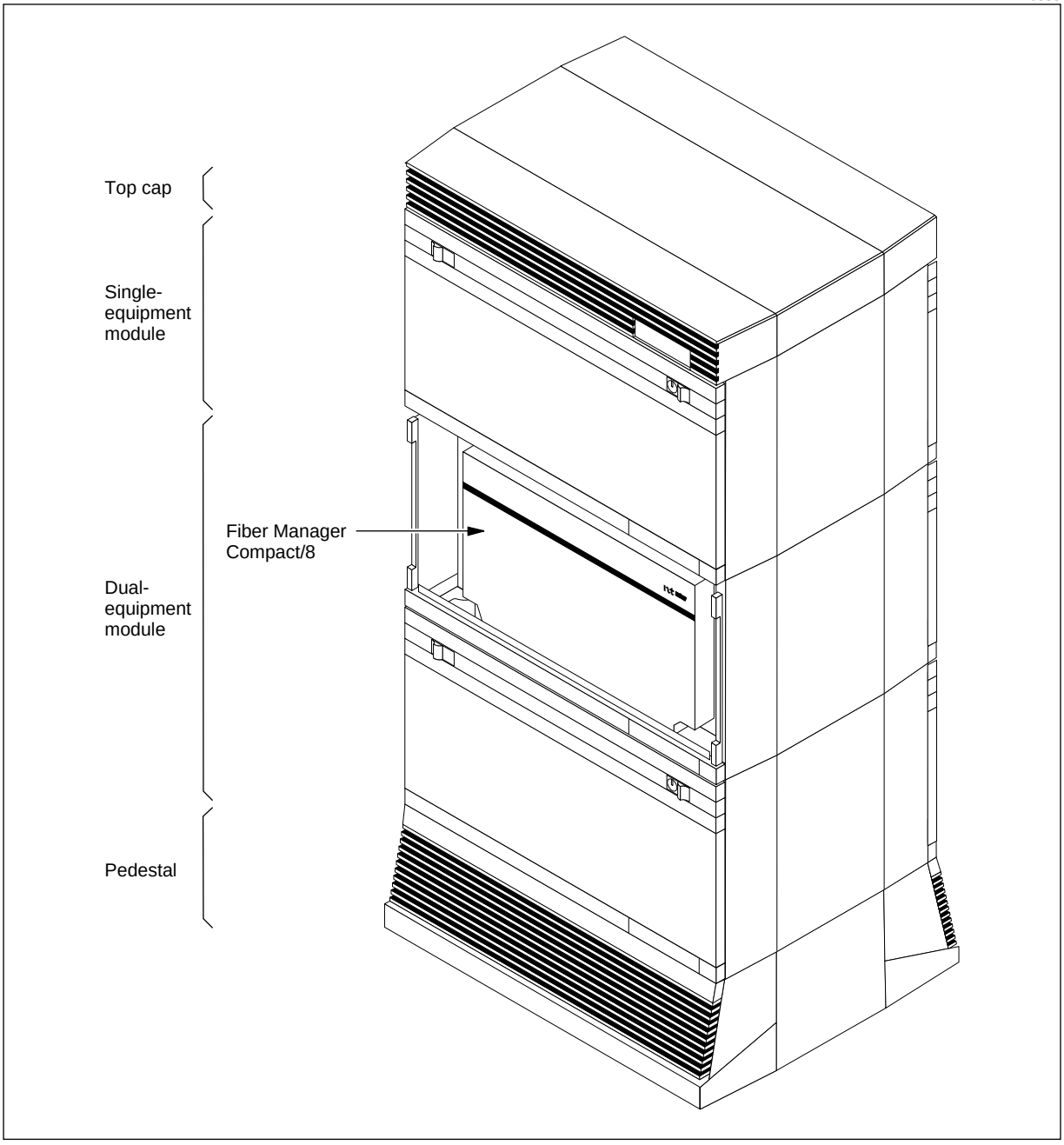


Figure 2-11
Rear view of master MBP cabinet showing the location of the FiberManager Compact/8 fiber patch panel

FW-10833



MPP cabinet configurations

The Modular Power Package (MPP) cabinet shown in Figure 2-12 on page 2-21 contains the following items:

- a top cap kit and a grille kit
- a dual equipment module that contains a dc distribution shelf, and up to two rectifier shelves that can contain a total of up to four MPR25A rectifiers

  Note: The upper rectifier shelf (rectifier shelf 1), equipped with three rectifiers, is standard equipment in the MPP. The lower rectifier shelf (rectifier shelf 2), equipped with one rectifier only, is optional and must be ordered separately. Rectifier positions 2 and 3 (the middle and the left-most positions respectively) in the lower rectifier shelf (rectifier shelf 2) cannot be equipped with rectifiers. Blank cover plates must be installed to cover these positions.

- a pedestal that contains a power distribution unit, a blower assembly and a filter to provide clean cooling air for the two rectifier shelves.

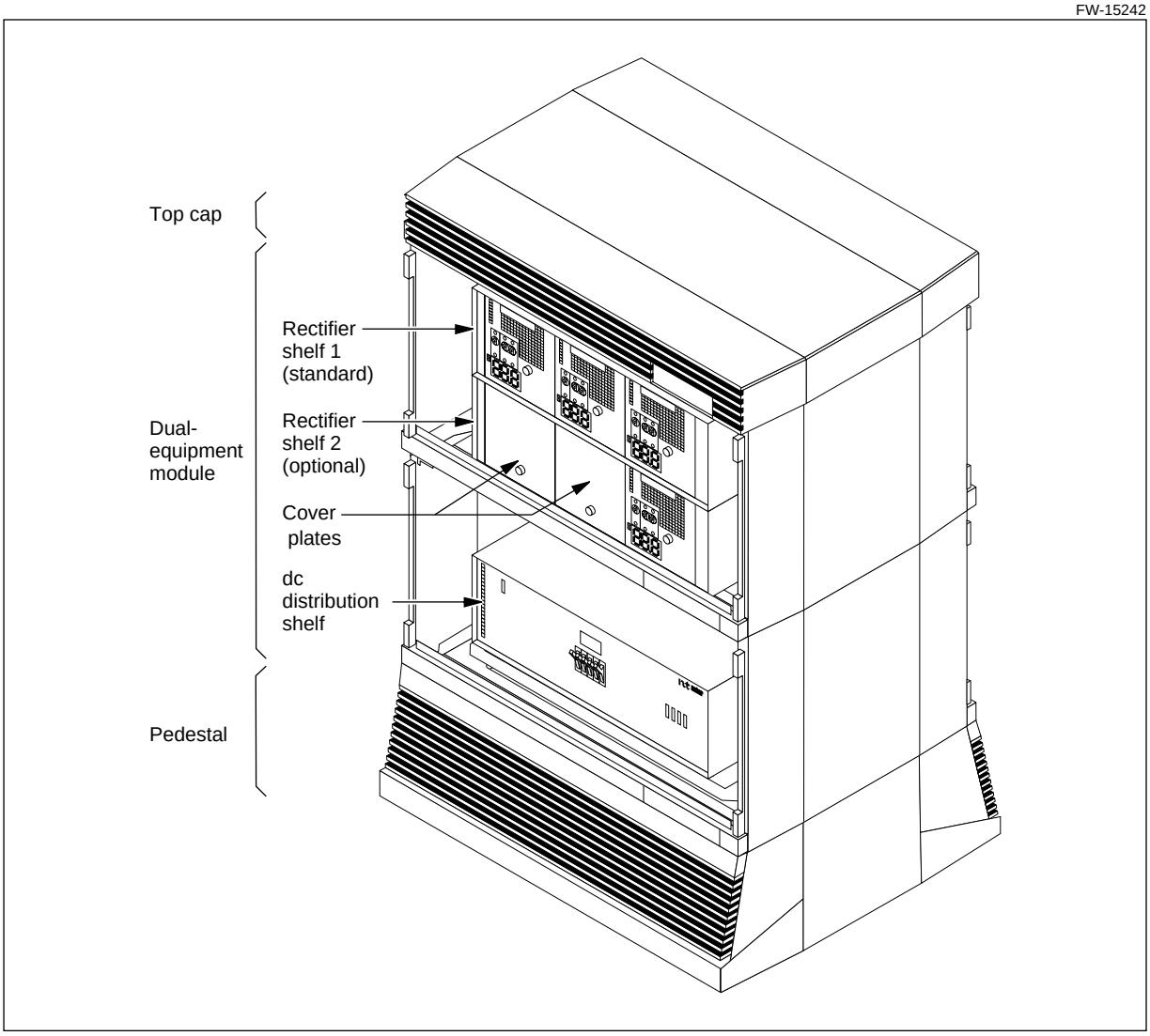
The dc distribution shelf is equipped with 12 Anderson Power pole connectors as follows:

- six pairs of connectors rated at 120 A for connecting strings of backup storage batteries.
- six pairs of connectors for supplying -48 V dc power. Four of these pairs of connectors are used for supplying power to the master MBP cabinet. One pair can be used for powering the blower unit in the MPP cabinet, and one pair for supplying -48 V dc power to external customer equipment.

These 12 pairs of connectors are prewired to a pair of terminal blocks located at the rear of the MPP cabinet. All external connections for dc power are wired to these terminal blocks at the installation site.

Figure 2-12
MPP cabinet configuration

FW-15242



Powering

AccessNode equipment in MBP cabinets requires four supply and return feeds each of which is rated at a nominal -48 V dc 30 A. These feeds can be provided from an optional Modular Power Package (MPP) cabinet, or from an external power source owned by the customer. Requirements for these feeds are detailed in *Site Installation Planning and Engineering, Addendum 1 (MBP)*, 323-3001-200.

The optional MPP cabinet requires two 35 A, 208/240 V ac feeds from a commercial power source.

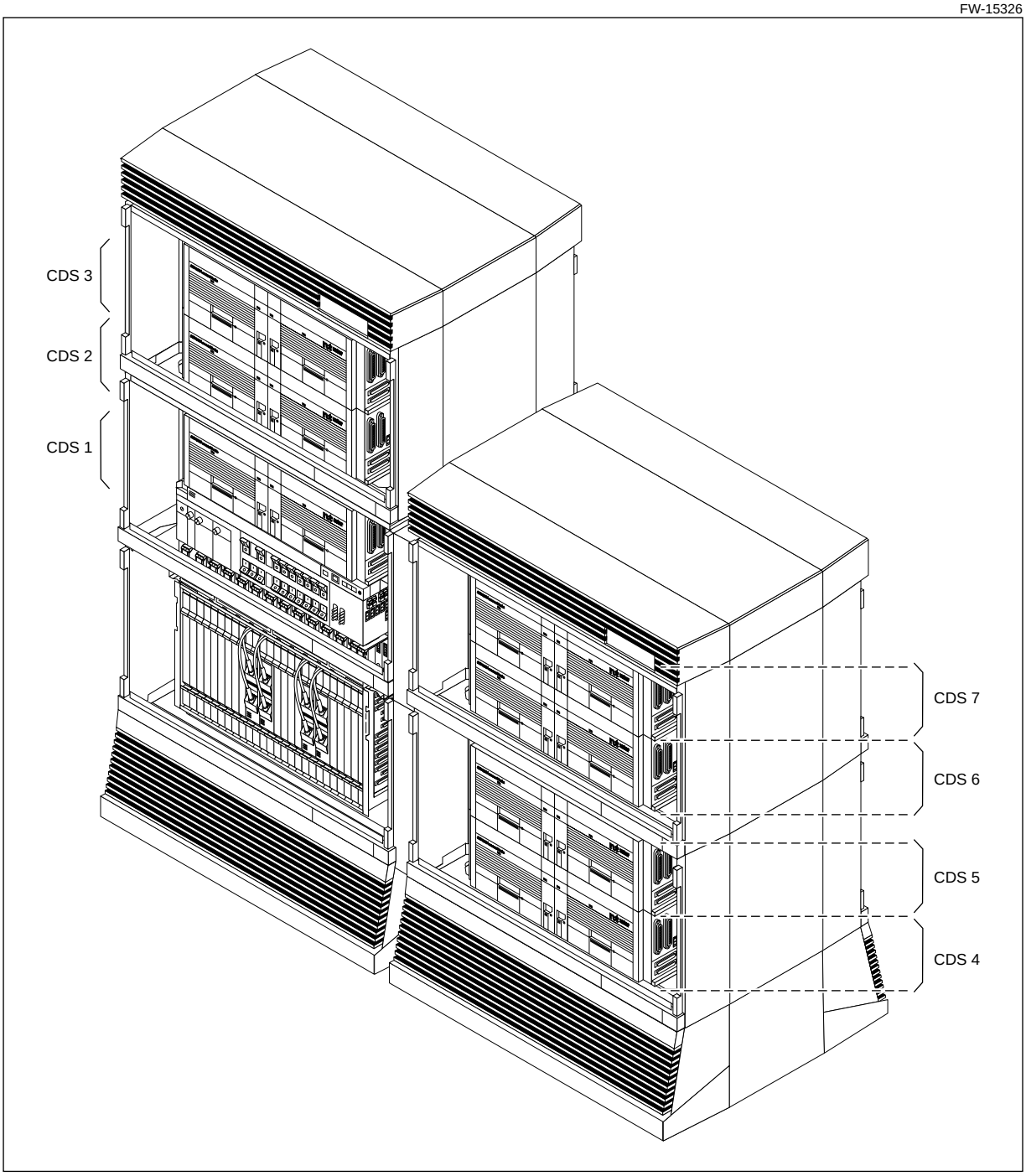
Battery backup is the responsibility of the customer. For information about the requirements for battery backup supplies, see *Site Installation Planning and Engineering, Addendum 1 (MBP)*, 323-3001-200. This document contains instructions for connecting a customer battery backup supply to the MPP cabinet.

Numbering of copper-distribution shelves

In MBP cabinets, copper-distribution shelf (CDS) 1 is the lowermost CDS in the master cabinet (above the ABM shelf), as shown in Figure 2-13 on page 2-23. Shelf number 2 is the CDS immediately above shelf 1, and so on up to the top of the master cabinet. Shelf numbering continues at the lowermost CDS in the expansion cabinet, and on up to shelf 7 which is the uppermost CDS in the expansion cabinet.

Figure 2-13
Numbering of copper-distribution shelves for a typical system in MBP cabinets

FW-15326



Alarm wiring

Alarm wiring connects external equipment to the pin field on the front left of the breaker interface panel (BIP) faceplate. Table 2-1 lists the alarm scan point terminations for external equipment alarms.

> ***Note:*** For directions to provision the alarms, see *System Administration Procedures,* 323-3001-302, in *Operations, Administration, and Provisioning,* Volume 4A.

Table 2-1
Alarm wiring for E2A external connections

Scan point	Alarm description	Alarm severity	Source	Source connector and pin number	BIP Pin field pin number
1	AC FA	Minor	DC distribution shelf	J15.14	1
1	AC FA RET		DC distribution shelf	J15.15	2
2	LVA	Major	DC distribution shelf	J15.3	3
3	REMOTE ACO	N/A	A/N		4
4	DOALM	Minor	Power alarm distribution unit (PDU)	J2.4	6
5	FSCALM	Minor	Modular business package (MBP)	J2.5	7
6	MPP FA	Major	Modular power package (MPP)	J15.5	9
7	MPP MN	Minor	MPP	J15.1	10
8	MPP MJ	Major	MPP	J15.2	12
9	RPTR FA	Major	RPTR 1, 2	Pos. 23, Pin 14	13
9	RPTR FA RTN		RPTR 1, 2	Pos. 23, Pin 16	14
10	RPTR LOS	Major	RPTR 1, 2	Pos. 23, Pin 8	15
10	RPTR LOS RTN		RPTR 1, 2	Pos. 23, Pin 10	14
11	RPTR ERR	Minor	RPTR 1, 2	Pos. 23, Pin 2	16
11	RPTR ERR RTN		RPTR 1, 2	Pos. 23, Pin 4	17
LGND	Alarm Reference		All of the above	Per Application	5, 8, 11, 18

Table 2-2 lists and defines the alarms.

Table 2-2
Alarm information

Alarm	Definition
AC FA	The ac failed alarm is connected from the dc shelf 15-pin D-Sub connector in the MPP dc distribution shelf to an E2A input on the side interconnect left (SIL) card and, in parallel, to the BIP pin field pins 1 and 2. The alarm can be activated if the customer installs an ac monitoring device with form-C dry relay contacts to monitor ac power input. The relay contacts must be closed to conduct current when an alarm is set. The contacts must be connected to the same BIP pin fields (1 and 2) as D-Sub connector.
DOALM	The door alarm is connected to the BIP wire wrap pin # 6 from the door switches of the equipment. The MPP door alarm passes through the MBP power distribution unit (PDU).
FSCALM	One of the fan speed controllers (FSC) has failed. A lit Top Cap LED indicates the column with the failed FSC. Cable NT4K82FA connects the FSC alarm to the SIL card.
MPP FA	A fuse or circuit breaker (or both) on the MPP dc distribution shelf tripped because of a fault load condition.
MPP MN	The MPP has a minor alarm set. Use the modem terminal in the MPP dc distribution shelf equipped with a RPM1000C card to identify the alarm. If the shelf is not equipped with a RPM1000C card, the alarm indicates the failure of a rectifier.
MPP MJ	The MPP has a major alarm set. Use the modem terminal in the MPP dc distribution shelf equipped with a RPM1000C card to identify the alarm. If the shelf is not equipped with a RPM1000C card, the alarm indicates the failure of two or more rectifiers.
RPTR FA	One or more repeaters have a power fuse open.
RPTR LOS	One or more repeaters are experiencing a loss of signal from span.
RPTR ERR	One or more repeaters are receiving excessive bipolar violations.

Note: Repeater shelf 1 and shelf 2 alarms are paralleled on the BIP pin field. Either one of the repeater shelves could be the source of the alarm. Check the alarm LEDs. The alarm LEDs on the failed repeater are lit.

Cabling diagrams

This section contains illustrations that show the connection of cables in the MBP and MPP cabinets. The illustrations are listed in the following table.

Table 2-3
Cables by function

Cables	See
Master MBP cabinet cabling	
power cabling to terminal block	Figure 2-14 on page 2-27
PDU and alarm	Figure 2-16 on page 2-29
CDS and LCAP	Figure 2-18 on page 2-31
DSX-1 shelf and T1 repeater shelf	Figure 2-20 on page 2-33
ABM shelf, I/O area and left side	Figure 2-21 on page 2-34
Expansion MBP cabinet cabling	
PDU and alarm	Figure 2-17 on page 2-30
CDS	Figure 2-19 on page 2-32
DSX-1 and T1 repeater shelf	Figure 2-20 on page 2-33
MPP cabinet	
terminal blocks	Figure 2-15 on page 2-28
PDU, alarm, and intershelf cables	Figure 2-22 on page 2-35

Figure 2-14
Cabling to the terminal block in the master cabinet

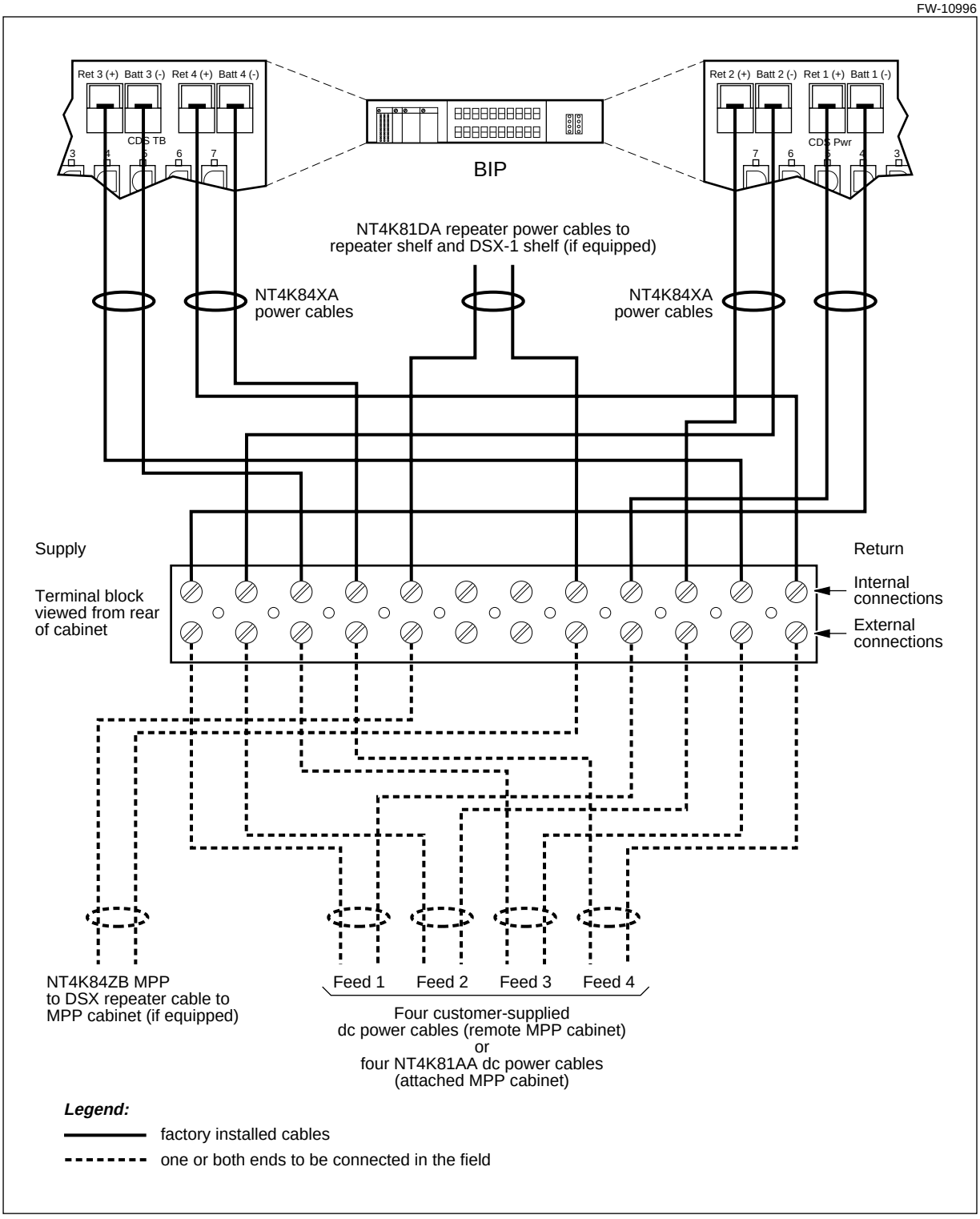


Figure 2-15
Cabling to the terminal blocks in the MPP cabinet

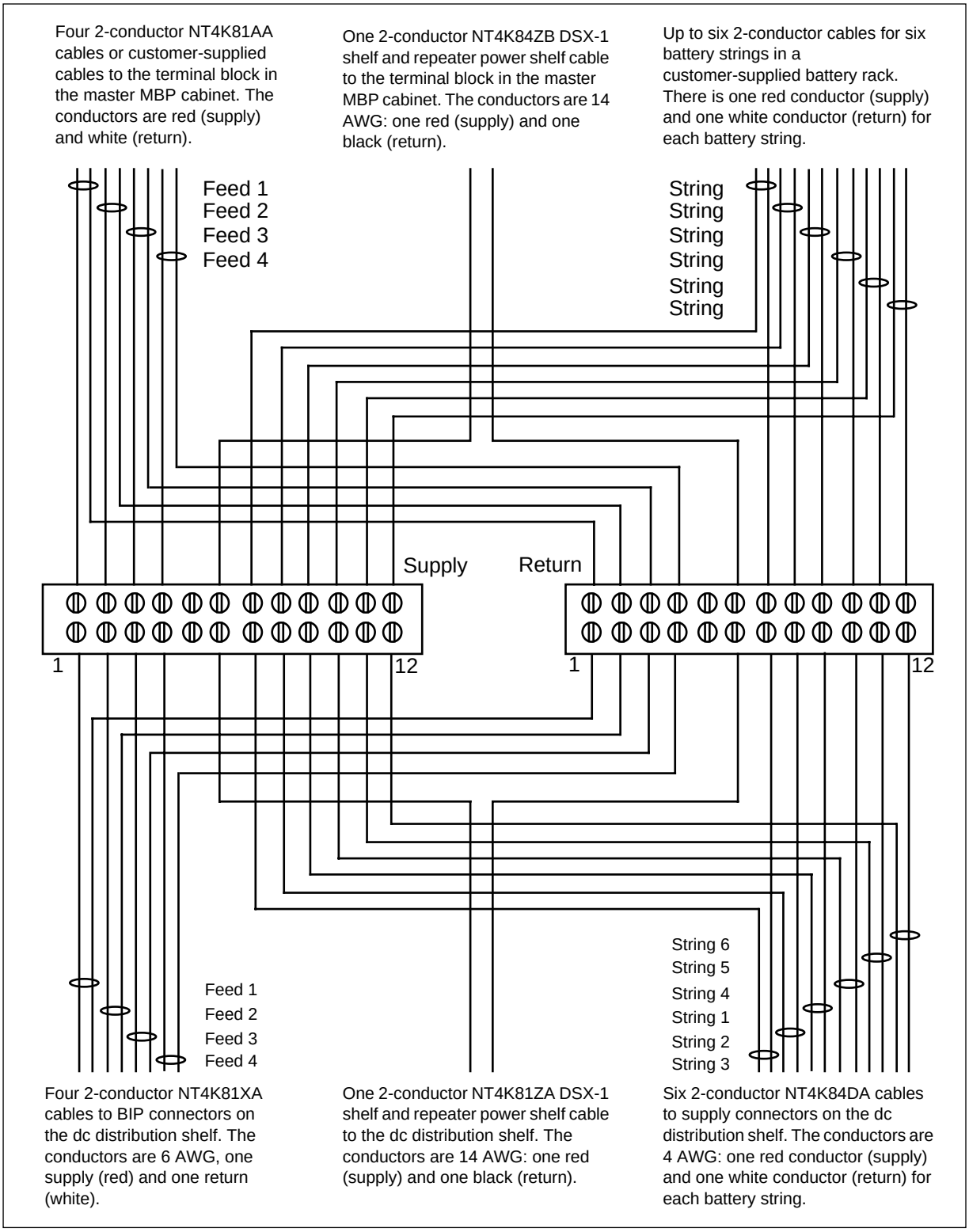
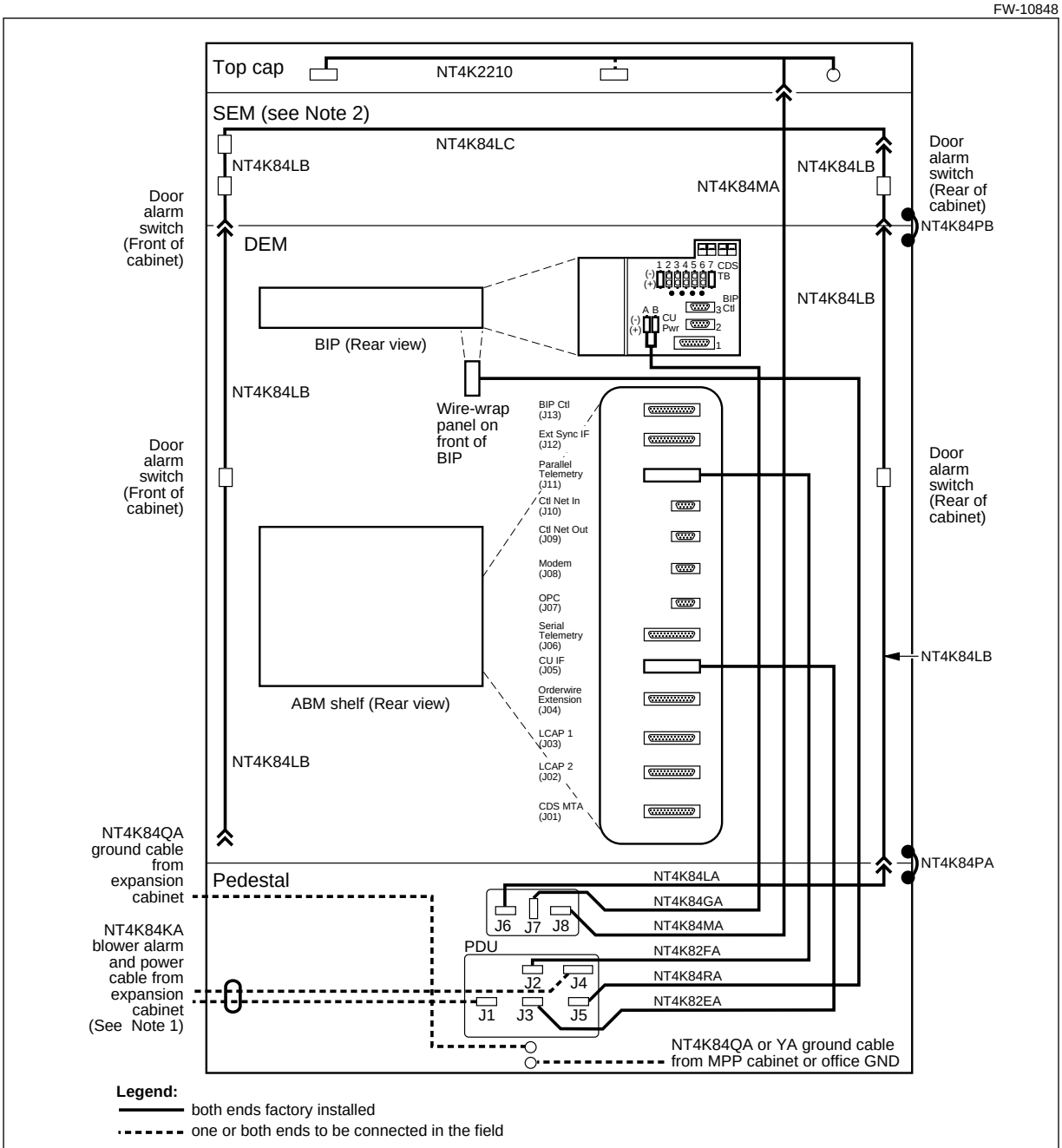


Figure 2-16
PDU and alarm cabling in the master cabinet

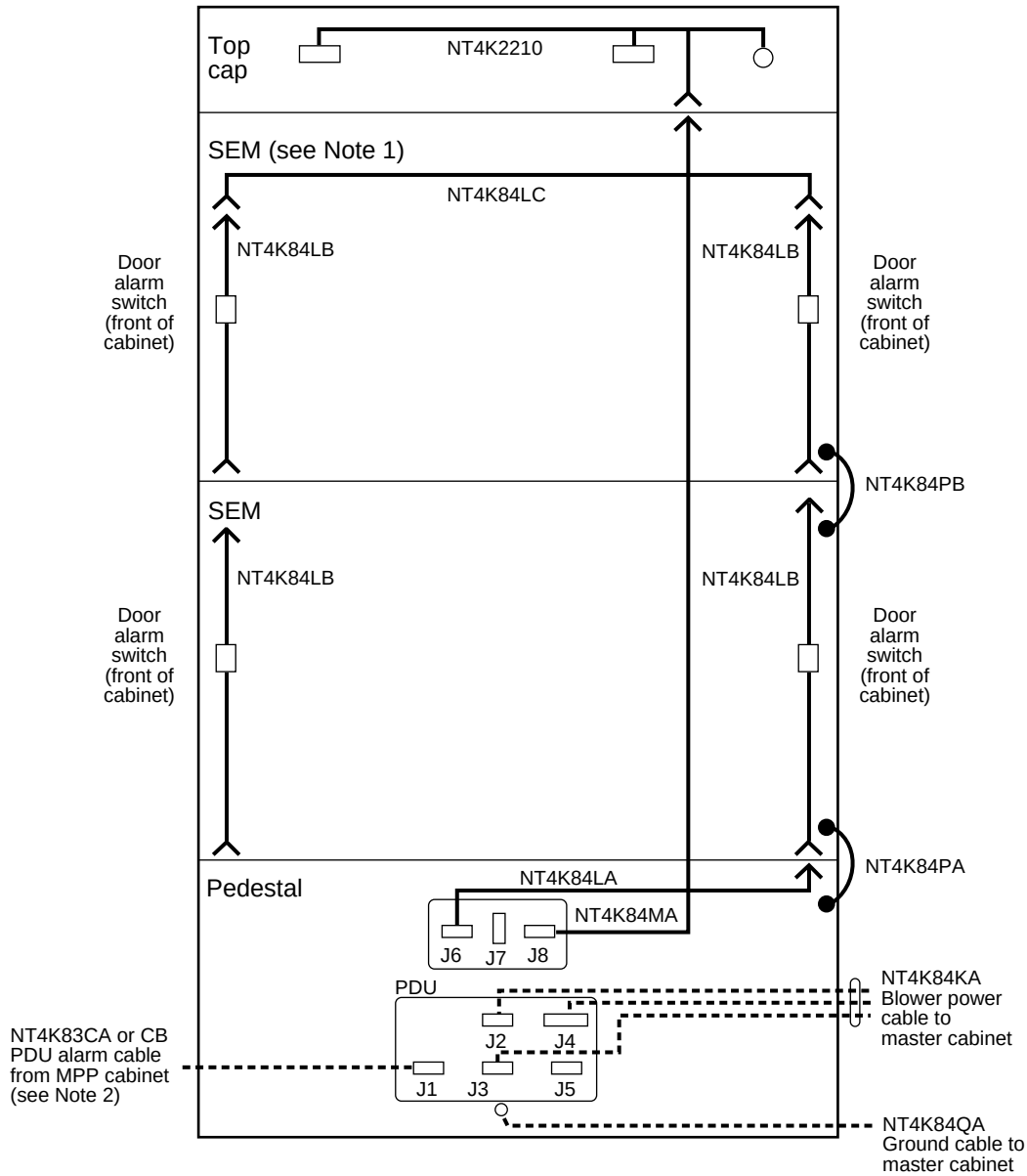


Note 1: The connector J1 in the last PDU of the equipment chain must be terminated by the NT4K86QA jumper. The equipment chain consists of the master cabinet followed by the expansion cabinet followed by the MPP. If, for example, the expansion cabinet is not used, then the PDU of the MPP is the last PDU in the chain and its J1 connector must be terminated with the NT4K86QA jumper.

Note 2: This illustration only shows one SEM. A master cabinet can contain up to two SEMs. Alarm cabling for the second SEM is similar to that shown here.

Figure 2-17
PDU and alarm cabling in the expansion cabinet

FW-10840



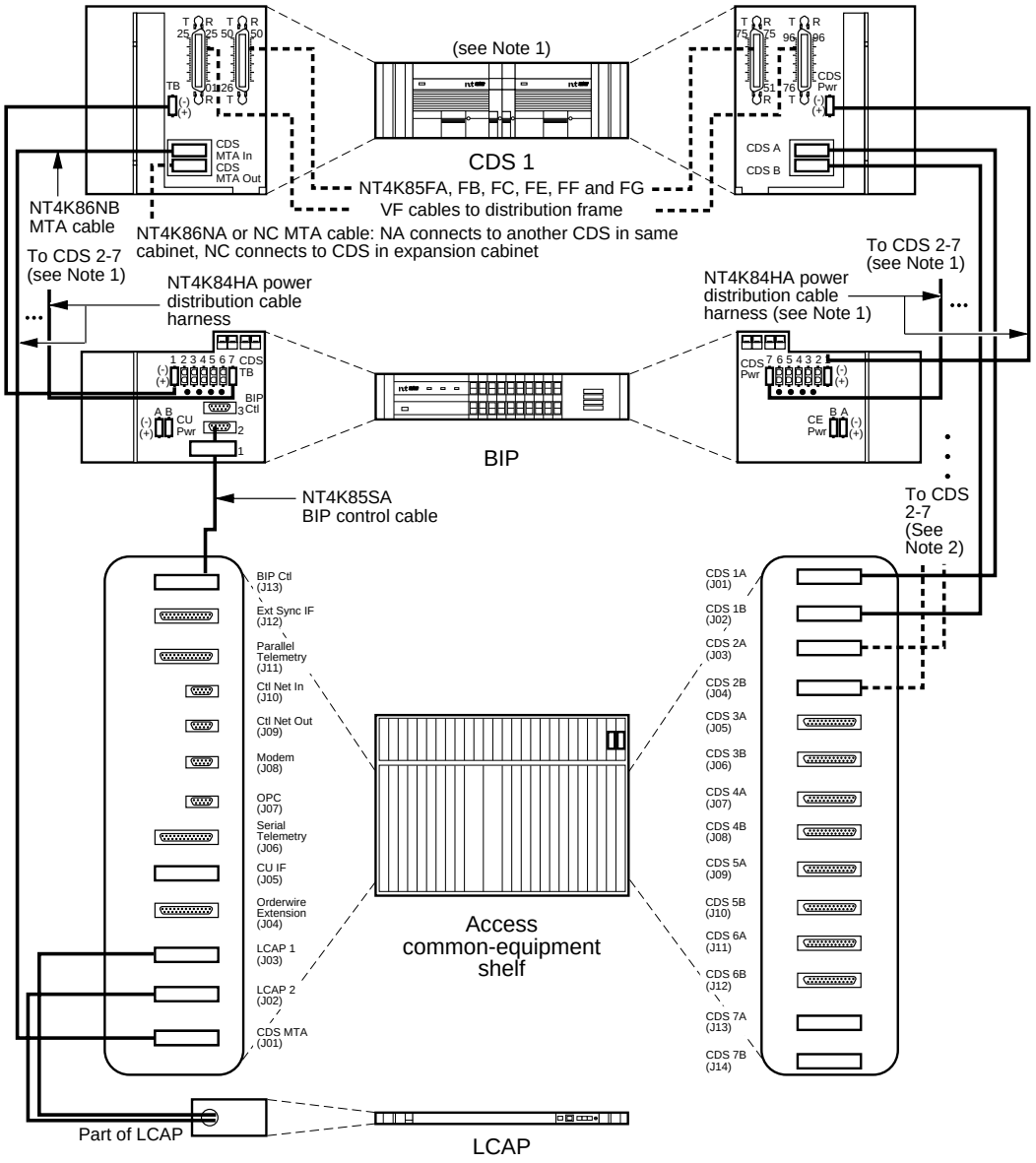
Legend:
both ends factory installed
one or both ends to be connected in the field

Note 1: This illustration only shows two SEMs. An expansion cabinet can contain up to four SEMs. Alarm cabling for the other SEMs is similar to that shown here.

Note 2: If an MPP cabinet is not used, install an NT4K86QA input jumper to connector J1.

Figure 2-18
CDS and LCAP cabling in the master cabinet

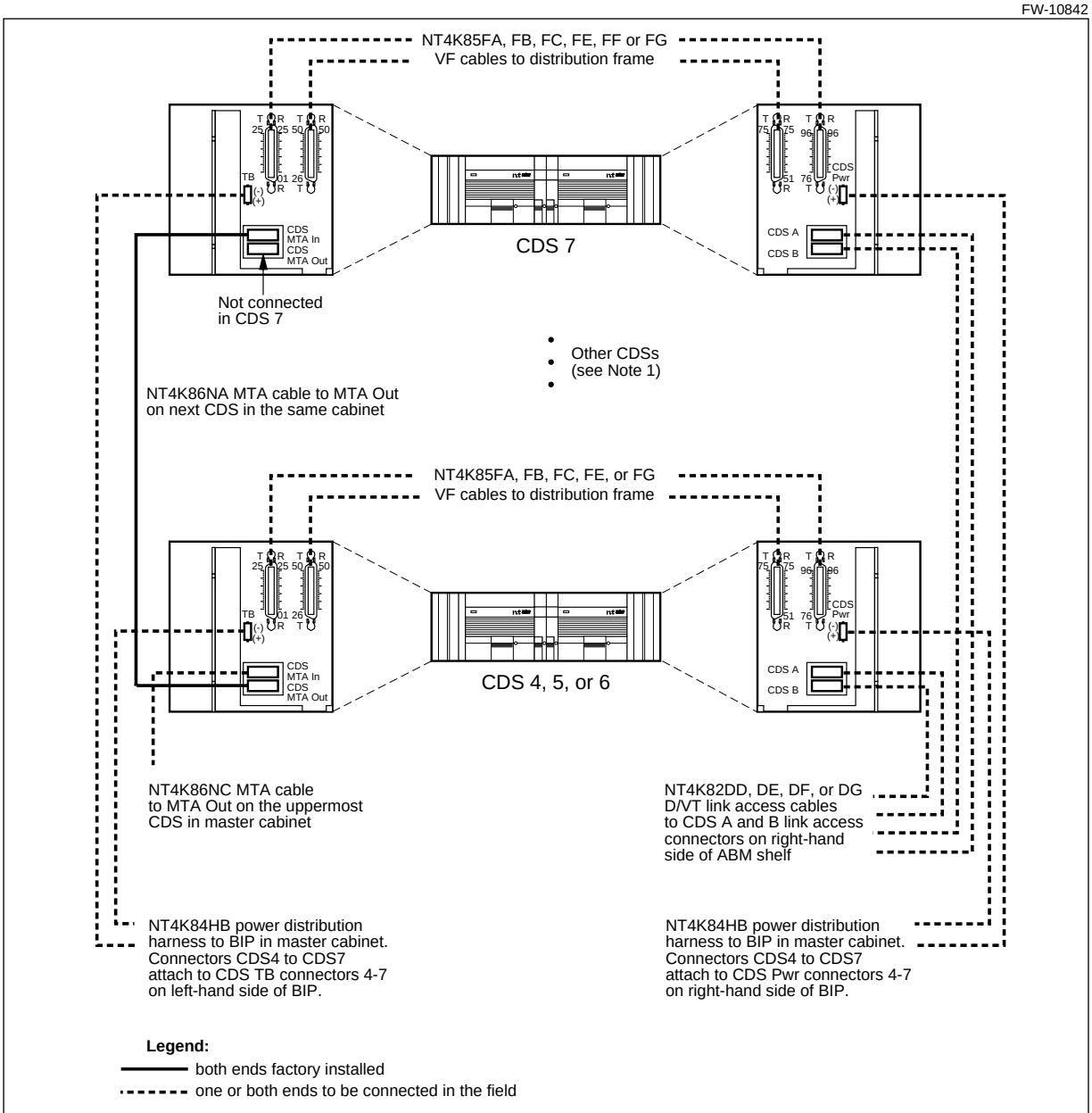
FW-10841



Note 1: Up to five CDSs can be installed in a master cabinet. If fewer than five are installed, unused connectors and cable are coiled up inside the cabinet.

Note 2:The D/VT link access cables for CDSs in an expansion cabinet (if used) are preconnected to the ABM shelf at the factory. At the installation site, they are uncoiled and connected to the CDSs in the expansion cabinet. When a FEM is shipped from the factory, cables are preconnected to the CDSs in the FEM at the factory. At the installation site, they are uncoiled and connected to the ABM shelf in the master cabinet.

Figure 2-19
CDS cabling in the expansion cabinet



Note 1: Up to four CDSs can be installed in an expansion cabinet. Only two are shown. Wiring for the other CDSs is similar to that shown here.

Note 2: When a system with an expansion kit is shipped from the factory, the D/VT link access cables for CDSs in an expansion cabinet (if used) are preconnected to the ABM shelf. At the installation site, they are uncoiled and connected to the CDSs in the expansion cabinet. When a FEM is shipped from the factory, cables are preconnected to the CDSs in the FEM at the factory. At the installation site, they are uncoiled and connected to the ABM shelf in the master cabinet.

Figure 2-20
DSX-1 and repeater cabling in the master cabinet and in the expansion cabinet

FW-10843

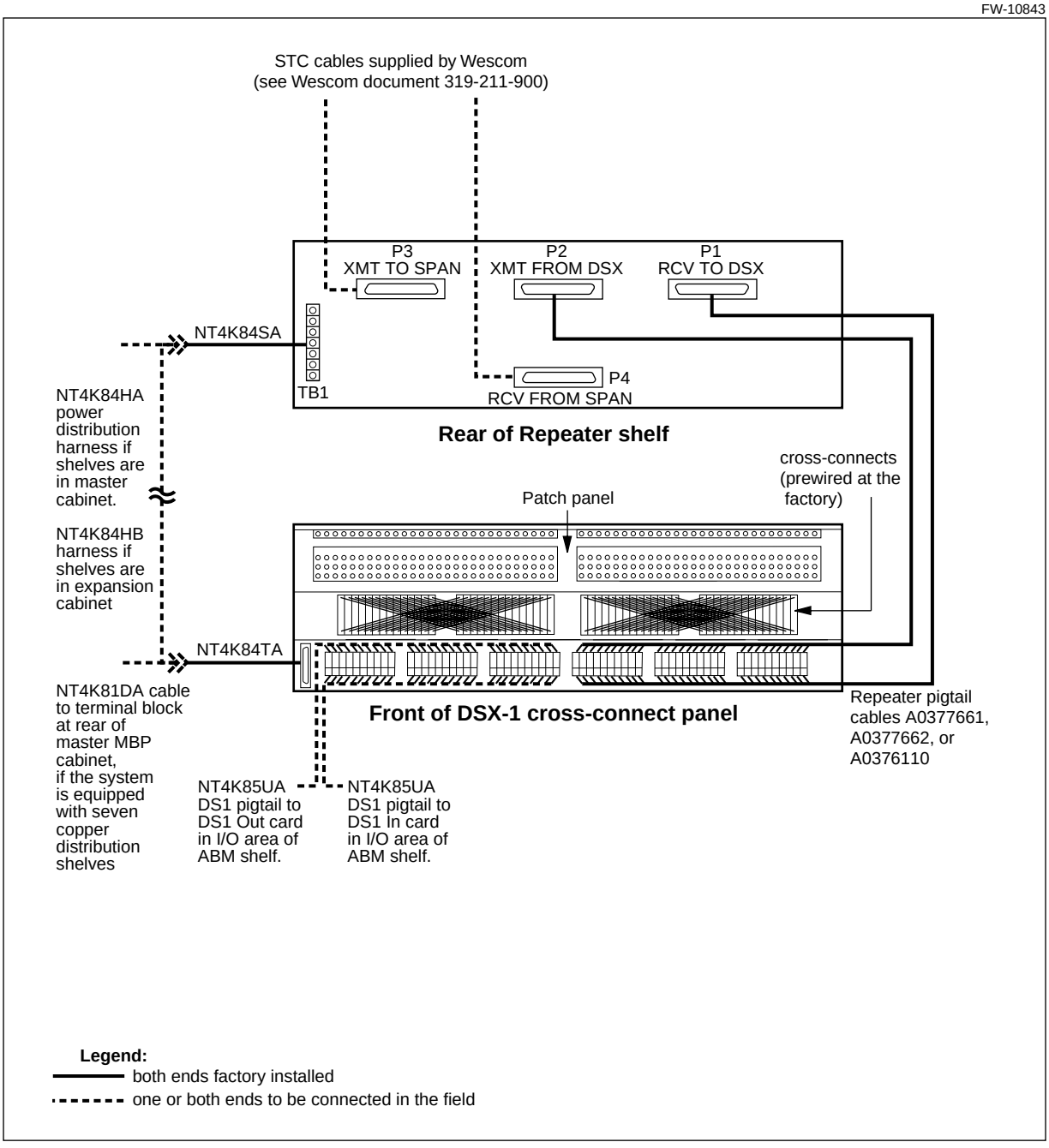


Figure 2-21
Cabling to the I/O area and the left side of the ABM shelf

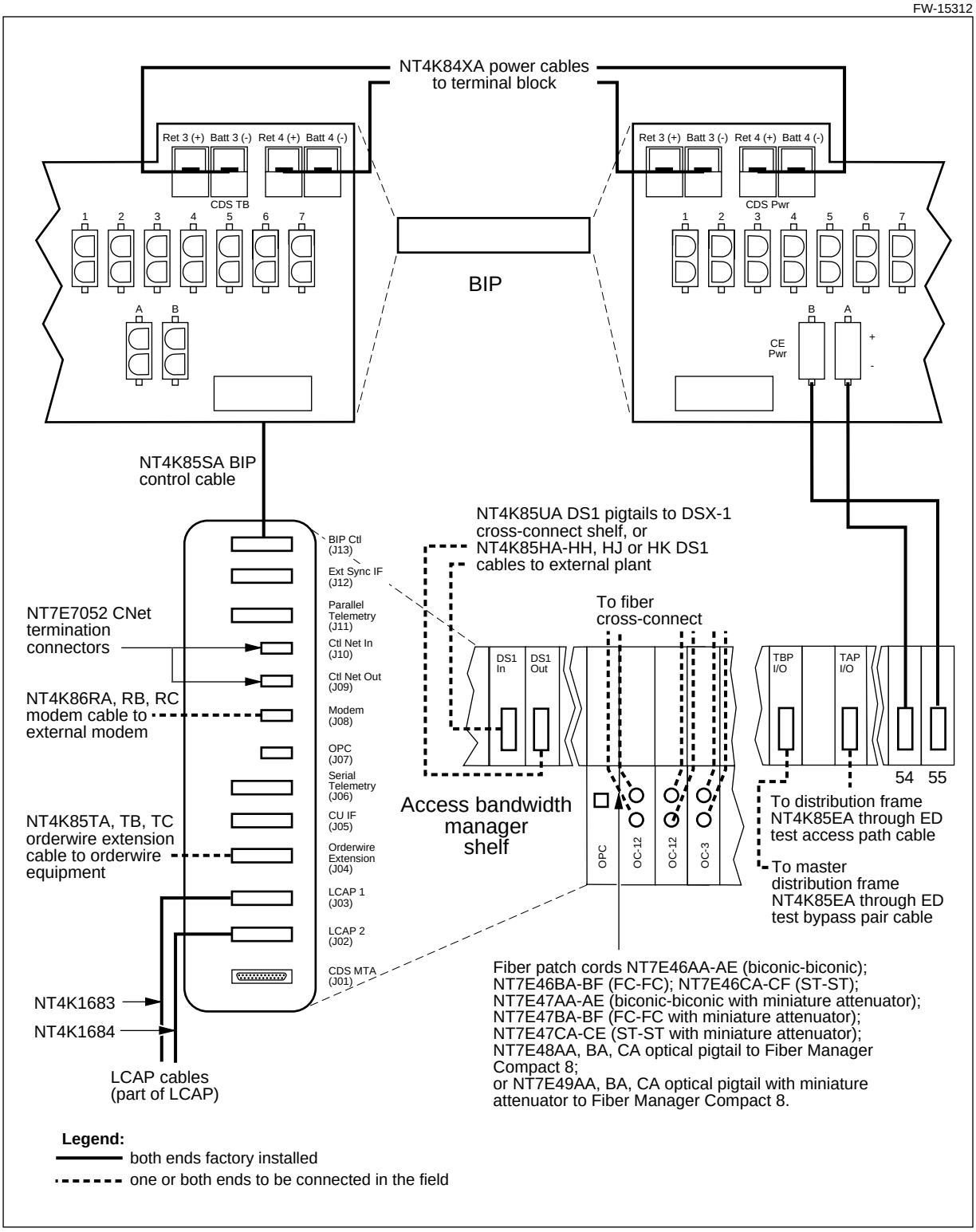
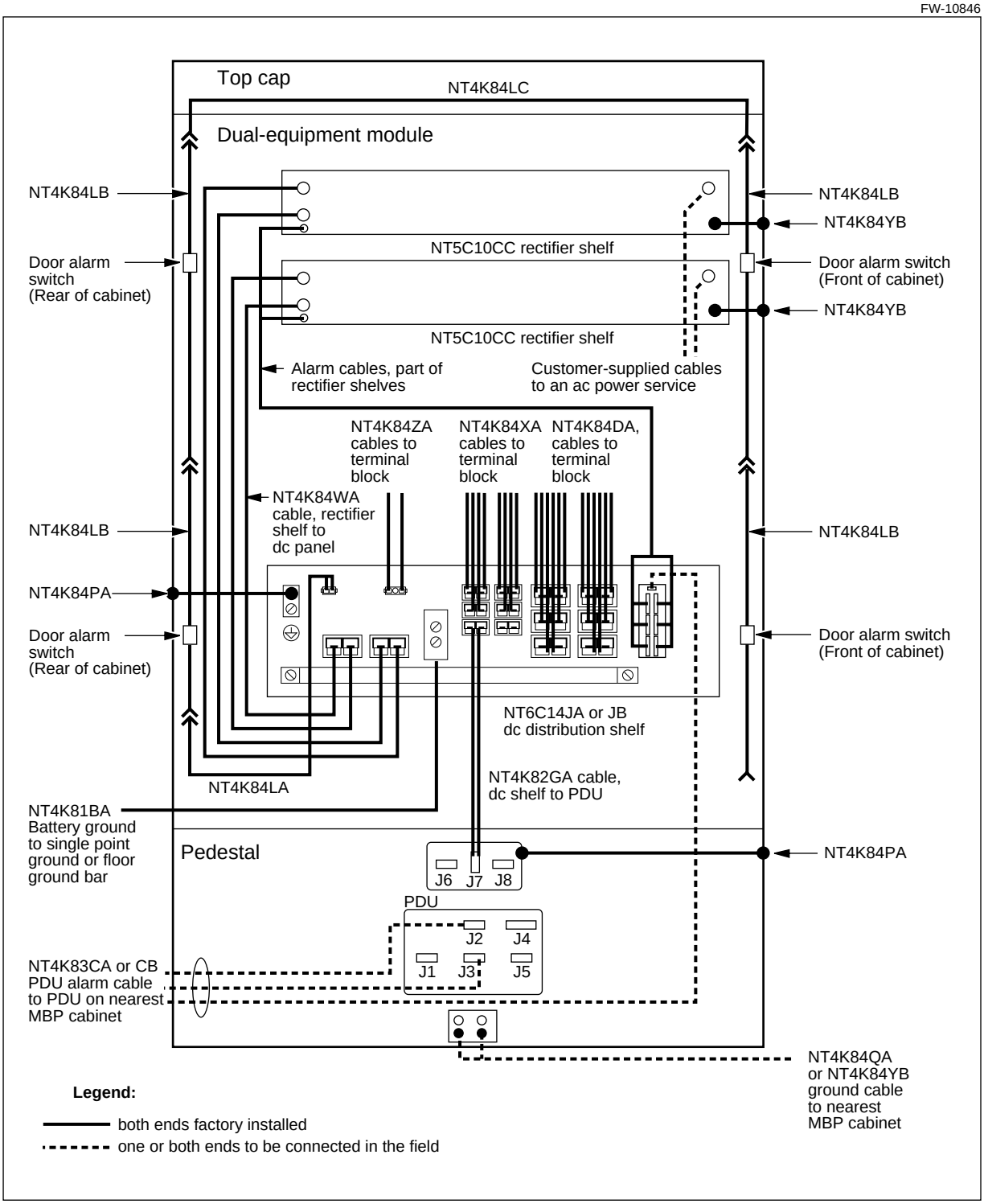


Figure 2-22
PDU, alarm, and intershelf cabling in the MPP cabinet



Mark and drill the floor

This chapter contains the procedures to mark and drill floors for the Modular Business Package (MBP) and Modular Power Package (MPP) cabinets.

Chapter contents

This chapter contains the following information:

Procedure 3-1
Preparing a concrete floor for mounting cabinets

Use this procedure to mark and drill concrete floor anchor holes for Modular Business Package (MBP) cabinets and Modular Power Package (MPP) cabinets. This procedure only applies to installations on concrete floors.

For installations on concrete floors, this procedure contains the additional steps required (if needed) to drill and sink the anchor holes in the floor.

Use the appropriate anchor kit for your application.

Requirements

The following tools and materials are required:

- vacuum cleaner
- carpenter’s fixed square
- measuring tape, 15 m (50 ft)
- straight edge, 2 m (6 ft)
- felt pen
- hammer
- center punch (large for concrete floor)
- carbide-tipped masonry drill bit as fits the anchors you are installing
- Roto-hammer drill (Hilti TE-52 or equivalent)
- rubber bulb
- wooden block for driving anchors into floor
- anchor setting tool to fit anchor used.
- anchor bolts (four per cabinet) from anchor kit: NT4K0602 or NT4K0605
- plastic drilling template, NT4K0606

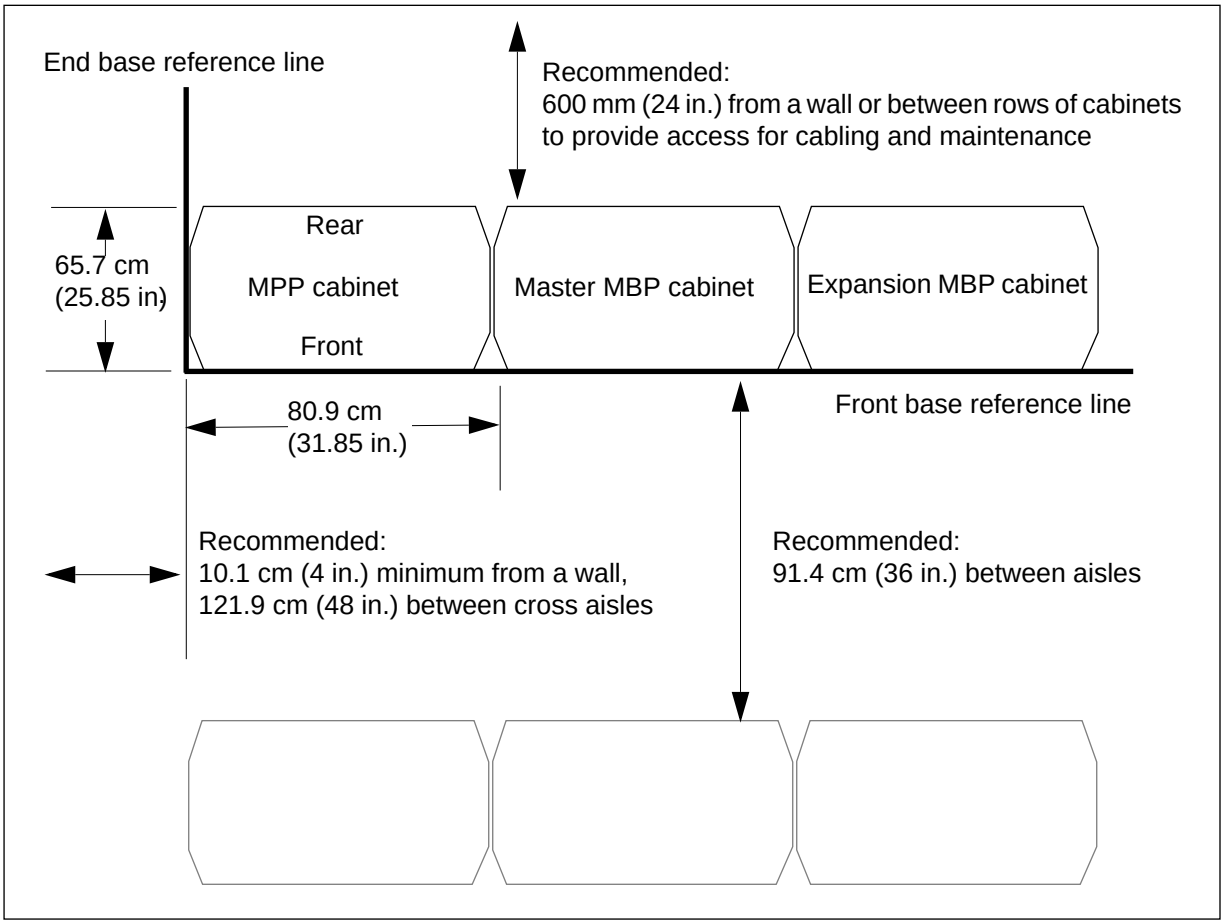
—continued—

Procedure 3-1 (continued)
Preparing a concrete floor for mounting cabinets

Action

Step	Action
1	Refer to the customer's floor plan for the intended location of the cabinets.
2	Lay out the front base reference line and the end base reference line using the tape measure, the carpenter's square, the straight edge, and the marker pen, as shown in Figure 3-1. ***Note:*** If the line-up is adjacent to a wall, always begin the layout with the cabinet nearest the wall and work away from the wall. If the line-up is on the end of an existing equipment line-up, always begin the layout with the cabinet that adjoins the line-up.

Figure 3-1
Marking the base reference lines for the cabinets



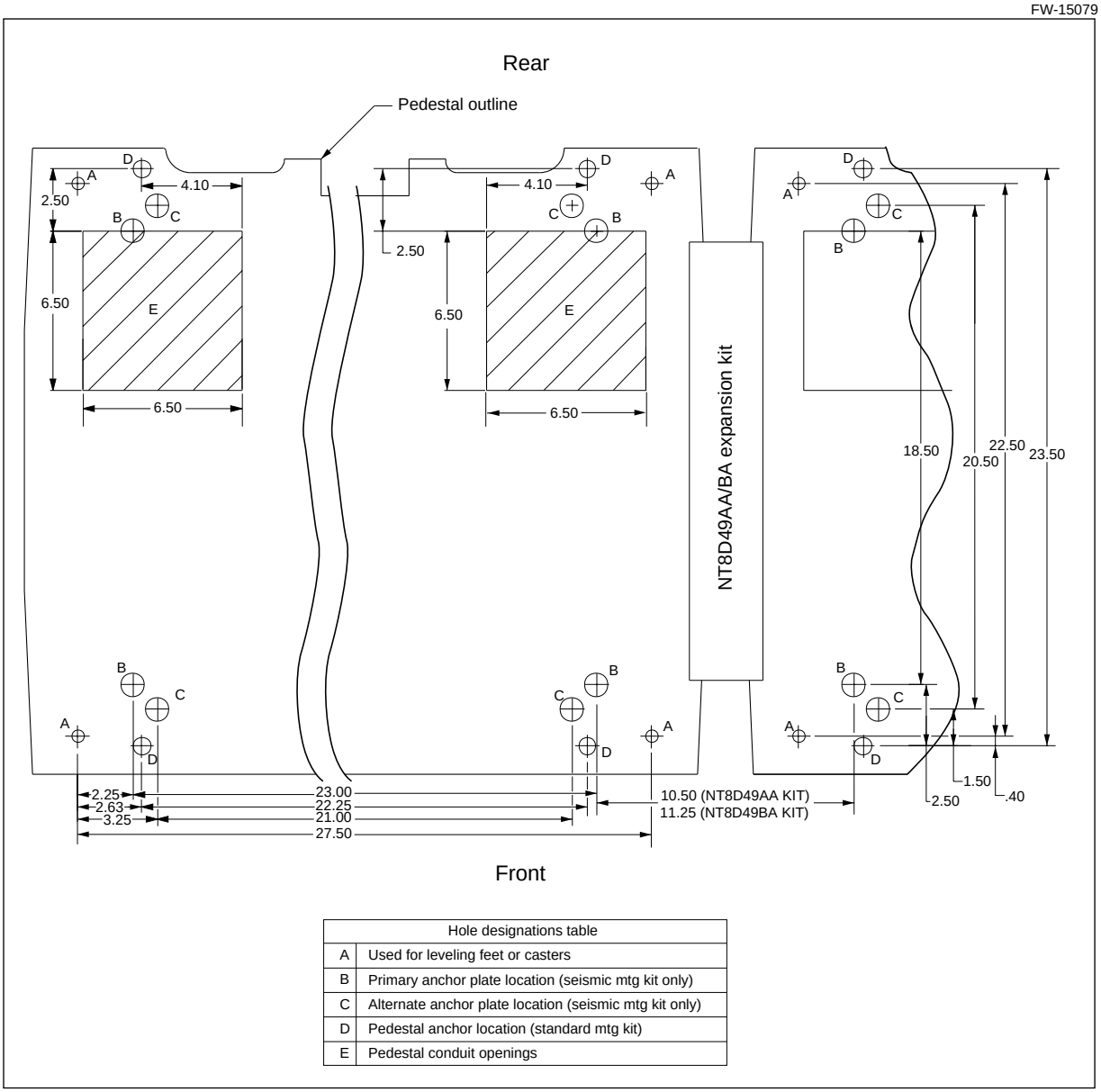
—continued—

Procedure 3-1 (continued)
Preparing a concrete floor for mounting cabinets

Step	Action
3	Select sheet 1 of the NT4K0606 plastic template as shown in Figure 3-2. This sheet applies to cabinets equipped with the NT8D49AA standard expansion kit. This kit is intended for use on concrete floors.

Figure 3-2
NT4K0606 MBP/MPP floor layout template

FW-15079



Hole designations table	
A	Used for leveling feet or casters
B	Primary anchor plate location (seismic mtg kit only)
C	Alternate anchor plate location (seismic mtg kit only)
D	Pedestal anchor location (standard mtg kit)
E	Pedestal conduit openings

—continued—

Procedure 3-1 (continued)
Preparing a concrete floor for mounting cabinets

Step	Action

4 Position sheet 1 of the NT4K06016 plastic template on the floor such that the cabinet outline aligns with the base reference lines marked on the floor.

5 Secure the template temporarily with pieces of masking tape.

6 Mark the locations of the anchor holes (labelled “D” on the template) with the marker pen.

7 Go to one of the following steps according to the number of cabinets to be installed:

If	Then go to
A second cabinet is to be installed adjacent to the first	step 8
No other cabinet is to be installed	step 12

8 Position the template for the second cabinet by removing the masking tape and sliding the plastic template along the front baseline to where the second cabinet is to be installed.

Note: The template is positioned correctly when the cabinet outline aligns with the front baseline marked on the floor, and the left-hand set of holes labelled “D” on the template align with the right-hand set of holes marked on the floor.

9 Tape the template to the floor and mark the locations of the anchor holes (D) for the second cabinet.

10 Go to one of the following steps according to the number of cabinets to be installed:

If	Then go to
A third cabinet is to be installed adjacent to the second	step 11
No other cabinet is to be installed	step 12

11 Move the plastic template along the front baseline again and mark the locations of the anchor holes for the third cabinet.

12 Remove the template.

13 Punch the centers of the anchor hole markings on the floor in preparation for drilling by using the hammer and center punch.

—continued—

Procedure 3-1 (continued)
Preparing a concrete floor for mounting cabinets

Step	Action

DANGER
Risk of permanent eye injury
Wear safety glasses while drilling the anchor holes, and when blowing debris out from the holes using the rubber bulb.

CAUTION
Risk of damage to floor or to ceiling below
Ensure that the holes you are drilling are of the correct depth for the thickness of the concrete floor and the anchor you are using. If you drill too deeply, you could penetrate to the floor below and damage overhead wiring or plumbing.

14 Using the Roto-hammer drill and the carbide drill bit, drill the anchoring holes to the depth specified by the anchor bolt kit manufacturer.

15 Blow debris out of the holes with the rubber bulb, then vacuum up the debris.

16 Drive each anchor into its hole using a block of wood and a hammer.

Note: The top of the anchor must be flush with the floor when driven into place.

17 Go to Chapter 4, “Unpacking the cabinets” on page 4-1.

—end—

Procedure 3-2
Preparing a raised floor for mounting cabinets

Use this procedure to mark the floor for Modular Business Package (MBP) cabinets and Modular Power Package (MPP) cabinets that are to be installed on raised floors or concrete floors without anchoring hardware.

For installations on raised floors, this procedure contains the additional steps required to cut openings in the floor tiles to permit the cables to pass through the floor.

Because of numerous variations in the construction of raised floors, Nortel Networks does not supply an anchor kit to secure the cabinets for installations on raised floors. If a customer requires the installation of special hardware to secure the cabinets in non-seismic installations on raised floors, such hardware must be site-engineered, with assistance from Nortel Networks.

Requirements

The following tools and materials are required:

- carpenter’s fixed square
- measuring tape, 15 m (50 ft)
- straight edge 2 m (6 ft)
- masking tape
- The following items for raised floors only. They are not required for installations on concrete floors:
  - — electric drill 1/2 drive, heavy duty (raised floor
  - — hole saw, high-speed steel, 25 mm (1 in.) diameter
  - — reciprocating saw, with steel-cutting blade
  - — sheet 2 of the plastic drilling template, NT4K0606

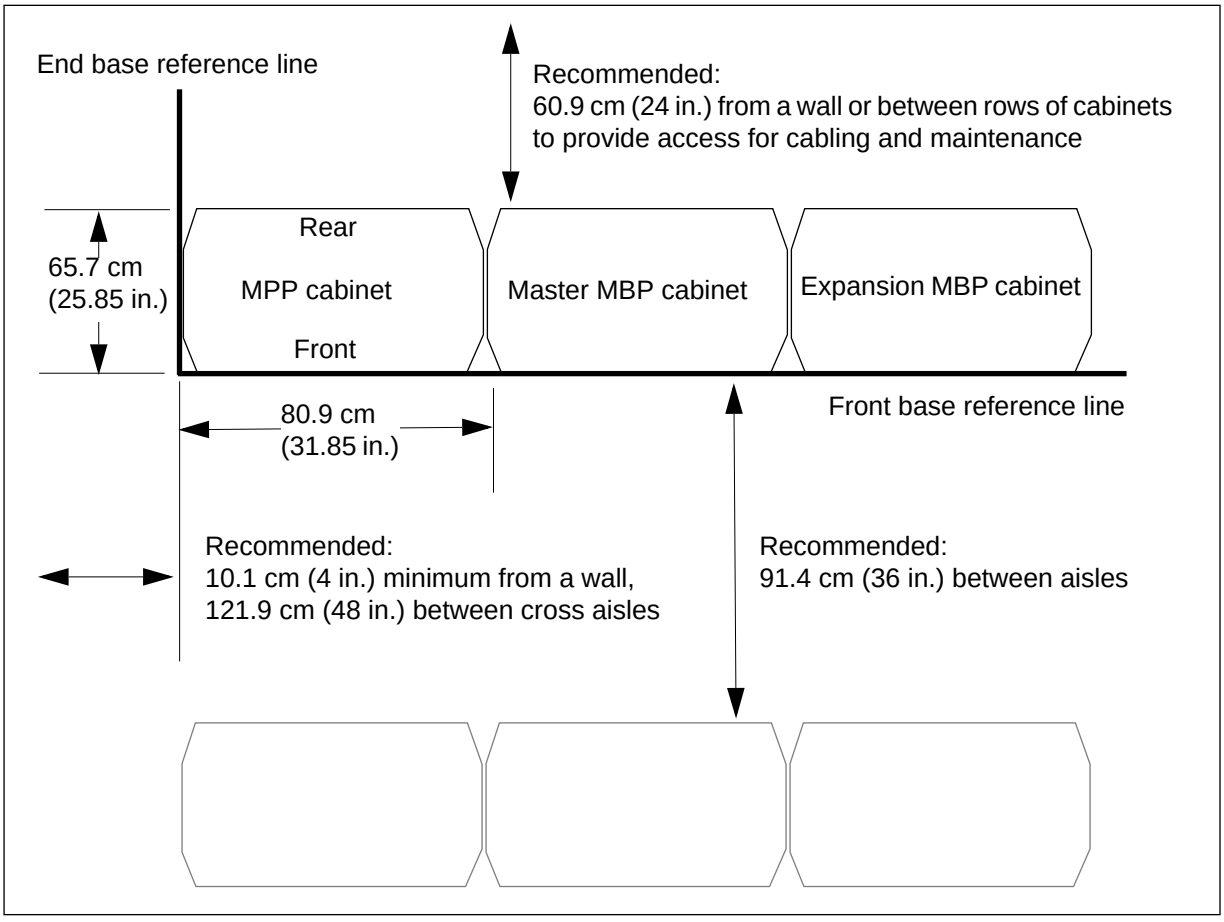
—continued—

Procedure 3-2 (continued)
Preparing a raised floor for mounting cabinets

Action

Step	Action
1	Refer to the customer's floor plan for the intended location of the cabinets.
2	Lay out the front base reference line and the end base reference line using the tape measure, the carpenter's square, the straight edge, and the marker pen, as shown in Figure 3-1. ***Note:*** If the line-up is adjacent to a wall, always begin the layout with the cabinet nearest the wall and work away from the wall. If the line-up is on the end of an existing equipment line-up, always begin the layout with the cabinet that adjoins the line-up.

Figure 3-3
Marking the base reference lines for the cabinets



—continued—

Procedure 3-2 (continued)
Preparing a raised floor for mounting cabinets

Step	Action

3 Go to one of the following steps according to the number of cabinets to be installed:

If you are installing cabinets on a	Then go to
raised floor	step 4
concrete floor and using no anchors	step 18

4 Select sheet 2 of the NT4K0606 plastic template as shown in Figure 3-4. This sheet applies to cabinets equipped with the NT8D49BA expansion kit.

Note: This sheet applies to cabinets equipped with the NT8D49BA expansion kit. This kit is intended for use on raised floors.

5 Position sheet 2 of the NT4K0606 plastic template on the floor, so that the cabinet outline aligns with the base reference lines marked on the floor.

6 Secure the template temporarily with pieces of masking tape.

7 Mark the locations of the anchor holes (labelled “D” on the template) with the marker pen.

Note: The holes labelled “D” will not actually be drilled, but are only intended to be used for aligning the template to mark the floor for the adjacent cabinet.

8 Mark the locations of the square cable entry holes (labelled “E” on the template) with the marker pen.

Note: The holes labelled “E” will be drilled and cut out in a later step.

9 Go to one of the following steps according to the number of cabinets to be installed:

If	Then go to
A second cabinet is to be installed adjacent to the first	step 10
No other cabinet is to be installed	step 14

10 Position the template for the second cabinet by removing the masking tape and sliding the plastic template along the front baseline to where the second cabinet is to be installed.

Note: The template is positioned correctly when the cabinet outline aligns with the front baseline marked on the floor, and the left-most set of holes labelled “D” on the template align with the right-most set of holes marked on the floor.

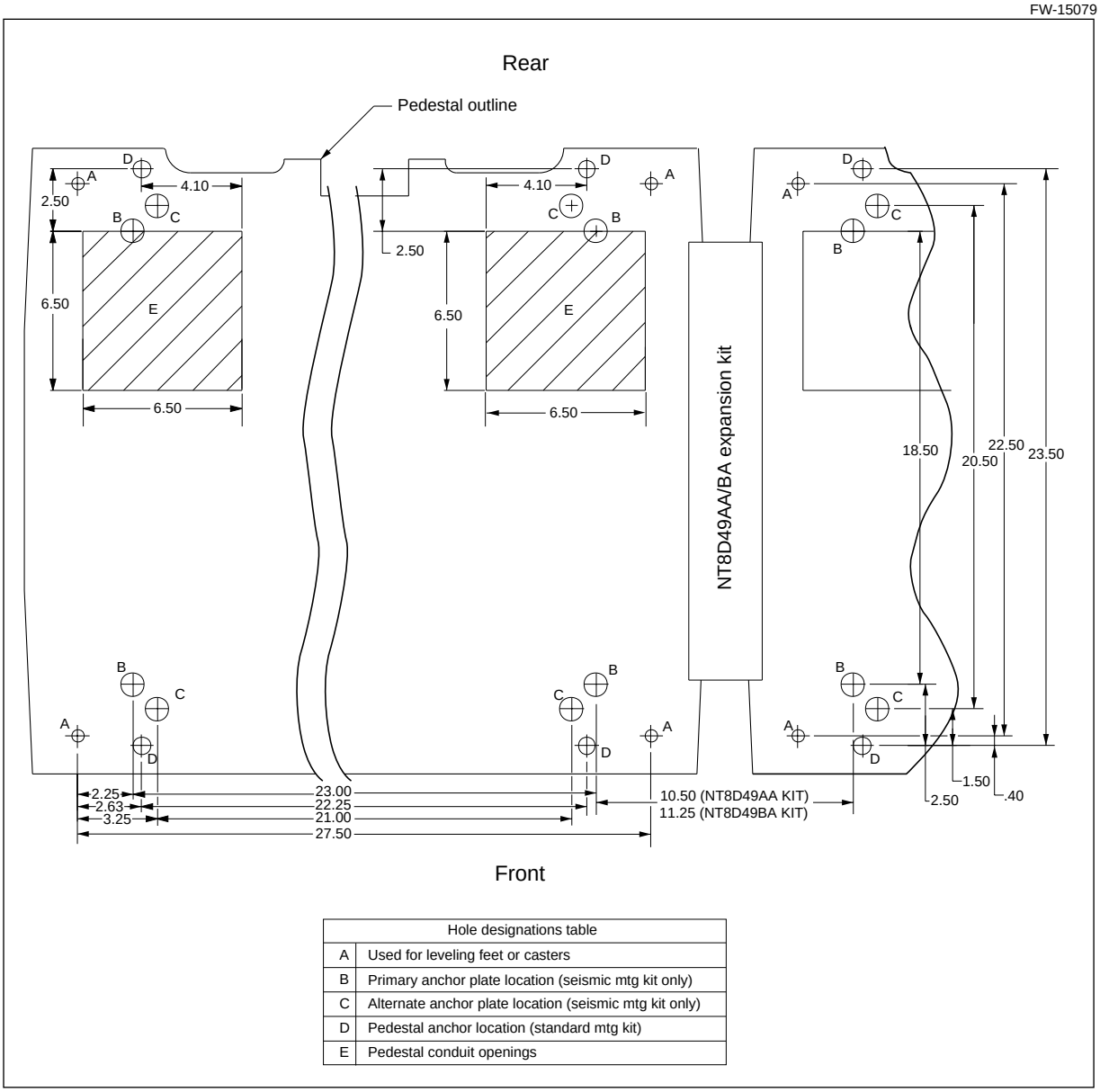
11 Tape the template to the floor and mark the locations of holes labelled “D” and the square cable openings labelled “E” for the second cabinet.

—continued—

Procedure 3-2 (continued)
Preparing a raised floor for mounting cabinets

Figure 3-4
NT4K0606 MBP/MPP floor layout template

FW-15079



Hole designations table	
A	Used for leveling feet or casters
B	Primary anchor plate location (seismic mtg kit only)
C	Alternate anchor plate location (seismic mtg kit only)
D	Pedestal anchor location (standard mtg kit)
E	Pedestal conduit openings

—continued—

Procedure 3-2 (continued)
Preparing a raised floor for mounting cabinets

Step	Action

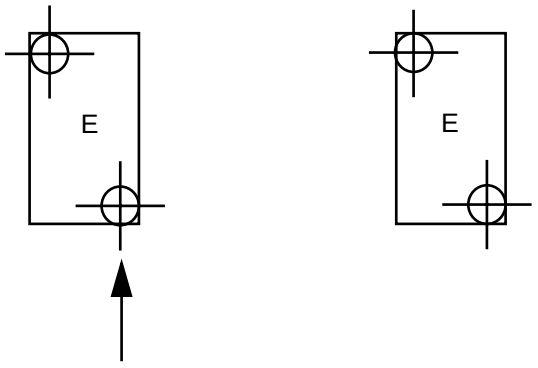
12 Go to one of the following steps according to the number of cabinets to be installed:

If	Then go to
A third cabinet is to be installed adjacent to the first	step 13
No other cabinet is to be installed	step 14

13 Move the plastic template along the front baseline again and mark the locations of the holes for the third cabinet.

14 Remove the template.

15 Using the drill and the hole saw, drill two holes at opposite corners of each square openings labelled “E” on the floor, as follows:

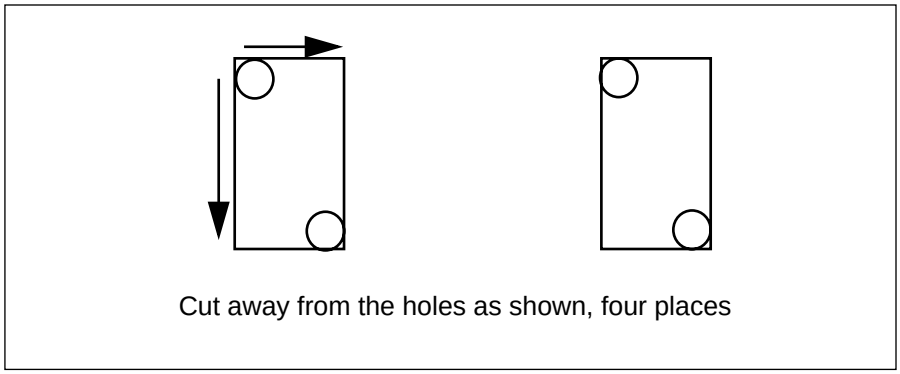


Drill with 25 mm (1 in.) diameter hole saw, four places

—continued—

Procedure 3-2 (continued)
Preparing a raised floor for mounting cabinets

Step	Action
16	Using the reciprocating saw, cut away from the holes along the sides of each opening, as follows.



Cut away from the holes as shown, four places

17	Vacuum up the debris.
18	Go to Chapter 4, “Unpacking the cabinets” on page 4-1.

—end—

Unpacking the cabinets

This chapter provides a procedure for unpacking the Modular Business Package (MBP) cabinets and Modular Power Package (MPP) cabinets.

Chapter contents

This chapter contains the following information:

Procedure 4-1
Unpacking the cabinets

Use this procedure to unpack the crated AccessNode MBP and MPP cabinets, and to inspect them for damage.

DANGER

Risk of injury when moving cabinets

Uncrated cabinets weigh from 170 kg (380 lb) to 280 kg (630 lb). Use at least three people to remove the cabinets from the shipping pallets. Ensure that you also wear protective footgear and gloves when maneuvering them.

CAUTION

Avoid structural stress when maneuvering the cabinets

When handling and maneuvering the cabinets, care must be exercised to avoid strain, excessive shock, or vibrations which might damage the equipment. Because the pallet is designed to minimize shock during transport, do not remove the cabinet from the pallet until it has reached the equipment room.

Requirements

The following tools and materials are required:

- lift truck to move pallets
- hammer
- screwdriver, 6 in. Phillips
- sheet metal shears (10 in.)
- ratchet wrench with 9/16 in. socket
- claw hammer
- work gloves, safety glasses, and safety boots

—continued—

Procedure 4-1 (continued)
Unpacking the cabinets

You must have already done the following in preparation for the arrival of the system as described in Addendum 1 to the *Site Installation Planning and Engineering Manual*, 323-3001-200, a separately bound document.

- prepared the floors and passageways so that cabinets and lift trucks will roll freely and evenly to the equipment room
- verified the dimensions of doorways and passageways.
- provided a clean dust-free area to allow for the unpacking of crated cabinets are modules
- identified an unpacking area. The unpacking area must be clean and as close to the equipment room as possible.

Action

Step	Action
1	Move the pallets that contain the crated cabinets to the unpacking area.

DANGER
Risk of injury from cut steel banding
Some cartons are strapped with steel bands. Take care when cutting the steel bands to avoid injury. Wear safety glasses, gloves, and boots. Hammer the bands flat after removing them to prevent recoil during their disposal.

2	Using the sheet metal shears, cut the banding surrounding the carton, as shown in Figure 4-1 on page 4-4.

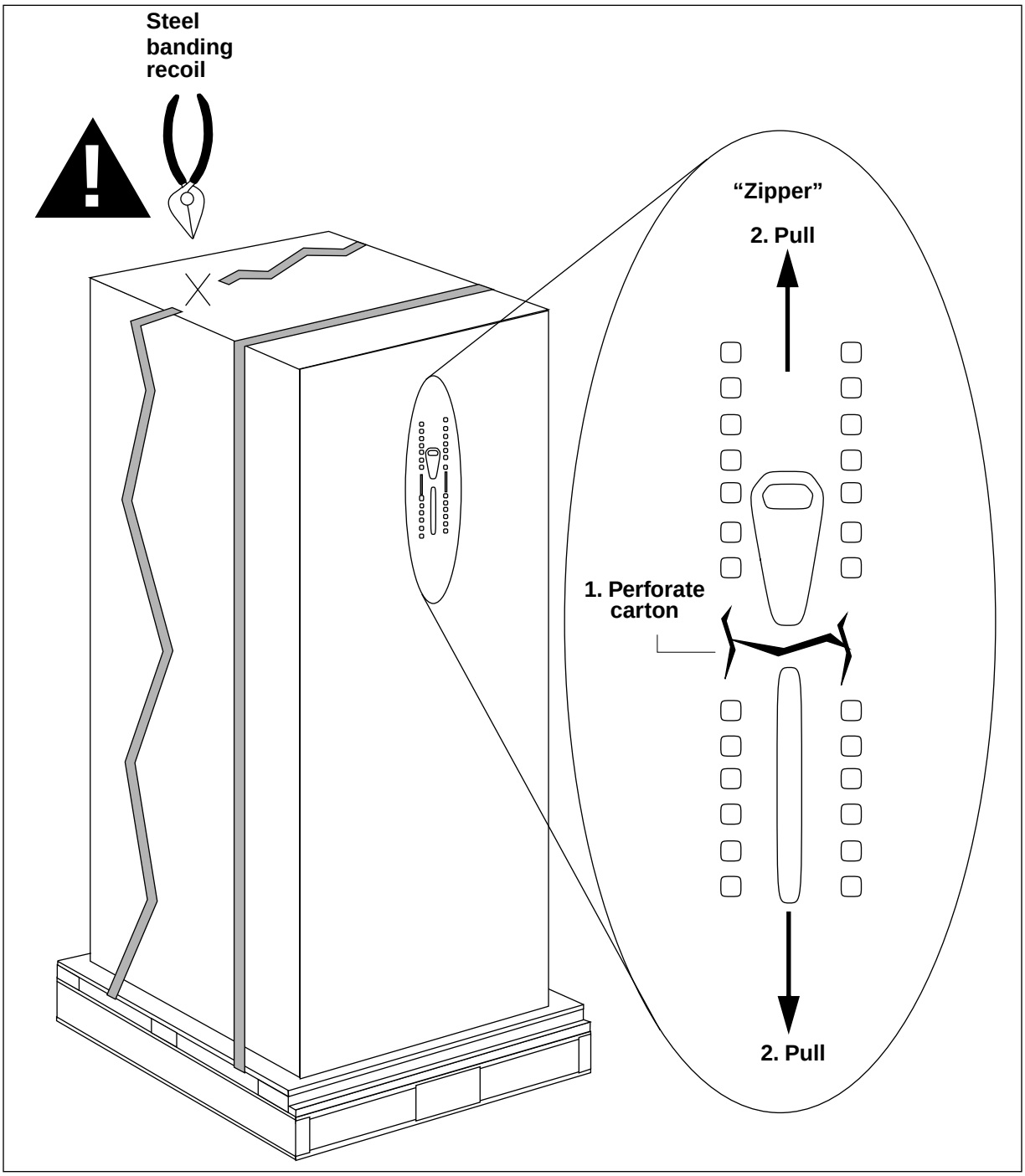
CAUTION
Risk of damage to the equipment
To avoid scratching the equipment, do not use a knife to split the carton open. Use the “zipper” provided on the carton.

3	Split open the cardboard carton by perforating the carton and pulling on the “zipper” symbol, as shown in Figure 4-1 on page 4-4.
4	Carefully remove all packing materials from around the cabinet and check it for damage. Notify Nortel Networks immediately of any damage.

—continued—

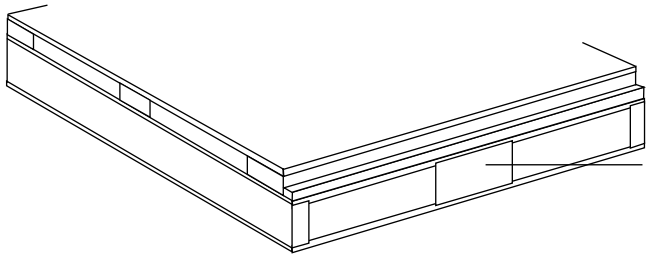
Procedure 4-1 (continued)
Unpacking the cabinets

Figure 4-1
Removing the carton



—continued—

Procedure 4-1 (continued)
Unpacking the cabinets

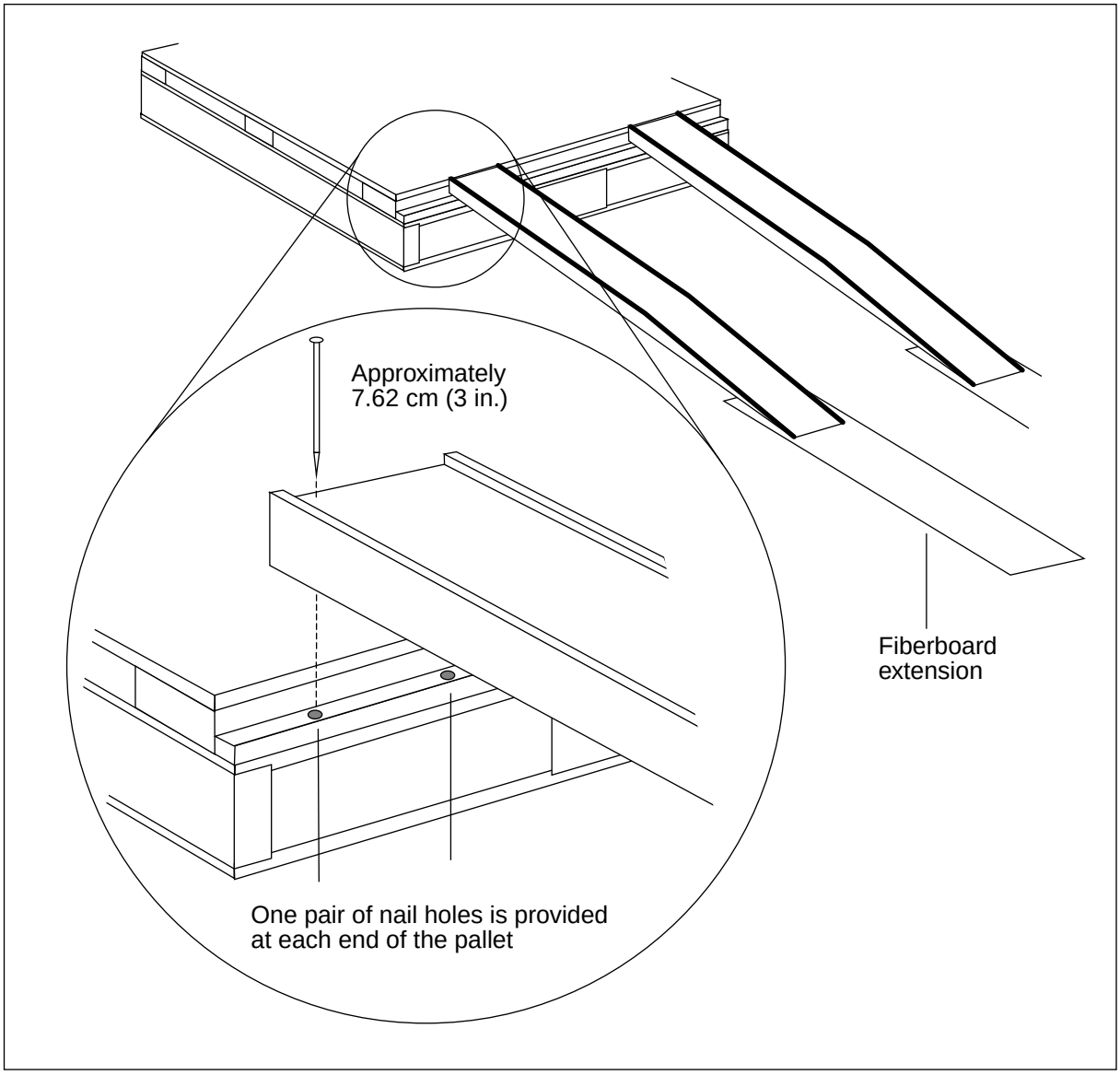
Step	Action
5	Unpack all cartons of cables and hardware, identify any damaged items. ***Note:*** Retain the shipping containers and the packing materials to repack the cabinet in case equipment has to be returned.
6	Compare the items received, piece by piece, against the system order form to identify any missing items. Notify Nortel Networks immediately of any missing items.
7	Maneuver the un-crated cabinet to an area in which it can be removed from its pallet. ***Note:*** An area 2 m (6 ft) by 2.7 m (7.5 ft) is required for this task. Ideally it should be in the equipment room. If there is insufficient space in the equipment room, the area should be located as close to the equipment room entrance as possible.
8	Perform Procedure 5-1 on page 5-4 (“Removing equipment covers”) in the next chapter. Then proceed with the next step of this procedure.
9	Remove the ramp cover from the pallet, as shown in the following figure. A pair of ramps for sliding the cabinet off the pallet are located underneath the cover. Use the screwdriver to pry the ramps out of the pallet.  Ramp cover (ramps inside) Use screwdriver to pry the ramps out of the pallet.
10	Withdraw the ramps from the pallet.

—continued—

Procedure 4-1 (continued)
Unpacking the cabinets

Step	Action
11	Nail the two ramps into place at one end of the pallet, as shown in Figure 4-2 using the nails provided with the ramps.
12	Place the two fiberboard extensions underneath the ends of the ramps as shown in Figure 4-2.

Figure 4-2
Attaching the ramps



—continued—

Procedure 4-1 (continued)
Unpacking the cabinets

Step	Action
13	Using the 9/16 socket, remove the two bolts that attach the metal bracket at each corner of the cabinet, as shown in Figure 4-3 on page 4-8.

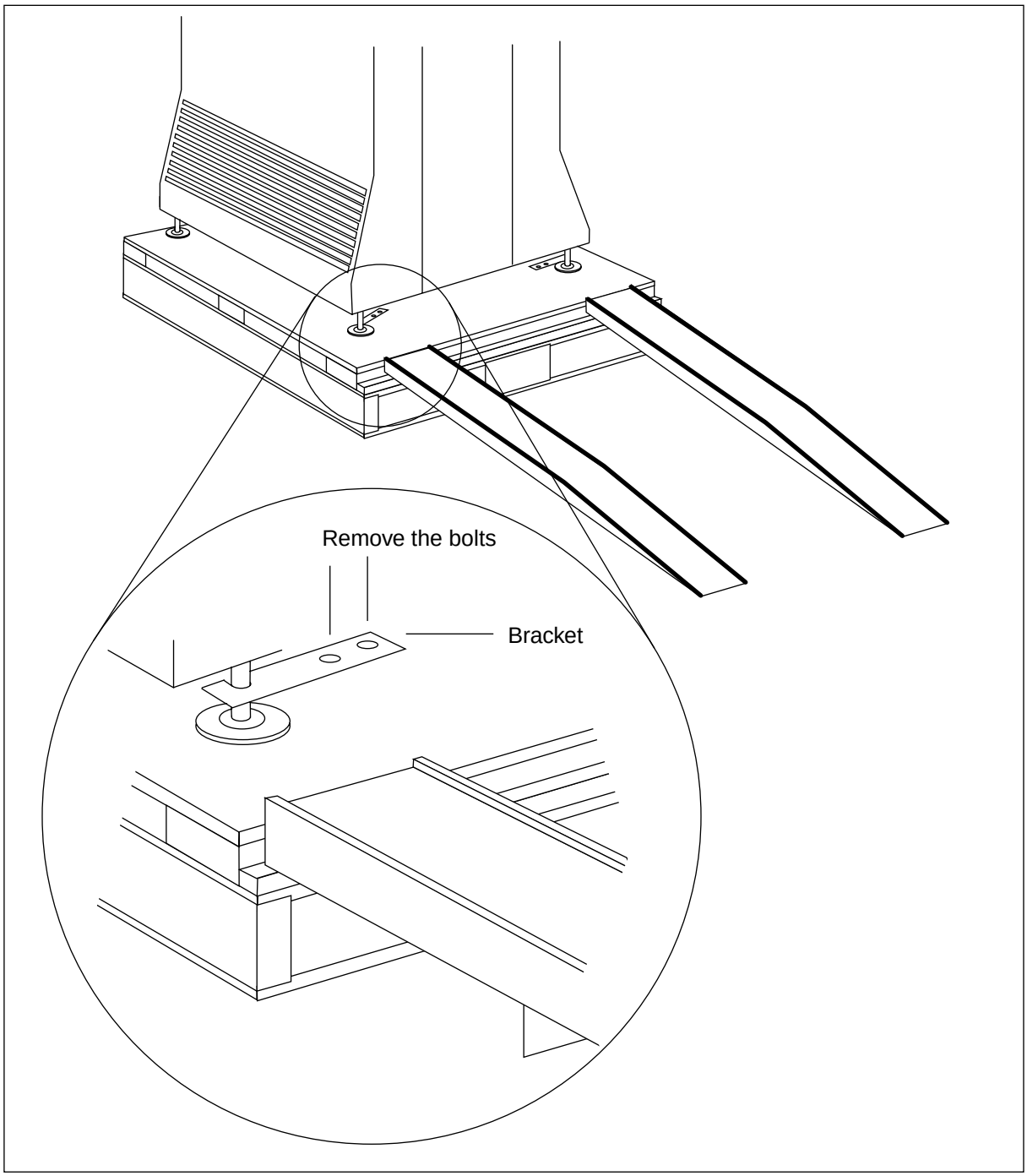
DANGER
Risk of injury
To avoid injury and possible damage to equipment, use three people for the following step: two people to guide the front of the cabinet down the ramps and a third person to guide the cabinet, and ensure that it does not slide off the ramps.

14	Carefully slide the cabinet off the pallet, down the ramps and onto the fiberboard extensions.
15	Discard the packing material and cabinet shipping pallet using local material disposal practices.

—continued—

Procedure 4-1 (continued)
Unpacking the cabinets

Figure 4-3
Removing the brackets



—end—

Removing equipment covers and panels

This chapter provides the procedures to remove equipment covers and panels from Modular Business Package (MBP) cabinets and Modular Power Package (MPP) cabinets.

Procedures for re-installing the covers and panels are in Chapter 16, “Installing the equipment covers”.

Chapter task lists

Select the task list based on the type of equipment configuration you are installing. Perform the procedures listed in the task list for that type of configuration.

Installing a master cabinet, and expansion cabinet, or an MPP cabinet

Perform the procedures in the order in which they are listed. If you cannot successfully complete these procedures, contact your next level of support.

Topic	See
Removing equipment covers	page 5-4
Removing the top cap grilles	page 5-6
Removing the pedestal grilles	page 5-8
Removing DEM separator bars	page 5-10
Removing the front cover from an ABM shelf	page 5-12
Removing the side panels	page 5-14

Installing a FiberManager Compact/8

Perform the following procedures in the order in which they are listed.

Task	See
Removing equipment covers	page 5-4
Removing the top cap grilles	page 5-6
Removing the pedestal grilles	page 5-8
Removing DEM separator bars	page 5-10
Removing the front cover from an ABM shelf	page 5-12
Adding a FiberManager Compact/8 fiber patch panel	page 10-1

Adding a copper distribution shelf to an existing single equipment module

Perform the following procedures in the order in which they are listed.

Task	See
Removing equipment covers	page 5-4
Removing the top cap grilles	page 5-6
Removing the pedestal grilles	page 5-8
Removing DEM separator bars	page 5-10
Adding a copper-distribution shelf to an existing single equipment module	page 11-1

Adding a field expansion module

Perform the following procedures in the order in which they are listed.

Task	See
Removing equipment covers	page 5-4
Removing the top cap grilles	page 5-6
Removing the pedestal grilles	page 5-8
Removing the side panels	page 5-14
Adding a field expansion module	page 12-1

Adding a rectifier shelf

Perform the following procedures in the order in which they are listed.

Task	See
Removing equipment covers	page 5-4
Removing the top cap grilles	page 5-6
Removing the pedestal grilles	page 5-8
Removing DEM separator bars	page 5-10
Adding a second rectifier shelf to an MPP cabinet	page 15-1

Adding OC-3 tributaries

Perform the following procedures in the order in which they are listed.

Task	See
Removing equipment covers	page 5-4
Removing the top cap grilles	page 5-6
Removing the pedestal grilles	page 5-8
Removing the front cover from an ABM shelf	page 5-12
Installing the fiber patch cords	page 9-91

Procedure 5-1
Removing equipment covers

Use this procedure to remove equipment covers from the front and rear of Modular Business Package (MBP) cabinets and Modular Power Package (MPP) cabinets.

Requirements

The following tools and materials are required:

- NSQ2000L or ATT216 tool for unlocking tool lockable covers
- sheets of cardboard or foam on which to rest the equipment covers while the installation is being performed

CAUTION
Risk of damage to equipment covers
The equipment covers are not hinged. Do not let go of a cover once you have released the latches, or it will drop to the floor.

Action

Step	Action
1	Unlock the latches as shown in Figure 5-1 on page 5-5.

If the covers are equipped with	Then
Key or tool locking covers	Insert the key or tool into the lock at the right side of the panel, and rotate it clockwise.
Safety locking covers	Rotate the locking knobs clockwise at the left side and the right side of the cover.

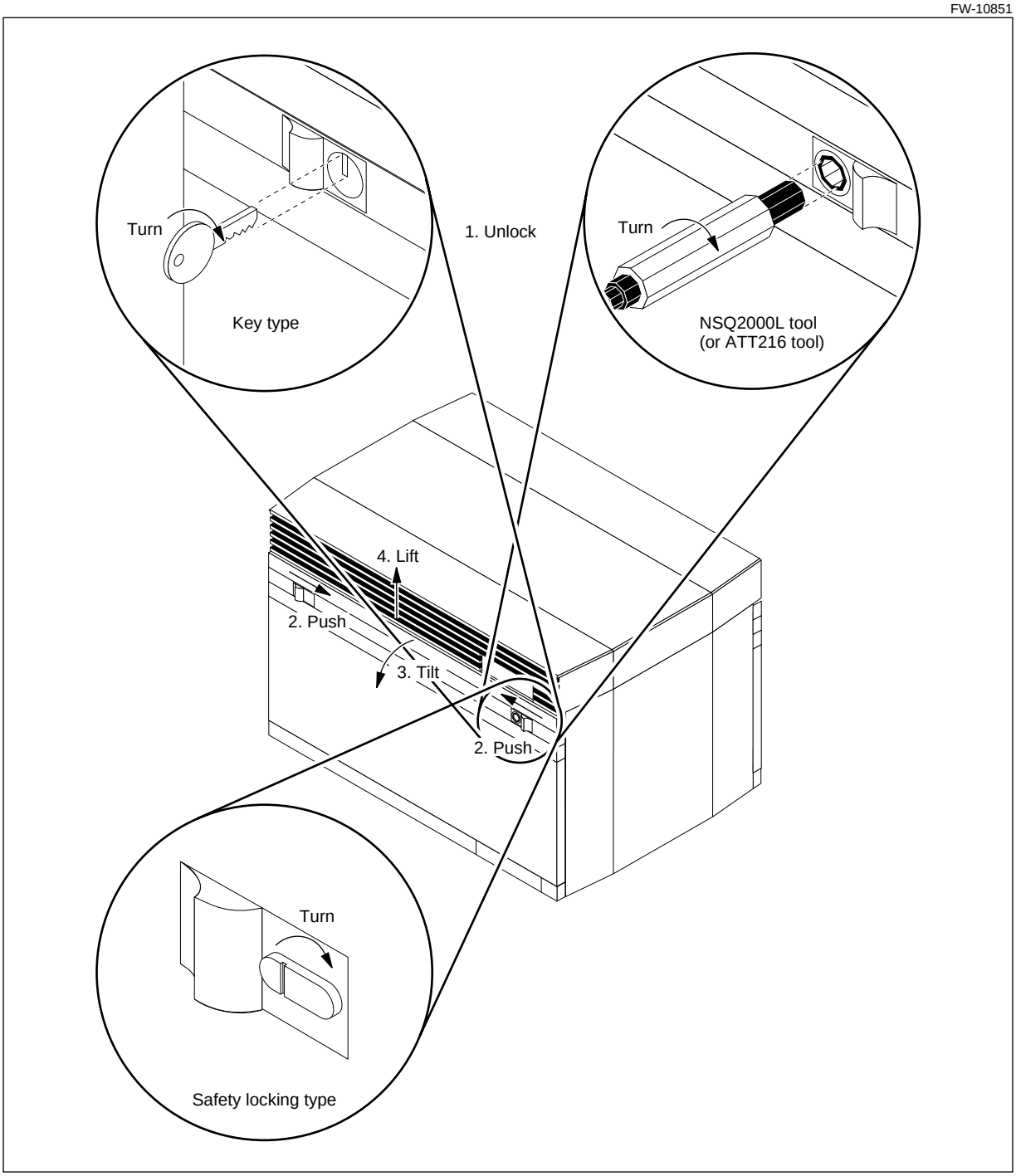
2	Pull the latches toward the center of the panel with your thumbs.
3	While keeping the latches pushed inwards, grasp the edges of the cover with your finger tips and tilt the top of the cover out towards you.
4	Lift the cover upward to remove it.
5	Store the cover on cardboard or foam to protect its finish while you perform the installation. For key-lockable covers, ensure that the keys are taped to one of the panels to avoid loss during the installation.

—continued—

Procedure 5-1 (continued)
Removing equipment covers

Figure 5-1
Removing an equipment cover

FW-10851



—end—

Procedure 5-2
Removing the top cap grilles

Use this procedure to remove a top cap grille from a Modular Business Package (MBP) cabinet or a Modular Power Package (MPP) cabinet.

Requirements

Before beginning this procedure, you must remove the equipment cover immediately below the top cap grille, as described in Procedure 5-1 on page 5-4.

The following tools and materials are required:

- sheets of cardboard or foam on which to rest the equipment covers while the installation is being performed

Action

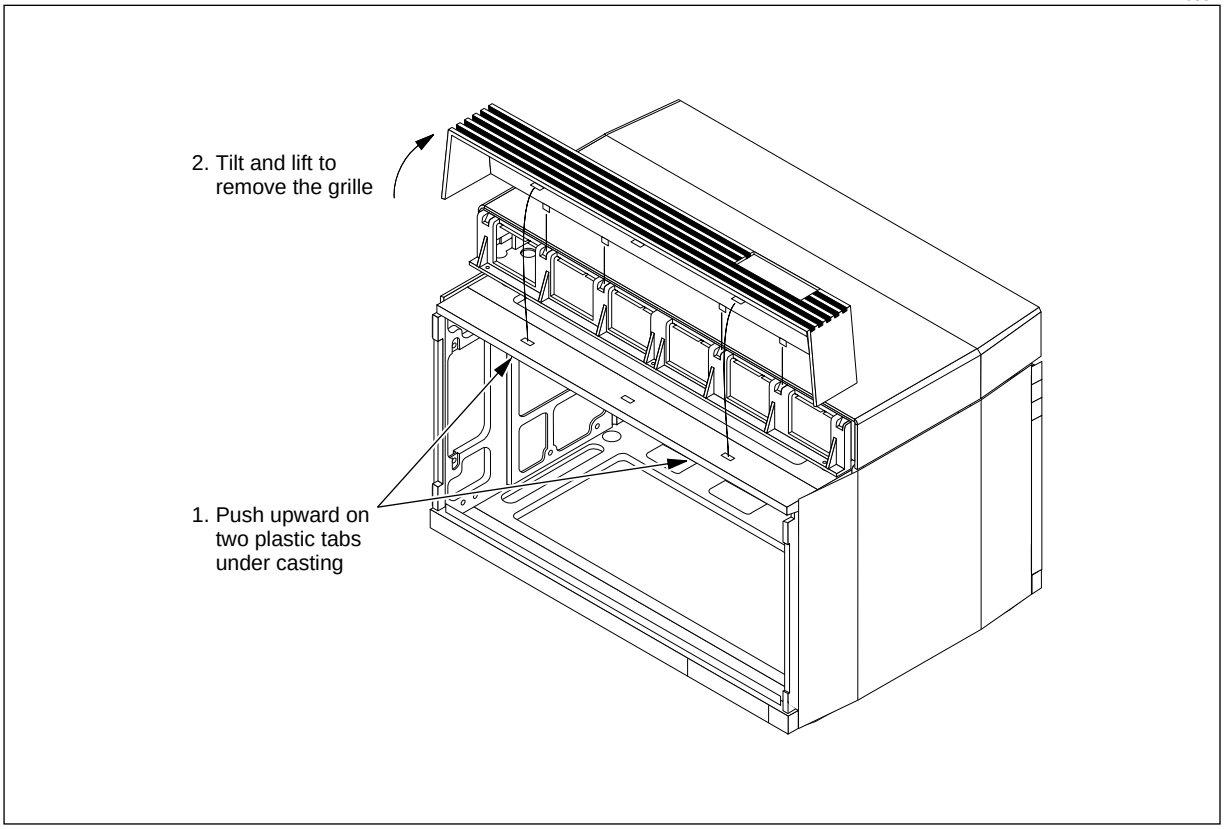
Step	Action
1	Push upward on the two plastic tabs that protrude below the casting as shown in Figure 5-2 on page 5-7.
2	Tilt the grille outward, and lift it up to remove it.
3	Store the grille on cardboard or foam to protect its finish while you perform the installation.

—continued—

Procedure 5-2 (continued)
Removing the top cap grilles

Figure 5-2
Removing the top cap grilles

FW-10854



—end—

Procedure 5-3
Removing the pedestal grilles

Use this procedure to remove a pedestal grille from a Modular Business Package (MBP) cabinet or a Modular Power Package (MPP) cabinet.

Requirements

The following tools and materials are required:

- screwdriver, flat blade, 1/4 in. blade width
- sheets of cardboard or foam on which to rest the equipment covers while the installation is being performed

Action

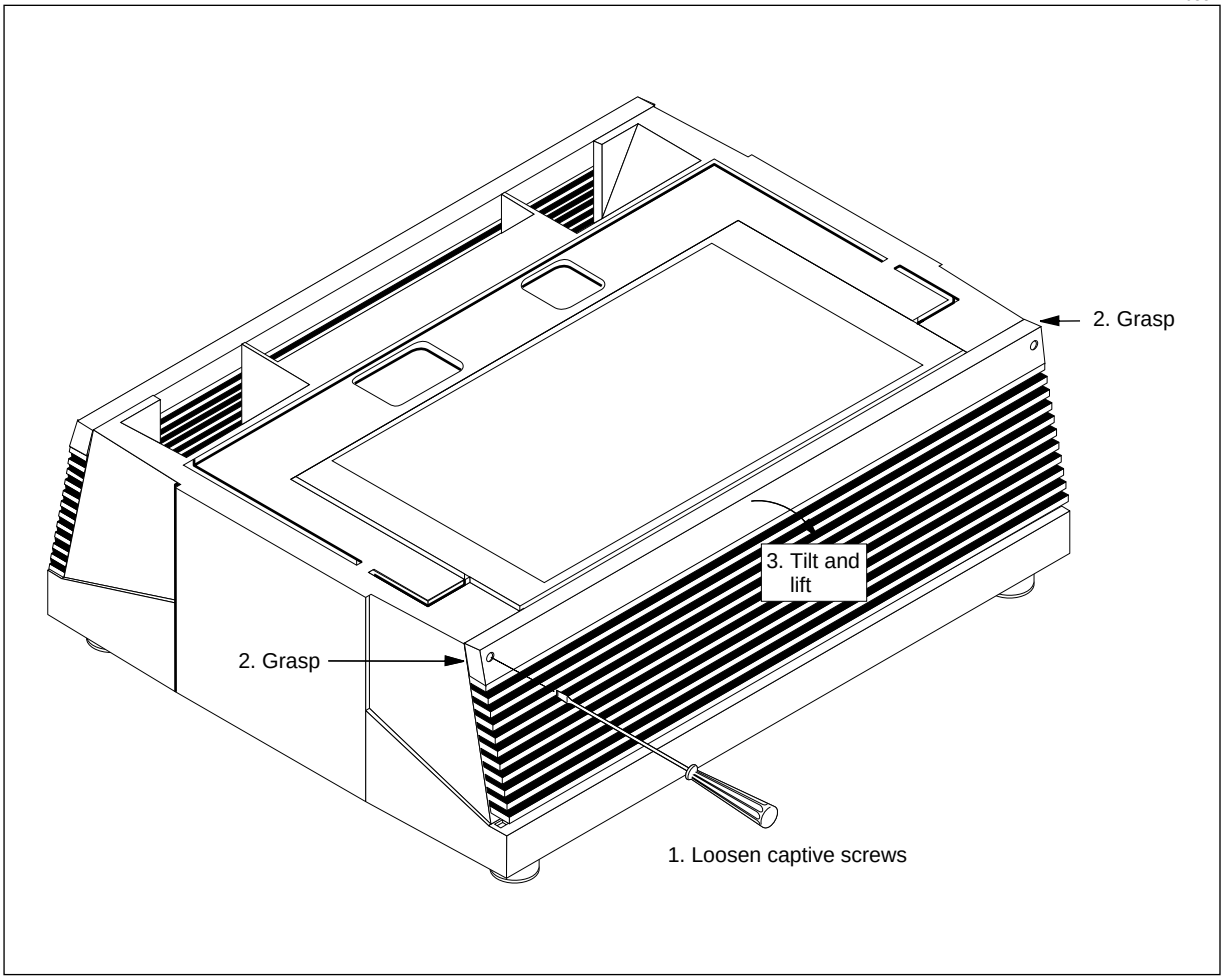
Step	Action
1	Release the two captive screws that hold the pedestal grille in place as shown in Figure 5-3 on page 5-9.
2	Grasp the top left and top right edges of the grille.
3	Tilt the grille outward, and lift it up to remove it.
4	Store the grille on cardboard or foam to protect its finish while you perform the installation.

—continued—

Procedure 5-3 (continued)
Removing the pedestal grilles

Figure 5-3
Removing a pedestal grille

FW-10852



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Procedure 5-4
Removing DEM separator bars

Use this procedure to remove a dual equipment module (DEM) separator bars from the front or rear of a master Modular Business Package (MBP) cabinet or a Modular Power Package (MPP) cabinet.

Requirements

The following tools and materials are required:

- sheets of cardboard or foam on which to rest the DEM separator bar while the installation is being performed

Action

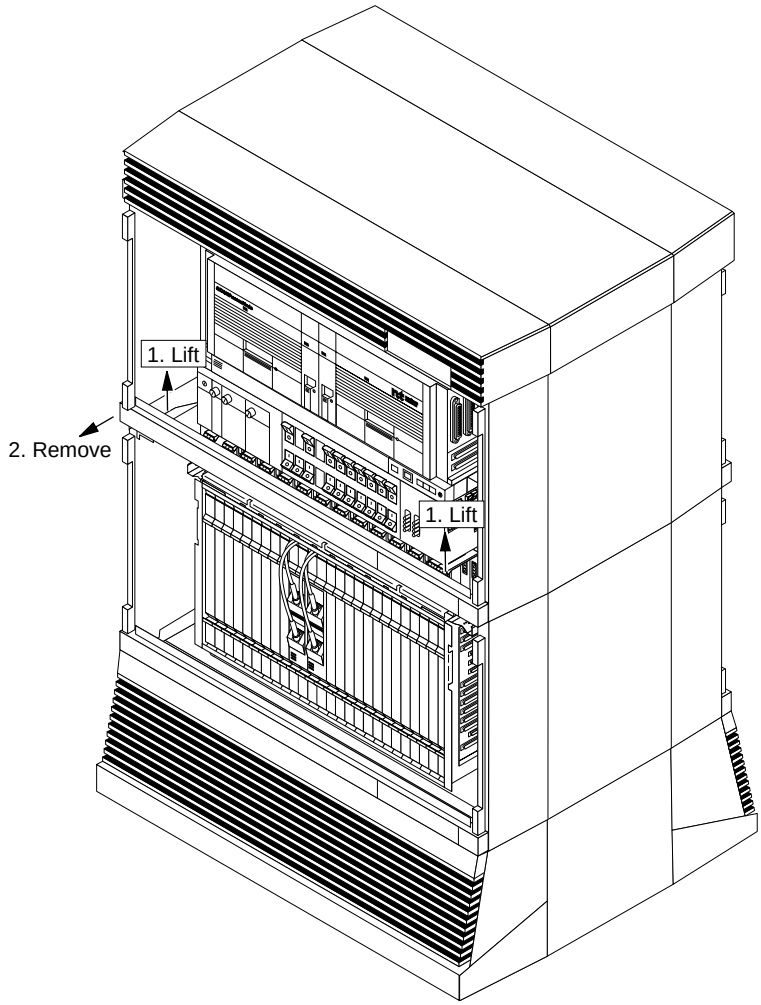
Step	Action
1	Grasp the left and right ends of the DEM separator bar, as shown in Figure 5-4 on page 5-11.
2	Lift the DEM separator bar vertically to disengage the guide pins from the cabinet and remove the bar from the cabinet. ***Note:*** It may be necessary to bump the underside of the bar with your fist to disengage it from the cabinet.
3	Store the separator bar on cardboard or foam to protect its finish while you perform the installation.

—continued—

Procedure 5-4 (continued)
Removing DEM separator bars

Figure 5-4
Removing a DEM separator bar

FW-10856



Note: This illustration shows the removal of the DEM separator from the front of a master MBP cabinet. Removal of the bar at the rear of this cabinet, or removal from the front or rear of the MPP cabinet is performed in the same way.

—end—

Procedure 5-5
Removing the front cover from an ABM shelf

Use this procedure to remove the front cover from the Access Bandwidth Manager (ABM) shelf in the master Modular Business Package Cabinet.

Requirements

The following tools and materials are required:

- flat bladed screwdriver (1/4 in. wide blade)
- sheets of cardboard or foam on which to rest the ABM shelf cover while the installation is being performed

Removing the ABM shelf cover is much easier if the DEM separator bar is removed first as described in Procedure 5-4 on page 5-10.

Action

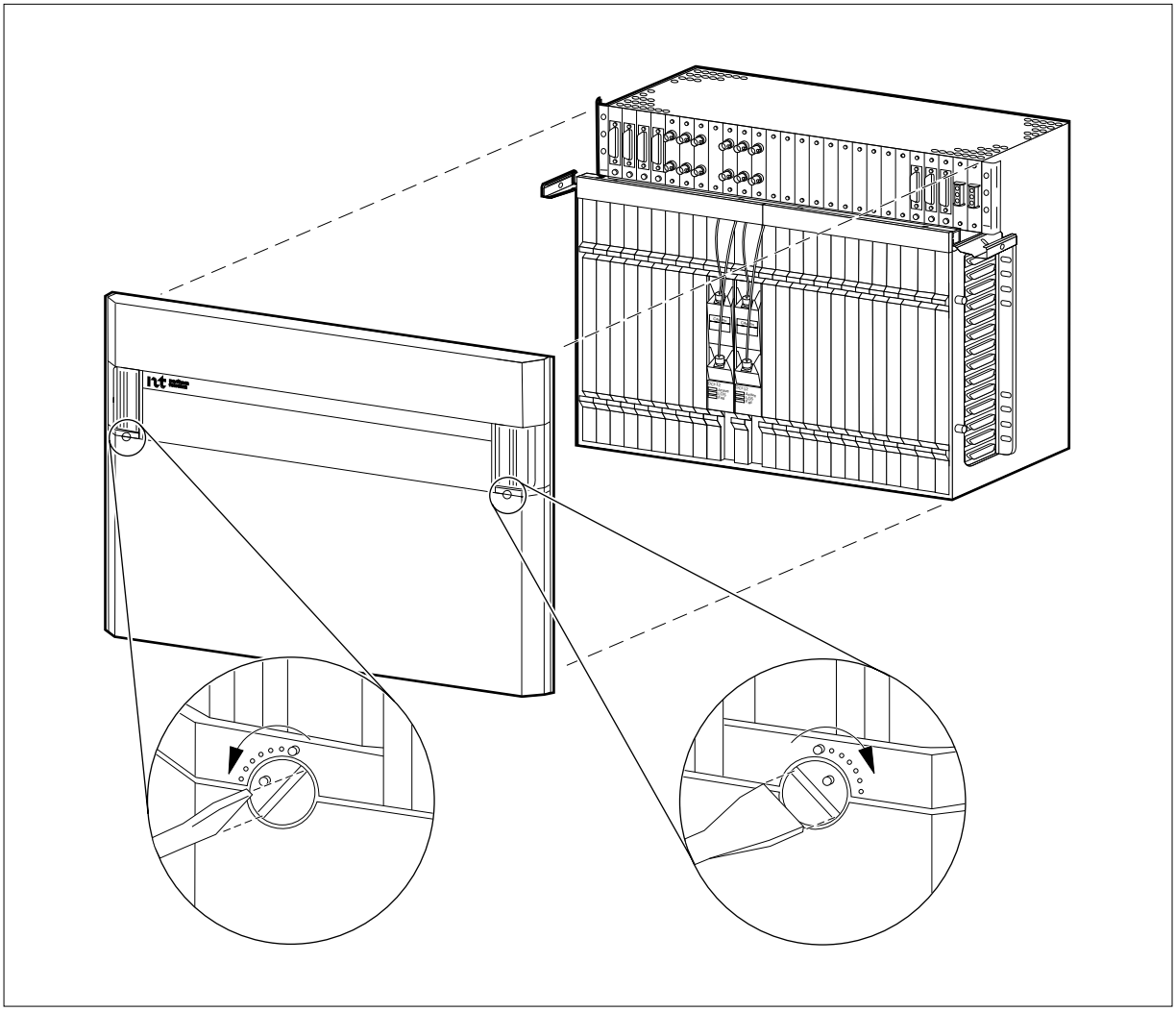
Step	Action
1	Using the screwdriver, turn the locking screws so that the dots no longer line up, as shown in Figure 5-5 on page 5-13.
2	Grasp the cover at the top edges and pull it towards you to remove it.
3	Store the cover on cardboard or foam to protect its finish while you perform the installation.

—continued—

Procedure 5-5 (continued)
Removing the front cover from an ABM shelf

Figure 5-5
Removing the front cover from the ABM shelf

FW-10017



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Procedure 5-6
Removing the side panels

Use this procedure to remove a side panel from a Modular business Package (MBP) cabinet or a Modular Power Package (MPP) cabinet.

Requirements

The following tools and materials are required:

- sheets of cardboard or foam on which to rest the ABM shelf cover while the installation is being performed
- nut driver, 5/16 in.

Before performing this procedure, remove the equipment covers as described in Procedure 5-1 on page 5-4.

Action

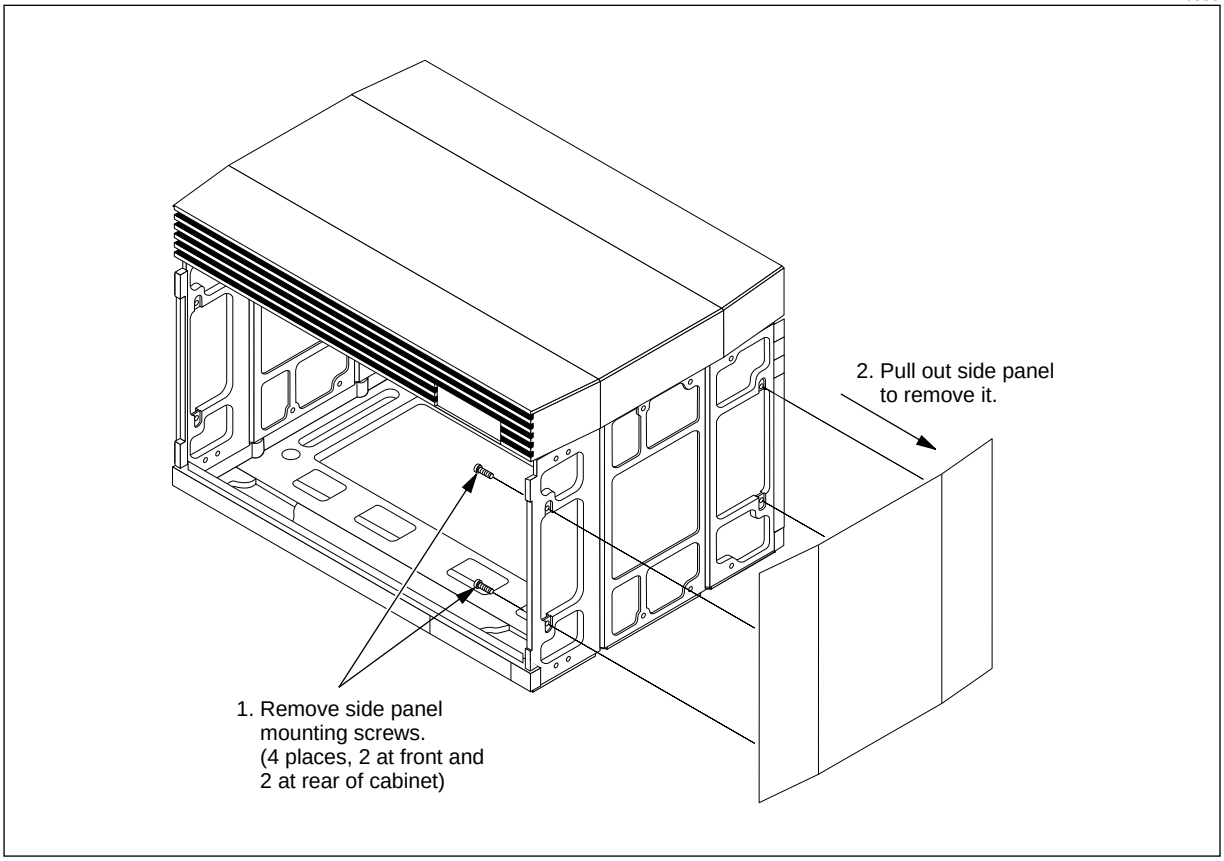
Step	Action
1	At the front of the cabinet, use the 5/16 nut driver to remove the two screws that secure the side panel to the casting, as shown in Figure 5-6 on page 5-15.
2	At the rear of the cabinet, hold the side panel so that it cannot fall, and remove the two other screws that secure it to the casting.
3	Store the side panel on cardboard or foam to avoid damaging its finish during the installation.

—continued—

Procedure 5-6 (continued)
Removing the side panels

Figure 5-6
Removing a side panel

FW-10858



—end—

Installing the cabinets

This chapter contains the procedures to position the Modular Business Package (MBP) and Modular Power Package (MPP) cabinets, and secure them in place.

Chapter contents

This chapter contains the following information:

Procedure 6-1
Installing the bracing rods and tie bars

Use this procedure to install the bracing rods and tie bars into the Modular Business Package (MBP) cabinets and Modular Power Package (MPP) cabinets. The bracing rod kits are optional except for earthquake Zones 3 and Zone 4 where they are required.

Northern Telecom offers four bracing rod kits as listed in the following table:

Kit	Used for
NT4K0650	cabinets that are one module high
NT4K0651	cabinets that are two modules high
NT4K0652	cabinets that are three modules high
NT4K0653	cabinets that are four modules high

Note: ASEM is considered one module in height and a DEM is considered two modules in height.

Requirements

The following tools and materials are required:

- torque wrench with 0.563 cm (9/16 in.) socket, minimum 2.08 kg-m (15 ft-lb) capacity
- wrench, open end 0.635 cm (1/4 in.)
- one bracing rod kit (see table above) for each cabinet

Action

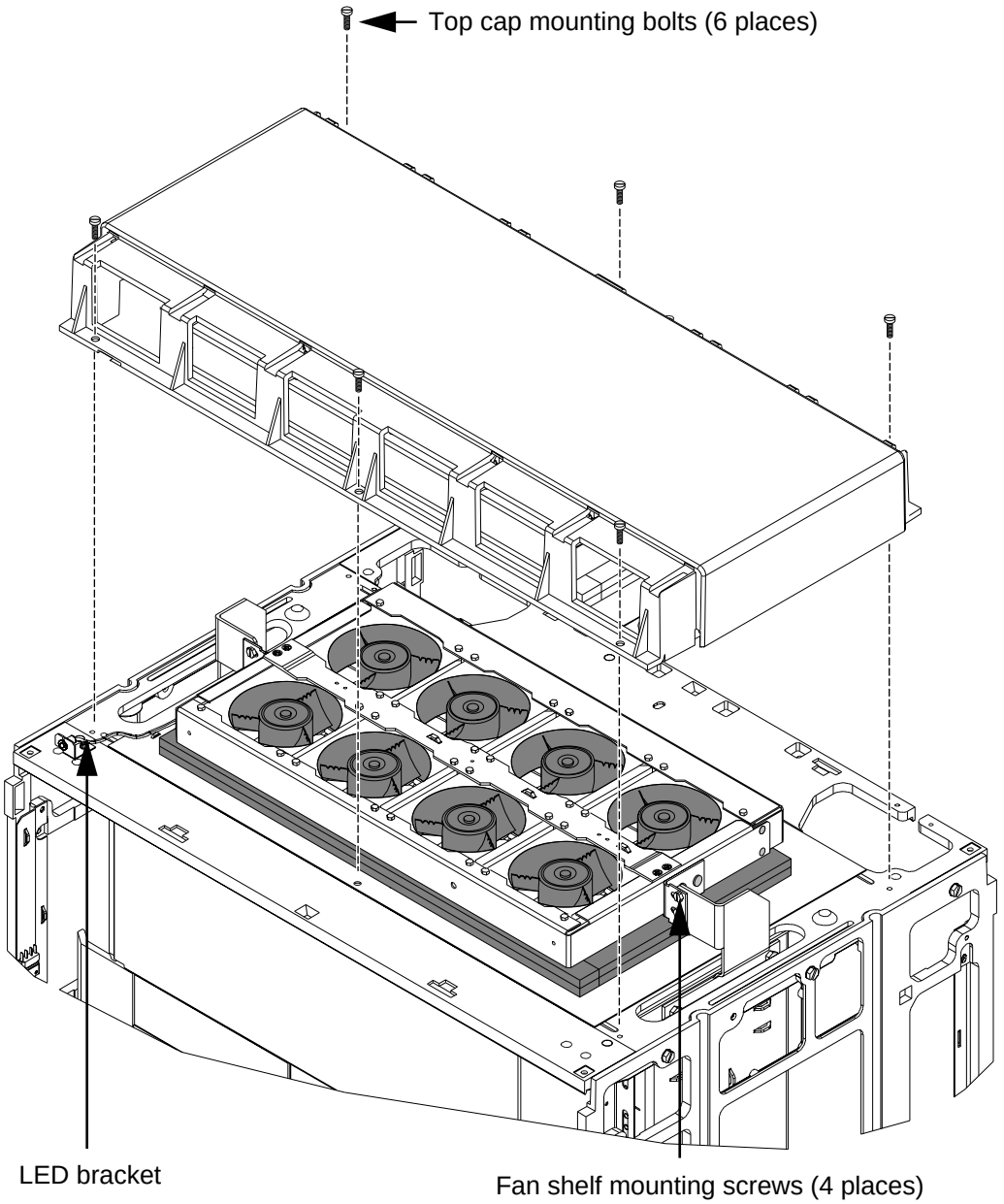
Step	Action
	Removing the fan shelf
1	Remove the six bolts that secure the top cap in place at the locations shown in Figure 6-1.
2	Lift the top cap clear of the cabinet.
3	Disconnect the alarm LED from the bracket at the top front of the cabinet.
4	Disconnect the fan shelf power connector from the rear of the fan shelf.
5	Remove the four fan shelf mounting bracket screws at the locations shown in Figure 6-1.
6	Remove the NT4K0610 fan shelf and lay it aside. It will be re-mounted in a later step.

—continued—

Procedure 6-1 (continued)
Installing the bracing rods and tie bars

Figure 6-1
Removing the top cap

FW-15616



Note: The power and temp/alarm connectors are located at the left rear of the fan shelf.

—continued—

Procedure 6-1 (continued)
Installing the bracing rods and tie bars

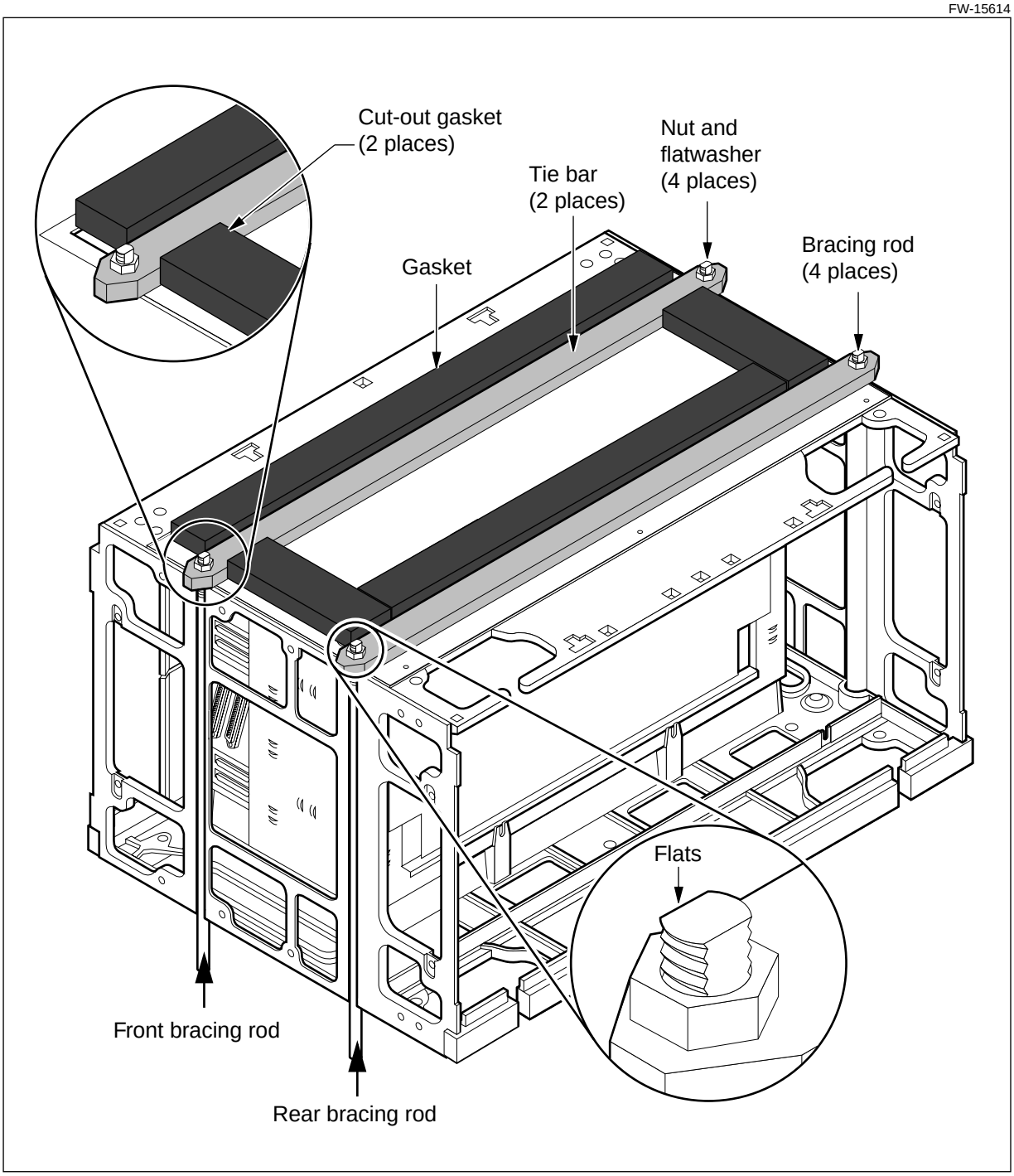
Step	Action
	Installing the bracing rod kit
7	Orient a bracing rod so that the end with the flats points upward, and lower it into one of the four locations shown in Figure 6-2.
8	Lower bracing rods into the other three locations in a similar fashion.
9	Start threading the bracing rods into the threads in the pedestal by hand.
10	Using a 1/4 in open end wrench, thread the bracing rods all the way into the pedestal. Do not over-tighten them.
11	Slip the tie bars into place over the bracing rods as shown in Figure 6-2.
12	Cut two sections out of the fan shelf gasket under the front tie bar to form-fit the front tie bar so that it lies flat on top of the equipment module.
13	Install one flat washer and one nut on each bracing rod to secure the tie bars.
14	Using the torque wrench, evenly tighten the nuts on all of the tie bars to a torque of from 12–13 ft-lb.
	Replacing the fan shelf
15	Place the fan shelf back on top of the cabinet.
16	Reinstall the fan shelf with the four mounting bracket screws.
17	Reconnect the alarm LED to the bracket at the front of the cabinet.
18	Reconnect the fan shelf power connector to the rear of the fan shelf.
19	Reinstall the top cap with the six mounting bolts.
20	Ensure that bracing rod kits are installed in all cabinets.
21	Go to the cabinet positioning procedure that applies to your cabinet arrangement.

—continued—

Procedure 6-1 (continued)
Installing the bracing rods and tie bars

Figure 6-2
Installing the tie bars

FW-15614



—end—

Procedure 6-2
Positioning and securing cabinets with anchor kits

Use this procedure to position, level, and secure Modular Business Package (MBP) cabinets and Modular Power Package (MPP) cabinets on concrete floors. This procedure mounts the floor brackets, positions the cabinets, and secures the cabinets to the floor brackets. The procedure is the same regardless of the bracing rod kit or anchor kit used. If you are not using floor anchors, only use the steps for positioning, leveling and aligning the cabinets on the floor.

This procedure assumes co-located cabinets. If your system MPP cabinet is not co-located, that is, it is separated by some distance of up to 10.7 m (35 ft), then you will still use this procedure but you will disregard the steps for mounting and connecting expansion kits to the MPP or to the left-hand side of the MBP master cabinet. The expansion kits are used only for co-located cabinets.

Nortel Networks offers two anchor kits as listed in the following table:

Kit	Used for	Notes
NT4K0602	Concrete floors less than 6 in. thick	This kit contains: • floor brackets • standard anchor bolts • washers and nuts • one NT4K0606 floor template
NT4K0605 (Zone 3–4 compliant)	Concrete floors 6 in. or more thick	This kit contains: • floor brackets • heavy-duty (seismic) anchor bolts • washers and nuts • one NT4K0606 floor template

DANGER

Risk of injury when maneuvering cabinets

Uncrated cabinets weigh from 170 kg (380 lb) to 280 kg (630 lb). Use at least three people to maneuver the cabinets. Ensure that you also wear protective foot gear and gloves.

CAUTION

Avoid structural stress when maneuvering uncrated cabinets

When handling and moving uncrated cabinets, care must be exercised to avoid strain, excessive shock or vibrations which might damage the equipment.

—continued—

Procedure 6-2 (continued)
Positioning and securing cabinets with anchor kits

Requirements

The floor must have been marked and the required anchors installed as described in Procedure 3-1, “Preparing a concrete floor for mounting cabinets” on page 3-2.

Because of numerous variations in the construction of raised floors, Nortel Networks does not supply an anchor kit to secure the cabinets for installations on raised floors. If you require the installation of special hardware to secure the cabinets in non-seismic installations on raised floors, such hardware must be site-engineered, with assistance from Nortel Networks.

The following tools and materials are required:

- block of wood 5.08 cm by 10.1 cm by about 25.4 cm long (2.0 in. by 4.0 in. by about 10.0 in. long)
- hammer
- 30.5 cm (12 in.) flathead screwdriver
- socket set, 1.3 cm (1/2 in.) drive
- socket set, 0.635 cm (1/4 in.) drive
- torque wrench 13.83 kg-m (100 ft-lb) capacity, 1.3 cm (1/2 in.) drive
- spirit level
- NT8D49AA expansion kit (for co-located cabinets)

Action

Step	Action
1	Select the first cabinet to install: the MPP, the MBP master cabinet or the MBP expansion cabinet. ***Note:*** If the line-up is adjacent to a wall, always begin the layout with the cabinet nearest the wall and work away from the wall. If the line-up is on the end of an existing equipment line-up, always begin the layout with the cabinet that adjoins the line-up.

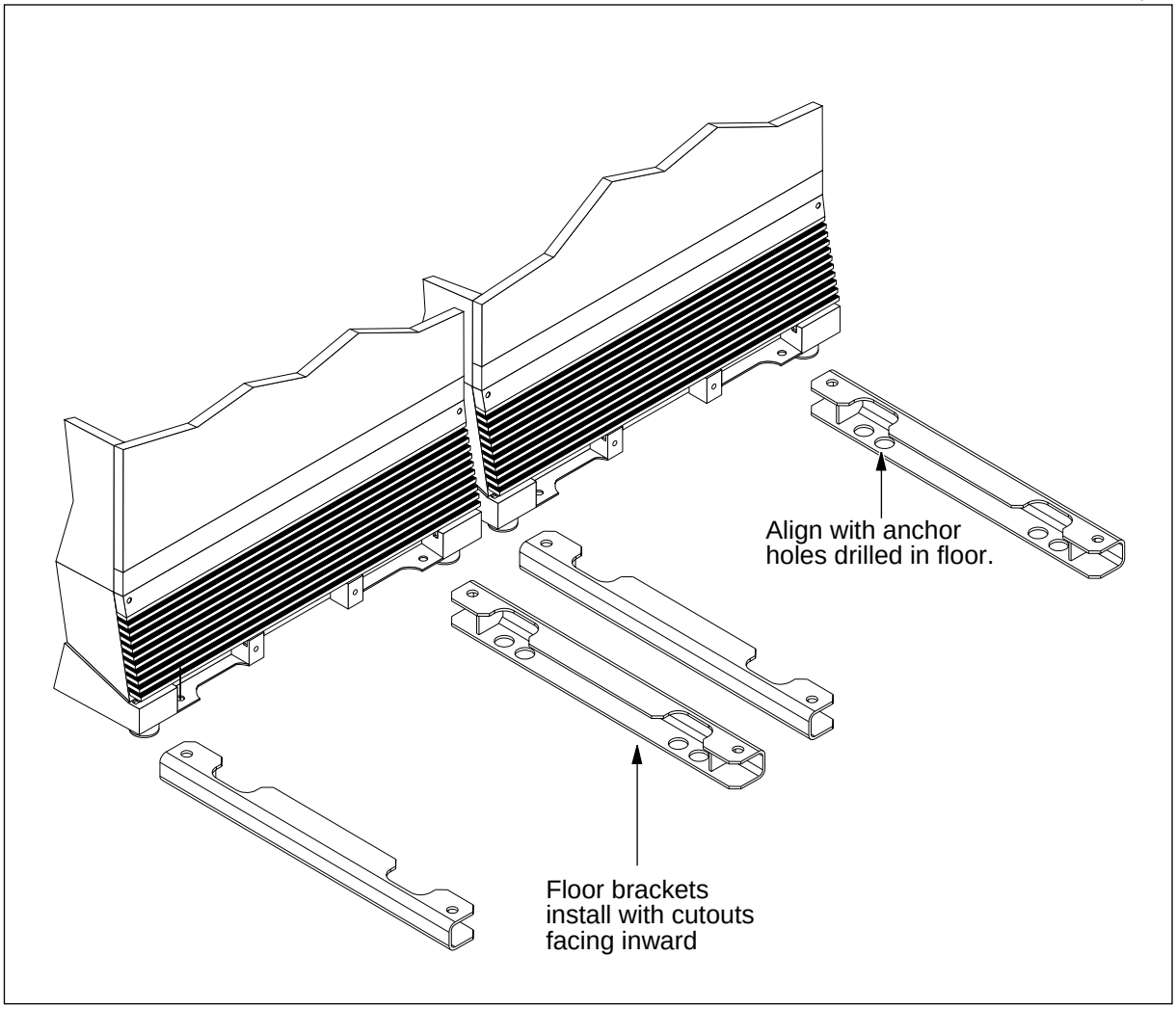
—continued—

Procedure 6-2 (continued)
Positioning and securing cabinets with anchor kits

Step	Action
	Installing floor brackets
2	Install two floor brackets for the cabinet onto the floor using two sets of anchor bolt hardware each as shown in Figure 6-3 and Figure 6-4.
3	Tighten the anchor bolts just enough to prevent the floor brackets from shifting. Do not tighten fully.

Figure 6-3
Placement of the seismic anchor plates

FW-15777

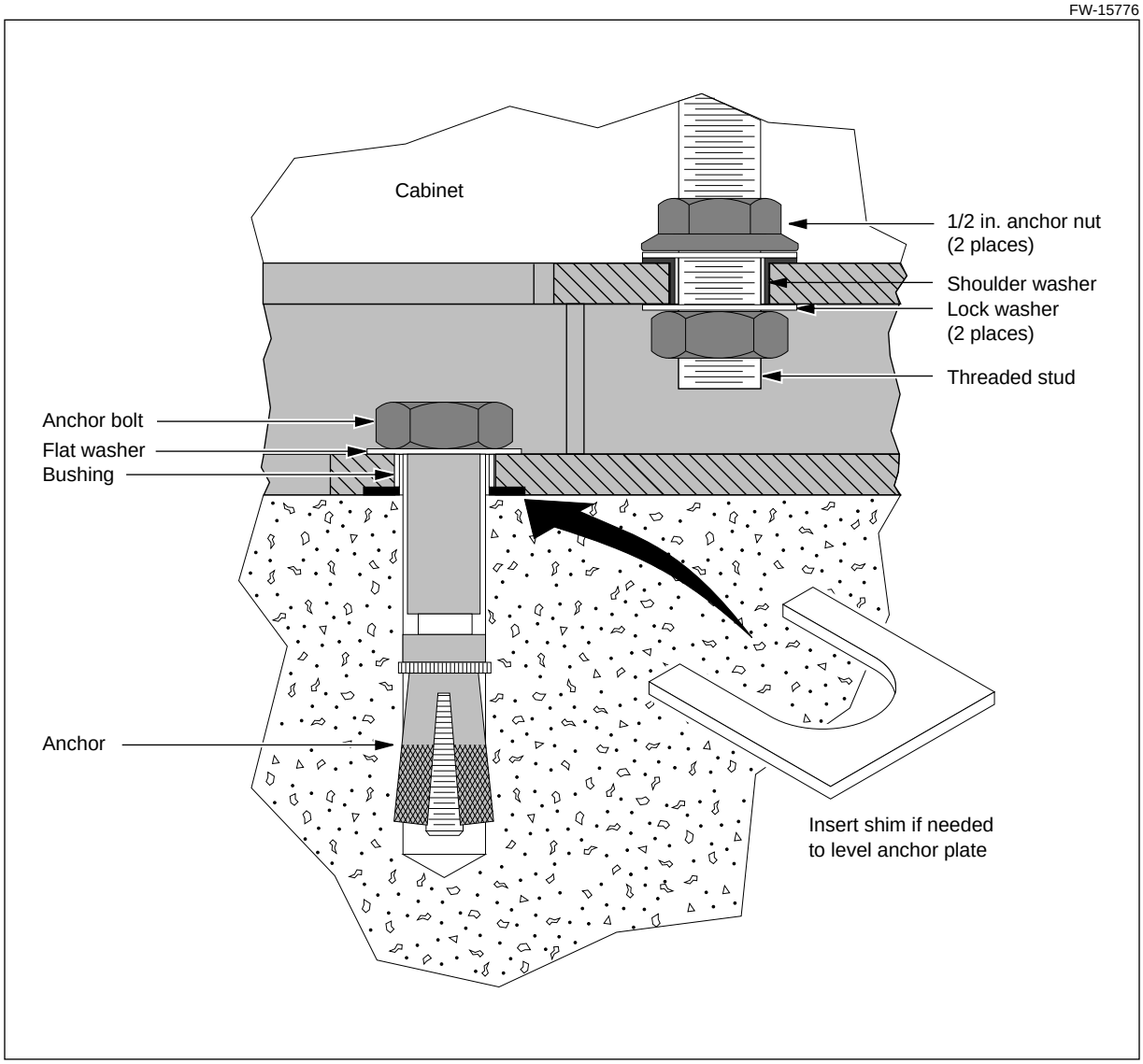


—continued—

Procedure 6-2 (continued)
Positioning and securing cabinets with anchor kits

Figure 6-4
Placement of the anchor bolts

FW-15776



—continued—

Procedure 6-2 (continued)
Positioning and securing cabinets with anchor kits

Step	Action
4	Using the spirit level, verify that the top surfaces of the floor brackets are level. ***Note:*** If they are not level, loosen the hardware on each non-leveled floor bracket, insert a metal shim (supplied in the anchoring kit) between the floor bracket and the floor at the anchor location, snug the hardware up again, and verify the level again using the spirit level.
5	Repeat step 4 until the top surfaces of the floor brackets are level.
6	Tighten the anchor bolts to a torque of 90 ft-lb.
Removing the leveling feet	
7	Remove the leveling feet on the bottom of the cabinet: **a.** Use a 3/4 in. socket to remove the 3/4 in. nut on top of each leveling foot. **b.** Use a 12 in. flathead screwdriver to adjust each leveling foot counterclockwise to remove the foot.
8	If you are installing the first cabinet, go to step 9. if you are installing the next cabinet, go to step 14.
Mounting the first cabinet	
9	Maneuver the cabinet onto the pair of floor brackets so that the holes in the top floor brackets align with the corresponding threaded levelling foot holes in the pedestal (see Figure 6-4).
10	Check that the cabinet is still aligned with the base reference lines marked on the floor, and readjust the cabinets or the floor brackets as necessary.
11	Insert the threaded bolt/rod hardware that secures the cabinet to the floor brackets as shown in Figure 6-4, but do not tighten it.
12	Using the spirit level, check that the top of the cabinet is horizontal and that the sides of the cabinet are vertical. If not, add shims accordingly.
13	Tighten the hardware that secures the cabinet to the floor bracket to a torque of 35 ft-lb then go to step 20.

—continued—

Procedure 6-2 (continued)
Positioning and securing cabinets with anchor kits

Step	Action

Mounting the next cabinet

14 Maneuver the next cabinet onto the pair of remaining floor brackets so that the holes in the floor brackets align with the corresponding threaded levelling foot holes in the pedestal (see Figure 6-4 on page 6-9).

15 Verify the alignment of the following:

- front of the cabinet with the base reference line on the floor
- mounting holes on each expansion kit with the expansion kit mounting holes on this cabinet.

If either of these two items are not in alignment, adjust the floor hardware as necessary.

16 Insert the threaded bolt/rod hardware that secures the cabinet to the floor brackets as shown in Figure 6-4, but do not tighten it.

17 Using the spirit level, check that the top of the cabinet is horizontal and that the sides of the cabinet are vertical. If not, add shims accordingly.

18 Tighten the hardware that secures the cabinet to the floor bracket to a torque of 35 ft-lb.

Connecting the expansion kit

CAUTION
Risk of damage to expansion kit
Do not use the screws that secure the expansion kit to draw the cabinets into alignment. Doing so will damage the expansion kit or strip the screw threads. Align the cabinets carefully before attempting to insert the screws.

19 Use four screws to connect the expansion kit to this cabinet as shown in Figure 6-5, and tighten it using a 5/16 in. socket wrench.

20 If you have another cabinet to install, go the step 21. If this is the last cabinet, got to step 23.

Installing an expansion kit

21 Use four screws to install one expansion kit on each module in the cabinet that butts onto a module in the next cabinet as shown in Figure 6-5.

22 Go to step 2 to install the next cabinet.

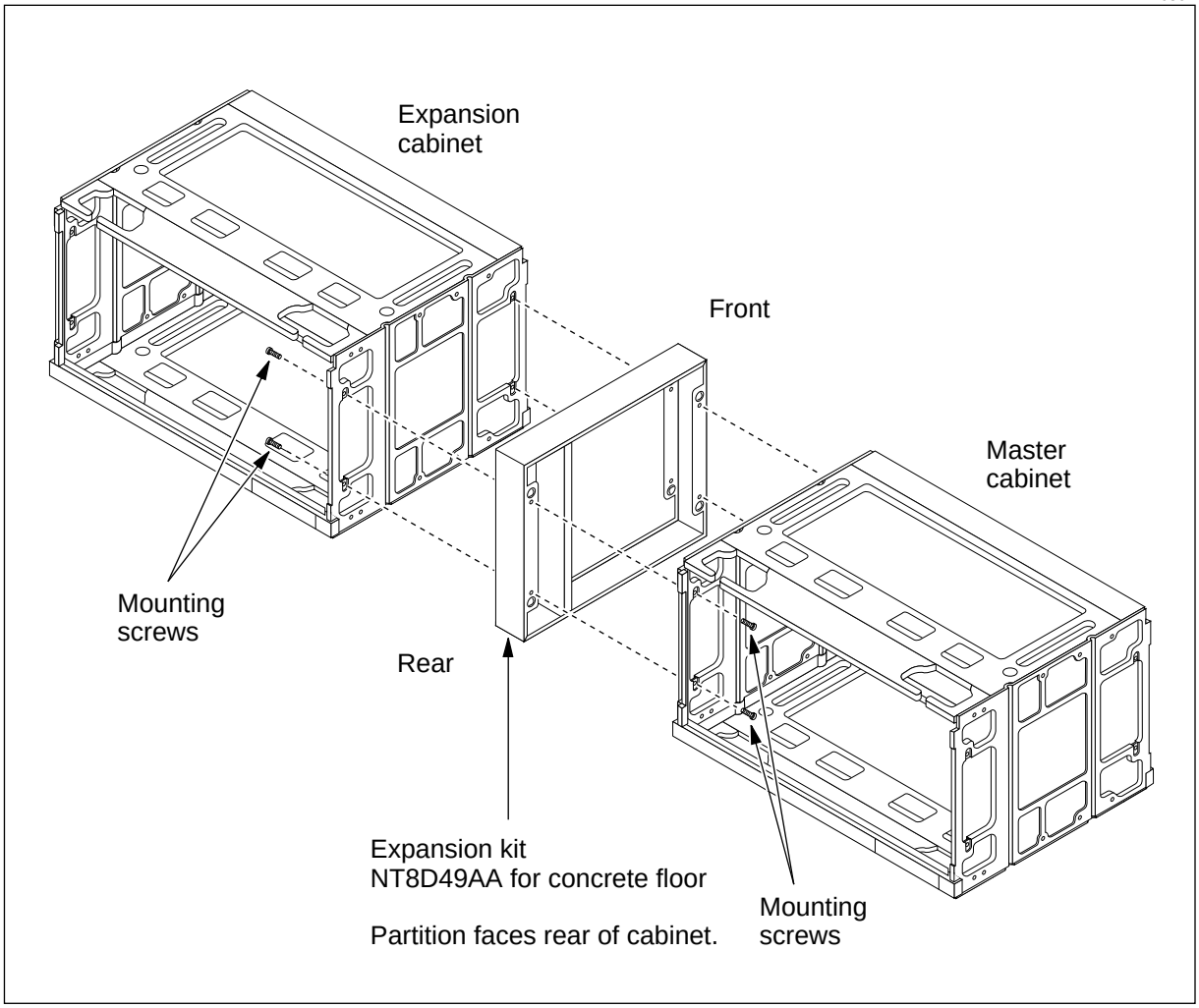
23 Perform Procedure 6-4, “Installing an NT4K09BA overhead cable entrance kit” on page 6-19.

—continued—

Procedure 6-2 (continued)
Positioning and securing cabinets with anchor kits

Figure 6-5
Installing an expansion kit, view showing the rear of the module

FW-10861



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Procedure 6-3
Positioning cabinets with no anchor kits

Use this procedure to position Modular Business Package (MBP) cabinets and Modular Power Package (MPP) cabinets on raised floors or on concrete floors when no anchor kit is used.

Because of numerous variations in the construction of raised floors, Nortel Networks does not supply an anchor kit to secure the cabinets for installations on raised floors. If a customer requires the installation of special hardware to secure the cabinets in non-seismic installations on raised floors, such hardware must be site-engineered, with assistance from Northern Telecom.

Requirements

The following tools and materials are required:

- spirit level
- ratchet with 1.9 cm (3/4 in.) socket
- nut driver 0.79 cm (5/16 in.)
- screwdriver, 30.5 cm (12 in.) medium flathead
- NT8D49AA expansion kits (for co-located cabinets)

The floor must have been marked and any cable openings cut in the floor, as described in Procedure 3-2, “Preparing a raised floor for mounting cabinets” on page 3-7.

DANGER

Risk of injury when maneuvering cabinets

Uncrated cabinets weigh from 170 kg (380 lb) to 280 kg (630 lb). Use at least two people to maneuver the cabinets. Ensure that you also wear protective foot gear and gloves.

CAUTION

Avoid structural stress when maneuvering uncrated cabinets

When handling or maneuvering uncrated cabinets, exercise care to avoid strain, excessive shock, or vibrations that might damage the equipment.

—continued—

Procedure 6-3 (continued)
Positioning cabinets with no anchor kits

Action

Step	Action

1 Select a cabinet to install: MPP cabinet, master cabinet, or expansion cabinet.

Note: If the line-up is adjacent to a wall, always begin the layout with the cabinet nearest the wall and work away from the wall. If the line-up is on the end of an existing equipment line-up, always begin the layout with the cabinet that adjoins the line-up.

2 Go the one of the following steps according to the cabinet you have selected to install:

If the cabinet is a	Then go to
MPP cabinet	step 3
Master cabinet	step 11
Expansion cabinet	step 19

MPP cabinet

3 Maneuver the MPP cabinet into position so that the outline of the pedestal aligns with the base reference lines marked on the floor.

4 Lower the levelling feet or the casters (whichever is fitted) on the MPP cabinet to within about 19 mm (3/4 in.) above the finished floor by using the following steps:

a. Use the 3/4 in. socket to loosen the 3/4 in. nut on top of each levelling foot.

b. Use the 12 in. flathead screwdriver to adjust each levelling foot clockwise to raise the cabinet or counterclockwise to lower the cabinet.

5 Using the spirit level, check that the top of the MPP cabinet is horizontal, and that the sides of the cabinet are vertical. If not, readjust the levelling feet (or casters).

6 Do one of the following:

If the MPP cabinet is to be	Then go to
attached to the master cabinet	step 7
installed remotely from the master cabinet	step 10

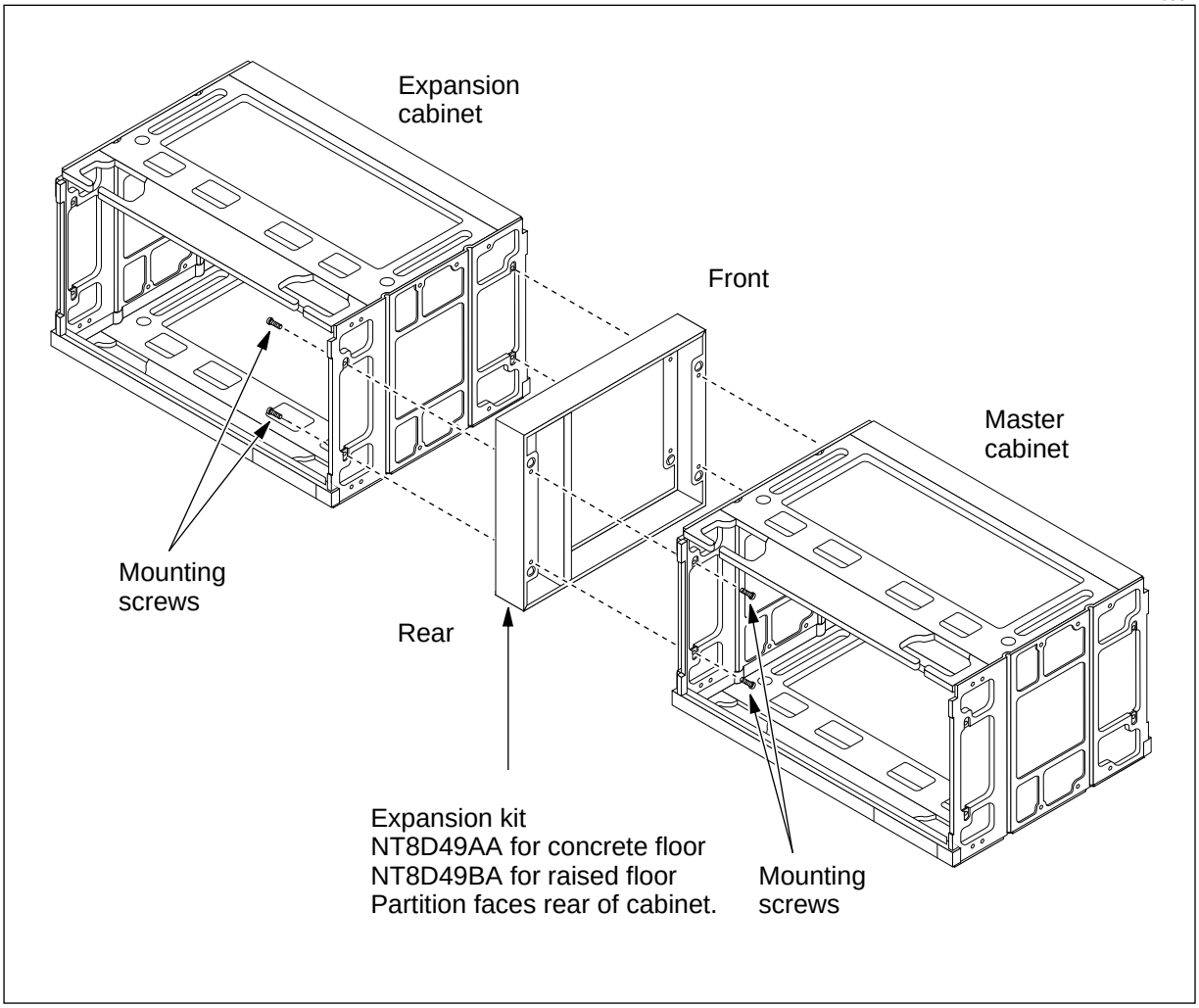
7 If the master cabinet has been installed, skip to step 8, otherwise use four 10-28 by 1/2 in. screws included in each NT8D49 expansion kit to secure an expansion kit to the right-hand side (viewed from the front of the cabinet) of the MPP cabinet, as shown in Figure 6-6. Go to step 10.

—continued—

Procedure 6-3 (continued)
Positioning cabinets with no anchor kits

Figure 6-6
Installing an expansion kit

FW-10861



—continued—

Procedure 6-3 (continued)
Positioning cabinets with no anchor kits

Step	Action

8 Verify that the holes in the expansion kit are aligned with the corresponding holes in the MPP cabinet. If not adjust the levelling feet (or casters) accordingly.

> **CAUTION**
> **Risk of damage to expansion kit**
> Do not use the screws that secure the expansion kit as a means to draw the cabinets into alignment. Doing so will damage the threads in the expansion kit. Align the cabinets carefully before attempting to insert the screws.

9 Insert and tighten the four screws that secure the expansion kit to the MPP cabinet, as shown in Figure 6-6.

10 Select the next cabinet to install in the order shown in the following list:

If the next cabinet is a	Then go to
Master cabinet	step 11
Expansion cabinet	step 19
none	step 26

Master cabinet

11 Maneuver the master cabinet into position so that the pedestal aligns with the base reference line marked on the floor.

12 Adjust the levelling feet (or casters) so that the holes in the expansion kits on the MPP cabinet align with the corresponding holes in the master cabinet by using the following steps:

a. Use the 3/4 in. socket to loosen the 3/4 in. nut on top of each levelling foot.

b. Use the 12 in. flathead screwdriver to adjust each levelling foot clockwise to raise the cabinet or counterclockwise to lower the cabinet.

13 Using the spirit level, check that the top of the master cabinet is horizontal, and that the side of the cabinet are vertical. If not, readjust the levelling feet (or casters).

14 If a co-located cabinet has already been installed, skip to step 16.

—continued—

Procedure 6-3 (continued)
Positioning cabinets with no anchor kits

Step	Action

15 If no other cabinet is to be installed, go to step 26. If a co-located cabinet will be installed next, do the following:

a. use four 10-28 by 1/2 in. screws included in each NT8D49 expansion kit to secure expansion kits to the cabinet, as shown in Figure 6-6.

Note: An MPP can be attached to the left-hand side and an expansion cabinet can be attached to the right-hand side of a master cabinet.

b. Go to step 18.

16 Verify that the holes in the expansion kits are still aligned with the corresponding holes in the master cabinet. If not adjust the levelling feet (or casters) accordingly.

CAUTION
Risk of damage to expansion kit
Do not use the screws that secure the expansion kit as a means to draw the cabinets into alignment. Doing so will damage the threads in the expansion kit. Align the cabinets carefully before attempting to insert the screws.

17 Insert and tighten the four screws that secure each expansion kit to the cabinet, as shown in Figure 6-6.

18 Select the next cabinet to install in the order shown in the following list:

If the next cabinet is	Then go to
an MPP cabinet	step 3
Expansion cabinet	step 19
none	step 26

—continued—

Procedure 6-3 (continued)
Positioning cabinets with no anchor kits

Step	Action
	Expansion cabinet
19	Maneuver the expansion cabinet into position so that the front edge of the pedestal aligns with the front base reference line marked on the floor.
20	Adjust the levelling feet so that the holes in the expansion kits on the expansion cabinet align with the corresponding holes in the master cabinet by using the following steps: **a.** Use the 3/4 in. socket to loosen the 3/4 in. nut on top of each levelling foot. **b.** Use the 12 in. flathead screwdriver to adjust each levelling foot clockwise to raise the cabinet or counterclockwise to lower the cabinet.
21	Using the spirit level, check that the top of the cabinet is horizontal, and that the sides of the cabinet are vertical. If not, readjust the levelling feet (or casters).
22	If a master cabinet has already been installed, skip to step 23, otherwise use four 10-28 by 1/2 in. screws included in each NT8D49 expansion kit to secure expansion kits to the cabinet, as shown in Figure 6-6. Go to step 25. ***Note:*** A master cabinet can be attached to the left-hand side of an expansion cabinet.
23	Check that the holes in the expansion kit still align with the corresponding holes in the master cabinet. If not adjust the levelling feet (or casters) accordingly.

CAUTION
Risk of damage to expansion kit
Do not use the screws that secure the expansion kit as a means to draw the cabinets into alignment. Doing so will damage the threads in the expansion kit. Align the cabinets carefully before attempting to insert the screws.

24	Insert and tighten the four screws that secure the expansion kit to the master cabinet, as shown in Figure 6-6.
25	Select the next cabinet to install in the order shown in the following list:

If the next cabinet is	Then go to
an MPP cabinet	step 3
Expansion cabinet	step 19
none	step 26

26	Go to Procedure 6-4, “Installing an NT4K09BA overhead cable entrance kit”.

—end—

Procedure 6-4
Installing an NT4K09BA overhead cable entrance kit

Use this procedure to install the NT4K09BA overhead cable entrance kit onto a Modular business Package (MBP) cabinet or a Modular Power Package (MPP) cabinet when the cabinet installation is on concrete floors or other floor conditions that necessitate over-head cabling.

Requirements

The following tools and materials are required:

- end wrench, 1.43 cm (9/16 in.)

Before performing this procedure, remove the equipment covers as described in Procedure 5-1, “Removing equipment covers” on page 5-4.

Action

Step	Action
1	Install one helical spring washer onto each of four cable entrance mounting bolts.
2	Insert the cable entrance mounting bolts with the spring washers installed through the end holes in the cable entrance cross bars.
3	Install the support posts onto the bolt.
4	Mount the cable entrance assemblies on top of the cabinet in alignment with the framework’s cable entrance mounting holes located adjacent to the top cap as shown in Figure 6-7. ***Note:*** The cross bars run across the top of the cabinet top cap from the front to the rear.
5	Use the 9/16 end wrench to securely install the four bolts into the top of the cabinet.
6	Go to Chapter 7, “Connecting the grounding and power cables” on page 7-1.

—continued—

Procedure 6-4 (continued)
Installing an NT4K09BA overhead cable entrance kit

Figure 6-7
Cable entrance installation exploded view

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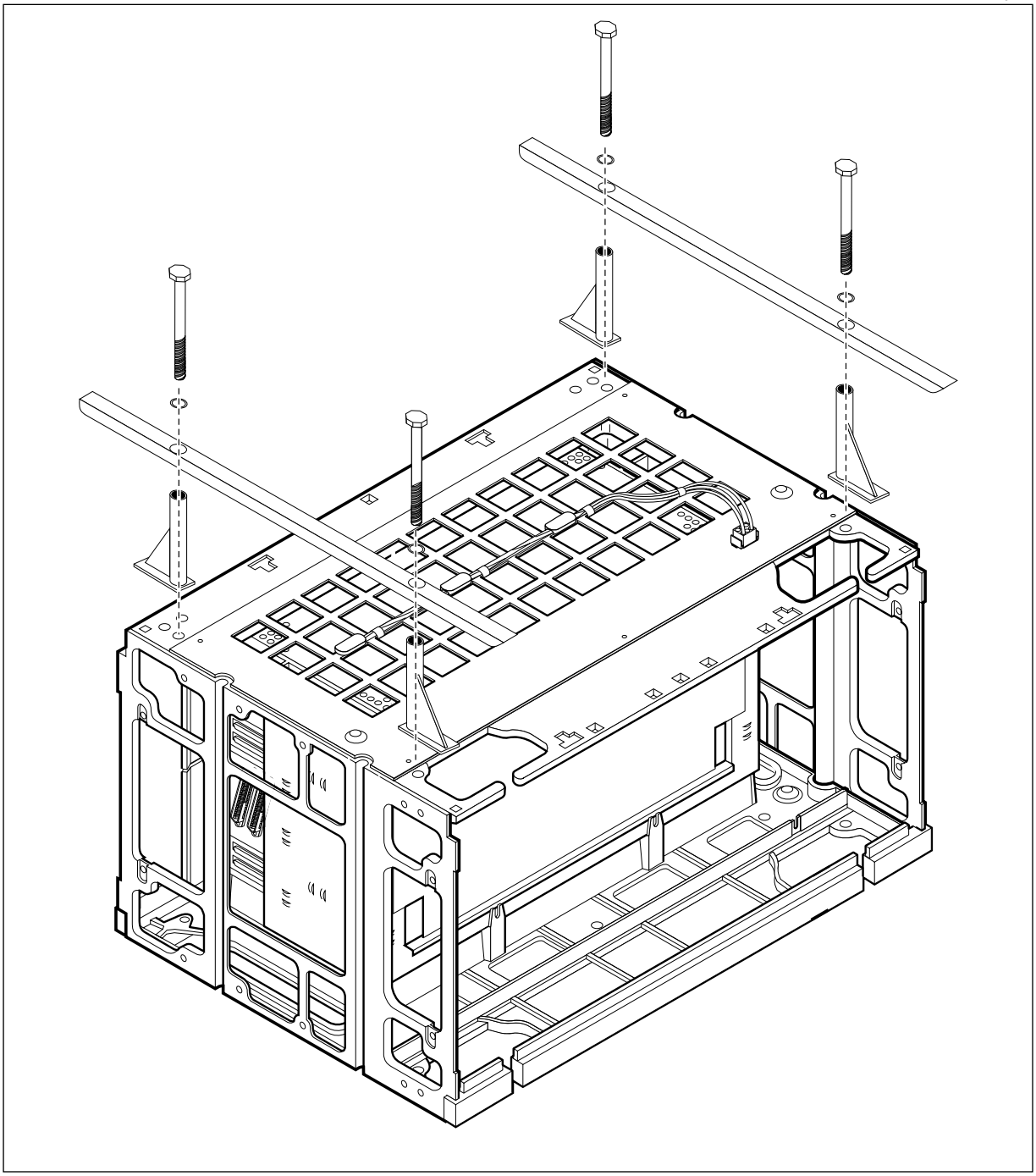


—end—

Connecting the grounding and power cables

This chapter provides the procedures to install ground cables, dc power harnesses between cabinets, and to connect ac power to a Modular Power Package (MPP) cabinet.

Chapter task lists

Select the task list for the configuration and equipment that you are installing. Perform the procedures listed in that task list.

Installing a multiplexer configuration, no MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the ground cables	page 7-6
Connecting the -48 V dc power cables, dc power source supplied by the customer	page 7-22
In systems equipped with an internal DSX-1 shelf and a T1 repeater shelf:	
Connect an NT4K84ZB cable to the terminal block in the master cabinet	page 7-34
Connect an NT4K81DA cable from the terminal block in the master cabinet to the DSX-1 shelf and the T1 repeater shelf	page 7-42

Installing a multiplexer configuration, with an MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the ground cables	page 7-6
Connecting the -48 V dc power cables, power source in an MPP cabinet	page 7-27
In systems equipped with an internal DSX-1 shelf and a T1 repeater shelf:	
Connect an NT4K84ZB cable to the terminal block in the master cabinet	page 7-34
Connect an NT4K81DA cable from the terminal block in the master cabinet to the DSX-1 shelf and the T1 repeater shelf	page 7-42
Connecting the ac feeds to the MPP cabinet	page 7-48
In systems that are equipped with backup batteries, connect the power cables from the backup batteries to the MPP cabinet	page 7-53

Installing a 96-line to 480-line single-cabinet configuration, no MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the ground cables	page 7-6
Connecting the -48 V dc power cables, dc power source supplied by the customer	page 7-22
In systems equipped with an internal DSX-1 shelf and a T1 repeater shelf:	
Connect an NT4K84ZB cable to the terminal block in the master cabinet	page 7-34
Connect an NT4K81DA cable from the terminal block in the master cabinet to the DSX-1 shelf and the T1 repeater shelf	page 7-42

Installing a 96-line to 480-line single-cabinet configuration, with an MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the ground cables	page 7-6
Connecting the -48 V dc power cables, power source in an MPP cabinet	page 7-27
In systems equipped with an internal DSX-1 shelf and a T1 repeater shelf:	
Connect an NT4K84ZB cable to the terminal block in the master cabinet	page 7-34
Connect an NT4K81DA cable from the terminal block in the master cabinet to the DSX-1 shelf and the repeater shelf	page 7-42
Connecting the ac feeds to MPP cabinet	page 7-48
In systems that are equipped with backup batteries, connect the power cables from the backup batteries to the MPP cabinet.	page 7-53

Installing a 384-line to 672-line two-cabinet configuration, no MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the ground cables	page 7-6
Connecting the dc power distribution harnesses from the expansion cabinet to the master cabinet	page 7-18
Connecting the -48 V dc power cables, dc power source supplied by the customer	page 7-22
In systems equipped with an internal DSX-1 shelf and a T1 repeater shelf:	
Connecting an NT4K84ZB cable to the terminal block in the master cabinet	page 7-34
Connecting an NT4K81DA cable from the terminal block in the master cabinet to the DSX-1 shelf and the T1 repeater shelf	page 7-42

Installing a 384-line to 672-line two-cabinet configuration, with an MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the ground cables	page 7-6
Connecting the dc power distribution harnesses from the expansion cabinet to the master cabinet	page 7-18
Connecting the -48 V dc power cables, power source in an MPP cabinet	page 7-27
In systems equipped with an internal DSX-1 shelf and a T1 repeater shelf:	
Connect an NT4K84ZB cable to the terminal block in the master cabinet	page 7-34
Connect an NT4K81DA cable from the terminal block in the master cabinet to the DSX-1 shelf and the T1 repeater shelf	page 7-42
Connecting the ac feeds to the MPP cabinet	page 7-48
In systems that are equipped with backup batteries, connect the power cables from the backup batteries to the MPP cabinet.	page 7-53

Adding an MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the ground cables	page 7-6
Connecting the -48 V dc power cables, dc power source supplied by the customer	page 7-22
In systems equipped with an internal DSX-1 shelf and a T1 repeater shelf, connect an NT4K84ZA or ZB cable to the terminal block in the master MBP cabinet	page 7-34
Connecting the ac feeds to the MPP cabinet	page 7-48
In systems that are equipped with backup batteries, connect the power cables from the backup batteries to the MPP cabinet.	page 7-53

Adding an expansion cabinet

Perform the procedures in the following table in the order in which they are listed.

Task	See
Connecting the ground cables	page 7-6
Connecting the dc power distribution harnesses from the expansion cabinet to the master cabinet	page 7-18
In systems equipped with a DSX-1 shelf and a T1 repeater shelf, connect an NT4K81DA cable from the terminal block in the master cabinet to the DSX-1 shelf	page 7-34

Procedure 7-1
Connecting the ground cables

Use this procedure to connect ground cables to Modular Business Package (MBP) cabinets and Modular Power Package (MPP) cabinets.

Two pairs of lugs on the pedestal of each cabinet are electrically connected to a common ground point to provide cabinet grounding. In buildings that use a common bonding network (CBN) grounding scheme, the common ground point is a floor ground bar (FGB). In buildings that use an isolated bonding network (IBN) grounding scheme, the common ground point is a single point ground (SPG). In small buildings, the FGB or SPG may not exist. In such cases, the building principal ground (BPG) is used as the common ground point.

The dc distribution shelf in the Modular Power Package (MPP) cabinet is equipped with a set of ground screws that are used for connecting a ground equalization bar inside the dc distribution shelf to the common ground point (SPG, FGB, or BPG).

All ground leads connected to the pedestal are 6 AWG green stranded single-conductor wire. The ground lead connected to the ground equalization bar of the dc distribution shelf is 6 AWG white or black stranded grounding lead.

For an explanation of grounding schemes, see *Addendum 1 (MBP) Site Installation Planning and Engineering*, 323-3001-200.

The MBP cabinets, the MPP cabinet, and the battery racks are daisy-chained and the last unit in the chain is connected to the common ground point with 6 AWG green stranded grounding lead. If the distance between units, or between the last unit in the chain and the common ground point exceeds 16 m (53 ft), 2 AWG wire must be used to cover the distance. Alternatively, each unit can be bonded to a 1/0 AWG collector by means of a 1 m (3.3 ft) length of 6 AWG stranded wire. The collector is in turn bonded to the common ground point by 2 AWG wire.

—continued—

Procedure 7-1 (continued)
Connecting the ground cables

Requirements

The following tools and materials are required:

- 6 AWG stranded conductor, with green jacket
- cable cutter
- power knife
- hex nut driver set
- crimping tool for ground lugs
- 2-hole ground lugs, holes spaced 5/8 in. apart and 1/4 in. dia. hole size
- cable ties
- torque wrench, capacity: 100 in-lb

Action

Step	Action

1 Choose one of the following steps:

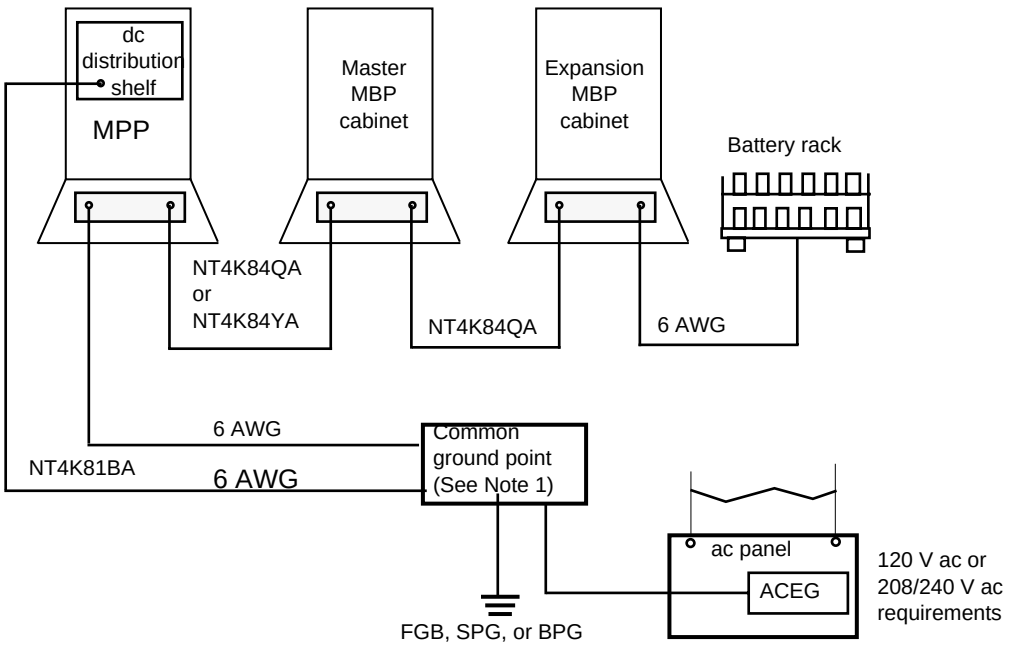
If the installation	And	Then go to
includes an MPP cabinet	a ground collector is NOT being used	step 2
	a ground collector is being used	step 22
does not include an MPP cabinet	a ground collector is NOT being used	step 32
	a ground collector is being installed	step 49

—continued—

Procedure 7-1 (continued)
Connecting the ground cables

Step	Action
	MPP cabinet without ground collector
2	See the schematic diagram in Figure 7-1 for a layout of the ground cables to be installed.

Figure 7-1
Grounding for systems powered from an MPP cabinet, without collector



Note 1: In buildings that use a common bonding network (CBN) grounding scheme, the common ground point is the floor ground bar (FGB). In buildings that use an isolated bonding network (IBN) grounding scheme, the common ground point is a single point ground (SPG). In small buildings, an FGB or an SPG may not exist. When this is the case, the (BPG) building principal ground is used as the common ground point.

Note 2: If the distance between pieces of equipment, or between the last piece of equipment in the grounding chain and the common ground point exceeds 16 m (53 ft), 2 AWG wire must be used to cover the distance.

—continued—

Procedure 7-1 (continued)
Connecting the ground cables

Step	Action
3	Route an NT4K84QA bay-bay ground cable between the pedestals of the master MBP cabinet and the expansion MBP cabinet. Refer to Figure 7-2 on page 7-10 for routing details of the ground cable.
4	At each end of the cable, attach the two-hole ground lug to the ground studs on the pedestal with two nuts.
5	Tighten the nuts on the ground studs to a torque of 67 in-lb.
6	Install a grounding cable between the pedestal of the MBP master cabinet and the pedestal of the MPP cabinet. ***Note:*** If the MPP cabinet is attached to the master cabinet, install an NT4K84QA ground cable. If the MPP cabinet is installed remotely from the MBP master cabinet, install an NT4K84YA ground cable. See Figure 7-2 on page 7-10 for routing details of the ground cable.
7	At both ends of the cable, attach the two-hole ground lug to the ground studs on the pedestal using two nuts.
8	Tighten the nuts to a torque of 67 in-lb.
9	Route a 6 AWG ground lead from the frame ground of the battery rack to the pedestal of the expansion cabinet. If an expansion cabinet is not used, route the lead to the pedestal of the master cabinet.
10	Attach the ground lead to the ground point on the battery rack according to the manufacturer's instructions.
11	Strip the pedestal end of the ground lead 13 mm (0.5 in.) and crimp a ground lug to the free end of the lead.

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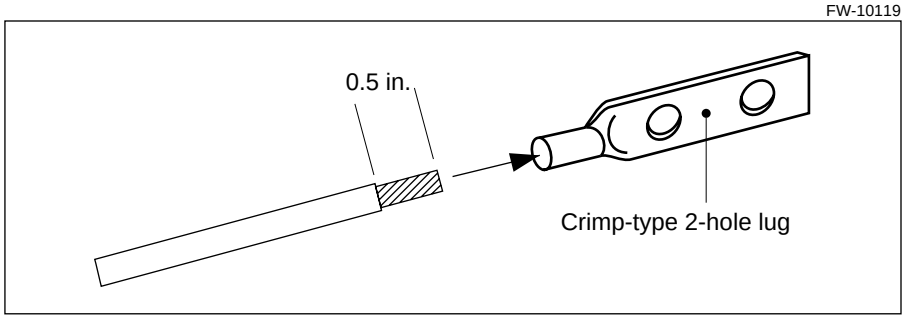


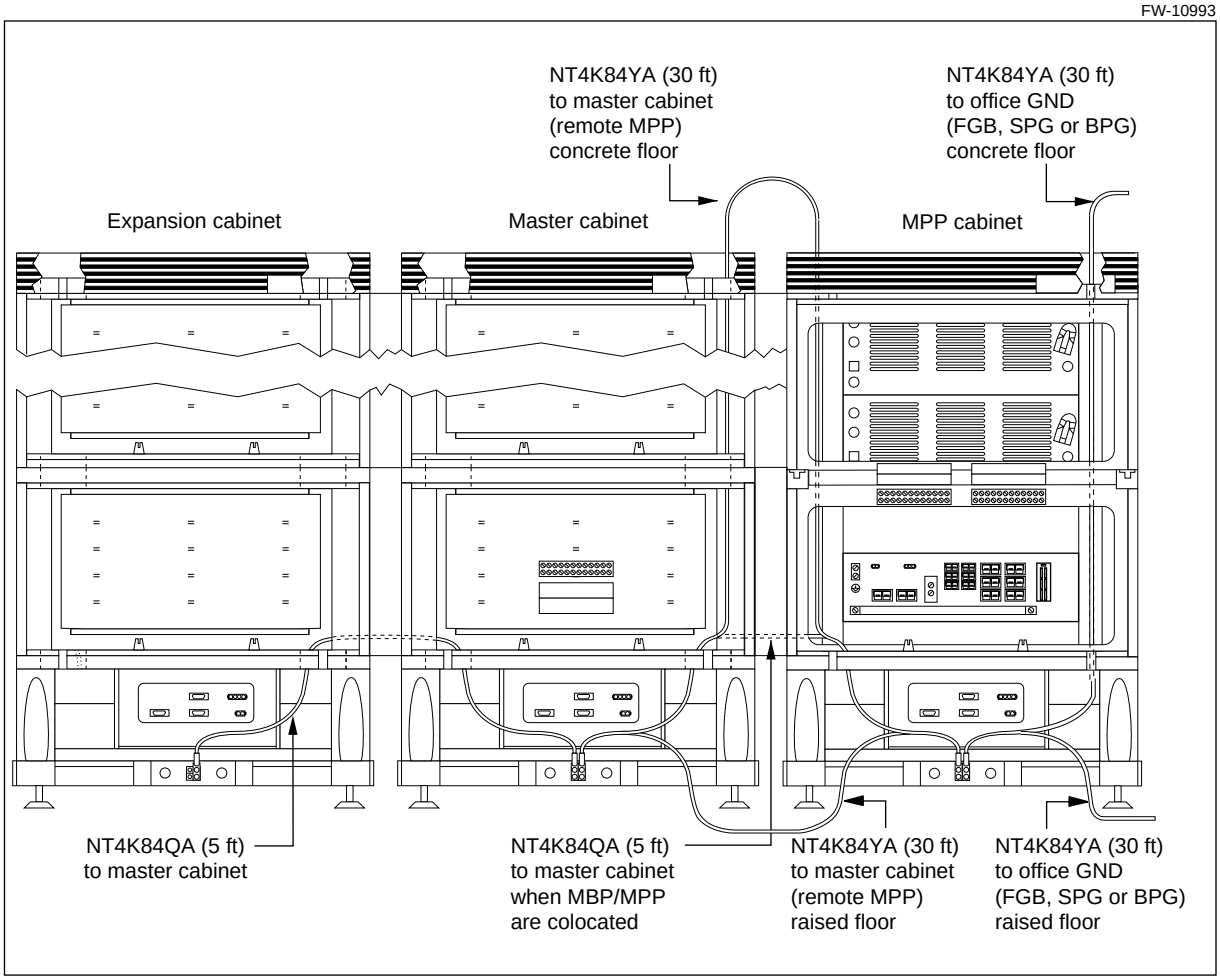
12	Attach the two-hole ground lug to the ground studs on the expansion cabinet (or the master cabinet, if an expansion cabinet is not used) using two nuts.
13	Tighten the nuts on the ground studs to a torque of 67 in-lb.
14	Route a 6 AWG ground lead from the remaining ground lugs on the pedestal of the MPP cabinet to the common ground point.

—continued—

Procedure 7-1 (continued)
Connecting the ground cables

Step	Action
15	Attach the ground lead to the common ground point according to the local electrical codes.
16	Strip the pedestal end of the ground lead 13 mm (0.5 in.) and crimp a ground lug to the free end of the lead.
17	Attach the two-hole ground lug on the pedestal end of the lead to the frame ground point on the pedestal of the MPP cabinet using two nuts.
18	Tighten the nuts on the ground studs to a torque of 67 in-lb.

Figure 7-2
Routing an NT4K84QA or NT4K84YA ground cable between cabinets



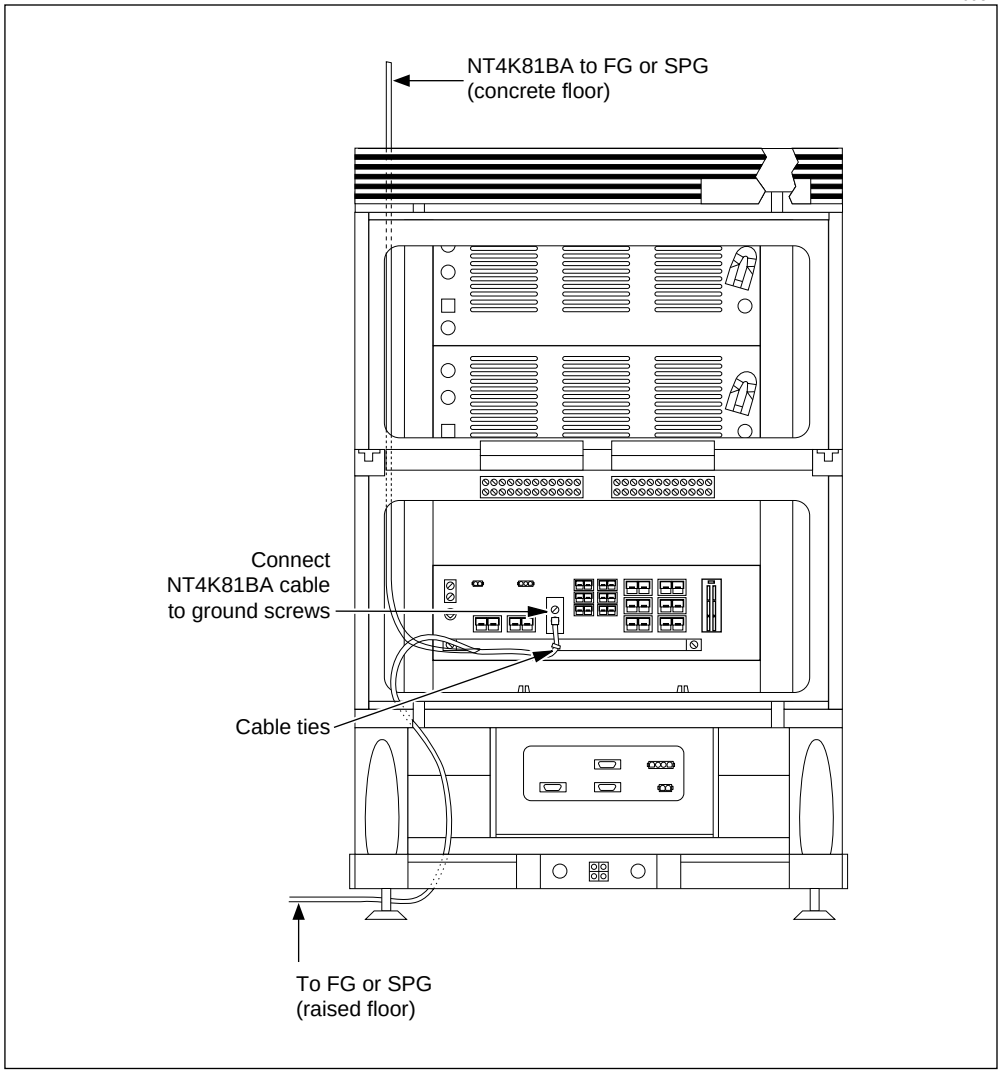
—continued—

Procedure 7-1 (continued)
Connecting the ground cables

Step	Action
19	Connect an NT4K81BA ground cable to the dc distribution shelf in the MPP cabinet, as shown in Figure 7-3.

Figure 7-3
Connecting an NT4K81BA ground cable to the dc distribution shelf in an MPP cabinet

FW-10954

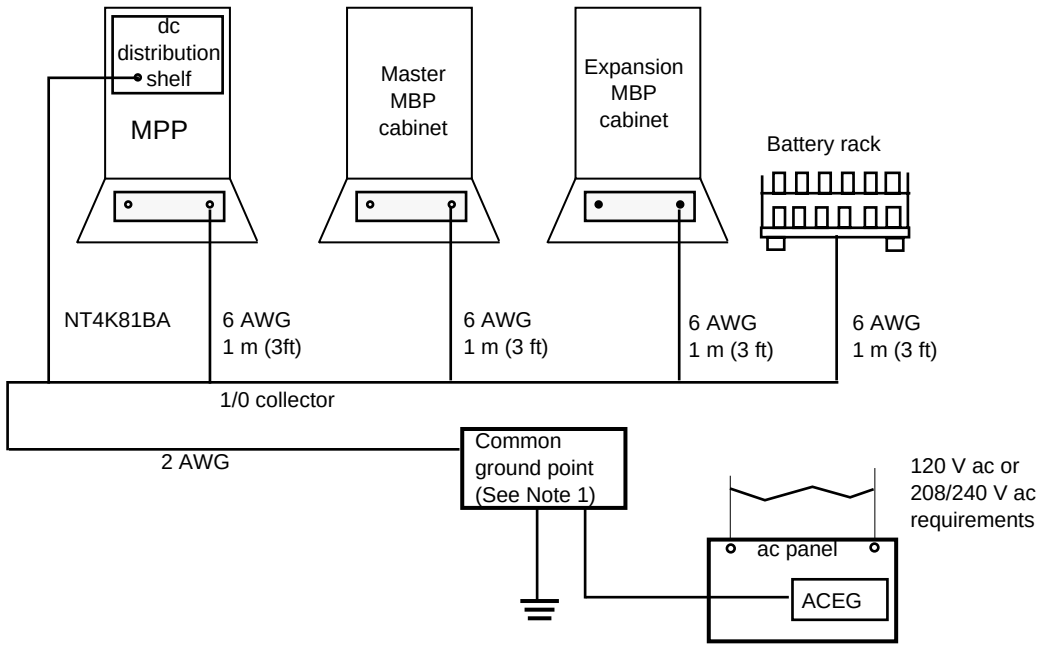


—continued—

Procedure 7-1 (continued)
Connecting the ground cables

Step	Action
20	Use a cable tie to attach the NT4K81BA cable to the bar on the rear of the dc distribution shelf.
21	Route the NT4K81BA cable to the common ground point and connect it according to local electrical codes. You have completed this procedure. Do not continue.
MPP cabinet with ground collector	
22	See the schematic diagram in Figure 7-4 for a layout of the ground cables to be installed.
23	Attach a 1/0 collector to the common ground point by means of 2 AWG wire in accordance with local electrical codes.

Figure 7-4
Grounding for systems powered from an MPP cabinet, with a collector



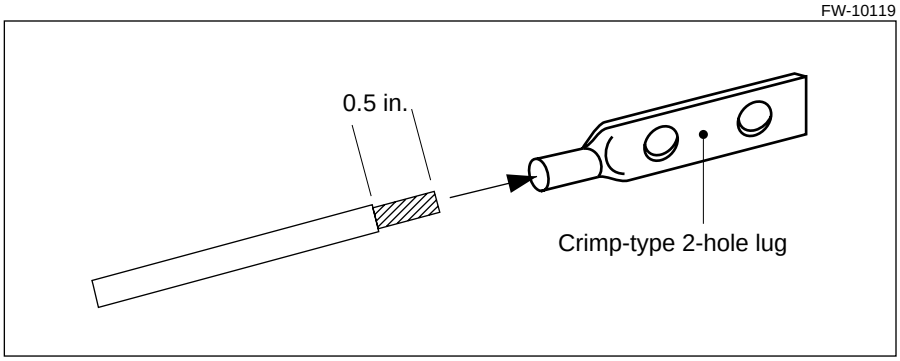
Note: In buildings that use a common bonding network (CBN) grounding scheme, the common ground point is the floor ground bar (FGB). In buildings that use an isolated bonding network (IBN) grounding scheme, the common ground point is a single point ground (SPG). In small buildings, an FGB or an SPG may not exist. When this is the case, the (BPG) building principal ground is used as the common ground point.

—continued—

Procedure 7-1 (continued)
Connecting the ground cables

Step	Action
24	Route 6 green jacket ground leads from the four points on the 1/0 AWG collector to the components shown in Figure 7-4 on page 7-12.
25	Attach one end of each of the four 6 AWG leads to the 1/0 AWG collector in accordance with local electrical codes.
26	Connect the free end of a 6 AWG lead to the frame ground point on the battery rack in accordance with the manufacturer's instructions.
27	Strip the free end of the remaining 6 AWG ground leads 13 mm (0.5 in.) and crimp ground lugs to the stripped leads.

FW-10119



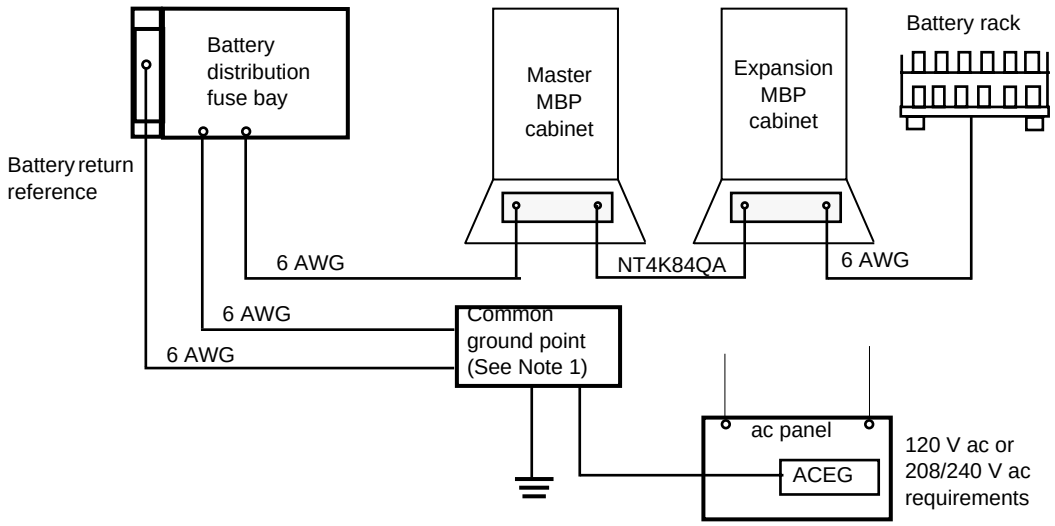
28	Attach the ground lugs on the free ends of the unconnected ground leads to the ground studs on the pedestals of each cabinet using two nuts for each ground lug.
29	Tighten the nuts on the ground studs to a torque of 67 in-lb.
30	Attach the NT4K81BA ground cable between the terminal block on the dc distribution shelf and the 1/0 collector, as shown in Figure 7-3 on page 7-11.
31	Use a cable tie to attach the NT4K81BA cable to the bar on the rear of the dc distribution shelf.

—continued—

Procedure 7-1 (continued)
Connecting the ground cables

Step	Action
	Customer-supplied dc power source without ground collector
32	See the schematic diagram in Figure 7-5 for a layout of the ground cables to be installed.

Figure 7-5
Grounding for systems powered from a customer-supplied source of dc power, without a collector



Note 1: In buildings that use a common bonding network (CBN) grounding scheme, the common ground point is the floor ground bar (FGB). In buildings that use an isolated bonding network (IBN) grounding scheme, the common ground point is a single point ground (SPG). In small buildings, an FGB or an SPG may not exist. When this is the case, the building principal ground is used as the common ground point.

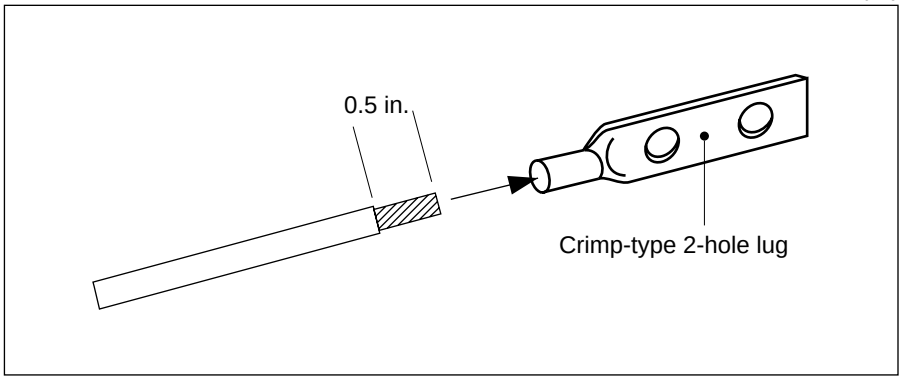
Note 2: If the distance between pieces of equipment, or between the last piece of equipment in the grounding chain and the common ground point exceeds 16 m (53 ft), 2 AWG wire must be used to cover the distance.

—continued—

Procedure 7-1 (continued)
Connecting the ground cables

Step	Action
33	Route an NT4K84QA bay-bay ground cable between the ground lugs on the pedestal of the master MBP cabinet and the expansion MBP cabinet. Refer to Figure 7-2 on page 7-10 for routing details.
34	At each end of the cable, attach the two-hole ground lug to the ground studs on the pedestal using two nuts.
35	Tighten the nuts on the ground studs to a torque of 67 in-lb.
36	Route a 6 AWG ground lead from the ground point on the frame of the battery rack to the pedestal of the expansion cabinet. If an expansion cabinet is not used, route the lead to the pedestal of the master cabinet.
37	Attach the ground lead to the ground point on the battery rack according to the manufacturer's instructions.
38	Strip the pedestal end of the ground lead 13 mm (0.5 in.) and crimp a ground lug to the free end of the lead.

FW-10119



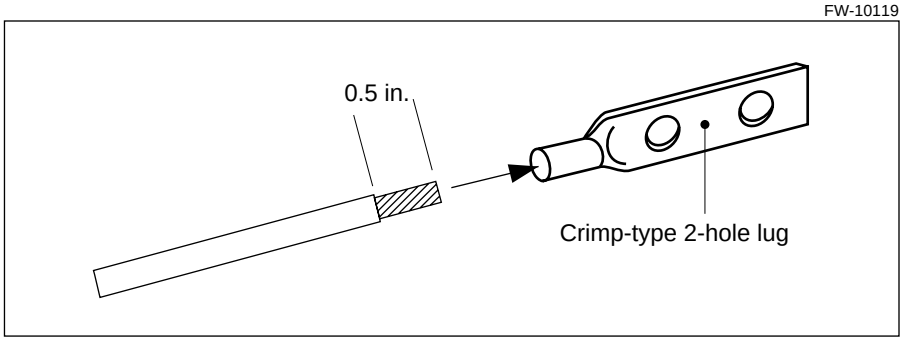
39	Attach the two-hole ground lug to the pedestal of the expansion cabinet (or the master cabinet, if an expansion cabinet is not used) using two nuts.
40	Tighten the nuts on the ground studs to a torque of 67 in-lb.
41	Route a 6 AWG ground lead from the remaining ground lugs on the pedestal of the master cabinet to the frame ground on the battery distribution fuse bay (BDFB).
42	Strip both ends of the ground lead 13 mm (0.5 in.) and crimp on ground lugs at both ends of the lead.
43	Attach the ground lead to the frame ground on the BDFB according to the manufacturer's instructions.
44	Attach the two-hole ground lug on the pedestal end of the lead to the ground studs on the pedestal of the master cabinet using two nuts.

—continued—

Procedure 7-1 (continued)
Connecting the ground cables

Step	Action
45	Tighten the nuts on the ground studs to a torque of 67 in-lb.
46	Run a 6 AWG ground lead from frame ground of the BDFB to the common ground point.
47	Attach the ground lead to the common ground point according to local electrical codes.
48	Attach the ground lead to the BDFB according to the manufacturer's instructions. You have completed this procedure. Do not continue.
Customer-supplied dc power source with ground collector	
49	See the schematic diagram in Figure 7-6 on page 7-17 for a layout of the ground cables to be installed.
50	Attach a 1/0 AWG collector to the common ground point with 2 AWG wire in accordance with local electrical codes.
51	Route 6 AWG green jacketed ground leads from the four points on the collector to the components shown in Figure 7-6 on page 7-17.
52	Attach one end of each 6 AWG lead to the 1/0 AWG collector in accordance with local electrical codes.
53	Connect the free end of the ground lead for the battery rack to the frame ground point on the battery rack in accordance with the manufacturer's instructions.
54	Connect the free end of the one of the two ground leads for the battery distribution fuse bay (BDFB) to the battery return reference according to the manufacturer's instructions.
55	Connect the free end of the other of the two ground leads for the BDFB to the BDFB frame ground according to the manufacturer's instructions.
56	Strip the free ends of the remaining ground leads13 mm (0.5 in.) and crimp ground lugs onto the stripped leads.

FW-10119

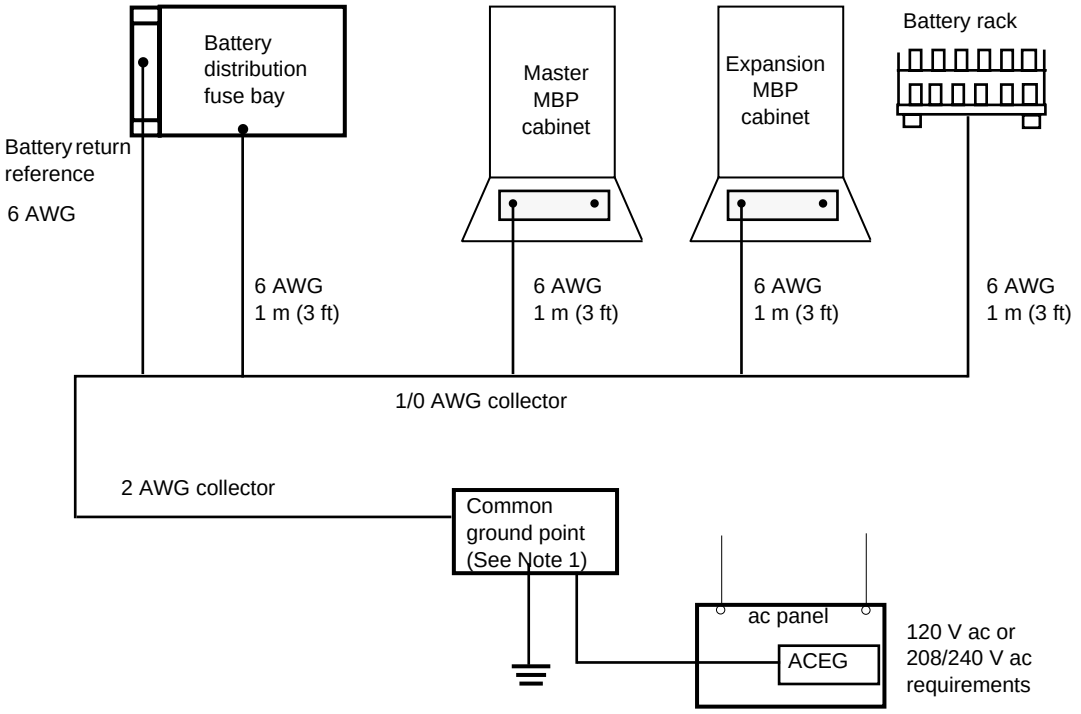


57	Attach the ground studs to the ground points on the pedestals of the MBP cabinets using two nuts for each ground lug.
58	Tighten the nuts on the grounding studs to a torque of 67 in-lb.

—continued—

Procedure 7-1 (continued)
Connecting the ground cables

Figure 7-6
Grounding for systems powered from a customer-supplied source of dc power, with a collector



Note: In buildings that use a common bonding network (CBN) grounding scheme, the common ground point is the floor ground bar (FGB). In buildings that use an isolated bonding network (IBN) grounding scheme, the common ground point is a single point ground (SPG). In small buildings, an FGB or an SPG may not exist. When this is the case, the building principal ground is used as the common ground point.

—end—

Procedure 7-2
Connecting the power distribution harnesses from the expansion cabinet to the master cabinet

Use this procedure to connect the NT4K84HB dc power distribution harnesses in the MBP expansion cabinet to the breaker interface panel (BIP) in the master MBP cabinet.

When an expansion cabinet is shipped from the factory, its two NT4K84HB dc power distribution harnesses are pre-connected to the shelves installed in the cabinet. The connectors that attach to the BIP in the master cabinet are rolled up and stored in the rear of the expansion cabinet for shipping. At the installation site, the harnesses are unrolled, and the free ends of the harnesses are attached to CDS Pwr and CDS TB connectors on the breaker interface panel (BIP) in the master MBP cabinet.

Requirements

The following tools and materials are required:

- cable ties
- side cutters
- set of nut drivers

The cabinets must have been positioned and secured as described in “Installing the cabinets” on page 6-1.

Action

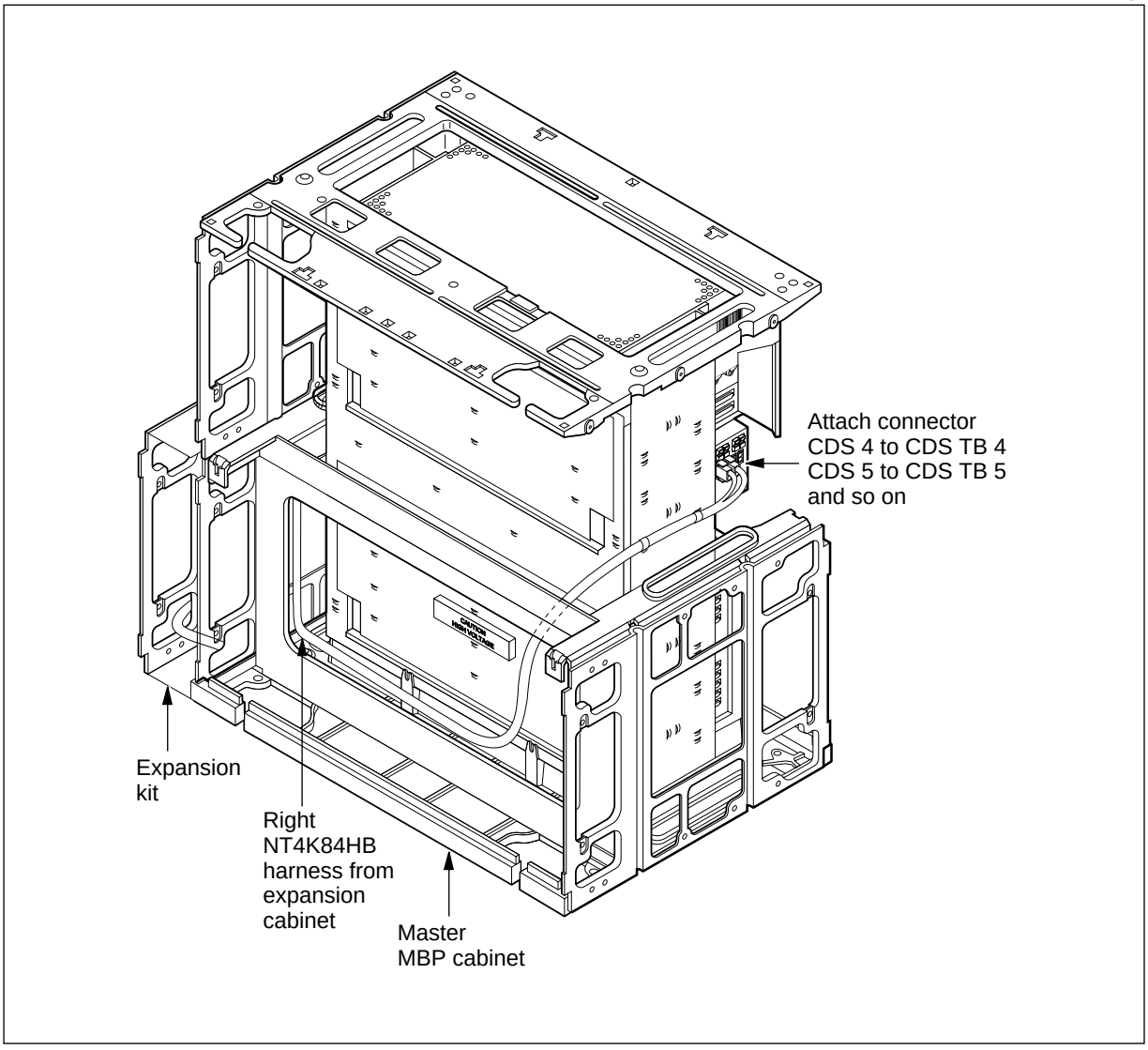
Step	Action
1	At the rear of the expansion cabinet, unroll the left and right NT4K84HB harnesses.
2	Route the right harness (at the right side of the expansion cabinet) through the expansion kit, and into the right side of the master cabinet, as shown in Figure 7-7 on page 7-19.

—continued—

Procedure 7-2 (continued)
Connecting the power distribution harnesses from the expansion cabinet to the master cabinet

Figure 7-7
Installing the right NT4K84HB power distribution harness

FW-11182



—continued—

Procedure 7-2 (continued)
Connecting the power distribution harnesses from the expansion cabinet to the master cabinet

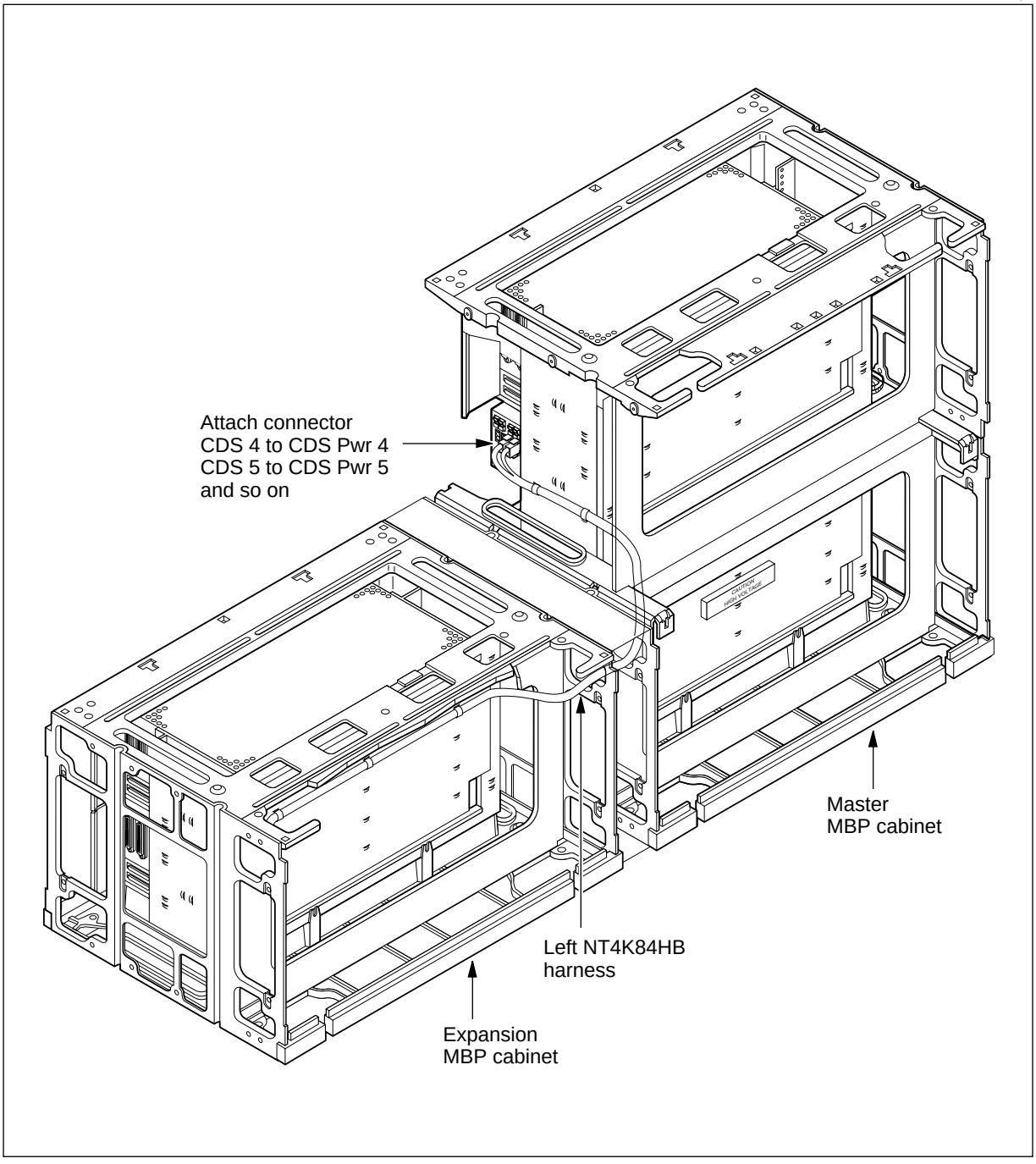
Step	Action
3	Attach the connectors on the right harness to the CDS Pwr connectors on the right side of the BIP, as shown in Figure 7-7 on page 7-19. Connector CDS 4 attaches to connector CDS TB 4, connector CDS 5 attaches to connector CDS TB 5, and so on. ***Note:*** Do not attach connectors for any shelves that are not installed in the expansion cabinet. For example, if CDS 7 is not installed in the expansion cabinet, do not attach connector CDS 7 to the BIP.
4	Install cable ties through the lances at the locations shown in Figure 7-7 on page 7-19 to secure the harness.
5	At the rear of the cabinets, route the left NT4K84HB harness from the left side of the expansion cabinet through the expansion kit, and into the left side of master cabinet, as shown in Figure 7-8 on page 7-21.
6	Attach the connectors on the harness to the appropriate CDS TB connectors on the left side of the BIP, as shown in Figure 7-8 on page 7-21. Connector CDS 4 attaches to connector CDS Pwr 4, connector CDS 5 attaches to connector CDS Pwr 5, and so on. ***Note:*** Do not attach connectors for any shelves that are not installed in the expansion cabinet. For example if CDS 7 is not installed in the expansion cabinet, do not attach connector CDS 7 to the BIP.
7	Install cable ties through the lances at the locations shown in Figure 7-8 on page 7-21 to secure the harness.

—continued—

Procedure 7-2 (continued)
Connecting the power distribution harnesses from the expansion cabinet to the master cabinet

Figure 7-8
Connecting the left NT4K84HB power distribution harness

FW-11181



—end—

Procedure 7-3
Connecting the -48 V dc power cables, dc power source supplied by the customer

Use this procedure to connect dc power cables from the battery distribution fuse bay (BDFB) of an external customer-supplied dc power source to the terminal block in the master MBP cabinet. These dc power cables are supplied by the customer. See *Addendum 1 (MBP) Site Installation Planning and Engineering*, 323-3001-200, for information about the requirements for these cables.

If you are connecting to an external power source that is equipped with separate A and B power sources, we recommend that you connect dc power feeds 1 and 3 to a different power source from power feeds 2 and 4. This will ensure continuous operation of the system should one power sources fail.

Requirements

The following tools and materials are required:

- cable ties
- side cutters
- four customer-supplied dc power cables. Each cable consists of two 6 AWG stranded conductors, one red (supply) and one white (return). The maximum cable length is 11.6 m (35 ft).
- screwdriver, starter, flat head
- flat-head screwdriver, 1/4 in. wide blade
- eight ring terminals, crimp type, for No. 10 screw and 6 AWG wire
- crimping tool for ring terminals, Thomas and Betts TBM 2, or equivalent

Action

Step	Action
1	At the battery distribution fuse bay (BDFB), connect the supply and return leads of the four dc power cables to separately fused connections. Do **not** insert the fuses at this time. ***Note:*** The cable colors are as follows: • supply (–) red • return (+) white
2	At the BDFB, insert the fuse for the supply and return leads for one of the four cables.

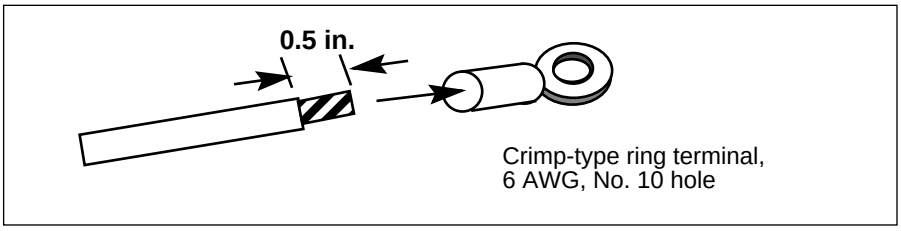
—continued—

Procedure 7-3 (continued)
Connecting the -48 V dc power cables, dc power source supplied by the customer

Step	Action
3	At the BIP end of the cable, measure the voltage across the supply and return leads using a voltmeter. ***Note:*** The voltage should be between -42 V dc and -56 V dc. If not, check the cables for loose crimps or incorrect connections.
4	Remove the fuse inserted at the BDFB.
5	Repeat steps 2 to 4 to check the voltages at the BIP ends of the three remaining cables.
6	At the BDFB, ensure that the fuses that supply all four power feeds are removed and that none of the power feeds is live.
7	Are you installing the cabinet on a concrete floor or a raised floor?

If you are installing	Then
On a raised floor	Local electrical codes may require that you run the power cables through conduit. If conduit is required, install 4 in. conduit from the BDFB to the knockout at the left side of the master cabinet pedestal. Route all four power cables through the conduit. Go to step 10.
On a concrete floor	Ensure that the top of the cabinet is equipped with a set of NT4K09BA top cap grilles with notches to allow cables to pass through them. Go to step 8.

8	Route the cables for supply and return feeds 1 and 2 from the BDFB into the left side of the master cabinet (as seen from the rear of the master cabinet), as shown in Figure 7-9 on page 7-25.
9	Route the cables for supply and return feeds 2 and 3 from the BDFB into the right side of the cabinet, as shown in Figure 7-9 on page 7-25.
10	Strip back each conductor 13 mm (1/2 in.) as shown in the following figure, and use the TBM 2 crimping tool to install a No. 6 AWG ring terminal on each cable conductor.



—continued—

Procedure 7-3 (continued)
Connecting the -48 V dc power cables, dc power source supplied by the customer

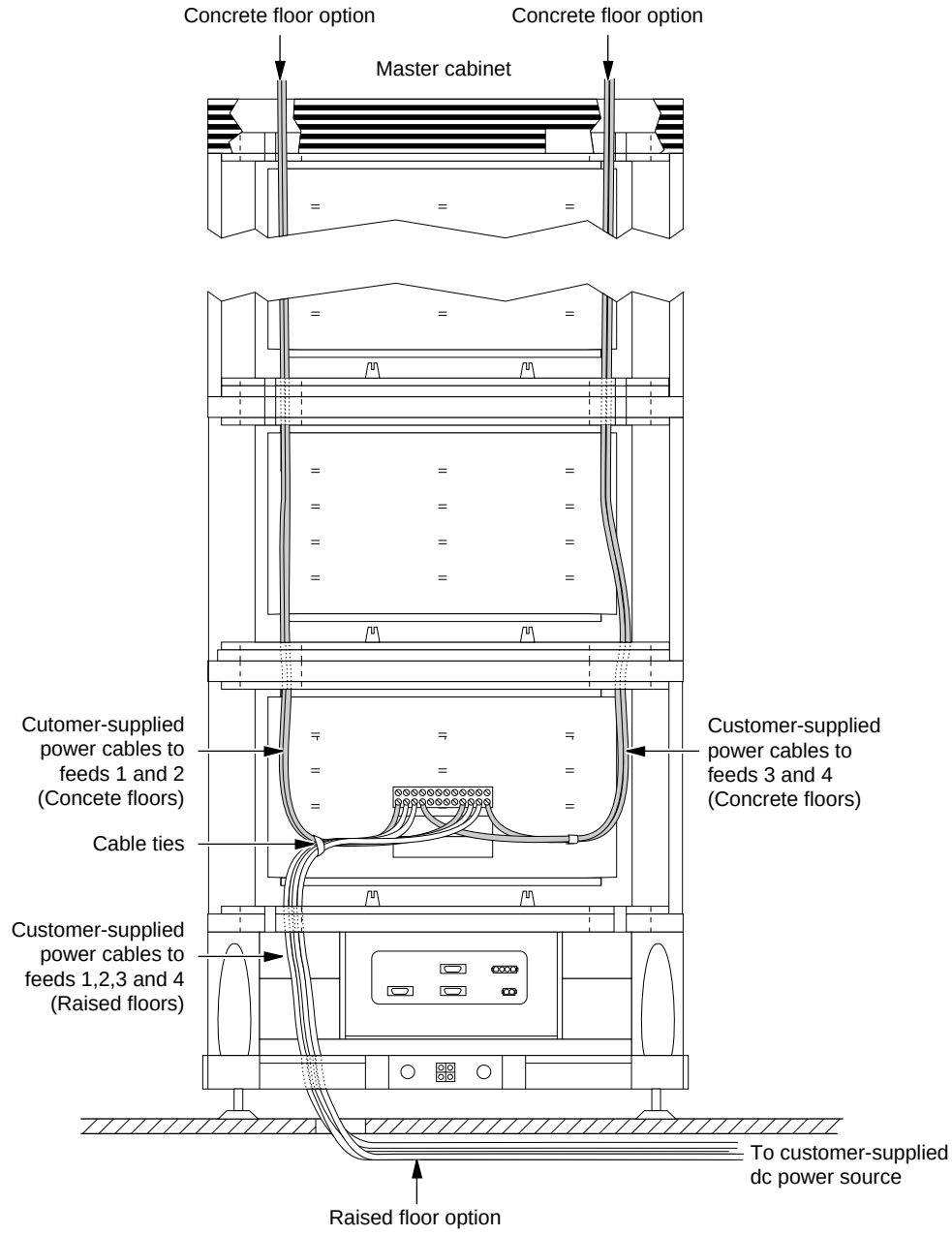
Step	Action
11	Remove the safety cover from the terminal block.
12	Connect the supply and return leads to the screws on the terminal block, as shown in Figure 7-10 on page 7-26.
13	Reinstall the safety cover on the terminal block.
14	In the Quick Reference Guide, make a record of the supply and return connection points at the BDFB. ***Note 1:*** Be sure to include • the number of the feed (1, 2, 3, or 4), • the BDFB number • number of the BDFB breaker or fuse. ***Note 2:*** For information about shelf powering schemes, and recommended fuse values, see *Addendum 1 (MBP) Site Installation Planning and Engineering,* 323-3001-200.

—continued—

Procedure 7-3 (continued)
Connecting the -48 V dc power cables, dc power source supplied by the customer

Figure 7-9
Installing customer-supplied dc power cables to the rear of the master cabinet

FW-10870

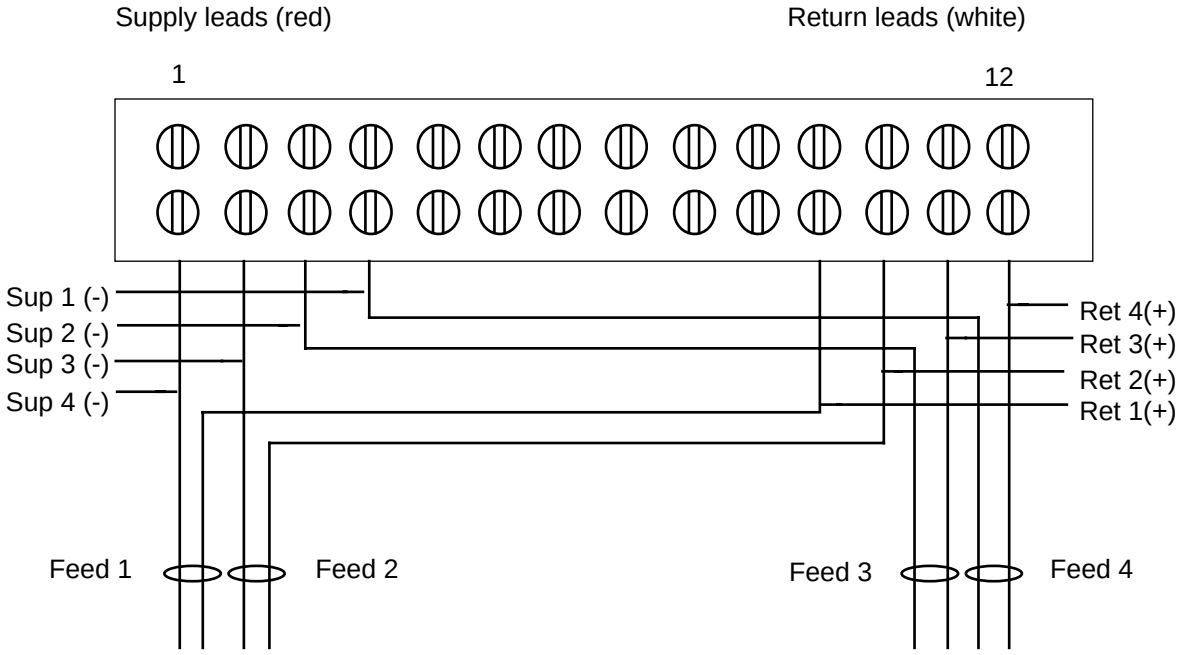


Note: Local electrical codes may require that the power cables be enclosed in conduit.

—continued—

Procedure 7-3 (continued)
Connecting the -48 V dc power cables, dc power source supplied by the customer

Figure 7-10
Connection of feeds 1 to 4 to the terminal block in the master MBP cabinet



Note: If the external dc power source is equipped with separate A and B power sources, we recommend that you connect feeds 1 and 3 to one of the power sources (A or B), and feeds 2 and 4 to the other power source. This will ensure continuous operation of the system in the event that one of the A or B power sources fails.

—end—

Procedure 7-4
Connecting the -48 V dc power cables, power source in an MPP cabinet

Use this procedure to connect four -48 V dc power cables from the terminal blocks in the Modular Power Package (MPP) cabinet to the terminal block in the master Modular Business Package (MBP) cabinet.

Two different cables can be used for this purpose:

- NT4K81AA cables that are used when the MPP cabinet and the MBP master cabinet are co-located
- customer-suppled power cables up to 10.7 m (35 ft) when the MPP cabinet is installed remotely from the master MBP cabinet.

  Note: All wiring and cabling must be conform to all local and national wiring standards as applicable to this installation.

Requirements

The following tools and materials are required:

- cable ties
- side cutters
- screwdriver, flat head, starter
- flat-bladed screwdriver, 1/4 in. wide blade
- Four BIP power cables. Use four NT4K81AA cables for attached MPP cabinets or four customer-supplied cables for remote MPP cabinets. Each customer-supplied cable consists of two 6 AWG conductors, one red (supply) and one white (return), up to 10.7 m long (35 ft).
- If you are using customer-supplied cables, you will also need the following items:
  - — 16 ring terminals, crimp type, No. 10 screw, 6 AWG wire
  - — crimping tool for 6 AWG terminals, Thomas and Betts TBM 2, or equivalent.

The cabinets must have been positioned, levelled, and secured as described in “Installing the cabinets” on page 6-1.

—continued—

Procedure 7-4 (continued)
Connecting the -48 V dc power cables, power source in an MPP cabinet

Action

Step	Action
1	At the rear of the MPP cabinet and the master cabinet, remove the safety covers from the terminal blocks and store them for re-installation.
2	Go to one of the following steps according to the location of the MPP cabinet.

If the MPP cabinet is	Then go to
attached to the master cabinet	step 3
remote from the master cabinet	step 8

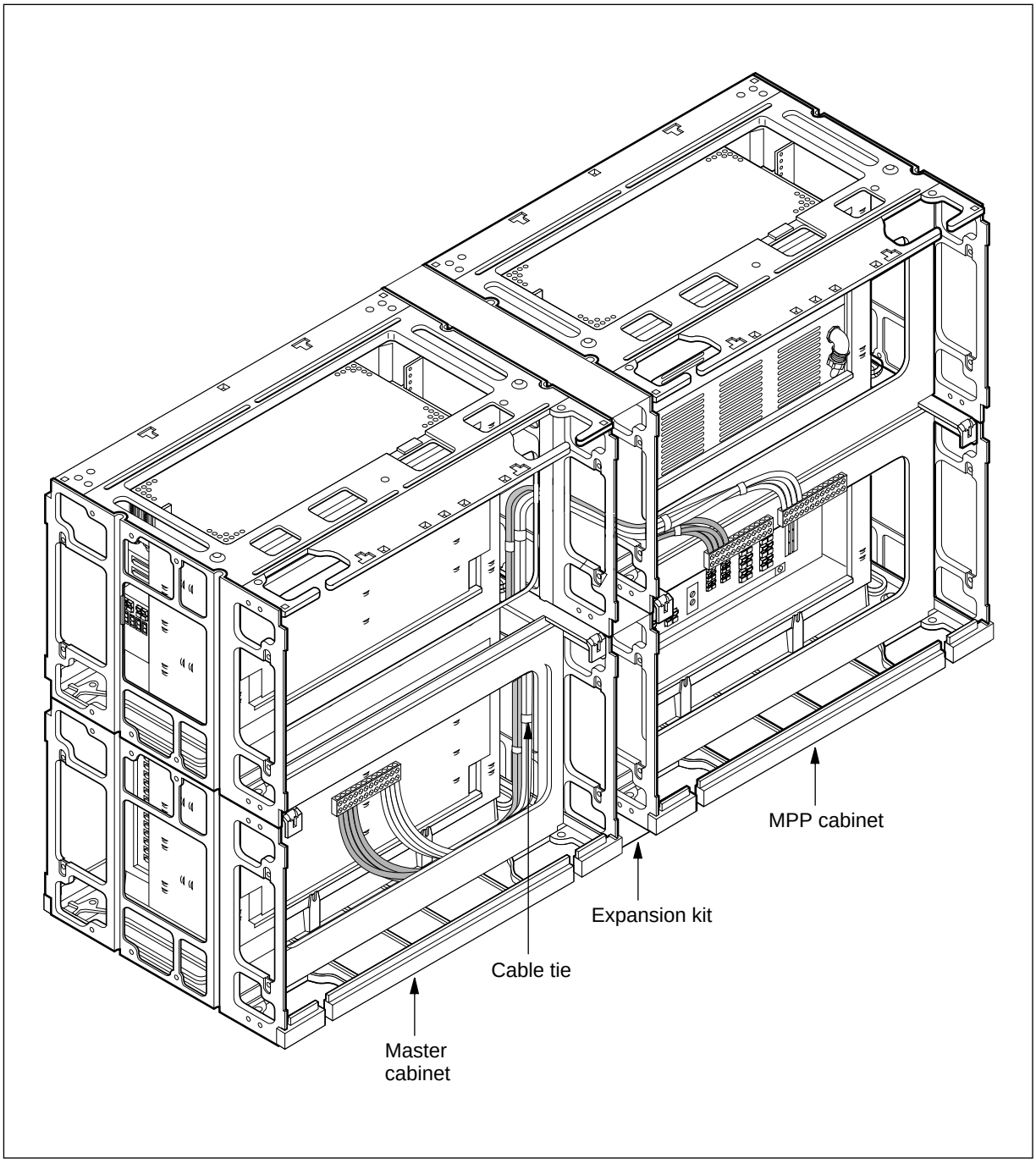
3	Route the cables from the MPP cabinet to the MBP master cabinet, as shown in Figure 7-11 on page 7-29.
4	Connect the supply and return leads of the four cables to the terminal block in the master MBP cabinet, as shown in Figure 7-12 on page 7-30.
5	Dress the cables into place and secure them with cable ties, as shown in Figure 7-11 on page 7-29.
6	Reinstall the safety covers on the terminal blocks.
7	Go to step 16.

—continued—

Procedure 7-4 (continued)
Connecting the -48 V dc power cables, power source in an MPP cabinet

Figure 7-11
Connecting -48 V dc power cables to the terminal blocks in the MPP cabinet

FW-11177



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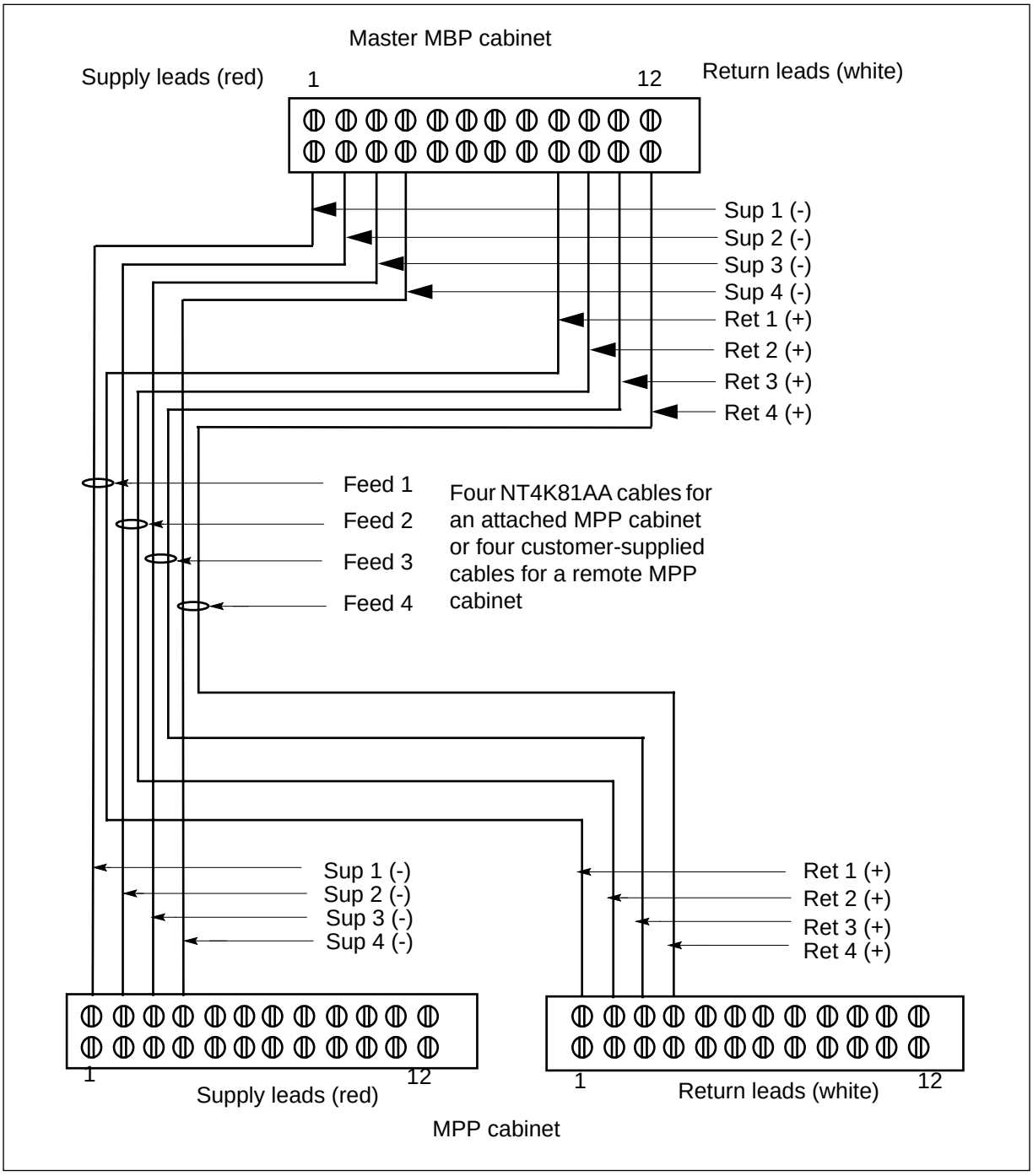
Procedure 7-4 (continued)
Connecting -48 V dc power cables to the terminal blocks in the MPP cabinet

Figure 7-12
Connecting -48 V dc power cables to the terminal blocks in the MPP cabinet



—continued—

Procedure 7-4 (continued)
Connecting the -48 V dc power cables, power source in an MPP cabinet

Step	Action

8 Are you installing the cabinets on a raised floor or a concrete floor?

If you are installing them on	Then go to
a raised floor	step 9
a concrete floor	step 10

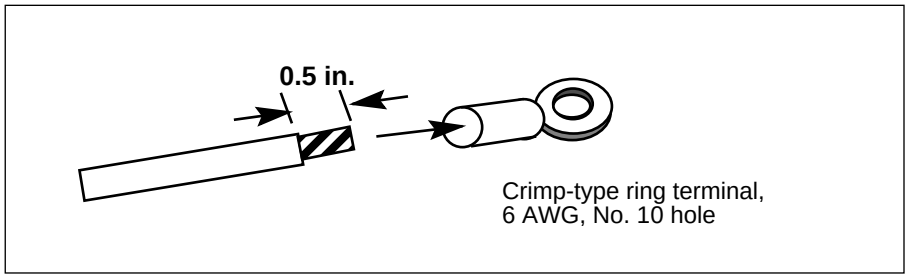
9 Check local and national electrical codes.

Note: Local or national electrical codes may require you to install power cables in conduit. If so, run 4-in. conduit between the 4-in. conduit knock-out holes at the bottom left side of the MPP cabinet pedestal and the bottom left side of the master cabinet (as viewed from the rear of the cabinets).

10 Route the four customer-supplied power cables from the terminal blocks in the MPP cabinet to the terminal block in the MBP cabinet.

Note: For cable routing in the MPP cabinet see Figure 7-13 on page 7-32, and for cable routing in the MBP cabinet, see Figure 7-14 on page 7-33.

11 Strip back each conductor 13 mm (1/2 in.) as shown in the following figure, and use the TBM 2 crimping tool to install a 6 AWG ring terminal on both ends of each cable conductor.



12 At the rear of the MPP cabinet, attach the four dc power cables to the terminal blocks as shown in Figure 7-11 on page 7-29.

13 At the rear of the MBP cabinet, attach the supply and return leads of the four cables to the terminal block as shown in Figure 7-11 on page 7-29.

14 Dress the cables into place and secure them with cable ties as shown in Figure 7-12 on page 7-30.

15 Reinstall the safety covers on the terminal blocks.

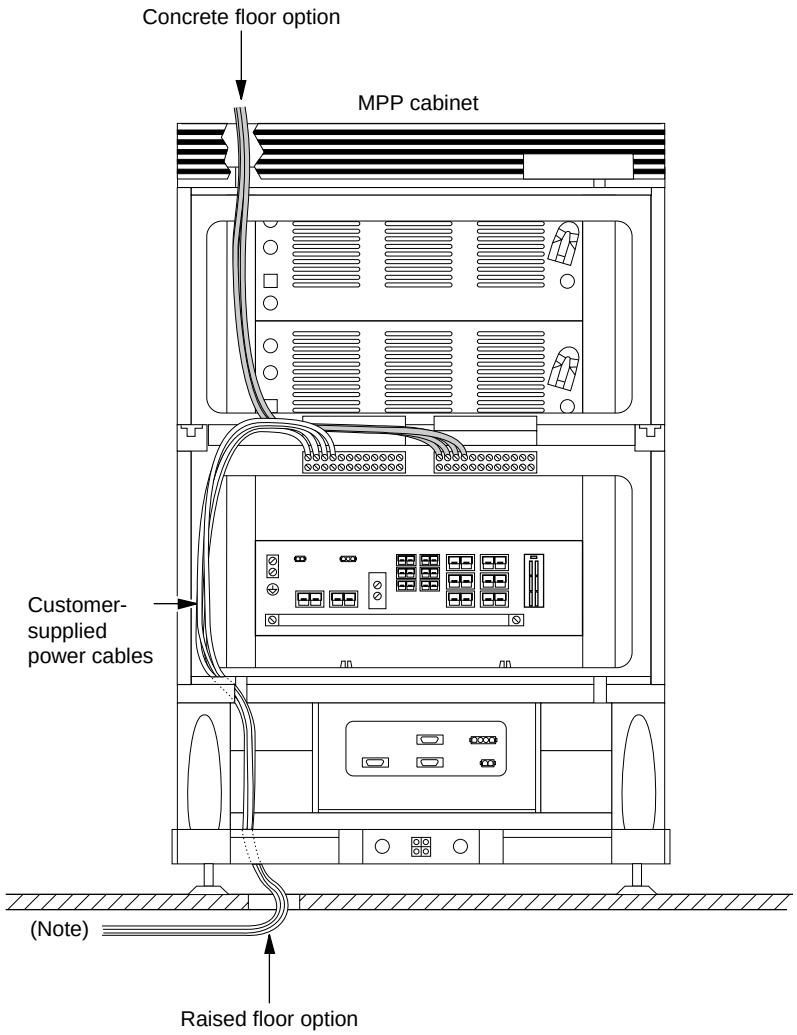
16 Go to Procedure 7-5 on page 7-34.

—continued—

Procedure 7-4 (continued)
Connecting the -48 V dc power cables, power source in an MPP cabinet

Figure 7-13
Routing -48 V dc power cables in the MPP cabinet, remote MPP cabinet

FW-10869



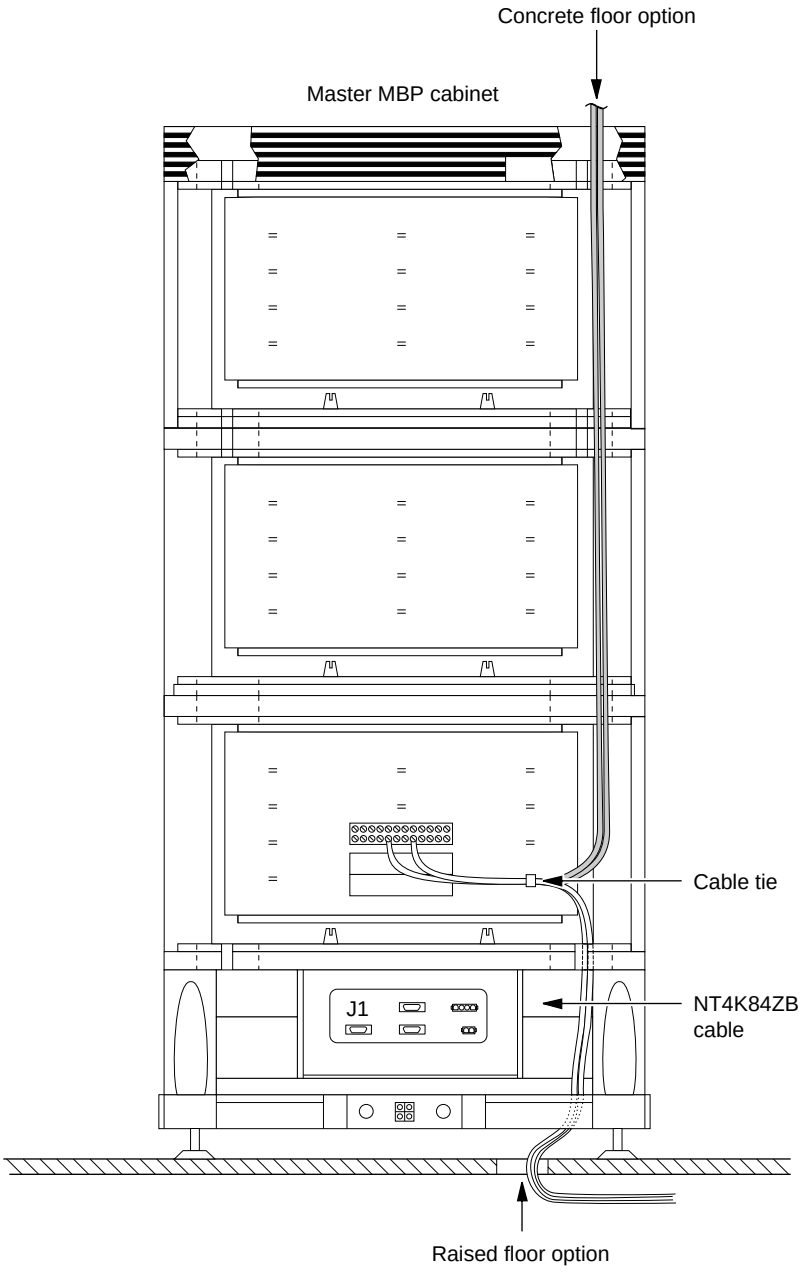
Note: Local electrical codes may require that the power cables be enclosed in conduit.

—continued—

Procedure 7-4 (continued)
Connecting the -48 V dc power cables, power source in an MPP cabinet

Figure 7-14
Routing -48 V dc power cables in the MBP cabinet, remote MPP cabinet

FW-10999



Note: Local electrical codes may require that the power cables be enclosed in conduit.

—end—

Procedure 7-5
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Use this procedure to connect an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable to the terminal block in the master MBP cabinet. The cables and their uses are as follows:

Product engineering code	Use
NT4K84ZA	connects to the terminal blocks in an attached MPP cabinet
NT4K84ZB	connects to the terminal blocks in a remote MPP cabinet, or to an external source of -48 V dc power that is supplied by the customer

Perform this procedure only when the MBP cabinets are equipped with seven copper distribution shelves, a DSX-1 shelf, and a repeater shelf. In such installations, all available circuit breakers on the BIP are used for powering the seven copper distribution shelves. Another source of -48 V dc is required for powering the DSX-1 shelf and the repeater shelf. This source is provided from terminal blocks at the rear of the MPP cabinet or from an external source of -48 V dc power that is supplied by the customer.

NT4K84ZA, ZB

Laced construction, two conductors 14 AWG, one black, one red. Each conductor is terminated with a ring terminal for a No.10 screw and a 14 AWG conductor. This cable is available in the following lengths:

4.3 m	(15 ft)	NT4K84ZA
10.7 m	(35 ft)	NT4K84ZB

—continued—

Procedure 7-5 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Requirements

The following tools and materials are required:

- cable ties
- NT4K84ZA or ZB power cable
- flat-bladed screwdriver, 1/4 in. wide blade

Action

Step	Action

1 At the rear of the master cabinet and the MPP cabinet, remove the safety covers from the terminal blocks and store them for re-installation.

2 Do one of the following:

If you are connecting	Then go to
an NT4K84ZA cable to an attached MPP cabinet	step 3
an NT4K84ZB cable to a remote MPP cabinet	step 8
an NT4K84ZB cable to an external customer-supplied power source	step 14

NT4K84ZA cable to attached MPP cabinet

3 Connect the NT4K84ZA cable to the terminal blocks at the rear of the MPP cabinet, as shown in Figure 7-15 on page 7-36.

4 Route the cable from the MPP cabinet to the master MBP cabinet as shown in Figure 7-16 on page 7-37.

5 Connect the NT4K84ZA cable to the terminal block in the master MBP cabinet, as shown in Figure 7-15 on page 7-36.

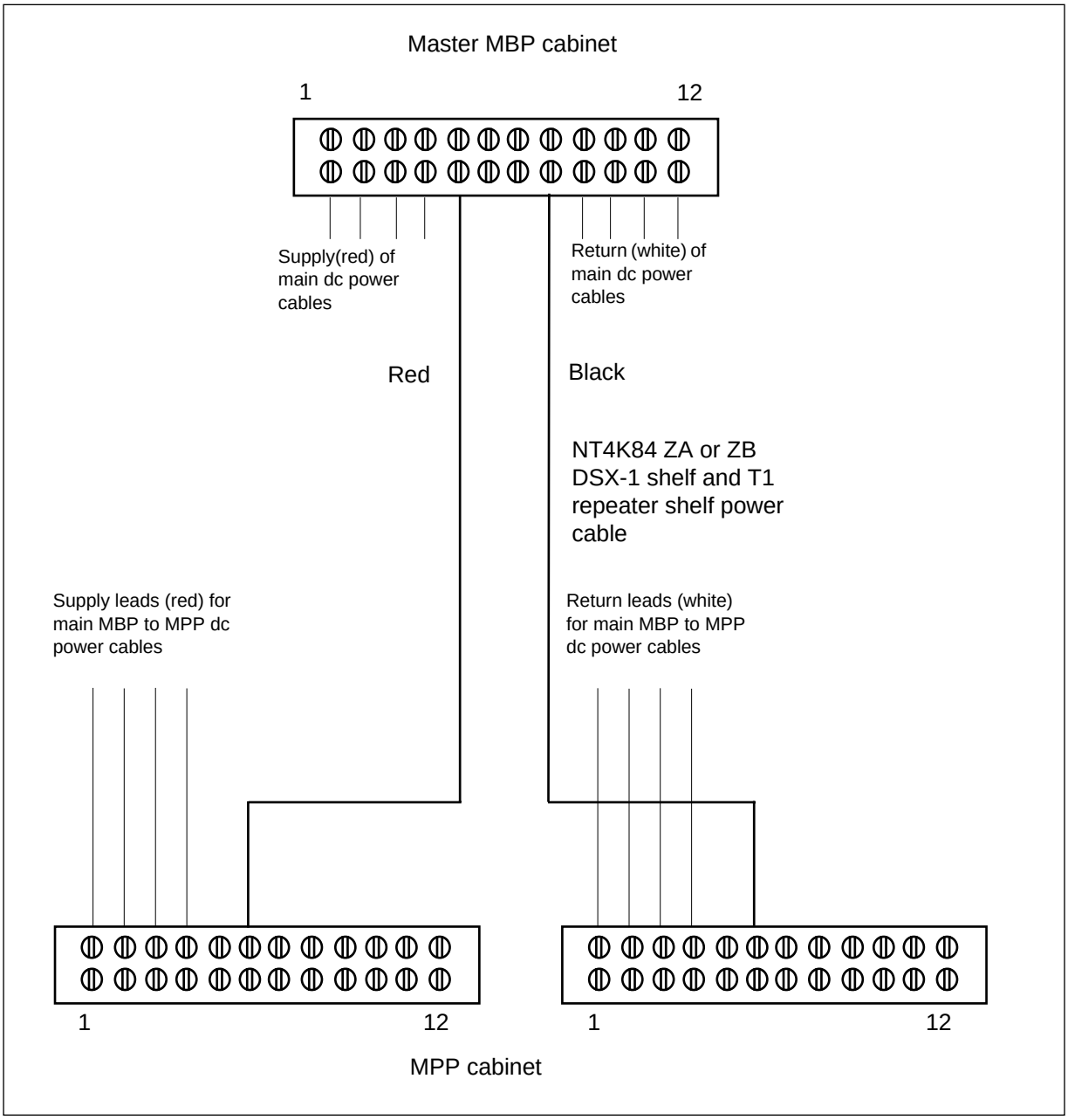
6 Dress the cable into place and secure it with cable ties as shown in Figure 7-16 on page 7-37.

7 Reinstall the safety covers on the terminal blocks. You have completed this procedure. Go to Procedure 7-6 on page 7-42.

—continued—

Procedure 7-5 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Figure 7-15
Connecting a DSX-1 shelf and T1 repeater cable to terminal blocks in the MPP cabinet and the master cabinet

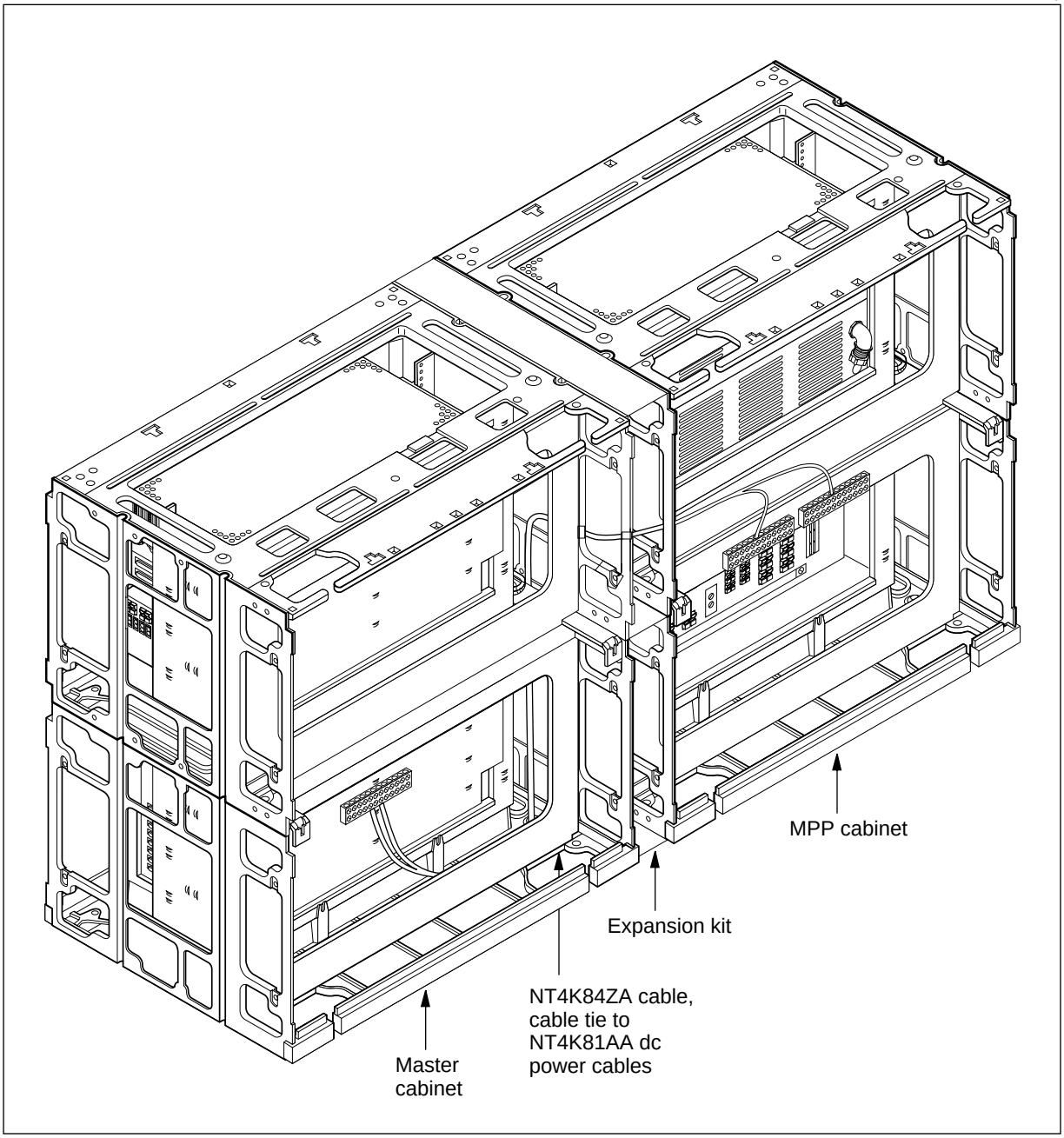


—continued—

Procedure 7-5 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Figure 7-16
Routing an NT4K84ZA cable between the MPP cabinet and the master MBP cabinet

FW-11179



—continued—

Procedure 7-5 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Step	Action

NT4K84ZA cable to remote MPP cabinet

8 Connect the NT4K84ZB cable to the terminal blocks at the rear of the MPP cabinet as shown in Figure 7-15 on page 7-36.

9 Are you installing the cabinets on a raised floor or on a concrete floor?

If you are installing them	Then go to
on a raised floor	step 10
on a concrete floor	step 11

10 Check the local electrical codes. They may require you to install the power cable in conduit.

If the codes	Then
require the use of conduit	Fish the cable through the 4 in. conduit that houses the four -48 V dc main power cables, then go to step 12.
do not require the use of conduit	Go to step 11.

11 Route the cable from the MPP cabinet to the master cabinet.

Note: For routing of the NT4K84ZB cable in the MPP cabinet see Figure 7-17 on page 7-40, and for routing of the cable in the MBP cabinet see Figure 7-18 on page 7-41.

12 Connect the NT4K84ZB cable to the terminal block in the master MBP cabinet as shown in Figure 7-15 on page 7-36.

13 Reinstall the safety covers on the terminal blocks. You have completed this procedure. Go to step 18.

—continued—

Procedure 7-5 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Step	Action

NT4K84ZA cable to customer-supplied dc power source

14 Connect the NT4K84ZB cable to the terminal block at the rear of the master MBP cabinet as shown Figure 7-15 on page 7-36.

15 Check the local electrical codes. They may require you to install the power cable in conduit.

If the codes	Then
require the use of conduit	Fish the cable through the 4 in. conduit that houses the four -48 V dc main power cables, then go to step 17.
do not require the use of conduit	Go to step 16.

16 Route the cable to the customer-supplied source of -48 V dc power.

17 At the customer-supplied source of -48 V dc power, connect the red lead to the -48 V dc supply and the black lead to the return.

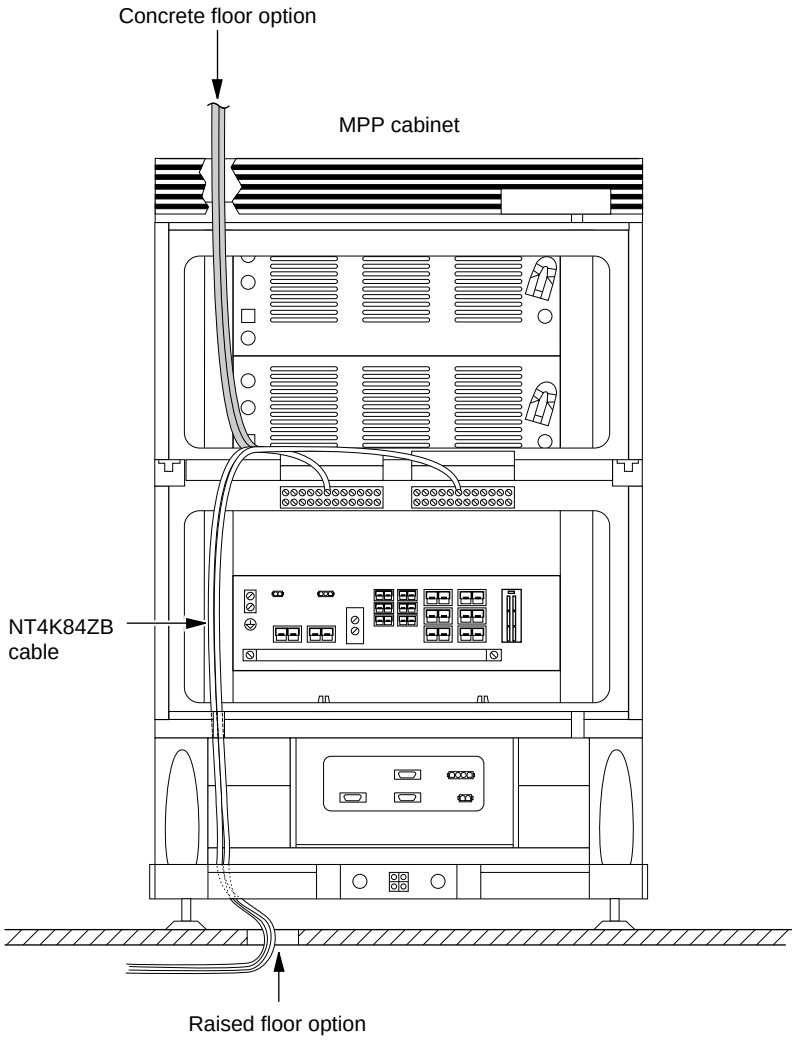
18 Go to Procedure 7-6 on page 7-42.

—continued—

Procedure 7-5 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Figure 7-17
Routing an NT4K84ZB cable in the MPP cabinet

FW-11180



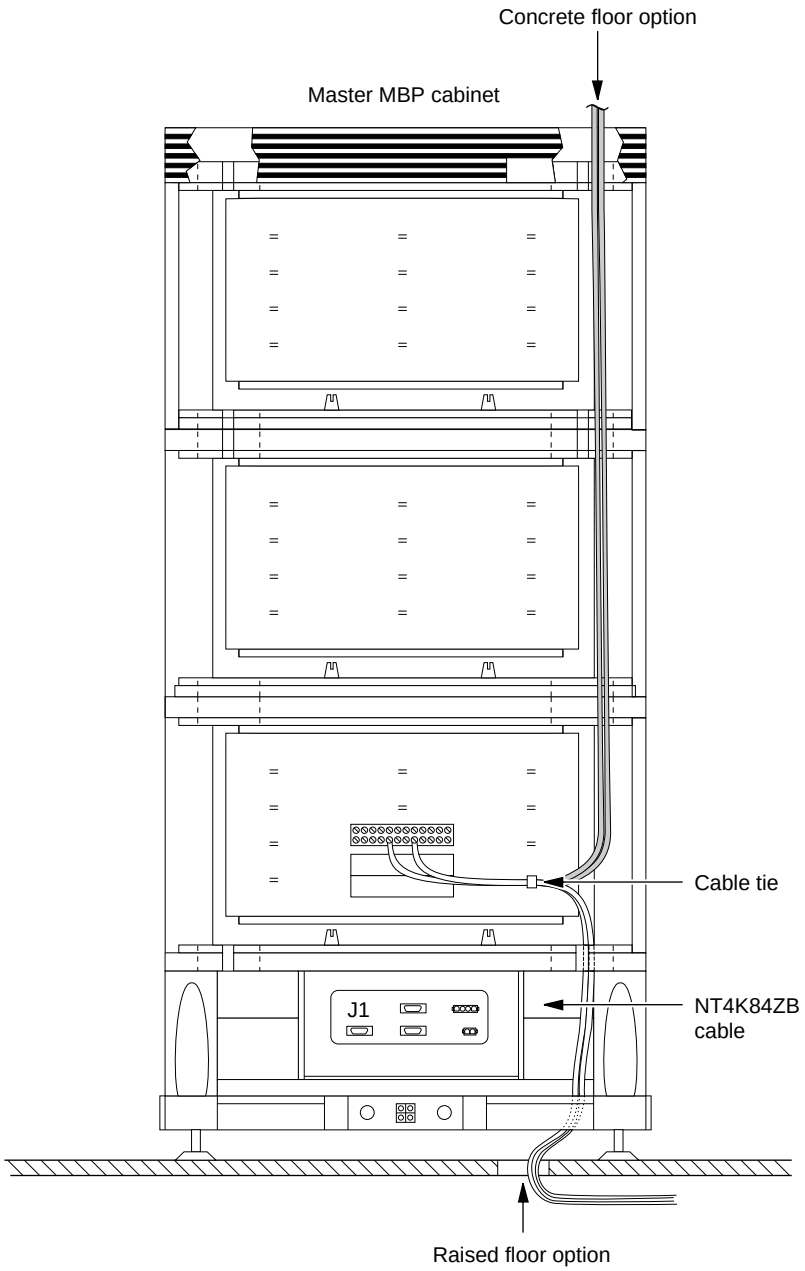
Note: Local electrical codes may require that the power cables be enclosed in conduit.

—continued—

Procedure 7-5 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Figure 7-18
Routing an NT4K84ZB cable in the master MBP cabinet

FW-10999



Note: Local electrical codes may require that the power cables be enclosed in conduit.

—end—

Procedure 7-6
Connecting an NT4K81DA DSX-1 shelf and T1 repeater shelf power cable

Use this procedure to connect an NT4K81DA DSX-1 shelf and repeater shelf power cable from the terminal block in the master MBP cabinet to the DSX-1 shelf and the repeater shelf.

NT4K81DA

14 AWG, stranded, laced bifurcated construction. At one end, two conductors, one black, one red, with ring terminals for connection to the terminal block in the master MBP cabinet. At the other end, two-pin Mate-n-Lok connectors for connection to the NT4K84SA and NT4K84TA cables on the repeater shelf and the DSX-1 shelf.

Requirements

The following tools and materials are required:

- cable ties
- NT4K81DA power cable
- flat-bladed screwdriver, 1/4 in. wide blade

—continued—

Procedure 7-6 (continued)
Connecting an NT4K81DA DSX-1 shelf and T1 repeater shelf power cable

Action

Step	Action
1	Connect the NT4K81DA cable to the terminal block in the rear of the master MBP cabinet as shown Figure 7-19 on page 7-44.
2	Go to one of the following steps:

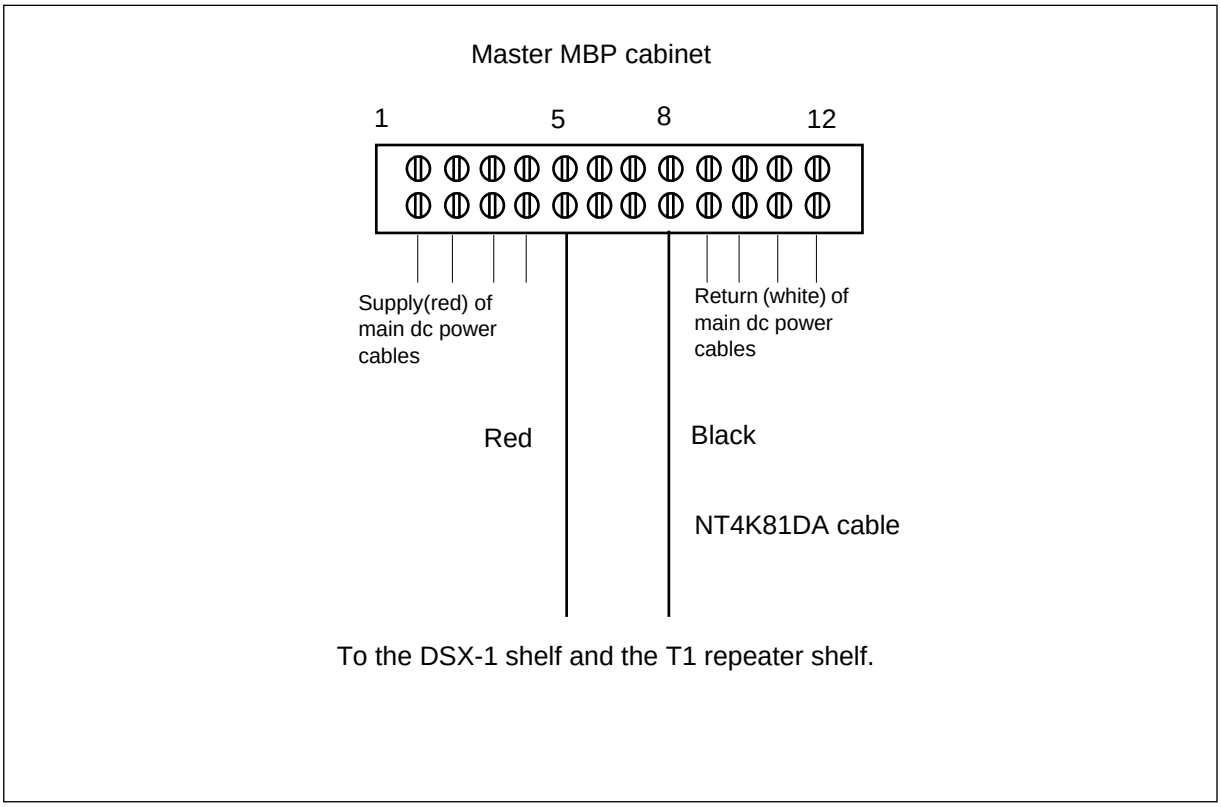
If the DSX-1 shelf and the T1 repeater shelf	Then go to
are in the expansion MBP cabinet	step 3
are in the master MBP cabinet	step 9

3	Run the cable out the left side of the master MBP cabinet into the expansion cabinet as shown in Figure 7-20 on page 7-45 and Figure 7-22 on page 7-47.
4	Route the NT4K81DA cable up the right side of the expansion cabinet and up to the DSX-1 shelf and the T1 repeater shelf as shown in Figure 7-21 on page 7-46.
5	Uncoil the NT4K84SA cable from the left rear of the expansion cabinet and run it across to the right side of the cabinet as shown in Figure 7-21 on page 7-46.
6	Connect one of the two Mate-N-Lok connectors on the NT4K81DA cable to the NT4K84SA cable as shown in Figure 7-21 on page 7-46.
7	Connect the second Mate-N-Lok connector to the NT4K84TA cable that is attached to the DSX-1 shelf as shown Figure 7-21 on page 7-46.
8	Install cable ties through the lances in the locations shown in Figure 7-21 on page 7-46 to secure the cables. Do not continue, you have completed this procedure.
9	Route the NT4K81DA cable up the right side of the cabinet and up to the DSX-1 shelf and the repeater shelf as shown in Figure 7-22 on page 7-47.
10	Uncoil the NT4K84SA cable from the left rear side of the master MBP cabinet, and run it across to the right side of the cabinet as shown in Figure 7-22 on page 7-47.
11	Connect one of the two Mate-N-Lok connectors to the NT4K84SA cable as shown in Figure 7-22 on page 7-47.
12	Connect the second Mate-N-Lok connector to the NT4K84TA cable that is attached to the DSX-1 shelf as shown in Figure 7-22 on page 7-47.
13	Install cable ties through the lances in the locations shown in Figure 7-22 on page 7-47 to secure the cable.

—continued—

Procedure 7-6 (continued)
Connecting an NT4K81DA DSX-1 shelf and T1 repeater shelf power cable

Figure 7-19
Connecting an NT4K8DA DSX-1 shelf and a T1 repeater shelf power cable to the terminal block in the MBP cabinet

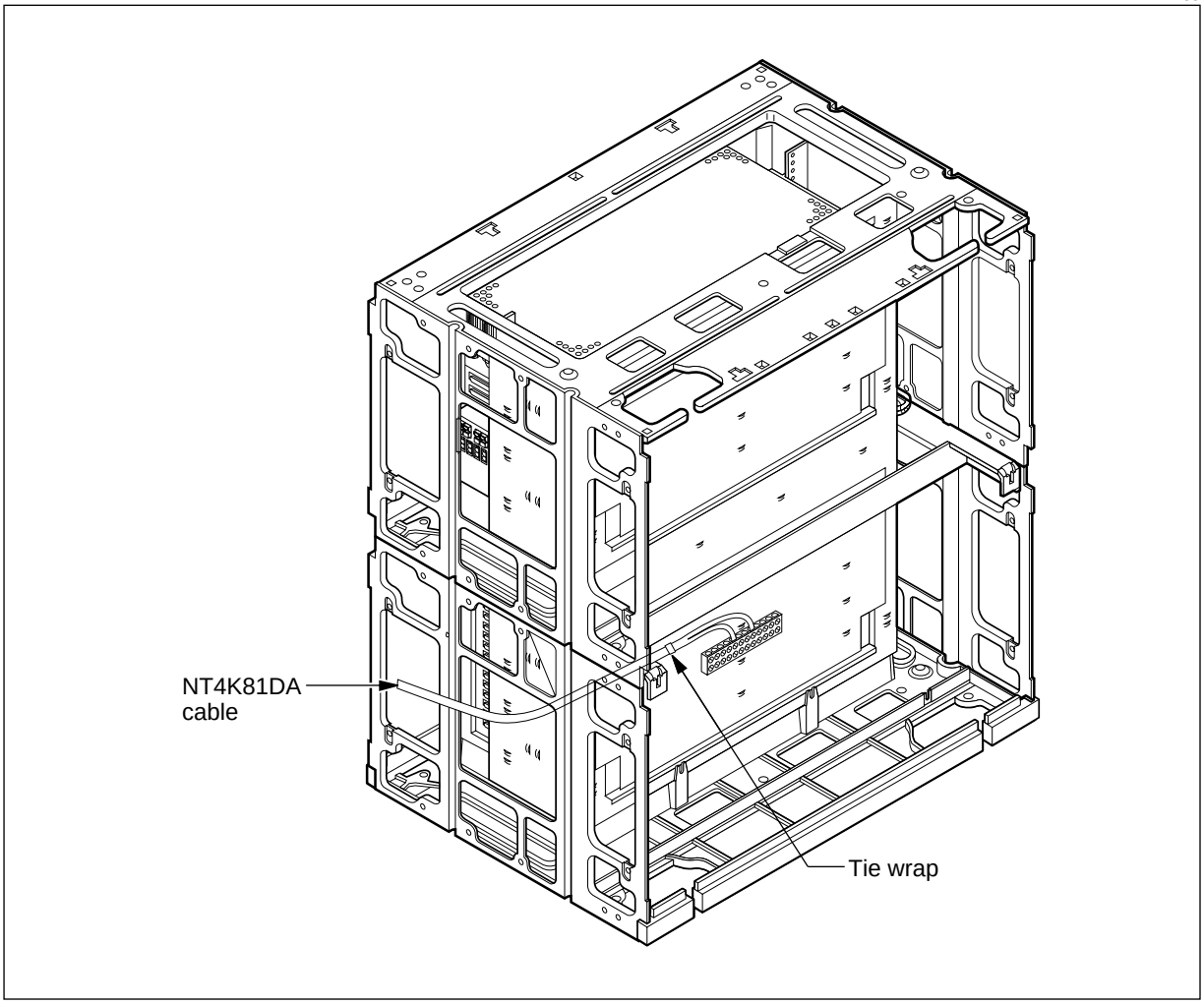


—continued—

Procedure 7-6 (continued)
Connecting an NT4K81DA DSX-1 shelf and T1 repeater shelf power cable

Figure 7-20
Routing an NT4K81DA DSX-1 shelf and T1 repeater shelf cable in the master MBP cabinet

FW--11185

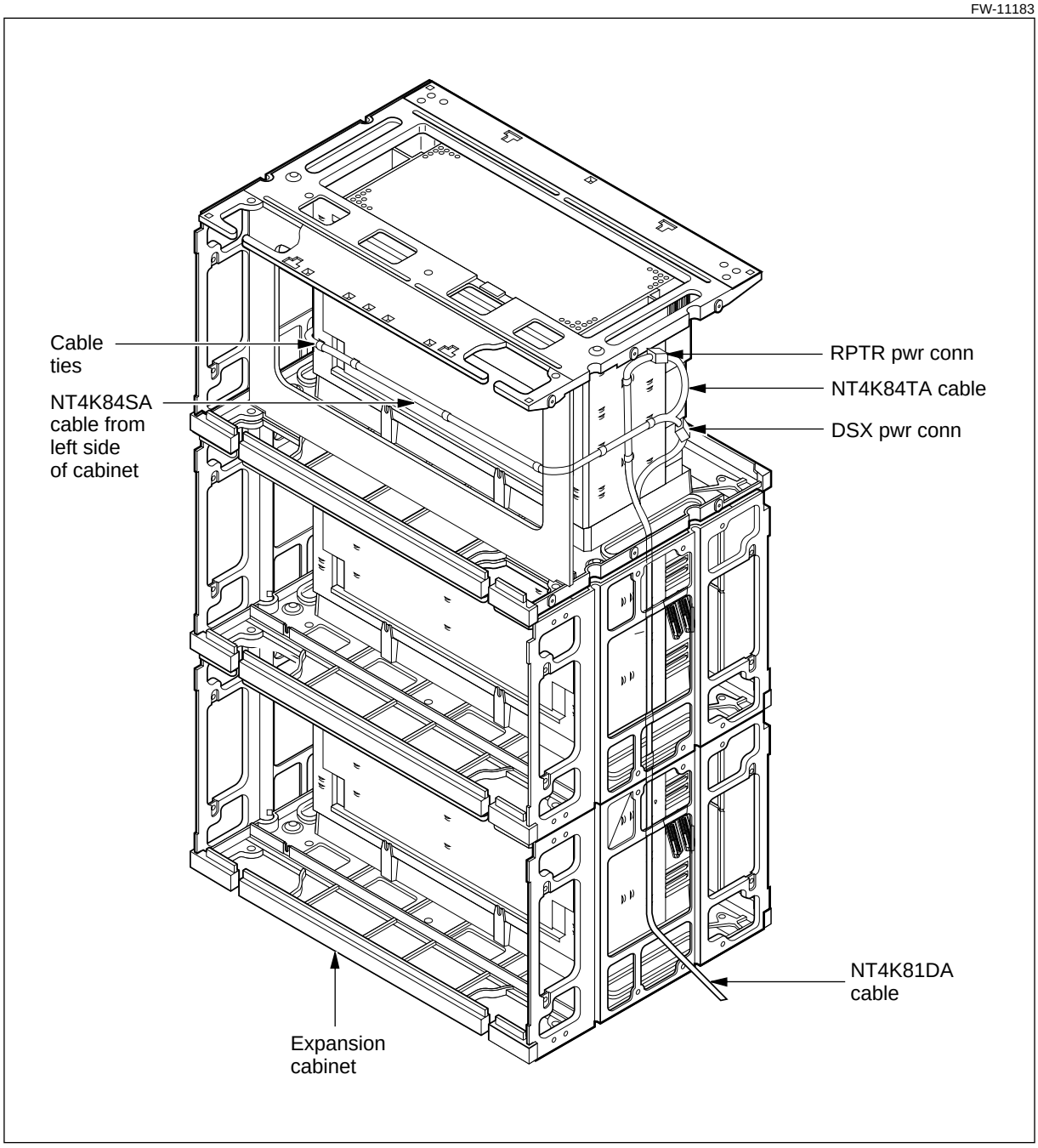


—continued—

Procedure 7-6 (continued)
Connecting an NT4K81DA DSX-1 shelf and T1 repeater shelf power cable

Figure 7-21
Routing NT4K81DA and NT4K84SA cables, DSX-1 and T1 repeater shelves in expansion cabinet

FW-11183

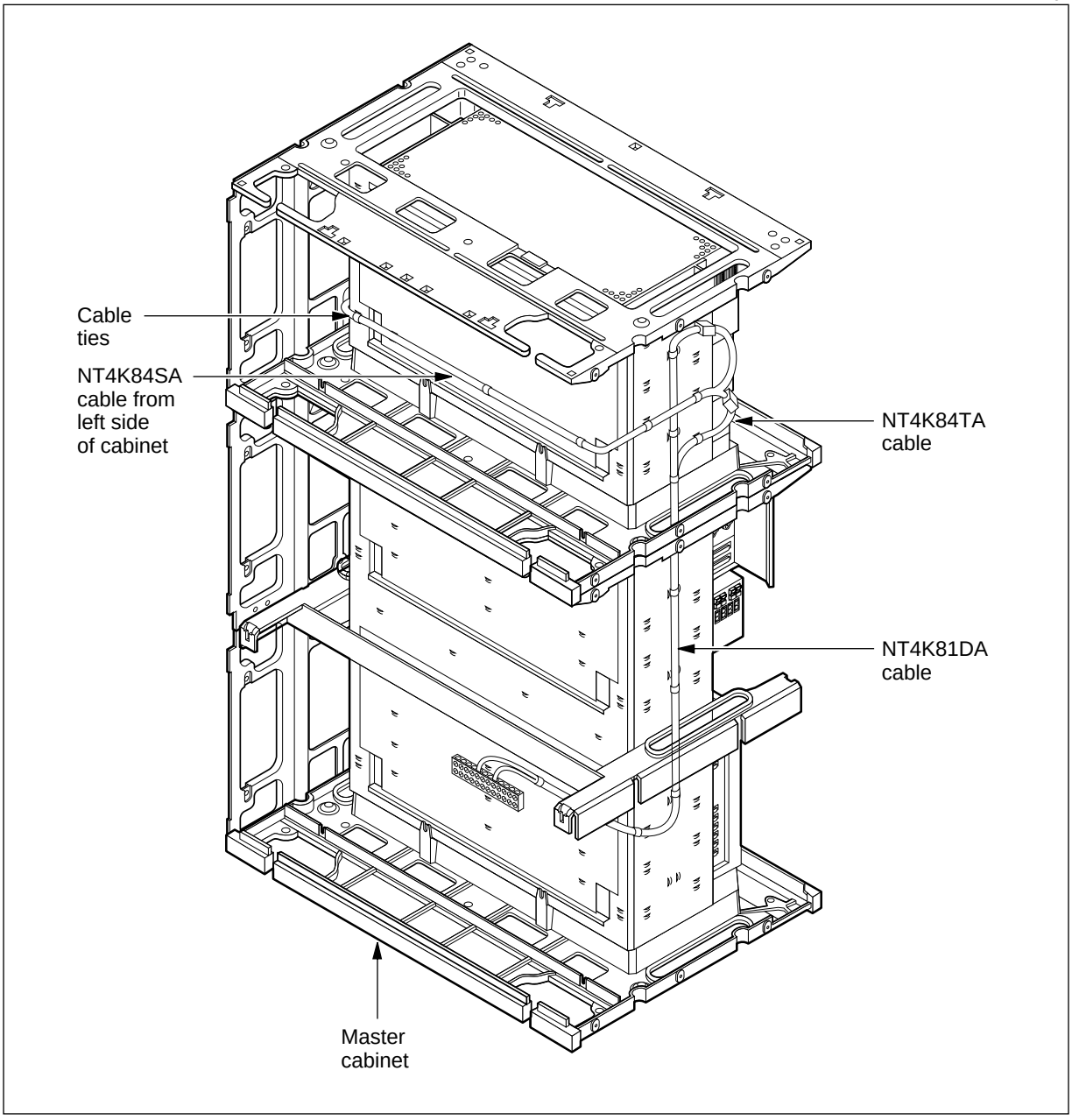


—continued—

Procedure 7-6 (continued)
Connecting an NT4K81DA DSX-1 shelf and T1 repeater shelf power cable

Figure 7-22
Routing an NT4K81DA cable to the SEM containing the DSX-1 shelf and the T1 repeater shelf

FW-11184



—end—

Procedure 7-7
Connecting the ac feeds to the MPP cabinet

Use this procedure to connect one 208/240 V ac 35 A feed to each rectifier shelf in a Modular Power Package (MPP) cabinet.

Note: This procedure must be performed by a qualified electrician.

Installation of the ac cabling must comply with the building distribution and grounding scheme. See “Power and grounding”, in *Addendum 1 (MBP) Site Installation Planning and Engineering*, 323-3001-200, for an explanation of building grounding schemes.

The length and conductor gauge of the ac cable used must comply with local electrical codes. Unless otherwise specified by local electrical codes, the preferred cable is armored three-conductor 10 AWG cable, colors: black, red, and green.

In systems that only require one rectifier shelf, power can be supplied by means of armored cable and a 208/240 V ac receptacle. However, in systems that require two rectifier shelves, the shelves must be cabled directly to the ac panel. Receptacles cannot be used.

Requirements

The following tools and materials are required:

- cable ties
- cable cutters
- flat-bladed screwdriver, 1/4 in. wide blade
- set of nut drivers
- power knife
- cable ripper for stripping armored cable

The ac panel must have been installed by a qualified electrician as described in *Addendum 1 (MBP) Site Installation Planning and Engineering*, 323-3001-200.

—continued—

Procedure 7-7 (continued)
Connecting the ac feeds to the MPP cabinet

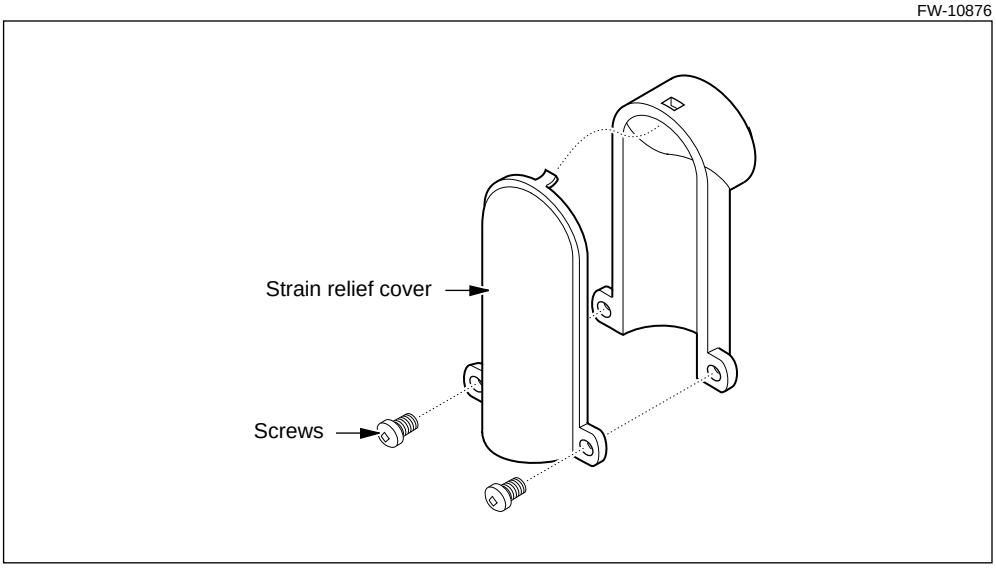
DANGER
Risk of electrocution
Ensure that power is shut off at the ac panel before performing this procedure. Either padlock the circuit breakers into the off position or remove them entirely from the breaker panel to ensure that power remains shut off.

Action

Step	Action
1	Ensure that the right angle strain relief on each rectifier shelf is oriented correctly as shown in Figure 7-23.
2	Start at the topmost rectifier shelf in the MPP cabinet.
3	At the rear of the MPP cabinet, remove the two screws that hold the cover of the right-angle strain relief in place, and remove the strain relief cover as shown in Figure 7-23.

Figure 7-23
Removing and installing a strain relief cover

FW-10876



—continued—

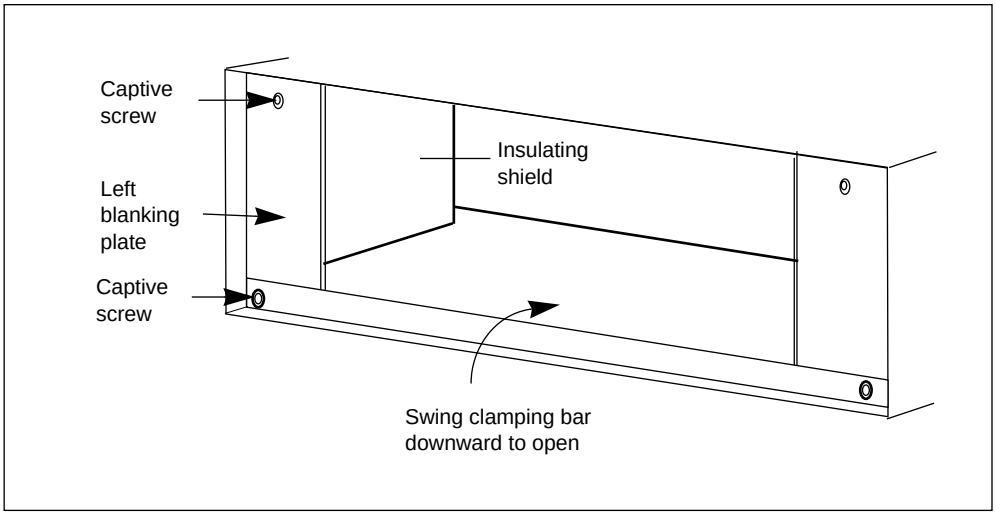
Procedure 7-7 (continued)
Connecting the ac feeds to the MPP cabinet

Step	Action

4 At the front of the MPP cabinet, release the two captive screws that hold the clamping bar in place as shown in Figure 7-24.

5 Swing the clamping bar downward.

Figure 7-24
Gaining access to the ac terminal



6 Release the retaining screw at the top of the left blanking plate.

7 Remove the left blanking plate by lifting it upward and outward.

8 Remove the insulating shield from the inside the left end of the shelf to expose the connection points for the ac feed.

9 Are you installing the MPP cabinet on a concrete floor on a raised floor?

If you are installing the cabinet	Then go to
on a concrete floor	step 11
on a raised floor	step 10

10 Check the local electrical codes to determine if ac power feeds have to be run in conduit. If conduit is required, run two lengths of 2-1/2 in conduit between the ac panel and the two knockouts that are located at the right rear of the MPP cabinet underneath the pedestal.

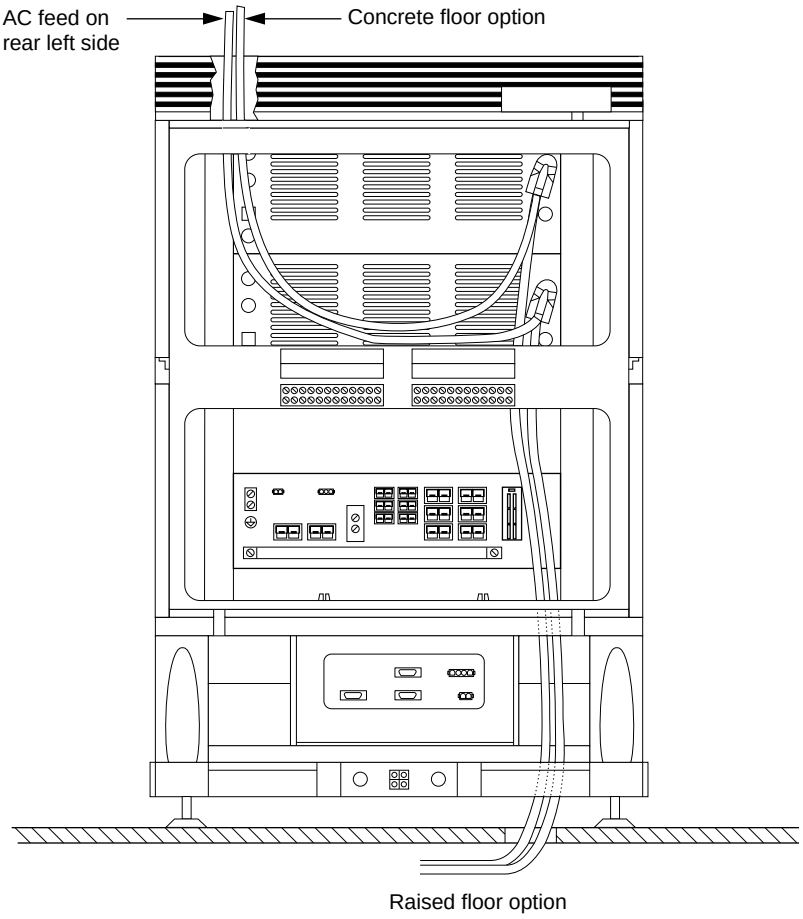
—continued—

Procedure 7-7 (continued)
Connecting the ac feeds to the MPP cabinet

Step	Action
11	Run cable for a 208/240 V ac 35 A feed from the ac panel into the rear of the MPP cabinet as shown in Figure 7-25. ***Note:*** For systems that only require one rectifier shelf, power can be connected to the shelf by a receptacle. For systems that require two rectifier shelves, the shelves must be cabled directly to the ac distribution panel. Receptacles cannot be used.

Figure 7-25
Routing the ac feeds into the rear of the MPP cabinet

FW-10877



Note: Local electrical codes may require that the battery cables be enclosed in conduit.

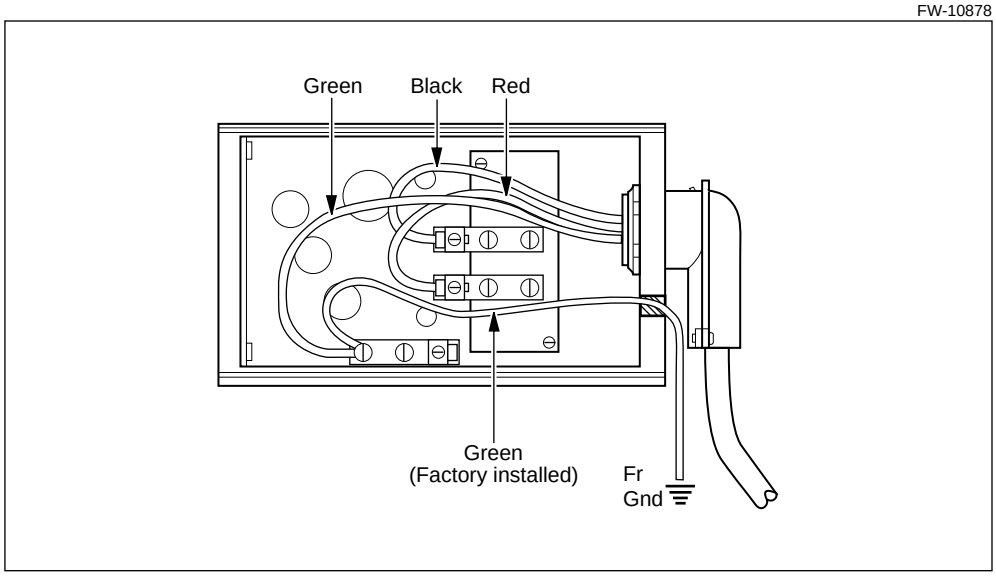
—continued—

Procedure 7-7 (continued)
Connecting the ac feeds to the MPP cabinet

Step	Action
12	Push the cable through the strain relief and into the rectifier shelf.
13	At the front of the cabinet, strip back the armored cable about 250 mm (10 in.) to expose the wires inside the cable.
14	Strip each of the wires in the cable back about 5 mm (1/2 in.) to expose the conductors.
15	Insert the conductors in to the terminal blocks, as shown in Figure 7-26, and tighten the terminal screws.
16	At the rear of the cabinet, reinstall the strain relief cover.
17	At the front of the cabinet, reinstall the insulating shield and the blanking plate.
18	Swing the clamping bar upward.
19	Tighten the captive screws that secure the clamping bar and the blanking plate in place.
20	Repeat step 1 to step 19 to install the ac feed to the second rectifier shelf, if a second rectifier shelf is used. ***Note:*** Do not switch on ac power to the MPP cabinet. Switching on the ac power and setting up the rectifiers is done as part of the commissioning procedures as described in *Commissioning and Testing*, Volume 3.

Figure 7-26
Connecting the conductors of the ac cable to the terminal screws inside the rectifier shelf

FW-10878



—end—

Procedure 7-8
Connecting power cables from backup batteries to an MPP cabinet

Use this procedure to install battery cables from battery strings in a battery rack to the terminal blocks in a Modular Power Package (MPP) cabinet.

Battery backup equipment is the responsibility of the customer. The installation and connection of all battery backup to the Modular Power Package (MPP) shall comply with all national, state, and local codes governing equipment of this type. The conductors between the MPP and the battery backup system shall be treated as "TAP" conductors, tapped from the common dc bus located in the dc distribution shelf of the MPP. The available current from this bus shall be calculated as follows:

- 25 A per rectifier (maximum 4)
- 30 A per battery string (maximum 6)

The conductors shall be terminated with 30 A over-current protectors that are provided as part of the battery source. The conductors should be protected from damage or enclosed in a raceway where not more than three feeders per raceway are installed.

Unless otherwise specified by the codes described at the beginning of this procedure, leads are 4 AWG stranded construction, red for supply and white for return, and up to 7.6 m (25 ft) in length and rated for 90 degrees C.

Requirements

The following tools and materials are required:

- cable ties and cable cutters
- flat-bladed screwdriver, 1/4 in. wide blade
- ring terminals, crimp type, for a No. 10 screw and 4 AWG conductors
- crimping tool, Thomas and Betts TBM 6, or equivalent
- set of nut drivers

DANGER
Risk of electrocution
Ensure that breakers on the battery rack that supply the power feeds are shut off while performing this procedure. If the battery racks are equipped with fuses, remove the fuses while performing this procedure.

—continued—

Procedure 7-8 (continued)
Connecting power cables from backup batteries to an MPP cabinet

Action

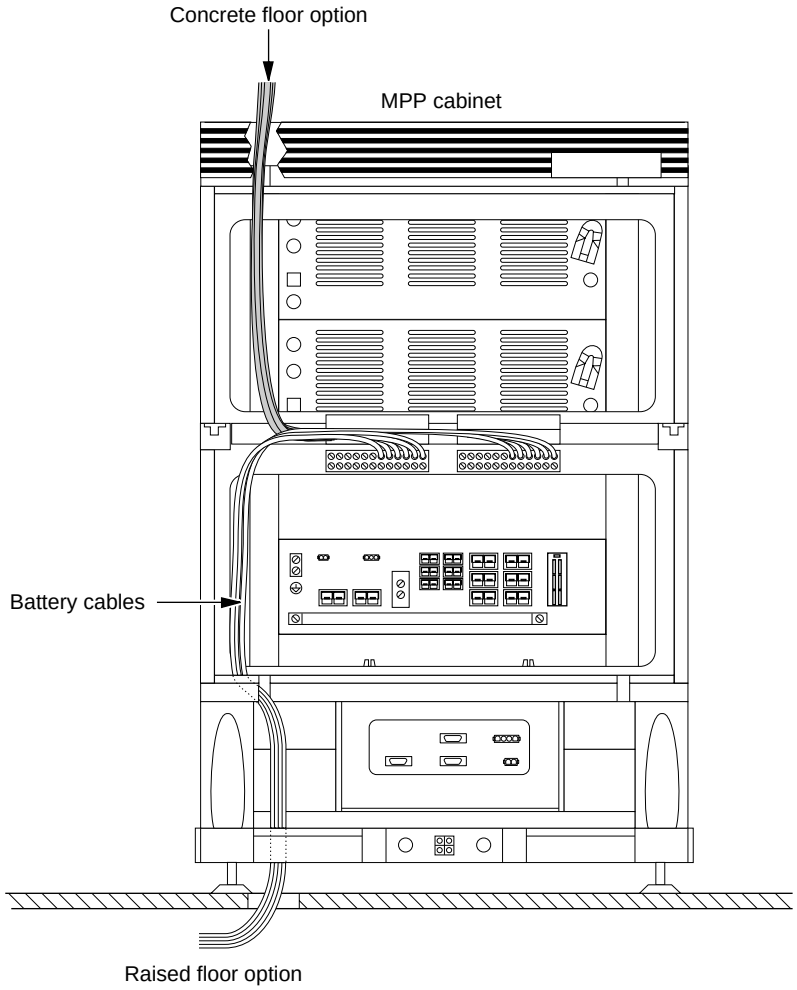
Step	Action
1	Start with any of the battery strings in the battery rack.
2	Are you installing the MPP cabinet on a raised floor or a concrete floor? **If you are installing the MPP cabinet** / **Then go to** on a raised floor / step 3 on a concrete floor / step 4
3	Check local electrical codes to determine if the battery feeds are to be run in conduit. If so, run a 4-in. diameter conduit from the battery rack to the knockout located at the left side of the MPP cabinet, underneath the pedestal.
4	Route a red 4 AWG lead and a white 4 AWG lead between the battery rack and the rear of the MPP cabinet. Do not connect the leads yet.
5	At the battery rack, connect the supply lead and the return lead to the terminals associated with the battery string. The supply (-) lead is red in color and the return (+) lead is white.
6	Route the battery cable into the rear of the MPP cabinet as shown in Figure 7-27 on page 7-55.
7	Strip back the conductors 13 mm (1/2 in.).
8	Crimp a ring terminal onto each lead using the TBM 6 crimping tool.
9	Attach the supply and return leads to the terminal blocks as shown in Figure 7-28 on page 7-56.
10	Repeat steps 1 to 9 to install battery cables for the remaining battery strings in the battery rack. ***Note:*** Do not switch on the breakers or insert the power feed fuses for the battery strings at this time. Power will be applied during the site commissioning and testing procedures described in *Commissioning and Testing*, Volume 3.

—continued—

Procedure 7-8 (continued)
Connecting power cables from backup batteries to an MPP cabinet

Figure 7-27
Routing battery cables into the MPP cabinet

FW-10951

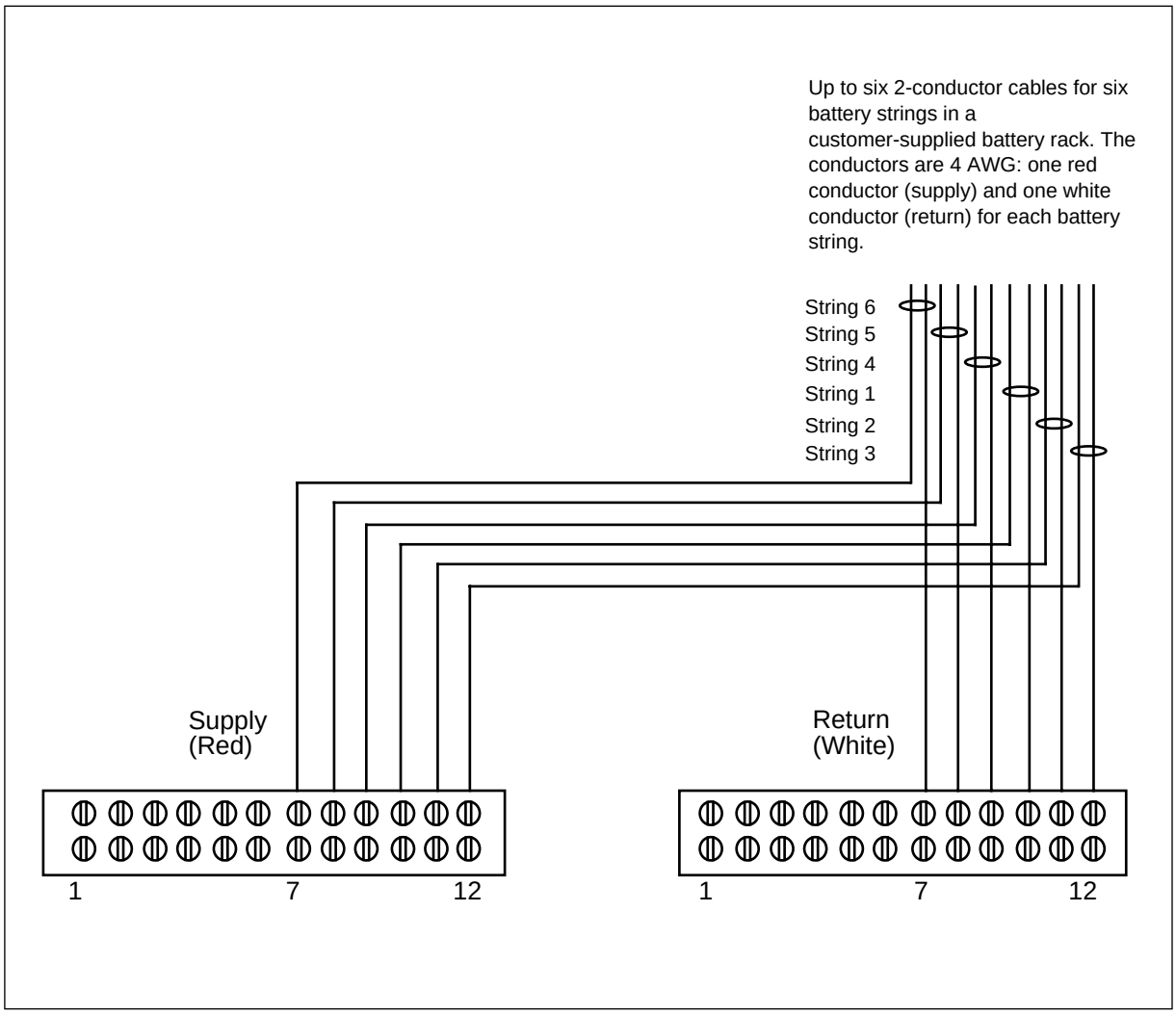


Note: Local electrical codes may require that the battery cables be enclosed in conduit.

—continued—

Procedure 7-8 (continued)
Connecting power cables from backup batteries to an MPP cabinet

Figure 7-28
Connecting the battery cables to the terminal blocks in the MPP cabinet



—end—

Connecting signal cables between cabinets

This chapter provides the procedures to connect signal cables between the master Modular Business Package (MBP) cabinet and the expansion MBP cabinet. The cables include: the metallic test access cable, D/VT link access cables, the power distribution unit (PDU) alarm cable, and the DS1 pigtails.

Chapter task lists

Select the task list for the equipment and configuration that you are installing. Perform the procedures as listed in that task list.

Installing a 384-to 672-line two-cabinet configuration, no MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the metallic test access cable	page 8-4
Connecting the D/VT link access cables	page 8-6
Connecting the alarm blower power cable between the master cabinet and the expansion cabinet	page 8-8
Connecting an alarm cable between the MPP cabinet and the master cabinet or the expansion cabinet	page 8-11
If the expansion cabinet is equipped with a DSX-1 shelf and a repeater shelf, connect the DS1 pigtails between the master cabinet and the expansion cabinet	page 8-15

Installing a multiplexer configuration, with an MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the alarm cable between the MPP cabinet and the master MBP cabinet	page 8-11

Installing a 96-line to 480-line single-cabinet configuration, with an MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the alarm cable between the MPP cabinet and the master MBP cabinet	page 8-11

Installing a 384-line to 672-line two-cabinet configuration, with an MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the metallic test access cable	page 8-4
Connecting the D/VT link access cables	page 8-6
Connecting the alarm and blower power cable between the master cabinet and the expansion cabinet	page 8-8
Connecting the alarm cable between the MPP cabinet and the master MBP cabinet	page 8-11
If the expansion cabinet is equipped with a DSX-1 shelf and a repeater shelf, connect the DS1 pigtails between the master cabinet and the expansion cabinet	page 8-15

Adding an MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the alarm cable between the MPP cabinet and the master MBP cabinet	page 8-11

Adding an expansion cabinet, no MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the metallic test access cable	page 8-4

Task	See
Connecting the D/VT link access cables	page 8-6
Connecting the alarm and blower power cable between the master cabinet and the expansion cabinet	page 8-8
If the expansion cabinet is equipped with a DSX-1 shelf and a repeater shelf, connect the DS1 pigtails between the master cabinet and the expansion cabinet	page 8-15

Adding an expansion cabinet, with an MPP cabinet

Perform the following procedures in the order in which they are listed.

Task	See
Connecting the metallic test access cable	page 8-4
Connecting the D/VT link access cables	page 8-6
Connecting the alarm and blower power cable between the master cabinet and the expansion cabinet	page 8-8
Connecting the alarm cable between the MPP cabinet and the master MBP cabinet	page 8-11
If the expansion cabinet is equipped with a DSX-1 shelf and a repeater shelf, connect the DS1 pigtails between the master cabinet and the expansion cabinet	page 8-15

Procedure 8-1
Connecting the metallic test access cable

Use this procedure to connect an NT4K86NC metallic test access cable between the uppermost copper-distribution shelf in the master Modular Business Package (MBP) cabinet and the lowermost copper-distribution shelf in the expansion MBP cabinet.

When an expansion cabinet is shipped from the factory, the NT4K86NC metallic test access cable is pre-connected to the MTA In connector on the lowermost copper-distribution shelf in the expansion cabinet. The free end of the cable is rolled up and stored in the rear of the expansion cabinet for shipping. At the installation site, the free end of the cable is unrolled and connected to the uppermost copper-distribution shelf in the master cabinet.

Requirements

The following tools and materials are required:

- cable ties
- side cutters

Action

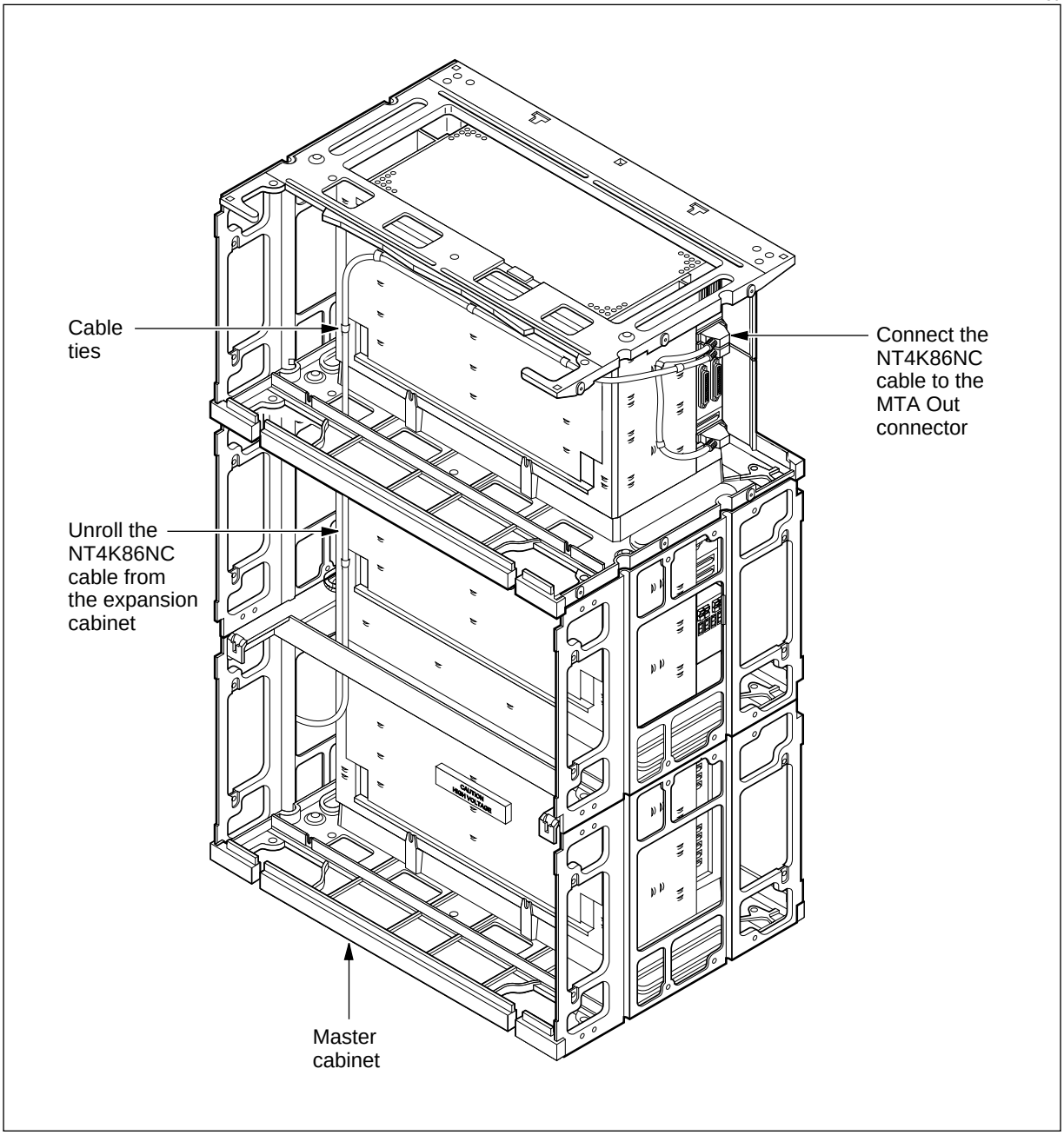
Step	Action
1	At the rear of the expansion cabinet, unroll the NT4K86NC metallic test access cable from the right side of the cabinet.
2	Route the cable from the right side of the expansion cabinet, through the expansion kit, and into the left side of the master cabinet as shown in Figure 8-1 on page 8-5.
3	Route the NT4K86NC cable up the left side of the master cabinet, and across the rear of the cabinet to the right side of the cabinet as shown in Figure 8-1 on page 8-5.
4	Connect the free end of the cable to the MTA Out connector on the uppermost copper-distribution shelf in the master cabinet as shown in Figure 8-1 on page 8-5.
5	Secure the cable with cable ties in the locations shown in Figure 8-1 on page 8-5.

—continued—

Procedure 8-1 (continued)
Connecting the metallic test access cable

Figure 8-1
Connecting an NT4K86NC metallic test access cable

FW-11186



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Procedure 8-2
Connecting the D/VT link access cables

Use this procedure to connect NT4K82DD to DG D/VT link access cables from the ABM shelf in the master Modular Business Package (MBP) cabinet to the copper-distribution shelves in the expansion MBP cabinet.

When a system equipped with an expansion cabinet is shipped from the factory, the NT4K82DD to DG cables required for the copper-distribution shelves in the expansion cabinet are pre-connected to the ABM shelf in the master cabinet. The free ends of the cables are rolled up and stored in the master cabinet for shipping. At the installation site, the free ends of the cables are unrolled from the master cabinet and are connected to the copper-distribution shelves in the expansion cabinet.

Requirements

The following tools and materials are required:

- cable ties
- side cutters

Action

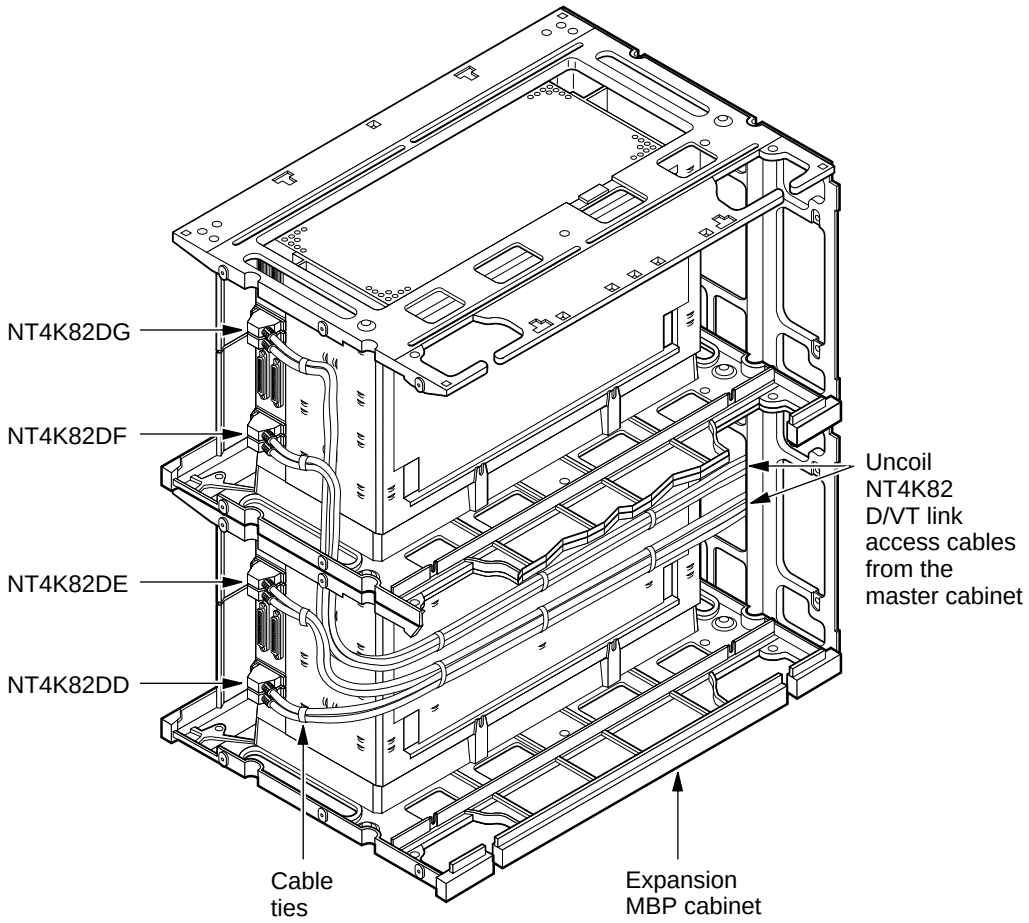
Step	Action
1	At the rear of the master cabinet, unroll the NT4K82 DD to DG D/VT link access cables.
2	Route the cables from the left side of the master cabinet to the left side of the expansion cabinet as shown in Figure 8-2 on page 8-7.
3	Secure the cables to the lances in the expansion cabinet with cable ties at the locations shown in Figure 8-2 on page 8-7.
4	Route the cables up the left side of the expansion cabinet and attach the A and B connectors of the cables to the A and B connectors on the copper-distribution shelves as shown in Figure 8-2 on page 8-7. ***Note:*** In some installations the expansion cabinet may not contain four copper-distribution shelves. In these installations, only the number of D/VT link access cables required for the CDSs in the expansion cabinet will have been installed at the factory.
5	Install cable ties in the lances at the locations shown in Figure 8-2 on page 8-7 to secure the cables.

—continued—

Procedure 8-2 (continued)
Connecting the D/VT link access cables

Figure 8-2
Connecting NT4K82DD to DG D/VT link access cables, rear view of expansion cabinet

FW-11187



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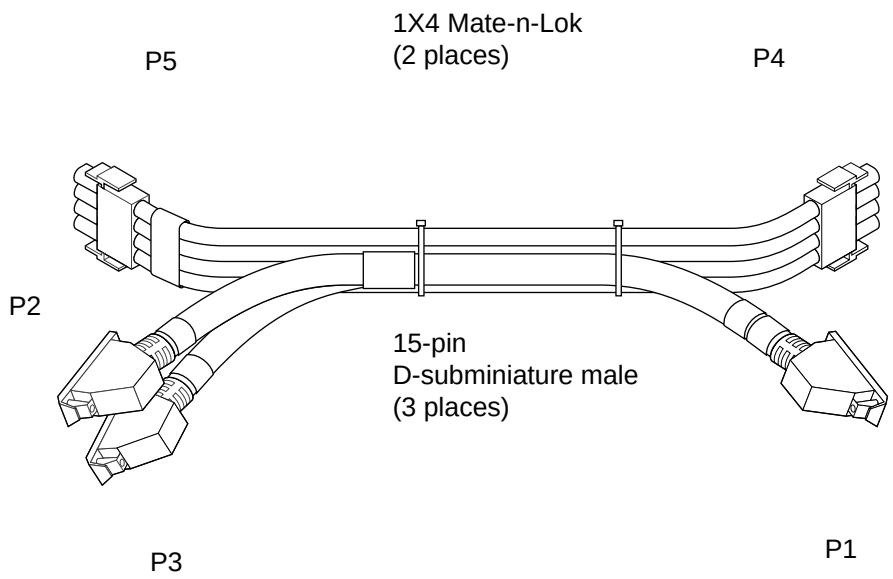
Procedure 8-3
Connecting the alarm blower power cable between the master cabinet and the expansion cabinet

Use this procedure to connect the NT4K84KA alarm blower power cable between the power distribution unit (PDU) in the pedestal of the master Modular Business Package (MBP) cabinet and the PDU of the expansion MBP cabinet.

FW-10847

NT4K84KA



This cable harness consists of two cable harnesses tied together with tie-wraps. One harness consists of four 10 AWG stranded leads 92 Red, 2 Blk) with 1X4 Mate-n-lok connector on each end. The other harness consists of 24-conductor, 24 AWG, solid wire cable with 15-pin D-subminiature connectors.

1.4 m (55.0 in.) NT4K84KA

Requirements

The following tools and materials are required:

- cable ties
- side cutters

—continued—

Procedure 8-3 (continued)
Connecting the alarm blower power cable between the master cabinet and the expansion cabinet

Action

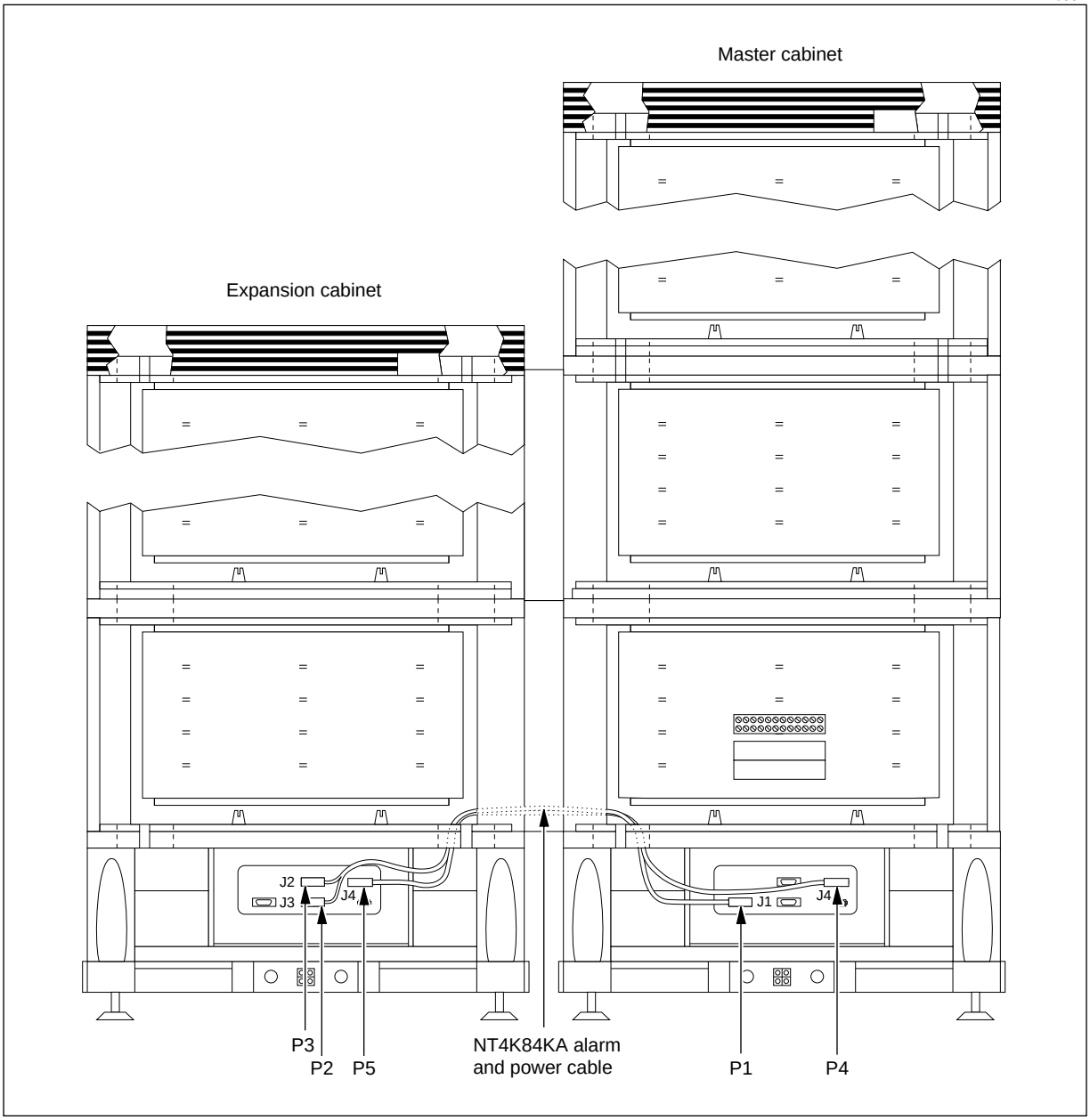
Step	Action
1	Remove the NT4K86QA input jumper from J1 on the PDU of the master cabinet and connect it to J1 on the PDU of the expansion cabinet.
2	At the rear of the master cabinet, attach connector P1 of the NT4K84KA cable to connector J1 of the PDU, and attach connector P4 to connector J4 as shown in Figure 8-3 on page 8-10.
3	Route the cable through the expansion kit into the expansion cabinet as shown in Figure 8-3 on page 8-10.
4	At the rear of the expansion cabinet, attach connector P5 of the cable to J4 of the PDU, attach connector P3 to J3, and connector P2 to J2.

—continued—

Procedure 8-3 (continued)
Connecting the alarm blower power cable between the master cabinet and the expansion cabinet

Figure 8-3
Connecting an alarm blower power cable between the master cabinet and the expansion cabinet

FW-10887



—end—

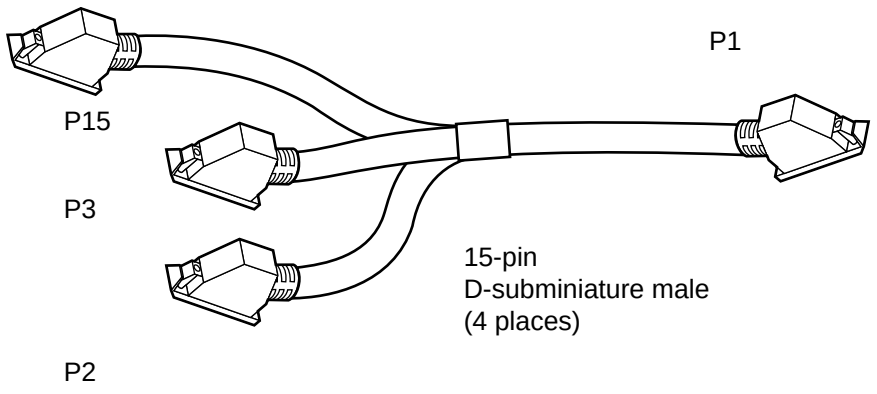
Procedure 8-4
Connecting an alarm cable between the MPP cabinet and the master cabinet or the expansion cabinet

Use this procedure to connect an NT4K83CA or CB alarm cable between the power distribution unit (PDU) of the Modular Power Package (MPP) cabinet and the PDU of a Modular Business Package (MBP) cabinet. If the system is equipped with an expansion MBP cabinet, the NT4K83CA or CB cable attaches to J1 on the PDU of the expansion MBP cabinet. If the system is equipped only with a master MBP cabinet, the cable attaches to J1 on the PDU of the master cabinet.

The NT4K83CA cable is used when the MPP cabinet is attached to the master MBP cabinet, and the NT4K83CB cable is used when the MPP cabinet is installed remotely from the master MBP cabinet.

FW-11005

NT4K83CA or CB



24-conductor, 24 AWG solid wire cable with 15-pin D-subminiature connectors.

1.6 m	(5.5 ft)	NT4K83CA
10.6 m	935 ft)	NT4K83CB

Requirements

The following tools and materials are required:

- cable ties

—continued—

Procedure 8-4 (continued)
Connecting an alarm cable between the MPP cabinet and the master cabinet or the expansion cabinet

Action

Step	Action
1	If the system is equipped with an expansion MBP cabinet, remove the NT4K86QA input jumper from J1 the PDU of the expansion cabinet. If the system is not equipped with an expansion cabinet, remove J1 from the PDU of the master MBP cabinet.
2	On the PDU at the rear of the MPP cabinet, attach cable connectors P2 to J2 on the PDU and connector P3 to J3 on the PDU, as shown in Figure 8-4 on page 8-13.
3	Route connector P1 up to the dc distribution shelf and connect it to the 15-pin female connector (DB-15) on the distribution shelf as shown in Figure 8-4 on page 8-13.
4	Are you installing a remote MPP cabinet or an attached MPP cabinet?

If you are installing	Then go to
an attached MPP cabinet	step 5
a remote MPP cabinet	step 8

5	Route the cable out of the MPP cabinet, through the expansion kit, and into the master MBP cabinet, as shown in Figure 8-4 on page 8-13.
6	Is the system equipped with an expansion cabinet?

If	Then
yes	Route the cable through the master MBP cabinet, through the expansion kit, into the expansion MBP cabinet, and down to the PDU. Go to step 8.
no	Route the cable down to the PDU in the master MBP cabinet. Go to step 7.

7	Attach the connector labelled PDU to connector J1 on the PDU, as shown in Figure 8-4 on page 8-13. Do not continue. You have completed this procedure.
8	Route the cable out of the cabinet and over to the expansion MBP cabinet, as shown in Figure 8-5 on page 8-14. If an expansion cabinet does not exist, route the cable to the master MBP cabinet.
9	Attach the connector labelled PDU to connector J1 on the PDU, as shown in Figure 8-5 on page 8-14.

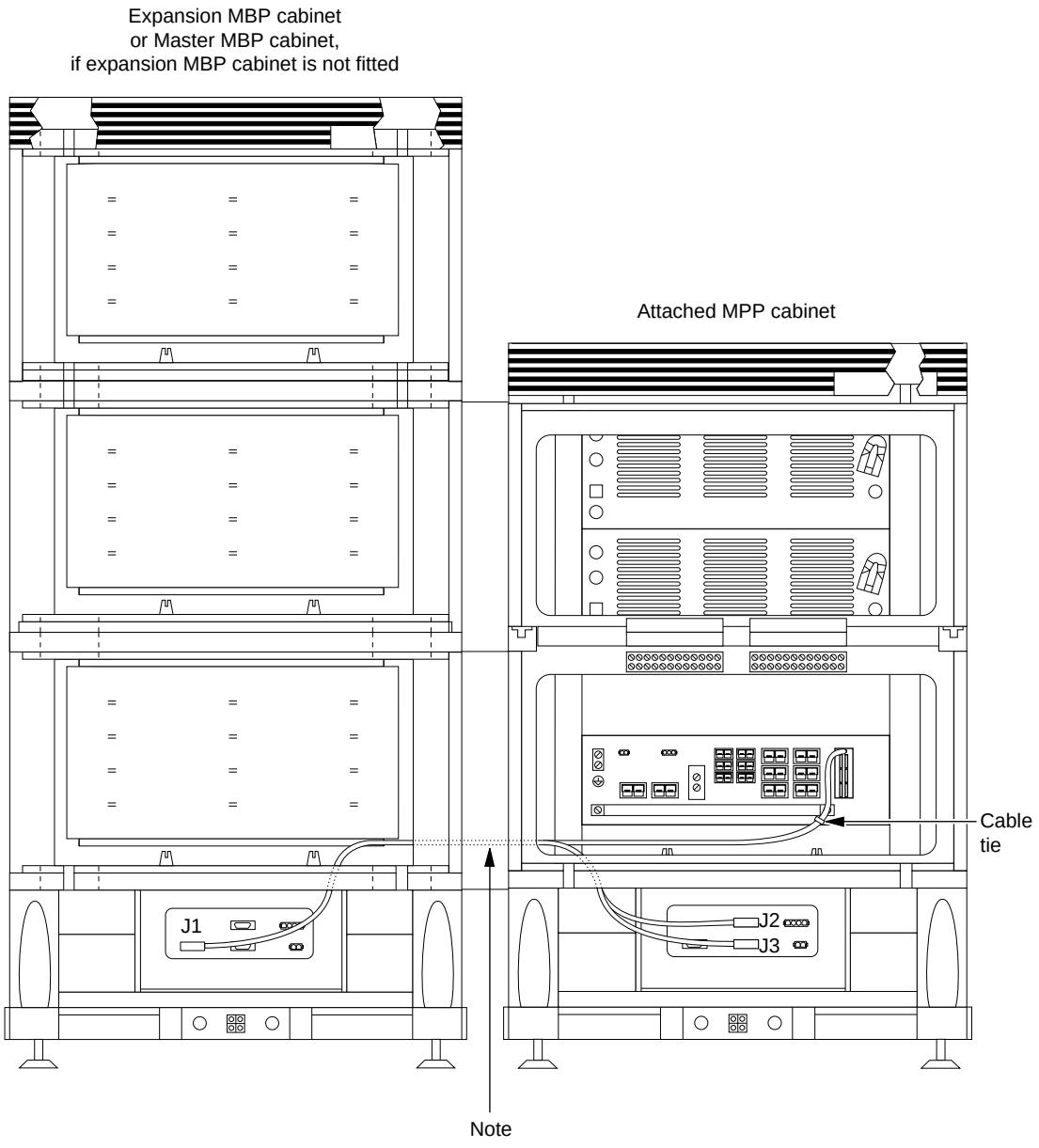
—continued—

Procedure 8-4 (continued)

Connecting an alarm cable between the MPP cabinet and the master cabinet or the expansion cabinet

Figure 8-4
Connecting an NT4K83CA cable to an MBP cabinet, attached MPP cabinet

FW-11192



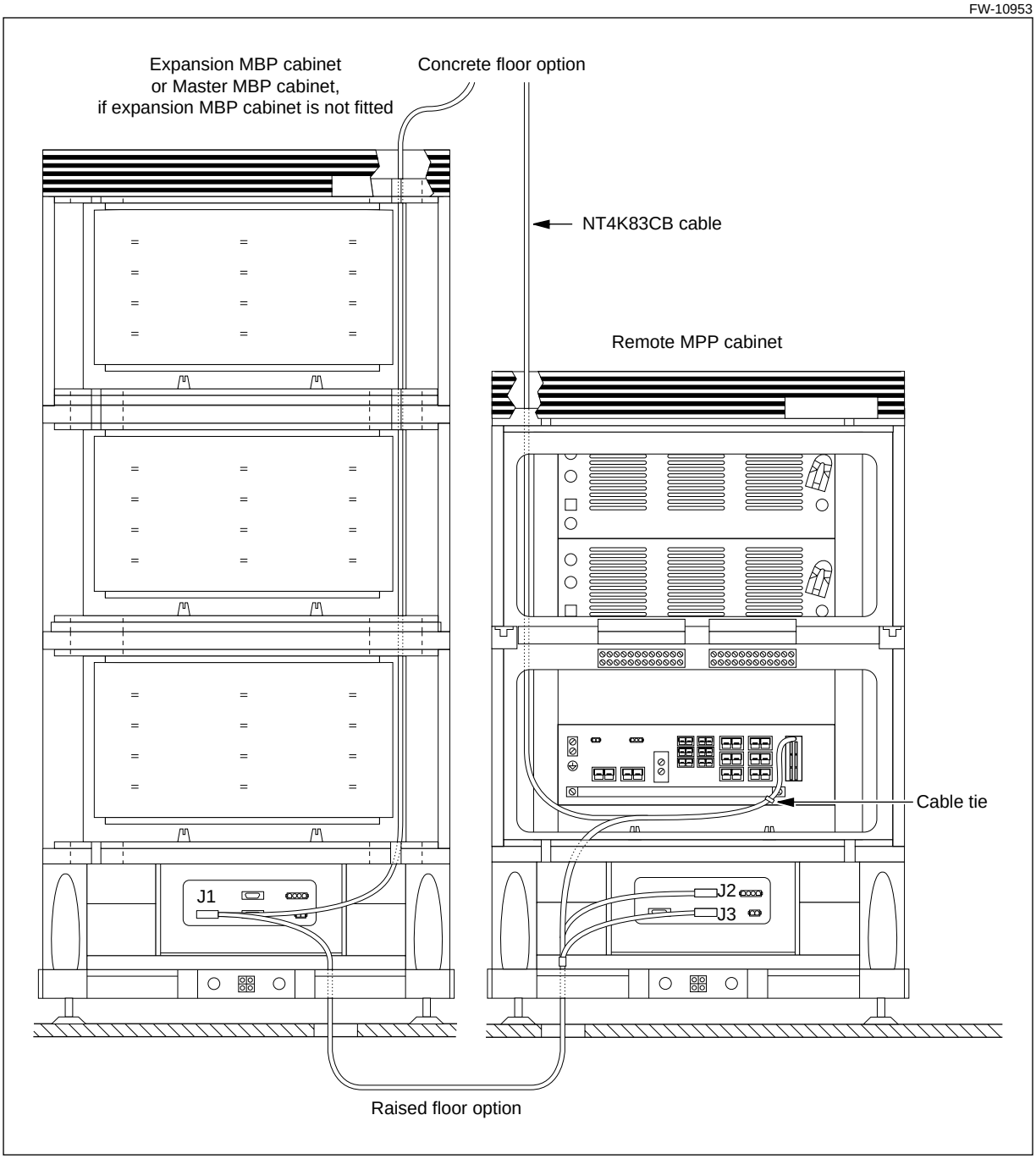
Note: The NT4K83CA cable passes through the expansion kit to the master cabinet, and connects to J1 on the PDU of the master cabinet if no expansion MBP cabinet is fitted. If an expansion kit is fitted, this cable passes through the master cabinet, and on into the expansion cabinet, where it connects to J1 on the PDU of the expansion cabinet.

—continued—

Procedure 8-4 (continued)
Connecting an alarm cable between the MPP cabinet and the master cabinet or the expansion cabinet

Figure 8-5
Connecting an NT4K83CB cable to an MBP cabinet, remote MPP cabinet

FW-10953



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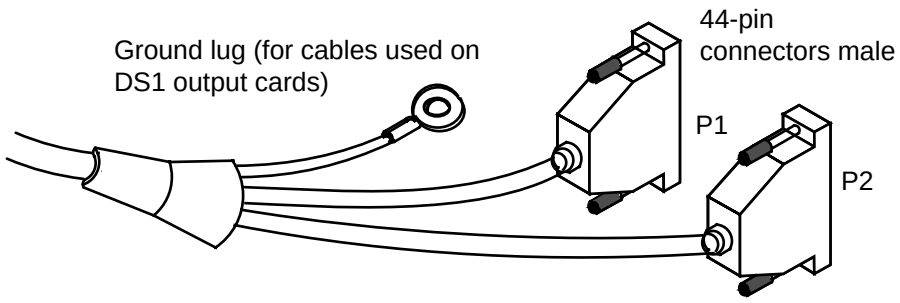
Procedure 8-5
Connecting the DS1 pigtails from an internal DSX-1

Use this procedure to connect NT4K85UA DS1 pigtails from an internal DSX-1 shelf installed at the top of a master cabinet or at the top of the expansion Modular Business Package (MBP) cabinet to the access bandwidth manager (ABM) shelf in the master MBP cabinet.

For the procedure to install DS1 cables only in systems that are equipped with an external DSX-1 panel, refer instead to Procedure 9-1 on page 9-3, "Installing the DS1 cables from an external DSX-1". For procedures to install a mixture of DS1s and DS3s, refer to Procedure 9-3 on page 9-36, "Installing a mix of DS1 and DS3 cables".

NT485UA DS1 pigtails



NT-613 30-pair, twisted 22 AWG solid wires with overall shielding. One end is split (15 pairs each) and connected to two 44-pin connectors (terminating 14 pairs each). These connectors attach to DS1 input and DS1 output cards in the I/O area of the ABM shelf. The other end is wire-wrapped to the DSX-1 shelf at the factory.

For cables used on DS1 output connectors, a ground lug wire provides connection of the outer shield to the ABM shelf frame ground. The ground lug wire is not used for DS1 input connectors.

When a system containing an internal DSX-1 shelf and a T1 repeater shelf is shipped from the factory, the DS1 pigtails are pre-connected to wire-wrap pins on the DSX-1 shelf. Wire-wrap cross-connections and the cables that connect the DSX-1 shelf to the repeater shelf are also pre-connected at the factory.

Two different installation scenarios exist. In one, the DSX-1 shelf and T1 repeater shelf are located in the expansion MBP cabinet. In the other, the two shelves are located in the master MBP cabinet.

—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

When the DSX-1 shelf and T1 repeater shelf are located in the expansion cabinet, the DS1 pigtails are uncoiled from the expansion cabinet at the installation site, routed to the ABM shelf, the I/O cards are installed, and the cable connectors of the DS1 pigtails are attached to them.

When the DSX-1 shelf and the T1 repeater shelf are contained in the master cabinet, the DS1 pigtails are pre-routed at the factory. At the installation site, the I/O cards are inserted into the ABM shelf and the pre-routed DS1 pigtails are connected to them.

Two working mappers installed in mapper slot positions on the ABM shelf are required for installations using an internal DSX-1 shelf, plus one protection mapper.

When installing DS1 cables, do not mix transmit (DS1 input) and receive (DS1 output) connections within the same cable: dedicate each cable to transmit or receive functions, but not both.

Figure 8-6 on page 8-17 shows the possible locations of the mappers and I/O cards. Table 8-1 shows the slots where mappers can be installed in an MBP cabinet at the remote fiber terminal (RFT) and also shows the I/O card slots that correspond to each of the mappers.

Table 8-1
Relationship between mapper slots and I/O card slots

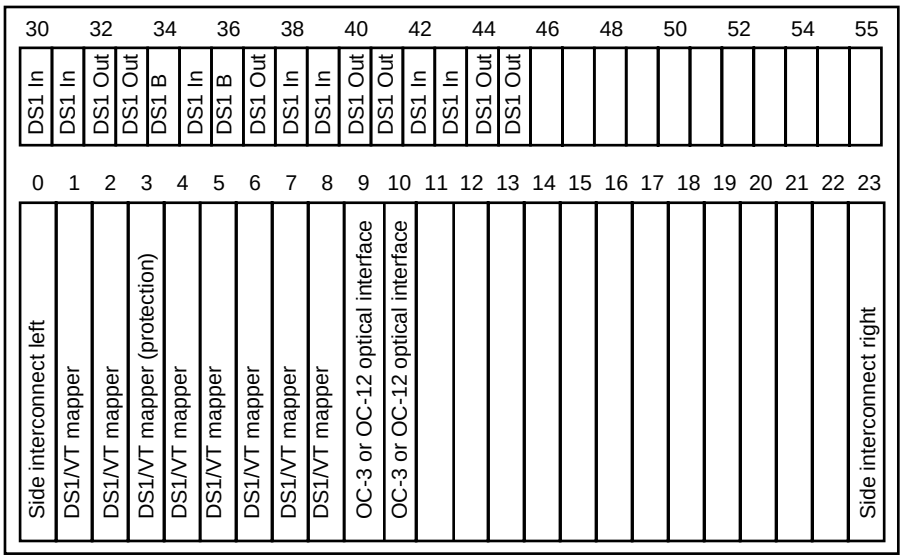
Mapper slot	Input card slot	Output card slot
1	30	32
2	31	33
3 (protection)	34 (protection bridge card)	36 (protection bridge card)
4	35	37
5	38	40
6	39	41
7	42	44
8	43	45

Note: Mapper slots 5–8 are used for the OPC when it is installed in the ABM shelf. These slots are then unavailable for mapper cards.

—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

Figure 8-6
Typical configuration of an ABM shelf



Mappers		I/O cards			
DS1	1	DS1 In	30	DS1 Out	32
DS1	2	DS1 In	31	Ds1 Out	33
DS1 P	3	DS1 B	34	DS1 B	36
DS1	4	DS1 In	35	DS1 Out	37
DS1	5	DS1 In	38	DS1 Out	40
DS1	6	DS1 In	39	DS1 Out	41
DS1	7	DS1 In	42	DS1 Out	44
DS1	8	DS1 In	43	DS1 Out	45

DS1 In DS1 input card (NT4K32AA)
DS1 Out DS1 output card (NT4K33AA)
DS1 B DS1 protection bridge card (NT4K31AA)
P protection

Note: Mapper slots 5–8 are used for the OPC when it is installed in the ABM.

—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

Pin-out details

Table 8-2 on page 8-19 and Table 8-3 on page 8-20 contain pin-outs for DS1 pigtails in installations that are equipped with an internal DSX-1 shelf and an internal T1 repeater shelf.

In the tables, the pin-outs on the wire-wrap field of the DSX-1 panel are only given for cables that connect to DS1 Input cards in the ABM shelf. Pin-outs for DS1 cables that connect to the output cards are the same as those given in the table, except that entries in column “IN or OUT” should read OUT for all leads.

The pigtail connectors (P1 and P2) are wired to consecutive DSX-1 positions. Connector P1 is wired to DSX-1 positions 1–14 and connector P2 is wired to DSX-1 positions 15–28.

—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

Table 8-2
Pin-outs for the DS1 pigtails, connector P1

Connector P1 at I/0 area of ABM shelf					Wire-wrap field on DSX-1 shelf			
Pair or DS1 No.	**Tip or Ring**	**Pin No.**	**Color code**		**Group**	**IN or OUT**	**Tip (T) or Ring (R)**	**Pin No.**
1	Tip	16	W	1BL	A	IN	T	1
	Ring	31	BL	1W	A	IN	R	1
2	Tip	17	W	1O	A	IN	T	2
	Ring	32	O	1W	A	IN	R	2
3	Tip	18	W	1G	A	IN	T	3
	Ring	33	G	1W	A	IN	R	3
4	Tip	19	W	1BR	A	IN	T	4
	Ring	34	BR	1W	A	IN	R	4
5	Tip	20	W	1S	A	IN	T	5
	Ring	35	S	1W	A	IN	R	5
6	Tip	21	R	1BL	A	IN	T	6
	Ring	36	BL	1R	A	IN	R	6
7	Tip	22	R	1O	A	IN	T	7
	Ring	37	O	1R	A	IN	R	7
8	Tip	23	R	1G	A	IN	T	8
	Ring	38	G	1R	A	IN	R	8
9	Tip	24	R	1BR	A	IN	T	9
	Ring	39	BR	1R	A	IN	R	9
10	Tip	25	R	1S	A	IN	T	10
	Ring	40	S	1R	A	IN	R	10
11	Tip	26	BL	1BL	A	IN	T	11
	Ring	41	BL	1BK	A	IN	R	11
12	Tip	27	BK	1O	A	IN	T	12
	Ring	42	O	1BK	A	IN	R	12
13	Tip	28	BK	1G	A	IN	T	13
	Ring	43	G	1BK	A	IN	R	13
14	Tip	29	BK	1BR	A	IN	T	14
	Ring	44	BR	1BK	A	IN	R	14

Note: Pins 1 to 15 of connectors P1 and P2 are not used, and pairs 29 and 30 are not used.

—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

Table 8-3
Pin-outs for the DS1 pigtails, connector P2

Connector P2 at I/0 area of ABM shelf					Wire-wrap field on DSX-1 shelf			
Pair or DS1 No.	**Tip or Ring**	**Pin No.**	**Color code**		**Group**	**IN or OUT**	**Tip (T) or Ring (R)**	**Pin No.**
15	Tip	16	BK	1S	A	IN	T	15
	Ring	31	S	1BK	A	IN	R	15
16	Tip	17	Y	1 BL	A	IN	T	16
	Ring	32	BL	1Y	A	IN	R	16
17	Tip	18	Y	1O	A	IN	T	17
	Ring	33	O	1Y	A	IN	R	17
18	Tip	19	Y	1G	A	IN	T	18
	Ring	34	G	1Y	A	IN	R	18
19	Tip	20	Y	1BR	A	IN	T	19
	Ring	35	BR	1Y	A	IN	R	19
20	Tip	21	Y	1S	A	IN	T	20
	Ring	36	S	1Y	A	IN	R	20
21	Tip	22	V	1BL	A	IN	T	21
	Ring	37	BL	1V	A	IN	R	21
22	Tip	23	V	1O	A	IN	T	22
	Ring	38	O	1V	A	IN	R	22
23	Tip	24	V	1G	A	IN	T	23
	Ring	39	G	1V	A	IN	R	23
24	Tip	25	V	1BR	A	IN	T	24
	Ring	40	BR	1V	A	IN	R	24
25	Tip	26	V	1S	A	IN	T	25
	Ring	41	S	1V	A	IN	R	25
The following pairs are contained in a blue binder								
26	Tip	27	W	1BL	A	IN	T	26
	Ring	42	BL	1W	A	IN	R	26
27	Tip	28	W	1O	A	IN	T	27
	Ring	43	O	1W	A	IN	R	27
28	Tip	29	W	1G	A	IN	T	28
	Ring	44	G	1W	A	IN	R	28
Note: Pins 1 to 15 of connectors P1 and P2 are not used, and pairs 29 and 30 are not used.								

—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

Requirements

The following tools and materials are required:

- screwdriver, flat blade, 1/8 in. wide
- screwdriver, phillips head, medium
- cable ties

Action

Step	Action
1	Install the DS1 mappers in the ABM shelf using facility records and the information in Table 8-1 on page 8-16 to determine the ABM shelf slot locations.
2	Remove the blank I/O faceplate cards (NT4K58ZA) from the associated I/O slots (see Table 8-1 on page 8-16) according to where you are going to install the DS1 mappers: ***Note:*** Two working mappers are required for the internal DSX-1 shelf and the T1 repeater shelf.
3	Insert I/O cards into the slots from which you removed the blank faceplates, as follows:

Type of card	PEC	I/O slot
DS1 input	NT4K32	30, 31, 35, 38, 39, 42, 43
DS1 output	NT4K33	32, 33, 37, 40, 41, 44, 45
Protection bridge card	NT4K31	34, 36

—continued—

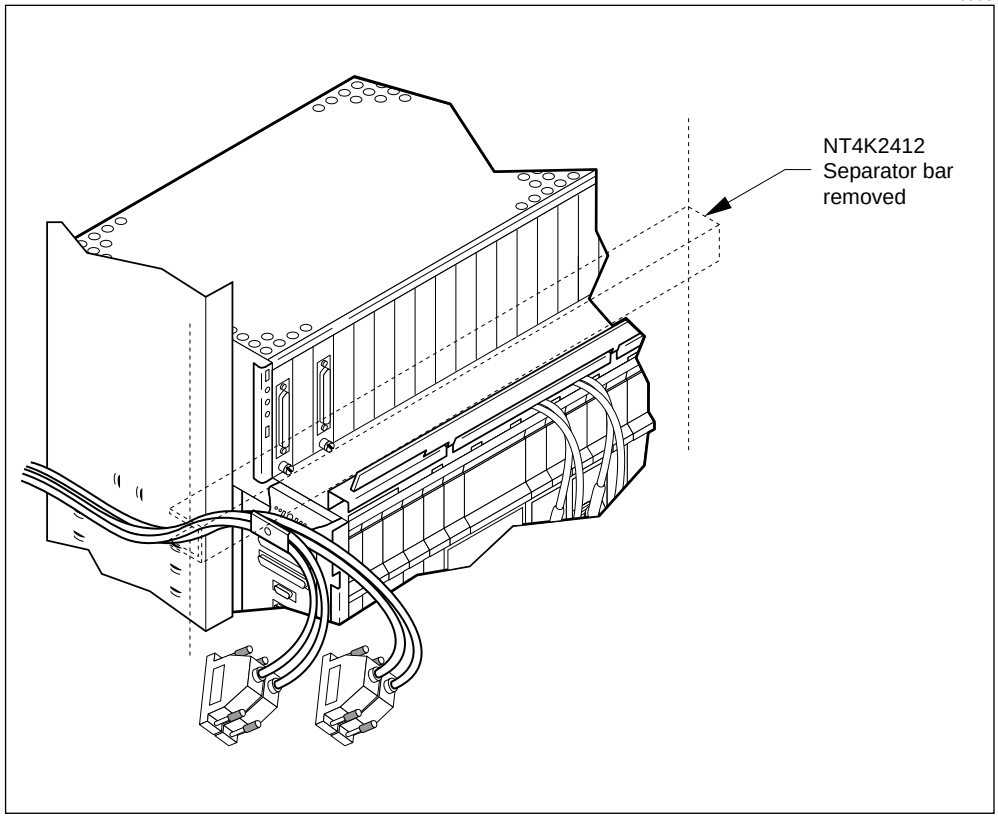
Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

Step	Action
4	Tighten the hold-down screw on the bottom of the I/O card faceplates, as shown in Figure 8-7.
5	Remove the cross connect jumper cable trough from the front of the DSX panel.
6	Are the DSX-1 shelf and the T1 repeater shelf installed in the master cabinet or the expansion cabinet?

If the shelves are in	Then go to
The master MBP cabinet	step 10
The expansion MBP cabinet	step 7

Figure 8-7
Location of the I/O card hold-down screws

FW-10903



—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

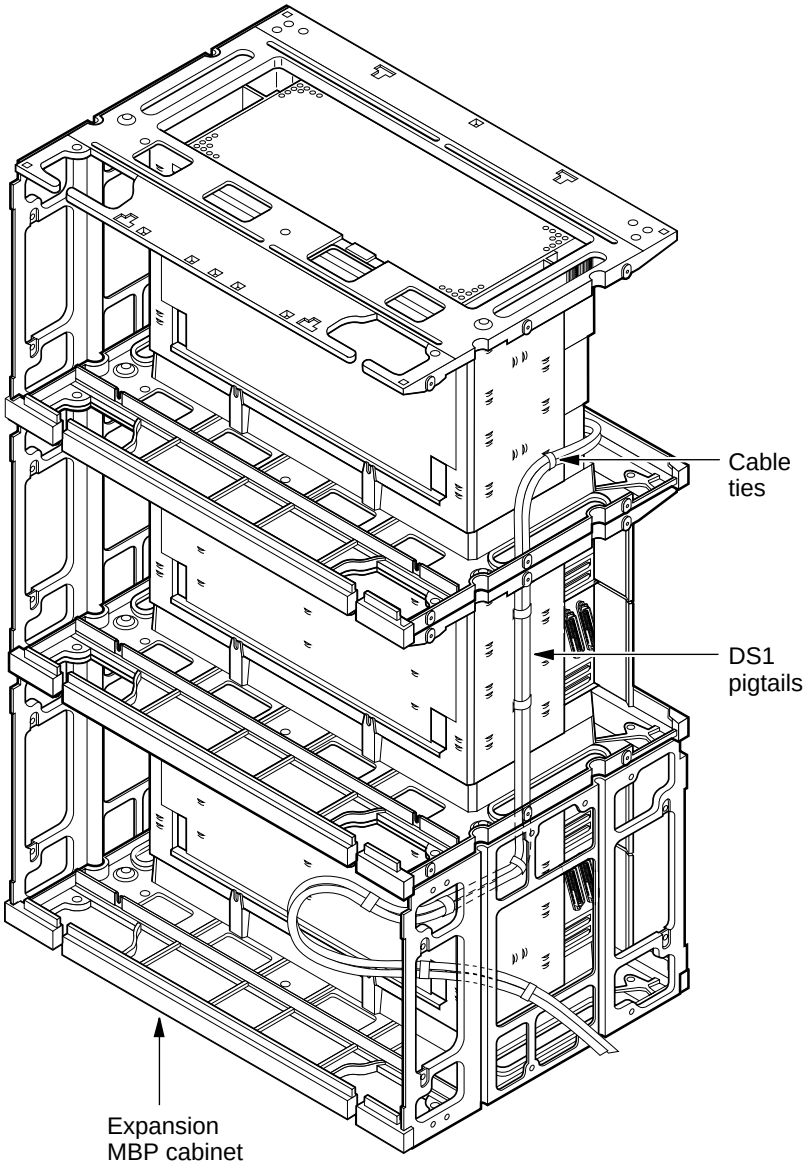
Step	Action
	Cable routing with the DSX-1 in the expansion cabinet
7	Route the DS1 pigtails down the right side of the expansion MBP cabinet, through the expansion cabinet, and out to the master cabinet, as shown in Figure 8-8 on page 8-24.
8	Tie-wrap the cable in the expansion cabinet as shown in Figure 8-8 on page 8-24.
9	Go to step 12.
	Cable routing with the DSX-1 in the master cabinet
10	Route the DS1 pigtails into the right side of the master cabinet (as viewed from the rear of the cabinet), as shown in Figure 8-9 on page 8-25.
11	Tie-wrap the cable in the expansion cabinet as shown in Figure 8-9 on page 8-25.
	Cable routing and connecting in the master cabinet
12	Remove the NT4K2412 separator bar from in front of the ABM shelf by lifting it up and out of the mounting brackets on the universal equipment module uprights as shown in Figure 8-10 on page 8-26.
13	Hang the DS1 pigtails temporarily in the cable tray, as shown in Figure 8-10 on page 8-26.

—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

Figure 8-8
Routing NT4K86UA DS1 pigtails in the expansion cabinet

FW-15234

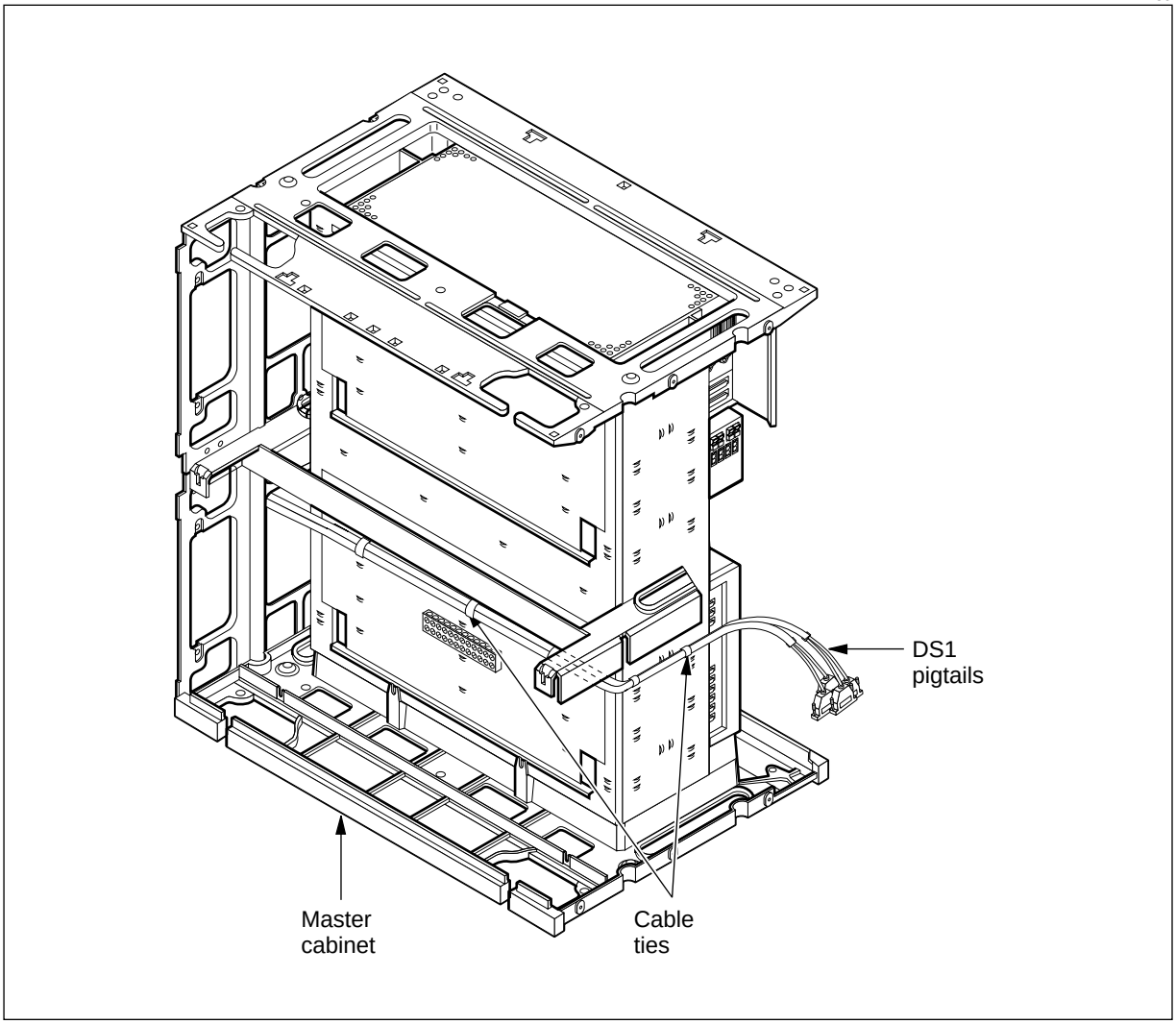


—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

Figure 8-9
Routing NT4K86UA DS1 pigtails in the master MBP cabinet

FW-11189

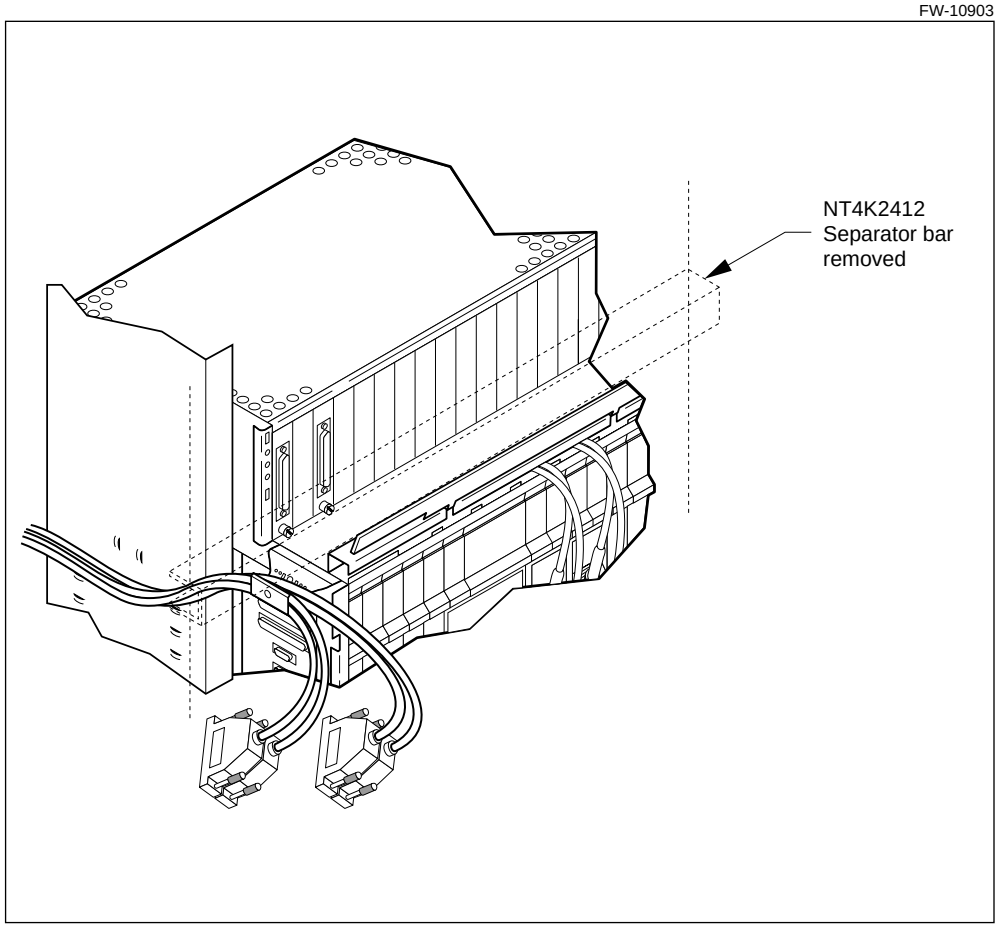


—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

Figure 8-10
Routing cables into the left side of the ABM shelf

FW-10903



—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

Step	Action

14 Connect the DS1 pigtail connectors P1 and P2 to the I/O cards.

Local office records determine the DS1 cable connections to the I/O cards.

Any DS1 transmit cable connector can connect to any I/O Input card assigned to any mapper position. The associated DS1 receive cable must connect to the I/O Output card associated with the same mapper position.

That is, if you connect the DS1 transmit cable connector P1 to I/O card slot 31 (mapper position 2) and connector P2 to I/O card slot 42 (mapper position 7), then you must connect the P1 connector of the associated receive cable to I/O card slot 32 (mapper position 2) and the P2 connector to I/O card slot 44 (mapper position 7). This table shows I/O slot connections.

If you have a working mapper in slot	Then connect the transmit cable connector (P1 or P2) to the assigned I/O card in slot	And using the associated receive cable, connect the corresponding receive cable connector (P1 or P2) to the I/O card in slot
1	30 (DS1 IN)	32 (DS1 OUT)
2	31 (DS1 IN)	33 (DS1 OUT)
3	34 (see Note)	36 (see Note)
4	35 (DS1 IN)	37 (DS1 OUT)
5	38 (DS1 IN)	40 (DS1 OUT)
6	39 (DS1 IN)	41 (DS1 OUT)
7	42 (DS1 IN)	44 (DS1 OUT)
8	43 (DS1 IN)	45 (DS1 OUT)

Note: When installing a transmit DS1 cable to the cards in slots 34 and 35, position the transmit cable connector in front of the protection DS1B card in slot 34. This connector is not used. Use a cable tie to attach the connector to the connector that is attached to the card in slot 35. Similarly, when installing a receive DS1 cable to the cards in slots 36 and 37, position the unused connector in front of the protection DS1B card in slot 36, and use a cable tie to secure it to the P2 connector that is attached to the card in slot 37.

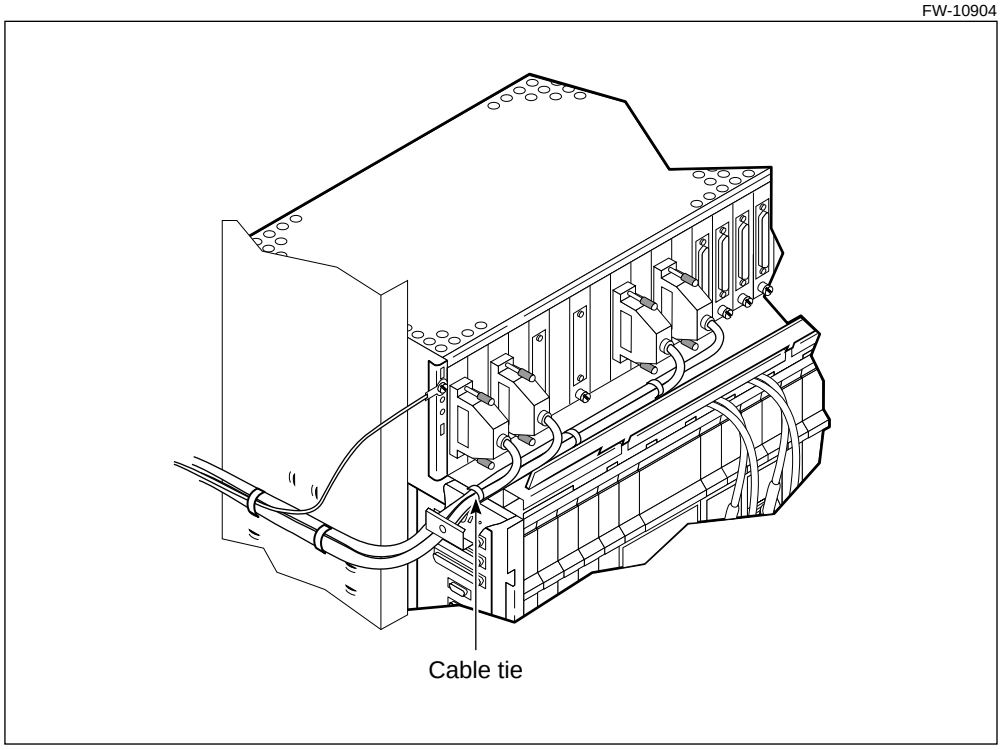
—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

Step	Action
15	Tighten the two hold-down screws just enough to draw the DS1 cable connectors in to place (2 in-lb maximum).
16	To take up the slack in the two cables, form two loops and insert them into the cable trough, as shown in Figure 8-11.
17	Tie the two loops together to prevent them unraveling, as shown in Figure 8-11.

Figure 8-11
Creating and securing the loops

FW-10904



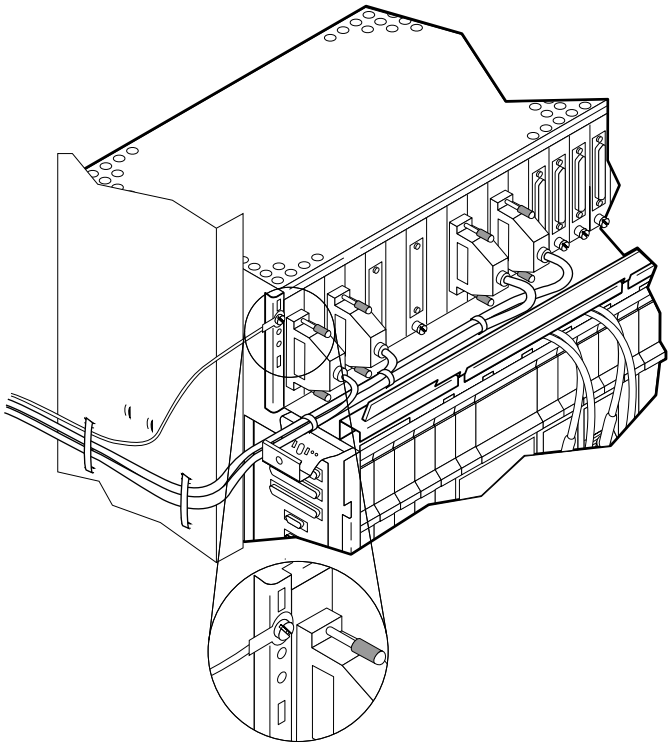
—continued—

Procedure 8-5 (continued)
Connecting the DS1 pigtails from an internal DSX-1

Step	Action
18	Re-install the DSX panel jumper cable trough.
19	Attach the ground lug on the receive (DS1 output) and the ground lug on the transmit (DS1 input) cable to the grounding screws on the ABM shelf, as shown in Figure 8-12.
20	Pull back any slack into the rear of the cabinet.
21	Secure the DS1 pigtails with cable ties, as shown in Figure 8-12.
22	Re-install the NT4K2412 separator bar.
23	Form and dress the cable slack into the rear of the cabinet.

Figure 8-12
Attaching the ground lugs

FW-10905



Note: I/O card bar code label mounting plate has been omitted for clarity.

—end—

Connecting the external signal cables

This chapter provides procedures for installing the external signal cabling for AccessNode equipment installed in Modular Business Package (MBP) cabinets.

External cabling includes the following cables:

- cables that connect to the left side of the access bandwidth manager (ABM) shelf:
  - fiber patch cords for OC-3 and OC-12 optics cards
  - orderwire extension cable
  - RS232 DTE modem connection
- cables that connect to the I/O area of the ABM shelf:
  - DS1 pigtails to a DSX-1 shelf installed at the top of the master cabinet or at the top of the expansion cabinet
  - DS1 cables installed to an external cross connect panel
  - DS3 cables installed to an external cross connect shelf
- VF cables from the copper-distribution shelves
- User interface cable to the local craft access panel (LCAP)

Pair and pin assignment tables are provided for each office termination cable.

For schematics of the cabling configurations, see “Introduction to equipment and cable configurations” on page 2-1.

Chapter contents

This chapter contains the following information:

Procedure 9-1
Installing the DS1 cables from an external DSX-1

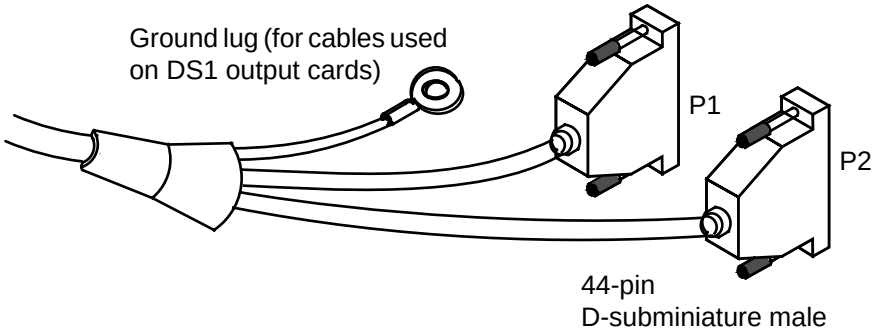
Use this procedure to install the DS1 cables (NT4K85HA through HJ) from an external DSX-1 cross-connect panel to the DS1 input and output cards on the access bandwidth manager (ABM) shelf.

To install DS1 pigtails to an internal DSX-1 cross-connect and a T1 repeater shelf, refer to Procedure 8-5, "Connecting the DS1 pigtails from an internal DSX-1" on page 8-15.

If you installed DSX-1 pigtails in Procedure 8-5, "Connecting the DS1 pigtails from an internal DSX-1" on page 8-15, use the vacant mapper positions for this procedure.

When installing DS1 cables, do not mix transmit (DS1 input) and receive (DS1 output) connections within the same cable: dedicate each cable to transmit or receive functions, but not both.

NT4K85HA through HJ



NT-613 30 pair, twisted 22 AWG solid wires with overall shielding. One end is split (15 pairs each) and connected to two 44-pin connectors (terminating 14 pairs each). For cables used on DS1 output connectors, a ground lug wire provides connection of the outer shield to the ABM shelf frame ground. The ground lug wire is not used for DS1 input connectors. The DS1 cable is available in the following lengths:

15 m	(50 ft)	NT4K85HH
30 m	(100 ft)	NT4K85HA
46 m	(150 ft)	NT4K85HB
61 m	(200 ft)	NT4K85HJ
76 m	(250 ft)	NT4K85HC
107 m	(350 ft)	NT4K85HD
137 m	(450 ft)	NT4K85HE
168 m	(550 ft)	NT4K85HF
198 m	(650 ft)	NT4K85HG

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Table 9-1 shows the slots where mappers can be installed in MBP cabinet at the remote fiber terminal (RFT) and also shows the I/O card slots that correspond to each of the mappers.

Table 9-1
Relationship between mapper slots and I/O card slots

Mapper slot	Input card slot	Output card slot
1	30	32
2	31	33
3 (protection)	34 (protection bridge card)	36 (protection bridge card)
4	35	37
5	38	40
6	39	41
7	42	44
8	43	45

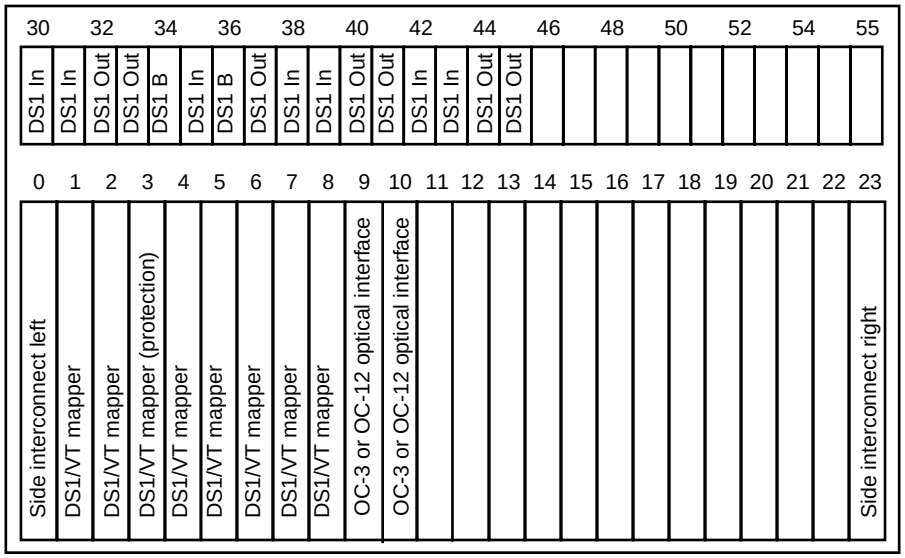
Note: Mapper slots 5–8 are used for the OPC when it is installed in the ABM shelf. These slots are then unavailable for mapper cards.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Figure 9-1 shows the possible locations of the mappers and I/O cards.

Figure 9-1
Typical configuration of an ABM shelf used as a remote fiber terminal



Mappers		I/O cards			
DS1	1	DS1 In	30	DS1 Out	32
DS1	2	DS1 In	31	Ds1 Out	33
DS1 P	3	DS1 B	34	DS1 B	36
DS1	4	DS1 In	35	DS1 Out	37
DS1	5	DS1 In	38	DS1 Out	40
DS1	6	DS1 In	39	DS1 Out	41
DS1	7	DS1 In	42	DS1 Out	44
DS1	8	DS1 In	43	DS1 Out	45

DS1 In DS1 input card (NT4K32AA)
DS1 Out DS1 output card (NT4K33AA)
DS1 B P DS1 protection bridge card (NT4K31AA) protection

Note: Mapper slots 5–8 are used for the OPC when it is installed in the ABM.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Requirements

The following tools and materials are required:

- cable cutters
- cable ties
- screwdriver, Phillips No. 1
- heat shrinkable tubing, black, 9.3 mm (3/8 in.) diameter, R0113153 or equivalent

Action

Step	Action
1	Install the DS1 mappers using the facility records and the information in Table 9-1 on page 9-4 to determine the slot locations of the DS1 mappers.
2	Remove the blank I/O faceplate cards (NT4K58ZA) from the following slots according to where you are going to install the DS1 mappers:
3	Insert cards into the slots from which you removed the blank faceplates, as follows:

Type of card	PEC	Slot
DS1 input	NT4K32	30, 31, 35, 38, 39, 42, 43
DS1 output	NT4K33	32, 33, 37, 40, 41, 44, 45
Protection bridge card	NT4K31	34, 36

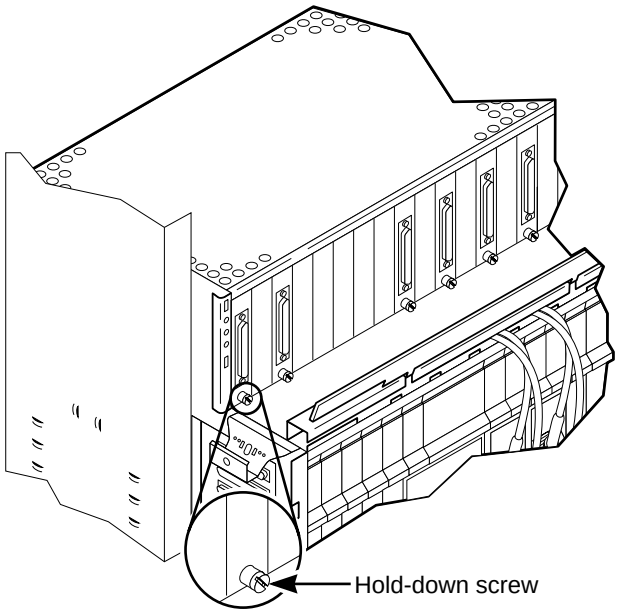
—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Step	Action
4	Tighten the hold-down screw at the bottom of each card faceplate as shown in Figure 9-2.

Figure 9-2
Location of the cable connector hold-down screws

FW-10913



Note: I/O card bar code label mounting plate has been omitted for clarity.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Step	Action

5 Determine the number of transmit and receive DS1 cables from the external DS1 cross-connect to the MBP.

Number of slots containing working mappers	Number of transmit cables	Number of receive cables
1–2 (1–28 DS1s)	1	1
3–4 (29–56 DS1s)	2	2
5–6 (57–84 DS1s)	3	3
7 (85–98 DS1s)	4	4

6 Label both ends of each DS1 cable to be routed from the external DSX-1 to the MBP with the range of DS1 numbers (1 to 28, 29 to 56, 57 to 84, or 85 to 98) and the function of the cable: transmit (Tx) or receive (Rx).

Note: The function of the DS1 cable (transmit or receive) is determined from the perspective of the DSX-1 cross-connect. Transmit cables carry signals away from the DSX-1 cross-connect, and receive cables carry signals towards the DSX-1 cross-connect.

7 Route the transmit and receive DS1 cables from the DSX-1 panel that are to be connected to mapper positions 1–4 down the right side of the cabinet (see Figure 9-3 on page 9-9).

Note: The routing of the DS1 cables is determined by local office records. That is, if the office records indicate that DS1s 1–14 are to be connected to mapper position 4, then the transmit and receive cables for the I/O card slots associated with mapper slot 4 will be routed into the right side of the cabinet.

8 Route the transmit and receive DS1 cables from the DSX-1 panel that are to be connected to mapper positions 5–7 down the left side of the cabinet (see Figure 9-4 on page 9-10).

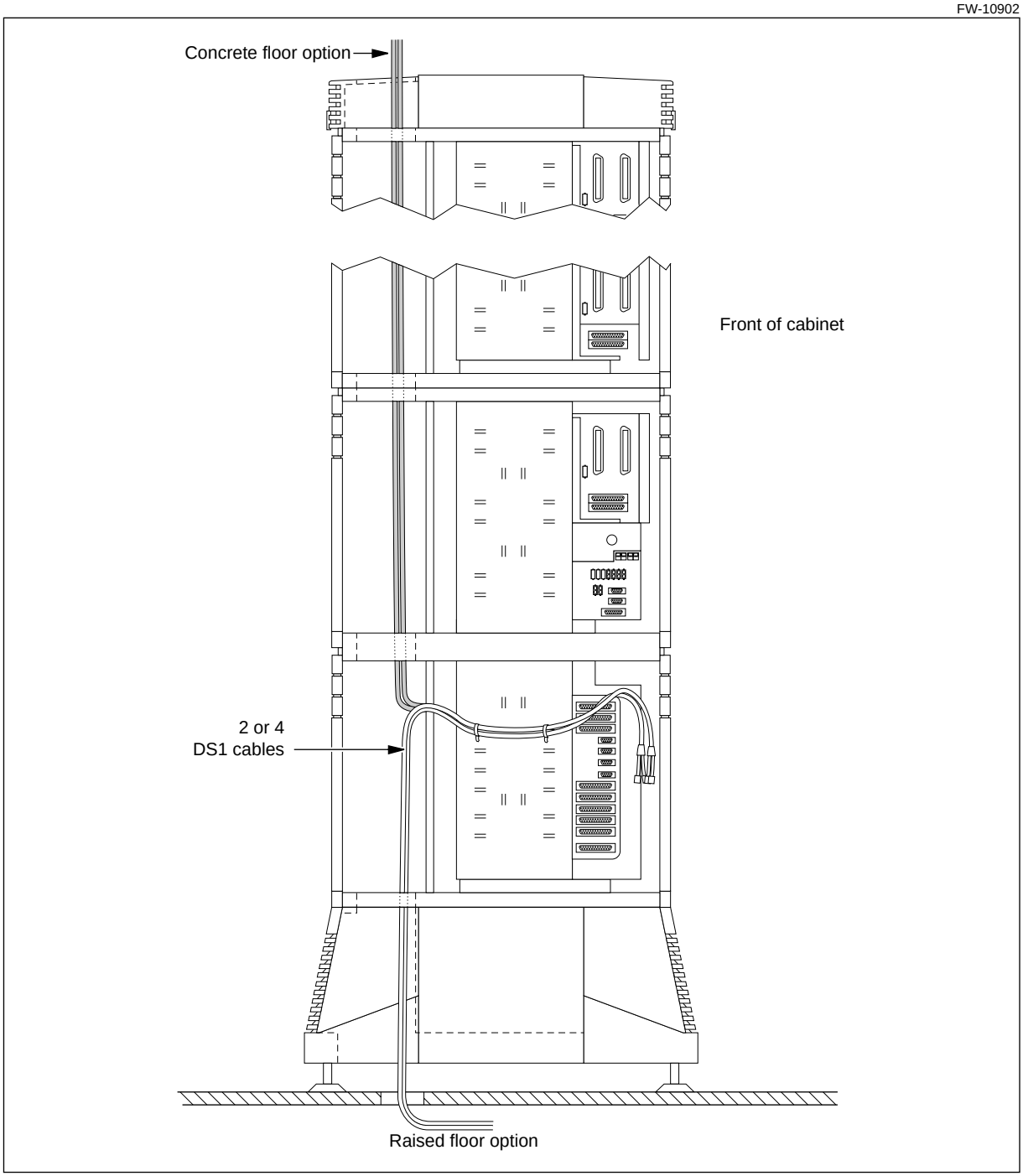
Note: The routing of the DS1 cables is determined by local office records. That is, if the office records indicate that DS1s 1–14 are to be connected to mapper position 5, then the transmit and receive cables for the I/O card slots associated with mapper slot 5 will be routed into the left side of the cabinet.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Figure 9-3
Routing DS1 cables into the right side of the master cabinet

FW-10902

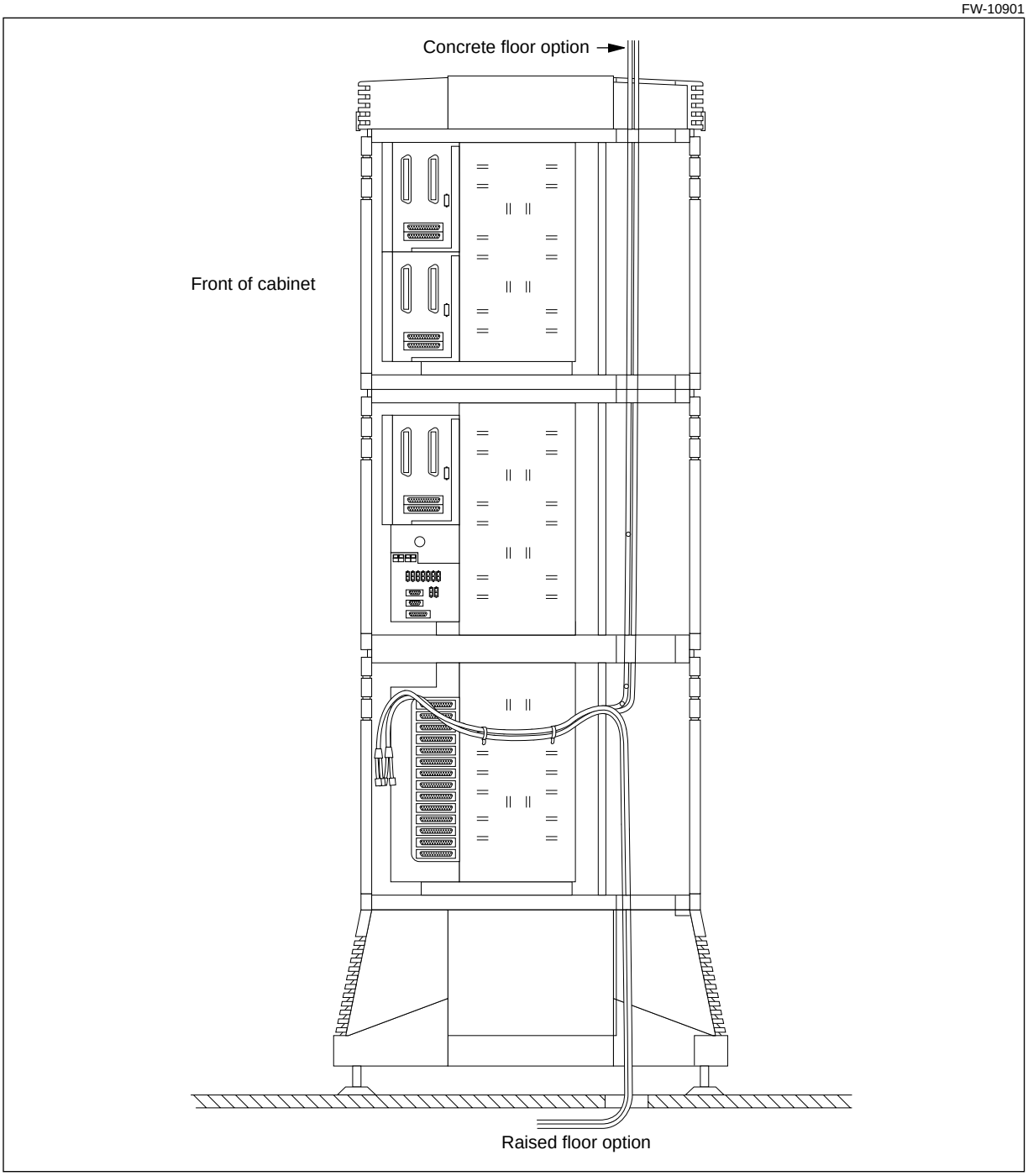


—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Figure 9-4
Routing DS1 cables into the left side of the master cabinet

FW-10901



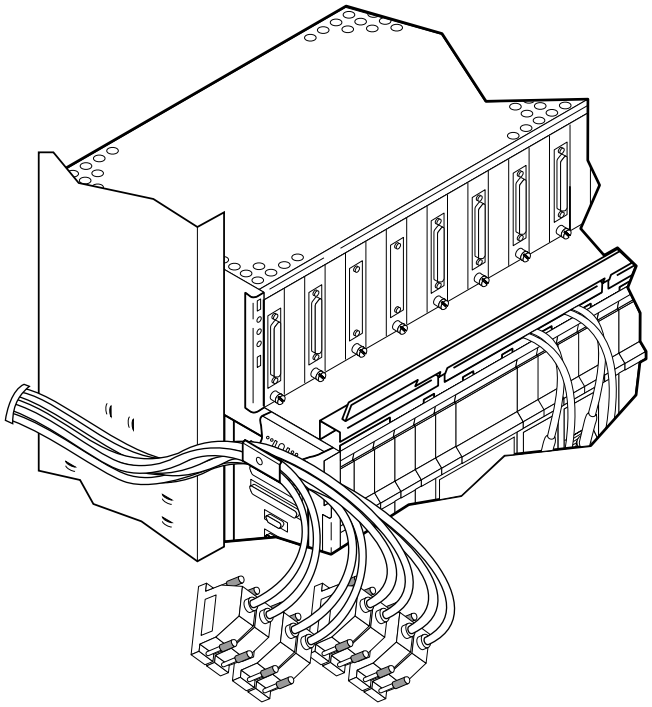
—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Step	Action
9	Hang the cable connectors temporarily in the cable tray as shown in Figure 9-5 and Figure 9-6 on page 9-12.

Figure 9-5
Hanging the right-side connectors temporarily in the cable tray

FW-10906



Note 1: I/O card bar code label mounting plate has been omitted for clarity.

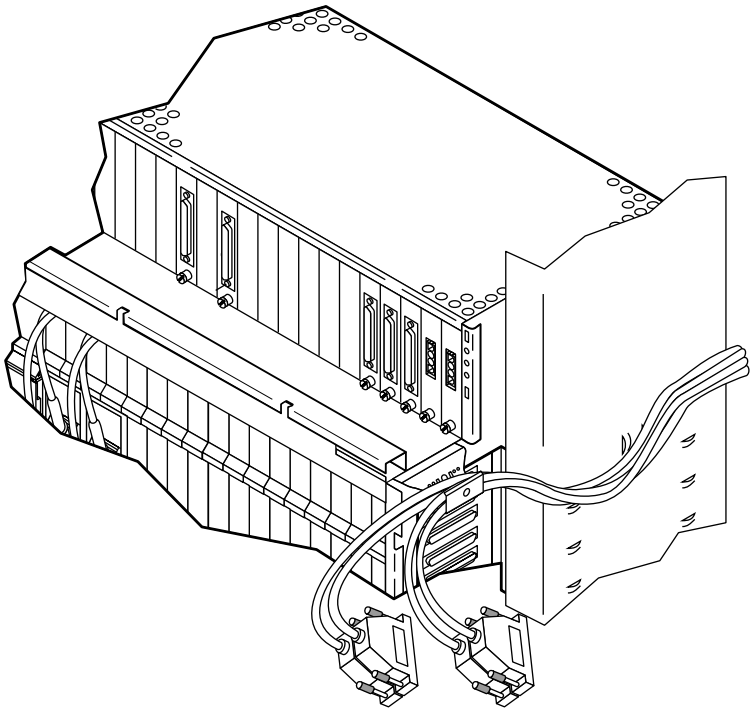
Note 2: Four cables are shown. Two cables are used if only one mapper is being installed.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Figure 9-6
Hanging the left-side cables temporarily in the cable tray

FW-10928



Note: I/O card bar code label mounting plate has been omitted for clarity.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Step	Action
10	Connect the DS1 cable connectors P1 and P2 to the I/O cards as shown in Figure 9-7 on page 9-14 and Figure 9-8 on page 9-15. Local office records determine the DS1 cable connections to the I/O cards. Any DS1 transmit cable connector can connect to any I/O Input card assigned to any mapper position. The corresponding DS1 receive cable connector must connect to the I/O Output card associated with the same mapper position. That is, if you connect the DS1 transmit cable connector P1 to I/O card slot 31 (mapper position 2) and connector P2 to I/O card slot 42 (mapper position 7), then you must connect the P1 connector of the associated receive cable to I/O card slot 32 (mapper position 2) and the P2 connector to I/O card slot 44 (mapper position 7). This table shows I/O slot connections.

If you have a working mapper in slot	Then connect the transmit cable connector (P1 or P2) to the assigned I/O card in slot	And using the associated receive cable, connect the corresponding receive cable connector (P1 or P2) to the I/O card in slot
1	30 (DS1 IN)	32 (DS1 OUT)
2	31 (DS1 IN)	33 (DS1 OUT)
3	34 (see Note)	36 (see Note)
4	35 (DS1 IN)	37 (DS1 OUT)
5	38 (DS1 IN)	40 (DS1 OUT)
6	39 (DS1 IN)	41 (DS1 OUT)
7	42 (DS1 IN)	44 (DS1 OUT)
8	43 (DS1 IN)	45 (DS1 OUT)

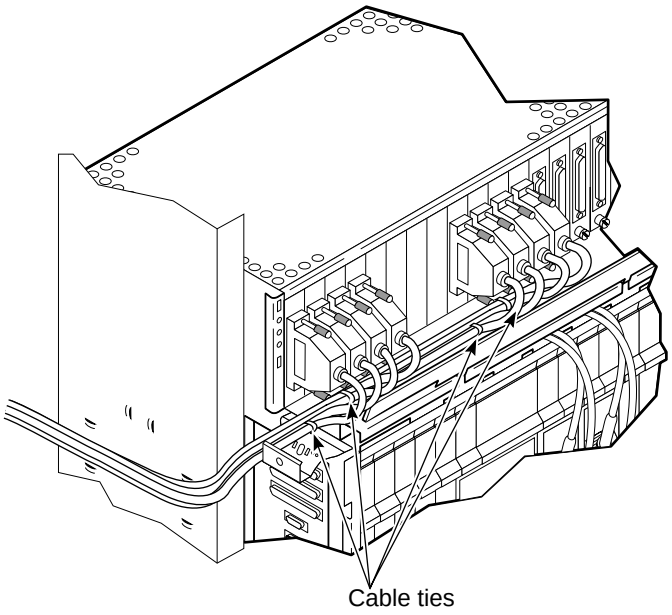
Note: ABM shelf mapper position 3 is used for the protection switch. The protection switch DS1B I/O cards mounted in I/O slots 34 and 35 are not cabled and have no external cable connection points on their faceplates.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Figure 9-7
Connecting the right-side DS1 cable connectors and dressing the cables

FW-10912



Note 1: I/O card bar code label mounting plate has been omitted for clarity.

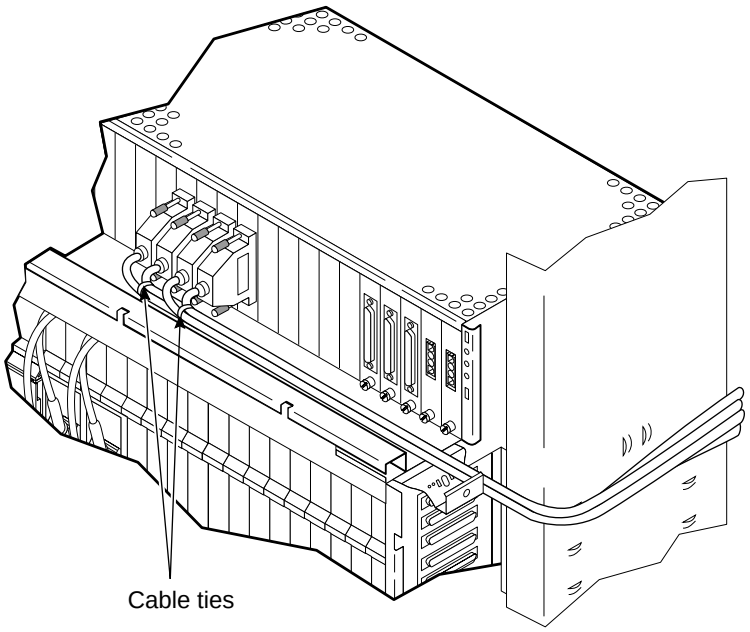
Note 2: Four cables are shown. Two cables are used if only one mapper is being installed.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Figure 9-8
Connecting the left-side DS1 cable connectors and dressing the cables

FW-10926



Note: I/O card bar code label mounting plate has been omitted for clarity.

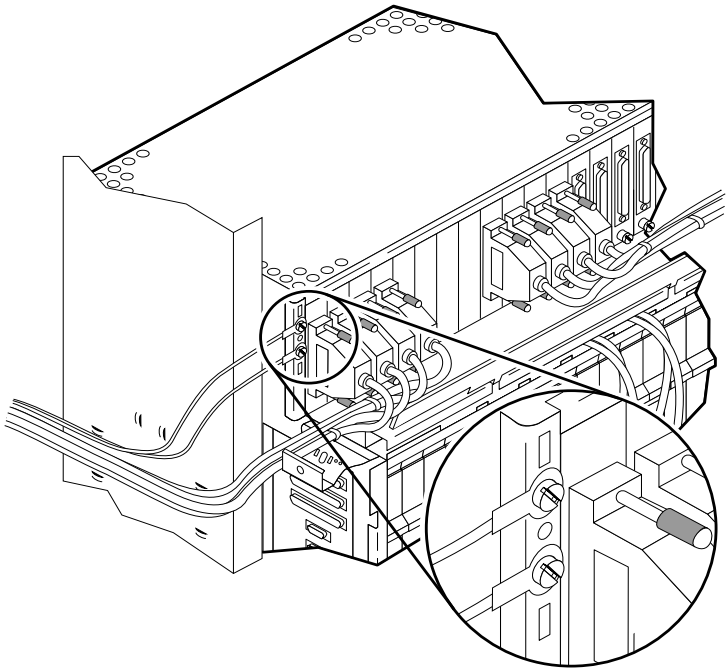
—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Step	Action
11	Tighten the connector hold-down screws just enough to draw the connectors into position (2 inch-pounds maximum).
12	Attach the ground lugs on each DS1 output cable to the ABM shelf frame with hex screws as shown in Figure 9-9 and Figure 9-10 on page 9-17.
13	Dress the cables to push the slack to the rear of the cabinet.
14	Secure the cable and slack with cable ties.
15	At the ABM shelf-end of each DS1 input cable, cut off the ground lead 50 mm (2 in.) from the sheath of the DS1 cable. These ground leads are not used.

Figure 9-9
Attaching the right-side ground lugs

FW-15251



Note 1: I/O card bar code label mounting plate has been omitted for clarity.

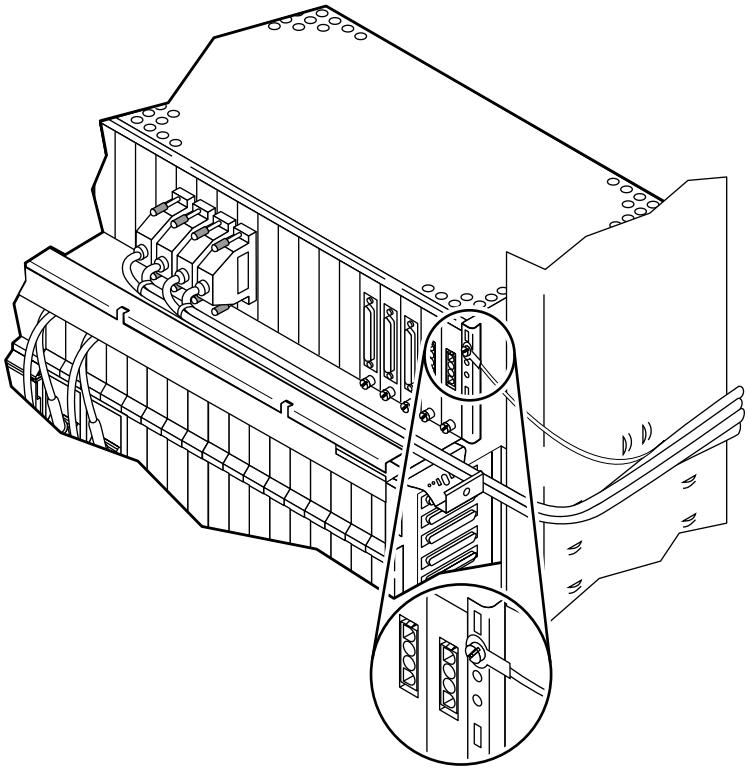
Note 2: Four cables are shown. Two cables are used if only one mapper is being installed.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Figure 9-10
Attaching the left-side ground lugs

FW-10927

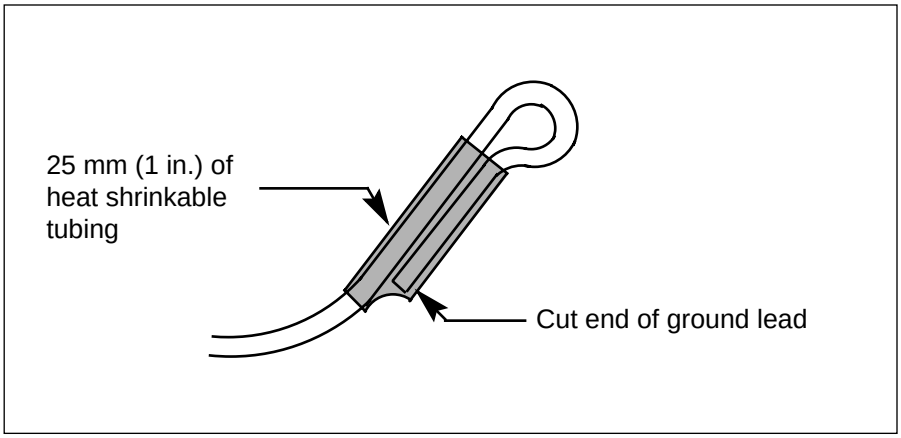


Note: I/O card bar code label mounting plate has been omitted for clarity.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Step	Action
16	Bend the cut end of the ground lead back on itself and protect the cut end with a 25 mm (1 in.) length of heat shrinkable tubing as shown in the following diagram.



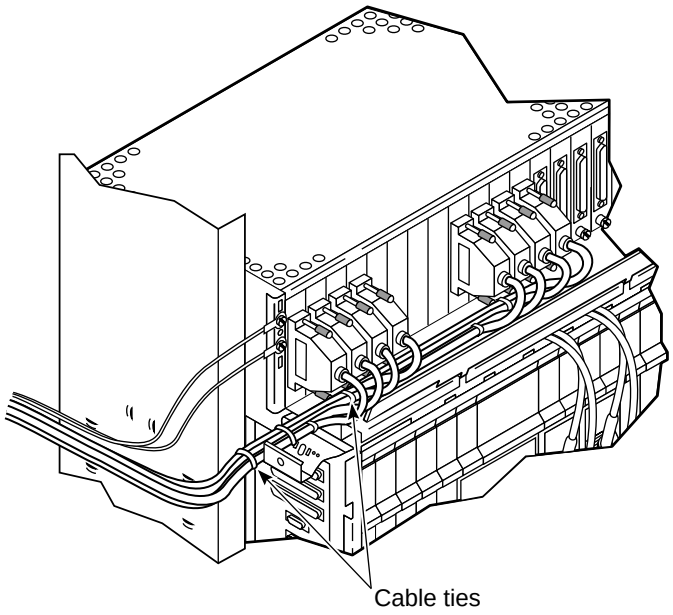
17	Dress the DS1 cables into the cable trough and use a cable tie to fasten them to the lance provided in the trough as shown in Figure 9-11 on page 9-19 and Figure 9-12 on page 9-20.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Figure 9-11
Attaching right-side DS1 cables to each other and to the cable trough

FW-10908



Note 1: I/O card bar code label mounting plate has been omitted for clarity.

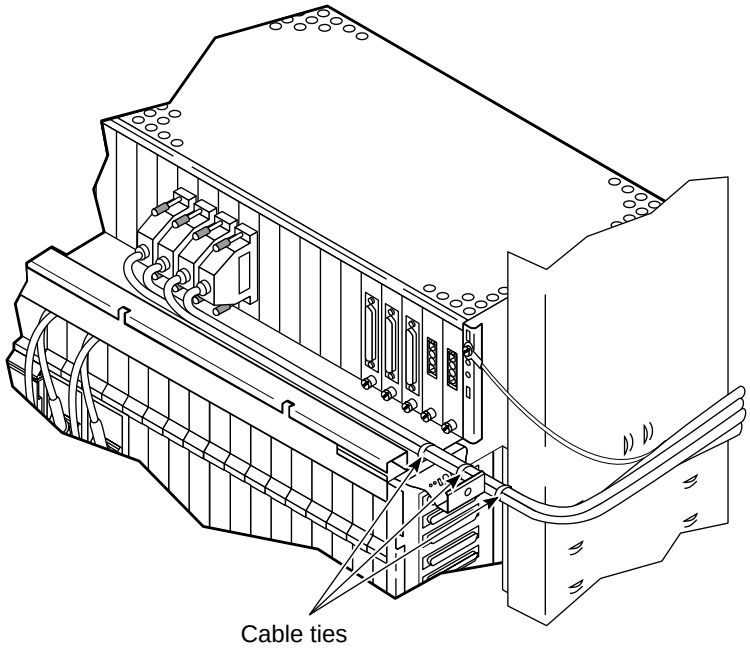
Note 2: Four cables are shown. Two cables are used if only one mapper is being installed.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Figure 9-12
Attaching left-side DS1 cables to each other and to the cable trough

FW-10930

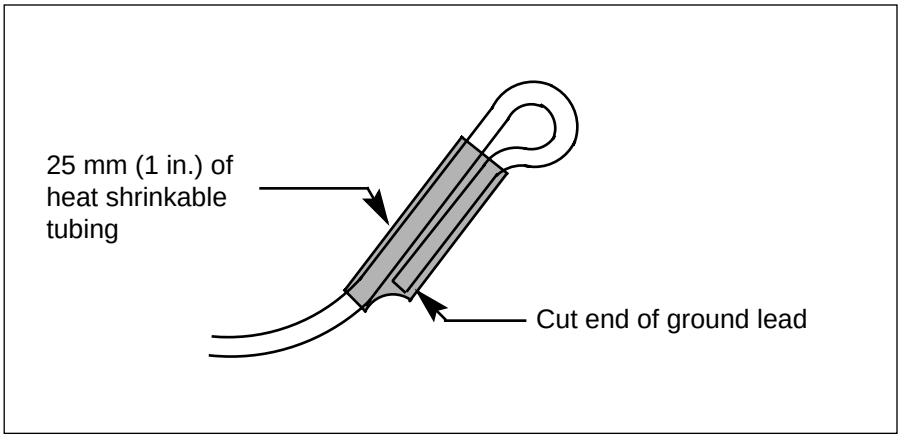


Note: I/O card bar code label mounting plate has been omitted for clarity.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

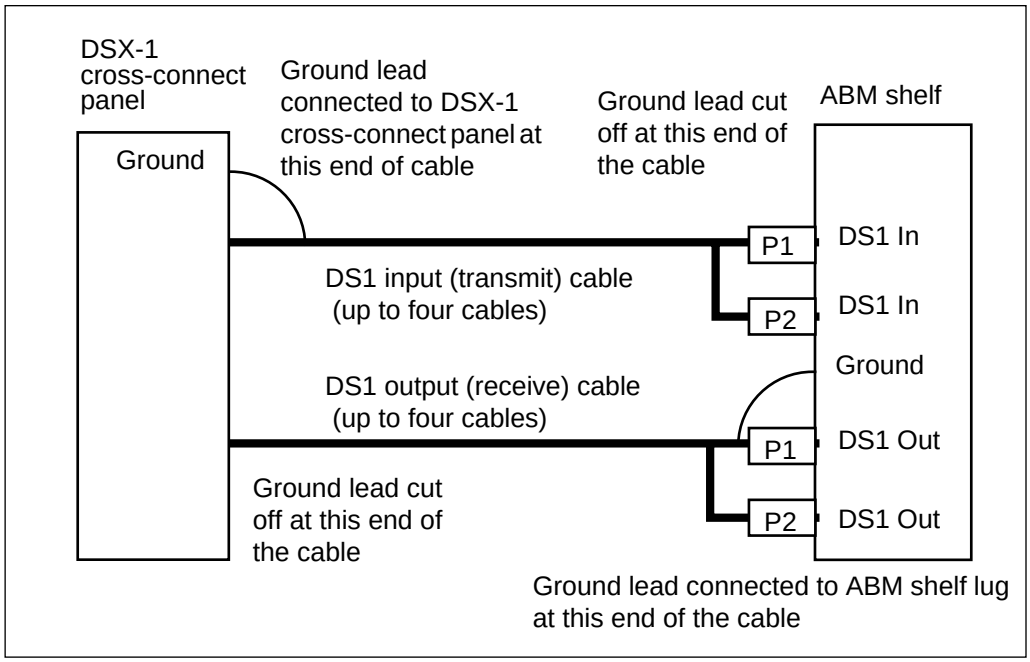
Step	Action
18	Dress all cable slack back into the cabinet.
19	Secure the DS1 cables in place with cable ties as shown in Figure 9-13 on page 9-23.
20	Label each DS1 cable for future reference. Indicate the DS1 input or DS1 output slot numbers and the direction of signal (transmit or receive).
21	Remove any slack in the DS1 cables by pulling them back towards the DSX-1 cross-connect panel.
22	Use Table 9-2 on page 9-24 to terminate DS1 cable to the external DSX-1 panel.
23	At the DSX-1 panel, cut off the ground leads within 2 in. (50 mm) of the panel. These leads are not used.
24	Bend the cut end of the ground lead back on itself and protect the cut end with a 25 mm (1 in.) length of heat shrinkable tubing as shown in the following diagram.



—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Step	Action
25	Dress all the DS1 cables in the cabinet and use cable ties to fasten them to the lances provided in the trough and bay frames. ***Note:*** When you have finished connecting all of the grounds, the grounding of the input and output DS1 cables will be as shown in the following diagram.



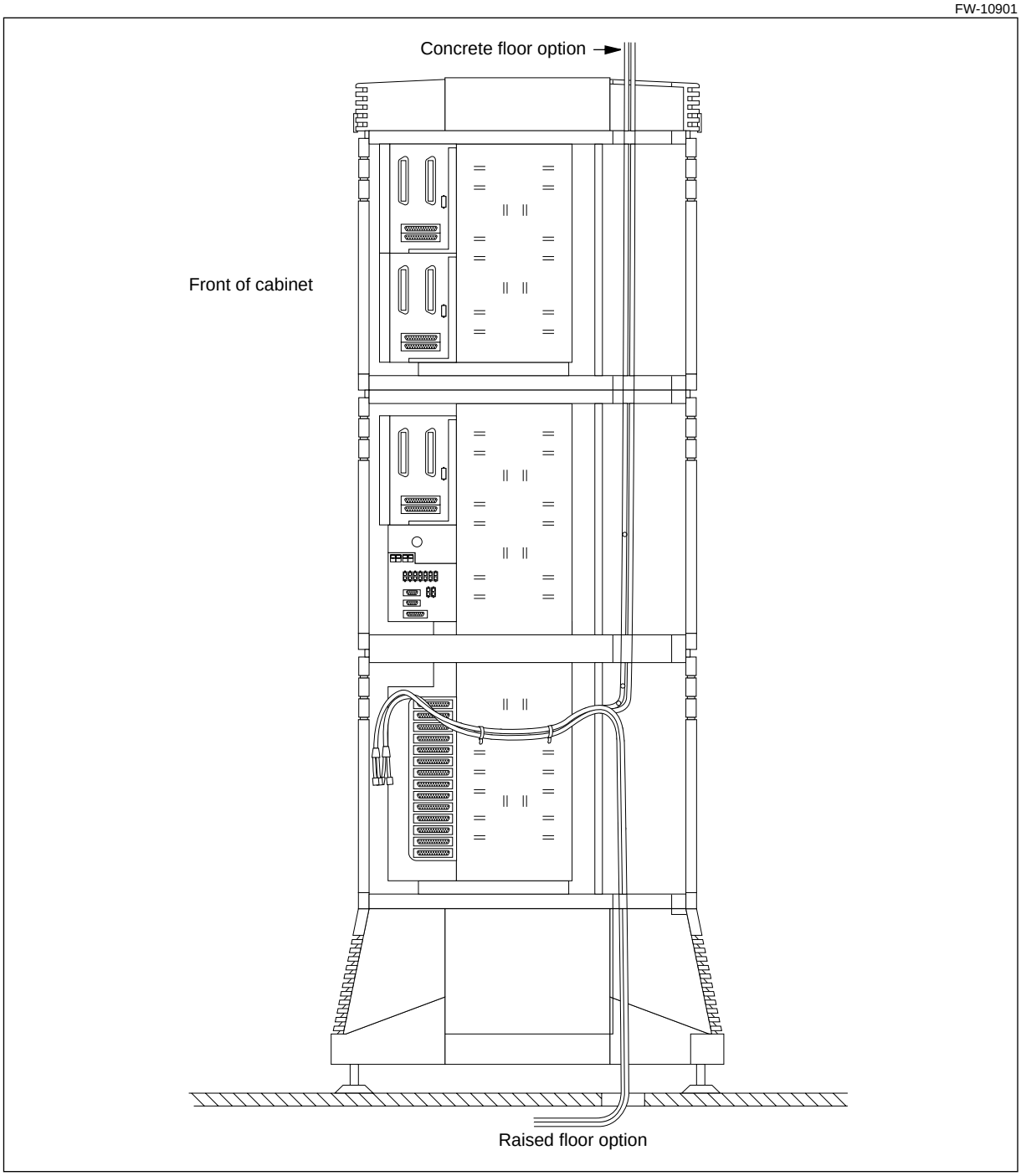
26	Continue the cabling procedures for the MBP using Procedure 9-4, “Installing a test access path cable” on page 9-64.

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Figure 9-13
Routing DS1 cables into the right side of the master cabinet

FW-10901



—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

The following table contains the pin-outs for the DS1 cable connectors P1 and P2 at the ABM shelf.

Note: Pins 1 to 15 of connectors P1 and P2 are not used, and pairs 29 and 30 are not used.

Table 9-2
DS1 cable connector pin-out details

Connector P1 at the I/O area of the ABM shelf				
Pair or DS1 no.	**Tip or Ring**	**Pin no.**	**Color code**	
1	Tip	16	W	1BL
	Ring	31	BL	1W
2	Tip	17	W	1O
	Ring	32	O	1W
3	Tip	18	W	1G
	Ring	33	G	1W
4	Tip	19	W	1BR
	Ring	34	BR	1W
5	Tip	20	W	1S
	Ring	35	S	1W
6	Tip	21	R	1BL
	Ring	36	BL	1R
7	Tip	22	R	1O
	Ring	37	O	1R
8	Tip	23	R	1G
	Ring	38	G	1R
9	Tip	24	R	1BR
	Ring	39	BR	1R
10	Tip	25	R	1S
	Ring	40	S	1R
—continued—				

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Table 9-2 (continued)
DS1 cable connector pin-out details

Connector P1 at the I/O area of the ABM shelf				
Pair or DS1 no.	**Tip or Ring**	**Pin no.**	**Color code**	
11	Tip	26	BL	1BL
	Ring	41	BL	1BK
12	Tip	27	BK	1O
	Ring	42	O	1BK
13	Tip	28	BK	1G
	Ring	43	G	1BK
14	Tip	29	BK	1BR
	Ring	44	BR	1BK
Connector P2 at the I/O area of the ABM shelf				
15	Tip	16	BK	1S
	Ring	31	S	1BK
16	Tip	17	Y	1 BL
	Ring	32	BL	1Y
17	Tip	18	Y	1O
	Ring	33	O	1Y
18	Tip	19	Y	1G
	Ring	34	G	1Y
19	Tip	20	Y	1BR
	Ring	35	BR	1Y
20	Tip	21	Y	1S
	Ring	36	S	1Y
—continued—				

—continued—

Procedure 9-1 (continued)
Installing the DS1 cables from an external DSX-1

Table 9-2 (continued)
DS1 cable connector pin-out details

Connector P2 at the I/O area of the ABM shelf				
Pair or DS1 no.	**Tip or Ring**	**Pin no.**	**Color code**	
21	Tip	22	V	1BL
	Ring	37	BL	1V
22	Tip	23	V	1O
	Ring	38	O	1V
23	Tip	24	V	1G
	Ring	39	G	1V
24	Tip	25	V	1BR
	Ring	40	BR	1V
25	Tip	26	V	1S
	Ring	41	S	1V
The following pairs are contained in a blue binder.				
26	Tip	27	W	1BL
	Ring	42	BL	1W
27	Tip	28	W	1O
	Ring	43	O	1W
28	Tip	29	W	1G
	Ring	44	G	1W
—end—				

—end—

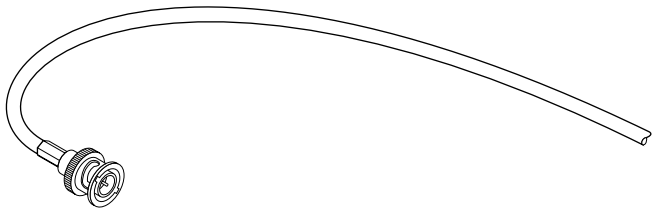
Procedure 9-2
Installing the DS3 cables

Use this procedure to connect up to a maximum of eighteen DS3 cables (NT7E43AA through AH, and NT7E43AJ to AL) to the access bandwidth manager (ABM) shelf when only DS3s are to be installed.

For cabling DS1s only, refer to Procedure 9-1, “Installing the DS1 cables from an external DSX-1” on page 9-3. Refer to Procedure 9-3, “Installing a mix of DS1 and DS3 cables” on page 9-36 for cabling a mixture of DS1s and DS3s. For information on planning your DS1/DS3 mapper layout, refer to *Mapper Layouts Planning Guide*, 323-3001-154, in the *Engineering, Configuration, and Ordering Guide*, Volume 1.

FW-10068

NT7E43AA through AH, and NT7E43AJ through AL



NT-734-E coaxial cables pre-connectorized at one end with a BNC connector. These cables are available in the following lengths:

5 m	(16.4 ft)	NT7E43AA
10 m	(32.8 ft)	NT7E43AB
20 m	(65.6 ft)	NT7E43AC
30 m	(88.4 ft)	NT7E43AD
40 m	(131.1 ft)	NT7E43AE
50 m	(163.9 ft)	NT7E43AF
60 m	(196.7 ft)	NT7E43AG
75 m	(245.9 ft)	NT7E43AH
80 m	(262.3 ft)	NT7E43AJ
100 m	(327.9 ft)	NT7E43AL
140 m	(459.0 ft)	NT7E43AK

It is recommended that you use a Schleuniger coaxial stripper tool Model HZ207A (Tool room number T00067) and BNC connector kit (Tool room number K000702) when installing BNC connectors in the field.

—continued—

Procedure 9-2 (continued)
Installing the DS3 cables

Requirements

The following tools and materials are required:

- wire cutters (flush cutting)
- screwdriver, flat blade, 1/8 in. wide
- Schleuniger coaxial stripper tool Model HZ207A (if installing BNC connectors in the field)
- cable ties

CAUTION
Risk of damage to DS3 cables
Do not bend a DS3 cable into a radius smaller than 38 mm (1.5 in.) to avoid damaging the cable.

Action

Step	Action

1 Use facility records to identify the slots in the ABM shelf into which DS3 mapper cards are to be installed.

For a description of the shelf configurations and the placement of mappers and I/O cards at the fiber central office terminal (FCOT) and at the remote fiber terminal (RFT), see *Addendum 1 (MBP) Site Installation Planning and Engineering*, 323-3001-200.

2 Remove the blank I/O faceplate cards from the following I/O slots according to the lower slots in the shelf into which the DS3 mappers are to be installed.

If a mapper is to be installed in ABM shelf slot	Remove the blank I/O faceplates from the following ABM shelf slots
1 (protection)	none
3 (working)	34, 35, and 36
5 (working)	38, 39, and 40
7 (working)	42, 43, and 44

3 Insert NT4K30AA DS3 I/O cards into the slots from which you removed the blank faceplate cards.

4 Tighten the hold-down screw on the faceplate of each I/O card.

—continued—

Procedure 9-2 (continued)
Installing the DS3 cables

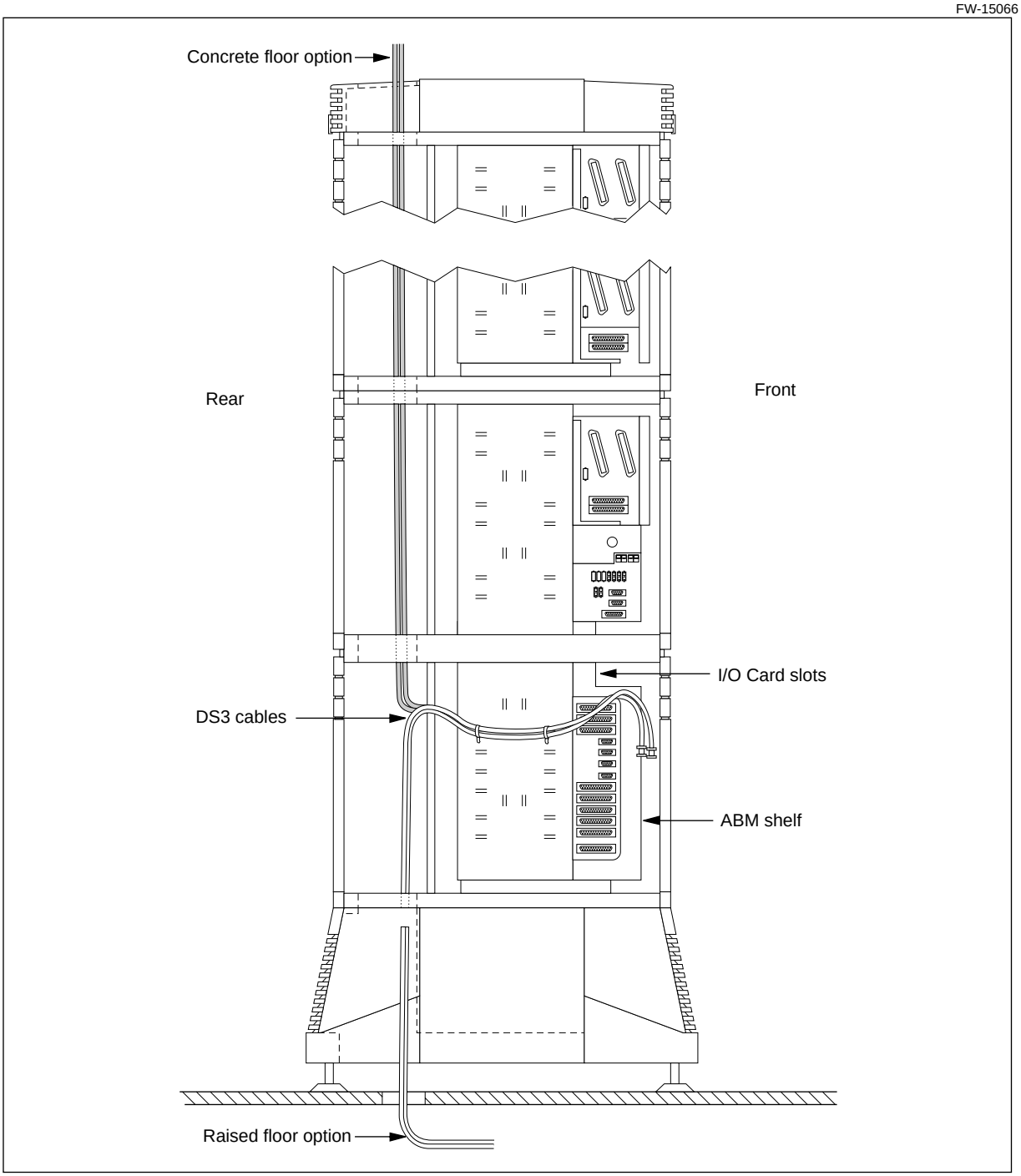
Step	Action
5	Label both ends of each DS3 cable with its DS3 number (1 to 9) and its function transmit (Tx) or receive (Rx).
6	Remove the top cap covers from the top of the master cabinet if the installation is for the concrete floor option. ***Note:*** Cables can exit the cabinet through the top cap grilles (concrete floors) or though the pedestal (raised floors). When cables exit the top of the cabinet, a set of notched NT4K09BA top cap grilles must be used instead of the standard NT4K09AA top cap grilles.
7	Run the connectorized ends of the DS3 cables into the left side of the master cabinet to the front of the left side of the ABM shelf. See Figure 9-14 on page 9-30 for cable routing details for the floor option to be installed. ***Note:*** For the concrete floor option, run the cables down into the top left side of the cabinet through the cable entry ports in the top cap assembly as shown in Figure 9-15 on page 9-31. For the raised floor option, run the cables up through the rear bottom right of the cabinet through the cable entry port cut-outs in the cabinet framework.

—continued—

Procedure 9-2 (continued)
Installing the DS3 cables

Figure 9-14
Routing DS3 cables into the left side of the master cabinet

FW-15066

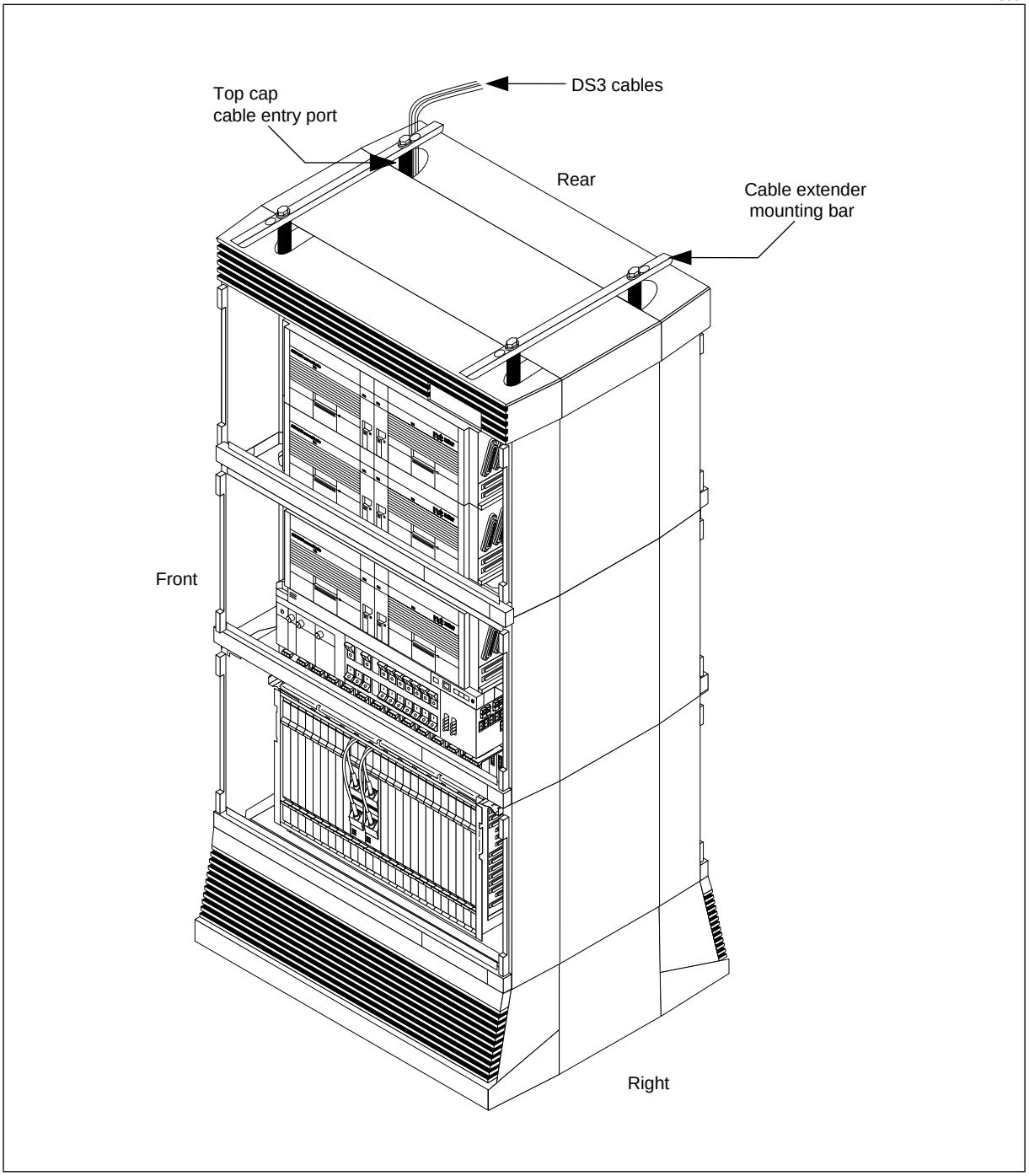


—continued—

Procedure 9-2 (continued)
Installing the DS3 cables

Figure 9-15
DS3 cable routing into the top of the MBP cabinet

FW-15067



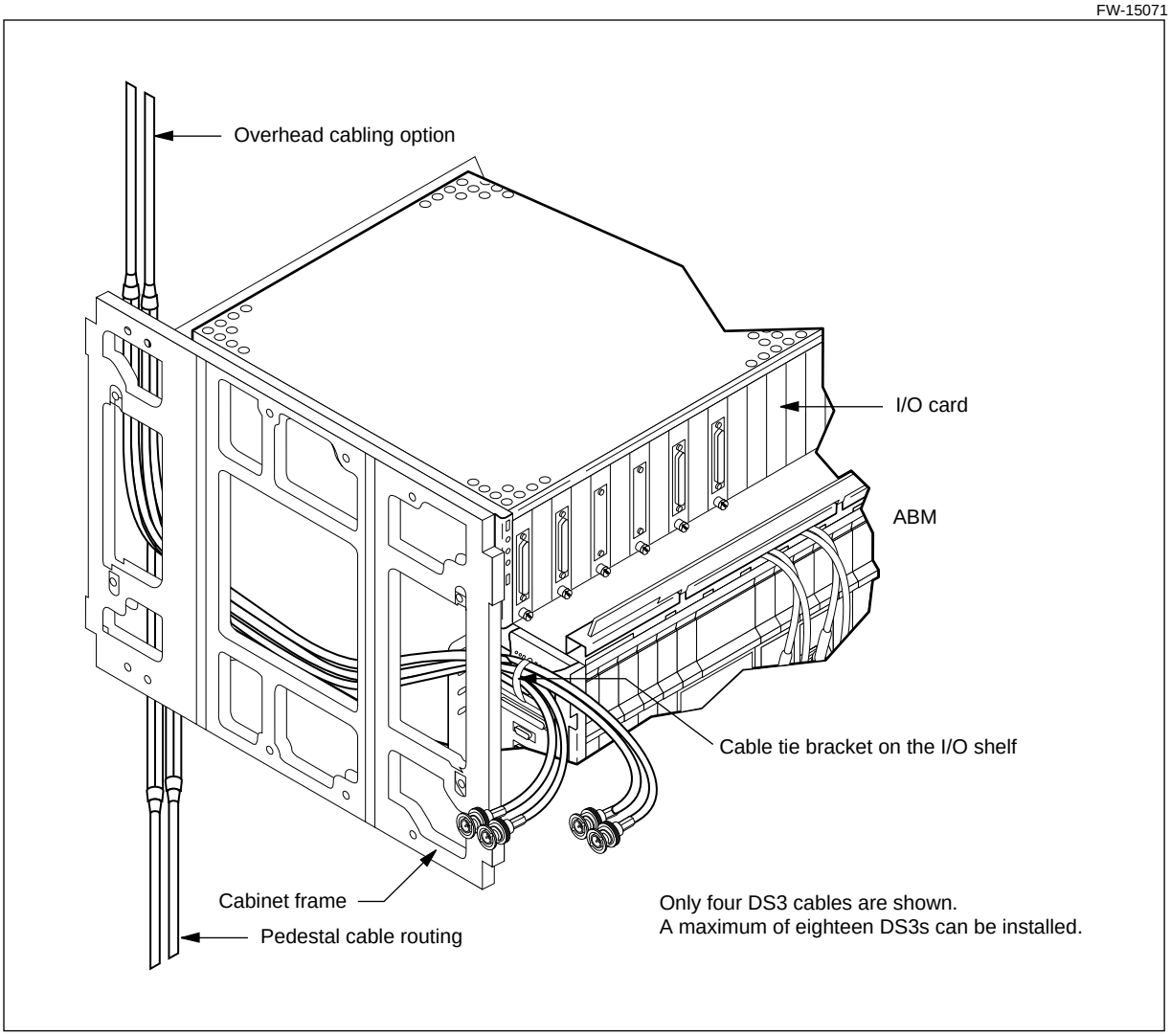
—continued—

Procedure 9-2 (continued)
Installing the DS3 cables

Step	Action
8	Hang the cables temporarily in the cable tray as shown in Figure 9-16.

Figure 9-16
Routing the DS3 cables in the MBP cabinet to the ABM I/O Slots

FW-15071

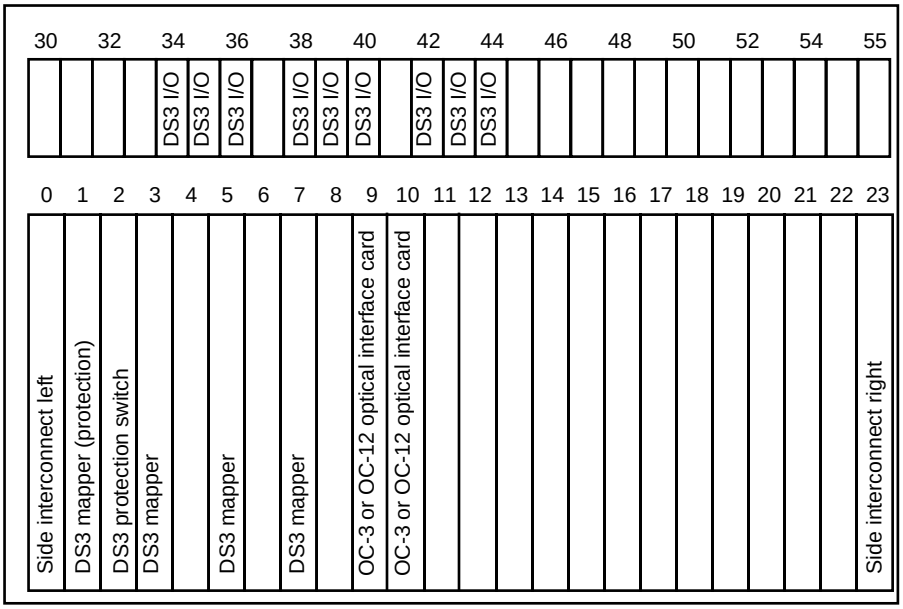


—continued—

Procedure 9-2 (continued)
Installing the DS3 cables

Step	Action
9	Connect the BNC connector of each DS3 cable to its intended I/O card in sequence, starting with the cable that attaches to the Rx connector of the left-most I/O card in the shelf, and ending with the Tx connector of the right-most card as shown in Figure 9-17.

Figure 9-17
Typical configuration for an ABM shelf with DS3s in an MBP



Note: This illustration shows a universal configuration that is fully equipped with three working DS3 mappers, but no OPC module. When an OPC module is fitted in lower slots 5 through 8, I/0 slots 38 through 44 contain blank faceplate cards, and the shelf holds a maximum of one DS3 mapper.

Mappers		DS3 I/O cards		
DS3 P	1	none		
DS3	3	34	35	36
DS3	5	38	39	40
DS3	7	42	43	44

P protection
DS3 I/O DS3 input output card (NT4K30AA)

—continued—

Procedure 9-2 (continued)
Installing the DS3 cables

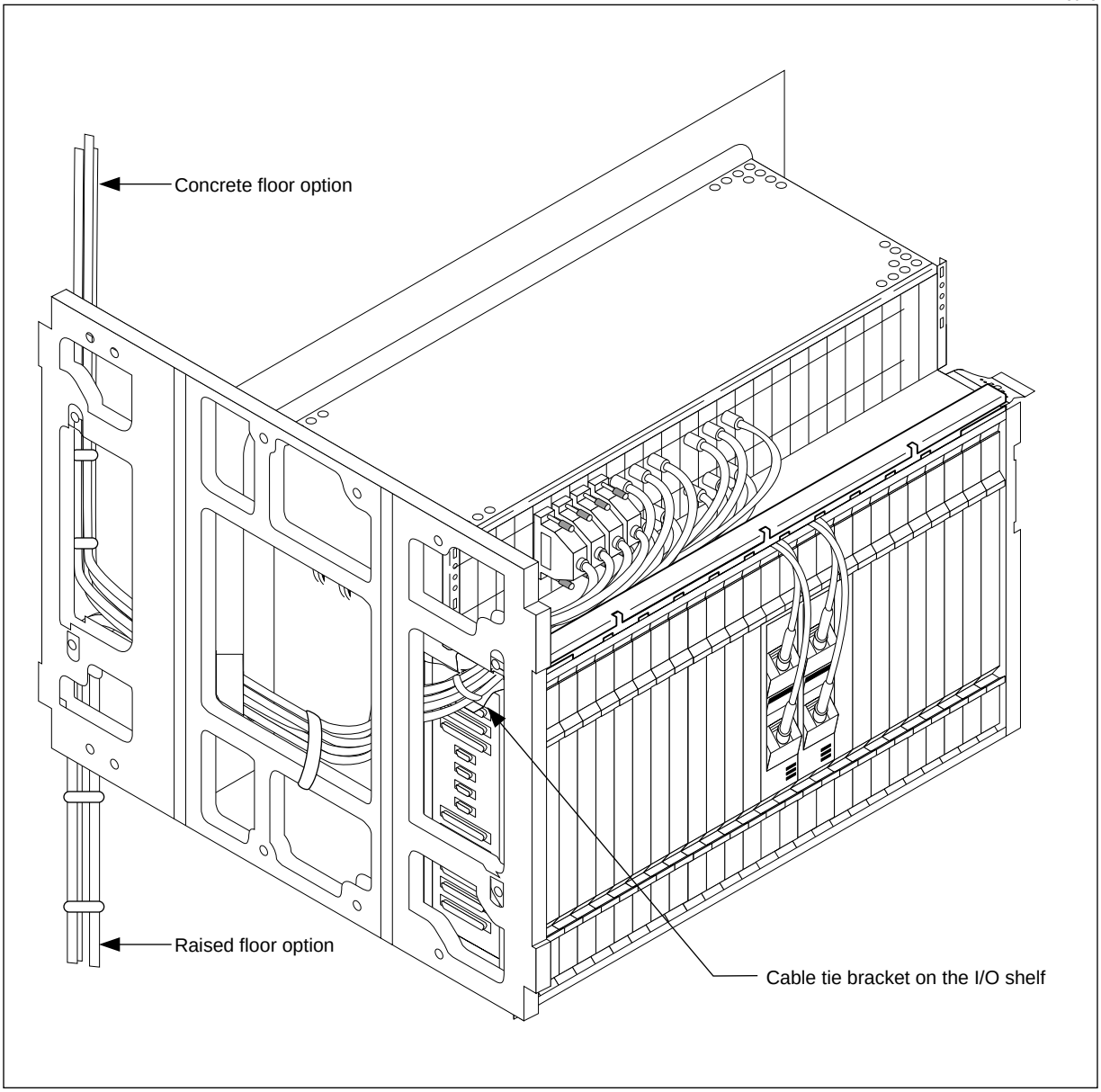
Step	Action
10	Dress the DS3 cables back towards the rear of the master cabinet toward the cable entry port (top or bottom entry).
11	Use a cable tie to attach the bundle of cables to the lance at the entrance to the cable trough, as shown in Figure 9-18 on page 9-35.
12	Use cable ties to attach the bundle of DS3s to the DEM framework as shown in Figure 9-18 on page 9-35.
13	For the concrete floor option, perform the following steps. If you are installing the raised floor option, go to step 14. **a.** Route the cables up the customer supplied cable rack waterfall. **b.** Dress the cables on the cable rack. **c.** Secure the cables to the cable rack. **d.** Continue to step 14.
14	Route the cables from the cabinet over to the DS3 cross-connect panel.
15	Connect the free ends of the cables to the DS3 cross-connect panel. ***Note:*** If the cabinet is installed in an integrated bonding network (IBN) grounding environment, and the DS3s connect to equipment that is located outside the IBN, the DS3s must be isolated from foreign grounds by means of a transmission ground reference panel that is bonded to the single point building ground (SPG) within the IBN.

—continued—

Procedure 9-2 (continued)
Installing the DS3 cables

Figure 9-18
Connecting and dressing DS3 cables on the left side of the cabinet

FW-15073



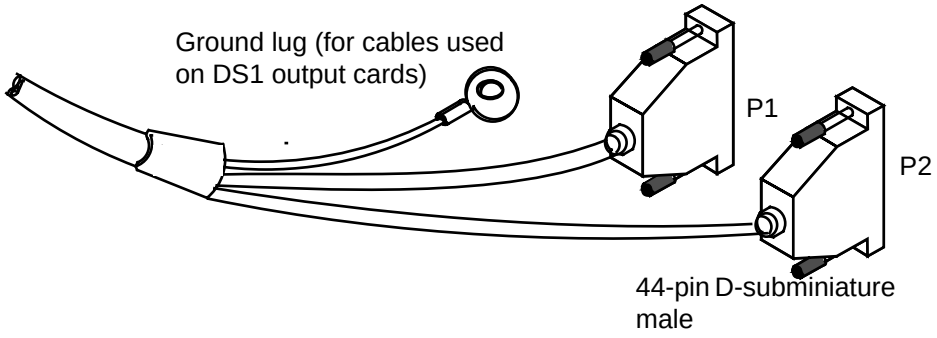
—end—

Procedure 9-3
Installing a mix of DS1 and DS3 cables

Use this procedure to install a mix of DS1 cables and DS3 cables to the access bandwidth manager (ABM) shelf in applications where the cross connect shelves are located external to the MBP. For information on planning your DS1/DS3 mapper layout, refer to *Mapper Layouts Planning Guide*, 323-3001-154, in the *Engineering, Configuration, and Ordering Guide*, Volume 1.

This procedure applies to shelves that contain a mix of DS1 and DS3s. For procedures to install DS1s to an ABM shelf that only contains DS1s, refer to Procedure 9-1, "Installing the DS1 cables from an external DSX-1" on page 9-3. For procedures to install DS3s to an ABM shelf that only contains DS3s, refer to Procedure 9-2, "Installing the DS3 cables" on page 9-27.

DS1 cables, NT4K85HA through HJ



NT-613 30 pair, twisted 22 AWG solid wires with overall shielding. One end is split (15 pairs each) and connected to two 44-pin connectors (terminating 14 pairs each). For cables used on DS1 output connectors, a ground lug wire provides connection of the outer shield to the ABM shelf frame ground. The ground lug wire is not used for DS1 input connectors. The DS1 cable is available in the following lengths:

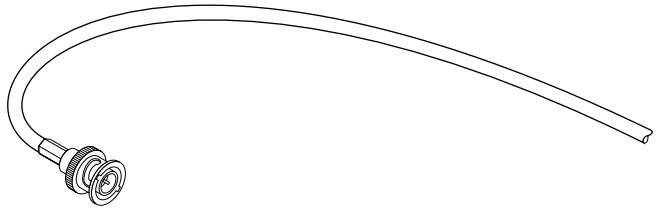
15 m	(50 ft)	NT4K85HH
31 m	(100 ft)	NT4K85HA
46 m	(150 ft)	NT4K85HB
61 m	(200 ft)	NT4K85HJ
76 m	(250 ft)	NT4K85HC
107 m	(350 ft)	NT4K85HD
137 m	(450 ft)	NT4K85HE
168 m	(550 ft)	NT4K85HF
198 m	(650 ft)	NT4K85HG

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

FW-10068

DS3 cables, NT7E43AA through AH, and NT7E43AJ through AL



NT-734-E coaxial cables pre-connectorized at one end with a BNC connector. These cables are available in the following lengths:

5 m	(16.4 ft)	NT7E43AA
10 m	(32.8 ft)	NT7E43AB
20 m	(65.6 ft)	NT7E43AC
30 m	(88.4 ft)	NT7E43AD
40 m	(131.1 ft)	NT7E43AE
50 m	(163.9 ft)	NT7E43AF
60 m	(196.7 ft)	NT7E43AG
75 m	(245.9 ft)	NT7E43AH
80 m	(262.3 ft)	NT7E43AJ
100 m	(327.9 ft)	NT7E43AL
140 m	(459.0 ft)	NT7E43AK

Figure 9-19 on page 9-38 through Figure 9-23 on page 9-42 show typical ABM shelf configurations with a mix of DS1s and DS3s.

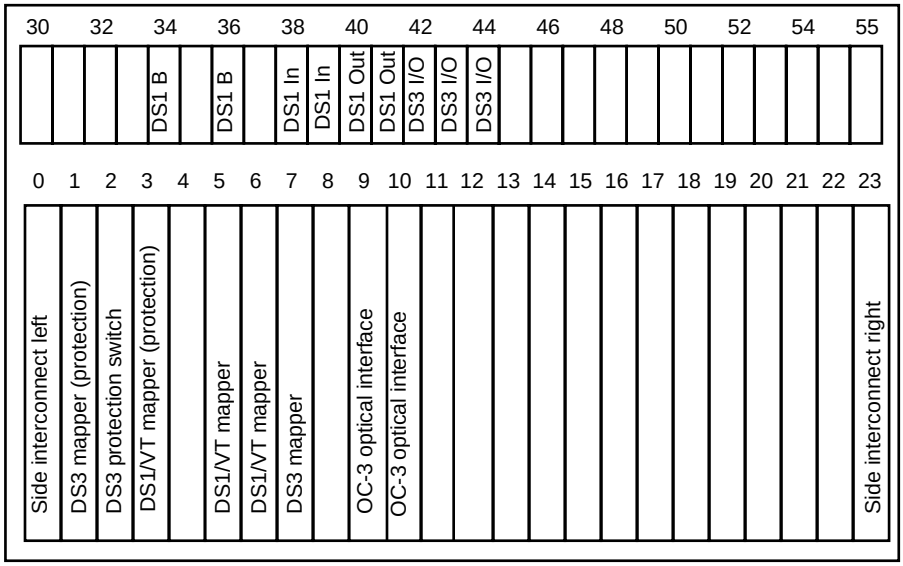
Note: When you are installing DS1 cables, do not mix transmit connections (DS1 output) and receive connections (DS1 input) within the same cable; dedicate each cable to transmit or receive functions, but not both.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-19
Typical OC-3 universal configurations for the FCOT and the RFT

2 working DS1 mappers and 1 working DS3 mapper, no OPC



Mappers		I/O cards					
DS3 P	1	none					
DS1 P	3	DS1 B	34	DS1 B	36		
DS1	5	DS1 In	38	DS1 Out	40		
DS1	6	DS1 In	39	DS1 Out	41		
DS3	7	DS3 I/0	42	DS3 I/O	43	DS3 I/O	44

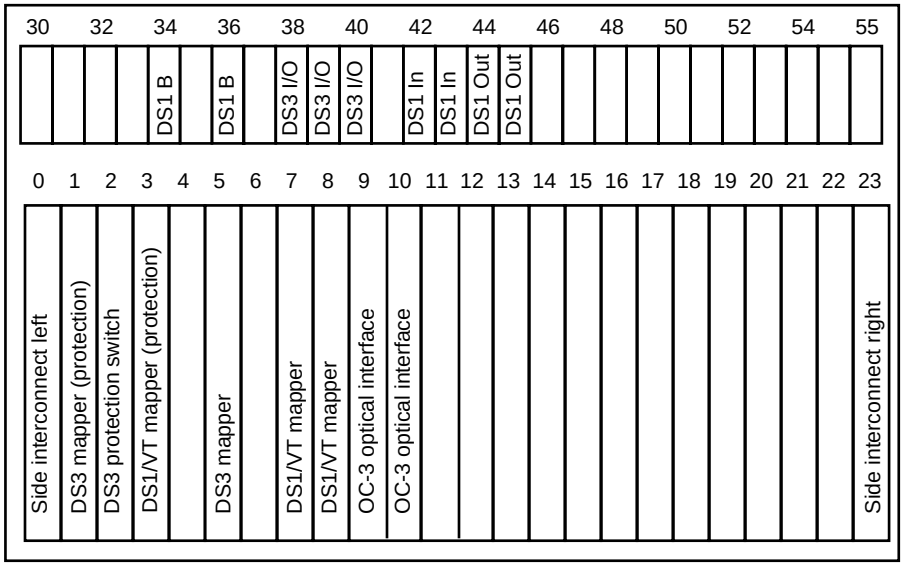
DS1 In DS1 input card (NT4K32AA)
DS1 Out DS1 output card (NT4K33AA)
DS1 B DS1 protection bridge card (NT4K31AA)
DS3 I/O DS3 input output card (NT4K30AA)
P protection

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-20
Typical OC-3 combined configurations for the FCOT and the RFT

2 working DS1 mappers and 1 working DS3 mapper, no OPC



Mappers		I/O cards					
DS3 P	1	none					
DS1 P	3	DS1 B	34	DS1 B	36		
DS3	5	DS3 I/0	38	DS3 I/O	39	DS3 I/O	40
DS1	7	DS1 In	42	DS1 Out	44		
DS1	8	DS1 In	43	DS1 Out	45		

DS1 In	DS1 input card (NT4K32AA)
DS1 Out	DS1 output card (NT4K33AA)
DS1 B	DS1 protection bridge card (NT4K31AA)
DS3 I/O	DS3 input output card (NT4K30AA)
P	protection

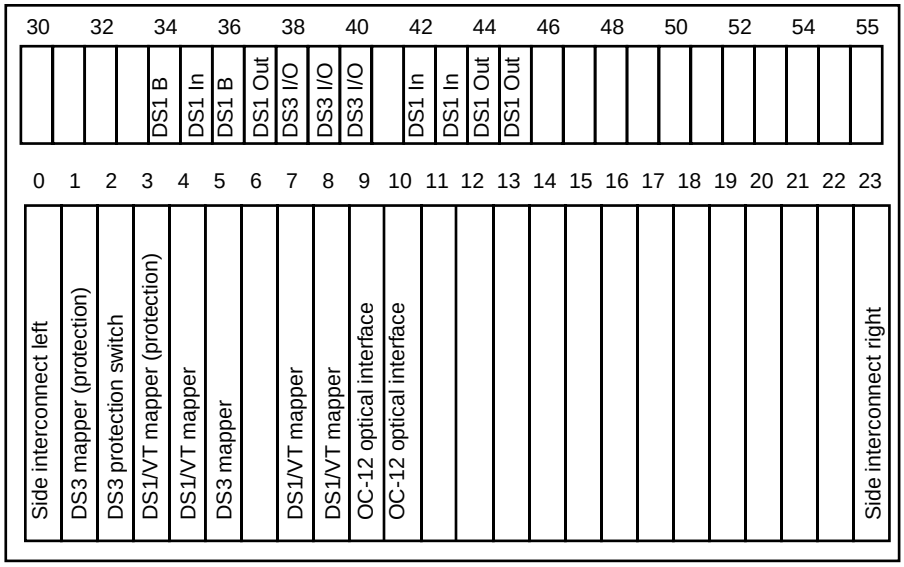
Note: This figure shows a typical combined configuration for the FCOT. At the RFT, a combined configuration contains a DS3 working mapper, but no DS1 mappers. Consequently, lower slots 7 and 8, and I/O slots 42 to 45 contain blank I/O faceplate cards.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-21
Typical OC-12 integrated configurations for the FCOT and the RFT

3 working DS1 mappers and 1 working DS3 mapper, no OPC



Mappers		I/O cards					
DS3 P	1	none					
DS1 P	3	DS1 B	34	DS1 B	36		
DS1	4	DS1 In	35	DS1 Out	37		
DS3	5	DS3	38	DS3	39	DS3	40
DS1	7	DS1 In	42	DS1 Out	44		
DS1	8	DS1 In	43	DS1 Out	45		

DS1 In DS1 input card (NT4K32AA)
DS1 Out DS1 output card (NT4K33AA)
DS1 B DS1 protection bridge card (NT4K31AA)
DS3 I/O DS3 input output card (NT4K30AA)
P protection

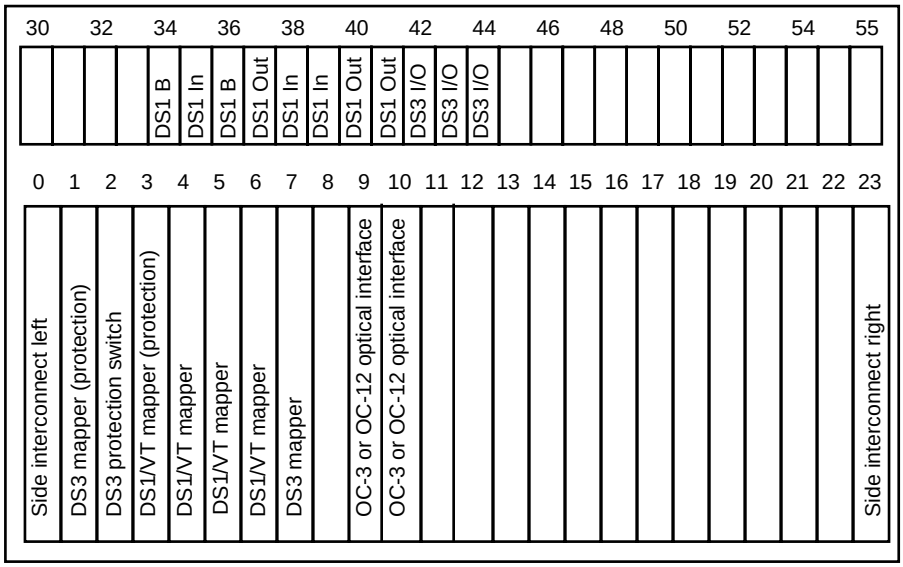
Note: This figure shows a typical integrated configuration for the FCOT. At the RFT, the integrated configuration contains one working DS1 mapper and one working DS3 mapper. Consequently at the RFT, lower slots 7 and 8, and I/O slots 42 to 45 contain blank I/O faceplate cards.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-22
Typical OC-12 universal configurations for the FCOT and the RFT, alternative 1

3 working DS1 mappers and 1 working DS3 mapper, no OPC



Mappers		I/O cards					
DS3 P	1	none					
DS1 P	3	DS1 B	34	DS1 B	36		
DS1	4	DS1 In	35	DS1 Out	37		
DS1	5	DS1 In	38	DS1 Out	40		
DS1	6	DS1 In	39	DS1 Out	41		
DS3	7	DS3 I/O	42	DS3 I/O	43	DS3 I/O	44

DS1 In DS1 input card (NT4K32AA)
DS1 Out DS1 output card (NT4K33AA)
DS1 B DS1 protection bridge card (NT4K31AA)
DS3 I/O DS3 input output card (NT4K30AA)
P protection

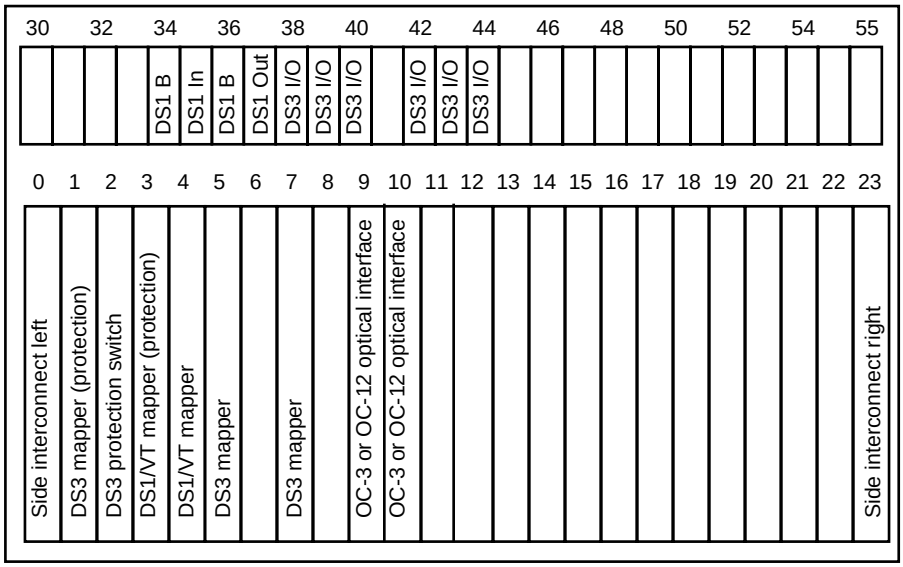
Note: This configuration shows an OC-12 universal configuration that is fully equipped with 3 working DS1 mappers. When the shelf is equipped with only two working DS1 mappers, lower slot 6 contains a faceplate card, and I/O slots 39 and 41 contain blank I/O faceplate cards.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-23
Typical OC-12 universal configurations for the FCOT and the RFT, alternative 2

1 working DS1 mapper and 2 working DS3 mappers, no OPC



Mappers		I/O cards					
DS3 P	1	none					
DS1 P	3	DS1 B	34	DS1 B	36		
DS1	4	DS1 In	35	DS1 Out	37		
DS3	5	DS3 I/O	38	DS3 I/O	39	DS3 I/O	40
DS3	7	DS3 I/O	42	DS3 I/O	43	DS3 I/O	44

DS1 In	DS1 input card (NT4K32AA)
DS1 Out	DS1 output card (NT4K33AA)
DS1 B	DS1 protection bridge card (NT4K31AA)
DS3 I/O	DS3 input output card (NT4K30AA)
P	protection

Note: This configuration shows an OC-12 universal configuration that is equipped with 1 working DS1 mapper.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Requirements

The following tools and materials are required:

- cable cutters
- cable ties
- screwdriver, Phillips No. 1
- heat shrinkable tubing, black, 9.3 mm (3/8 in.) diameter, R0113153, or equivalent

Action

Step	Action

Equip the ABM shelf I/O slots

1 Use facility records to identify the lower slots into which DS1 and DS3 mappers are to be installed in the ABM shelf.

For a description of the shelf configurations and the placement of mappers and I/O cards at the fiber central office terminal (FCOT) and at the remote fiber terminal (RFT), see *Addendum 1 (MBP), Site Installation Planning and Engineering*, 323-3001-200.

2 Remove the blank I/O faceplate cards from the following ABM I/0 slots according to the lower slots in which DS1 and DS3 mappers are to be installed.

Slots with DS1 mappers	Remove faceplate cards from slots	Slots with DS3 mappers	Remove faceplate cards from slots
3 (protection)	34, 36	1 (protection)	none
4	35, 37	5	38, 39, 40
5	38, 40	7	42, 43, 44
7	42, 44		
8	43, 45		

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Step	Action

3 Insert I/O cards into the ABM shelf according to the slots into which mappers are to be installed as follows:

Slots with mappers	Type of mapper	Insert the following types of I/O cards into these slots					
1	DS3 P	none					
3	DS1 P	DS1 B	34	DS1 B	36		
4	DS1	DS1 In	35	DS1 Out	37		
5	DS1	DS1 In	38	DS1 Out	40		
	DS3	DS3	38	DS3	39	DS3	40
7	DS1	DS1 In	40	DS1 Out	42		
	DS3	DS3	42	DS3	43	DS3	44
8	DS1	DS1 In	43	DS1 Out	45		

DS1 In	DS1 input card, NT4K32AA
DS1 Out	DS1 output card, NT4K33AA
DS1 B	DS1 protection bridge card (NT4K31AA
DS3 I/O	DS3 input output card, NT4K30AA
P	protection

4 Tighten the hold-down screws at the bottom of the card faceplates.

5 Label both ends of each DS1 cable and each DS3 cable as follows:

DS1 cables	the range of DS1 numbers (1 to 14 or 15 to 28), and the function of the cable: Tx (transmit) or Rx (receive)
DS3 cables	the number of the DS3 (1 to 6) and the function of the cable: TX (transmit) or Rx (receive)

Note: The function of the cable (transmit or receive) is determined from the perspective of the cross connect panel. Transmit cables carry signals away from the cross connect, and receive cables carry signals toward the cross connect.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

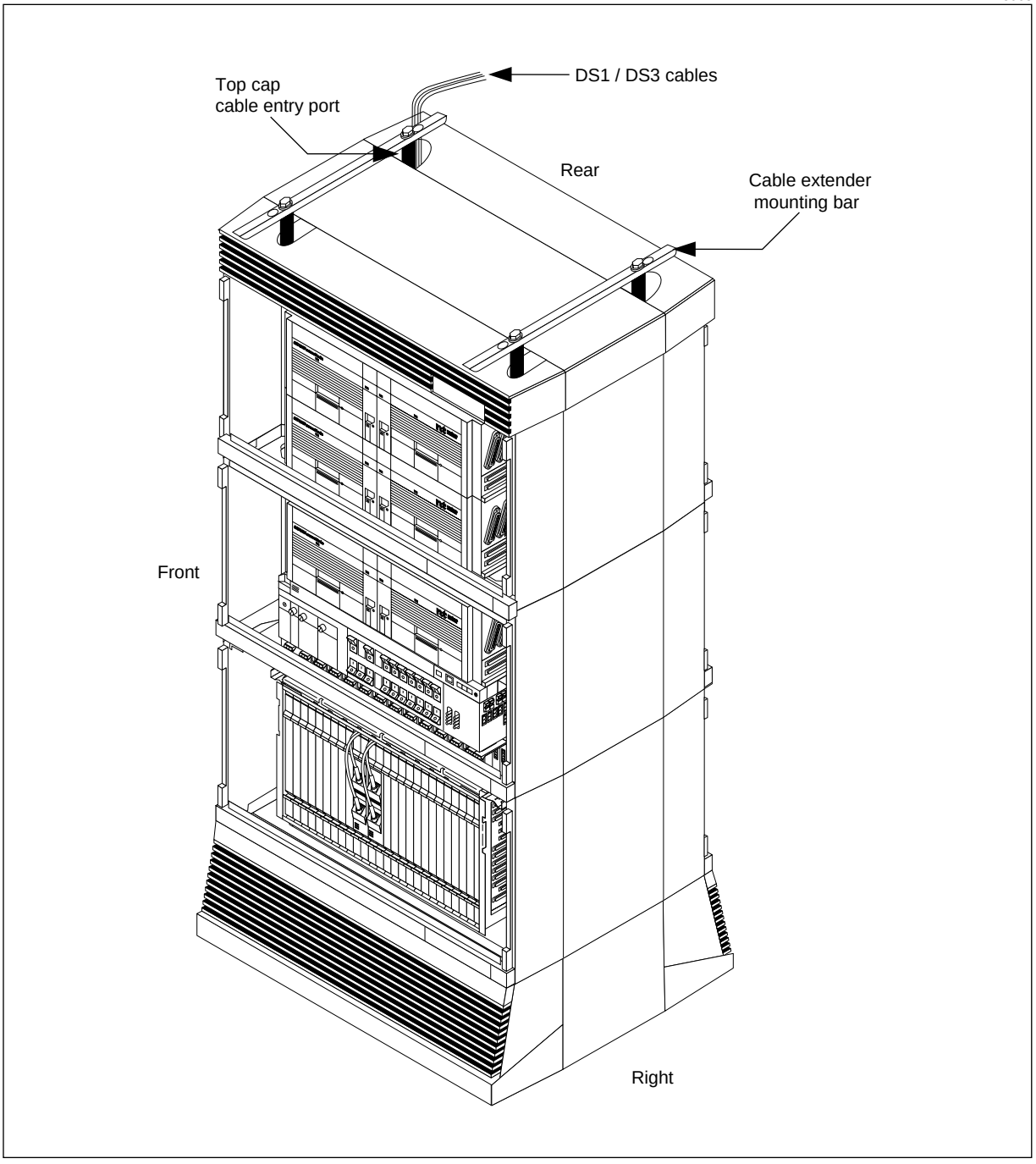
Step	Action
	Routing the cables to the left side of the ABM shelf
6	Remove the top cap covers from the top of the cabinet if the installation is for the concrete floor option. ***Note:*** Cables can exit the cabinet through the top cap grilles (concrete floors) or though the pedestal (raised floors). When cables exit the top of the cabinet, a set of notched NT4K09BA top cap grilles must be used instead of the standard NT4K09AA top cap grilles.
7	Run one DS1 cable for each pair of DS1 cards (DS1 In, DS1 Out, or DS1 B) that you installed in I/O slots 34 to 41 into the right side of the master cabinet (see Figure 9-24 on page 9-46) to the front of the ABM shelf (see Figure 9-25 on page 9-47). ***Note:*** For the concrete floor option, run the cables down into the top right side of the cabinet through the cable entry ports in the top cap assembly as shown in Figure 9-24 on page 9-46. For the raised floor option, run the cables up through the rear bottom right of the cabinet through the cable entry port cut-outs in the cabinet framework.
8	Run two DS3 cables (one Tx and one Rx) for each DS3 card that you installed in I/O slots 38 to 40 into the right side of the master cabinet (see Figure 9-24 on page 9-46) to the front of the ABM shelf (see Figure 9-25 on page 9-47). ***Note:*** For the concrete floor option, run the cables down into the top right side of the cabinet through the cable entry ports in the top cap assembly as shown in Figure 9-24 on page 9-46. For the raised floor option, run the cables up through the rear bottom right of the cabinet through the cable entry port cut-outs in the cabinet framework.
9	Hang the cables temporarily in the cable tray as shown in Figure 9-26 on page 9-48.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-24
DS1 and DS3 cable routing into the top of the MBP cabinet

FW-15068

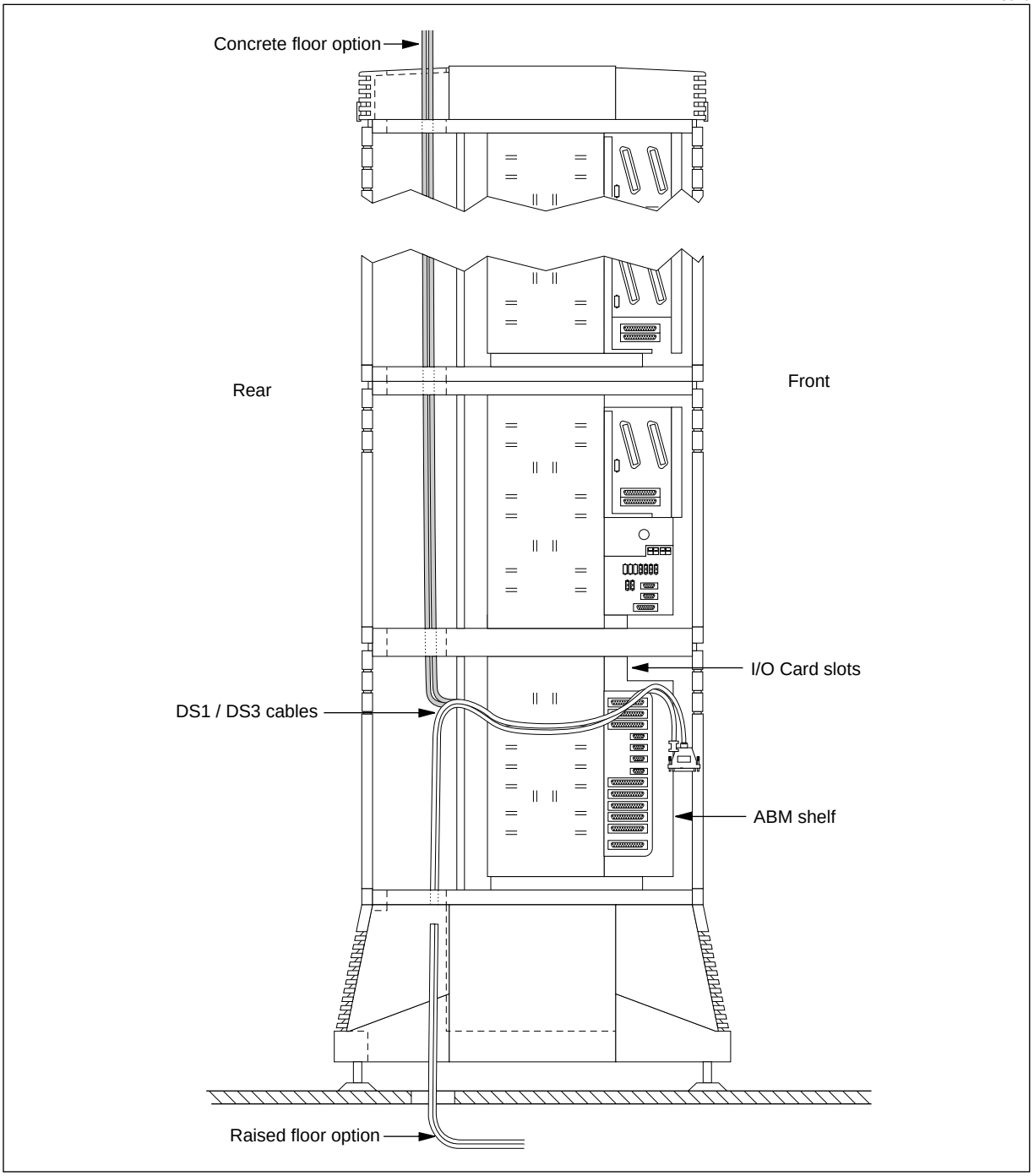


—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-25
Routing DS1 and DS3 cables into the right side of the MBP cabinet

FW-15070

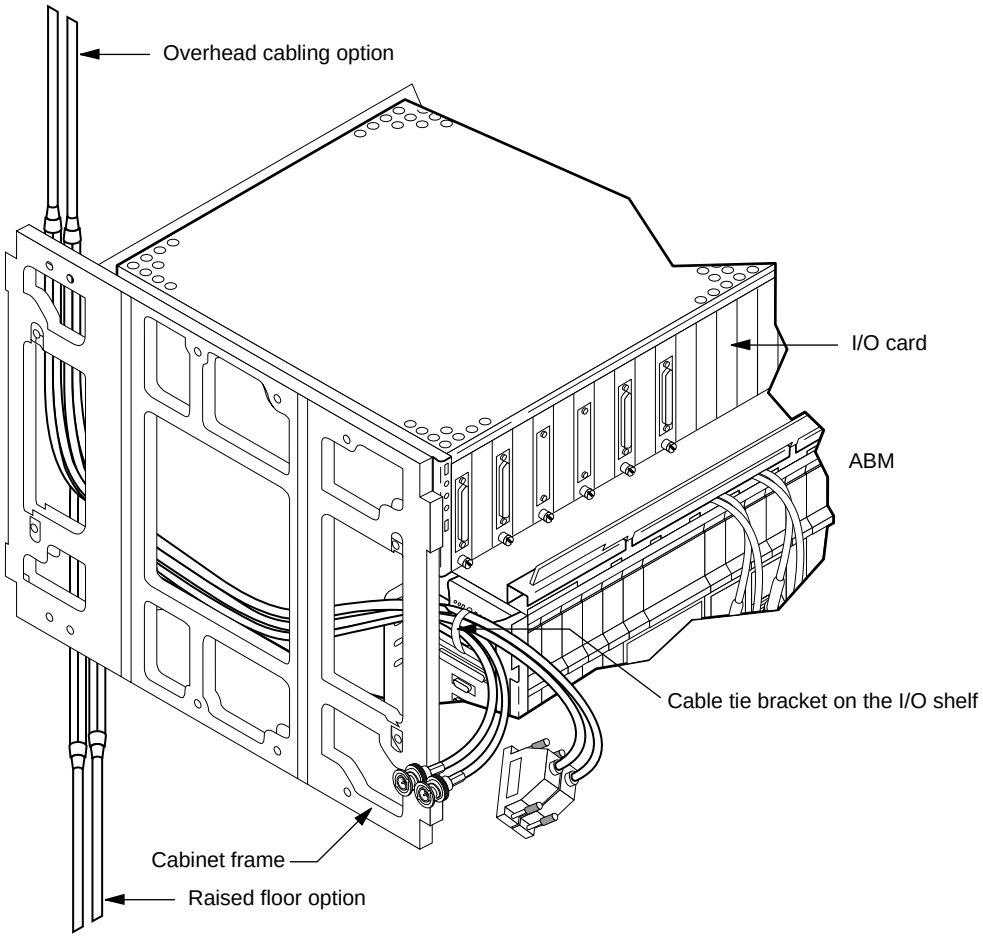


—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-26
Routing the DS1 and DS3 cables in the MBP cabinet to the right side of the ABM

FW-15072



—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Step	Action
	Connecting and dressing the right side cables
10	Starting at slot 34 and ending at slot 41, attach the DS1 cables and the DS3 cables to the intended connectors on the I/O cards, as shown in Figure 9-27 on page 9-50. ***Note:*** When installing a DS1 cable to the cards in slots 34 and 35, position the P1 connector in front of the DS1B card in slot 34. This connector is not used. Use a cable tie to secure the P1 connector to the P2 connector that is attached to the card in slot 35. Similarly, when installing a DS1 cable to the cards in slots 36 and 37, position the unused P1 connector in front of the card in slot 36, and use a cable tie to secure it to the P2 connector that is attached to the card in slot 37.
11	Tighten the connector hold down screws on the DS1 connectors just enough to draw the connector into position (2 inch-pounds maximum). Do not over-tighten.
12	Dress the DS1 and DS3 cables back towards the rear of the cabinet toward the cable entry port (top or bottom entry).
13	Use a cable tie to attach the bundle of cables to the lance at the entrance to the cable trough, as shown in Figure 9-27 on page 9-50.
14	Use cable ties to attach the bundle of cables to the DEM framework, as shown in Figure 9-27 on page 9-50.
15	Attach the ground lugs of the receive DS1 cables to the ground lugs at the right side of the ABM shelf, as shown in Figure 9-28 on page 9-51.
16	For the concrete floor option, perform the following steps. If you are installing the raised floor option, go to step 17. **a.** Route the cables up the customer supplied cable rack waterfall. **b.** Dress the cables on the cable rack. **c.** Secure the cables to the customer supplied cable rack. **d.** Continue to step 17.
17	Perform additional DS1/DS3 cabling procedures for I/O slots 42 through 45 according to the following:

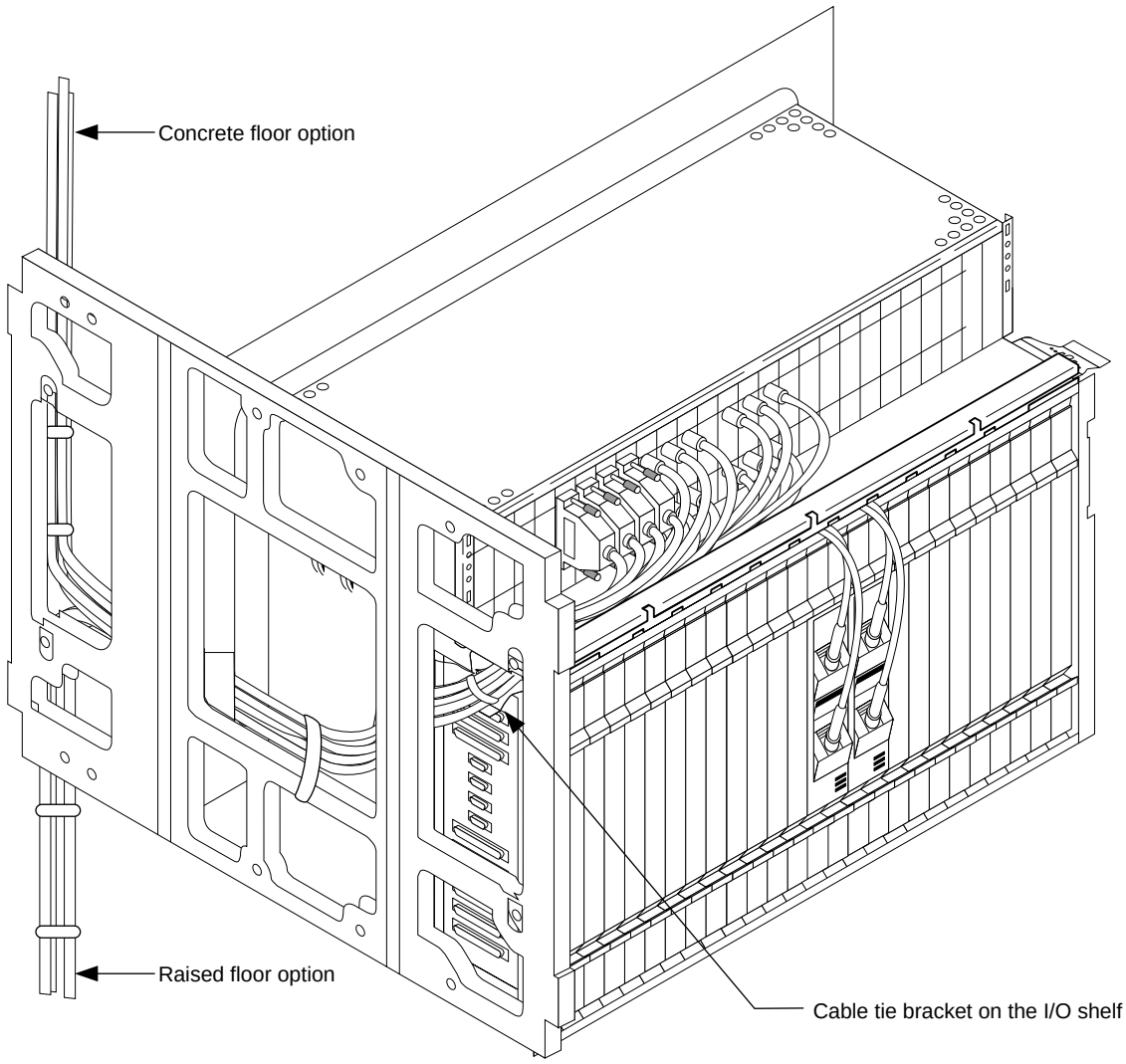
If	Then go to
I/O slots 42 to 45 are equipped	step 18
I/O slots 42-45 are not equipped	step 28

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-27
Connecting and dressing DS1 and DS3 cables on the right side of the cabinet

FW-15073



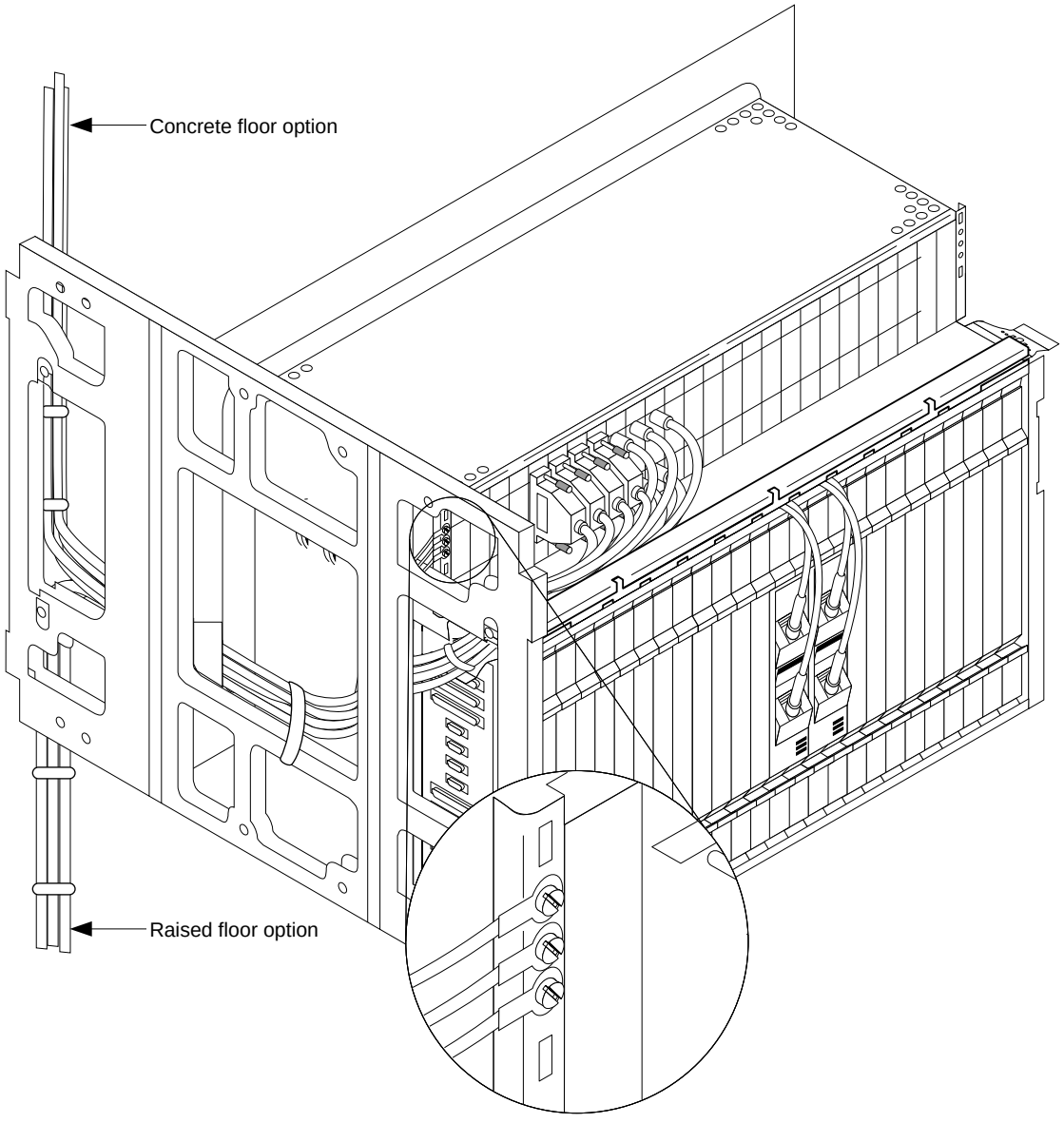
Note: This illustration shows a typical routing for DS1 and DS3 cables. The actual number and placement of the cards and of the cables that connect them will vary according to the shelf configuration.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-28
Attaching the ground lugs of the receive DS1 cables

FW-15074



Note: This illustration shows a typical routing for DS1 and DS3 cables. The actual number and placement of the cards and of the cables that connect them will vary according to the shelf configuration.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

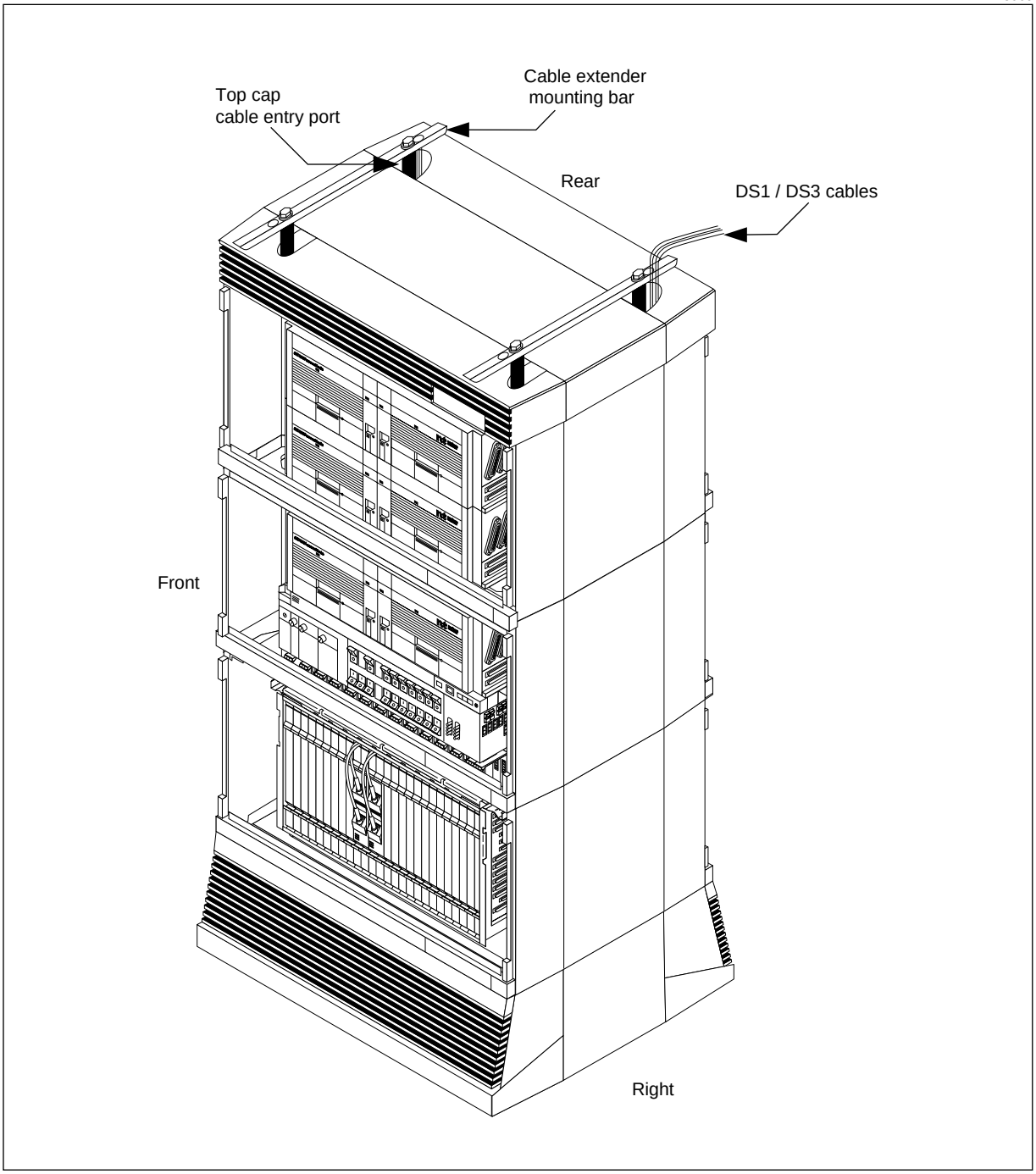
Step	Action
	Routing the cables to the left side of the ABM shelf
18	Run one DS1 cable for each pair of DS1 cards (DS1 In, DS1 Out, or DS1 B) that you installed in I/O slots 42 through 45 into the left side of the master cabinet (see Figure 9-29 on page 9-53) to the front of the ABM shelf (see Figure 9-30 on page 9-54). ***Note:*** For the concrete floor option, run the cables down into the top left side of the cabinet through the cable entry ports in the top cap assembly as shown in Figure 9-29 on page 9-53. For the raised floor option, run the cables up through the rear bottom left of the cabinet through the cable entry port cut-outs in the cabinet framework.
19	Run two DS3 cables (one Tx and one Rx) for each DS3 card that you installed in I/O slots 42 through 45 into the left side of the master cabinet (see Figure 9-29 on page 9-53) to the front of the ABM shelf (see Figure 9-30 on page 9-54). ***Note:*** For the concrete floor option, run the cables down into the top left side of the cabinet through the cable entry ports in the top cap assembly as shown in Figure 9-29 on page 9-53. For the raised floor option, run the cables up through the rear bottom left of the cabinet through the cable entry port cut-outs in the cabinet framework.
20	Hang the cables temporarily in the cable tray as shown in Figure 9-31 on page 9-55.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-29
DS1 and DS3 cable routing into the top of the MBP cabinet

FW-15069

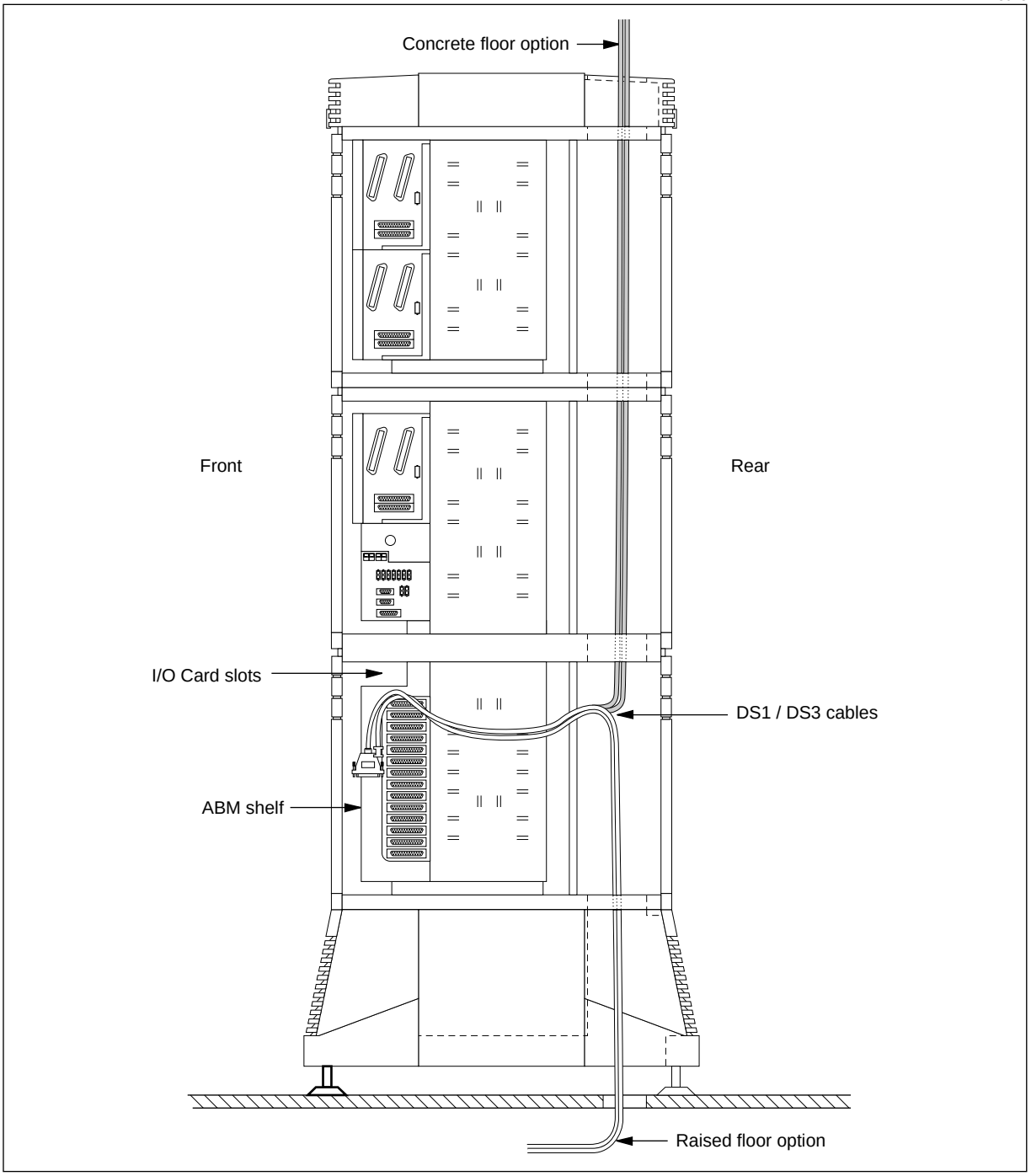


—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-30
Routing DS1 and DS3 cables into the left side of the MBP cabinet

FW-15075

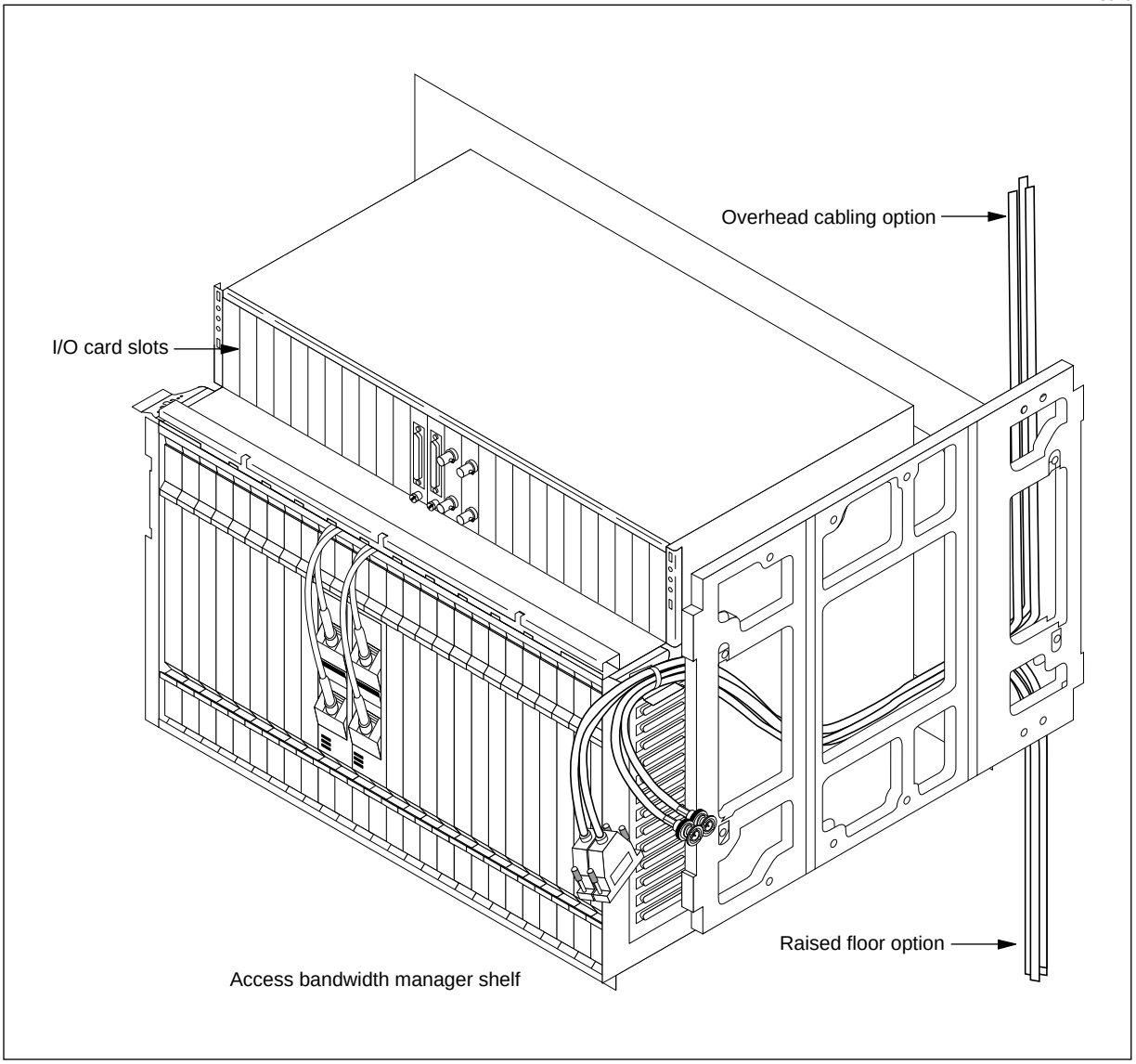


—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-31
Routing the DS1 and DS3 cables in the MBP cabinet to the left side of the ABM

FW-15076



—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

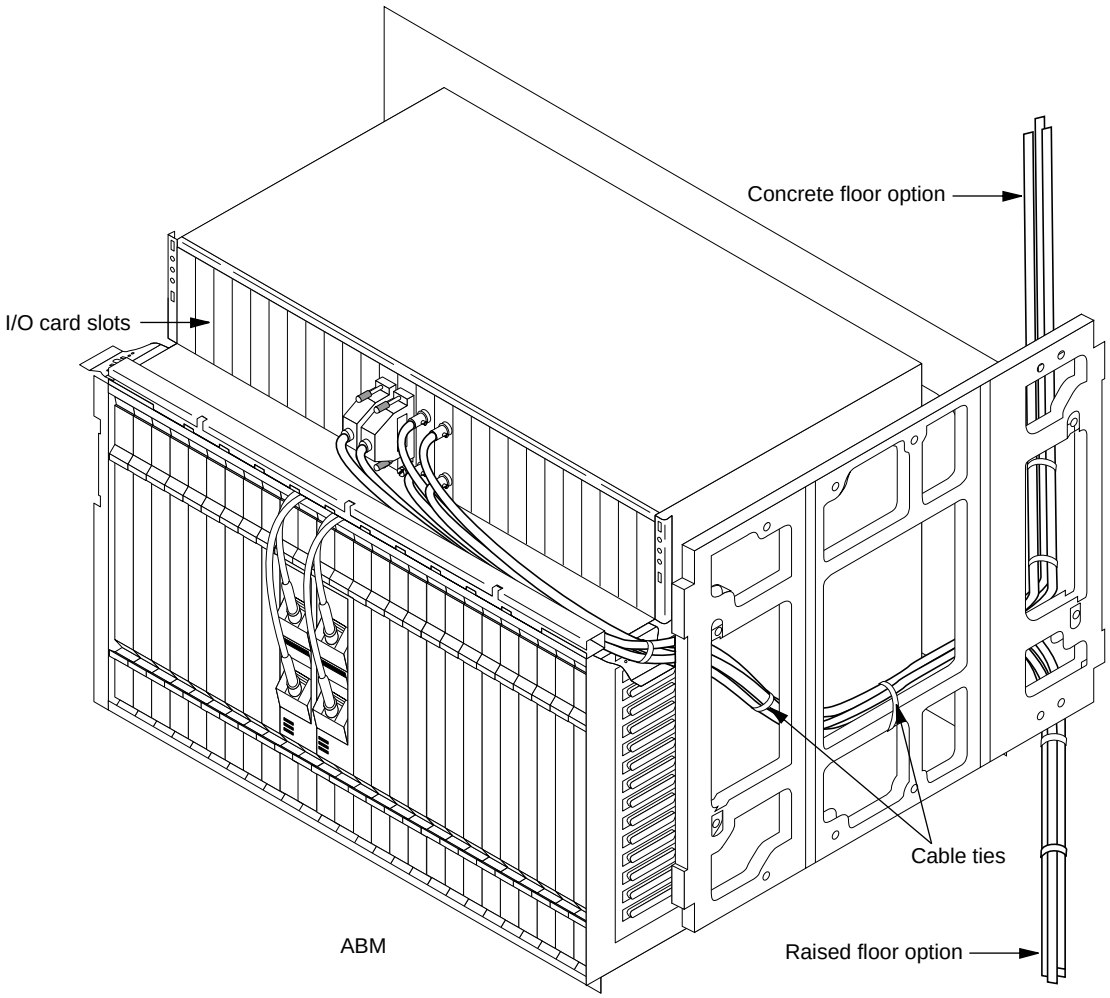
Step	Action
	Connecting and dressing the left side cables
21	Starting at slot 42 and ending at slot 45, attach the DS1 cables and the DS3 cables to the intended connectors on the I/O cards, as shown in Figure 9-32 on page 9-57. ***Note:*** When installing a DS1 cable to the cards in slots 34 and 35, position the P1 connector in front of the DS1B card in slot 34. This connector is not used. Use a cable tie to secure the P1 connector to the P2 connector that is attached to the card in slot 35. Similarly, when installing a DS1 cable to the cards in slots 36 and 37, position the unused P1 connector in front of the card in slot 36, and use a cable tie to secure it to the P2 connector that is attached to the card in slot 37.
22	Tighten the connector hold down screws on the DS1 connectors just enough to draw the connector into position (2 inch-pounds maximum). Do not over-tighten.
23	Dress the DS1 and DS3 cables back towards the rear of the cabinet toward the cable entry port (top or bottom entry).
24	Use a cable tie to attach the bundle of cables to the lance at the entrance to the cable trough, as shown in Figure 9-32 on page 9-57.
25	Use cable ties to attach the bundle of cables to the DEM framework, as shown in Figure 9-32 on page 9-57.
26	Attach the ground lugs of the receive DS1 cables to the ground lugs at the left side of the ABM shelf, as shown in Figure 9-33 on page 9-58.
27	For the concrete floor option, perform the following steps. If you are installing the raised floor option, go to step 28. **a.** Route the cables up the customer supplied cable rack waterfall. **b.** Dress the cables on the cable rack. **c.** Secure the cables to the customer supplied cable rack. **d.** Continue to step 28.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-32
Connecting and dressing DS1 and DS3 cables on the left side of the cabinet

FW-15077



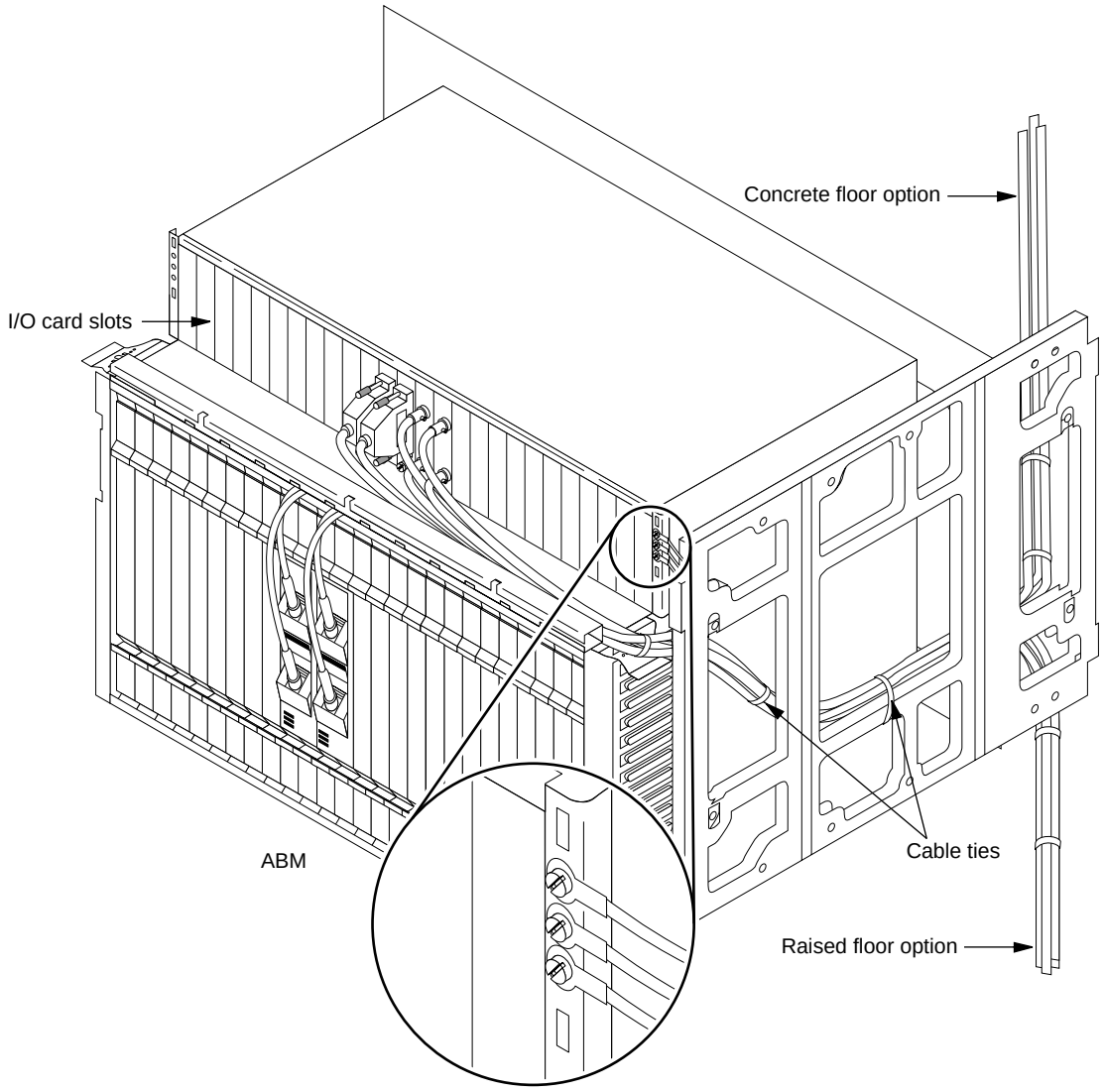
Note: This illustration shows a typical routing for DS1 and DS3 cables. The actual number and placement of the cards and of the cables that connect them will vary according to the shelf configuration.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Figure 9-33
Attaching the ground lugs of the receive DS1 cables

FW-15078

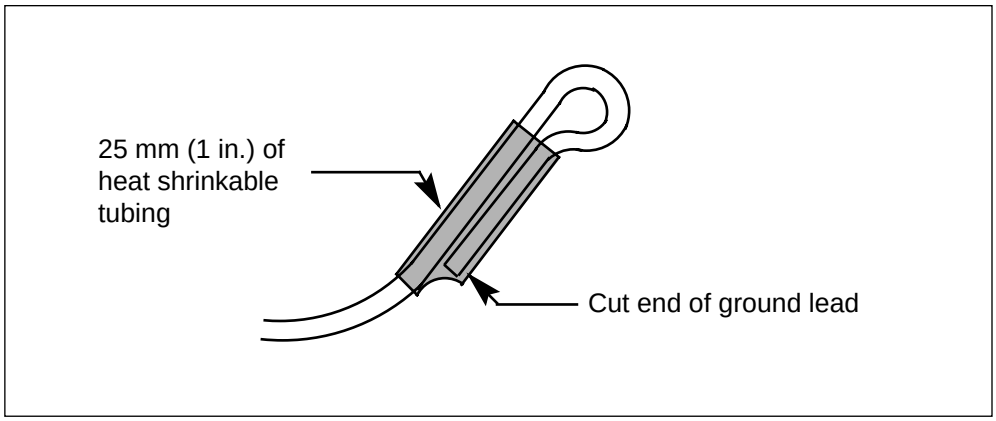


Note: This illustration shows a typical routing for DS1 and DS3 cables. The actual number and placement of the cards and of the cables that connect them will vary according to the shelf configuration.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Step	Action
	Connecting the DS1 cable ground leads at the cross connect shelf
28	Route the DS1 and DS3 cables from the master cabinet over to the DS1 cross connect and the DS3 cross connect panels.
29	Use Table 9-2 on page 9-24 to terminate the office end of each DS1 cable to the DSX-1 cross-connect panel.
30	At the cross connect shelf end of the transmit DS1 cables, cut off the ground lead to within 50 mm (2 in.) of the cable jacket.
31	Bend the cut end of the ground lead back on itself and protect it with a 25 mm (1 in.) length of heat shrinkable tubing, as shown in the following diagram.



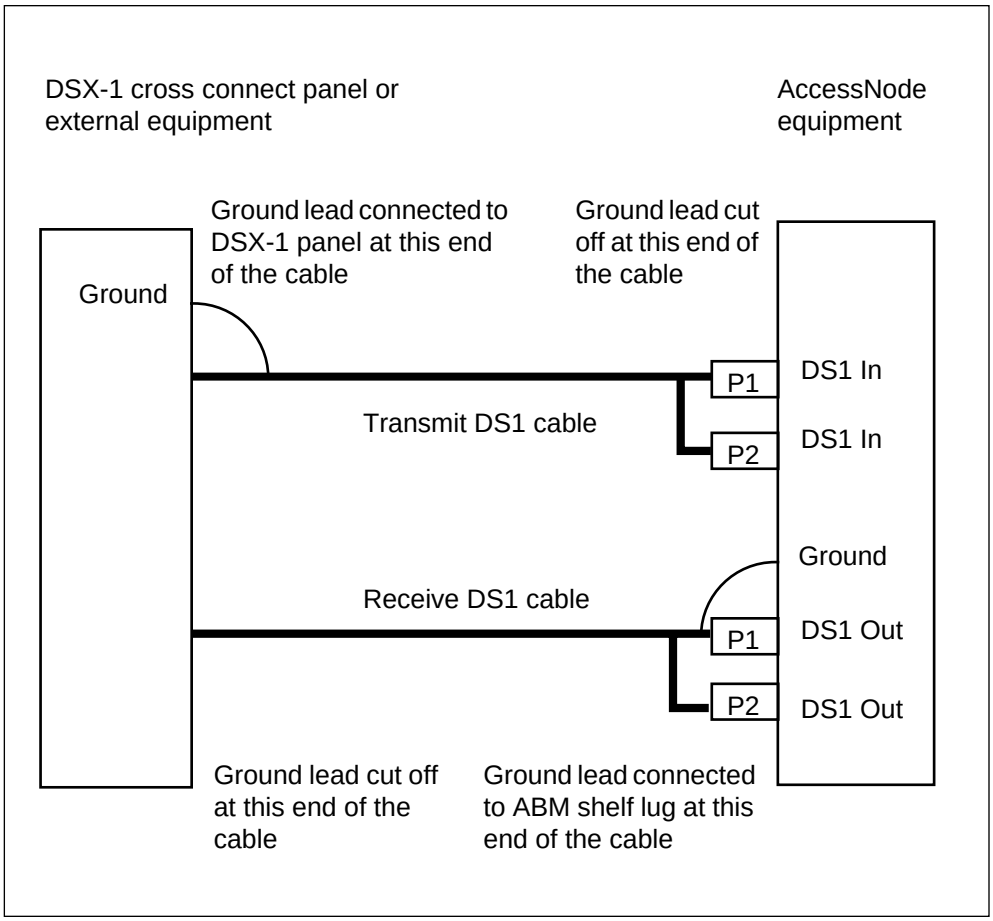
—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Step	Action

32 Ensure that the cable grounding connections are completed as shown in this schematic diagram.

Note: When you have finished connecting all of the grounds, the grounding of the transmit and receive DS1 cables will be as shown.



Terminating the cables at the cross connect shelf

33 Use Table 9-2 on page 9-24 to terminate the office-end of the DS1 cables to the DSX-1 cross-connect panel.

34 Terminate the DS3 cables to the DS3 cross-connect panel.

35 Continue the cabling procedures using Procedure 9-4, “Installing a test access path cable” on page 9-64, or Procedure 9-5, “Installing a test bypass path cable” on page 9-69.

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

The following table contains the pin-outs for the DS1 cable connectors P1 and P2 at the ABM shelf.

Note: Pins 1 to 15 of connectors P1 and P2 are not used, and pairs 29 and 30 are not used.

Table 9-3
DS1 cable connector pin-out details

Connector P1 at the I/O area of the ABM shelf				
Pair or DS1 no.	**Tip or Ring**	**Pin no.**	**Color code**	
1	Tip	16	W	1BL
	Ring	31	BL	1W
2	Tip	17	W	1O
	Ring	32	O	1W
3	Tip	18	W	1G
	Ring	33	G	1W
4	Tip	19	W	1BR
	Ring	34	BR	1W
5	Tip	20	W	1S
	Ring	35	S	1W
6	Tip	21	R	1BL
	Ring	36	BL	1R
7	Tip	22	R	1O
	Ring	37	O	1R
8	Tip	23	R	1G
	Ring	38	G	1R
9	Tip	24	R	1BR
	Ring	39	BR	1R
10	Tip	25	R	1S
	Ring	40	S	1R
—continued—				

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Table 9-3 (continued)
DS1 cable connector pin-out details

Connector P1 at the I/O area of the ABM shelf				
Pair or DS1 No.	**Tip or Ring**	**Pin No.**	**Color code**	
11	Tip	26	BL	1BL
	Ring	41	BL	1BK
12	Tip	27	BK	1O
	Ring	42	O	1BK
13	Tip	28	BK	1G
	Ring	43	G	1BK
14	Tip	29	BK	1BR
	Ring	44	BR	1BK
Connector P2 at the I/O area of the ABM shelf				
15	Tip	16	BK	1S
	Ring	31	S	1BK
16	Tip	17	Y	1 BL
	Ring	32	BL	1Y
17	Tip	18	Y	1O
	Ring	33	O	1Y
18	Tip	19	Y	1G
	Ring	34	G	1Y
19	Tip	20	Y	1BR
	Ring	35	BR	1Y
20	Tip	21	Y	1S
	Ring	36	S	1Y
—continued—				

—continued—

Procedure 9-3 (continued)
Installing a mix of DS1 and DS3 cables

Table 9-3 (continued)
DS1 cable connector pin-out details

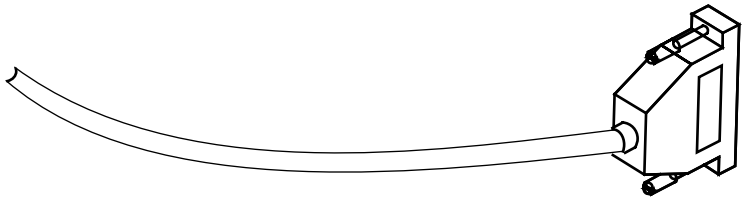
Connector P2 at the I/O area of the ABM shelf				
Pair or DS1 No.	**Tip or Ring**	**Pin No.**	**Color code**	
21	Tip	22	V	1BL
	Ring	37	BL	1V
22	Tip	23	V	1O
	Ring	38	O	1V
23	Tip	24	V	1G
	Ring	39	G	1V
24	Tip	25	V	1BR
	Ring	40	BR	1V
25	Tip	26	V	1S
	Ring	41	S	1V
The following pairs are contained in a blue binder.				
26	Tip	27	W	1BL
	Ring	42	BL	1W
27	Tip	28	W	1O
	Ring	43	O	1W
28	Tip	29	W	1G
	Ring	44	G	1W
—end—				

—end—

Procedure 9-4
Installing a test access path cable

Use this procedure to install the test access path (TAP) cable function (NT4K85EA through ED) from the TAP I/O card on the access bandwidth manager (ABM) shelf to the main distribution frame (MDF) cross-connect.

NT4K85EA, EB, EC, or ED



44-pin

D-subminiature male

25-pair, twisted., 26 AWG solid wires connectorized one end for connection to the access bandwidth manager shelf TAP I/O card. This cable is available in the following lengths:

15 m	(50 ft)	NT4K85ED
31 m	(100 ft)	NT4K85EA
61 m	(200 ft)	NT4K85EB
91 m	(300 ft)	NT4K85EC

Note 1: The same cable is used to perform test access path (TAP) and test bypass pair (TBP) functions, but the signals and the connection points of the cable are different.

Note 2: See the installation job records to determine if the TAP cable is applicable to your installation or whether the TBP function is applicable. If the TBP function applies, go to Procedure 9-5, “Installing a test bypass path cable” on page 9-69.

Requirement

The following tools and materials are required:

- cable cutters
- cable ties
- flat-bladed screwdriver, 1/8 in.wide blade

—continued—

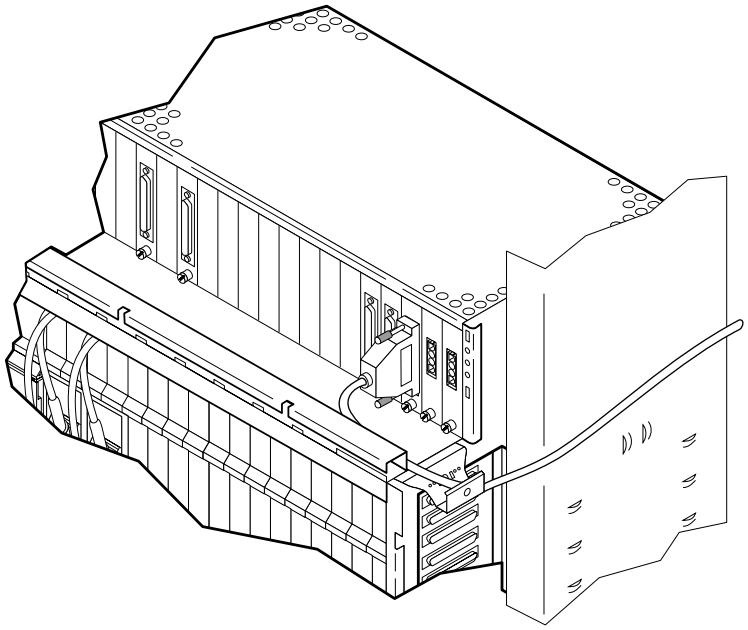
Procedure 9-4 (continued)
Installing a test access path cable

Action

Step	Action
1	Remove the blank I/O faceplate card (NT4K58ZA) from slot 53 and insert the test access path I/O (NT4K58KA) card.
2	Tighten the hold-down screws on the bottom of the card faceplate.
3	At the left rear of the cabinet, route the test access path cable to the front of the cabinet, as shown in Figure 9-35 on page 9-66. Leave sufficient slack in the cable to reach the I/O area at the front of the ABM shelf.
4	At the front of the cabinet, attach the test access path cable to the connector of the I/O card in slot 53, as shown in Figure 9-34.
5	Secure the connector with the two screws, using a flathead screwdriver.
6	Dress the test access path cable from the connector into the cable trough and secure the cable in place with cable ties.

Figure 9-34
Connecting a test access path cable (TAP function)

FW-10931



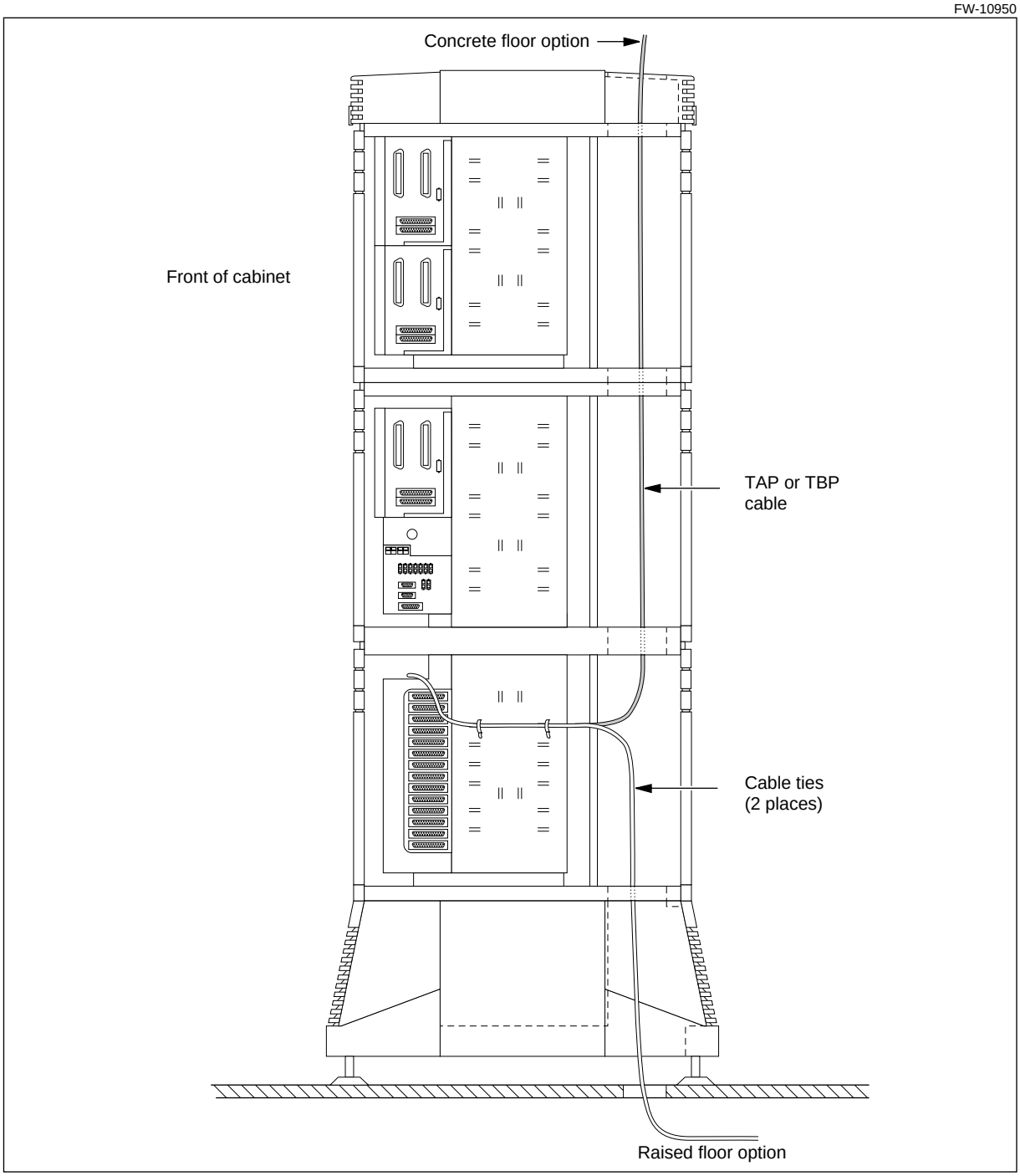
Note: I/O card bar code label mounting plate has been omitted for clarity.

—continued—

Procedure 9-4 (continued)
Installing a test access path cable

Figure 9-35
Routing of a test access path cable to the front of the master cabinet

FW-10950



—continued—

Procedure 9-4 (continued)
Installing a test access path cable

Step	Action
7	Dress the cable slack back into the cabinet, and secure the cable in place with cable ties at the locations shown in Figure 9-35 on page 9-66.
8	Route the cable out of the cabinet to the MDF cross-connect, and secure it with cable ties. ***Note:*** Cables can exit the cabinet through the top cap grilles (concrete floor) or through the pedestal (raised floor). When cables exit the top of the cabinet, a set of notched NT4K09BA top cap grilles must be used instead of the standard NT4K09AA top cap grilles.
9	Refer to Table 9-3 on page 9-68 to terminate the office end of the cable to the MDF cross connect.
10	Continue the cabling procedures using Procedure 9-6, “Installing an orderwire extension cable” on page 9-74.

—continued—

Procedure 9-4 (continued)
Installing a test access path cable

Table 9-3
Color code and pin out detail for the test access path cable (TAP function)

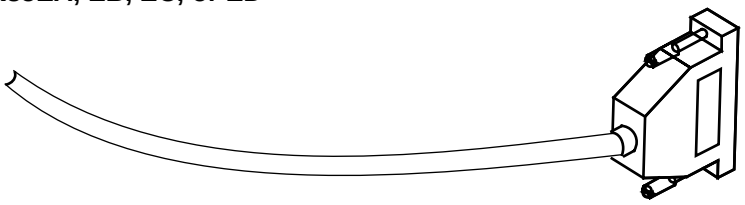
Signal	Pin	Pair	Color		Signal	Pin	Pair	Color	
1 A In R	1	1	BL	1W	2 C Out R	23	12	O	1BK
1 A In T	2	1	W	1BL	2 C Out T	24	12	BK	1O
1 A Out R	3	2	O	1W	MTA R	25	13	G	1BK
1 A Out T	4	2	W	1O	MTA T	26	13	BK	1G
1 B In R	5	3	G	1W	Rmte TBP R	27	14	BR	1BK
1 B In T	6	3	W	1G	Rmte TBP T	28	14	BK	1BR
1 B Out R	7	4	BR	1W	Ext TBP R	29	15	S	1BK
1 B Out T	8	4	W	1BR	Ext TBP T	30	15	BK	1S
1 C In R	9	5	S	1W	NC	31		NC	
1 C In T	10	5	W	1S	NC	32		NC	
1 C Out R	11	6	BL	1R	NC	33		NC	
1 C Out T	12	6	R	1BL	NC	34		NC	
2 A In R	13	7	O	1R	NC	35		NC	
2 A In T	14	7	R	1O	NC	36		NC	
2 A Out R	15	8	G	1R	NC	37		NC	
2 A Out T	16	8	R	1G	NC	38		NC	
2 B In R	17	9	BR	1R	NC	39		NC	
2 B In T	18	9	R	1BR	NC	40		NC	
2 B Out R	19	10	S	1R	NC	41		NC	
2 B Out T	20	10	R	1S	NC	42		NC	
2 C In R	11	21	BL	1BK	NC	43		NC	
2 C In T	11	22	BK	1BL	NC	44		NC	
NC = no connection									

—end—

Procedure 9-5
Installing a test bypass path cable

Use this procedure to install a test bypass pair cable (NT4K85EA through ED) that is being used to perform the function of a test bypass pair cable. This cable connects from the TBP I/O card on the access bandwidth manager (ABM) shelf to the main distribution frame (MDF) cross connect.

NT4K85EA, EB, EC, or ED



44-pin
D-subminiature male

25-pair, twisted, 26 AWG solid wires connectorized one end for connection to the access bandwidth manager shelf TAP I/O card. This cable is available in the following lengths:

15 m	(50 ft)	NT4K85ED
31 m	(100 ft)	NT4K85EA
61 m	(200 ft)	NT4K85EB
91 m	(300 ft)	NT4K85EC

Note 1: The same cable is used to perform test access path (TAP) and test bypass pair (TBP) functions, but the signals and the connection points of the cable are different.

Note 2: See the installation job records to determine if the TBP cable is applicable to your installation or whether the TAP function is applicable. If the TAP function applies, go to Procedure 9-4, “Installing a test access path cable” on page 9-64.

Requirement

The following tools and materials are required:

- cable cutters
- flat bladed screwdriver, 1/4in. wide blade
- cable ties

—continued—

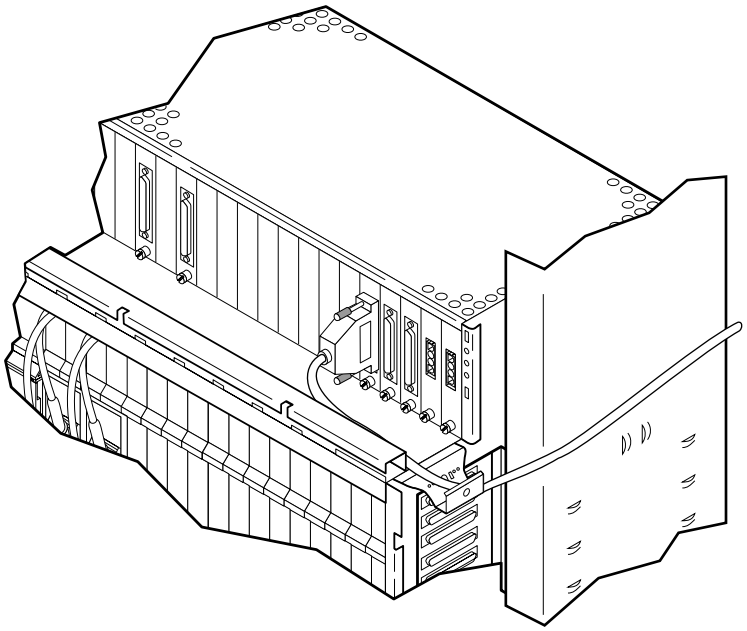
Procedure 9-5 (continued)
Installing a test bypass path cable

Action

Step	Action
1	Remove the blank I/O faceplate card (NT4K58ZA) from slot 51 and insert the test bypass pairs I/O (NT4K58CA) card.
2	Tighten the hold-down screws on the bottom of the card faceplate.
3	At the left rear of the cabinet, route the test bypass path cable to the front of the cabinet, as shown in Figure 9-37 on page 9-71. Leave sufficient slack in the cable to reach the I/O area at the front of the ABM shelf.
4	At the front of the cabinet, attach the test bypass path cable to the connector of the I/O card in slot 51, as shown in Figure 9-36.
5	Secure the connector with the two screws, using a flathead screwdriver.
6	Dress the test bypass path cable from the connector into the cable trough and secure the cable in place with a cable tie.

Figure 9-36
Connecting a test bypass path cable (TBP function)

FW-10932



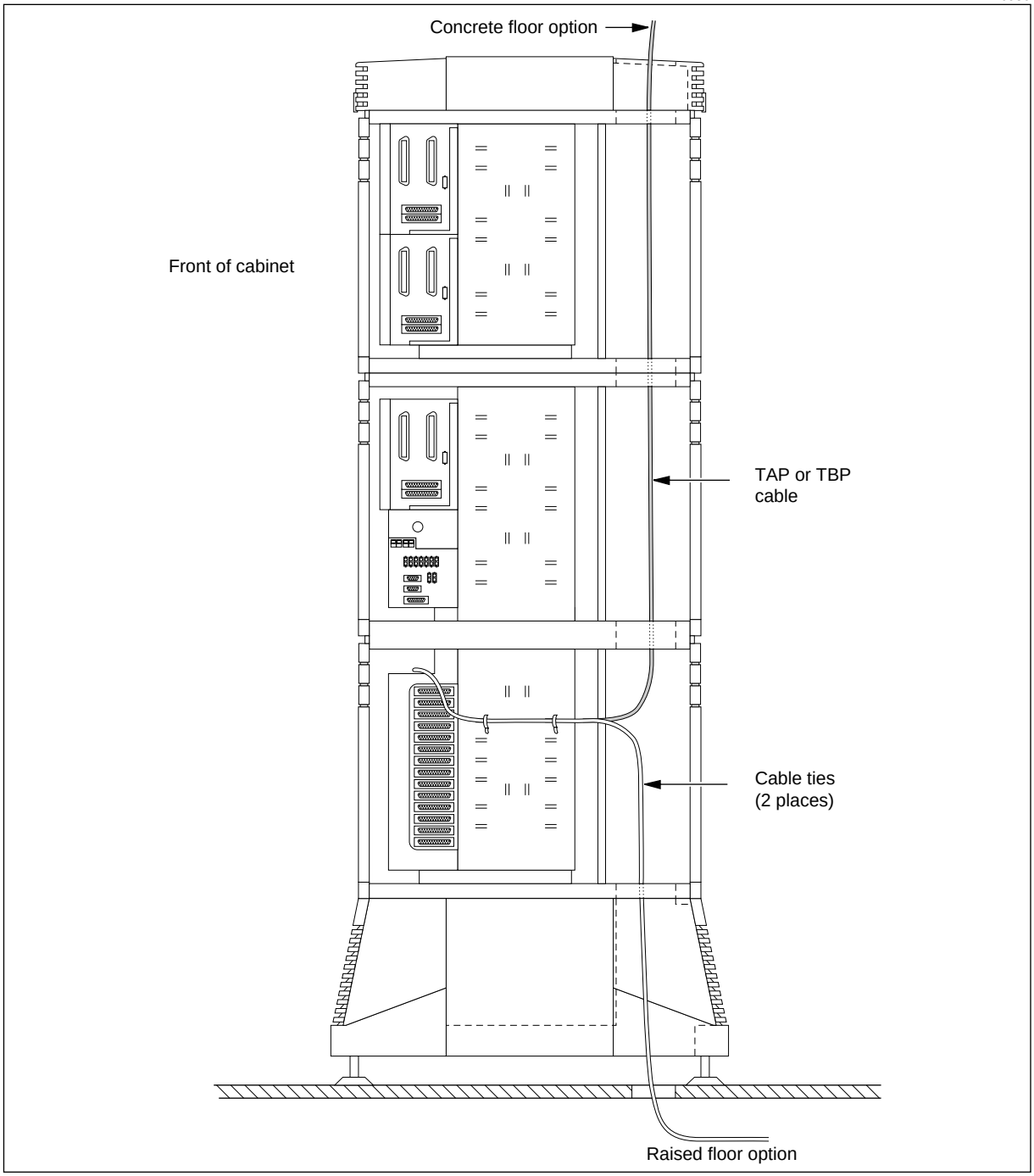
Note: I/O card bar code label mounting plate has been omitted for clarity.

—continued—

Procedure 9-5 (continued)
Installing a test bypass path cable

Figure 9-37
Routing of a test bypass path cable (TBP function) to the front of the master cabinet

FW-10950



—continued—

Procedure 9-5 (continued)
Installing a test bypass path cable

Step	Action
7	Dress the cable slack back into the cabinet, and secure the cable in place with cable ties at the locations shown in Figure 9-37 on page 9-71.
8	Run the cable out of the cabinet to the MDF cross-connect, and secure it in place with cable ties. ***Note:*** Cables can exit the cabinet through the top cap grilles (concrete floors) or through the pedestal (raised floors). When cables exit the top of the cabinet, a set of notched NT4K09BA top cap grilles must be used instead of the standard NT4K09AA top cap grilles.
9	Refer to the following table and terminate the office end of the cable to the MDF cross-connect.

—continued—

Procedure 9-5 (continued)
Installing a test bypass path cable

Table 9-4
Color code and pin-out detail for the test bypass pair cable (TBP function)

Signal	Pin	Pair	Color		Signal	Pin	Pair	Color
Bypass 1R	1	1	BL	1W	NC	23	12	NC
Bypass 1T	2	1	W	1BL	NC	24	12	NC
Bypass 2R	3	2	O	1W	NC	25	13	NC
Bypass 2T	4	2	W	1O	NC	26	13	NC
Bypass 3R	5	3	G	1W	NC	27	14	NC
Bypass 3T	6	3	W	1G	NC	28	14	NC
Bypass 4R	7	4	BR	1W	NC	29	15	NC
Bypass 4T	8	4	W	1BR	NC	30	15	NC
Bypass 5R	9	5	S	1W	NC	31		NC
Bypass 5T	10	5	W	1S	NC	32		NC
Bypass 6R	11	6	BL	1R	NC	33		NC
Bypass 6T	12	6	R	1BL	NC	34		NC
NC	13	7	NC		NC	35		NC
NC	14	7	NC		NC	36		NC
NC	15	8	NC		NC	37		NC
NC	16	8	NC		NC	38		NC
Inhibit 1	17	9	BR	1R	NC	39		NC
Inhibit 2	18	9	R	1BR	NC	40		NC
Inhibit 3	19	10	S	1R	NC	41		NC
Inhibit 4	20	10	R	1S	NC	42		NC
Inhibit 5	21	11	BL	1BK	NC	43		NC
Inhibit 6	22	11	BK	1BL	NC	44		NC
NC = no connection								

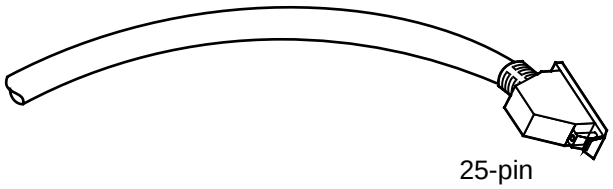
—end—

Procedure 9-6
Installing an orderwire extension cable

Use this procedure to install the external orderwire extension cable (NT4K85TA, TB, or TC) between the access bandwidth manager (ABM) shelf and the office cross connect for the extension of orderwire circuitry.

If no orderwire extension cabling is required as per job specifications, continue the cabling procedures using Procedure 9-7, “Installing a modem cable” on page 9-78.

NT4K85TA, TB, and TC



25-pin
D-subminiature male

12-pair, twisted, 26 AWG solid wires connectorized at one end for connection to the ABM shelf, and the other end free for customer termination to the intended office equipment. This cable is available in the following lengths:

30.5 m	(100 ft)	NT4K85TA
61 m	(200 ft)	NT4K85TB
91.4 m	(300 ft)	NT4K85TC

Requirement

The following tools and materials are required:

- cable cutters
- cable ties

Action

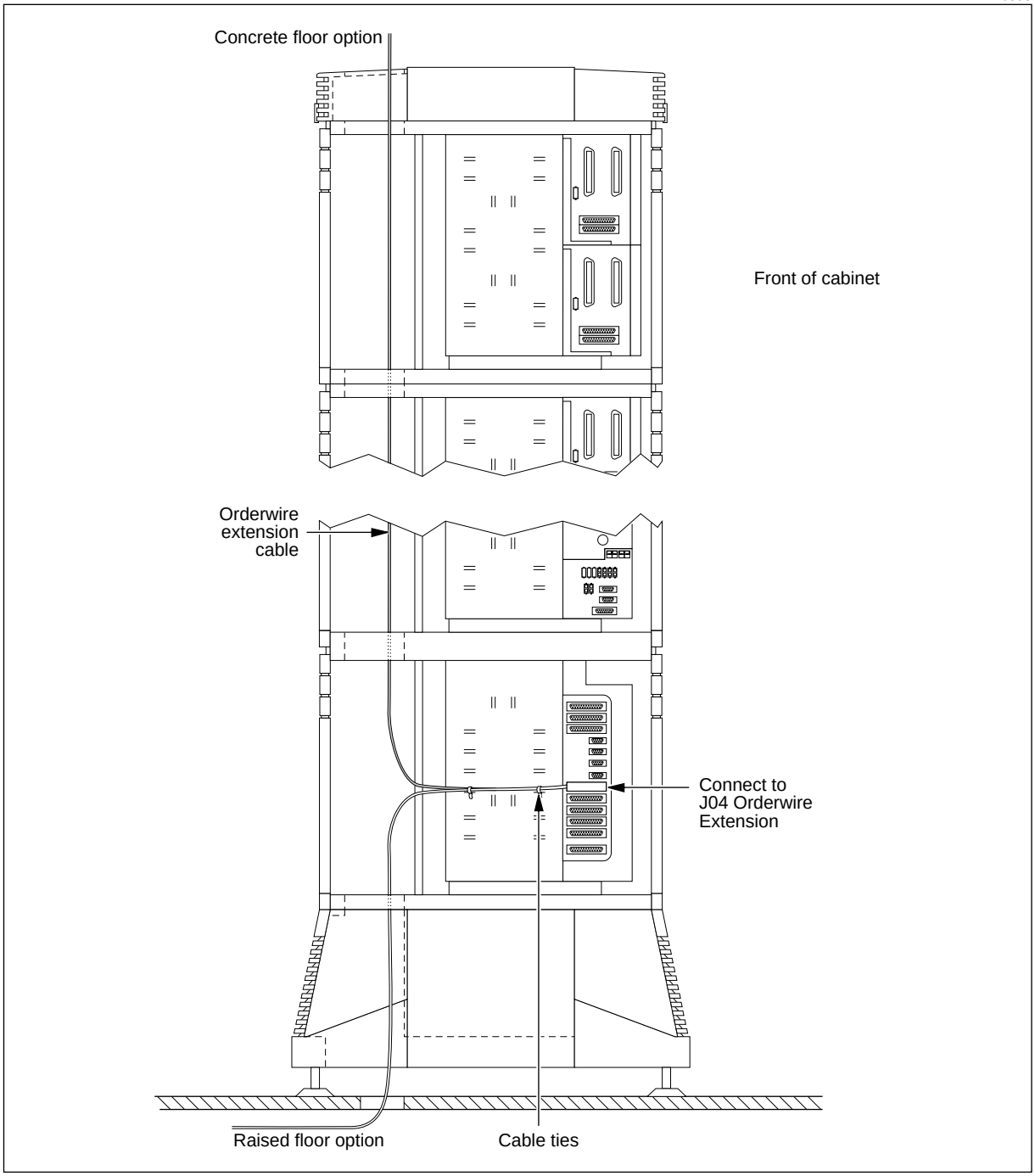
Step	Action
1	At the right rear of the master cabinet, route the orderwire extension cable to the front of the cabinet, as shown in Figure 9-38 on page 9-75. Leave sufficient slack to reach the front of the ABM shelf.
2	At the front of the cabinet, attach the 25-pin connector of the orderwire extension cable to the connector labelled Orderwire Extension (J04) on the right side of the ABM shelf, as shown in Figure 9-38.

—continued—

Procedure 9-6 (continued)
Installing an orderwire extension cable

Figure 9-38
Routing the orderwire extension cable into the right side of the master cabinet

FW-10893



—continued—

Procedure 9-6 (continued)
Installing an orderwire extension cable

Step	Action
3	Dress the cable slack back into the cabinet, and secure the cable in place with cable ties at the locations shown in Figure 9-38 on page 9-75.
4	Route the orderwire extension cable from the cabinet to the external office cross-connect. ***Note:*** Cables can exit the cabinet through the top cap grilles (concrete floors) or through the pedestal (raised floors). When cables exit the top of the cabinet, a set of notched NT4K09BA top cap grilles must be used instead of the standard top NT4K09AA cap grilles.
5	Refer to Table 9-5 on page 9-77 and complete the office connections.
6	Continue the cabling procedures using Procedure 9-7, “Installing a modem cable” on page 9-78.

—continued—

Procedure 9-6 (continued)
Installing an orderwire extension cable

Table 9-5
Pin-out details

Signal	Pin	Pair	Color
2W OW jack Tip	1	1	BL 1W
2W OW jack Ring	2	1	BL 2W
4W OW handset T1	3	2	O 1W
4W OW handset T2	4	2	O 2W
4W OW handset R1	5	3	G 1W
4W OW handset R2	6	3	G 2W
4W OW handset S1	7	4	BR 1W
4W OW handset S1	8	4	BR 2W
Brdcst Call	9	5	S 1W
Bell Ext OW	10	5	S 2W
Bell (return)	11	6	BL 1R
LED Loc OW	12	6	BL 2R
LED Exp OW	13	7	O 1R
Select Loc OW	14	7	O 2R
Select Exp OW	15	8	G 1R
Common Return	16	8	G 2R
Common Return	17	jumpered to 16	
4W Loc OW T input	18	9	BR 1R
4W Loc OW R input	19	9	BR 2R
4W Loc OW T1 output	20	10	S 1R
4W Loc OW R1 output	21	10	S 2R
4W Exp OW T input	22	11	BL 1BK
4W Exp OW R input	23	11	BL 2BK
4W Exp OW T1 output	24	12	O1BK
4W Exp OW R1 output	25	12	BK 1O

—end—

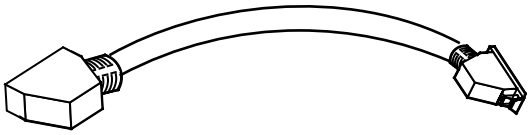
Procedure 9-7
Installing a modem cable

Use this procedure to install the optional modem cable (NT4K86RA, RB, RC) between the ABM shelf and an office modem unit. You can also connect this cable to data terminal equipment (DTE) such as a printer or a VT-100 terminal. However, when connecting DTE you must install an NT7E44MA null modem adaptor cable between the NT4K86RA, RB, or RC cable and the printer or terminal.

> ***Note:*** When DTE is being installed, the modem cables can only be connected between equipment bonded to the same ground point.

If no modem cable is required as per job specifications, continue the cabling procedures using Procedure 9-8, “Installing the VF cables” on page 9-82.

NT4K86RA, RB, RC



25-pin
D-subminiature male

9-pin
D-subminiature male

4-pair, twisted, 26 AWG solid wires with shielding, connectorized at both ends. One end connects to the 9-pin connector on the ABM shelf and the other end connects to the 25-pin connector on a remote modem. This cable is available in the following lengths:

1.5 m	(5 ft)	NT4K86RA
4.6 m	(15 ft)	NT4K86RB
15 m	(50 ft)	NT4K86RC

—continued—

Procedure 9-7 (continued)
Installing a modem cable

Table 9-6 provides the pin-out connections for the NT4K86 cables.

Table 9-6
Pin-outs for the NT4K86RA, RB, or RC cables

9-pin connector Pin	Signal	25-pin connector Pin
1	data carrier detect (DCD)	8
2	receive (Rx)	3
3	transmit (Tx)	2
4	data terminal ready (DTR)	20
5	signal ground	7
6	data set ready (DSR)	6
7	request to send (RTS)	4
8	clear to send	5
9	no connection	
There are no connections to pins 1, 9 to 19, and 21 to 25 on the 25-pin connector		

Requirements

The following tools and material are required:

- cable cutters
- cable ties

Action

Step	Action
1	At the right rear of the cabinet, route the modem cable to the front of the cabinet, as shown in Figure 9-39 on page 9-81.
2	At the front of the cabinet, attach the modem cable to the Modem (J08) connector on the right side of the ABM shelf, as shown in Figure 9-39. on page 9-81
3	Dress the cable slack back into the cabinet, and secure it in place with cable ties in the locations shown in Figure 9-39 on page 9-81.

—continued—

Procedure 9-7 (continued)
Installing a modem cable

Step	Action

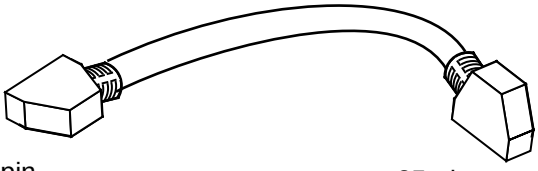
4 Route the cable out of the cabinet.

Note: Cables can exit the cabinet through the top cap grilles (concrete floors) or though the pedestal (raised floors). When cables exit the top of the cabinet, a set of notched NT4K09BA top cap grilles must be used instead of the standard NT4K09AA top cap grilles.

5 Do one of the following:

If	Then
You are installing a modem	Connect the free end of the cable to the modem. Go to step 6.
You are installing a printer or a terminal	Connect an NT7E44MA null modem adaptor (as shown in the diagram below) between the NT4K86RA, RB, or RC cable and the printer or terminal. Go to step 6.

NT7E44MA null modem adaptor for direct connection to a printer, or a VT-100-type terminal



25-pin
D-subminiature female

25-pin
D-subminiature female

4-pair, 26 AWG solid wire connectorized at both ends. One end connects to the male connector on the NT7E44EA or EB cable and the other end connects directly to the terminal or printer.

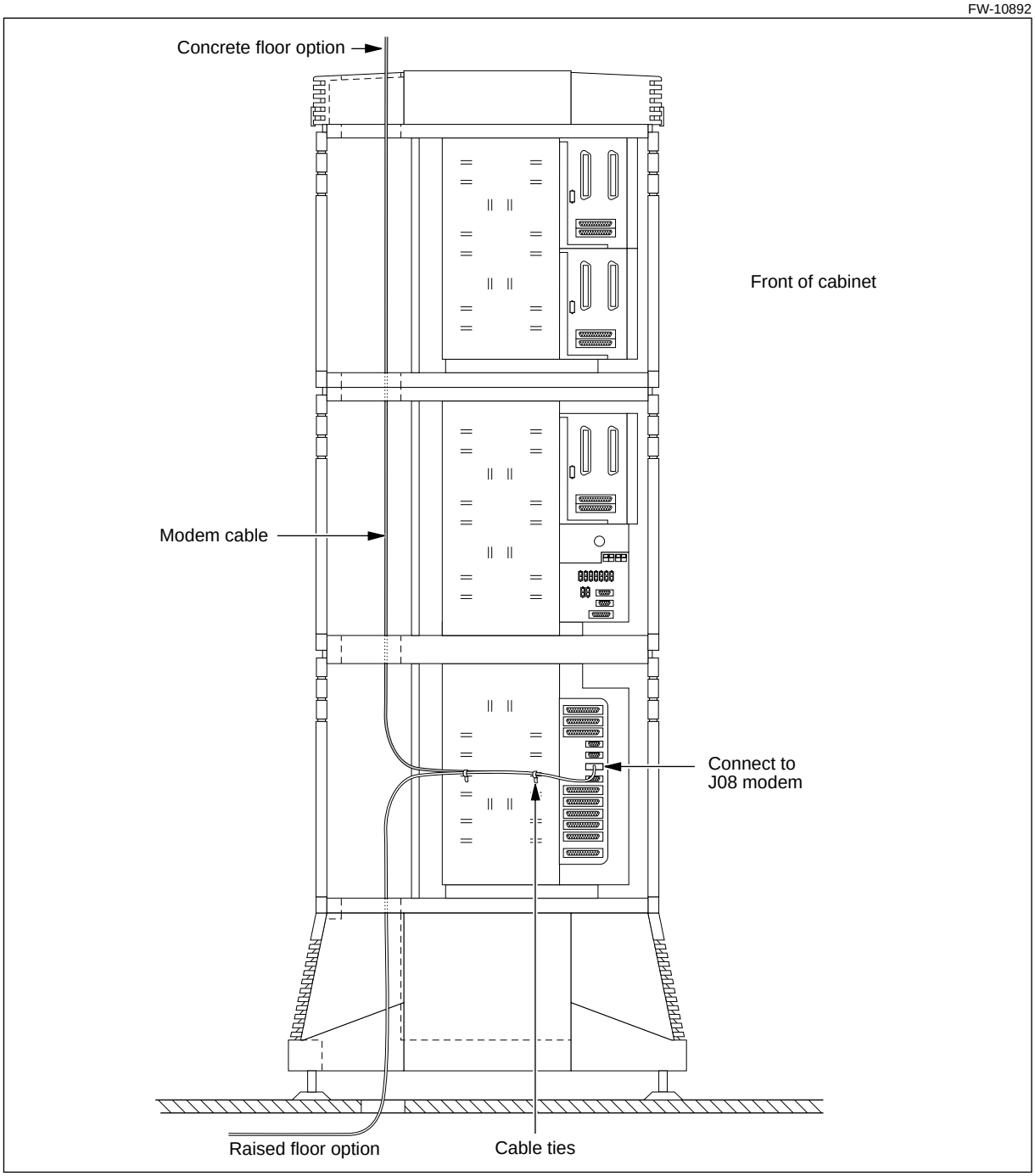
6 Continue the cabling procedures using Procedure 9-8, “Installing the VF cables” on page 9-82.

—continued—

Procedure 9-7 (continued)
Installing a modem cable

Figure 9-39
Routing a modem cable to the front of the master cabinet

FW-10892

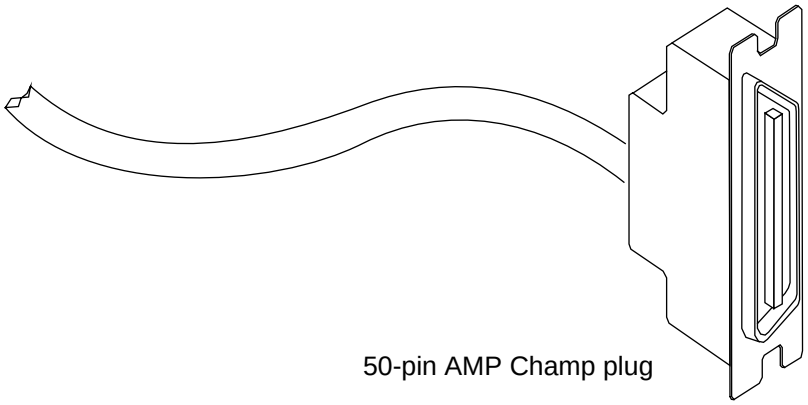


—end—

Procedure 9-8
Installing the VF cables

Use this procedure to install VF cables (NT4K85FH, FJ, FK, FL, FM, or FN) from a copper-distribution shelf to the main distribution frame. If the cabinet is not equipped with copper-distribution shelves, skip this procedure and go on to the next procedure.

NT4K85FH, FJ, FK, FL, FM or FN



25-pair twisted 24 AWG solid wire connectorized at one end with an AMP Champ plug, available in the following lengths:

15 m	(50 ft)	NT4K85FL
31 m	(100 ft)	NT4K85FH
46 m	(150 ft)	NT4K85FM
61 m	(200 ft)	NT4K85FJ
76 m	(250 ft)	NT4K85FN
91 m	(300 ft)	NT4K85FK

Requirements

The following tools are required:

- cable cutters
- cable ties
- wire-wrap tool or BIX connector tool for establishing connections to a main distribution frame
- needle nosed pliers

—continued—

Procedure 9-8 (continued)
Installing the VF cables

Action

Step	Action
1	For each copper-distribution shelf, route four connectorized VF cables to the front of the cabinet. Route two to the right front of the cabinet and two to the left front of the cabinet.
2	Using local office procedures, designate both ends of the four 25-pair VF cables, indicating copper-distribution shelf number, and the pair assignment. • two right cables (pairs 1–25, and 25–50) • two left cables (pairs 51–75, and 76–96; 4 pairs are spares)
3	Connect the two right side 25-pair connectorized VF cables to the shelf connectors, as shown in Figure 9-40 on page 9-84 for pairs 1–50, and secure the bail-lock latching.

CAUTION
Risk of damage to equipment
During the initial setup of the AccessNode copper-distribution shelves, Northern Telecom recommends that the equipment side remains disconnected from the outside plant subscriber loops (at the protection modules) until the line cards are installed and powered up. For example, when using five-pin protector modules, pull the modules out slightly, to the first detent position.

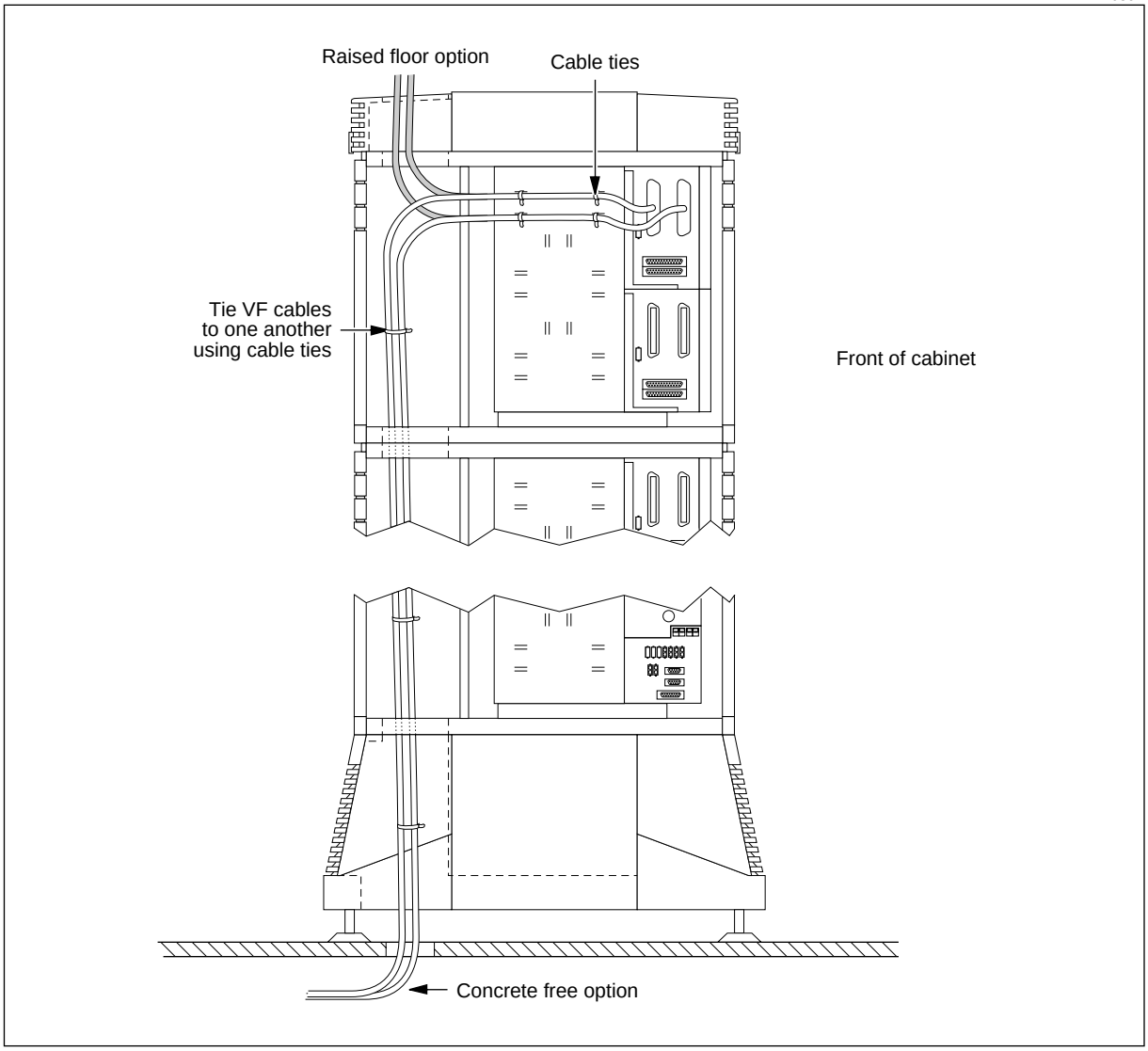
4	Connect the two left side 25-pair connectorized VF cables to the shelf connectors, as shown in Figure 9-41 on page 9-85 for pairs 51–96, and secure the bail-lock latching.
5	Dress the cable slack back into the cabinet, and secure the cables in place with cable ties, as shown in Figure 9-40 on page 9-84 and Figure 9-41 on page 9-85.

—continued—

Procedure 9-8 (continued)
Installing the VF cables

Figure 9-40
Connecting VF pairs 1 to 50 to a copper-distribution shelf

FW-10894

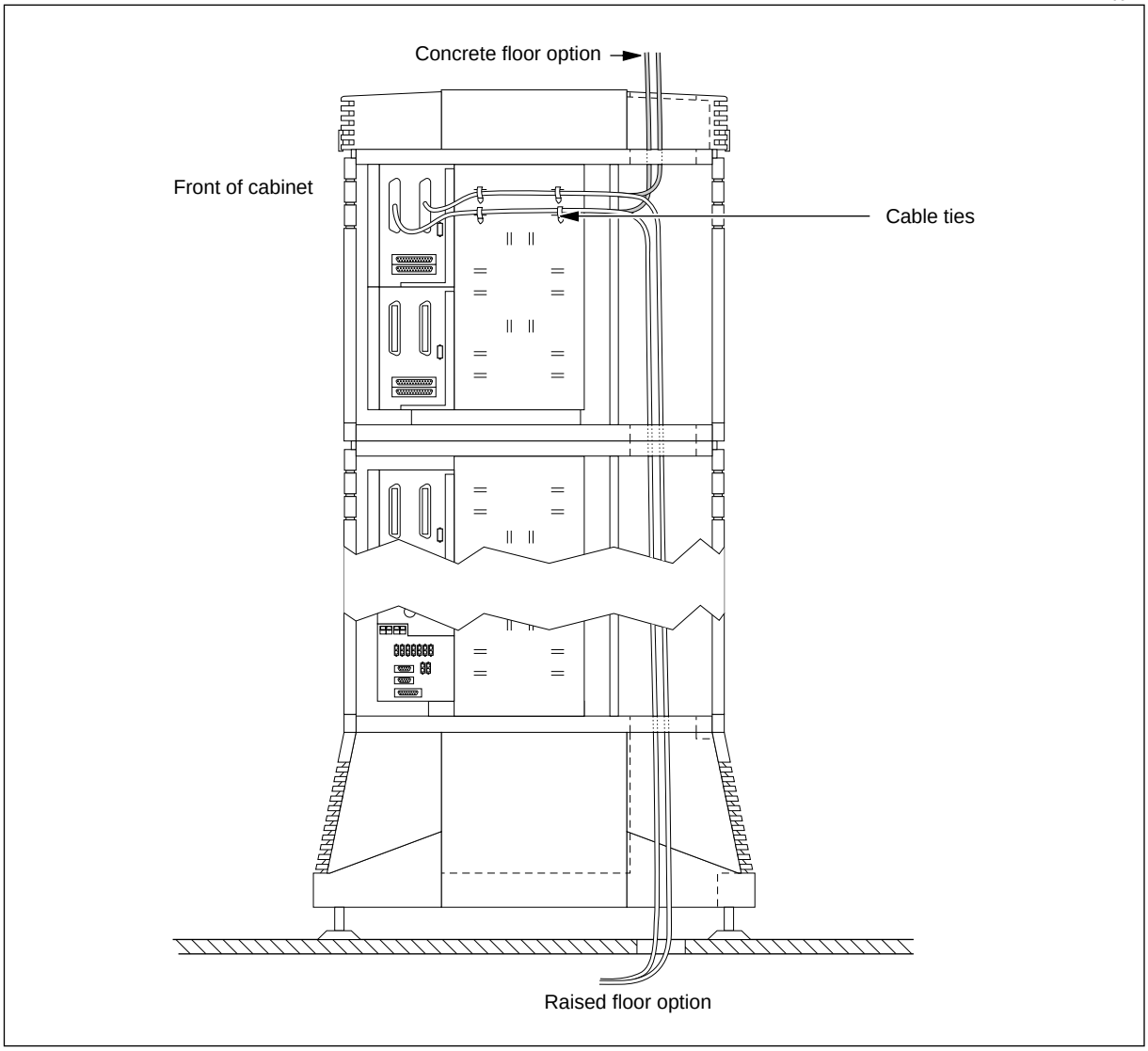


—continued—

Procedure 9-8 (continued)
Installing the VF cables

Figure 9-41
Connecting VF pairs 51 to 96 plus four spares to a copper-distribution shelf

FW-10921



—continued—

Procedure 9-8 (continued)
Installing the VF cables

Step	Action
6	Route the cables to the main distribution frame and terminate each VF cable to the MDF cross connect. Refer to Table 9-7 for the pair and color code assignment of a 25-pair connectorized cable.
7	Continue the cabling procedures using Procedure 9-9, “Installing a user interface cable to the LCAP” on page 9-87.

Table 9-7
VF cable pin and wire color code

Connector pin			Color		Connector pin			Color	
Ring	**Tip**	**Pair**	**Ring**	**Tip**	**Ring**	**Tip**	**Pair**	**Ring**	**Tip**
1	26	1	W1BL	BL1W	14	39	14	BK1BR	BR1BK
2	27	2	W1O	O1W	15	40	15	BK1S	S1BK
3	28	3	W1G	G1W	16	41	16	Y1BL	BL1Y
4	29	4	W1BR	BR1W	17	42	17	Y1O	O1Y
5	30	5	W1S	S1W	18	43	18	Y1G	G1Y
6	31	6	R1BL	BL1R	19	44	19	Y1BR	BR1Y
7	32	7	R1O	O1R	20	45	20	Y1S	S1Y
8	33	8	R1G	G1R	21	46	21	V1BL	BL1V
9	34	9	R1BR	BR1R	22	47	22	V1O	O1V
10	35	10	R1S	S1R	23	48	23	V1G	G1V
11	36	11	BK1BL	BL1BK	24	49	24	V1BR	BR1V
12	37	12	BK1O	O1BK	25	50	25	V1S	S1V
13	38	13	BK1G	G1BK					

—end—

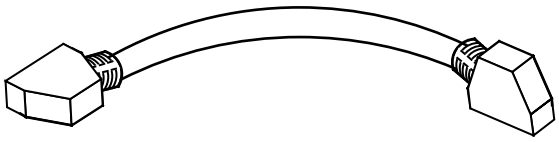
Procedure 9-9
Installing a user interface cable to the LCAP

Use this procedure to install an NT7E44FA or FB cable between User Interface Port 2 connector on the front panel of the local craft access panel (LCAP) and a printer, a CRT, or a modem.

If you are connecting the LCAP to a modem, you must connect an NT7E44MB null modem adaptor between the NT7E44FA, FB cable and the modem or printer.

> ***Note:*** If you are not using a modem, you must only connect the cables between equipment that is bonded to the same ground point.

NT7E44FA and FB



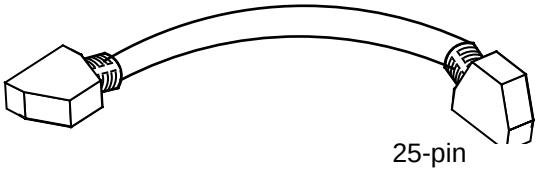
25-pin
D-subminiature male

25-pin
D-subminiature male

4-pair, twisted, 26 AWG solid wires with shielding, connectorized at both ends. One end connects to the 25-pin connector on the faceplate of the LCAP and the other end is for connection to a 25-pin connector of a VT-100 terminal. This cable is available in the following lengths:

5 m	(16.4 ft)	NT7E44FA
20 m	(65.6 ft)	NT7E44FB

NT7E44MB null modem adaptor for connection to a modem



25-pin
D-subminiature female

25-pin
D-subminiature female

4-pair, 26 AWG solid wire connectorized at both ends. One end connects to the male connector on the NT7E44FA or FB cable and the other end connects directly to the modem.

—continued—

Procedure 9-9 (continued)
Installing a user interface cable to the LCAP

Requirements

The following tools and materials are required:

- screwdriver, flat blade, 1/4 in. wide

Action

Step	Action
1	Connect the female connector of the NT7E44FA or FB cable to connector User Interface Port 2 on the local craft access panel (LCAP), as shown in Figure 9-42 on page 9-90.
2	Connect the other end of the cable to the printer or the CRT. If the cable is being connected to a modem, insert an NT7E44 MB null modem adaptor between the NT7E44 cable and the modem.
3	Reference the following table for the pin-outs of the 25-pin male connectors on the NT7E44FA or FB cable. This cable has a “straight-through” construction. Pin 1 on one male connector is connected to pin 1 on the other male connector, pin 2 is connected to pin 2, and so on.

—continued—

Procedure 9-9 (continued)
Installing a user interface cable to the LCAP

Table 9-8
Pin-outs for the 25-pin male connectors on NT7E44FA or FB

Pin on first 25-pin male connector	Color code	Signal	Pin on second 25-pin male connector
1	BK	not used	1
2	BR	Rx	2
3	R	Tx	3
4	O	RTS	4
5	Y	CTS	5
6	G	DSR	6
7	BL	signal ground	7
8	V	DCD	8
9 to19	not connected	not used	9 to19
20	W BK BR stripes	DTR	20
21 to 25	not connected	not connected	21 to 25

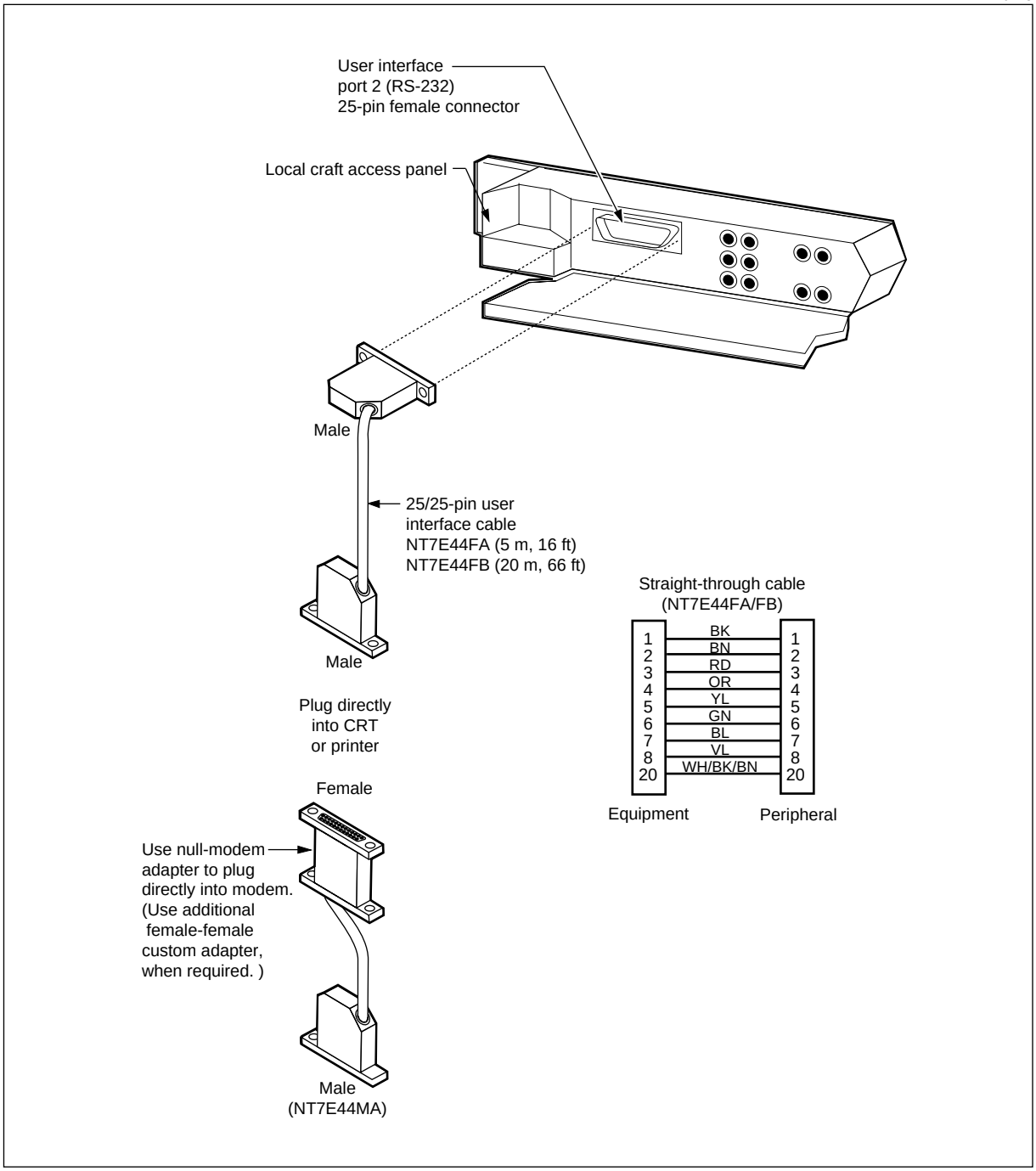
4 Continue the cabling procedures using Procedure 9-10, “Installing the fiber patch cords” on page 9-91.

—continued—

Procedure 9-9 (continued)
Installing a user interface cable to the LCAP

Figure 9-42
Connecting a user interface cable to the LCAP

FW-10773



—end—

Procedure 9-10
Installing the fiber patch cords

Use this procedure to install fiber patch cords and pigtails (see Table 9-9 on page 9-92 through Table 9-12 on page 9-94) from the faceplate of the OC-3 and OC-12 optical interface cards in the access bandwidth manager (ABM) shelf to a fiber patch panel mounted outside the Modular Business Package (MBP) cabinet.

For procedures to install fiber patch cords in MBP cabinets equipped with a FiberManager Compact Shelf/8 fiber patch panel mounted inside the master cabinet, see the Northern Telecom Publication *FiberManager Compact/8, Installation and Maintenance Documentation Package.*

The OC-3 and OC-12 optical interface cards do not have to be installed at this time. Circuit packs are installed later. See *Commissioning and Testing*, Volume 3.

—continued—

Procedure 9-10 (continued)
Installing the fiber patch cords

Table 9-9
Optical patch cords

PEC	Length (meters)	Length (feet)	Connector type
NT7E46AA	5	16.4	Biconic-biconic
NT7E46AB	10	32.8	
NT7E46AC	15	49.2	
NT7E46AD	20	65.6	
NT7E46AE	30	98.4	
NT7E46BF	3	9.8	FC-FC
NT7E46BA	5	16.4	
NT7E46BB	10	32.8	
NT7E46BC	15	49.2	
NT7E46BD	20	65.6	
NT7E46BE	30	98.4	
NT7E46CF	3	9.8	ST-ST
NT7E46CA	5	16.4	
NT7E46CB	10	32.8	
NT7E46CC	15	49.2	
NT7E46CD	20	65.6	
NT7E46CE	30	98.4	
NT7E46FA	5	16.4	SC-SC
NT7E46FB	10	32.8	
NT7E46FC	15	49.2	
NT7E46FD	20	65.6	
NT7E46FE	30	98.4	

—continued—

Procedure 9-10 (continued)
Installing the fiber patch cords

Table 9-10
Optical patch cords with miniature variable optical attenuators

PEC	Length (meters)	Length (feet)	Connector type
NT7E47AA	5	16.4	Biconic-biconic
NT7E47AB	10	32.8	
NT7E47AC	15	49.2	
NT7E47AD	20	65.6	
NT7E47AE	30	98.4	
NT7E47BA	5	16.4	FC-FC
NT7E47BB	10	32.8	
NT7E47BC	15	49.2	
NT7E47BD	20	65.6	
NT7E47BE	30	98.4	
NT7E47CA	5	16.4	ST-ST
NT7E47CB	10	32.8	
NT7E47CC	15	49.2	
NT7E47CD	20	65.6	
NT7E47CE	30	98.4	
NT7E47FA	5	16.4	SC-SC
NT7E47FB	10	32.8	
NT7E47FC	15	49.2	
NT7E47FD	20	65.6	
NT7E47FE	30	98.4	

—continued—

Procedure 9-10 (continued)
Installing the fiber patch cords

Table 9-11
Optical pigtails

PEC	Length (meters)	Length (feet)	Connector type
NT7E48AA	20	65.6	Biconic
NT7E48BA	20	65.6	FC
NT7E48CA	20	65.6	ST
NT7E48FA	20	65.6	SC

Table 9-12
Optical pigtails with miniature variable optical attenuators

PEC	Length (meters)	Length (feet)	Connector type
NT7E49AA	20	65.6	Biconic
NT7E49BA	20	65.6	FC
NT7E49CA	20	65.6	ST
NT7E49FA	20	65.6	SC

Note 1: Optical patch cords and pigtails with miniature variable optical attenuators install at the receiver of the OC-3 and OC-12 optical interfaces.

Note 2: To each ABM shelf, four fiber cables are required for primary transport, and eight optional cables for secondary and tributary transport access. Two fiber cables are required for each OC-3 and OC-12 optics interface card.

Note 3: Fiber patch cords are routed inside a horizontal channel of the ABM shelf to the right side of the cabinet. They are then encased in split tubing for protection. Typically, 18mm (0.75 in.) split tubing accommodates 4 to 14 fiber patch cords. The length of split tubing corresponds to the length required for the fiber cabling.

—continued—

Procedure 9-10 (continued)
Installing the fiber patch cords

Requirements

The following materials are required:

- wire cutters (flush cutting)
- cable ties
- split tubing, 18 mm (0.75 in.)
- spiral wrap tubing 13 mm (0.5 in.)
- Northern Telecom Publication *FiberManager Compact/8, Installation and maintenance documentation package.* This document is required if the cabinet is equipped with a FiberManager Compact/8 fiber patch panel.

DANGER
Risk of eye injury
When handling optical fibers, follow the safety procedures recommended by your company at all times.

If possible, shut off power to all external transmission equipment so laser beams will not be present at the exposed ends of the fiber cables. Wear safety glasses, and avoid looking at the exposed ends of the fiber cables. Keep all connectors capped while the cables are disconnected.

CAUTION
Risk of damage to the optical fibers
Handle fibers with extreme care. Observe a minimum bending radius of 76 mm (3 in.) at all times. Optical connections to the optical units should be finger-tightened only.

—continued—

Procedure 9-10 (continued)
Installing the fiber patch cords

Action

Step	Action

1 Do one of the following:

If the fiber patch panel	Then
is external to the MBP cabinets	Go to step 2.
is a FiberManager Compact/8 installed in the master cabinet	Use NTP *FiberManager Compact/8, Installation and maintenance documentation package* to install the fiber patch cords. Go to 13.

External fiber patch panel

2 Label both ends of the patch cords with the following information:

- the slot number in the ABM shelf for the intended OC-3 or OC-12 optical interface card (slot 9 or 10)
- the direction of signal: transmit (Tx) or receive (Rx)

3 Measure and cut the split tubing.

Note: The split tubing will be run from the front of the ABM shelf to a location where the fiber patch cords can be protected by means other than the split tubing. If no other means of protection is available, the split tubing must extend all the way to the external fiber patch panel.

4 Insert the labeled fiber patch cords into the split tubing along the entire length.

5 Route the split tubing with the fibers inside into the cabinet to the front of the ABM shelf as shown in Figure 9-43 on page 9-97.

Note: The split tubing with the fiber patch cords inside can enter the cabinet through the top cap grilles (on concrete floors) or through the pedestal (raised floors) as shown in Figure 9-43 on page 9-97. When tubing enters the top of the cabinet, a set of notched NT4K09BA top cap grilles must be used instead of the standard NT4K09AA top cap grilles.

6 Insert the first 50 mm (1/2 in.) of the split tubing into the fiber trough at the front of the ABM shelf and secure with cable ties as shown in Figure 9-44 on page 9-99.

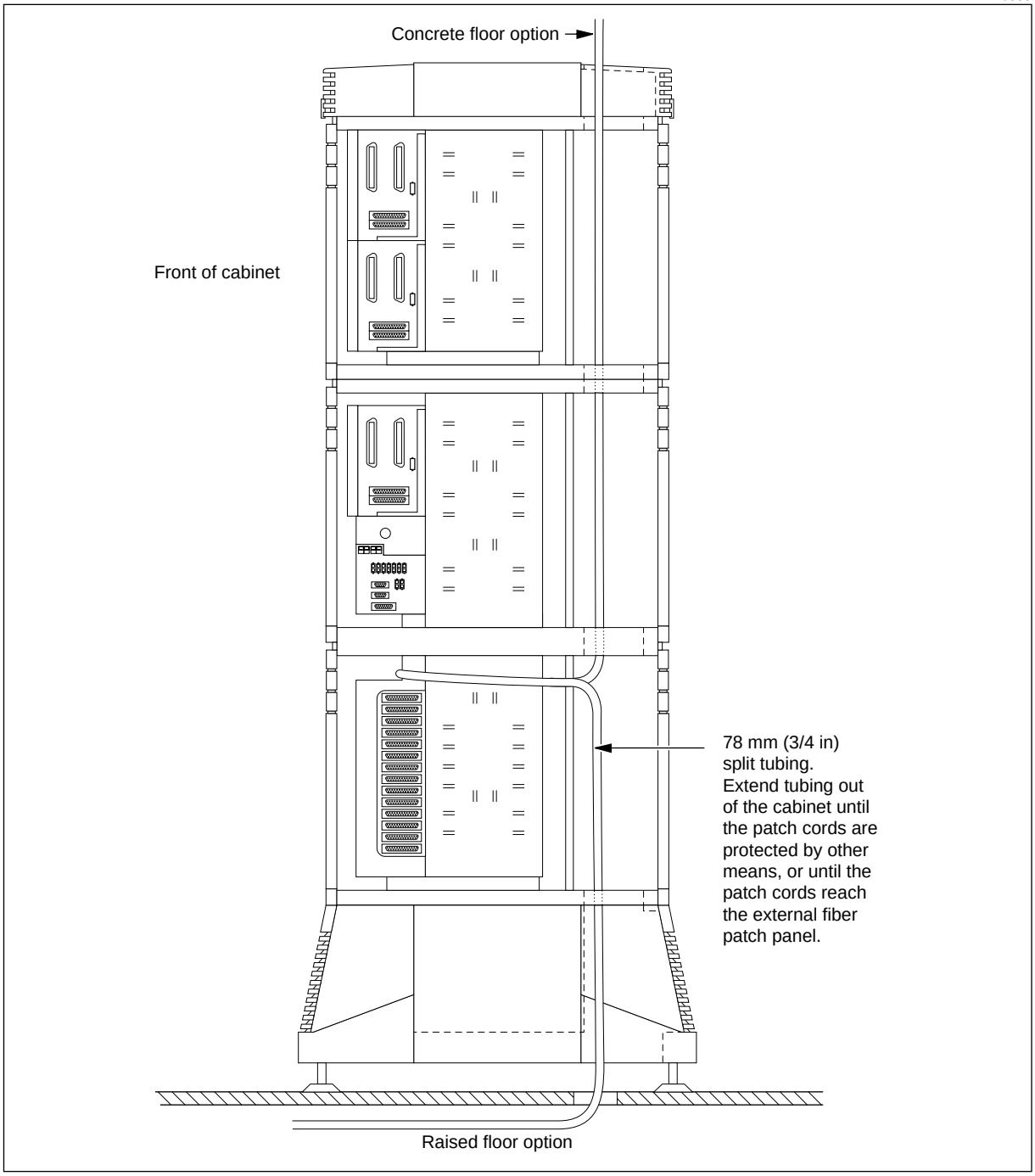
7 Secure the split tubing with cable ties to the cabinet side panel lancings and the rear panel lancings for either the concrete floor or the raised floor as applicable.

—continued—

Procedure 9-10 (continued)
Installing the fiber patch cords

Figure 9-43
Routing the split tubing

FW-10889



—continued—

Procedure 9-10 (continued)
Installing the fiber patch cords

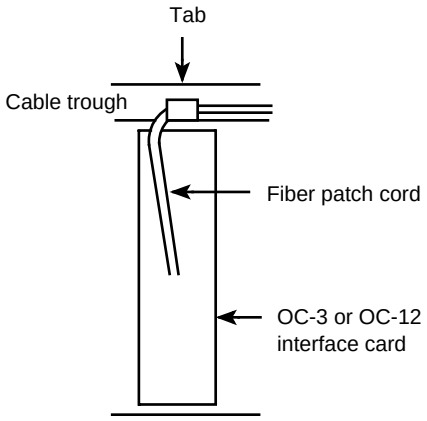
Step	Action

8 Dress the fiber patch cords along the fiber trough, as shown in Figure 9-44 on page 9-99.

> **CAUTION**
> **Risk of damage to fiber patch cords**
> Ensure that each fiber patch cord exits the cable trough to the left of the tab that is immediately above the card to which the patch cord connects. If a cord exits the trough to the right of the tab, it may snag and become damaged when an adjacent card is removed.

9 Hang the connector-end of the patch cords out of the trough at the intended locations of the OC-3 or OC-12 optical interface cards. The cards install in slots 9 and 10.

Ensure that each fiber patch cord exits the cable trough to the left of the tab that is located above the card to which the patch cord connects.



Note: Leave enough slack to read the intended Rx (top) or Tx (bottom) connector of the OC-3 or OC-12 optical interface cards.

10 Secure the split tubing with the fibers inside for the remaining length of the split tubing run.

11 Connect the fibers to the external fiber patch panel according to the manufacturer's instructions.

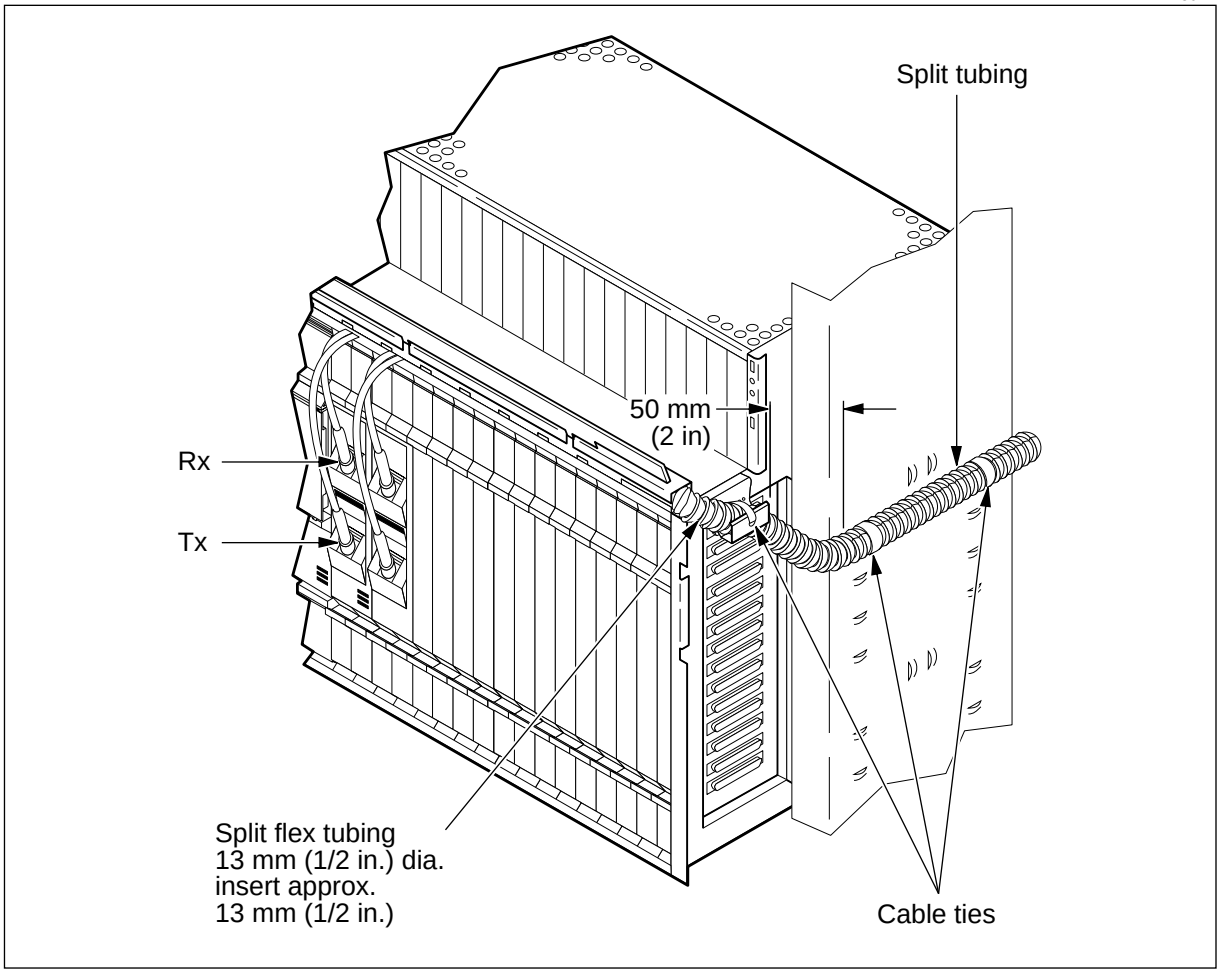
12 Go to step 24.

—continued—

Procedure 9-10 (continued)
Installing the fiber patch cords

Figure 9-44
Routing fiber patch cords into the cable trough at the front of the ABM shelf

FW-15041



—continued—

Procedure 9-10 (continued)
Installing the fiber patch cords

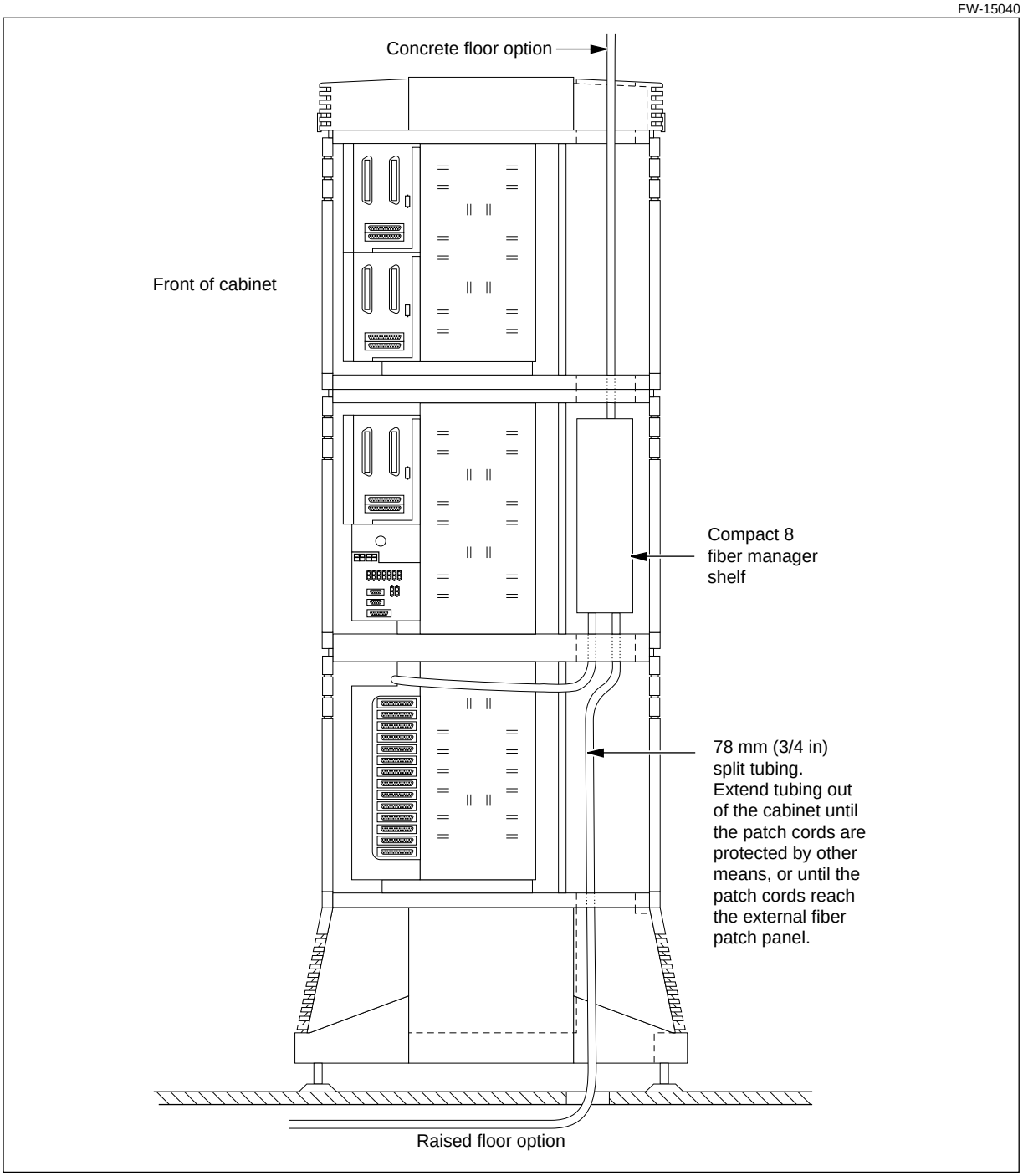
Step	Action
	Internal FiberManager Compact/8 patch panel
13	Label both ends of the patch cords with the following information: • the slot number in the ABM shelf for the intended OC-3 or OC-12 optical interface card (slot 9 or 10) • the direction of signal: transmit (Tx) or receive (Rx)
14	Measure and cut the split tubing for the shelf-to-ABM run. ***Note:*** The split tubing will be run from the front of the ABM shelf (see Figure 9-45 on page 9-101) to the FiberManager Compact/8 shelf located at the rear of the MBP cabinet.
15	Insert the labeled fiber patch cords into the split tubing along the entire length.
16	Route the split tubing with the fibers inside from the front of the ABM to the fiber manager shelf as shown in Figure 9-44 on page 9-99.
17	Insert the first 50 mm (1/2 in.) of the split tubing into the fiber trough at the front of the ABM shelf and secure with cable ties as shown in Figure 9-44 on page 9-99.
18	Secure the split tubing with cable ties to the cabinet side panel lancings and the rear panel lancings.
19	Secure the split tubing to the fiber manager shelf as indicated in the installation and maintenance document.
20	Protect the external fibers from the office with split flex tubing.
21	Route the split tubing with the external fibers inside into the cabinet to the fiber manager shelf as shown in Figure 9-46 on page 9-102. ***Note:*** The split tubing with the fibers inside can enter the cabinet through the top cap grilles (on concrete floors) or through the pedestal (raised floors) as shown in Figure 9-46 on page 9-102. When tubing enters the top of the cabinet, a set of notched NT4K09BA top cap grilles must be used instead of the standard NT4K09AA top cap grilles.
22	Secure the split tubing with cable ties to the cabinet side panel lancings and the rear panel lancings for either the concrete floor or the raised floor as applicable.
23	Use the fiber manager installation and maintenance document to route, splice and store the fibers in the FiberManager Compact/8 shelf.

—continued—

Procedure 9-10 (continued)
Installing the fiber patch cords

Figure 9-45
FiberManager Compact/8 shelf location

FW-15040

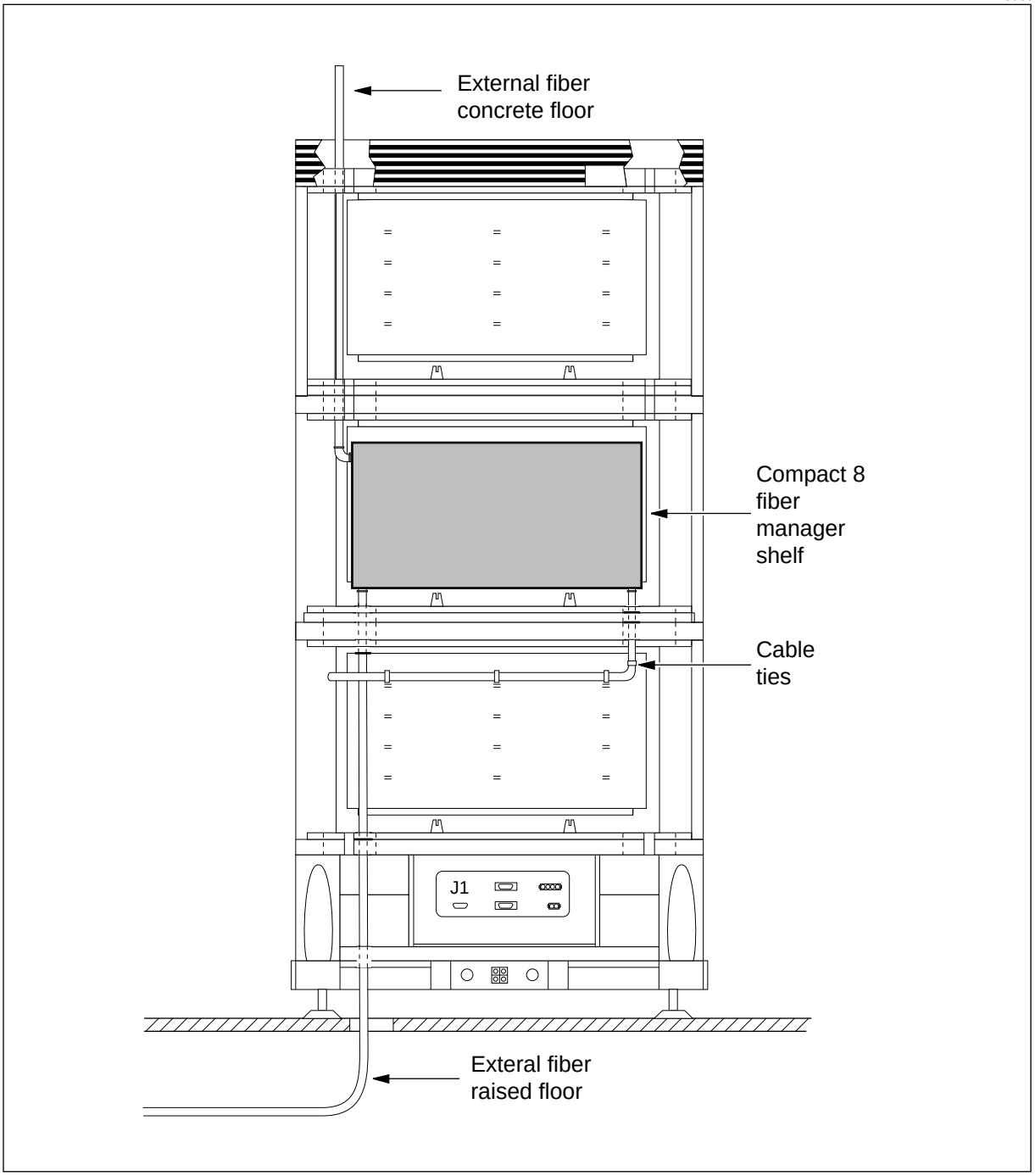


—continued—

Procedure 9-10 (continued)
Installing the fiber patch cords

Figure 9-46
Fiber routing into the fiber manager shelf

FW-15039



—continued—

Procedure 9-10 (continued)
Installing the fiber patch cords

Step	Action

24 Proceed to the next task:

If	Then go to one of these procedures
you want to field mount additional equipment	“Adding a copper-distribution shelf to an existing single equipment module” on page 11-1 “Adding a field expansion module” on page 12-1 “Connecting a copper-distribution shelf” on page 13-1 “Connecting a DSX-1 shelf and a T1 repeater shelf” on page 14-1 “Adding a second rectifier shelf to an MPP cabinet” on page 15-1
no additional field mounted equipment is to be installed	“Installing the equipment covers” on page 16-1

—end—

Adding a FiberManager Compact/8 fiber patch panel

This chapter contains the procedure for installing a FiberManager Compact/8 fiber patch panel in the master Modular Business Package (MBP) cabinet of an existing system.

To install the FiberManager Compact/8, you need a copy of the Nortel Networks Publication *FiberManager Compact/8, Installation and Maintenance Documentation Package.* This document is shipped with the FiberManager Compact/8.

Chapter contents

This chapter contains the following information:

Procedure 10-1
Installing the FiberManager/Compact 8

Use this procedure to install an QFMCK38 FiberManager Compact/8 fiber patch panel in the master MBP cabinet of an existing system and to connect the optical pigtails.

This procedure applies to all of the following optical pigtails:

Optical pigtails

PEC	Length (in meters)	Connector type
NT7E48AA	20	Biconic
NT7E48BA	20	FC
NT7E48CA	20	ST
NT7E48FA	20	SC

Optical pigtails with miniature variable optical attenuators

PEC	Length (in meters)	Connector type
NT7E49AA	20	Biconic
NT7E49BA	20	FC
NT7E49CA	20	ST
NT7E49FA	20	SC

Note 1: Optical patch cords and pigtails with miniature variable optical attenuators install at the receiver of the OC-3 and OC-12 optical interfaces. The attenuators are stored inside the FiberManager Compact/8 fiber patch panel.

Note 2: Fiber patch cords are routed inside a horizontal channel to the right side of the ABM shelf (cabinet viewed from the rear). The cords are encased in a short length of split flex tubing (R0115726). The split tubing runs from the front of the ABM shelf across the rear of the cabinet, to the FiberManager Compact/8 fiber patch panel. Typically, 18 mm (0.75 in.) split tubing accommodates 4 to 14 fiber patch cords. The length of split tubing corresponds to the length required for the fiber cabling.

—continued—

Procedure 10-1 (continued)
Installing the FiberManager/Compact 8

Requirements

The following materials are required:

- wire cutters, flush cutting
- cable ties
- split tubing, 18 mm (0.75 in.)
- spiral wrap tubing 13 mm (0.5 in.)
- Nortel Networks Publication *FiberManager Compact/8, Installation and Maintenance Documentation Package.* This document is shipped with the FiberManager Compact/8 fiber patch panel.

Before beginning this procedure you must have removed the equipment covers at the rear of the master MBP cabinet, and on the following:

- the rear top cap grille if cables exit the cabinet through the top cap
- the rear pedestal grille if cables exit the cabinet through the pedestal

DANGER
Risk of eye injury
If possible, shut off power to external transmission equipment so laser beams will not be present on the exposed ends of the fiber cables. Wear safety glasses and avoid direct exposure to any laser beams present at the exposed ends of the cables. Keep all optical connectors capped while the cables are disconnected.

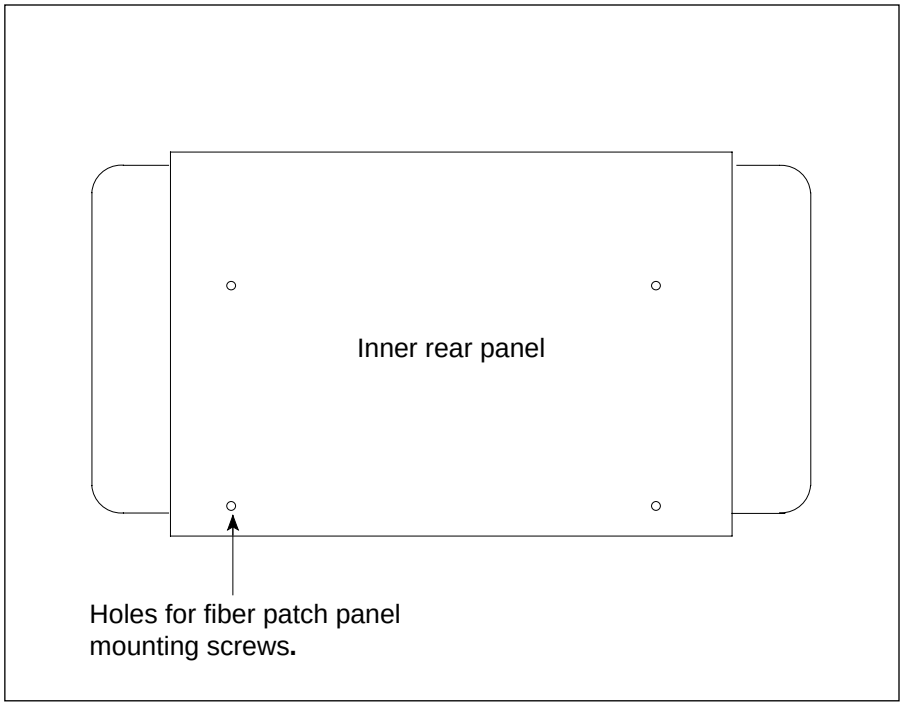
CAUTION
Risk of damage to the optical fibers
Handle fibers with extreme care. Observe a minimum bending radius of 76 mm (3 in.) at all times. Optical connections to the optical units should be finger-tightened only.

—continued—

Procedure 10-1 (continued)
Installing the FiberManager/Compact 8

Action

Step	Action
1	At the upper rear of the DEM in the master cabinet, start the threads of the four mounting screws for the FiberManager Compact/8 in the inner rear panel, as shown in the figure below. Do not tighten the screws fully.



2	Open the cover of the FiberManager Compact/8 fiber patch panel so you can see the heads of the mounting screws installed on the inner rear panel.
3	Hang the fiber patch panel over the screws installed in the inner rear panel.

—continued—

Procedure 10-1 (continued)
Installing the FiberManager/Compact 8

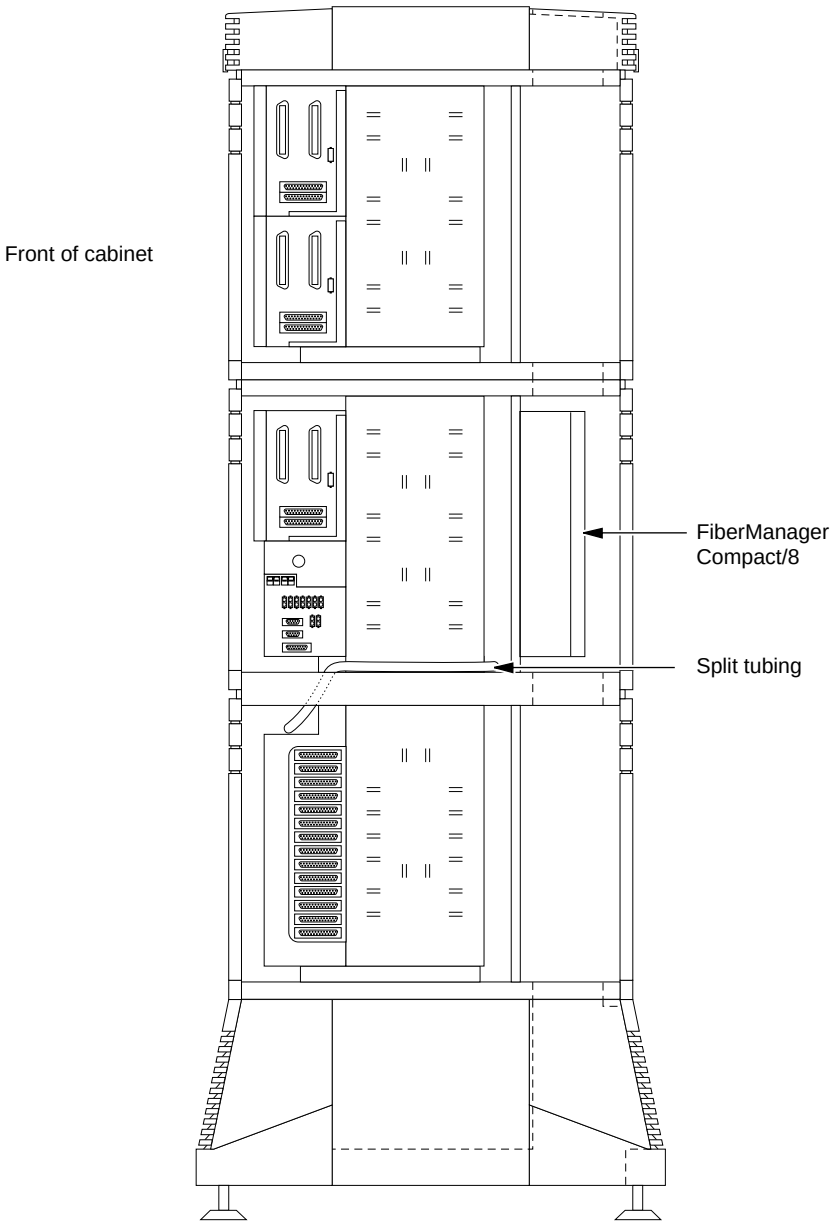
Step	Action
4	Tighten the screws to secure the panel in place.
5	Connect an NT4K84PD ground lead between a ground stud inside the FiberManager Compact/8 and the ground stud on the lower die casting of the SEM that is immediately above the FiberManager Compact/8.
6	Starting at the right front of the master cabinet, run split tubing to the rear of the cabinet, as shown in Figure 10-1 on page 10-6. The split tubing is used to protect the fiber patch cords against crushing and abrasion.
7	At the rear of the cabinet, route the split tubing across to the right side of the cabinet and secure it in place with cable ties, as shown in Figure 10-2 on page 10-7.
8	Insert the split tubing into the cutout on the right side (as viewed from the rear of the MBP cabinet) of the FiberManager Compact/8.
9	Using local office procedures, label both ends of the patch cord pigtails with the following information: • the slot number in the ABM shelf for the intended OC-3 or OC-12 optical interface card • the direction of signal: transmit (Tx) or receive (Rx)
10	At the front of the cabinet, enclose the fiber patch cords in a 75 mm (4 in.) length of 13 mm (1/2 in.) spiral wrap tubing.
11	Insert the first 50 mm (1/2 in.) of the spiral wrap tubing into the fiber trough at the front of the ABM shelf, as shown in Figure 10-3 on page 10-8.
12	Dress the fiber patch cords along the fiber trough, as shown in Figure 10-3 on page 10-8.

—continued—

Procedure 10-1 (continued)
Installing the FiberManager/Compact 8

Figure 10-1
Routing the split tubing to the rear of the cabinet

FW-10922

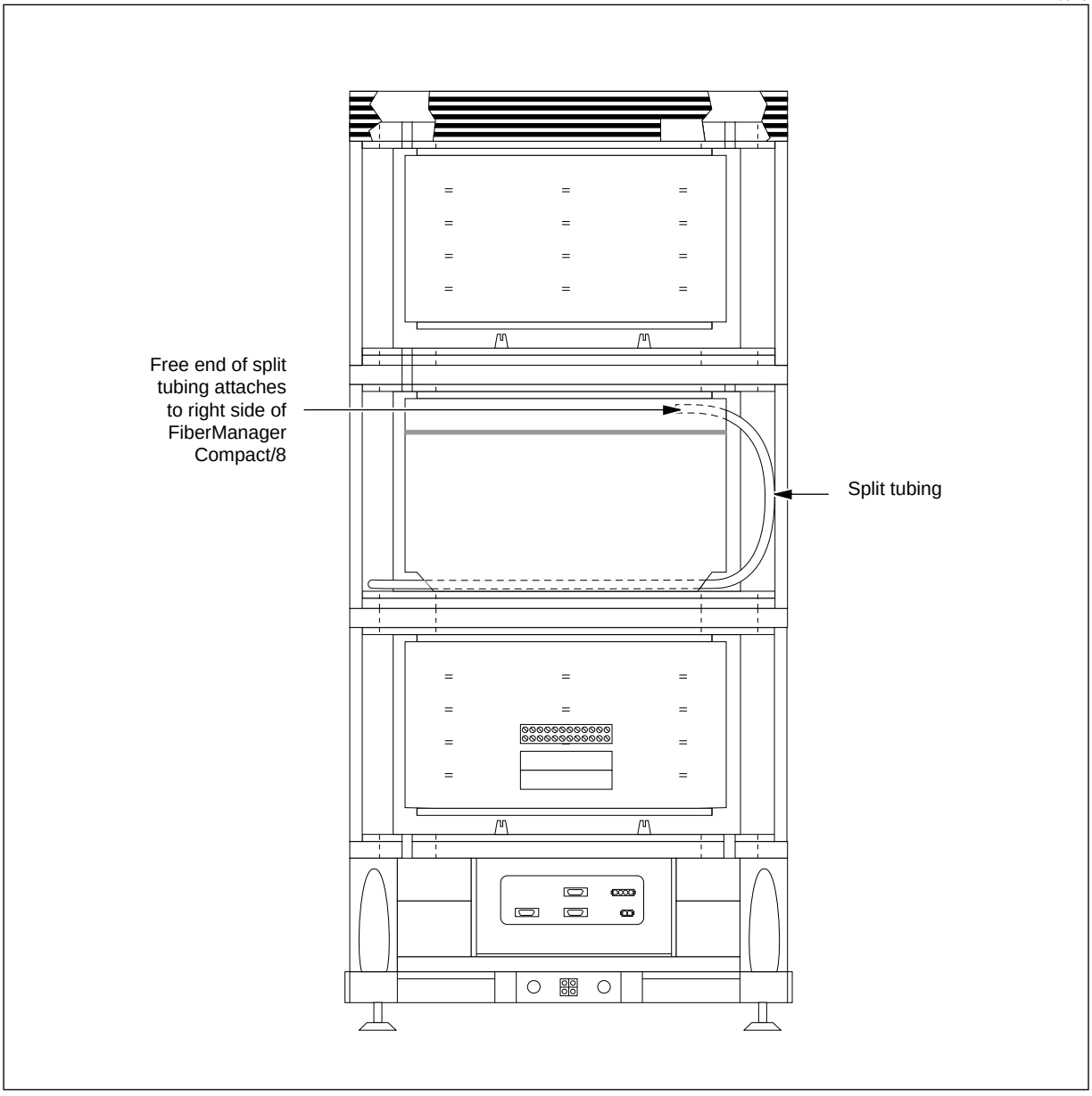


—continued—

Procedure 10-1 (continued)
Installing the FiberManager/Compact 8

Figure 10-2
Routing the split tubing across the rear of the master MBP cabinet

FW-10923

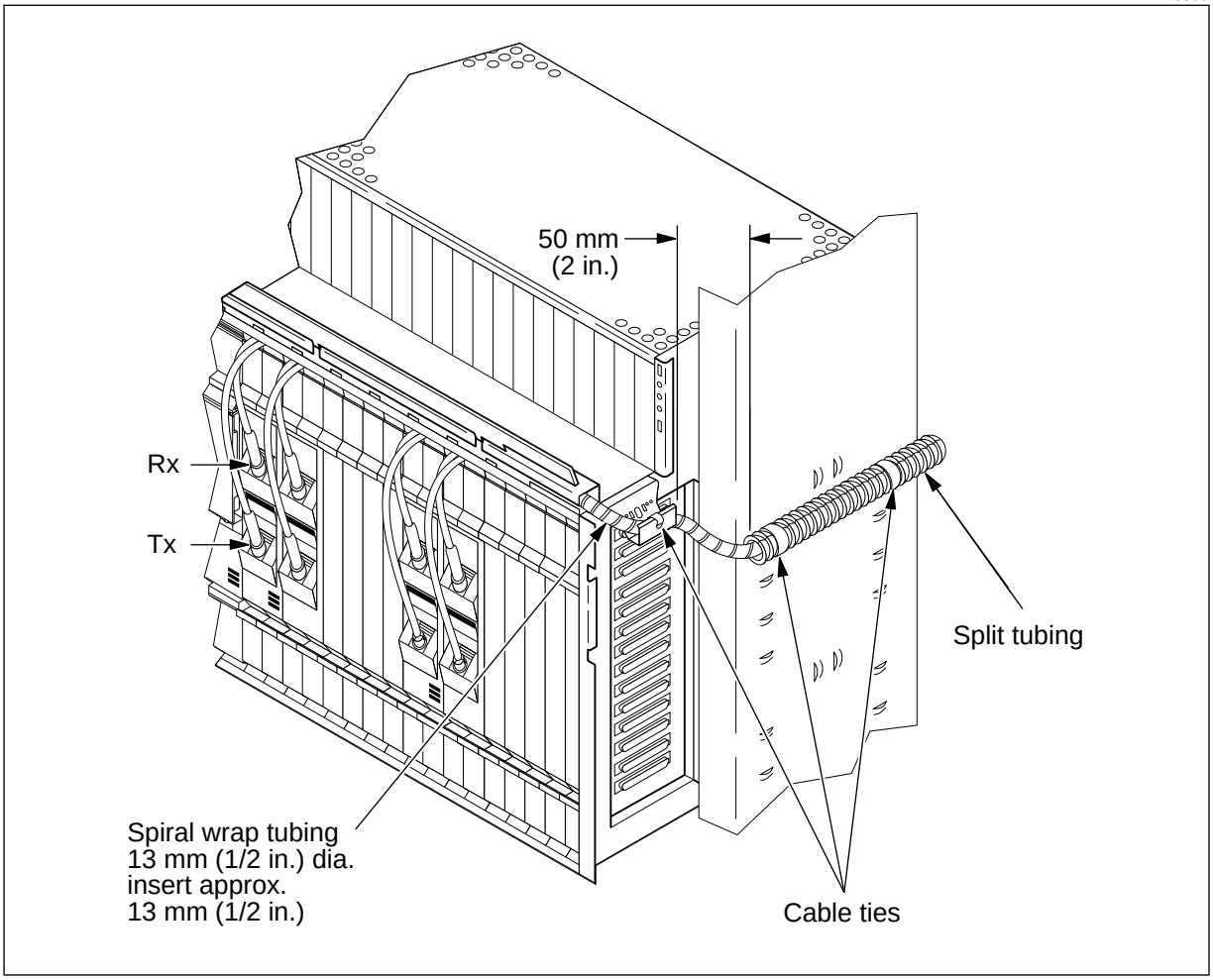


—continued—

Procedure 10-1 (continued)
Installing the FiberManager/Compact 8

Figure 10-3
Routing the fiber patch cords into the cable trough at the front of the ABM shelf

FW-15309



—continued—

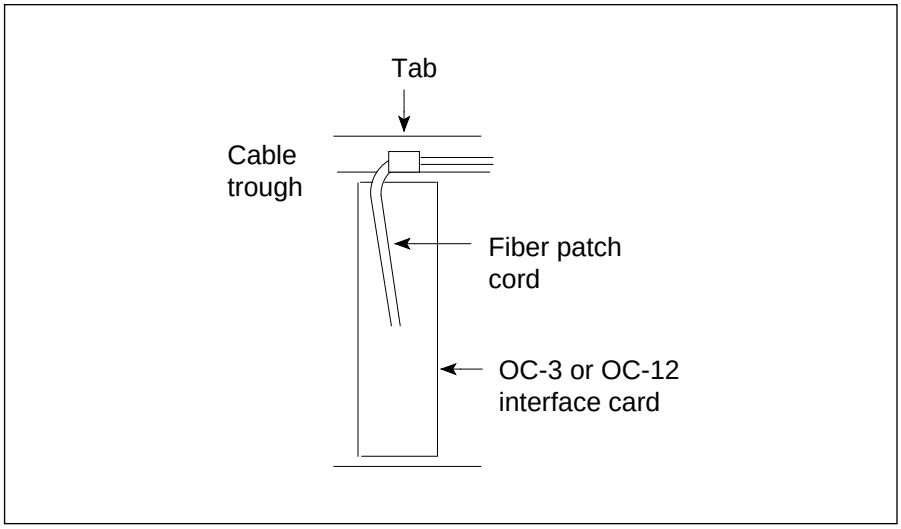
Procedure 10-1 (continued)
Installing the FiberManager/Compact 8

Step	Action

CAUTION
Risk of damage to fiber patch cords
Ensure that each fiber patch cord exits the cable trough to the left of the tab that is immediately above the card to which the patch cord connects. If a cord exits the trough to the right of the tab, it may snag and become damaged when an adjacent card is removed.

13 Hang the connector-end of the patch cords out of the trough at the intended locations of the OC-3 and OC-12 optical interface cards. The cards install in slots 9 and 10.

Ensure that each fiber patch cord exits the cable trough to the left of the tab that is located above the card to which the patch cord connects.



Note: Leave enough slack to read the intended Rx (top) or Tx (bottom) connector of the OC-3 and OC-12 optical interface cards.

14 Starting at the front of the ABM shelf, feed the fiber patch cords into the split tubing along its entire length.

15 Use Nortel Networks Publication *FiberManager Compact/8, Installation and Maintenance Documentation Package* to install the fiber patch pigtails into the right side of the patch panel and to connect the external fiber cables.

—end—

Adding a copper-distribution shelf to an existing single equipment module

This chapter contains the procedure for adding a copper-distribution shelf (CDS) to a single equipment module that is part of an installed system.

Chapter contents

This chapter contains the following information:

Procedure 11-1
Mounting the copper-distribution shelf

Use this procedure to mount a copper-distribution shelf in an existing single equipment module (SEM).

Requirements

The following tools and materials are required:

- Screwdriver, flat blade, 1/4-in. width
- Keys to remove key-lockable covers
- NT4K12 copper-distribution shelf

Two people are required to perform this procedure.

Equipment covers have been removed to allow installation of the copper-distribution shelf.

Action

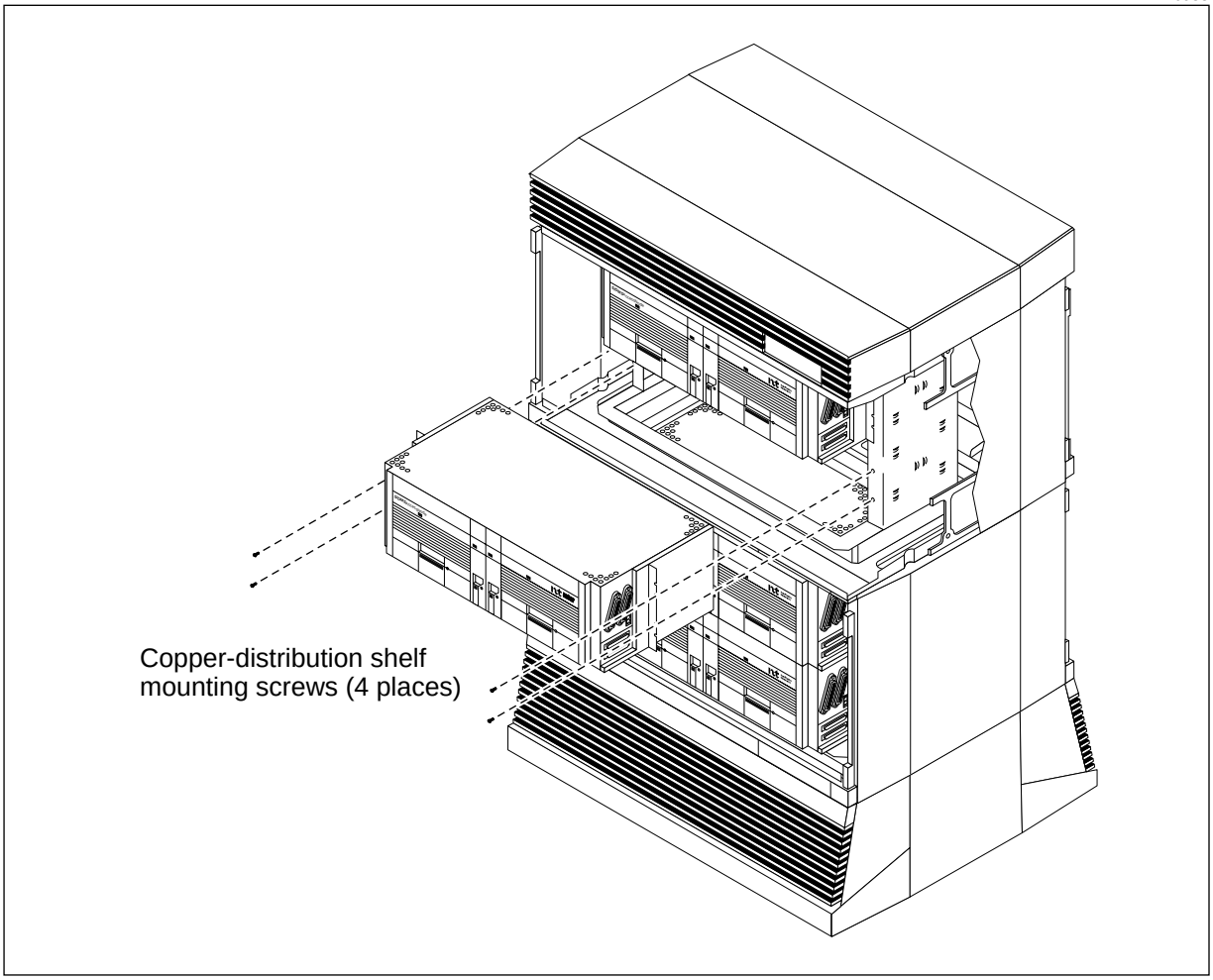
Step	Action
1	Maneuver the copper-distribution shelf into position and align the mounting holes in the shelf with the corresponding holes in the single equipment module, as shown in Figure 11-1 on page 11-3.
2	Have one person hold the shelf in position while the other inserts the four mounting screws.
3	Tighten the mounting screws.
4	Refer to “Connecting a copper-distribution shelf” on page 13-1 for the procedures to connect the cables to the copper-distribution shelf.

—continued—

Procedure 11-1 (continued)
Mounting the copper-distribution shelf

Figure 11-1
Installing a copper-distribution shelf in an existing single equipment module

FW-10933



—end—

Adding a field expansion module

This chapter contains the procedure for adding a field expansion module to the top of a master MBP cabinet or to the top of an expansion Modular Business Package (MBP) cabinet.

Chapter contents

This chapter contains the following information:

Procedure 12-1
Mounting the field expansion module (seismic kit)

Use this procedure to mount a field expansion module (FEM) at the top of an existing master Modular Business Package (MBP) cabinet or an existing expansion MBP cabinet when an NT8D64CA or CB seismic kit is used.

Do not exceed a cabinet height of three modules when installing a FEMs for Zone 4 applications. A single equipment module is counted as one module high, a FEM is counted as one module high, and a dual equipment module is counted as two modules high. Cabinets that are four modules high do not comply with Zone 4 seismic requirements.

Requirements

The following tools and materials are required:

- side cutters
- socket set 3/8-in. drive
- NT8D64BD cube expansion bracing kit

For installations in which the external signal cables enter the cabinet through the top cap (concrete floor option), there must be enough clearance between the top cap of the cabinet and the overhead cable rack to permit installation of the field expansion module. There must also be sufficient slack in the external signal cables to move them out of the way (to the rear of the cabinet), while the field expansion module is installed. If not, the external signal cables must be disconnected.

Before beginning this procedure, equipment covers and side panels must have been removed to permit installation of the FEM.

—continued—

Procedure 12-1 (continued)
Mounting the field expansion module (seismic kit)

Action

Step	Action

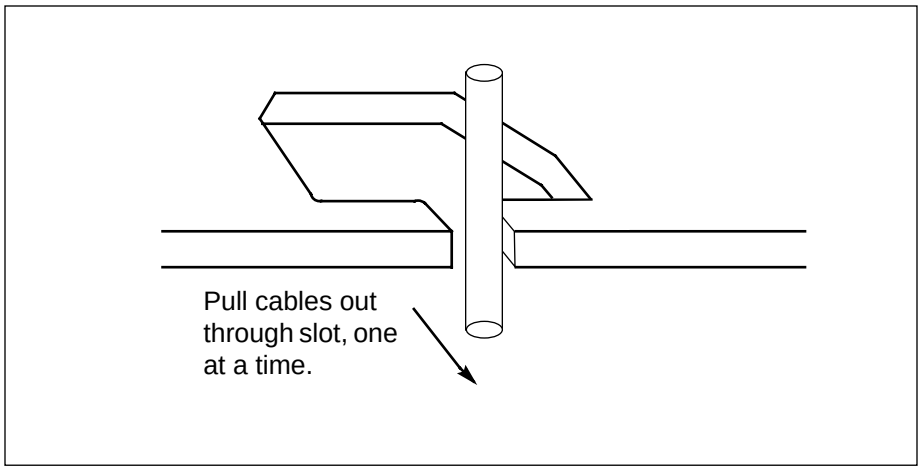
1 At the rear of the cabinet to which the field expansion module (FEM) is being added, cut any cable ties that bundle the external cables together.

2 Go to one of the following steps:

If the cables enter the cabinet through	Then go to
the top cap	step 3
the pedestal	step 5

3 Cut the cables ties all the way up to the overhead cable rack, and pull any cable slack down toward the cabinet.

4 Slip the external signal cables out through the cable entry slots at the rear of the cabinet, and temporarily tie the cables out of the way so that the new FEM can be installed.



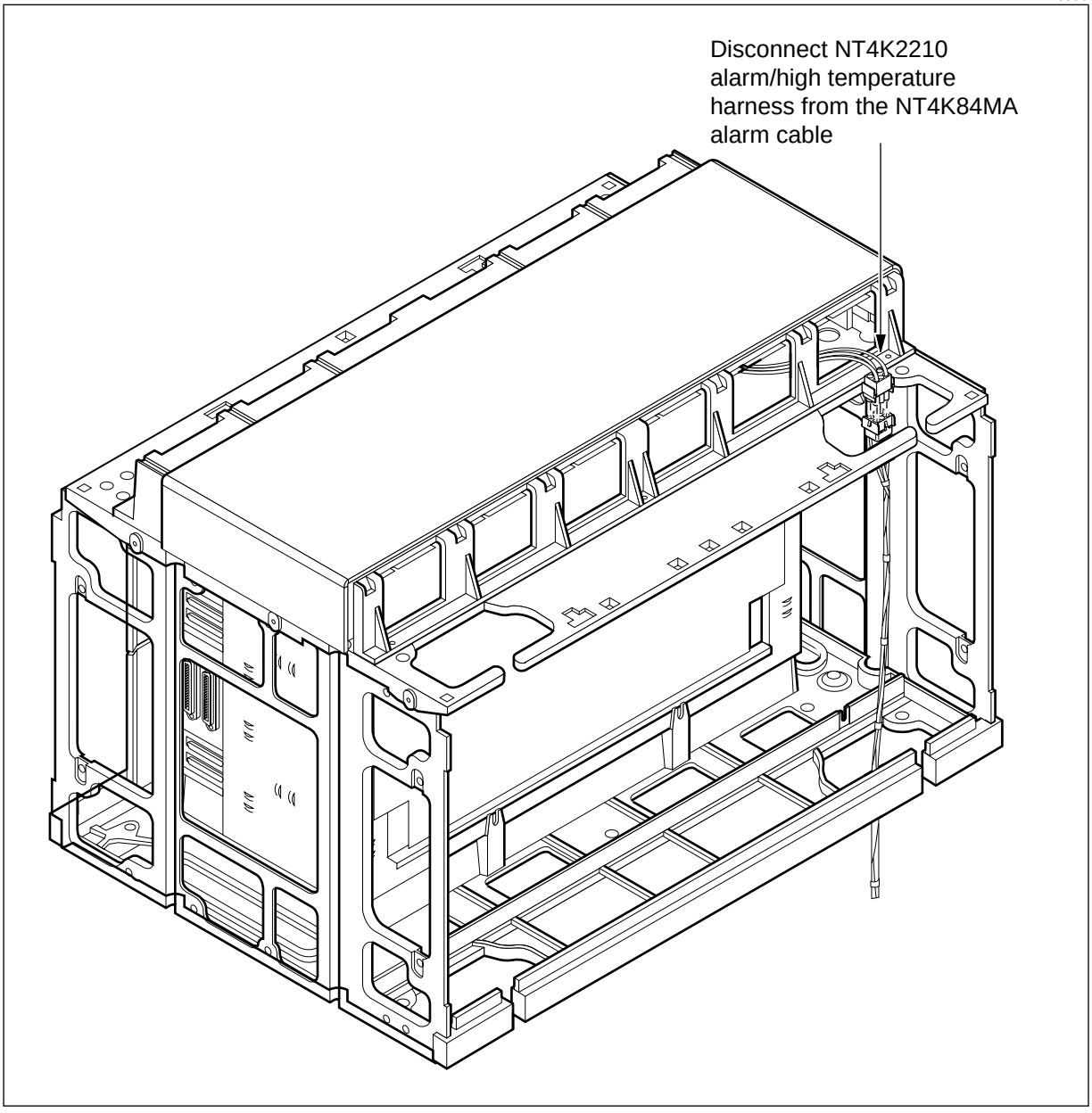
5 Disconnect the NT4K2210 alarm/temp harness assembly from the NT4K84MA high temperature alarm cable, as shown in Figure 12-1 on page 12-4.

—continued—

Procedure 12-1 (continued)
Mounting the field expansion module (seismic kit)

Figure 12-1
Disconnecting the NT4K2210 alarm/high temperature harness from the NT4K84MA alarm cable

FW-10896



—continued—

Procedure 12-1 (continued)
Mounting the field expansion module (seismic kit)

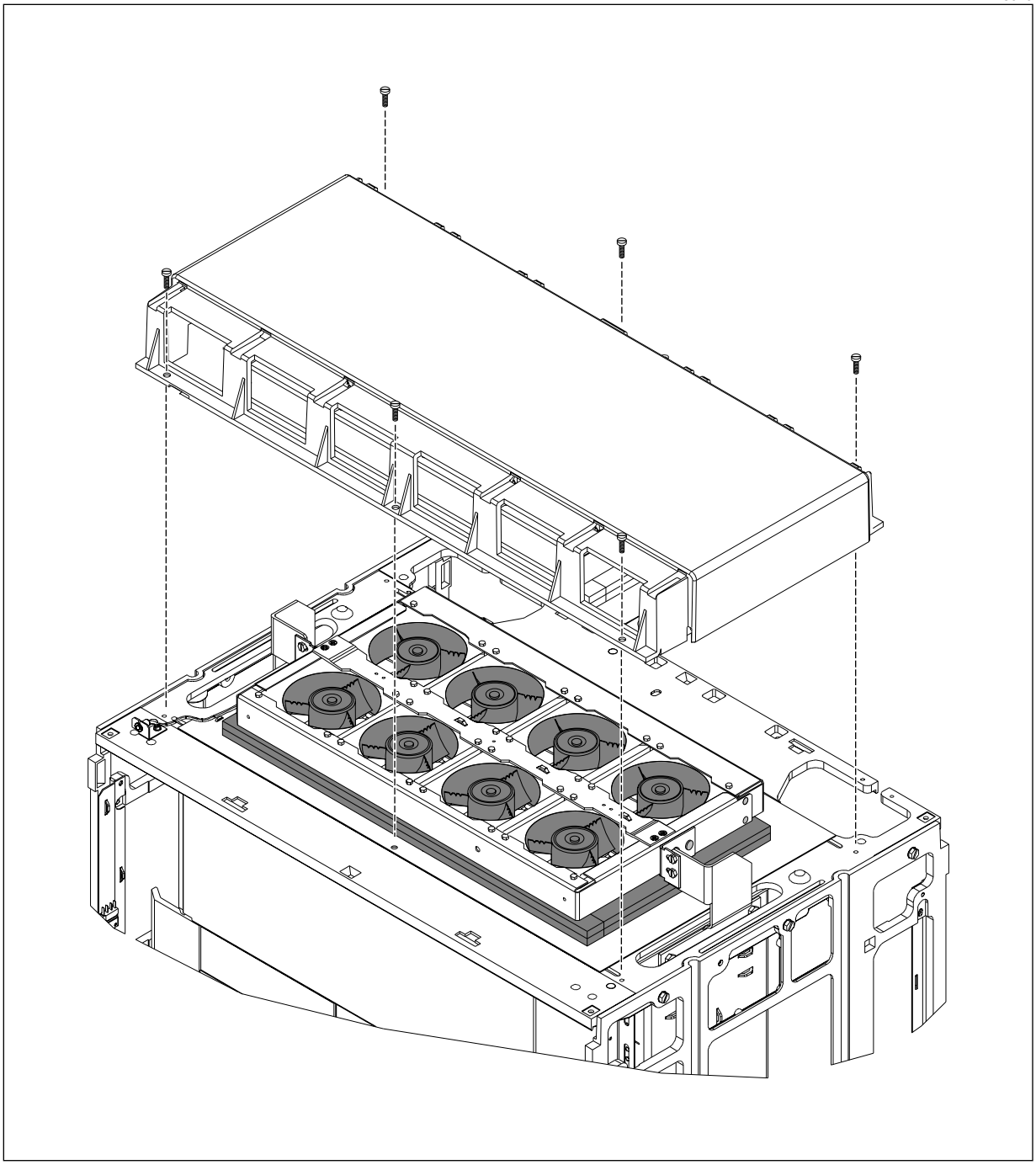
Step	Action
6	Remove the six screws that hold the top cap in place, as shown in Figure 12-2 on page 12-6.
7	Lift the top cap off the cabinet and set it to one side.
8	Reach inside the uppermost module in the cabinet, and disconnect the NT4K84LC alarm extender cable from the NT4K84LB door alarm cable at the front of the cabinet, and from the NT4K84LB door alarm cable at the rear of the cabinet.
9	Remove the NT4K84LC cable from the cabinet and set it to one side.
10	Remove the 4 nuts and washers that hold the earthquake tie bars in place, and remove the tie bars, as shown in Figure 12-3 on page 12-7.
11	Remove the top cap grille, as shown in Figure 12-4 on page 12-8.

—continued—

Procedure 12-1 (continued)
Mounting the field expansion module (seismic kit)

Figure 12-2
Removing the top cap

FW-15616

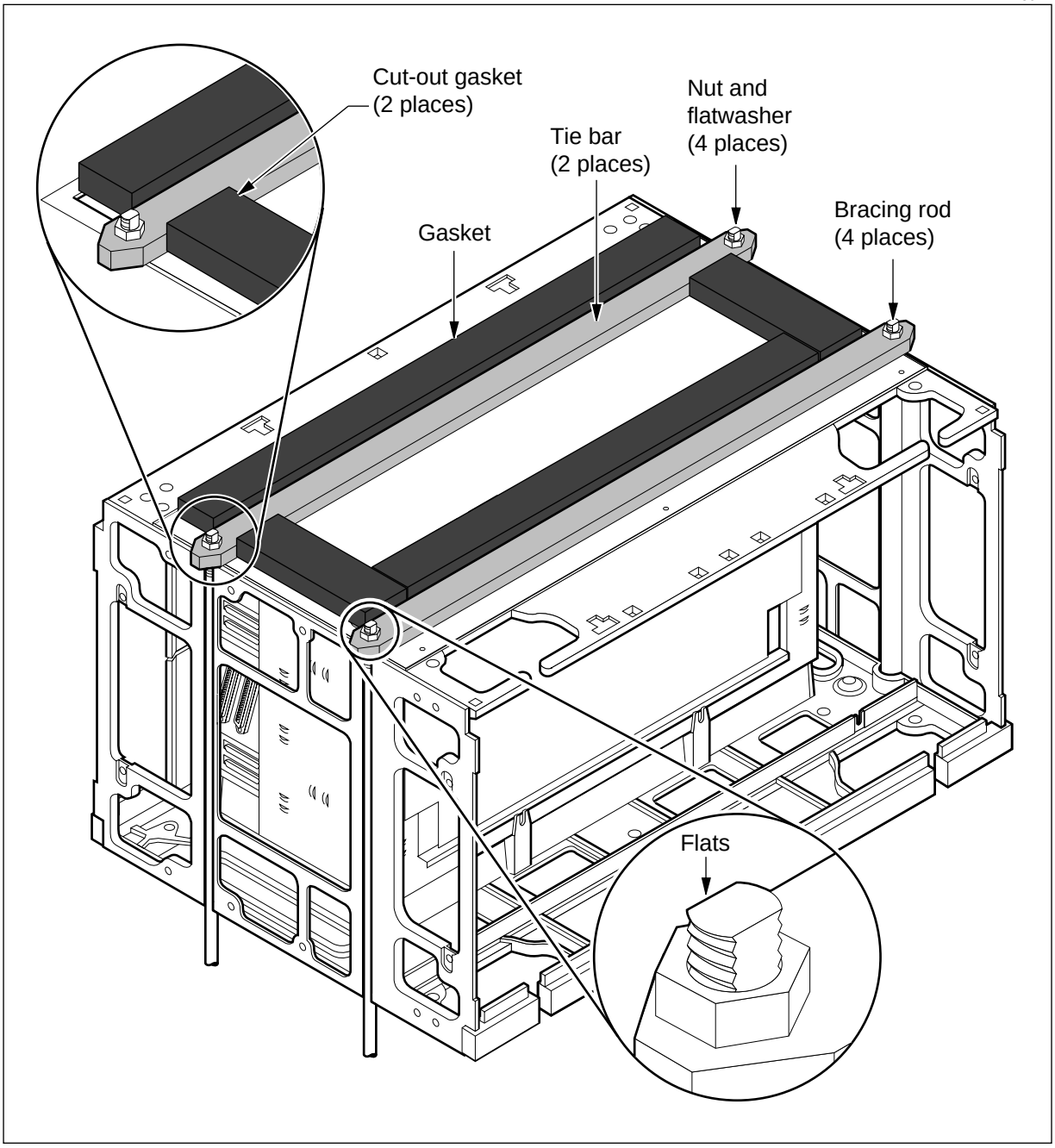


—continued—

Procedure 12-1 (continued)
Mounting the field expansion module (seismic kit)

Figure 12-3
Removing the tie bars

FW-15614

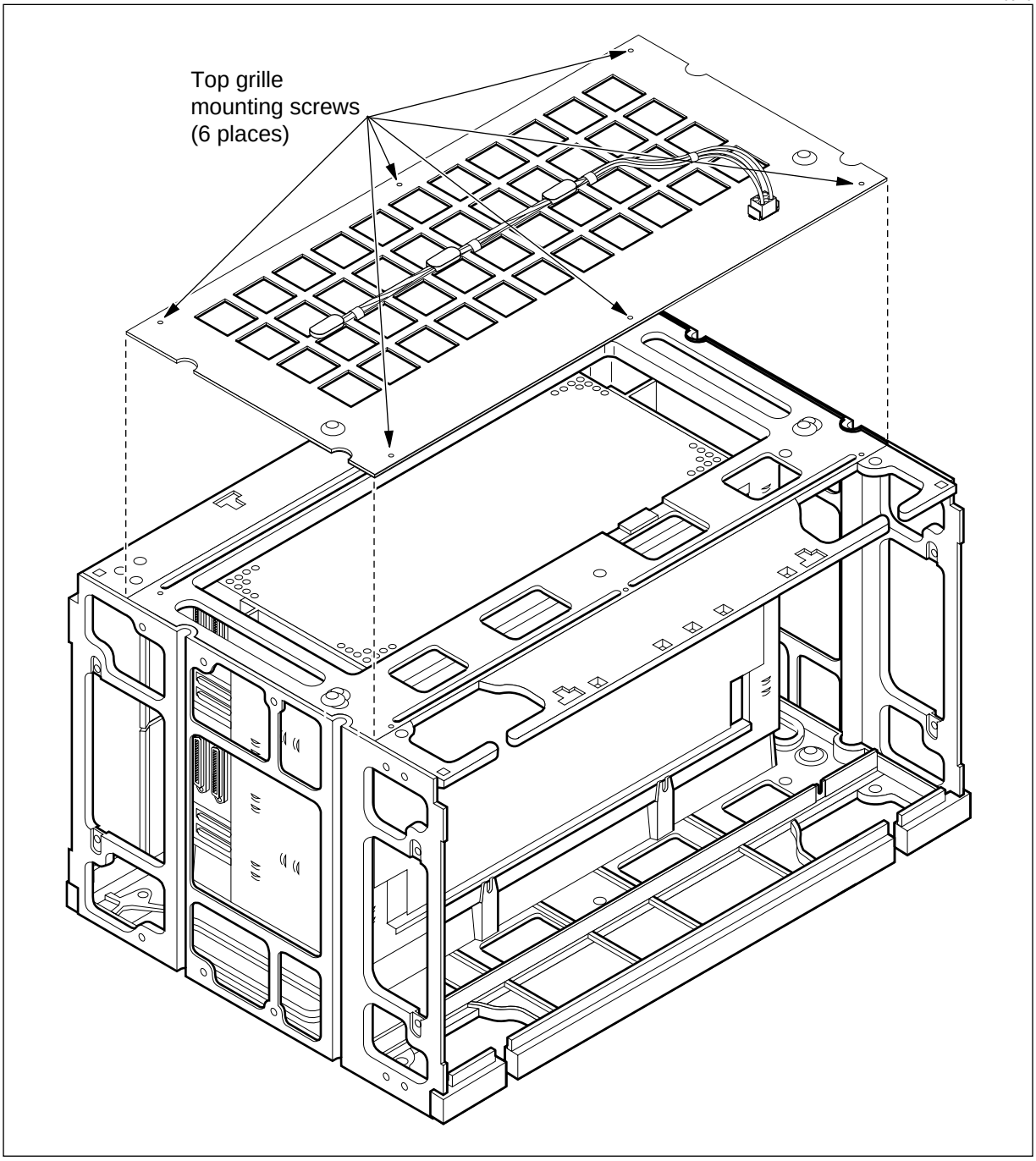


—continued—

Procedure 12-1 (continued)
Mounting the field expansion module (seismic kit)

Figure 12-4
Removing the top cap grille

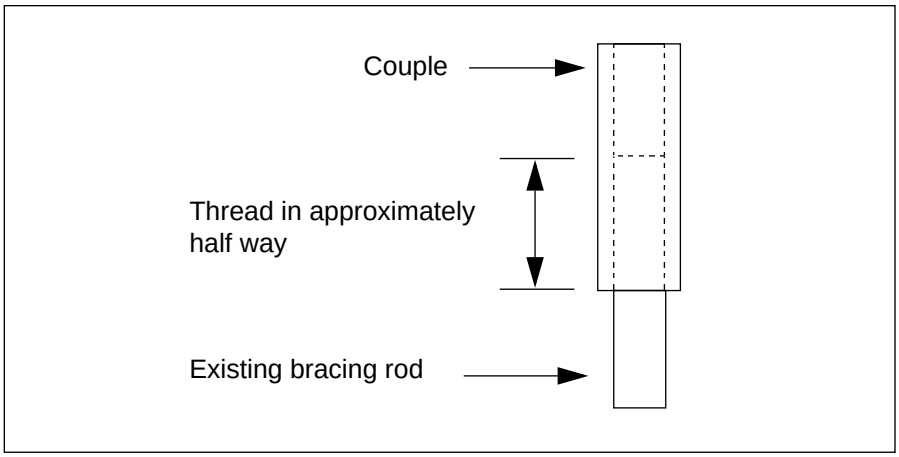
FW-10946



—continued—

Procedure 12-1 (continued)
Mounting the field expansion module (seismic kit)

Step	Action
12	Two people are required for this step. Lift the new FEM into place.
13	Thread one coupler onto each of the four existing bracing rods. Turn the couplers onto the existing bracing rods until the rod is inserted halfway into the coupler.



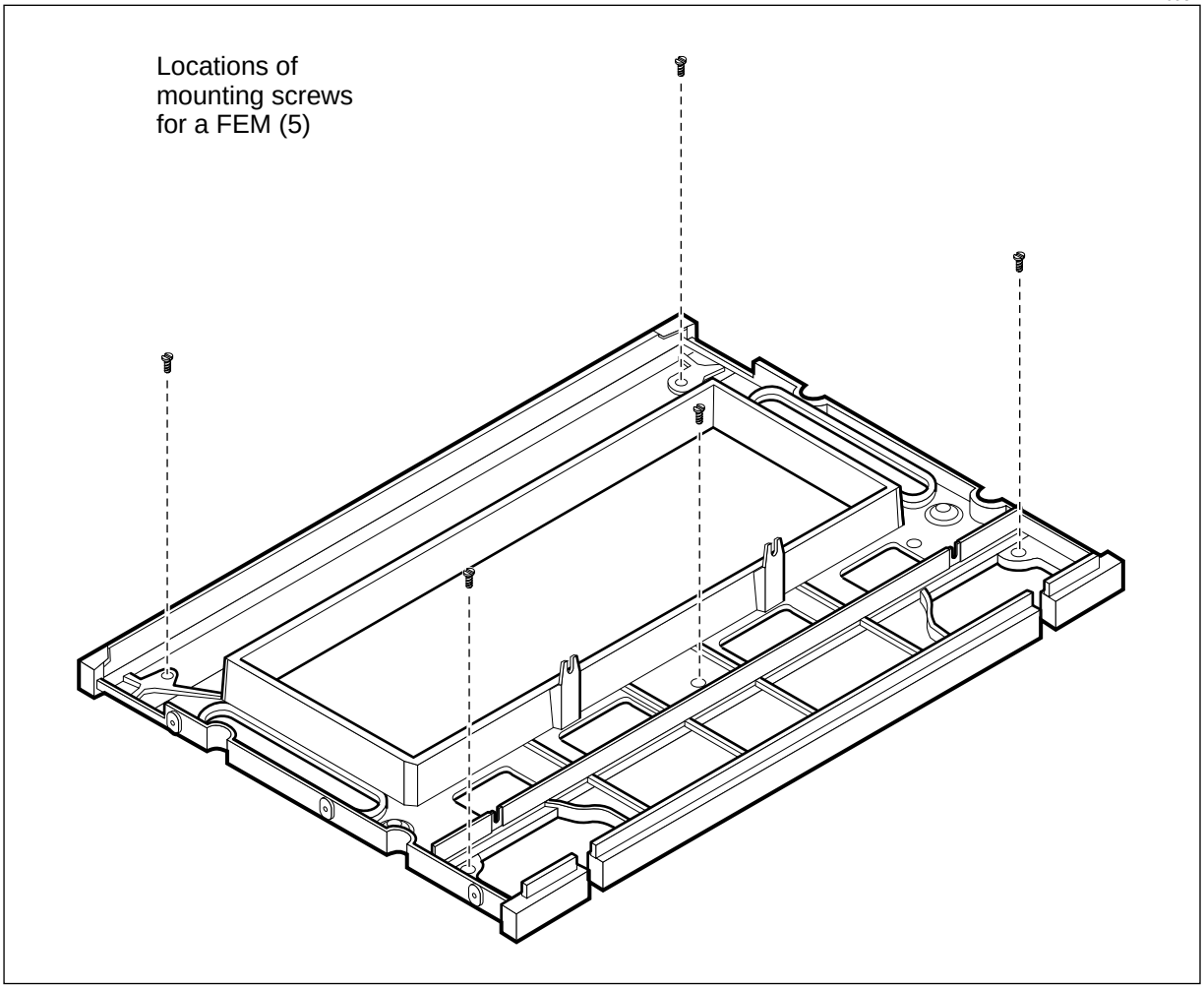
14	Thread the extension bracing rods into the couplers installed in the previous step.
15	Secure the new FEM to the uppermost module in the cabinet with five screws in the locations shown in Figure 12-5 on page 12-10.
16	Install the top cap grille on the top of the new FEM.

—continued—

Procedure 12-1 (continued)
Mounting the field expansion module (seismic kit)

Figure 12-5
Inserting the hardware that secures the field expansion module

FW-10934



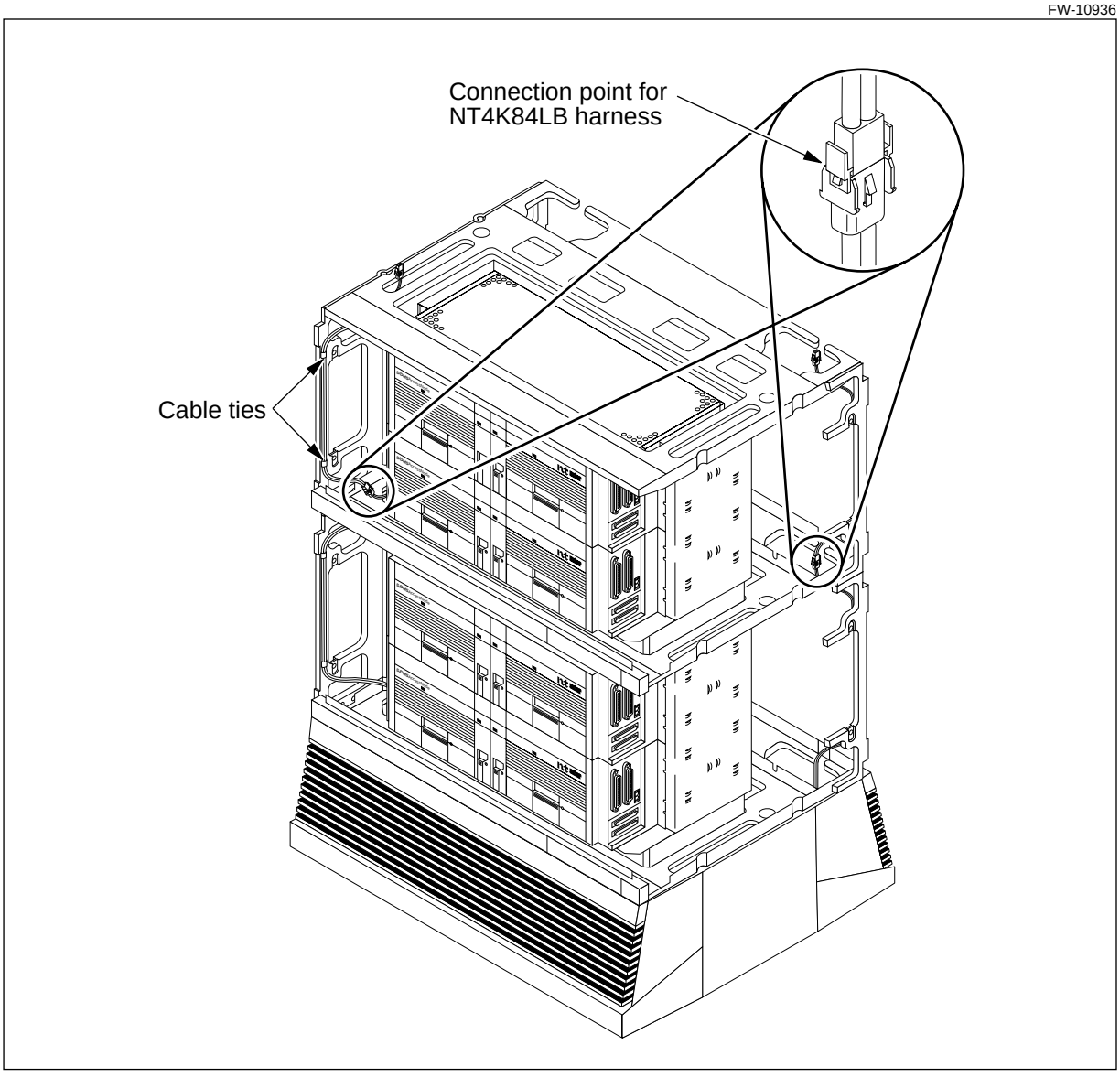
—continued—

Procedure 12-1 (continued)
Mounting the field expansion module (seismic kit)

Step	Action
17	Connect the two NT4K84LB door alarm cables in the new FEM to the NT4K84LB door alarm cables in the module beneath the FEM, as shown in Figure 12-6.

Figure 12-6
Connecting the NT4K84LB door alarm cables

FW-10936



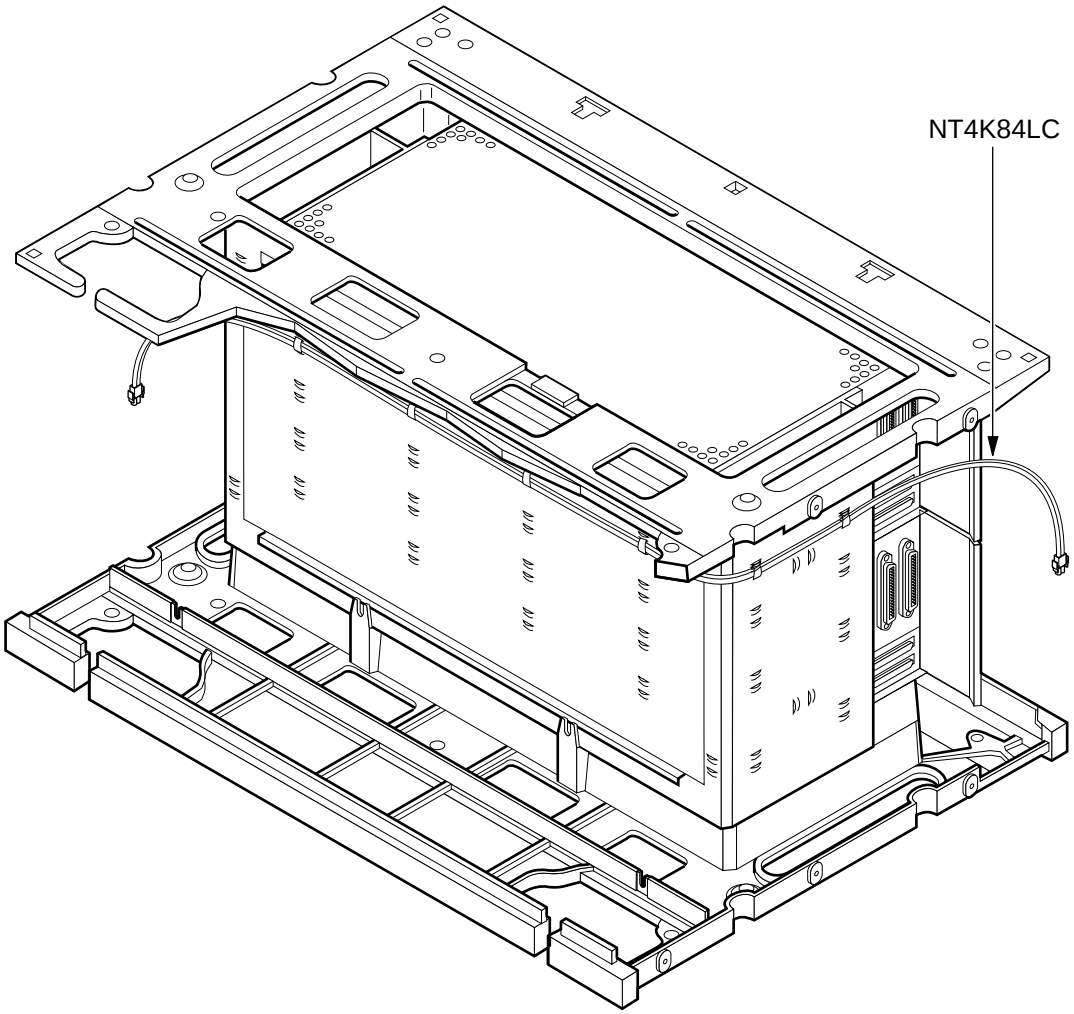
—continued—

Procedure 12-1 (continued)
Mounting the field expansion module (seismic kit)

Step	Action
18	Route the NT4K84LC alarm extender cable around the rear of the FEM and secure it with cable ties as shown in Figure 12-7.

Figure 12-7
Routing the NT4K84LC cable and securing it with cable ties

FW-10935



Note: If the FEM contains a DSX-1 shelf and a T1 repeater shelf, cable tie the NT4K84LC cable to the top die casting, after the FEM and top cap are installed.

—continued—

Procedure 12-1 (continued)
Mounting the field expansion module (seismic kit)

Step	Action
19	Connect the NT4K84LC cable to the NT4K84LB harnesses at the front and rear of the cabinet.
20	Reinstall the tie bars, and secure each one in place with a nut and a flat washer.
21	Install the top cap on top of the new FEM and secure it into place with the six screws removed in step 6.
22	Extend the NT4K84MA alarm cable at the rear of the cabinet, and connect it to the NT4K2210 alarm/temp harness assembly as shown in Figure 12-8 on page 12-14.
23	Connect a ground cable to the ground stud inside the right rear of the FEM. Use an NT4K84PB ground cable if the module below the FEM is a SEM, or an NT4K84PC ground cable if the module below the FEM is a DEM.
24	Route the ground cable into the module below and connect it to the ground stud.
25	For installations in which the cables enter the cabinet through the top cap, slip the external signal cables into the rear of cabinet, one at a time, through the cable entry slots.
26	Perform the next procedure as follows:

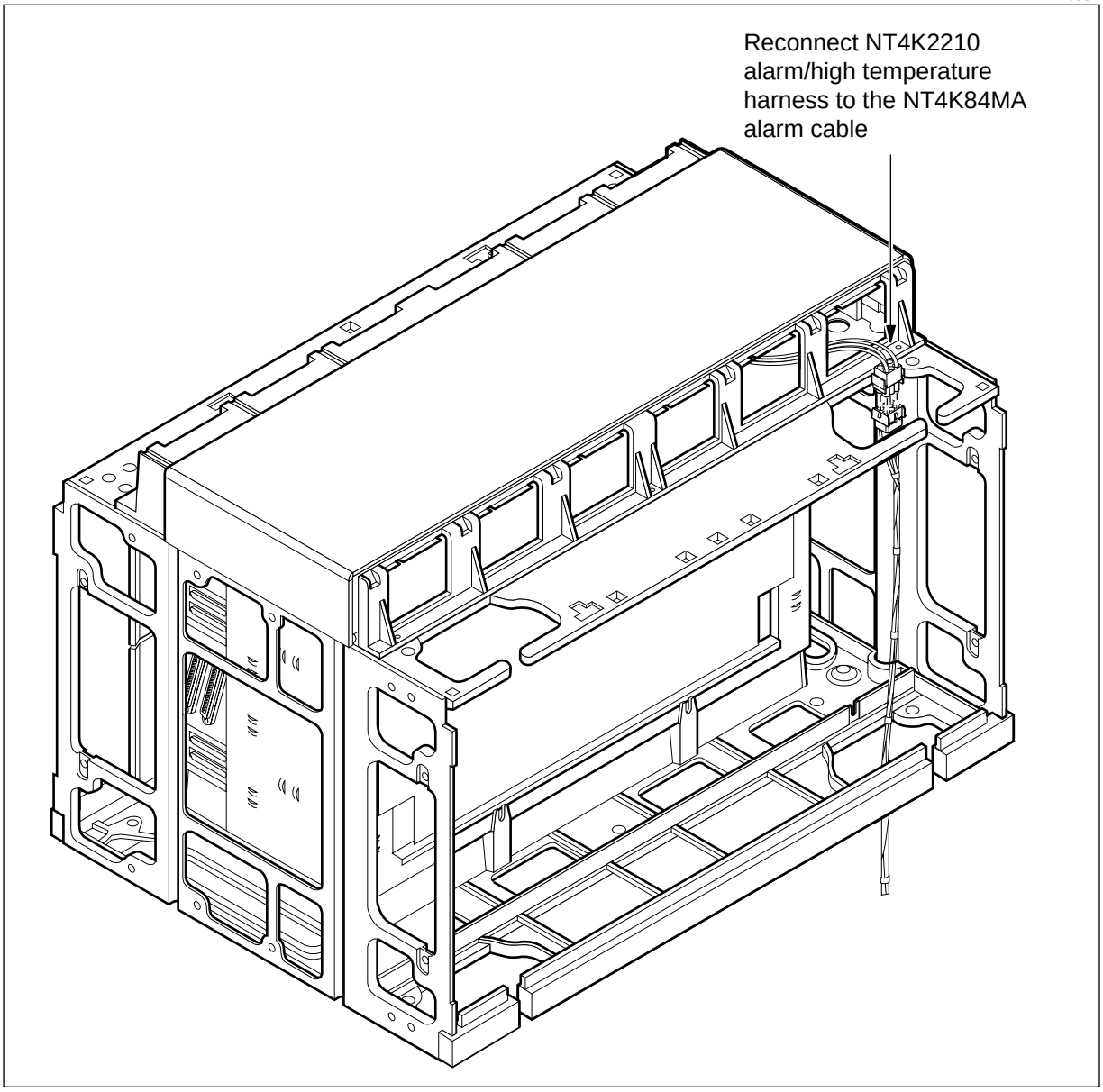
If the FEM contains	**Then go to**
copper-distribution shelves	“Connecting a copper-distribution shelf” on page 13-1.
a repeater shelf and a DSX-1 shelf	“Connecting a DSX-1 shelf and a T1 repeater shelf” on page 14-1.

—continued—

Procedure 12-1 (continued)
Mounting the field expansion module (seismic kit)

Figure 12-8
Reconnecting the NT4K84MA alarm cable and the NT4K2210 alarm/temp harness

FW-10884



—end—

Procedure 12-2
Mounting the field expansion module (no seismic kit)

Use this procedure to mount a field expansion module (FEM) at the top of an existing master Modular Business Package (MBP) cabinet or an expansion MBP cabinet when the cabinets are not equipped with a seismic kit.

Requirements

The following tools and materials are required:

- side cutters
- socket set 3/8-in. drive

For installations in which the external signal cables enter the cabinet through the top cap (concrete floor option), there must be enough clearance between the top cap of the cabinet and the overhead cable rack to permit installation of the field expansion module. There must also be sufficient slack in the external signal cables to move them out of the way (to the rear of the cabinet), while the field expansion module is installed. If not, the external signal cables must be disconnected.

Action

Step	Action
1	At the rear of the cabinet to which the field expansion module (FEM) is being added, cut any cable ties that bundle the external cables together.
2	Go to one of the following steps:

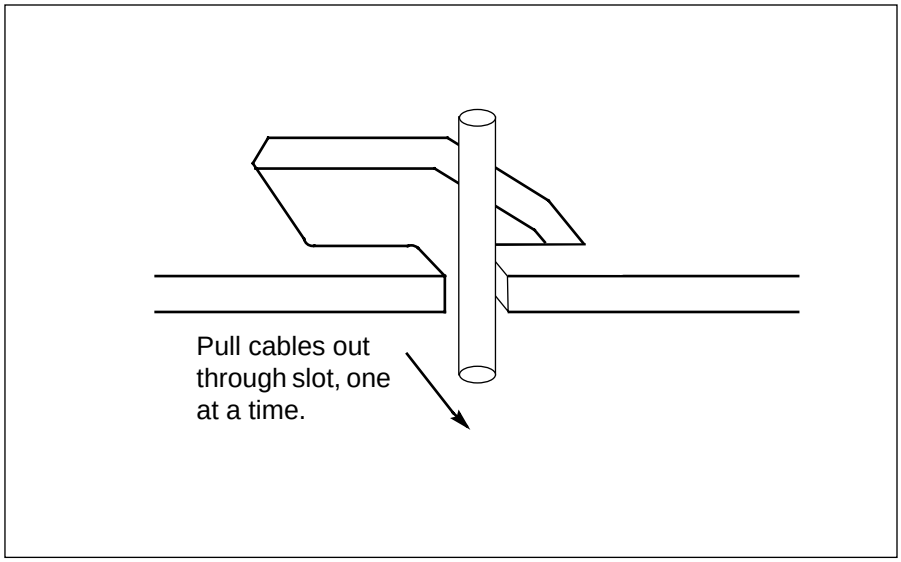
If cables enter the cabinet through	Then go to
the top cap	step 3
the pedestal	step 5

3	Cut the cables ties all the way up to the overhead cable rack, and pull any cable slack down toward the cabinet.

—continued—

Procedure 12-2 (continued)
Mounting the field expansion module (no seismic kit)

Step	Action
4	Slip the external signal cables out through the cable entry slots at the rear of the cabinet, and temporarily tie the cables out of the way so that the new FEM can be installed.



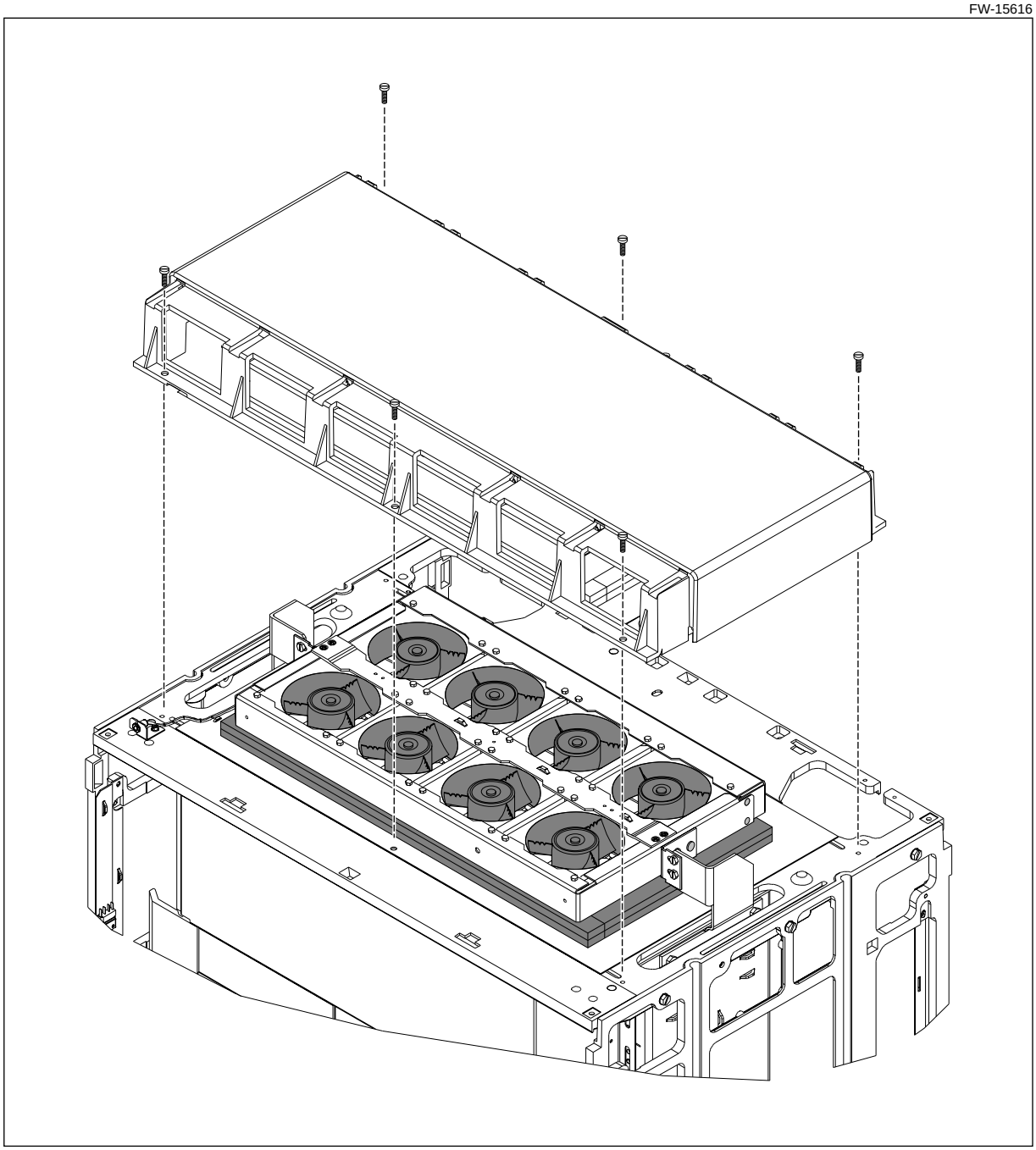
5	Remove the six bolts that hold the top cap in place, as shown in Figure 12-9 on page 12-17.
6	Lift the top cap off the cabinet and set it to one side.

—continued—

Procedure 12-2 (continued)
Mounting the field expansion module (no seismic kit)

Figure 12-9
Removing the top cap

FW-15616



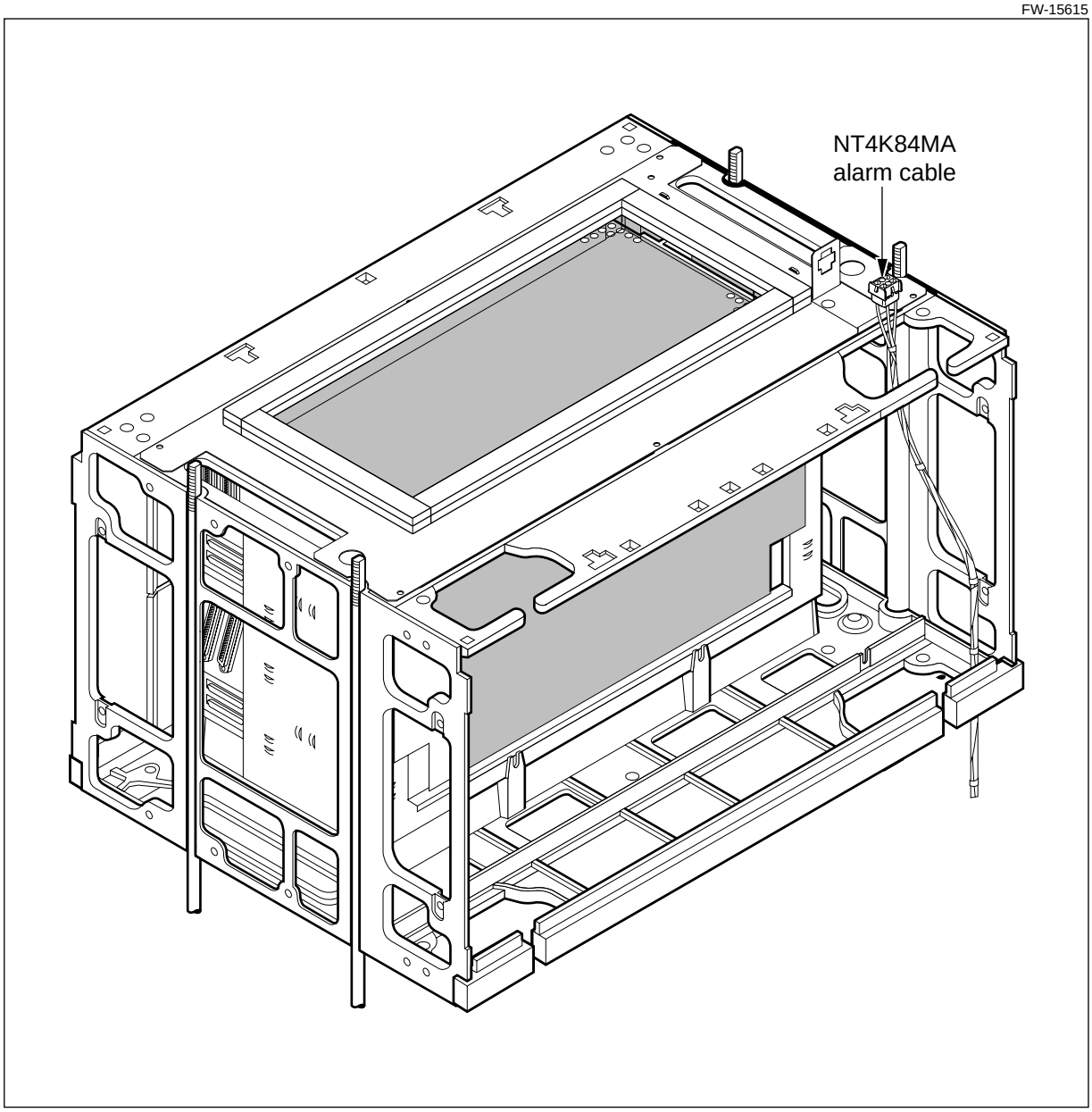
—continued—

Procedure 12-2 (continued)
Mounting the field expansion module (no seismic kit)

Step	Action
7	Disconnect the NT4K2210 alarm/temp harness assembly from the NT4K84MA high temperature alarm cable, as shown in Figure 12-10.

Figure 12-10
Disconnecting the NT4K2210 alarm/temperature harness from the NT4K84MA alarm cable

FW-15615



—continued—

Procedure 12-2 (continued)
Mounting the field expansion module (no seismic kit)

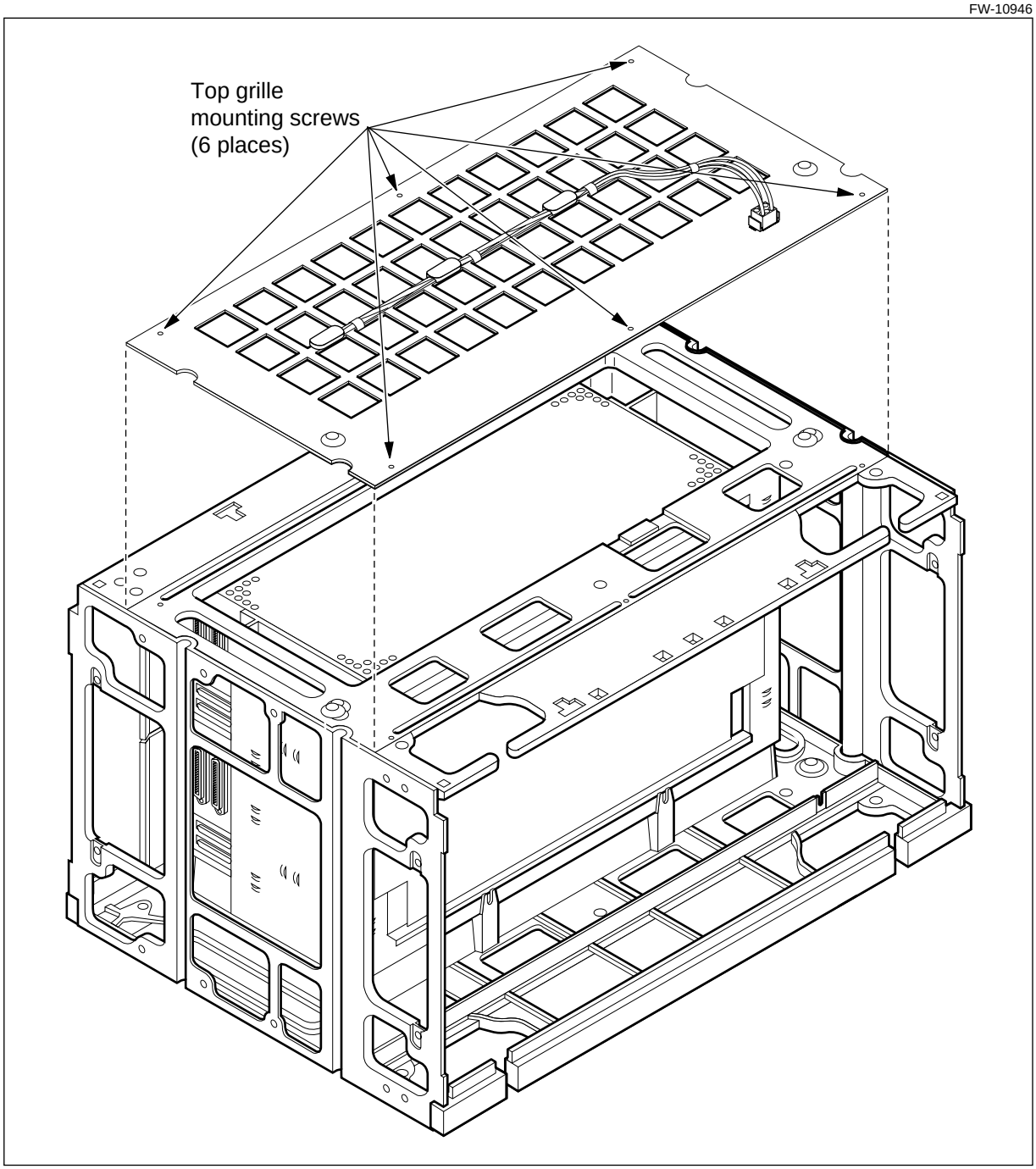
Step	Action
8	Reach inside the uppermost module in the cabinet, and disconnect the NT4K84LC alarm extender cable from the NT4K84LB door alarm at the front of the cabinet and the NT4K84LB door alarm cable at the rear of the cabinet.
9	Remove the NT4K84LC cable from the cabinet and set it to one side.
10	Remove the top grille, as shown in Figure 12-11 on page 12-20.

—continued—

Procedure 12-2 (continued)
Mounting the field expansion module (no seismic kit)

Figure 12-11
Removing the top cap grille

FW-10946



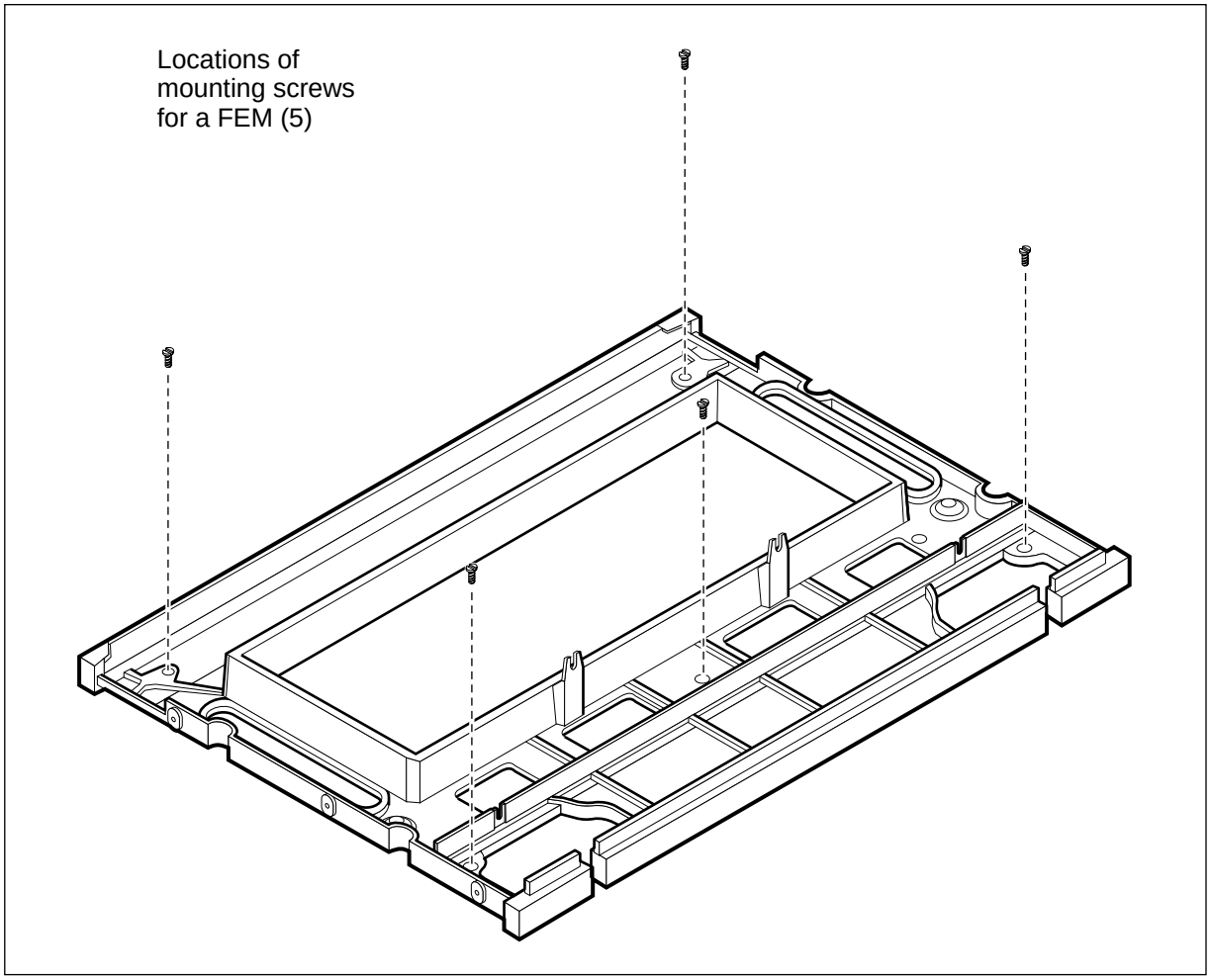
—continued—

Procedure 12-2 (continued)
Mounting the field expansion module (no seismic kit)

Step	Action
11	Two people are required for this step. Lift the new FEM into place.
12	Secure the new FEM to the uppermost module in the cabinet with five screws in the locations shown in Figure 12-12.

Figure 12-12
Inserting the hardware that secures a field expansion module in place

FW-10934



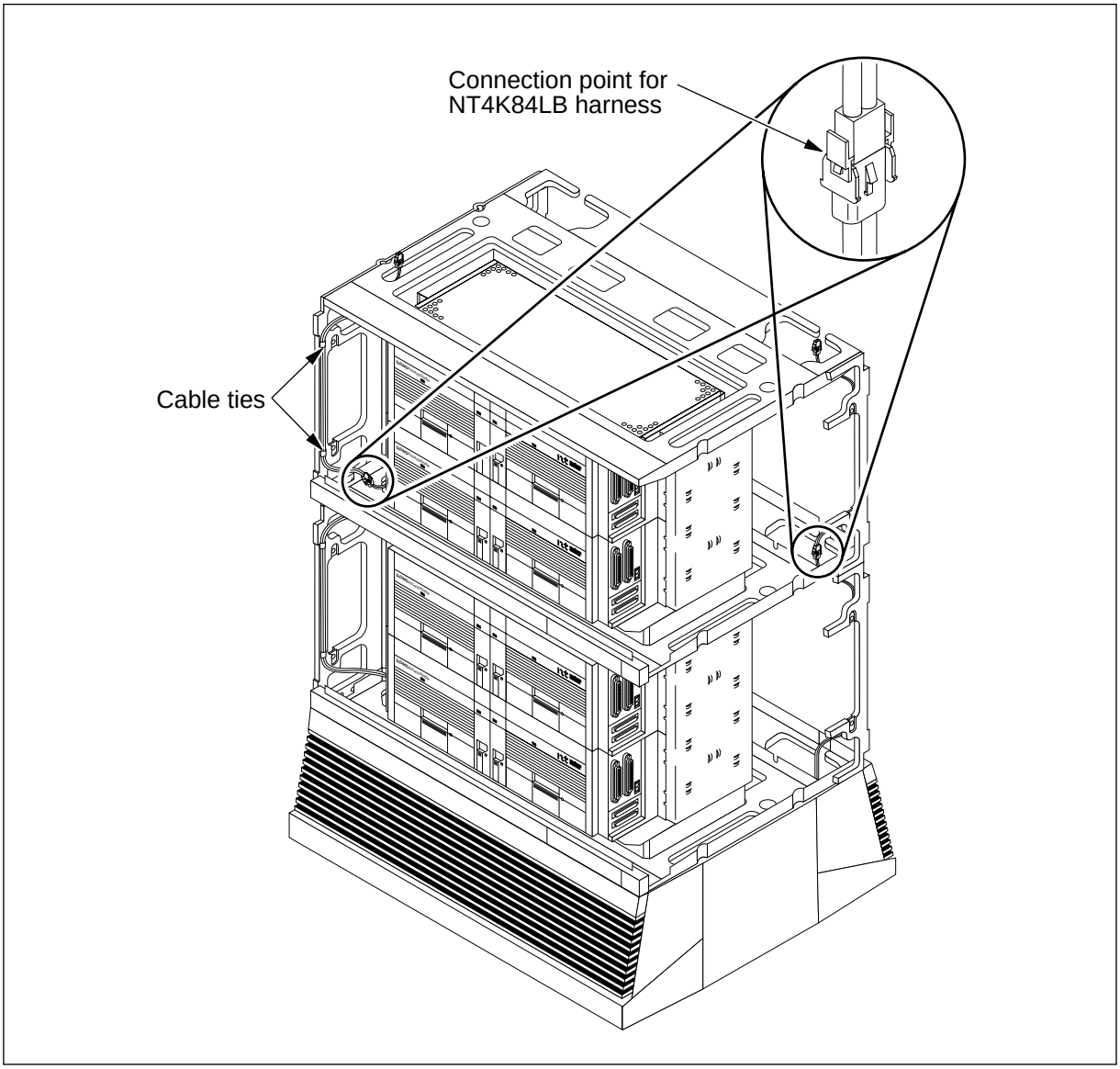
—continued—

Procedure 12-2 (continued)
Mounting the field expansion module (no seismic kit)

Step	Action
13	Install the top cap grille on the top of the new FEM.
14	Connect the two NT4K84LB door alarm cables in the new FEM to the NT4K84LB door alarm cables in the module beneath the FEM, as shown in Figure 12-13.

Figure 12-13
Connecting the NT4K84LB door alarm cables

FW-10936



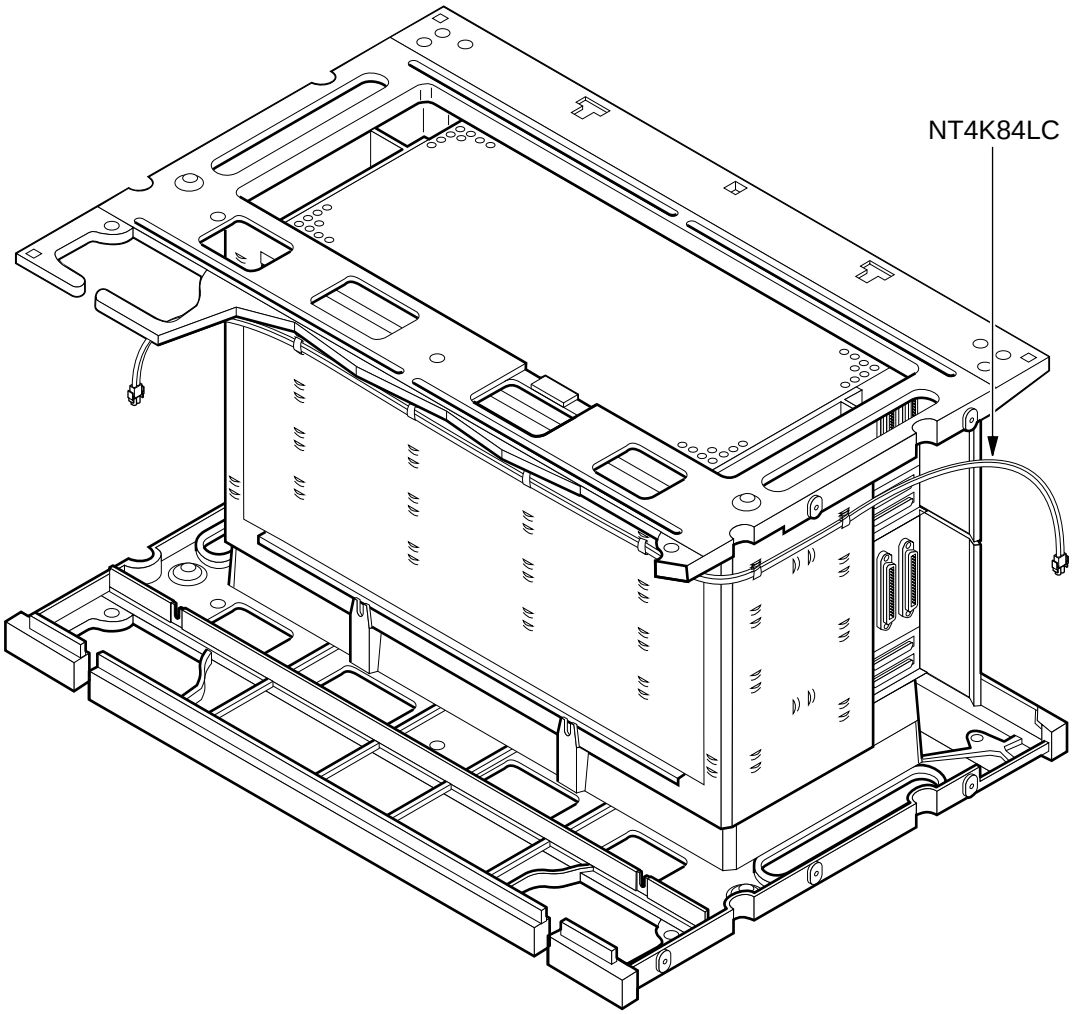
—continued—

Procedure 12-2 (continued)
Mounting the field expansion module (no seismic kit)

Step	Action
15	Route the NT4K84LC alarm extender cable around the rear of the FEM and secure it with cable ties as shown in Figure 12-14.

Figure 12-14
Routing the NT4K84LC cable and securing it with cable ties

FW-10935



Note: If the FEM contains a DSX-1 shelf and a T1 repeater shelf, cable tie the NT4K84LC cable to the top die casting, after the FEM and top cap are installed.

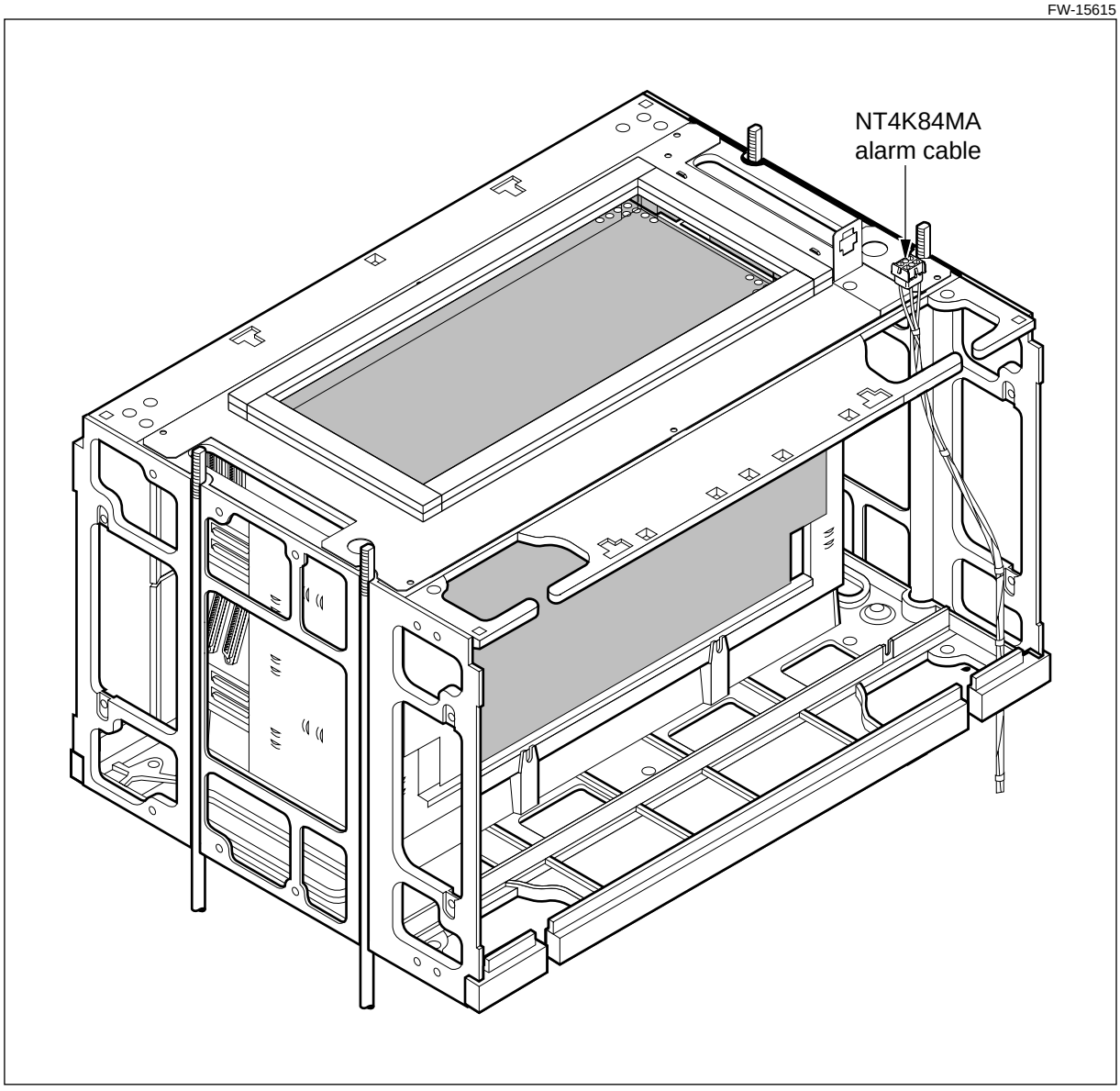
—continued—

Procedure 12-2 (continued)
Mounting the field expansion module (no seismic kit)

16 Extend the NT4K84MA alarm cable at the rear of the cabinet, and connect it to the NT4K2210 alarm/temp harness assembly as shown in Figure 12-15.

Figure 12-15
Reconnecting the NT4K84MA alarm cable and the NT4K2210 alarm/temperature harness

FW-15615



—continued—

Procedure 12-2 (continued)
Mounting the field expansion module (no seismic kit)

Step	Action
17	Connect the NT4K84LC cable to the NT4K84LB harnesses at the front and rear of the cabinet.
18	Install the top cap on top of the new FEM and secure into place with the six screws removed in step 5.
19	Connect a ground cable to the ground stud inside the right rear of the FEM. Use an NT4K84PB ground cable if the module below the FEM is a SEM, or an NT4K84PC ground cable if the module below the FEM is a DEM.
20	Route the ground cable into the module below and connected it to the ground stud.
21	For installations in which the cables enter the cabinet through the top cap, slip the external signal cables into the rear of cabinet, one at a time through the cable entry slots.
22	Perform the next procedure as follows:

If the FEM contains	Then go to
copper-distribution shelves	“Connecting a copper-distribution shelf” on page 13-1.
a repeater shelf and a DSX-1 shelf	“Connecting a DSX-1 shelf and a T1 repeater shelf” on page 14-1.

—end—

Connecting a copper-distribution shelf

This chapter contains the procedure for connecting the cables to a copper-distribution shelf (CDS) that has been added to a master Modular Business Package (MBP) cabinet or to an expansion MBP cabinet.

Chapter contents

This chapter contains the following information:

Procedure 13-1
Connecting the dc power distribution harnesses to a copper-distribution shelf

Use this procedure to connect the two dc power distribution harnesses in an Modular Business Package (MBP) cabinet to a copper-distribution shelf that has been added to an existing system.

Two variants of dc power distribution harness are used in modular business package cabinets: an NT4K84HA harness for use in master MBP cabinets, and an NT4K84HB harness for use in expansion MBP cabinets. Two harnesses are used in each cabinet, one to supply power to the left side of shelves in the cabinet and one to supply power to shelves in the right side. The NT4K84HA harness in the master cabinet is equipped with connectors to power up to five copper-distribution shelves, and the NT4K84HB harness in the expansion cabinet is equipped with connectors for four copper-distribution shelves.

In cabinets that are equipped with less than a full complement of distribution shelves, unused connectors and cables are coiled up and secured at the top of the side raceways of the cabinet. When a copper-distribution shelf is added to the top of the cabinet, the harnesses at each side of the cabinet are uncoiled, extended up to the copper-distribution shelf, and attached to the CDS Pwr and CDS TB connectors on the copper-distribution shelf.

Requirements

The following tools and materials are required:

- side cutters

Action

Step	Action
1	Uncoil the power distribution harness at the left side of the cabinet in which the copper-distribution shelf is installed.
2	Route the harness up to the copper-distribution shelf (see Figure 13-1 on page 13-3).
3	Attach the appropriate connector of the power distribution harness to the CDS Pwr connector on the copper-distribution shelf (see Figure 13-1 on page 13-3). If the copper-distribution shelf installed is CDS 5, attach the power distribution harness CDS 5 connector to the CDS Pwr connector on the shelf, CDS 6 harness connector to CDS 6 shelf Pwr connector, and so on.
4	Install cable ties through the lances at the locations shown in Figure 13-1 on page 13-3 to hold the harness in place.

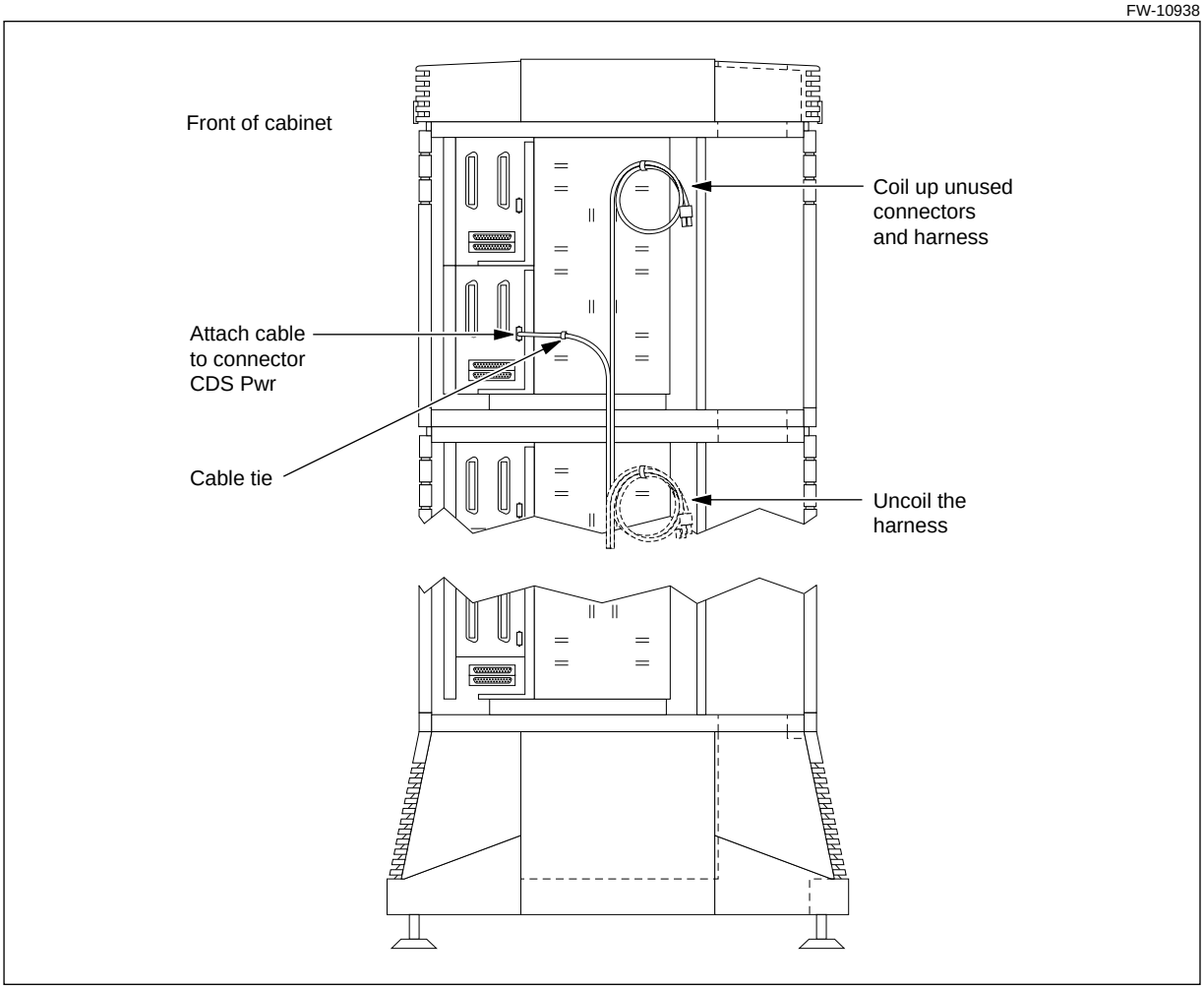
—continued—

Procedure 13-1 (continued)
Connecting the dc power distribution harnesses to a copper-distribution shelf

Step	Action
5	Coil up unused connectors and harness and secure them to cabinet using a cable tie, as shown in Figure 13-1.
6	Uncoil the power distribution harness at the right side of the cabinet.

Figure 13-1
Connecting a dc power distribution harness to a copper-distribution shelf, left side of cabinet

FW-10938



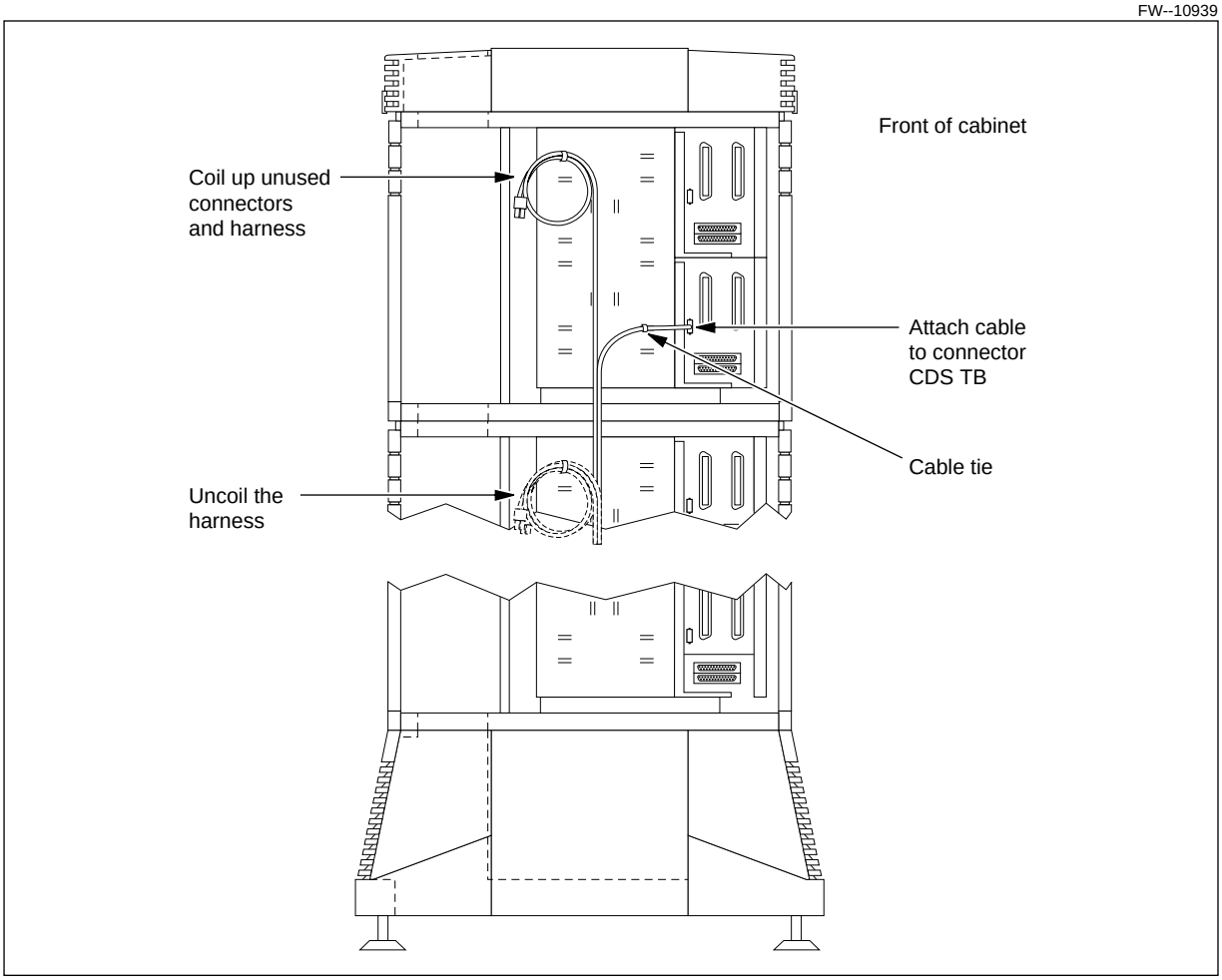
—continued—

Procedure 13-1 (continued)
Connecting the dc power distribution harnesses to a copper-distribution shelf

Step	Action
7	Route the harness up to the copper-distribution shelf (see Figure 13-2).
8	Attach the appropriate connector of the power distribution harness to the CDS TB connector on the copper-distribution shelf, as shown in Figure 13-2. If the copper-distribution shelf installed is CDS 5, attach the CDS 5 connector of the power distribution harness to the CDS TB connector on the shelf, if the shelf is CDS 6 attach the CDS 6 connector to the shelf, and so on
9	Install cable ties through the lances at the locations shown in Figure 13-2 to hold the harness in place.
10	Coil up unused connectors and harness and secure them to cabinet using a cable tie, as shown in Figure 13-2.

Figure 13-2
Connecting a dc power distribution harness to a copper-distribution shelf, right side of cabinet

FW--10939



—end—

Procedure 13-2
Connecting the metallic test access cable

Use this procedure to connect an NT4K86NA, NB, or NC metallic test access cable to a copper-distribution shelf (CDS) that has been added to the system.

Requirements

The following tools and materials are required:

- cable ties
- side cutters

Action

Step	Action

1 Go to one of the following steps according to the location of the copper-distribution shelf:

If the shelf is located in	And the cabinet contains	Then go to
the master cabinet	no other copper-distribution shelves	step 5
	other copper-distribution shelves	step 2
the expansion cabinet	no other copper-distribution shelves	step 8
	other copper-distribution shelves	step 2

2 Attach one end of an NT4K86NA metallic test access (MTA) cable to the CDS MTA In connector on the copper-distribution shelf that has been added, as shown in Figure 13-3 on page 13-6.

3 Run the cable down the side raceway of the cabinet, as shown in Figure 13-3 on page 13-6, and attach the other end to the CDS MTA Out connector on the copper-distribution shelf immediately below the shelf that is added to the system.

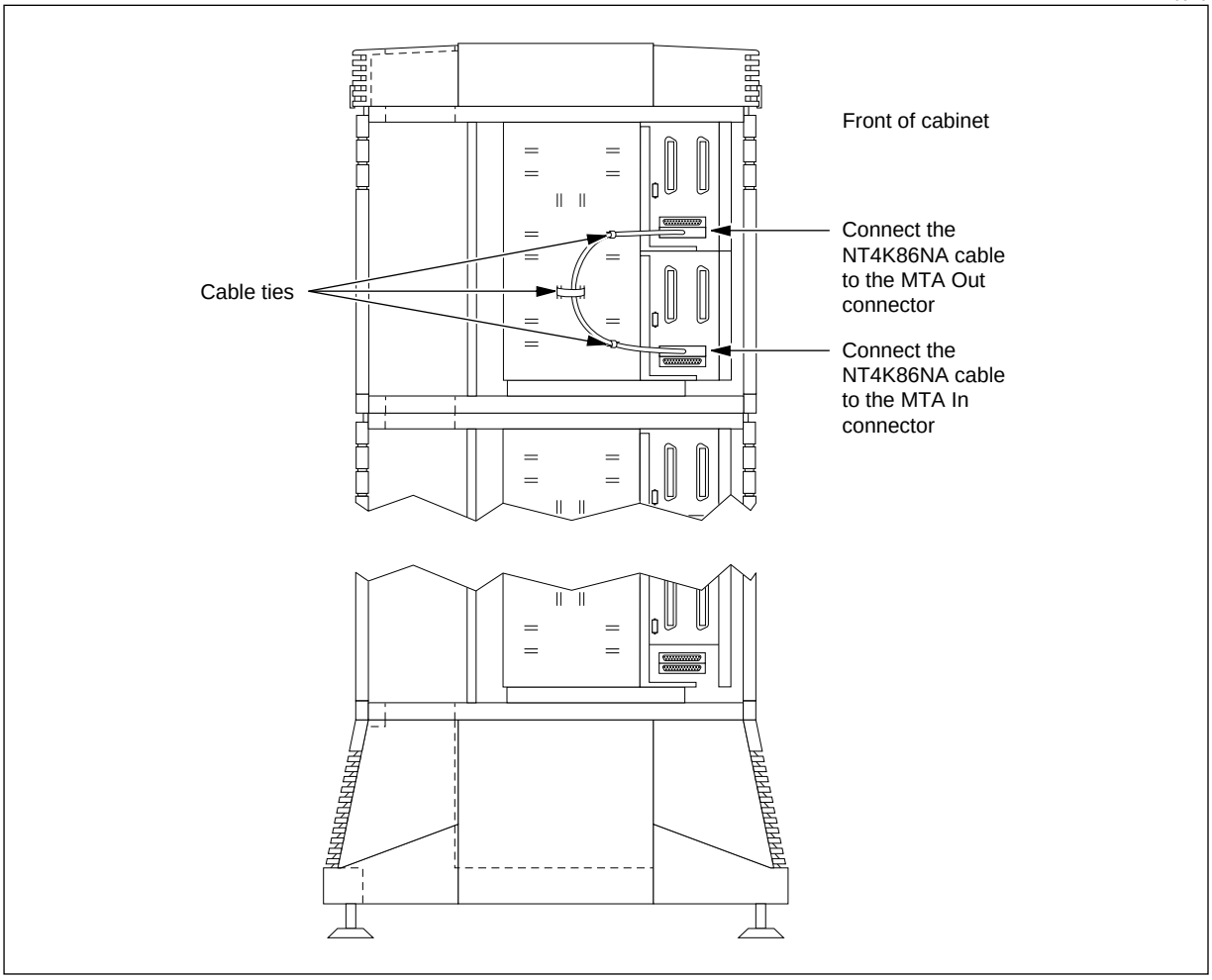
4 Secure the cable in place with cable ties at the locations shown in Figure 13-3 on page 13-6. You have completed this procedure. Do not continue.

—continued—

Procedure 13-2 (continued)
Connecting the metallic test access cable

Figure 13-3
Connecting an NT4K86NA metallic test access cable

FW-10940



—continued—

Procedure 13-2 (continued)
Connecting the metallic test access cable

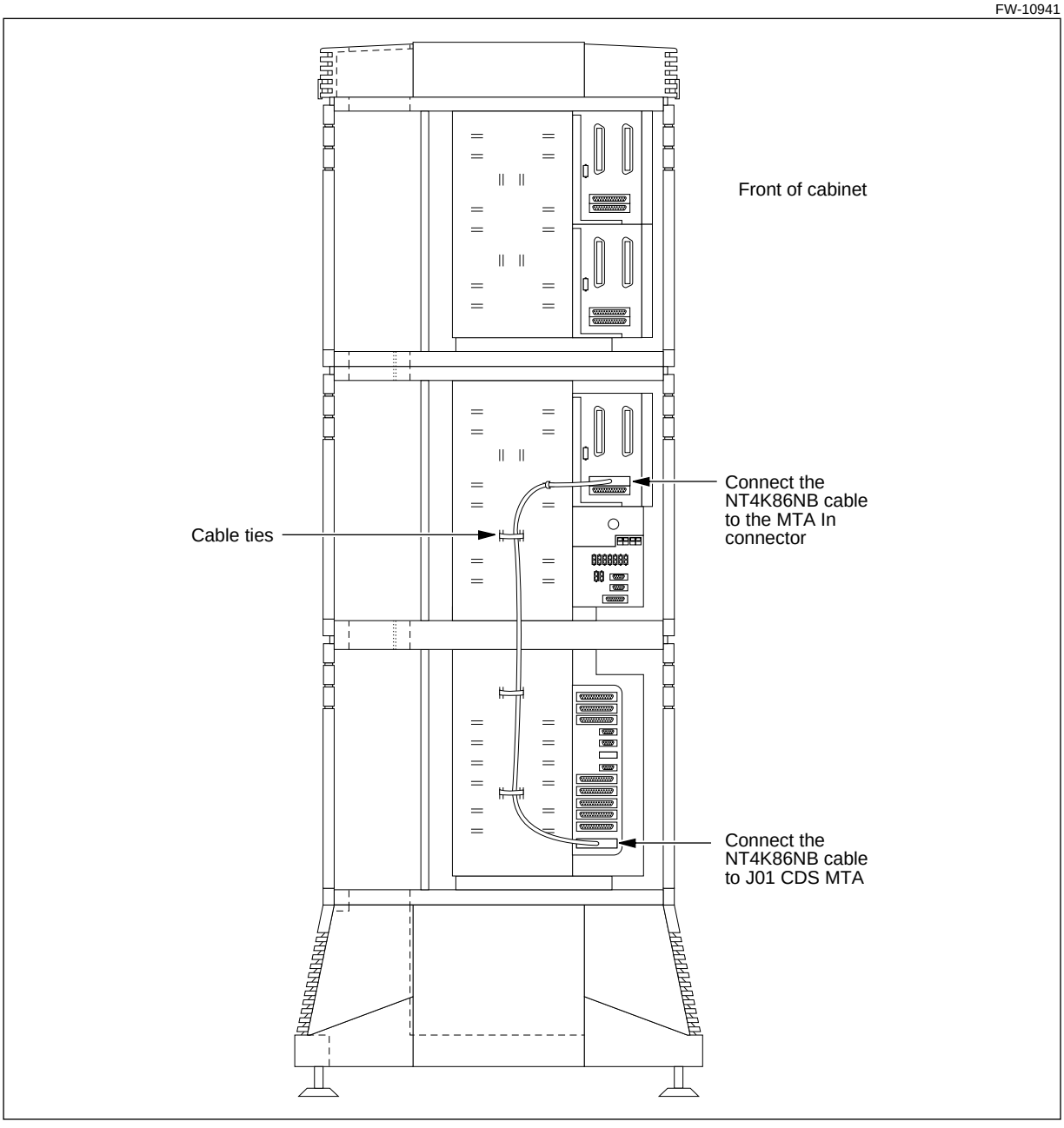
Step	Action
5	Attach one end of an NT4K86NB metallic test access cable to the CDS MTA In connector on the copper-distribution shelf that has been added, as shown in Figure 13-4 on page 13-8.
6	Run the cable down the side raceway of the cabinet, as shown in Figure 13-4 on page 13-8, and attach the other end to the CDS MTA Out connector on the access bandwidth manager (ABM) shelf.
7	Secure the cable in place with cable ties at the locations shown in Figure 13-4 on page 13-8. You have completed this procedure. Do not continue.

—continued—

Procedure 13-2 (continued)
Connecting the metallic test access cable

Figure 13-4
Attaching an NT4K86NB metallic test access cable

FW-10941



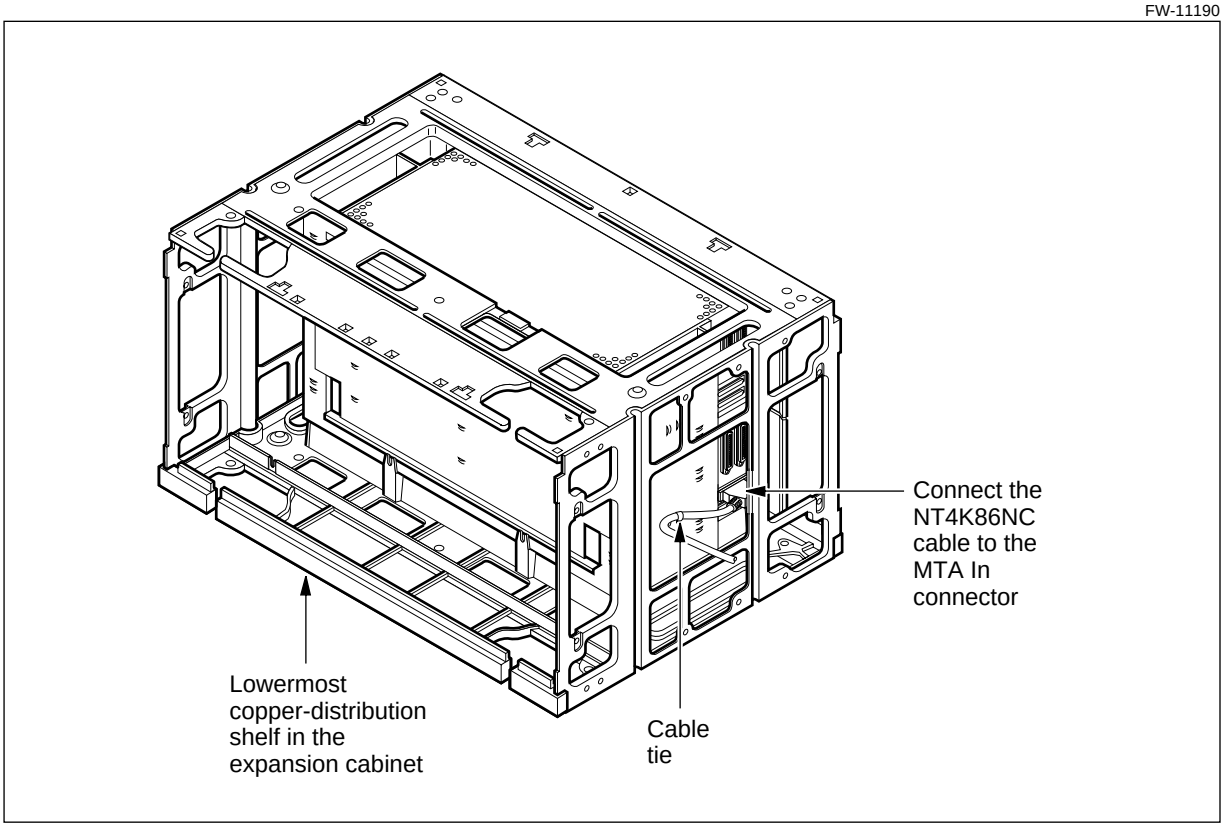
—continued—

Procedure 13-2 (continued)
Connecting the metallic test access cable

Step	Action
8	Attach one end of an NT4K86NC metallic test access cable to the CDS MTA In connector on the copper-distribution shelf you are adding, as shown in Figure 13-5.
9	Route the NT4K86NC cable out of the expansion cabinet, and into the expansion kit, as shown in Figure 13-5.
10	Route the cable through the expansion kit, and across the rear of the master MBP cabinet, as shown in Figure 13-6 on page 13-10.
11	Connect the free end of the NT4K86NC cable to the MTA Out connector of the uppermost copper-distribution shelf in the master cabinet, as shown in Figure 13-6 on page 13-10.
12	Secure the cable in place with cable ties at the locations shown in Figure 13-5 and Figure 13-6 on page 13-10.
13	Secure the cable in place with cable ties at the locations shown in Figure 13-4 on page 13-8. You have completed this procedure. Do not continue.

Figure 13-5
Connecting an NT4K86NC metallic test access cable in the expansion cabinet

FW-11190

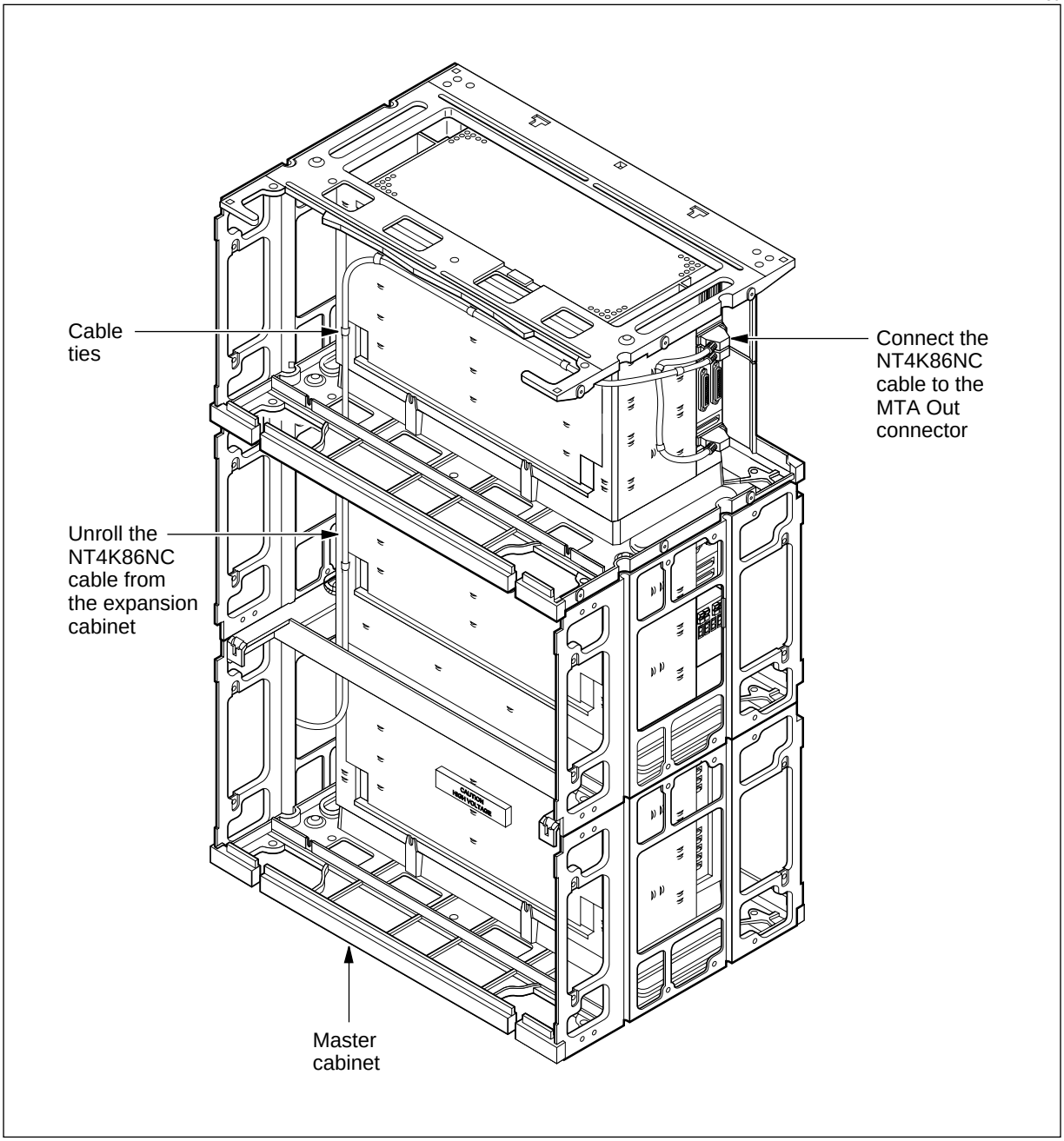


—continued—

Procedure 13-2 (continued)
Connecting the metallic test access cable

Figure 13-6
Connecting an NT4K86NC metallic test access cable in the master cabinet

FW-11186



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Procedure 13-3
Connecting the D/VT link access cables

Use this procedure to connect NT4K82DA to DG D/VT link access cables to a copper-distribution shelf that has been added to an existing system.

Requirements

The following tools and materials are required:

- cable ties
- side cutters

Action

Step	Action

1 Using the following table select the D/VT link access cable for the copper-distribution shelf you are going to install.

Cabinet	Number of the CDS you are installing	Use the following cable
master cabinet	1	NT4K82DA
	2	NT4K82DB
	3	NT4K82DC
	4	NT4K82DD
	5	NT4K82DE
expansion cabinet	4	NT4K82DD
	5	NT4K82DE
	6	NT4K82DF
	7	NT4K82DG

2 Feed two D/VT link access cables from the left rear of the master cabinet to the front of the cabinet, at the level of the ABM shelf.

3 At the front of the master cabinet, connect the D/VT link access cables to the CDS A and B connectors on the right side of the ABM shelf. If the copper-distribution shelf you are installing is CDS 1, attach the cable to the CDS 1A and CDS 1B connectors on the ABM shelf; if the shelf you are installing is shelf 2, attach the cable to connectors CDS 2A and CDS 2B, and so on.

—continued—

Procedure 13-3 (continued)
Connecting the D/VT link access cables

Step	Action
4	Go to one of the following steps according to the cabinet in which the copper-distribution shelf is installed:

If	Then go to
the master cabinet	step 5
the expansion cabinet	step 8

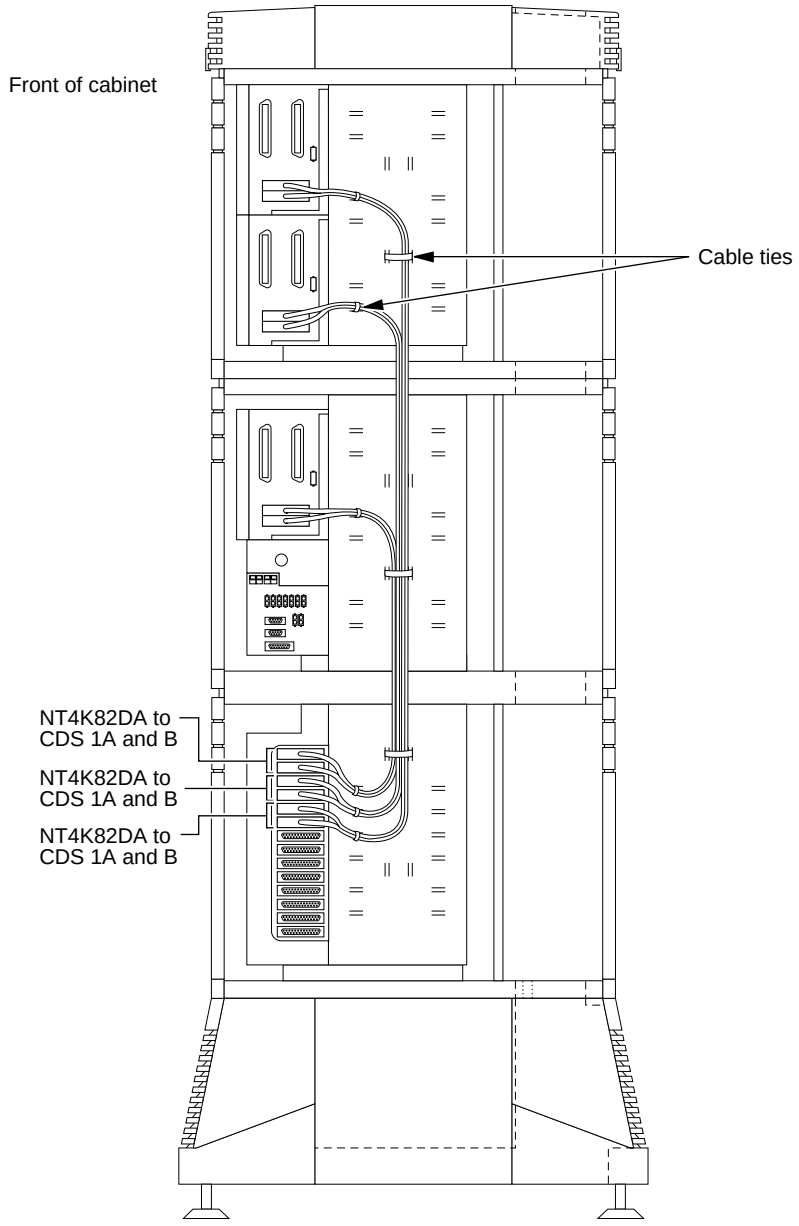
5	At the rear of the master cabinet, route the D/VT link access cable up the left side of the cabinet, as shown in Figure 13-7 on page 13-13.
6	Attach the cables to the A and B connectors on the copper-distribution shelf, as shown in Figure 13-7 on page 13-13.
7	Secure the cables with cable ties at the locations shown in Figure 13-7 on page 13-13. Do not continue, you have completed this procedure.
8	At the rear of the master cabinet, uncoil the D/VT link access cables, and route them across the lowermost expansion kit, and into the expansion cabinet, as shown in Figure 13-8 on page 13-14.
9	Route the cables up the left side of the expansion cabinet and attach the A and B connectors of the cables to the A and B connectors on the copper-distribution shelf, as shown in Figure 13-8 on page 13-14.
10	Secure the cables to the expansion cabinet with cable ties as the locations shown Figure 13-8 on page 13-14.

—continued—

Procedure 13-3 (continued)
Connecting the D/VT link access cables

Figure 13-7
Connecting the D/VT link access cables to a copper-distribution shelf in the master cabinet

FW-10943



Note: This figure is only intended to show routing of the A and B link access cables. There may be more or fewer copper-distribution shelves in the cabinet, than are shown in this illustration.

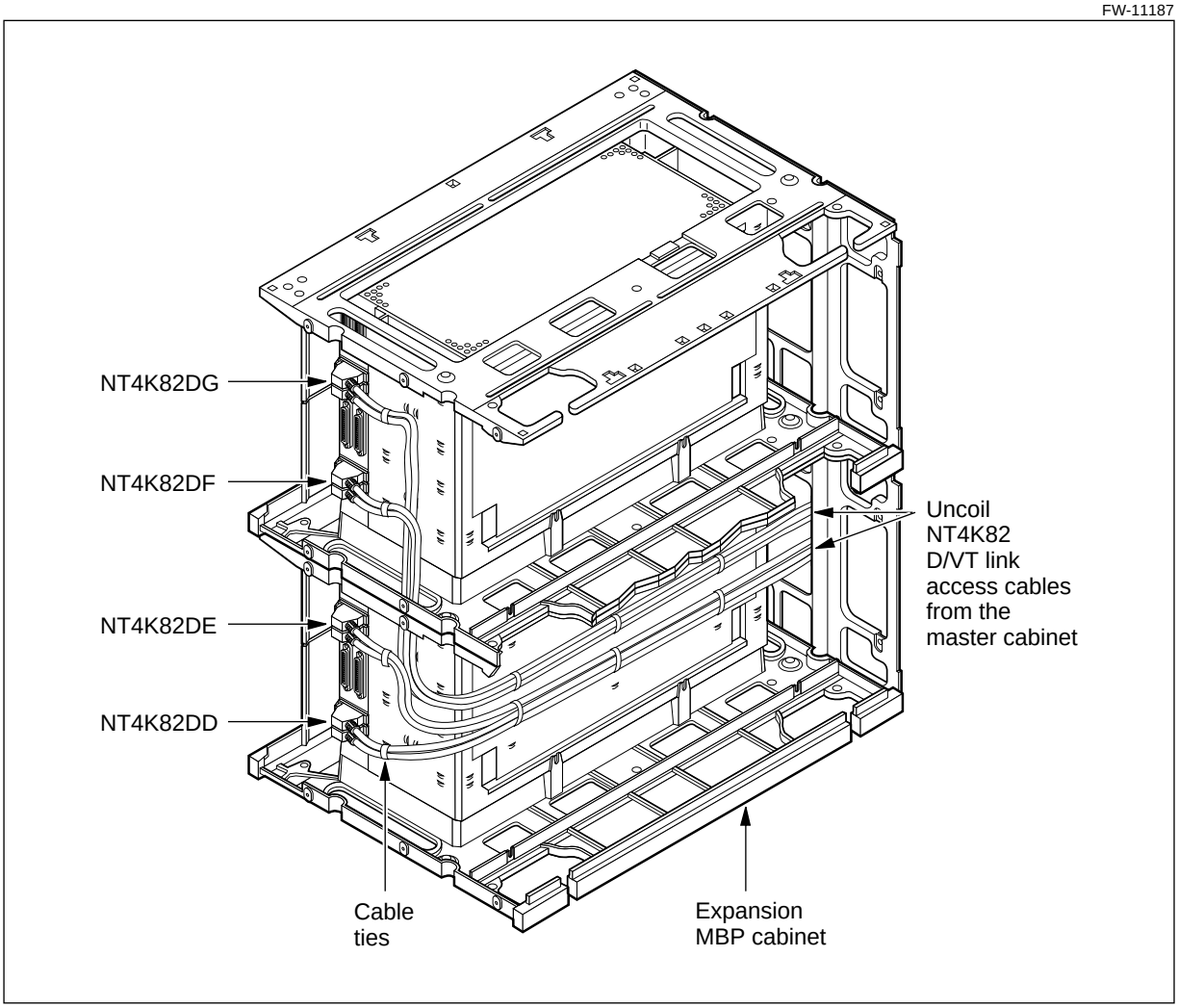
—continued—

Procedure 13-3 (continued)
Connecting the D/VT link access cables

Step	Action
11	At the rear of the master cabinet, uncoil the D/VT link access cables, and route them across the lowermost expansion kit, and into the expansion cabinet, as shown in Figure 13-8.
12	Route the cables up the left side of the expansion cabinet and attach the A and B connectors of the cables to the A and B connectors on the copper-distribution shelf, as shown in Figure 13-8.
13	Secure the cables to the expansion cabinet with cable ties as the locations shown Figure 13-8.

Figure 13-8
Connecting the D/VT link access cables to a copper-distribution shelf in the expansion cabinet

FW-11187

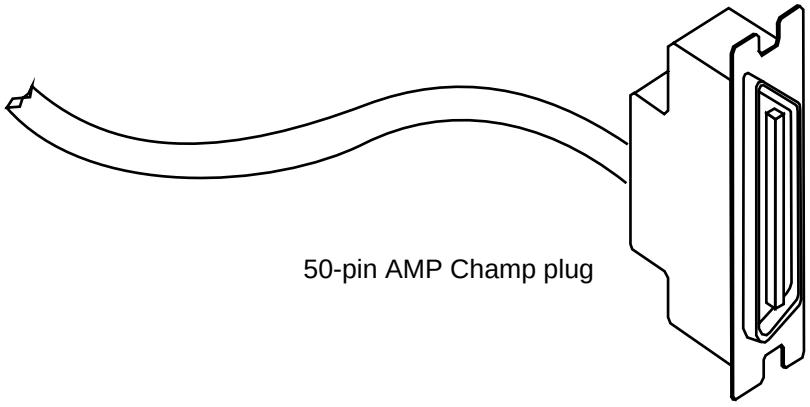


—end—

Procedure 13-4
Connecting the VF cables

Use this procedure to install VF cables (NT4K85FH, FJ, FK, FL, FM, or FN) from a copper-distribution shelf to the main distribution frame.

NT4K85FH, FJ, FK, FL, FM or FN



25-pair twisted 24 AWG solid wire connectorized at one end with an AMP Champ plug, available in the following lengths:

15 m	(50 ft)	NT4K85FL
31 m	(100 ft)	NT4K85FH
46 m	(150 ft)	NT4K85FM
61 m	(200 ft)	NT4K85FJ
76 m	(250 ft)	NT4K85FN
91 m	(300 ft)	NT4K85FK

Requirements

The following tools are required:

- cable cutters
- cable ties
- wire-wrap tool or BIX connector tool for establishing connections to a main distribution frame
- needle nosed pliers

—continued—

Procedure 13-4 (continued)
Connecting the VF cables

Action

Step	Action
1	For each copper-distribution shelf, route four connectorized VF cables to the front of the cabinet. Route two to the right front of the cabinet and two to the left front of the cabinet.
2	Using local office procedures, designate both ends of the four 25-pair VF cables, indicating copper-distribution shelf number, and the pair assignment. • two right cables (pairs 1 to 25, and 25 to 50) • two left cables (pairs 51 to 75, and 76 to 96, plus 4 spares)
3	Connect the two right side 25-pair connectorized VF cables to the shelf connectors, as shown in Figure 13-9 on page 13-17 for pairs 1 to 50, and secure the bail-lock latching.
4	Connect the two left side 25-pair connectorized VF cables to the shelf connectors, as shown in Figure 13-10 on page 13-18 for pairs 51 to 96 plus 4 spares, and secure the bail-lock latches.

CAUTION
Risk of damage to equipment
During the initial setup of the AccessNode copper-distribution shelves, Northern Telecom recommends that the equipment side remains disconnected from the outside plant subscriber loops (at the protection modules) until the line cards are installed and powered up. For example, when using five-pin protector modules, pull the modules out slightly, to the first detent position.

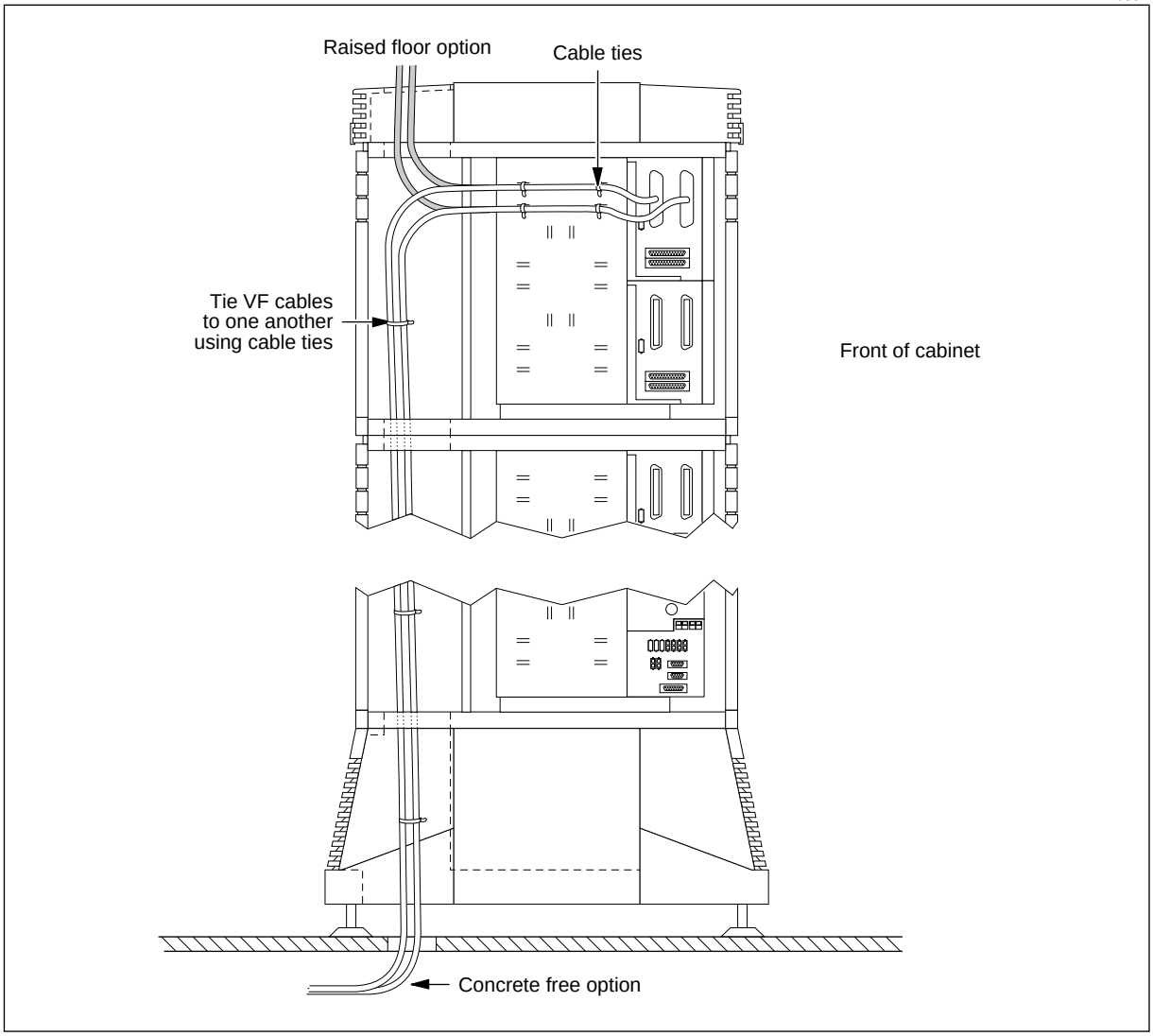
5	Dress the cable slack back into the cabinet, and secure the cables in place with cable ties, as shown in Figure 13-9 on page 13-17 and Figure 13-10 on page 13-18.

—continued—

Procedure 13-4 (continued)
Connecting the VF cables

Figure 13-9
Connecting VF pairs 1–50 to a copper-distribution shelf

FW-10894

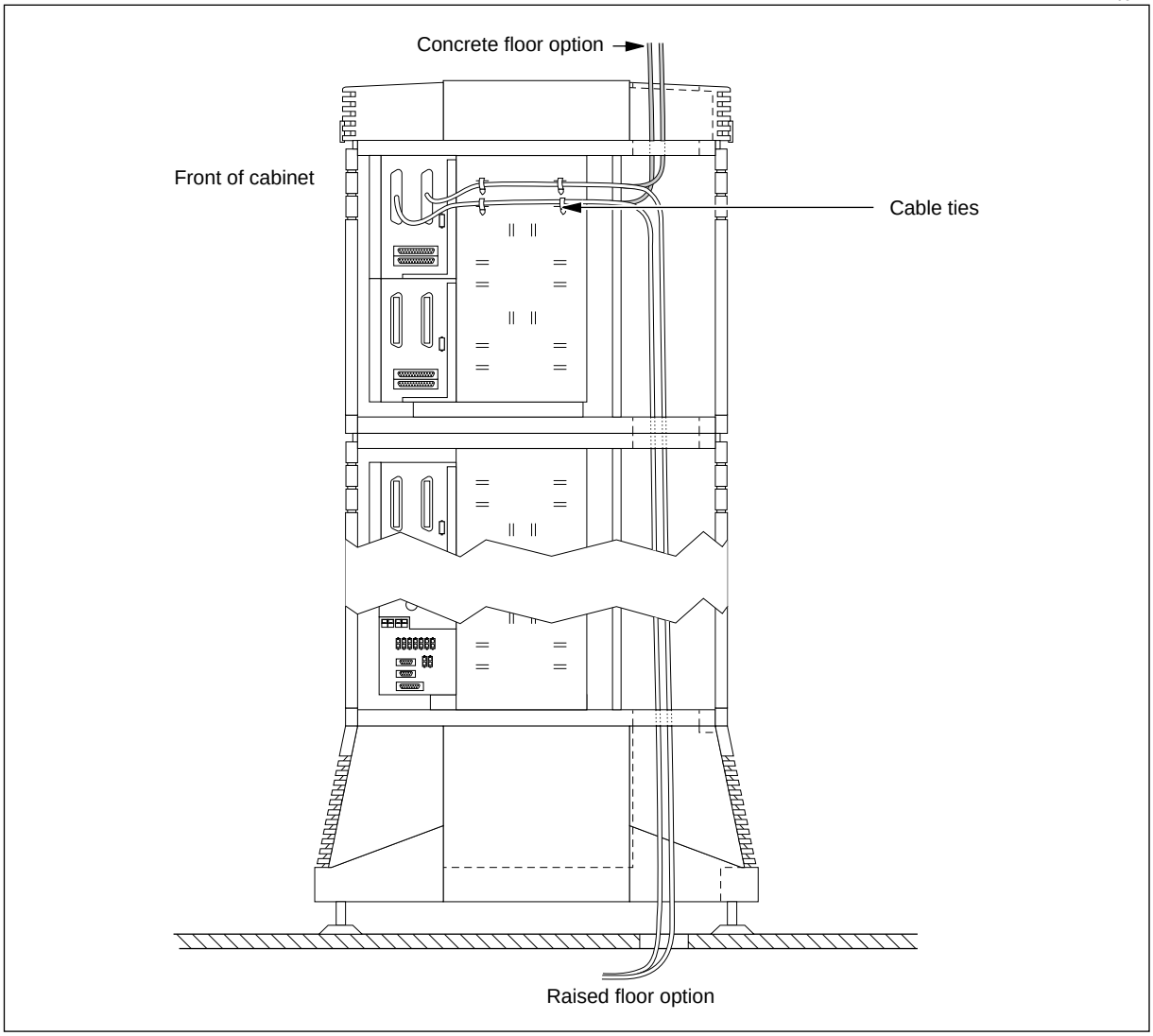


—continued—

Procedure 13-4 (continued)
Connecting the VF cables

Figure 13-10
Connecting VF pairs 51–96 plus 4 spares to a copper-distribution shelf

FW-10921



—continued—

Procedure 13-4 (continued)
Connecting the VF cables

Step	Action
6	Route the cables to the main distribution frame and terminate each VF cable to the MDF cross-connect. Refer to the following table for the pair and color code assignment of a 25-pair connectorized cable.

Table 13-1
VF cable pin and wire color code

Connector pin			Color		Connector pin			Color	
Ring	**Tip**	**Pair**	**Ring**	**Tip**	**Ring**	**Tip**	**Pair**	**Ring**	**Tip**
1	26	1	W1BL	BL1W	14	39	14	BK1BR	BR1BK
2	27	2	W1O	O1W	15	40	15	BK1S	S1BK
3	28	3	W1G	G1W	16	41	16	Y1BL	BL1Y
4	29	4	W1BR	BR1W	17	42	17	Y1O	O1Y
5	30	5	W1S	S1W	18	43	18	Y1G	G1Y
6	31	6	R1BL	BL1R	19	44	19	Y1BR	BR1Y
7	32	7	R1O	O1R	20	45	20	Y1S	S1Y
8	33	8	R1G	G1R	21	46	21	V1BL	BL1V
9	34	9	R1BR	BR1R	22	47	22	V1O	O1V
10	35	10	R1S	S1R	23	48	23	V1G	G1V
11	36	11	BK1BL	BL1BK	24	49	24	V1BR	BR1V
12	37	12	BK1O	O1BK	25	50	25	V1S	S1V
13	38	13	BK1G	G1BK					

—end—

Connecting a DSX-1 shelf and a T1 repeater shelf

This chapter contains the procedures for connecting the cables to a DSX-1 shelf and a T1 repeater shelf that have be added to an existing Modular Business Package (MBP) cabinet.

Chapter contents

This chapter contains the following information:

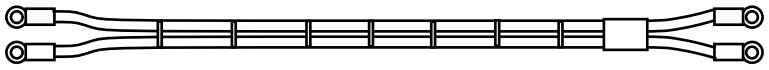
Procedure 14-1
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Use this procedure to connect an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable to the terminal block in the master MBP cabinet. The cables and their uses are as follows:

Product engineering code	Connects to the
NT4K84ZA	terminal blocks in an attached MPP cabinet
NT4K84ZB	terminal blocks in a remote MPP cabinet, or to an external source of -48 V dc power that is supplied by the customer

Perform this procedure only when the MBP cabinets are equipped with seven copper-distribution shelves, a DSX-1 shelf, and a repeater shelf. In such installations, all available circuit breakers on the BIP are used for powering the seven copper-distribution shelves. Another source of -48 V dc is required for powering the DSX-1 shelf and the repeater shelf. This source is provided from terminal blocks at the rear of the MPP cabinet or from an external source of 48 V dc power that is supplied by the customer.

NT4K84ZB



Laced construction, two conductors 14 AWG, one black, one red. Each conductor is terminated with a ring terminal for a No.10 screw and a
14 AWG conductor. This cable is available in the following lengths:

4.3 m	(15 ft)	NT4K84ZA for an attached MPP cabinets
10.7 m	(35 ft)	NT4K84ZB for a remote MPP cabinet or an external customer supplied power source.

—continued—

Procedure 14-1 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Requirements

The following tools and materials are required:

- cable ties
- NT4K84ZA or ZB power cable
- flat-bladed screwdriver, 1/4 in. wide blade

Action

Step	Action
1	At the rear of the master cabinet and the MPP cabinet (if one exists), remove the safety covers from the terminal blocks and store them for re-installation.
2	Do one of the following:

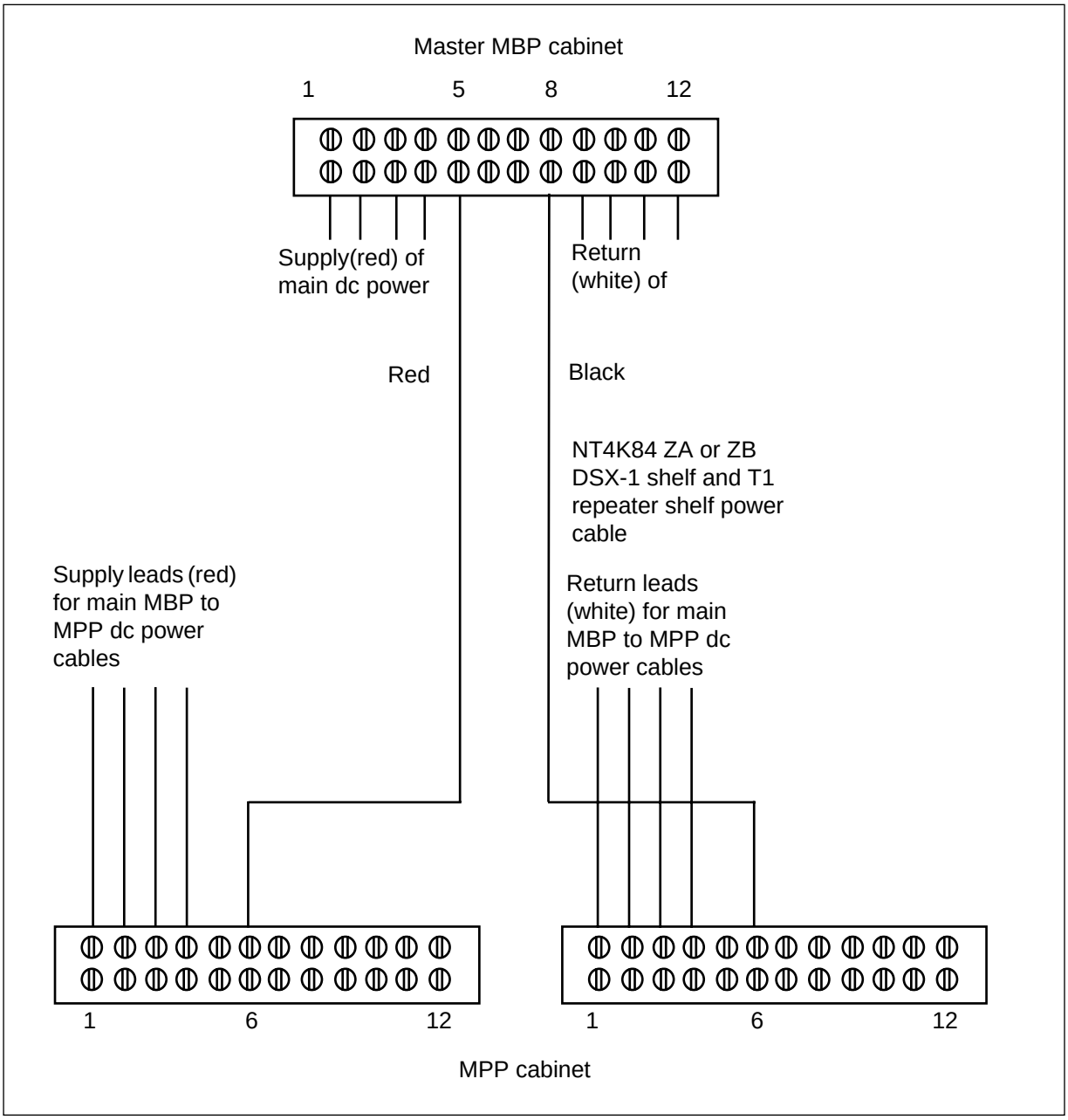
If you are connecting	Then go to
an NT4K84ZA cable to an attached MPP cabinet	step 3
an NT4K84ZB cable to a remote MPP cabinet	step 8
an NT4K84ZB cable to an external customer-supplied power source	step 14

3	Connect the NT4K84ZA cable to the terminal blocks at the rear of the MPP cabinet, as shown in Figure 14-1 on page 14-4.
4	Route the cable from the MPP cabinet to the master MBP cabinet as shown in Figure 14-2 on page 14-5.
5	Connect the NT4K84ZA cable to the terminal block in the master MBP cabinet, as shown in Figure 14-1 on page 14-4.
6	Dress the cable into place and secure it with cable ties, as shown in Figure 14-2 on page 14-5.
7	Reinstall the safety covers on the terminal blocks.

—continued—

Procedure 14-1 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Figure 14-1
Connecting a DSX-1 shelf and T1 repeater cable to terminal blocks in the MPP cabinet and the master cabinet

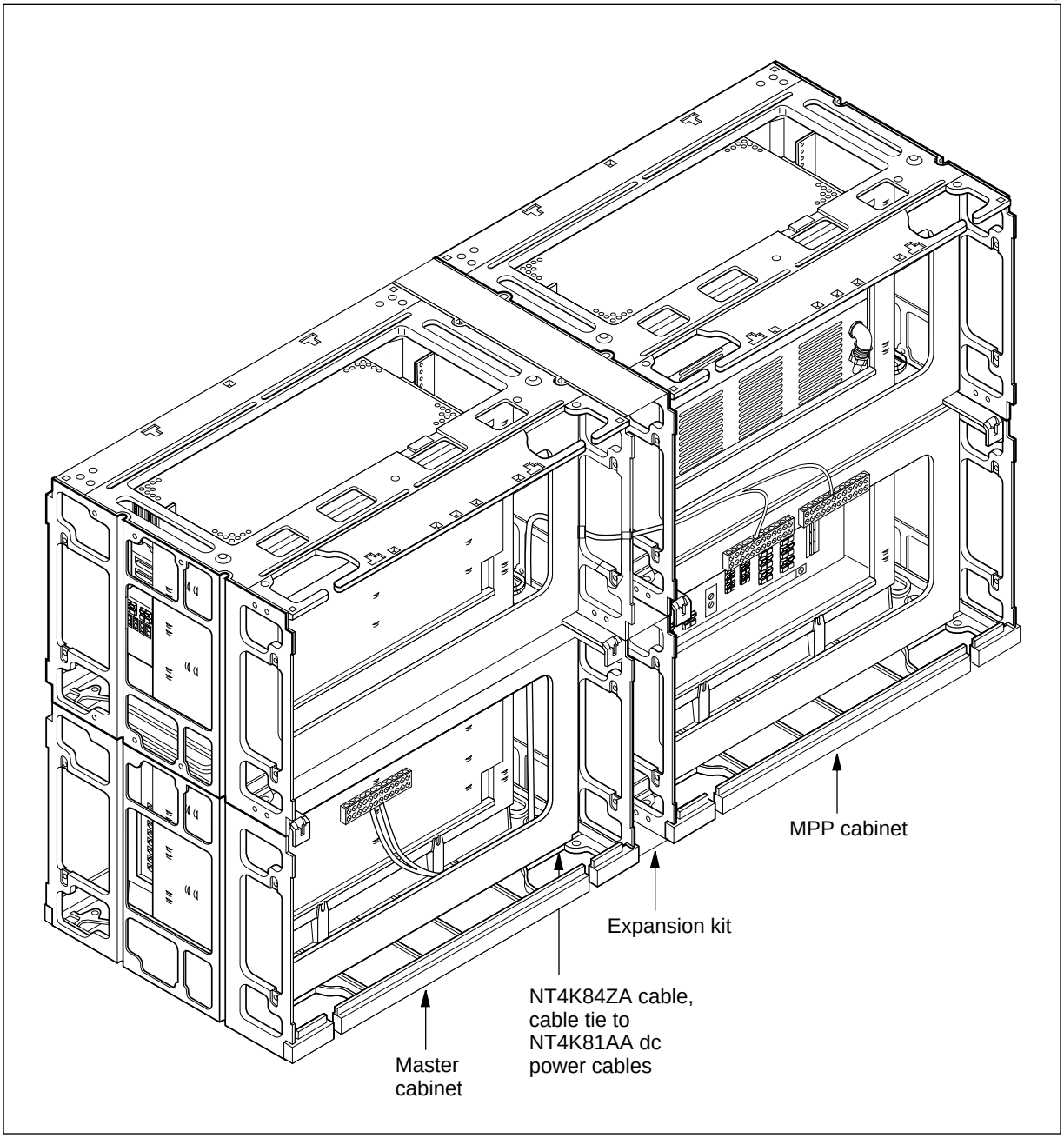


—continued—

Procedure 14-1 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Figure 14-2
Routing an NT4K84ZA cable between the MPP cabinet and the master MBP cabinet

FW-11179



—continued—

Procedure 14-1 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Step	Action

8 Connect the NT4K84ZB cable to the terminal blocks at the rear of the MPP cabinet, as shown in Figure 14-1 on page 14-4.

9 Are you installing the cabinets on a raised floor or on a concrete floor?

If you are installing them	Then go to
on a raised floor	step 10
on a concrete floor	step 11

10 Check the local electrical codes. They may require you to install the power cable in conduit.

If the codes	
require the use of conduit	Fish the cable through the 4-in. conduit that houses the four -48 V dc main power cables. Go to step 12.
do not require the use of conduit	Go to step 11.

11 Route the cable from the MPP cabinet to the master cabinet. For routing of the NT4K84ZB cable in the MPP cabinet, see Figure 14-3 on page 14-7 and for routing of the cable in the MBP cabinet, see Figure 14-4 on page 14-8.

12 Connect the NT4K84ZB cable to the terminal block in the master MBP cabinet, as shown in Figure 14-1 on page 14-4.

13 Reinstall the safety covers on the terminal blocks. You have completed this procedure. Do not continue.

14 Connect the NT4K84ZB cable to the terminal block at the rear of the master MBP cabinet, as shown Figure 14-1 on page 14-4.

15 Check the local electrical codes. They may require you to install the power cable in conduit.

If the codes	Then
require the use of conduit	Fish the cable through the 4-in. conduit that houses the four -48 V dc main power cables. Go to step 17.
do not require the use of conduit	Go to step 16.

16 Route the cable to the customer-supplied source of -48 V dc power.

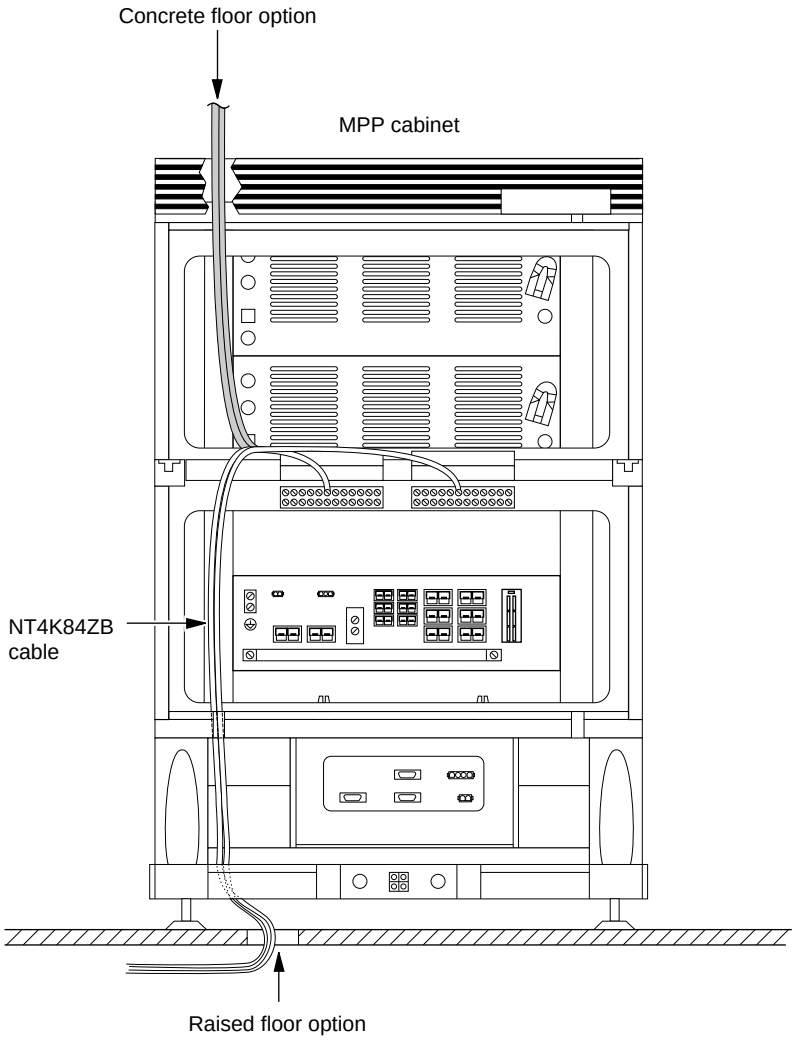
17 At the customer-supplied source of -48 V dc power, connect the red lead to the -48 V dc supply and the black lead to the return.

—continued—

Procedure 14-1 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Figure 14-3
Routing an NT4K84ZB cable in the MPP cabinet

FW-11180



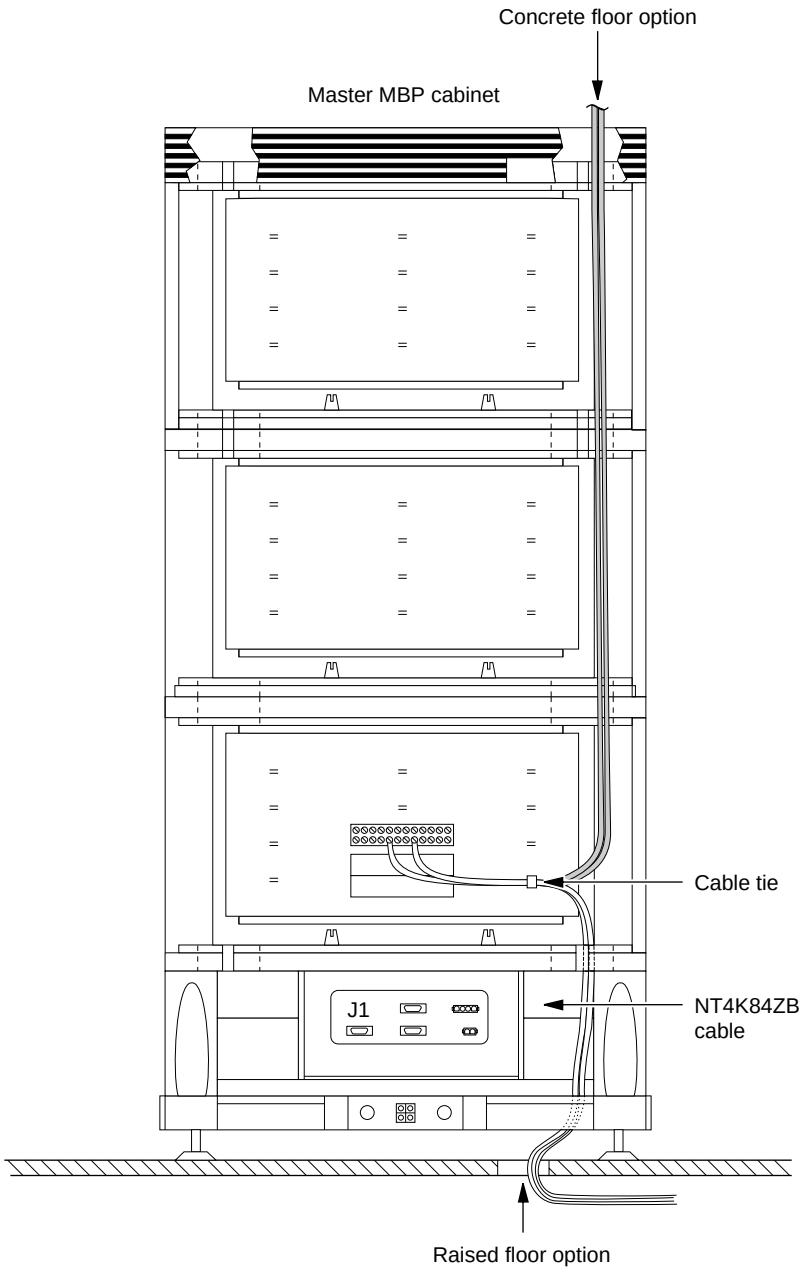
Note: Local electrical codes may require that the power cables be enclosed in conduit.

—continued—

Procedure 14-1 (continued)
Connecting an NT4K84ZA or ZB DSX-1 shelf and T1 repeater shelf power cable

Figure 14-4
Routing an NT4K84ZB cable in the master MBP cabinet

FW-10999



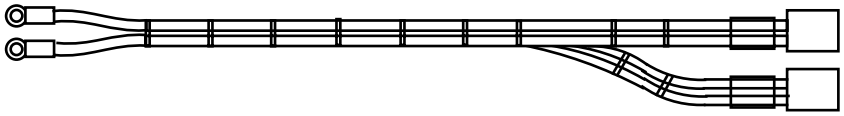
Note: Local electrical codes may require that the power cables be enclosed in conduit.

—end—

Procedure 14-2
Connecting an NT4K81DA DSX-1 shelf and T1 repeater shelf power cable

Use this procedure to connect an NT4K81DA DSX-1 shelf and repeater shelf power cable from the terminal block in the master MBP cabinet to the DSX-1 shelf and the repeater shelf.

NT4K81DA



Laced bifurcated construction. At one end, two conductors 14 AWG, one black, one red, with ring terminals for connection to the terminal block in the master MBP cabinet. At the other end, two-pin Mate-n-Lok connectors for connection to the NT4K84SA and NT4K84TA cables on the repeater shelf and the DSX-1 shelf.

Requirements

The following tools and materials are required:

- cable ties
- NT4K81DA power cable
- flat-bladed screwdriver, 1/4-in. wide blade

—continued—

Procedure 14-2 (continued)
Connecting an NT4K81DA DSX-1 shelf and T1 repeater shelf power cable

Action

Step	Action

1 Connect the NT4K81DA cable to the terminal block in the rear of the master MBP cabinet, as shown Figure 14-5 on page 14-11.

2 Go to one of the following steps:

If the DSX-1 shelf and the T1 repeater shelf	Then go to
are in the expansion MBP cabinet	step 3
are in the master MBP cabinet	step 9

3 Run the cable out the left side of the master MBP cabinet into the expansion cabinet, as shown in Figure 14-6 on page 14-12.

4 Route the NT4K81DA cable up the right side of the expansion cabinet and up to the DSX-1 shelf and the T1 repeater shelf, as shown in Figure 14-7 on page 14-13.

5 Uncoil the NT4K84SA cable from the left rear of the expansion cabinet and run it across to the right side of the cabinet, as shown in Figure 14-7 on page 14-13.

6 Connect one of the two Mate-N-Lok connectors on the NT4K81DA cable to the NT4K84SA cable, as shown in Figure 14-7 on page 14-13.

7 Connect the second Mate-N-Lok connector to the NT4K84TA cable that is attached to the DSX-1 shelf, as shown Figure 14-7 on page 14-13.

8 Install cable ties through the lances in the locations shown in Figure 14-7 on page 14-13 to secure the cables. Do not continue, you have completed this procedure.

9 Route the NT4K81DA cable up the right side of the cabinet and up to the DSX-1 shelf and the repeater shelf, as shown in Figure 14-8 on page 14-14.

10 Uncoil the NT4K84SA cable from the left rear side of the master MBP cabinet, and run it across to the right side of the cabinet, as shown in Figure 14-8 on page 14-14.

11 Connect one of the two Mate-N-Lok connectors to the NT4K84SA cable, as shown in Figure 14-8 on page 14-14.

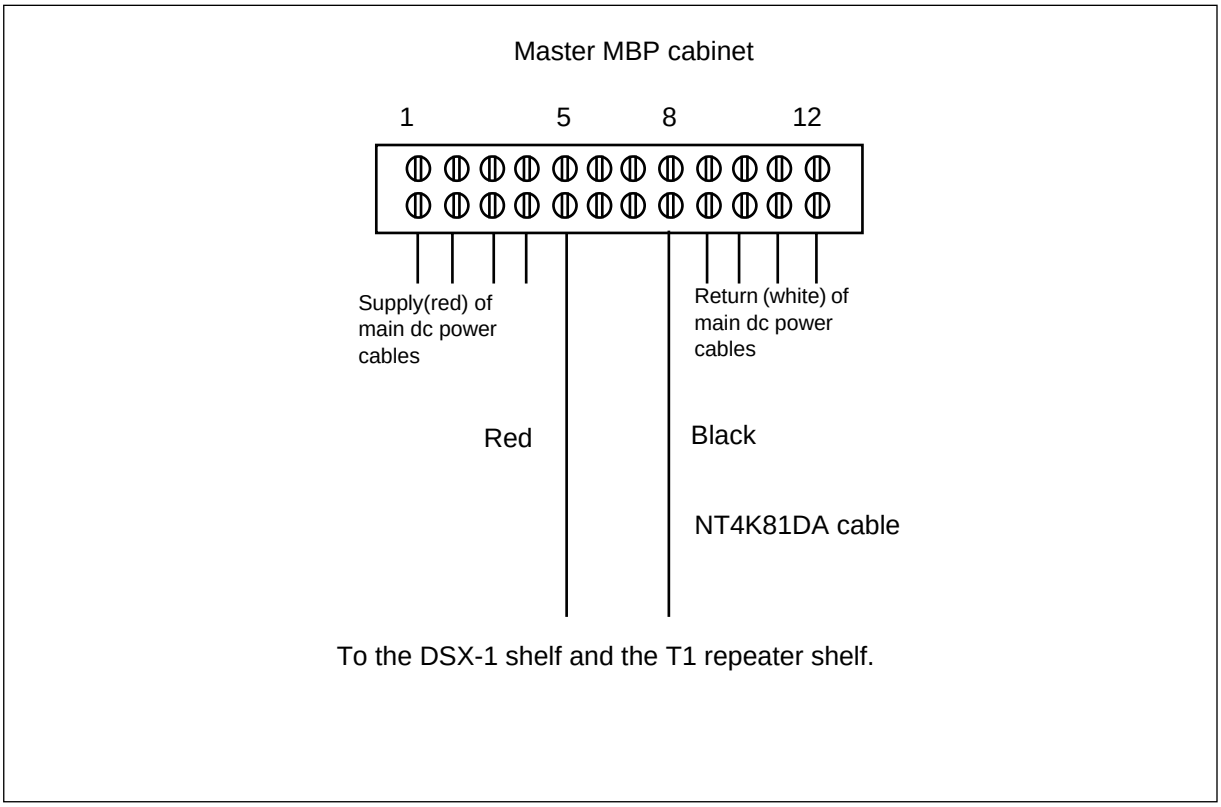
12 Connect the second Mate-N-Lok connector to the NT4K84TA cable that is attached to the DSX-1 shelf, as shown in Figure 14-8 on page 14-14.

13 Install cable ties through the lances in the locations shown in Figure 14-8 on page 14-14 to secure the cable.

—continued—

Procedure 14-2 (continued)
Connecting an NT4K81DA DSX-1 shelf and T1 repeater shelf power cable

Figure 14-5
Connecting an NT4K8DA DSX-1 shelf and a T1 repeater shelf power cable to the terminal block in the MBP cabinet

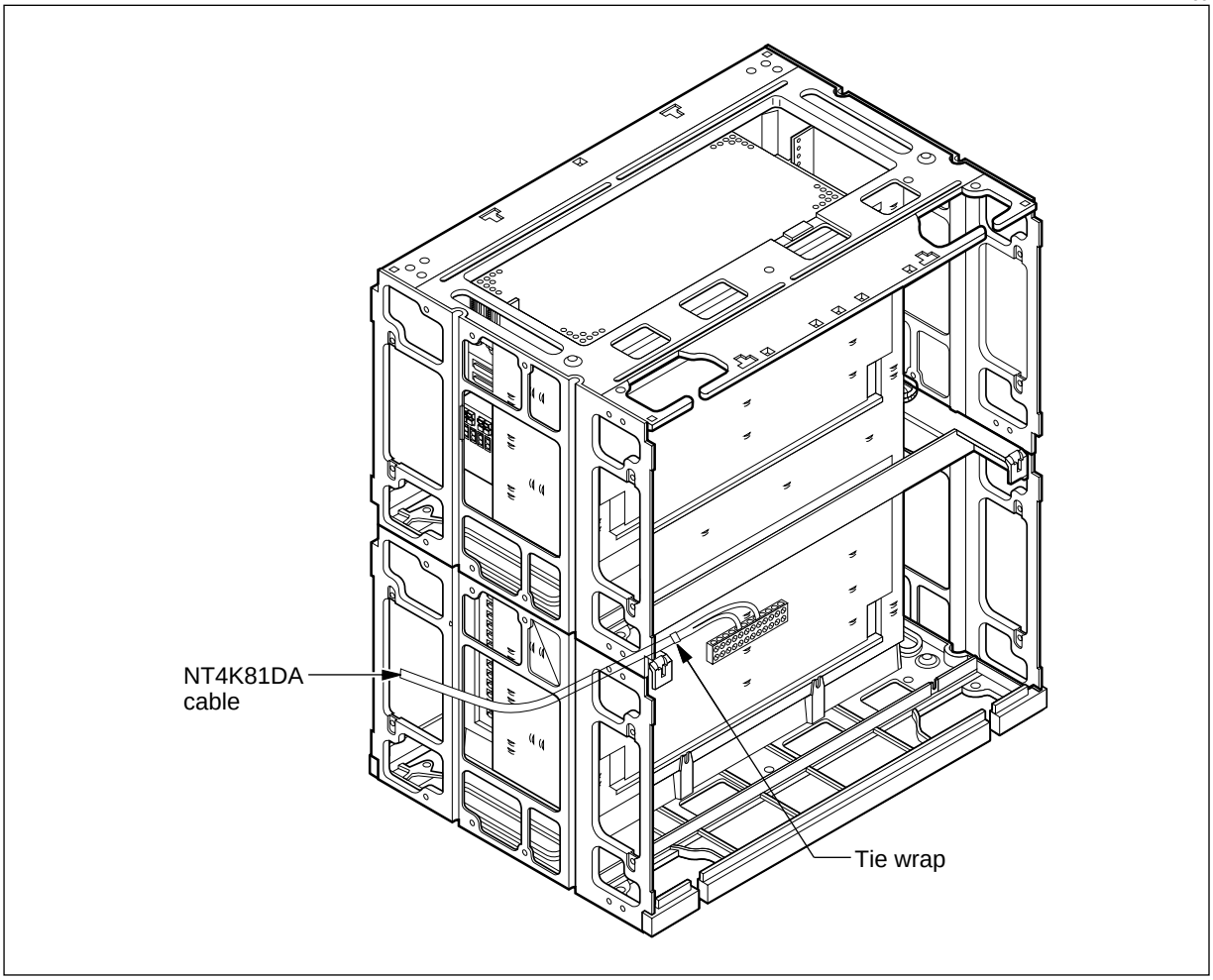


—continued—

Procedure 14-2 (continued)
Connecting an NT4K81DA DSX-1 shelf and T1 repeater shelf power cable

Figure 14-6
Routing an NT4K81DA DSX-1 shelf and T1 repeater shelf cable in the master MBP cabinet

FW-11185

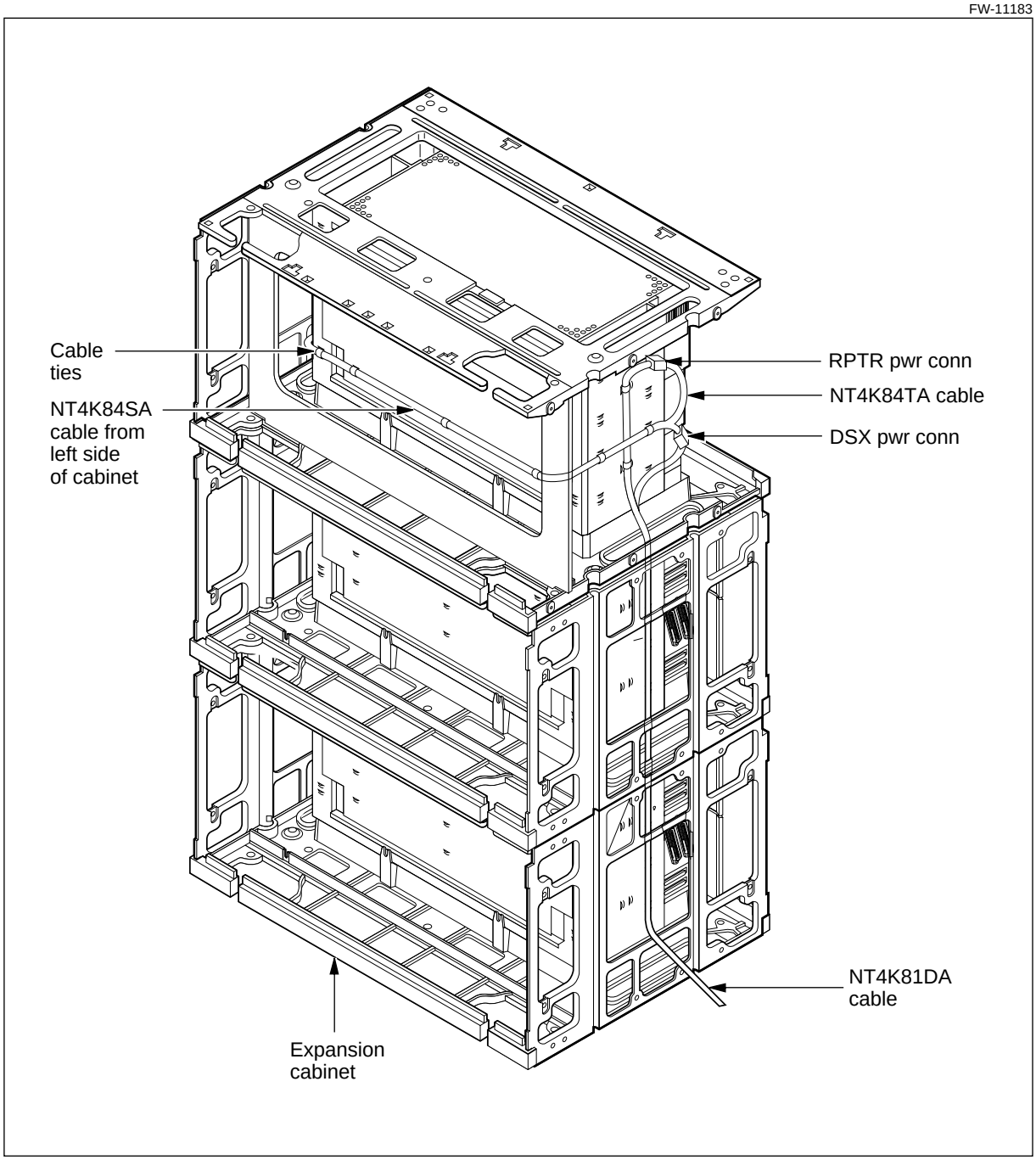


—continued—

Procedure 14-2 (continued)
Connecting an NT4K81DA DSX-1 shelf and T1 repeater shelf power cable

Figure 14-7
Routing NT4K81DA and NT4K84SA cables, DSX-1 and T1 repeater shelves in expansion cabinet

FW-11183

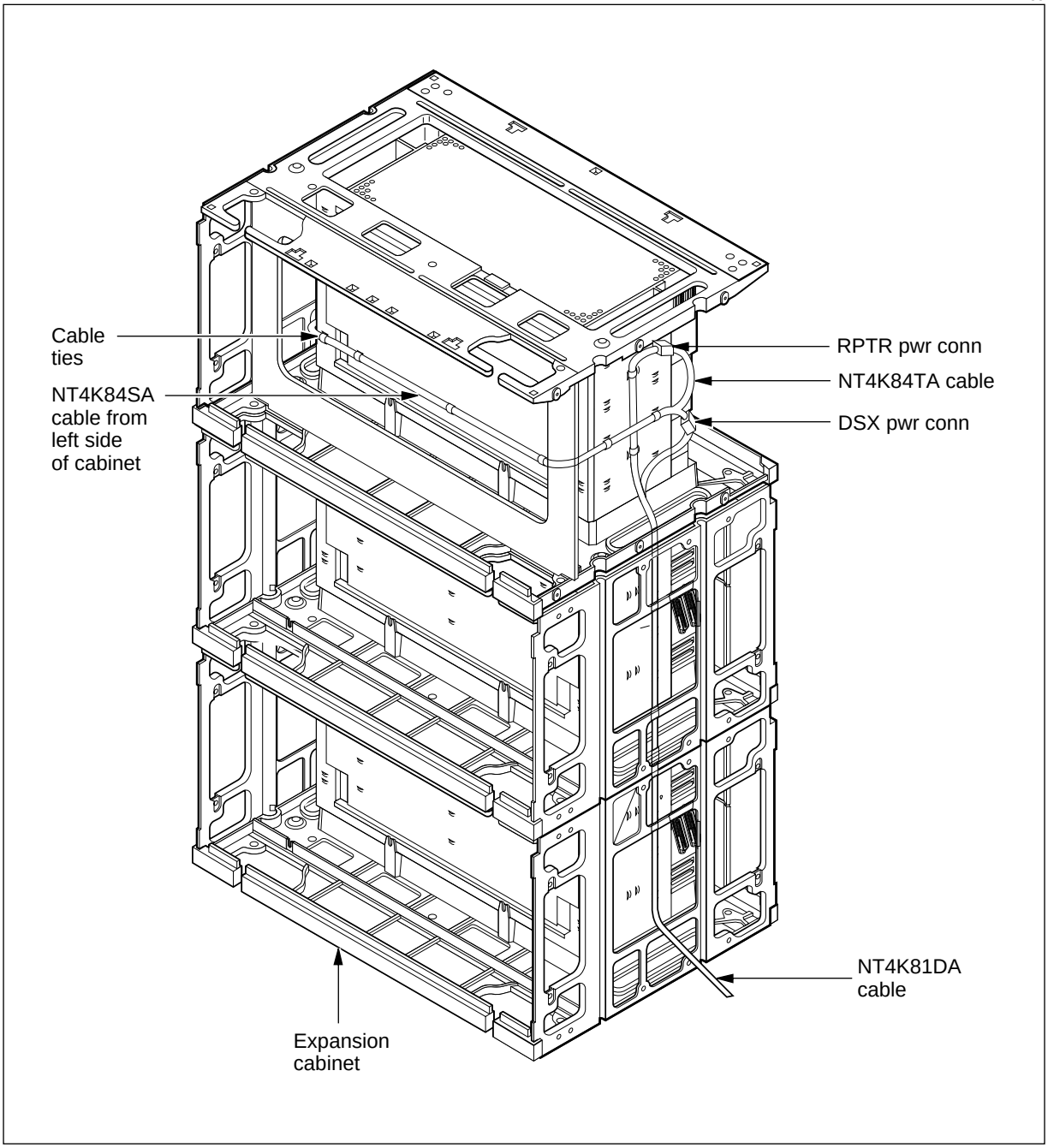


—continued—

Procedure 14-2 (continued)
Connecting an NT4K81DA DSX-1 shelf and T1 repeater shelf power cable

Figure 14-8
Routing an NT4K81DA cable to the SEM containing the DSX-1 shelf and the T1 repeater shelf

FW-11183



—end—

Procedure 14-3
Connecting dc power from the power distribution harnesses in an MBP cabinet

Use this procedure to connect dc power to a DSX-1 shelf and a T1 repeater shelf using the NT4K84HA dc power distribution harnesses in a master MBP cabinet or the NT4K84HB dc power distribution harnesses in an expansion MBP cabinet.

Perform this procedure only when the MBP cabinets are equipped with from one to six copper-distribution shelves. In such installations, there are unused connectors on the dc distribution harnesses in the MBP cabinet in which the DSX-1 shelf and T1 shelf are being installed. This procedure attaches these unused connectors to cables that are pre-connected to the shelves to provide a source of -48 V dc power.

Note: CDS 7 powering is used to power the DSX and the repeater shelves when the seventh copper-distribution shelf is not installed.

Requirements

The following tools and materials are required:

- cable ties

Action

Step	Action
1	Uncoil the power distribution harness at the left side of the cabinet in which the DSX-1 shelf and the T1 repeater shelf are installed.
2	Route the harness up to the T1 repeater shelf, as shown in Figure 14-9 on page 14-17.
3	Attach the connector of the power distribution harness to the NT4K84SA cable on the T1 repeater shelf, as shown in Figure 14-9 on page 14-17. If the T1 repeater shelf is installed in place of CDS 4, attach connector CDS 4 to the cable that is pre-connected to the T1 repeater shelf. If the T1 repeater shelf is installed in place of CDS 5, attach connector CDS 5, and so on.

—continued—

Procedure 14-3 (continued)
Connecting dc power from the power distribution harnesses in an MBP cabinet

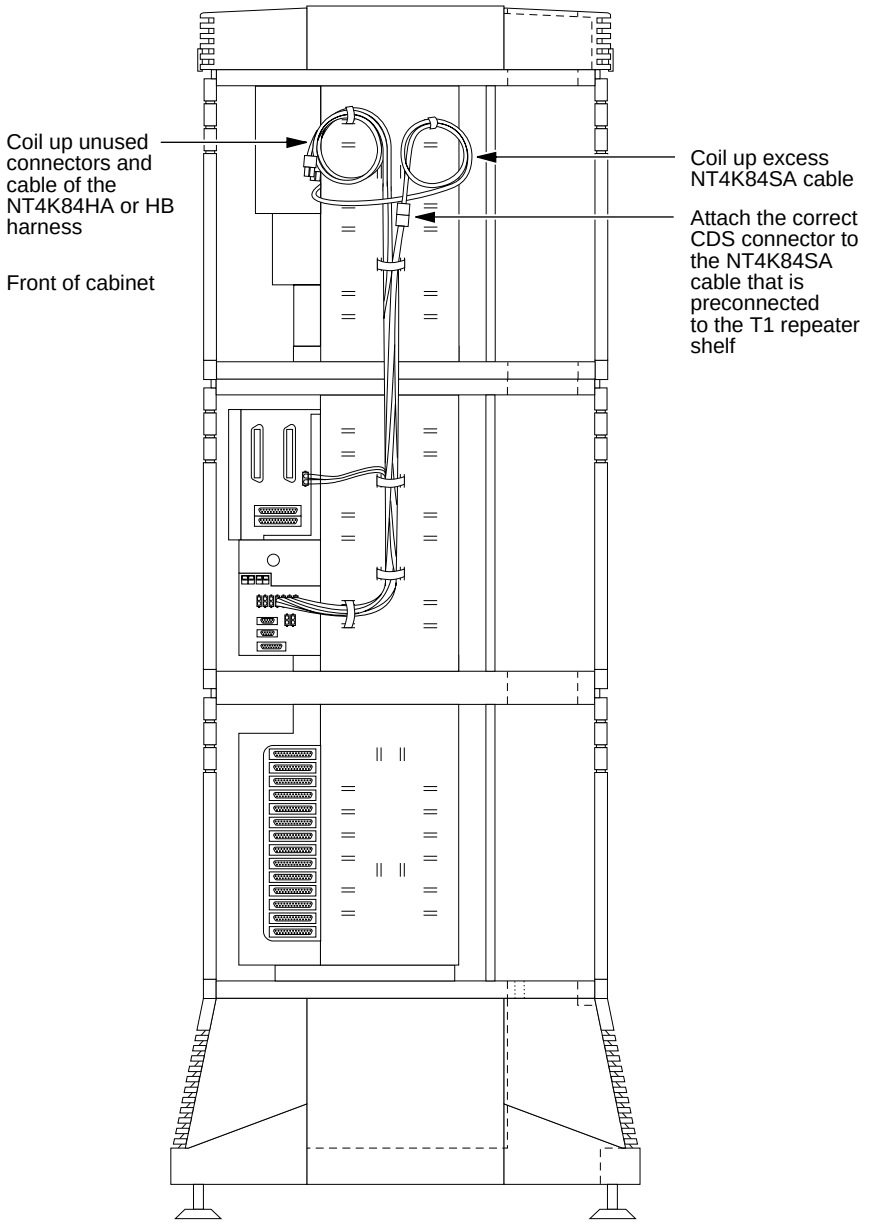
Step	Action
4	Coil up unused connectors and cable of the dc distribution harness, and secure them to the cabinet with a cable tie, as shown in Figure 14-9 on page 14-17.
5	Uncoil the power distribution harness at the right side of the cabinet.
6	Route the harness up to the DSX-1 shelf as shown in Figure 14-10 on page 14-18.
7	Attach the connector of the power distribution harness to the NT4K84TA cable on the DSX-1 shelf, as shown in Figure 14-10 on page 14-18. If the DSX-1 repeater shelf is installed in place of CDS 4, attach connector CDS 4 to the cable that is pre-connected to the DSX-1 shelf. If the DSX-1 shelf is installed in place of CDS 5, attach connector CDS 5, and so on.
8	Coil up unused connectors and cable of the dc distribution harness, and secure them to the cabinet with a cable tie, as shown in Figure 14-10 on page 14-18.

—continued—

Procedure 14-3 (continued)
Connecting dc power from the power distribution harnesses in an MBP cabinet

Figure 14-9
Connecting the dc harnesses to the T1 repeater shelf

FW-10944

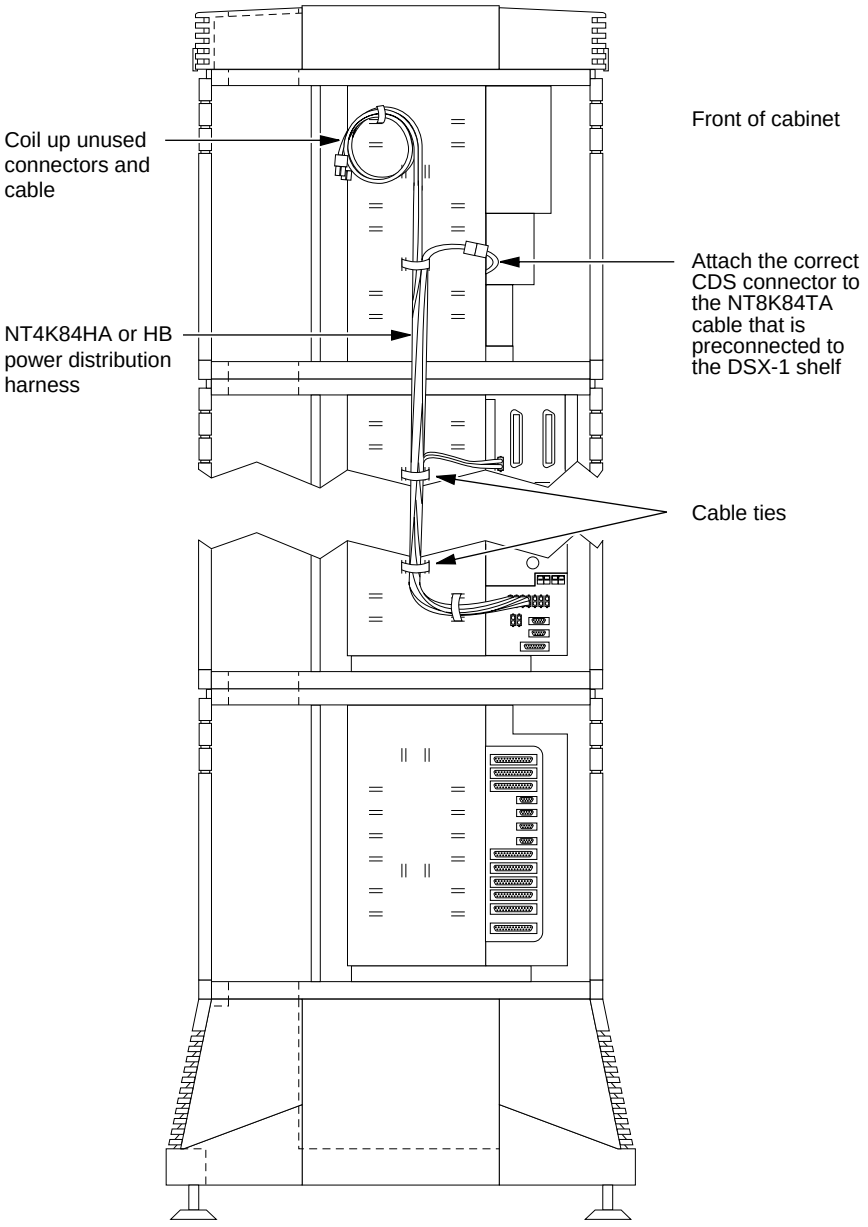


—continued—

Procedure 14-3 (continued)
Connecting dc power from the power distribution harnesses in an MBP cabinet

Figure 14-10
Connecting the dc distribution harnesses to the DSX-1 shelf

FW-10945

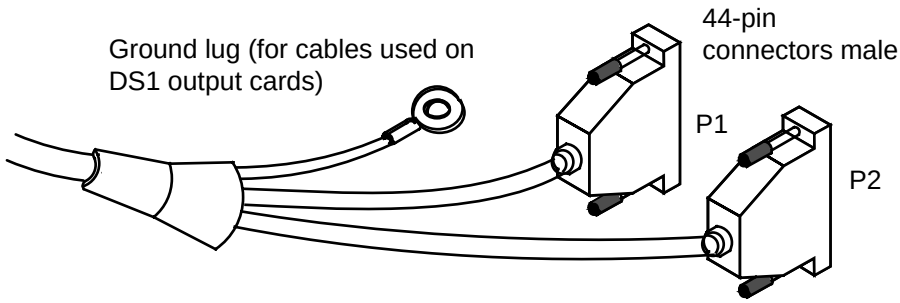


—end—

Procedure 14-4
Connecting the DS1 pigtails

Use this procedure to connect NT4K85UA DS1 pigtails from an internal DSX-1 shelf installed at the top of a master cabinet or at the top of the expansion Modular Business Package (MBP) cabinet to the access bandwidth manager (ABM) shelf in the master MBP cabinet.

NT485UA DS1 pigtails



NT-613 30-pair, twisted 22 AWG solid wires with overall shielding. One end is split (15 pairs each) and connected to two 44-pin connectors (terminating 14 pairs each). These connectors attach to DS1 input and DS1 output cards in the I/O area of the ABM shelf. The other end is wire-wrapped to the DSX-1 shelf at the factory.

For cables used on DS1 output connectors, a ground lug wire provides connection of the outer shield to the ABM shelf frame ground. The ground lug wire is not used for DS1 input connectors.

When a field expansion module (FEM) containing a DSX-1 shelf and a T1 repeater shelf is shipped from the factory, the DS1 pigtails are pre-connected to wire-wrap pins on the DSX-1 shelf. Wire-wrap cross connections and the cables that connect the DSX-1 shelf to the T1 repeater shelf are also pre-connected at the factory.

At the installation site, the DS1 input and DS1 output cards are installed in the ABM shelf, the DS1 pigtails are uncoiled from the DSX-1 shelf, routed to the ABM shelf, and attached to the DS1 input and DS1 output cards.

Two different installation scenarios exist. In one, the DSX-1 shelf and T1 repeater shelf are located in the expansion MBP cabinet. In the other, the two shelves are located in the master MBP cabinet. This procedure supports both scenarios.

—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

When the DSX-1 shelf and T1 repeater shelf are located in the expansion cabinet, the DS1 pigtails are uncoiled from the expansion cabinet at the installation site, routed to the ABM shelf, the I/O cards are installed, and the cable connectors of the DS1 pigtails are attached to them.

When the DSX-1 shelf and the T1 repeater shelf are contained in the master cabinet, the DS1 pigtails are pre-routed at the factory. At the installation site, the I/O cards are inserted into the ABM shelf and the pre-routed DS1 pigtails are connected to them.

Two working mappers installed in mapper slot positions on the ABM shelf are required for installations using an internal DSX-1 shelf, plus one protection mapper.

When installing DS1 cables, do not mix transmit (DS1 input) and receive (DS1 output) connections within the same cable: dedicate each cable to transmit or receive functions, but not both.

Figure 14-11 on page 14-21 shows the possible locations of the mappers and I/O cards. Table 14-1 shows the slots where mappers can be installed in an MBP cabinet at the remote fiber terminal (RFT) and also shows the I/O card slots that correspond to each of the mappers.

Table 14-1
Relationship between mapper slots and I/O card slots

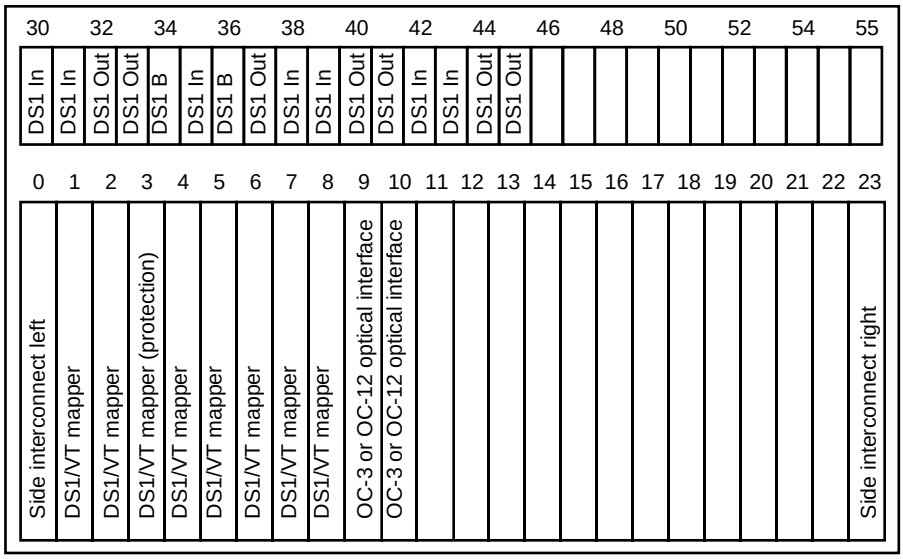
Mapper slot	Input card slot	Output card slot
1	30	32
2	31	33
3 (protection)	34 (protection bridge card)	36 (protection bridge card)
4	35	37
5	38	40
6	39	41
7	42	44
8	43	45

Note: Mapper slots 5–8 are used for the OPC when it is installed in the ABM shelf. These slots are then unavailable for mapper cards.

—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

Figure 14-11
Typical configuration of an ABM shelf



Mappers		I/O cards			
DS1	1	DS1 In	30	DS1 Out	32
DS1	2	DS1 In	31	Ds1 Out	33
DS1 P	3	DS1 B	34	DS1 B	36
DS1	4	DS1 In	35	DS1 Out	37
DS1	5	DS1 In	38	DS1 Out	40
DS1	6	DS1 In	39	DS1 Out	41
DS1	7	DS1 In	42	DS1 Out	44
DS1	8	DS1 In	43	DS1 Out	45

Note: Mapper slots 5–8 are used for the OPC when it is installed in the ABM.

—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

Pin-out details

Table 14-2 on page 14-23 and Table 14-3 on page 14-24 contain pin-outs for DS1 pigtails in installations that are equipped with an internal DSX-1 shelf and an internal T1 repeater shelf.

In the tables, the pin-outs on the wire-wrap field of the DSX-1 panel are only given for cables that connect to DS1 Input cards in the ABM shelf. Pin-outs for DS1 cables that connect to the output cards are the same as those given in the table, except that entries in column “IN or OUT” should read OUT for all leads.

The pigtail connectors (P1 and P2) are wired to consecutive DSX-1 positions. Connector P1 is wired to DSX-1 positions 1–14 and connector P2 is wired to DSX-1 positions 15–28.

—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

Table 14-2
Pin-outs for the DS1 pigtails, connector P1

Connector P1 at I/0 area of ABM shelf					Wire-wrap field on DSX-1 shelf			
Pair or DS1 No.	**Tip or Ring**	**Pin No.**	**Color code**		**Group**	**IN or OUT**	**Tip (T) or Ring (R)**	**Pin No.**
1	Tip	16	W	1BL	A	IN	T	1
	Ring	31	BL	1W	A	IN	R	1
2	Tip	17	W	1O	A	IN	T	2
	Ring	32	O	1W	A	IN	R	2
3	Tip	18	W	1G	A	IN	T	3
	Ring	33	G	1W	A	IN	R	3
4	Tip	19	W	1BR	A	IN	T	4
	Ring	34	BR	1W	A	IN	R	4
5	Tip	20	W	1S	A	IN	T	5
	Ring	35	S	1W	A	IN	R	5
6	Tip	21	R	1BL	A	IN	T	6
	Ring	36	BL	1R	A	IN	R	6
7	Tip	22	R	1O	A	IN	T	7
	Ring	37	O	1R	A	IN	R	7
8	Tip	23	R	1G	A	IN	T	8
	Ring	38	G	1R	A	IN	R	8
9	Tip	24	R	1BR	A	IN	T	9
	Ring	39	BR	1R	A	IN	R	9
10	Tip	25	R	1S	A	IN	T	10
	Ring	40	S	1R	A	IN	R	10
11	Tip	26	BL	1BL	A	IN	T	11
	Ring	41	BL	1BK	A	IN	R	11
12	Tip	27	BK	1O	A	IN	T	12
	Ring	42	O	1BK	A	IN	R	12
13	Tip	28	BK	1G	A	IN	T	13
	Ring	43	G	1BK	A	IN	R	13
14	Tip	29	BK	1BR	A	IN	T	14
	Ring	44	BR	1BK	A	IN	R	14

Note: Pins 1 to 15 of connectors P1 and P2 are not used, and pairs 29 and 30 are not used.

—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

Table 14-3
Pin-outs for the DS1 pigtails, connector P2

Connector P2 at I/0 area of ABM shelf					Wire-wrap field on DSX-1 shelf			
Pair or DS1 No.	**Tip or Ring**	**Pin No.**	**Color code**		**Group**	**IN or OUT**	**Tip (T) or Ring (R)**	**Pin No.**
15	Tip	16	BK	1S	A	IN	T	15
	Ring	31	S	1BK	A	IN	R	15
16	Tip	17	Y	1 BL	A	IN	T	16
	Ring	32	BL	1Y	A	IN	R	16
17	Tip	18	Y	1O	A	IN	T	17
	Ring	33	O	1Y	A	IN	R	17
18	Tip	19	Y	1G	A	IN	T	18
	Ring	34	G	1Y	A	IN	R	18
19	Tip	20	Y	1BR	A	IN	T	19
	Ring	35	BR	1Y	A	IN	R	19
20	Tip	21	Y	1S	A	IN	T	20
	Ring	36	S	1Y	A	IN	R	20
21	Tip	22	V	1BL	A	IN	T	21
	Ring	37	BL	1V	A	IN	R	21
22	Tip	23	V	1O	A	IN	T	22
	Ring	38	O	1V	A	IN	R	22
23	Tip	24	V	1G	A	IN	T	23
	Ring	39	G	1V	A	IN	R	23
24	Tip	25	V	1BR	A	IN	T	24
	Ring	40	BR	1V	A	IN	R	24
25	Tip	26	V	1S	A	IN	T	25
	Ring	41	S	1V	A	IN	R	25
The following pairs are contained in a blue binder.								
26	Tip	27	W	1BL	A	IN	T	26
	Ring	42	BL	1W	A	IN	R	26
27	Tip	28	W	1O	A	IN	T	27
	Ring	43	O	1W	A	IN	R	27
28	Tip	29	W	1G	A	IN	T	28
	Ring	44	G	1W	A	IN	R	28
Note: Pins 1 to 15 of connectors P1 and P2 are not used, and pairs 29 and 30 are not used.								

—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

Requirements

The following tools and materials are required:

- screwdriver, flat blade, 1/8 in. wide
- screwdriver, phillips head, medium
- cable ties

Action

Step	Action
1	Install the DS1 mappers in the ABM shelf using facility records and the information in Table 14-1 on page 14-20 to determine the ABM shelf slot locations.
2	Remove the blank I/O faceplate cards (NT4K58ZA) from the associated I/O slots (see Table 14-1 on page 14-20) according to where you are going to install the DS1 mappers: ***Note:*** Two working mappers are required for the internal DSX-1 shelf and the T1 repeater shelf.
3	Insert I/O cards into the slots from which you removed the blank faceplates, as follows:

Type of card	PEC	I/O slot
DS1 input	NT4K32	30, 31, 35, 38, 39, 42, 43
DS1 output	NT4K33	32, 33, 37, 40, 41, 44, 45
Protection bridge card	NT4K31	34, 36

—continued—

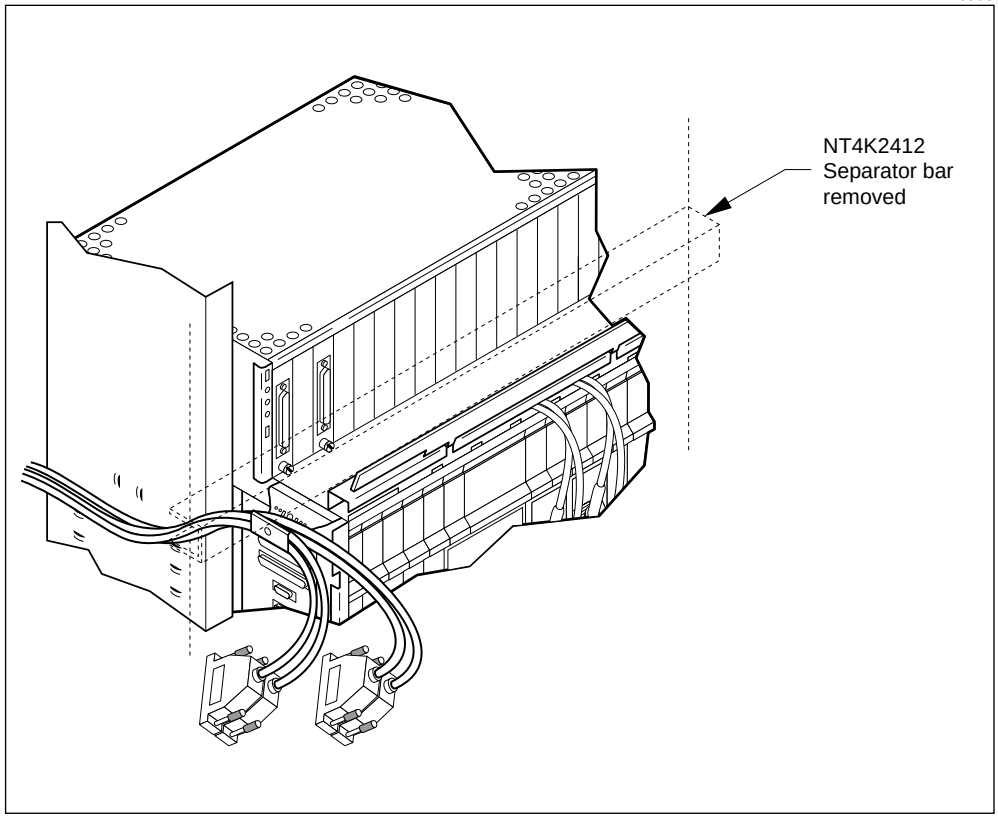
Procedure 14-4 (continued)
Connecting the DS1 pigtails

Step	Action
4	Tighten the hold-down screw on the bottom of the card faceplates, as shown in Figure 14-12.
5	Remove the cross connect jumper cable trough from the front of the DSX panel.
6	Are the DSX-1 shelf and the T1 repeater shelf installed in the master cabinet or the expansion cabinet?

If the shelves are in	Then
The master MBP cabinet	step 10
The expansion MBP cabinet	step 7

Figure 14-12
Location of the I/O card hold-down screws

FW-10903



—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

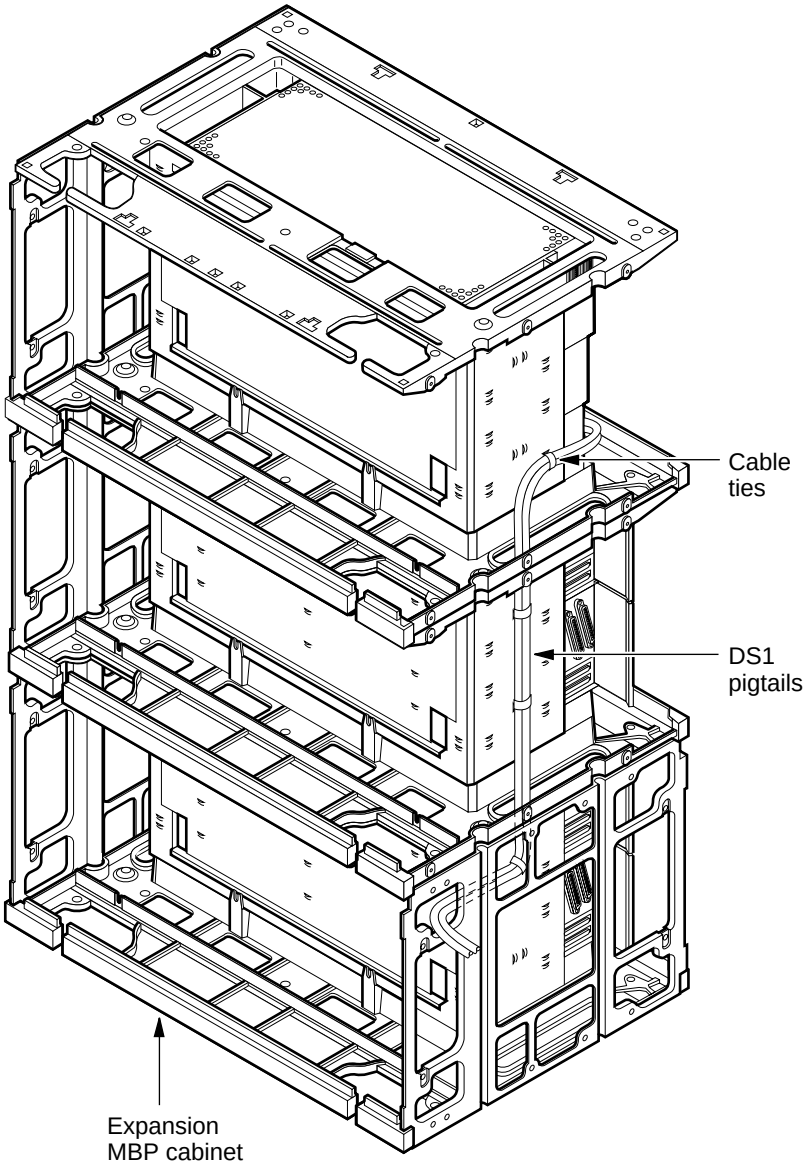
Step	Action
	Cable routing with the DSX-1 in the expansion cabinet
7	Route the DS1 pigtails down the right side of the expansion MBP cabinet, through the expansion cabinet, and out to the master cabinet, as shown in Figure 14-13 on page 14-28.
8	Tie-wrap the cable in the expansion cabinet as shown in Figure 14-13 on page 14-28.
9	Go to step 12.
	Cable routing with the DSX-1 in the master cabinet
10	Route the DS1 pigtails into the right side of the master cabinet (as viewed from the rear of the cabinet), as shown in Figure 14-14 on page 14-29.
11	Tie-wrap the cable in the expansion cabinet as shown in Figure 14-14 on page 14-29.
	Cable routing and connecting in the master cabinet
12	Remove the NT4K2412 separator bar from in front of the ABM shelf by lifting it up and out of the mounting brackets on the universal equipment module uprights as shown in Figure 14-15 on page 14-30.
13	Hang the DS1 pigtails temporarily in the cable tray, as shown in Figure 14-15 on page 14-30.

—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

Figure 14-13
Routing NT4K86UA DS1 pigtails in the expansion cabinet

FW-11188

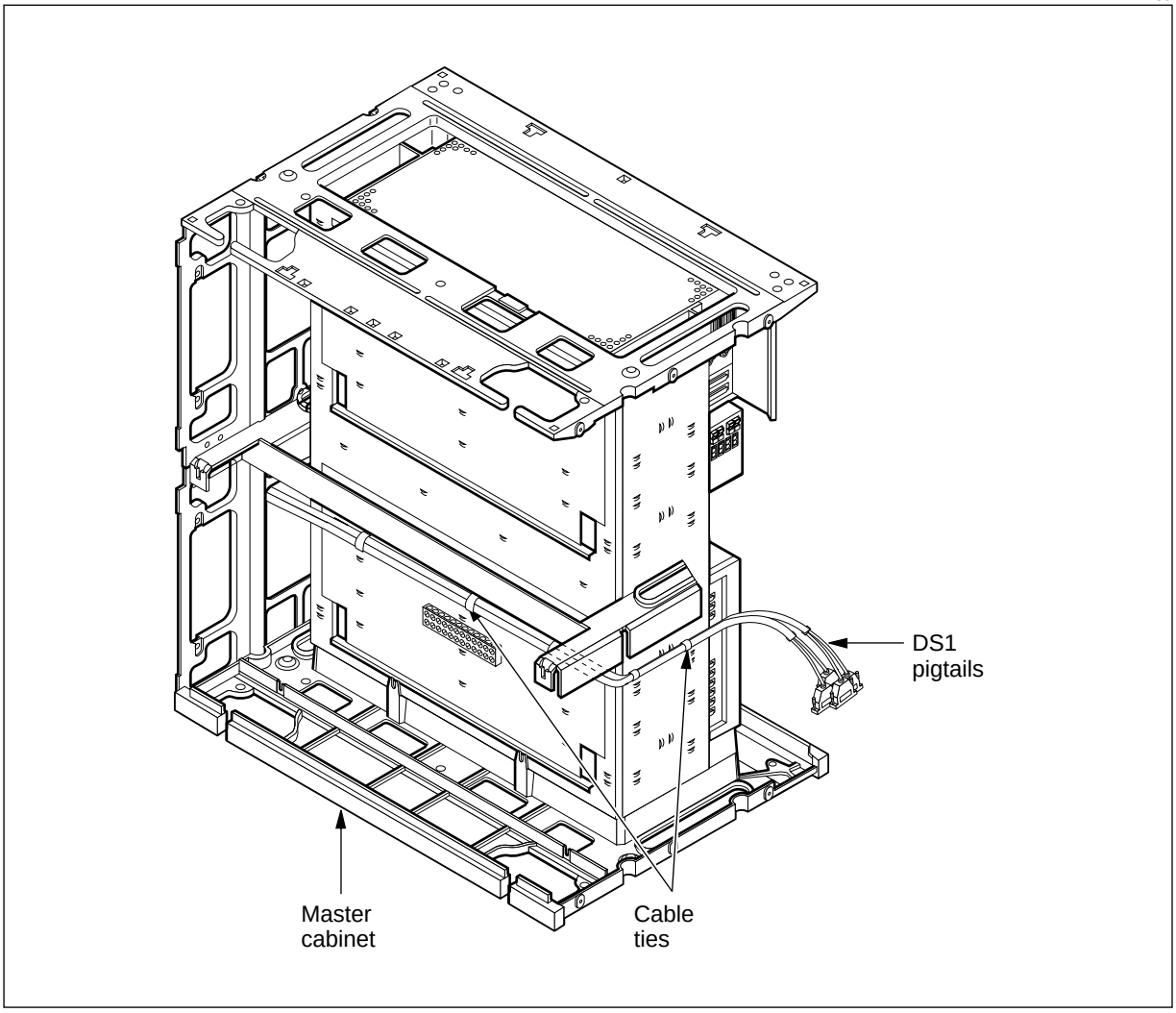


—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

Figure 14-14
Routing NT4K86UA DS1 pigtails in the master MBP cabinet

FW-11189

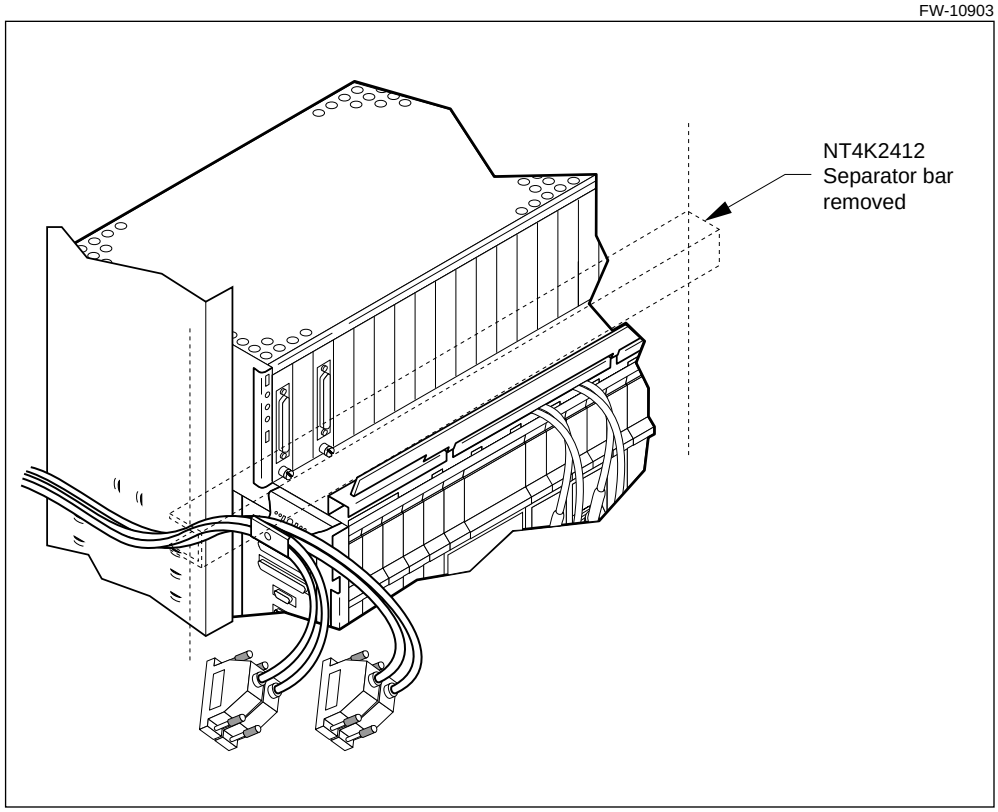


—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

Figure 14-15
Routing cables into the left side of the ABM shelf

FW-10903



—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

Step	Action
14	Connect the DS1 pigtail connectors P1 and P2 to the I/O cards. Local office records determine the DS1 cable connections to the I/O cards. Any DS1 transmit cable connector can connect to any I/O Input card assigned to any mapper position. The associated DS1 receive cable must connect to the I/O Output card associated with the same mapper position. That is, if you connect the DS1 transmit cable connector P1 to I/O card slot 31 (mapper position 2) and connector P2 to I/O card slot 42 (mapper position 7), then you must connect the P1 connector of the associated receive cable to I/O card slot 32 (mapper position 2) and the P2 connector to I/O card slot 44 (mapper position 7). This table shows I/O slot connections.

If you have a working mapper in slot	Then connect the transmit cable connector (P1 or P2) to the assigned I/O card in slot	And using the associated receive cable, connect the corresponding receive cable connector (P1 or P2) to the I/O card in slot
1	30 (DS1 IN)	32 (DS1 OUT)
2	31 (DS1 IN)	33 (DS1 OUT)
3	34 (see Note)	36 (see Note)
4	35 (DS1 IN)	37 (DS1 OUT)
5	38 (DS1 IN)	40 (DS1 OUT)
6	39 (DS1 IN)	41 (DS1 OUT)
7	42 (DS1 IN)	44 (DS1 OUT)
8	43 (DS1 IN)	45 (DS1 OUT)

Note: When installing a transmit DS1 cable to the cards in slots 34 and 35, position the transmit cable connector in front of the protection DS1B card in slot 34. This connector is not used. Use a cable tie to attach the connector to the connector that is attached to the card in slot 35. Similarly, when installing a receive DS1 cable to the cards in slots 36 and 37, position the unused connector in front of the protection DS1B card in slot 36, and use a cable tie to secure it to the P2 connector that is attached to the card in slot 37.

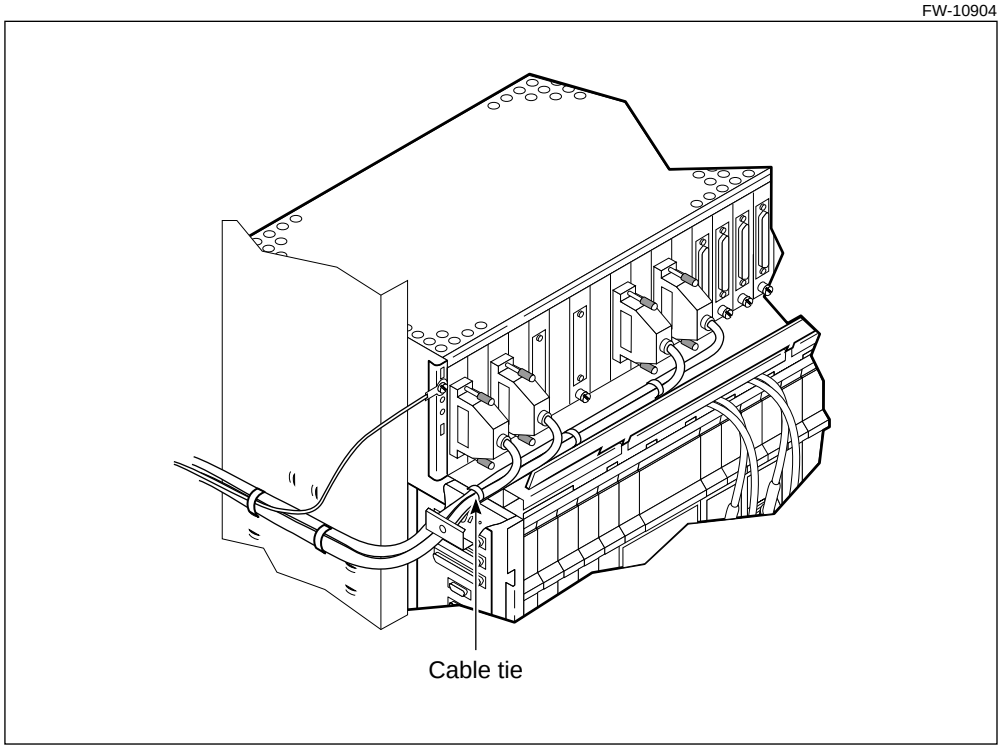
—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

Step	Action
15	Tighten the two hold-down screws just enough to draw the DS1 cable connectors in to place (2 in-lb maximum).
16	To take up the slack in the two cables, form two loops and insert them into the cable trough, as shown in Figure 14-16.
17	Tie the two loops together to prevent them unraveling, as shown in Figure 14-16.

Figure 14-16
Creating and securing the loops

FW-10904



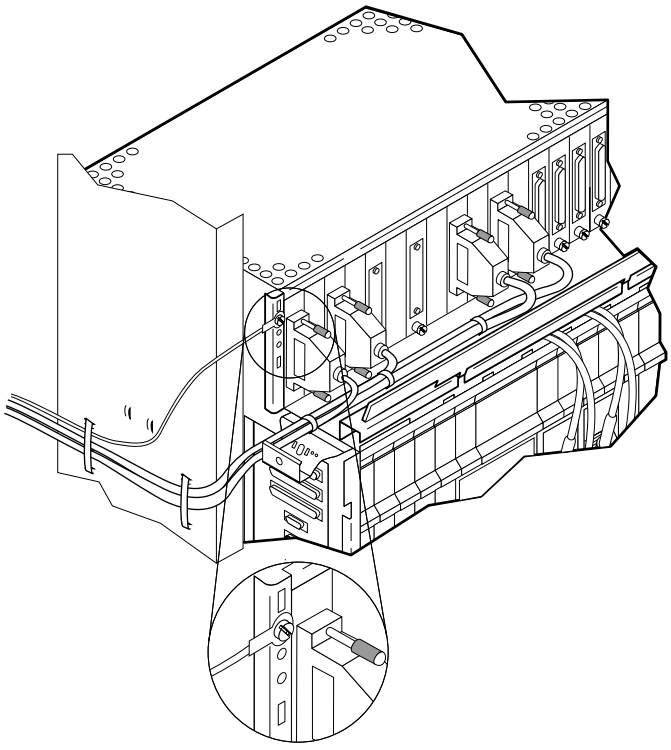
—continued—

Procedure 14-4 (continued)
Connecting the DS1 pigtails

Step	Action
18	Re-install the DSX panel jumper cable trough.
19	Attach the ground lug on the receive (DS1 output) and the ground lug on the transmit (DS1 input) cable to the grounding screws on the ABM shelf, as shown in Figure 14-17.
20	Pull back any slack into the rear of the cabinet.
21	Secure the DS1 pigtails with cable ties, as shown in Figure 14-17.
22	Re-install the NT4K2412 separator bar.
23	Form and dress the cable slack into the rear of the cabinet.
24	Secure the cables with a cable tie inserted into the lance at the entrance to the cable trough, as shown in Figure 14-16 on page 14-32.

Figure 14-17
Attaching the ground lugs

FW-10905



Note: I/O card bar code label mounting plate has been omitted for clarity.

—end—

Adding a second rectifier shelf to an MPP cabinet

This chapter contains the procedures for adding a second rectifier shelf to a Modular Power Package (MPP) cabinet.

Chapter contents

This chapter contains the following information:

Procedure 15-1
Installing the rectifier shelf in the MPP cabinet

Use this procedure to install a second rectifier shelf in a Modular Power Package (MPP) cabinet. Installing the shelf includes connection of the dc power cables and the alarm signal cables.

Requirements

The following tools and materials are required:

- cable ties
- flat-bladed screwdriver, 1/4-in. wide blade
- socket set

The front and rear equipment covers must have been removed from the MPP cabinet.

DANGER
Risk of electrocution
Ensure that electrical power is shut off at the ac panel before performing this procedure. Either lock the breakers in the off position or remove them temporarily to ensure that power remains shut off.

—continued—

Procedure 15-1 (continued)
Installing the rectifier shelf in the MPP cabinet

Action

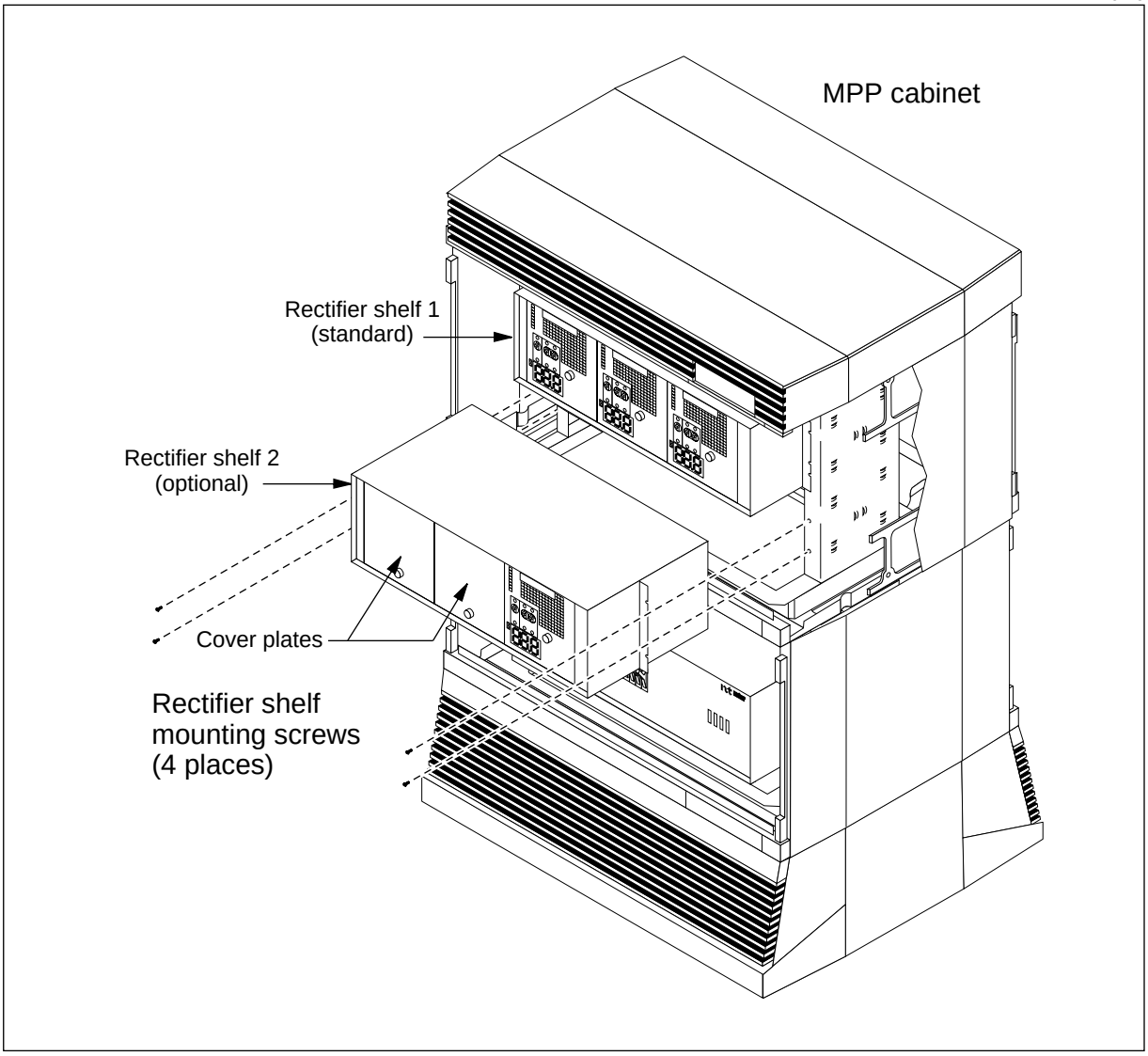
Step	Action
1	Insert the second rectifier shelf (rectifier shelf 2) into the front of the MPP cabinet immediately below the existing rectifier shelf 1, as shown in Figure 15-1 on page 15-4.
2	Secure the rectifier shelf to the cabinet with the four self-tapping screws and lock washers contained in the NT4K0625 shelf mounting kit.
3	At the rear of the cabinet, connect the NT4K84YB ground cable from the rectifier shelf to the cabinet, as shown in Figure 15-2 on page 15-5.
4	Unroll the three signal cables that are attached to the left rear of the rectifier shelf, and connect them to the three unused 8-pin Molex connectors on the dc distribution shelf, as shown in Figure 15-2 on page 15-5.
5	Unroll the NT4K84WA dc power cable from the rectifier shelf and connect it to the two unused rectifier power connectors on the dc distribution shelf, as shown in Figure 15-2 on page 15-5. The red lead (battery) connects to the -48V terminal on the dc distribution shelf, and the black lead (return) connects to the BR terminal.
6	Use a cable tie to attach the NT4K84WA cable to the tie bar on the dc distribution shelf, as shown in Figure 15-2 on page 15-5.

—continued—

Procedure 15-1 (continued)
Installing the rectifier shelf in the MPP cabinet

Figure 15-1
Installing the rectifier shelf

FW-15243

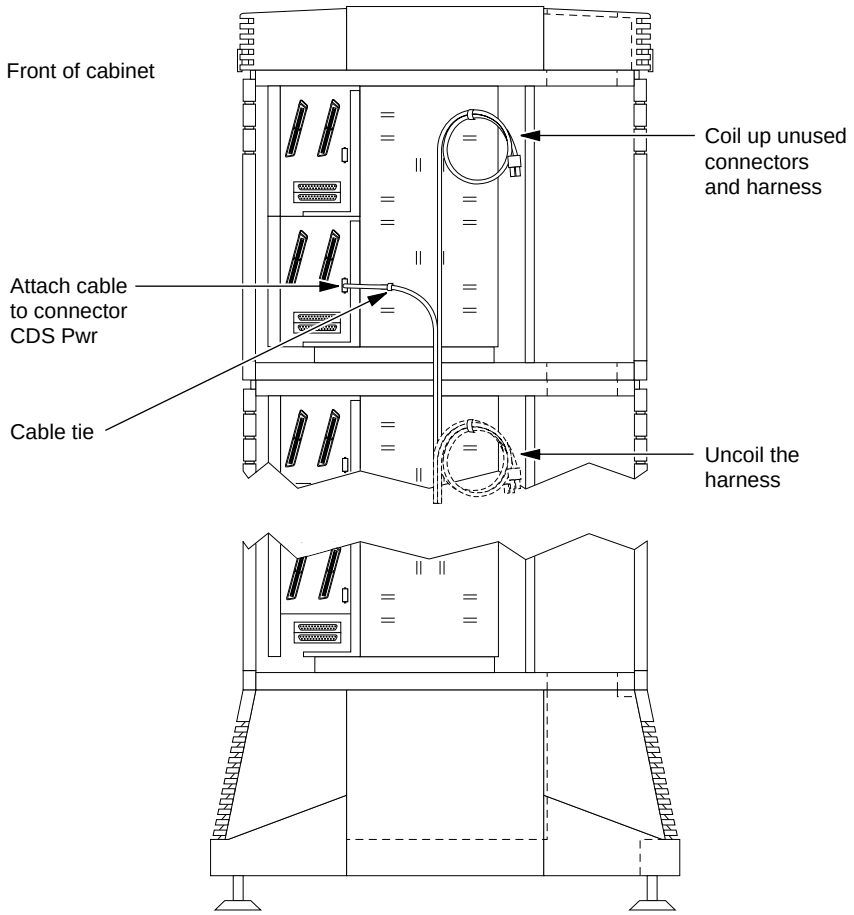


—continued—

Procedure 15-1 (continued)
Installing the rectifier shelf in the MPP cabinet

Figure 15-2
Connecting signal cables and ground cables to the rectifier shelf

FW-15245



—end—

Procedure 15-2
Connecting the ac feeds to the MPP cabinet

Use this procedure to connect one 208/240 V ac 35 A feed to a rectifier shelf that has been added to a Modular Power Package (MPP) cabinet.

Installation of the ac cabling must comply with the building distribution and grounding scheme. For an explanation of building grounding schemes, see "Power and grounding" in *Addendum 1 (MBP) Site Installation Planning and Engineering*, 323-3001-200.

The ac cable used must comply with local electrical codes. Unless otherwise specified by local electrical codes, the preferred cable is armored three-conductor 10 AWG cable, colors: black, red, and green.

In systems that only require one rectifier shelf, power can be supplied by means of armored cable and a 208/240 V ac receptacle. However, in systems that require two rectifier shelves, the shelves must be cabled directly to the ac panel. Receptacles cannot be used.

Requirements

The following tools and materials are required:

- cable ties
- cable cutters
- flat-bladed screwdriver, 1/4-in. wide blade
- set of nut drivers
- power knife
- cable ripper for stripping armored cable

The ac panel must have been installed by a qualified electrician as described in *Addendum 1 (MBP) Site Installation Planning and Engineering*, 323-3001-200.

—continued—

Procedure 15-2 (continued)
Connecting the ac feeds to the MPP cabinet

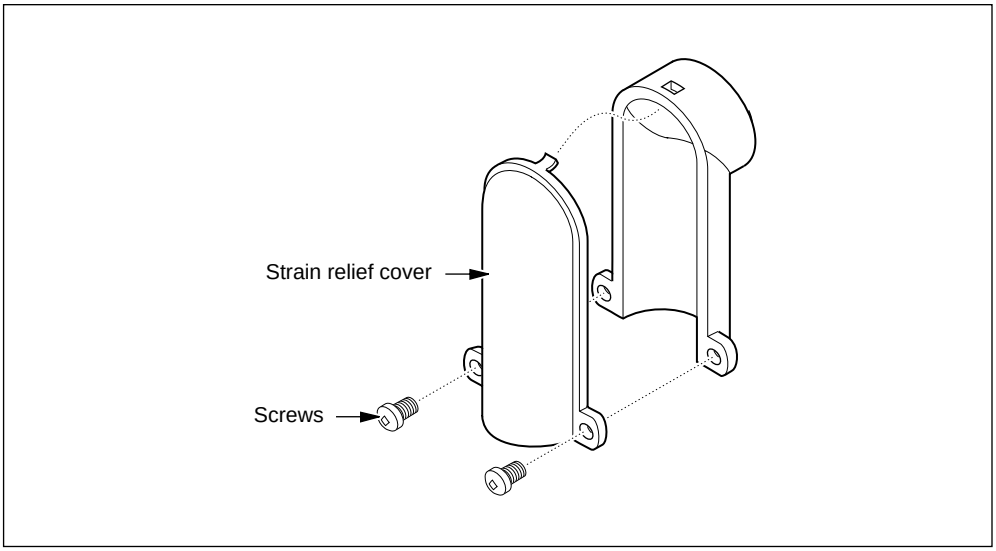
DANGER
Risk of electrocution
Ensure that power is shut off at the ac panel before performing this procedure. Either padlock the circuit breakers into the off position or remove them entirely from the breaker panel to ensure that power remains shut off.

Action

Step	Action
1	Start at the topmost rectifier shelf in the MPP cabinet.
2	At the rear of the MPP cabinet, remove the two screws that hold the cover of the right-angle strain relief in place, and remove the strain relief cover, as shown in Figure 15-3.

Figure 15-3
Removing and installing a strain relief cover

FW-10876



—continued—

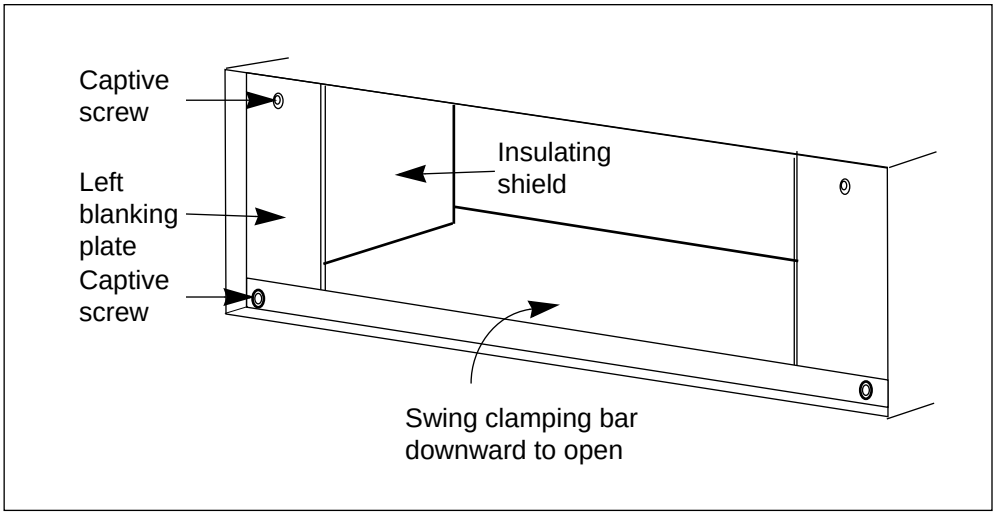
Procedure 15-2 (continued)
Connecting the ac feeds to the MPP cabinet

Step	Action

3 At the front of the MPP cabinet, release the two captive screws that hold the clamping bar in place, as shown in Figure 15-4.

4 Swing the clamping bar downward.

Figure 15-4
Gaining access to the ac terminal



5 Release the retaining screw at the top of the left blanking plate.

6 Remove the left blanking plate by lifting it upward and outward.

7 Remove the insulating shield from the inside the left end of the shelf to expose the connection points for the ac feed.

8 Are you installing the MPP cabinet on a concrete floor on a raised floor?

If you are installing the cabinet	Then go to
on a concrete floor	step 10
on a raised floor	step 9

9 Check the local electrical codes to determine if ac power feeds have to be run in conduit. If conduit is required, run two lengths of 2-1/2 in conduit between the ac panel and the two knockouts that are located at the right rear of the MPP cabinet underneath the pedestal.

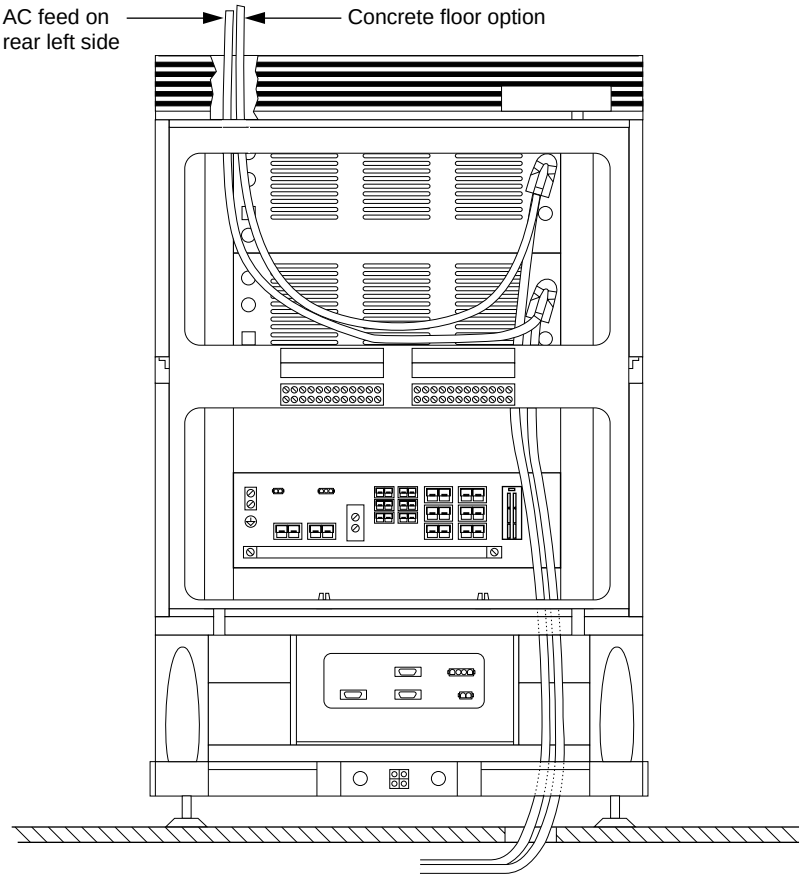
—continued—

Procedure 15-2 (continued)
Connecting the ac feeds to the MPP cabinet

Step	Action
10	Run cable for a 208/240 V ac 35 A feed from the ac panel into the rear of the MPP cabinet, as shown in Figure 15-5. ***Note:*** For systems that only require one rectifier shelf, power can be connected to the shelf by a receptacle. For systems that require two rectifier shelves, the shelves must be cabled directly to the ac distribution panel. Receptacles cannot be used.

Figure 15-5
Routing the ac feeds into the rear of the MPP cabinet

FW--10877



Note: Local electrical codes may require that the battery cables be enclosed in conduit.

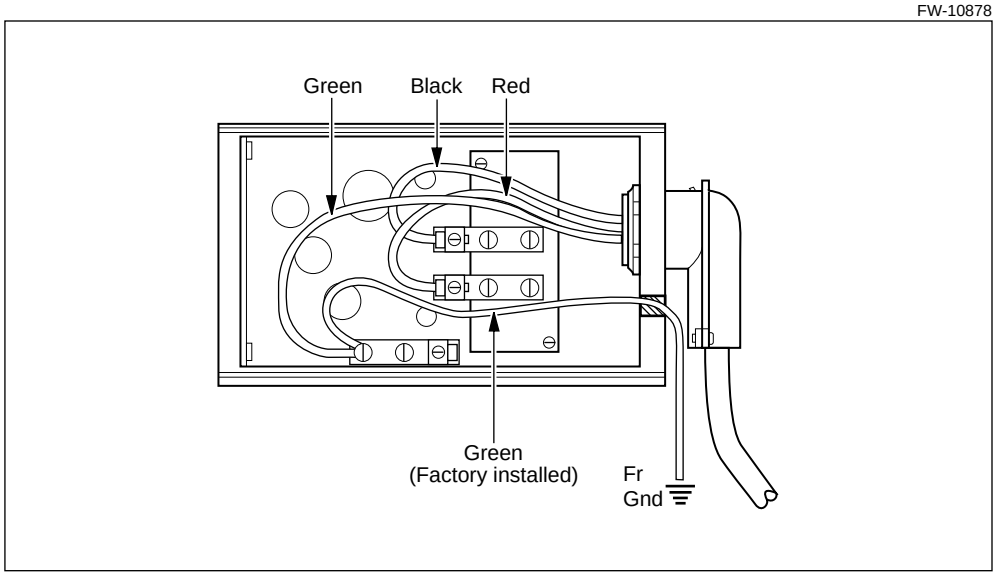
—continued—

Procedure 15-2 (continued)
Connecting the ac feeds to the MPP cabinet

Step	Action
11	Push the cable through the strain relief and into the rectifier shelf.
12	At the front of the cabinet, strip back the armored cable about 250 mm (10 in.) to expose the wires inside the cable.
13	Strip each of the wires in the cable back about 5 mm (1/2 in.) to expose the conductors.
14	Insert the conductors in to the terminal blocks, as shown in Figure 15-6, and tighten the terminal screws.
15	At the rear of the cabinet, reinstall the strain relief cover.
16	At the front of the cabinet, reinstall the insulating shield and the blanking plate.
17	Swing the clamping bar upward.
18	Tighten the captive screws that secure the clamping bar and the blanking plate in place.
19	Repeat steps 1 to step 18 to install the ac feed to the second rectifier shelf, if a second rectifier shelf is used. ***Note:*** Do not switch on ac power to the MPP cabinet. Switching on the ac power and setting up the rectifiers is done as part of the commissioning procedures as described in *Commissioning and Testing*, Volume 3.

Figure 15-6
Connecting the conductors of the ac cable to the terminal screws inside the rectifier shelf

FW-10878



—end—

Installing the equipment covers

This chapter provides procedures for reinstalling equipment covers, grilles, and panels on Modular Business Package (MBP) cabinets and on Modular Power Package (MPP) cabinets.

Chapter contents

This chapter contains the following information:

Procedure 16-1
Installing the ABM shelf cover

Use this procedure to reinstall the cover on the access bandwidth manager (ABM) shelf.

Requirements

The following tools and materials are required:

- screwdriver, 1/4-in. wide blade

Action

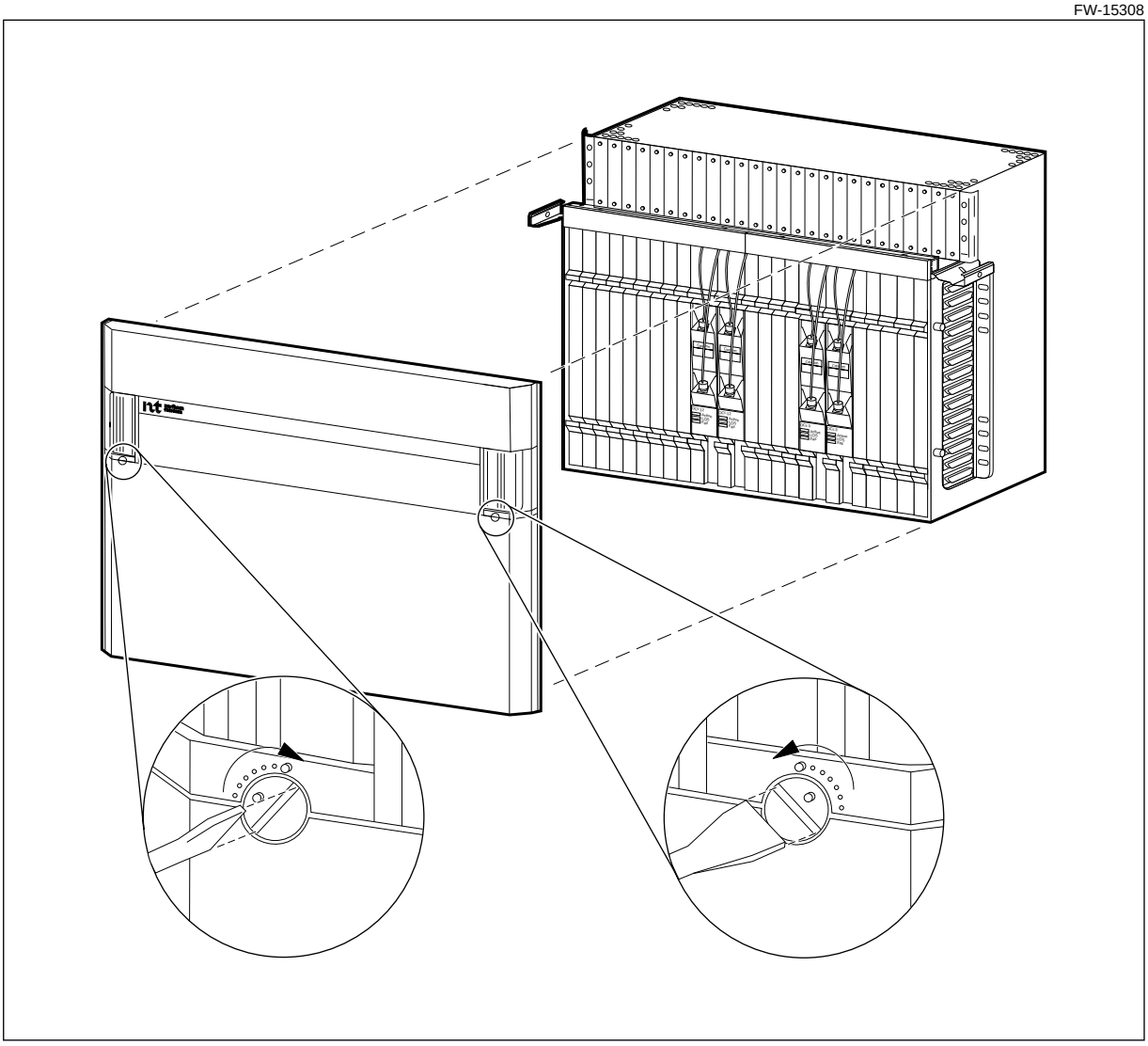
Step	Action
1	Position the cover so that it engages the aligning pins on the ABM shelf, as shown in Figure 16-1 on page 16-3.
2	Grasp the cover by the two handles and push the cover in towards the shelf until the handles snap into the closed position.
3	Using the screwdriver, rotate the locking screws so that the dots align, as shown in Figure 16-1 on page 16-3.

—continued—

Procedure 16-1 (continued)
Installing the ABM shelf cover

Figure 16-1
Installing the ABM shelf cover

FW-15308



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Procedure 16-2
Installing the side panels

Use this procedure to reinstall the side panels on Modular Business Package (MBP) cabinets and Modular Power Package (MPP) cabinets.

Requirements

The following tools and materials are required:

- nut driver 5/16-in.
- side panels

Action

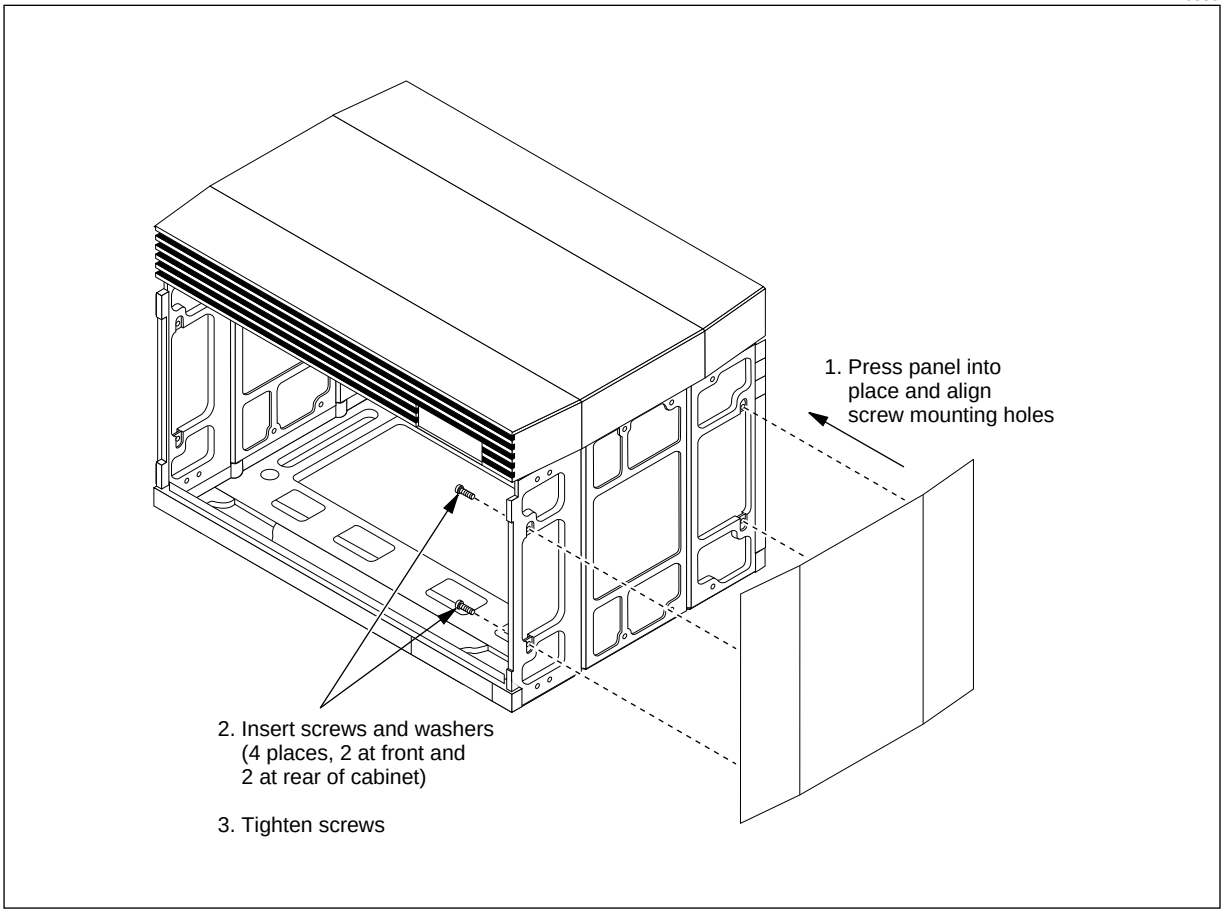
Step	Action
1	Position the side panels and align the mounting screw holes with the casting as shown in Figure 16-2 on page 16-5.
2	Insert two mounting screws at the front of the cabinet, and two at the rear of the cabinet.
3	Tighten the four screws to secure the side panel.
4	Repeat this procedure to install all other side panels on the cabinets.

—continued—

Procedure 16-2 (continued)
Installing the side panels

Figure 16-2
Installing the side panels

FW-10859



—end—

Procedure 16-3
Installing a DEM separator

Use this procedure reinstall a dual equipment module (DEM) separator on the front or rear of the master Modular Business Package (MBP) cabinet or the Modular Power Package (MPP) cabinet.

Requirements

The following tools and materials are required:

- none

Action

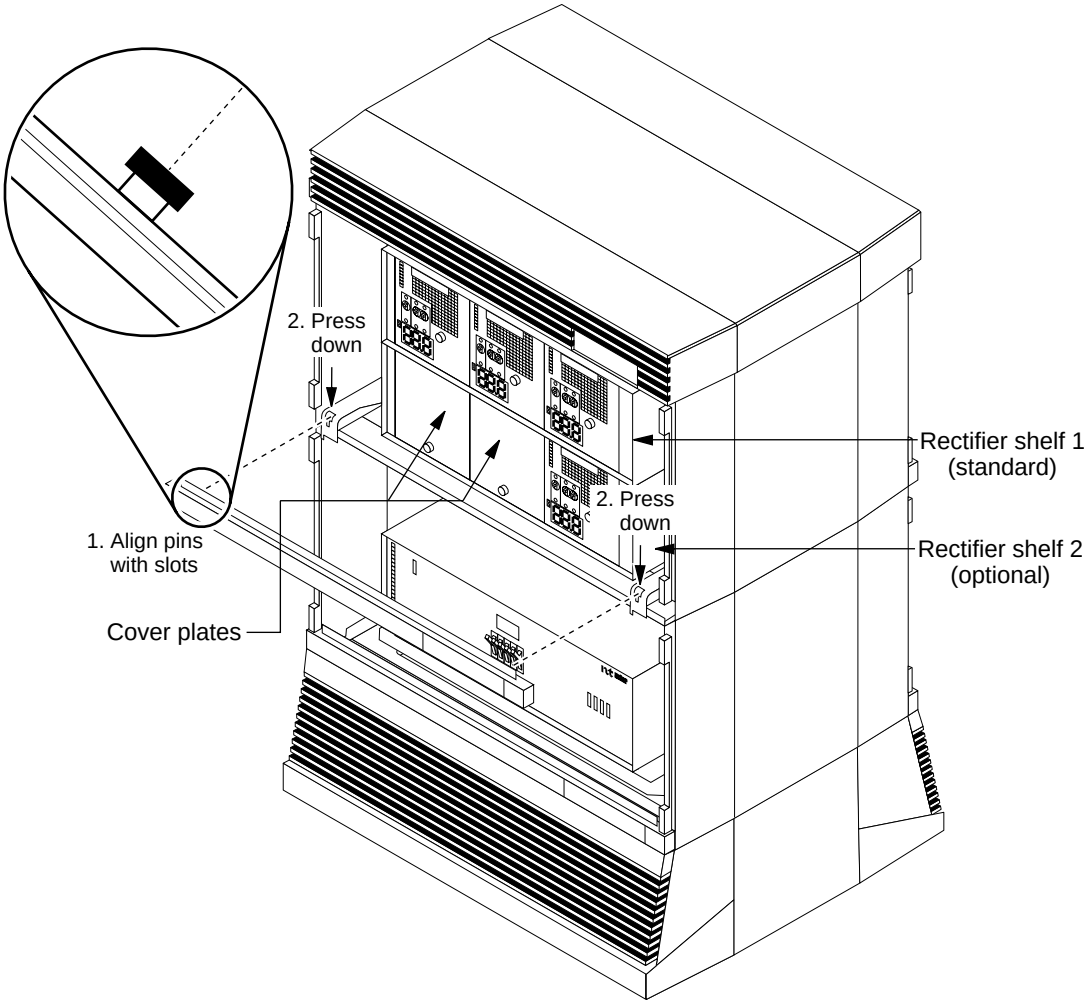
Step	Action
1	Position the DEM separator on the cabinet such that the pins on the DEM separator align with the slots in the DEM separator supports, as shown in Figure 16-3 on page 16-7.
2	Press down on both ends of the DEM separator, until the pins fully engage the slots in the DEM separator supports.
3	Repeat this procedure to install all other DEM separators on the cabinets.

—continued—

Procedure 16-3 (continued)
Installing a DEM separator

Figure 16-3
Installing a DEM separator

FW-15244



Note: This illustration shows the DEM separator bar at the front of an MPP cabinet. All other separators on MBP and MPP cabinets are installed in the same way.

—end—

Procedure 16-4
Installing the top cap grilles

Use this procedure to reinstall the grilles on the top caps of Modular business Package (MBP) cabinets and Modular Power Package (MPP) cabinets.

Requirements

The following tools and materials are required:

- top cap grilles NT4K09AA for raised floors or NT4K09AB for concrete floors

Action

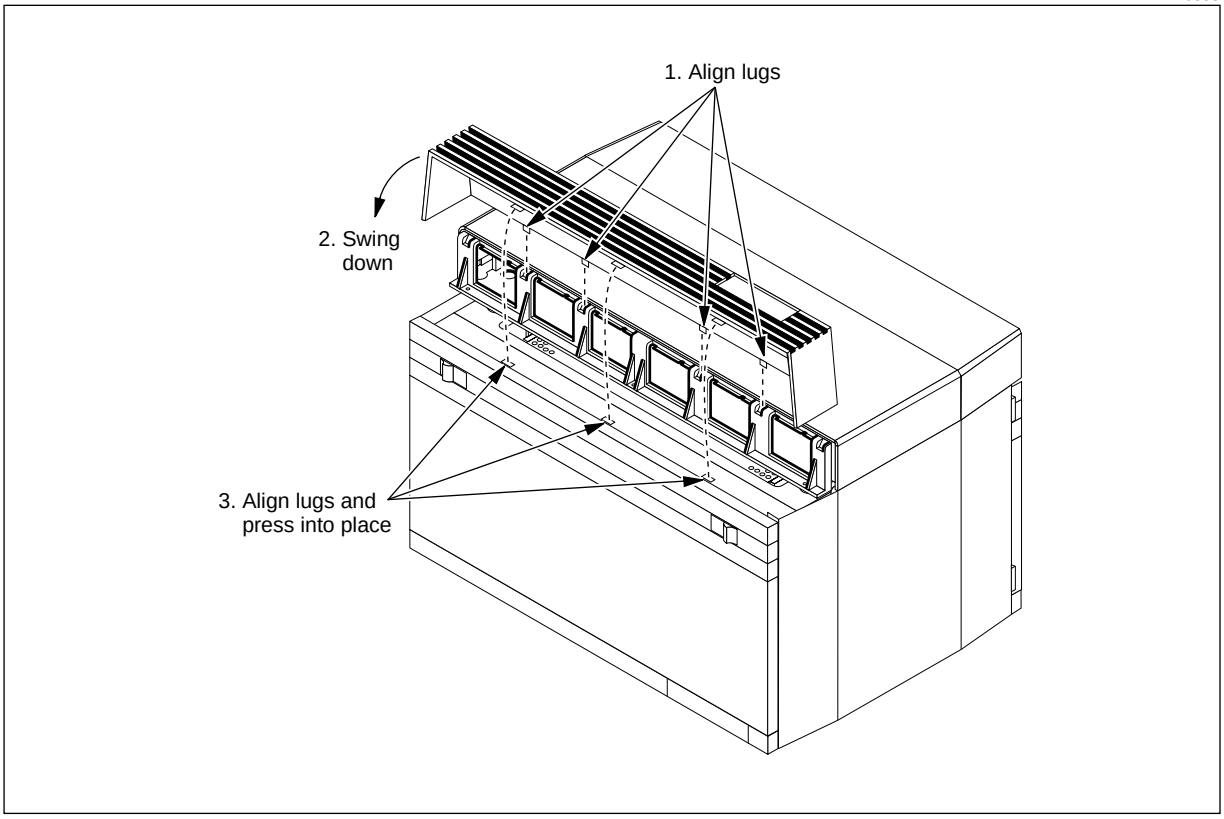
Step	Action
1	Align the lugs in the top cap grille with the corresponding holes in the top casting, as shown in Figure 16-4 on page 16-9.
2	Swing the top cap grille downward.
3	Align the lugs at the front of the top cap grille with the holes in the top cap, and press the top cap grille down into place.
4	Repeat this procedure to install all of the remaining top cap grilles.

—continued—

Procedure 16-4 (continued)
Installing the top cap grilles

Figure 16-4
Installing a top cap grille

FW-10855



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Procedure 16-5
Installing the pedestal grilles

Use this procedure to reinstall the grilles on the pedestals of Modular Business Package (MBP) and Modular Power Package (MPP) cabinets.

Requirements

The following tools and materials are required:

- screwdriver, 1/4-in. wide blade
- pedestal grille NT4K2640

Action

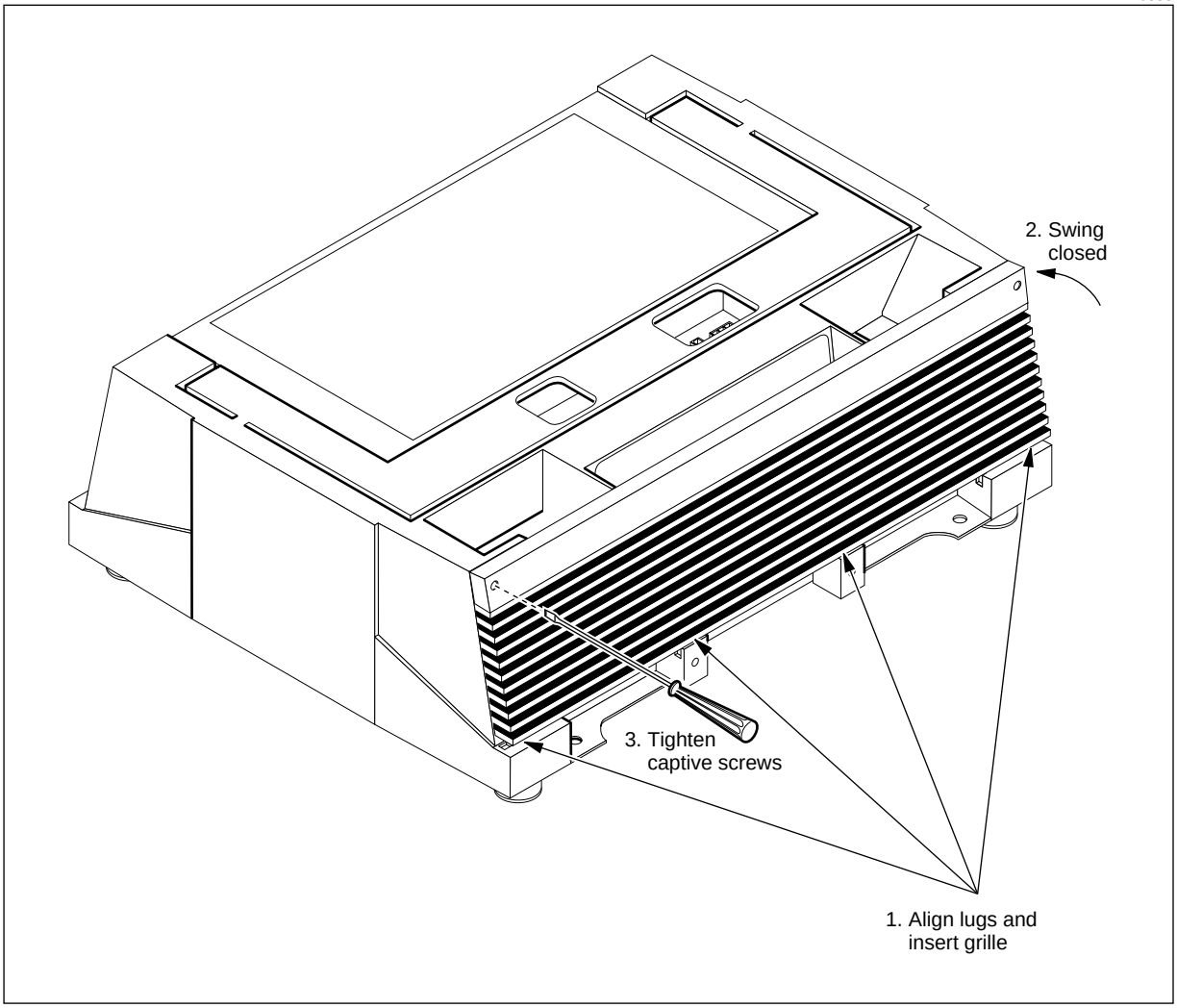
Step	Action
1	Align the lugs on the base of the pedestal grille with the corresponding holes in the pedestal casting, as shown in Figure 16-5 on page 16-11.
2	Insert the lugs on the pedestal grille into the holes in the pedestal casting.
3	Swing the top of the pedestal grille towards the casting.
4	Using the screwdriver, tighten the two captive screws in the pedestal grille to secure the grille.

—continued—

Procedure 16-5 (continued)
Installing the pedestal grilles

Figure 16-5
Installing a pedestal grille

FW-10853



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Procedure 16-6
Installing the equipment covers

Use this procedure to reinstall the equipment covers at the front and rear of Modular Business Package (MBP) and Modular Power Package (MPP) cabinets.

Requirements

The following tools and materials are required:

- NSQ2000L tool or ATT216 tool
- Set of keys for key-lockable covers
- equipment covers

Action

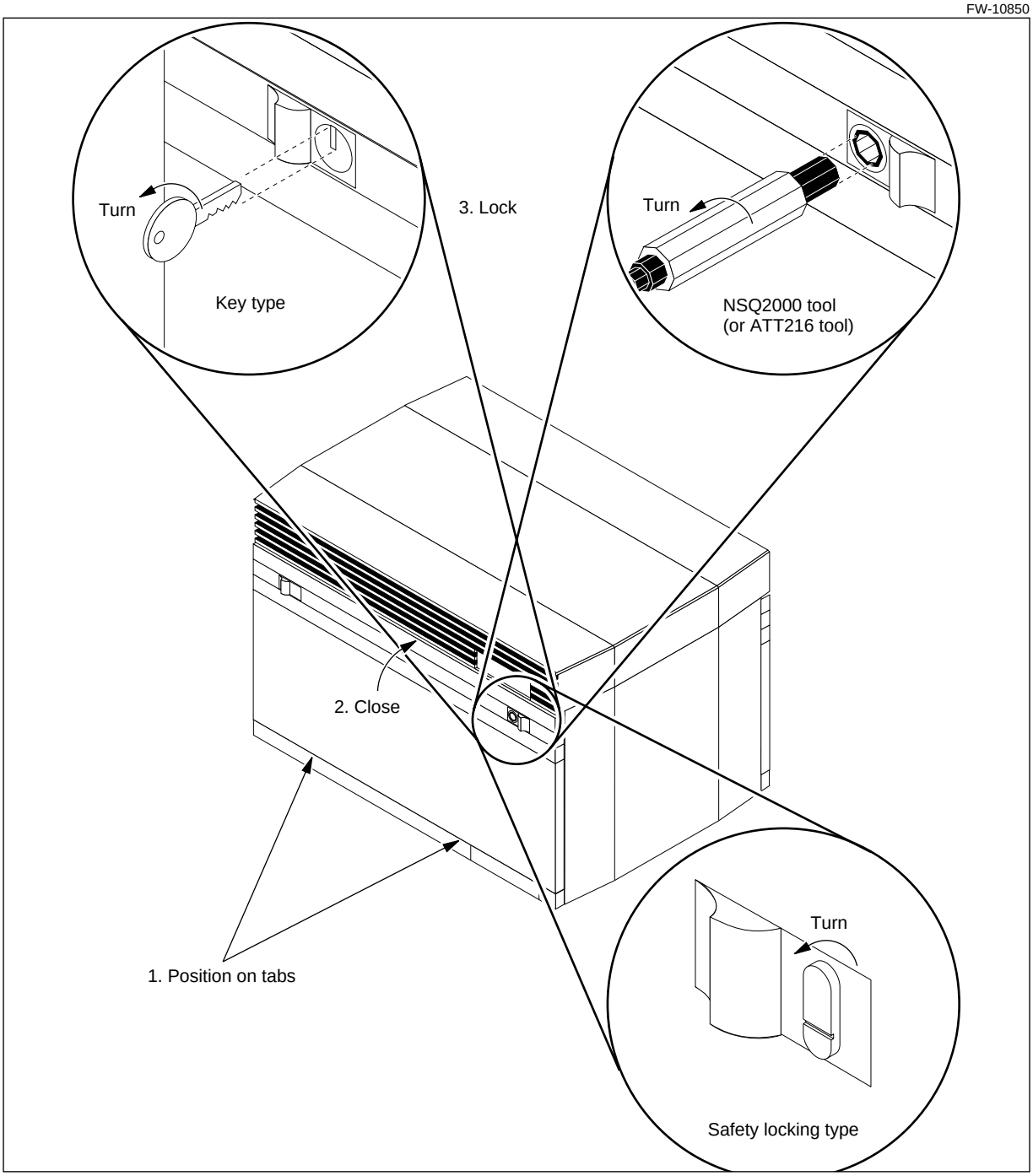
Step	Action
1	Position the tabs at the bottom edge of the equipment cover into the corresponding slots in the cabinet, as shown in Figure 16-6 on page 16-13.
2	Push the top of the cover in towards the cabinet, until the latches click into place.
3	Lock the equipment cover, as shown in Figure 16-6 on page 16-13.

—continued—

Procedure 16-6 (continued)
Installing the equipment covers

Figure 16-6
Installing an equipment cover

FW-10850



—end—

Technical support information

This section lists the technical support available for AccessNode.

Note: AccessNode Express products are serviced by the AccessNode support team detailed in this section.

24 hour emergency technical assistance

This section explains how to contact 24 hour emergency technical assistance.

If you are here...	**Then call this number**...
United States	(800) ASK-ETAS (800) 275-3827
Canada	(613) 226-5456

Non-emergency support and software upgrade support

This section explains how to contact non-emergency support and software upgrade support.

If you are here...	**Then call this number**...
United States Normal business hours 8:00 am - 5:00 pm local time Monday to Friday All other times (for urgent software upgrade support only)	(800) ASK-TRAN (800) 275-8726 (800) ASK-ETAS (800) 275-3827
Canada Normal business hours 8:00 am - 4:00 pm local time Monday to Friday All other times (for urgent software upgrade support only)	Call your regional field service engineering support group. See the list of regional service centers for Canada at the back of this chapter. (800) ASK-ETAS (800) 275-3827

Standard repair service: USA

This section explains how to contact US standard repair service.

US standard repair service consists of like-for-like replacement: a replacement circuit pack is shipped within five (5) working days after receiving the order.

Call customer service	and...	ship defective unit prepaid to...
(800) 251-1758 and request a Repair Order Number. 7:00 am - 6:00 pm CST Monday to Friday	Mark the defective item with the following: • assigned repair order number • explanation of the problem.	Nortel Networks 917 Air Park Center Drive Nashville, TN 37217 Attn: Repair and Return

Standard repair service: Canada

This section explains how to contact Canadian standard repair service. Canadian standard repair service consists of the following options:

- **Like-for-like replacement**: A replacement circuit pack is shipped within five (5) working days after receiving the order.
- **Repair of the circuit pack**: The repaired circuit pack is shipped within fourteen (14) days after receipt of the defective circuit pack.

Call customer service	and...	ship defective unit prepaid to...
(800) 668-1717 (English) (800) 668-1748 (French) and request a Repair Order Number. Monday to Friday 8:00 am - 5:00 pm local time	Mark the defective item with the following: • assigned repair order number • explanation of the problem.	Northern Telecom Canada Ltd. Repair Customer Service Group 9300 Trans Canada Highway St. Laurent, Québec H4S 1K5 CANADA

Emergency repair service: USA

This section explains how to contact US emergency repair service. A replacement circuit pack is shipped within 24 hours of receiving the order.

Call customer service	and...	ship prepaid to...
(800) 251-1758 and request an emergency replacement.	**1)** Give the following: • name • company name • telephone number • exact unit code and name for emergency replacement • ship-to address **2)** Mark the defective item with the assigned emergency repair order number	Nortel Networks 917 Air Park Center Dr. Nashville, TN 37217 Attn: Repair and Return

Emergency repair service: Canada

This section explains how to contact Canadian emergency repair service. A replacement circuit pack is shipped from Nortel within 24 hours of receiving the order.

Call customer service	and...	ship prepaid to...
Normal business hours Monday to Friday 8:00 am - 5:00 pm local time (800) 668-1717 (English) (800) 668-1748 (French) and request an emergency replacement. All other times: (800) 361-2575 and request an emergency replacement.	**1)** Give the following: • name • company name • telephone number • exact unit code and name for emergency replacement • ship-to address **2)** Mark the defective item with the assigned emergency repair order number	Northern Telecom Canada Ltd. Repair Customer Service Group 9300 Trans Canada Highway St. Laurent, Québec H4S 1K5 CANADA

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SONET Products

AccessNode

Modular Business Package Cabinet Installation Manual

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