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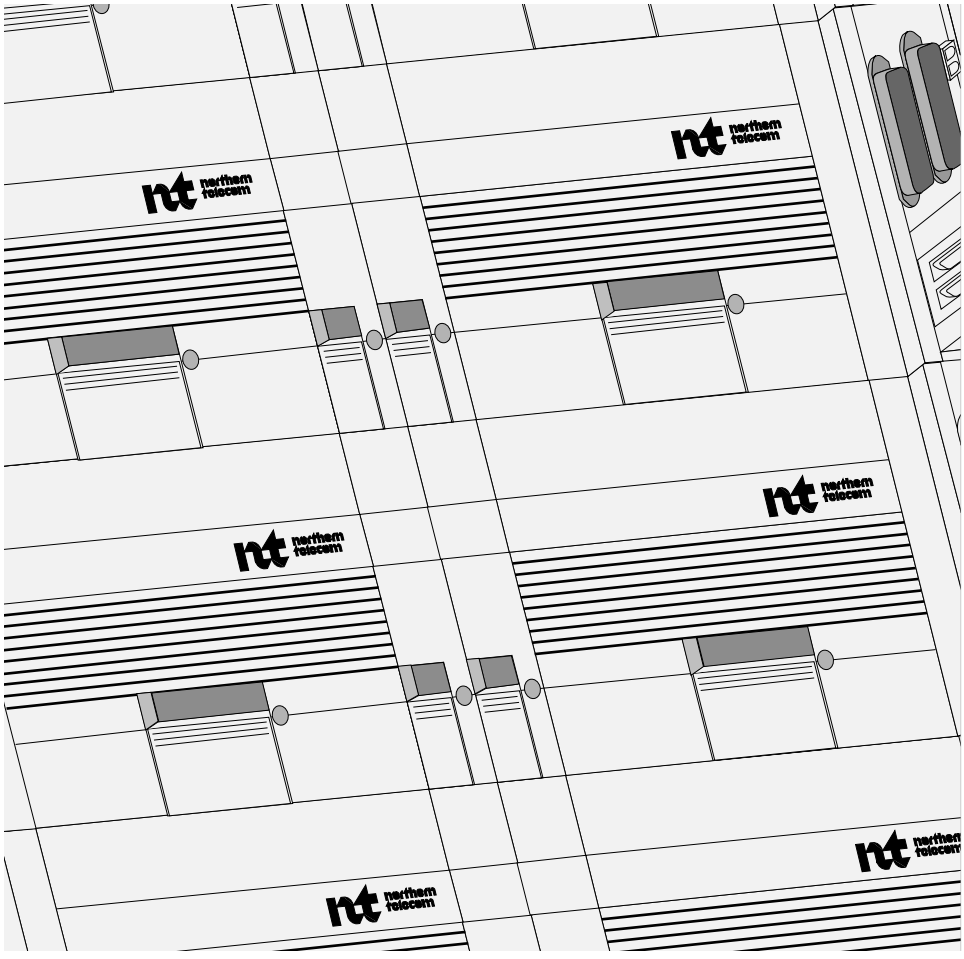
SONET Products

AccessNode

Modular Business Package VTBM Ring Installation Guide

Issue 1.0 February 1999



NORTEL NETWORKS™

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Modular Business Package VTBM Ring Installation Guide

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Publication history

February 1999

Release-Independent Standard Issue 1.0 of the document. For this release, the following information was updated or added:

- BIP redesign

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.

September 1997

Standard 01.01 release of the document for general distribution.

July 1996

Standard 01.01 released for general distribution. This is a new document that describes the installation procedures for the modular business package virtual tributary bandwidth manager master and expansion cabinets.

Table of contents

About this document

This document contains instructions for performing the following installation activities:

- installing virtual tributary bandwidth manager (VTBM) modular business package (MBP) master and expansion cabinets
- verifying the installation
- powering up and adjusting the equipment

Over-head cable racking and under-floor conduits are the responsibility of the customer.

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.

Refer to the *Modular Business Package VTBM Ring User Guide* for helpful information regarding the VTBM MBP and equipment module replacement requirements and procedures.

Before using this document to install AccessNode VTBM equipment in MBP cabinets, you should already have considered the following list of requirements and developed a floor plan, as described in *Site Planning and Engineering-MBP,* 323-3001-200, in the *Engineering Configuration and Ordering Guide,* Volume 1, of the AccessNode documentation suite.

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

How to use this document

Read Chapter 1, “Safety guidelines and warnings”, before beginning any installation procedure.

Read Chapter 2, “Introduction to the VTBM MBP”, to familiarize yourself with the VTBM MBP product and its configurations.

Perform the installation procedures in order beginning with Chapter 3, “Marking and drilling the floor”. Navigational information is included in the procedures to direct you to go to the next procedure to perform, or to guide you in the selection of optional installation procedures. If no navigational information is listed in the procedure, continue with the next procedure listed.

If you cannot complete any procedure in this document, contact your next level of support for assistance.

Installing a new system

This document for installing a new system details the mechanical installation procedures that you will need in order to install and power up an AccessNode VTBM-ready MBP system.

Pre-installation equipment requirements

Before beginning the installation procedures you should have on hand the following equipment:

- MBP cabinets
- NT4K81DA (or equivalent) 6 AWG dc power cables
- NT4K09BA overhead cable extender kit for each cabinet (if you are installing equipment on concrete floors or routing cable above the cabinets)
- battery testing loading device (customer supplied)
- four batteries per cabinet
- 8 battery harnesses (4 Red and 4 White) per cabinet (with mounting hardware)
- cable racking material from the cabinets to the cross-connect facilities
- NT4K0601 floor template

Installing a 96-line to 672-line VTBM MBP cabinet configuration

The following table outlines the chapters of this document that you use to install and power up the remote sites in the system. Perform the tasks in the table in the order in which they are listed.

The chapters contain the procedures for a single MBP cabinet that contains up to two copper-distribution shelves (96 lines to 192 lines) and an MBP expansion cabinet that contains up to five copper-distribution shelves (96 lines to 480 lines).

Task	See
Information	
Read the chapter “Safety guidelines and warnings”	page 1-1
Read the chapter “Introduction to the VTBM MBP”	page 2-1
Installation procedures	
Marking and drilling the floor	page 3-1
Unpacking the cabinets	page 4-1
Installing the cabinets	page 5-1
Connecting power and ground cables	page 6-1
Routing and connecting MBP cabling	page 7-1
Installing the fiber cables	page 8-1
Installing the batteries and adjusting the rectifiers	page 9-1
Powering up the equipment and installing the circuit packs	page 10-1

FCC Part 15.21 radio interference information to the user

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 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 is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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 jackets used in equipment cables. These abbreviations take the form:

<pair_color> <group_marker_type> <group_marker_color>

where:			
<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>	Is 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.

Commissioning information

Commissioning procedures are not within the scope of this document. Commissioning procedures are in *Commissioning and Testing*, Volume 3. However, the following commissioning information is provided for your convenience:

For commissioning, you will use a modular operations controller (OPC) to perform the required commissioning on the access bandwidth manager (ABM) VTBM remote fiber terminal (RFT) network element.

Refer to *Commissioning and Testing*, Volume 3 and also to *OPC User Interface Description*, 323-3001-301, in *Operations, Administration, and Provisioning*, Volume 4A, to learn how to set up and use the OPC.

Note 1: If a Transaction Language 1 (TL1) interface is being used, it must be disconnected from the OPC before any commissioning changes are made through the OPC Commissioning Manager tool. Once the commissioning changes are complete, the TL1 connection can be reestablished with the primary OPC. The TL1 connection to the backup OPC can be reestablished only after datasync is complete.

CAUTION
Loss of NE recognition
If the TL1 interface is not disconnected before commissioning changes are made, alarms and events from network elements with changed commissioning data may not be reported or retrieved, and commands to these network elements may not be recognized.

Note 2: When a terminal is connected to an OPC for commissioning, OPC port 1 (port B) is used. For a successful connection, port 1 (B) must be configured for terminal communications.

Before starting the commissioning process

Before you begin commissioning, ensure that you do the actions that follow.

- Make photocopies of the commissioning forms found on the following pages for each network element (NE) or RFT at each site.
- Plan out in advance the unique network element ID that you will be assigning to each NE or RFT in the system.
- Identify the particular span of control configuration that applies to the system to be commissioned.
- Verify that a CNet cable has been installed between network elements that are bridged in a single span of control. The default userID is “admin” and the default password is “admin”.
- Obtain the OPC userID and password for the system line-up and testing (SLAT) security level. The default userID is “slat” and the default password is “slat”.
- Obtain the NE logon userID and password for the admin security level. The default userID is “admin” and the default password is “admin”.

Commissioning procedures are in *Commissioning and Testing*, Volume 3.

Commissioning data forms, results forms and DS1/3 mapper forms

Commissioning forms are included in the back of this section for your use in tracking and maintaining records of remote site detail information and circuit pack locations within the shelves of the cabinets. Photocopy at least one form for each network element.

You will use Commissioning Data Forms when you perform commissioning procedures for the ABM.

The Commissioning Results form is three pages long. Use it to record the completion of each procedure as it is performed at each site.

Use the ABM DS1 Mapper Layout Forms to record where the DS1 and DS3 mappers and their corresponding I/O cards are located at each site.

Commissioning Data Record

Use a copy of this form to keep a permanent record of all commissioning data.

Network name:	**System type:**	
System name:	**OPC name:**	
Primary OPC serial number:	**Alias:**	**Time zone:**
Backup OPC serial number:	**Alias:**	**Time zone:**

Remote OPCs

OPC name	Primary serial number	Primary alias	Backup serial number	Backup alias

Network elements

Network element number	Shelf Type	Shelf Function	Shelf serial number	Network element name	Network element location	GMT offset (Apr-Oct)	GMT offset (Oct-Apr)	Route diversity

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Commissioning Results form

AccessNode system: _____

Location name: _____

Location type:
(CO or remote) _____

Shelf type
(ABM or TBM) _____

Customer: _____

Project: _____

COEO/Customer #: _____

Fiber World Product Release _____

Tested by: _____

Date: _____

Page	Procedure and items tested	Results
	Preparing your worksheets Hub Remote site	 pass _____ pass _____
	Installing software in a local OPC	pass _____
	Entering system-level data	pass _____
	Entering network-element commissioning data	pass _____
	Entering network element configuration data	pass _____
	Perform a manual NE database backup (if applicable)	pass _____
	Transferring data from the primary OPC to the portable OPC (if applicable)	pass _____
	Saving OPC data to tape	pass _____
	Inspecting the network element Hub Remote site	 pass _____ pass _____
	Installing the MBP rectifiers	pass _____
	Verifying the MBP rectifiers	pass _____
	Verifying the NT6C14JA dc distribution shelf (if applicable)	pass _____
	Verifying power at the BIP (ABM shelf) battery1/return1 (hub) battery2/return2 (hub) battery3/return3 (hub) battery4/return4 (hub) battery1/return1 (Remote site) battery2/return2 (Remote site) battery3/return3 (Remote site) battery4/return4 (Remote site)	(reqt: –42 to –56 V dc) _____ V dc _____ V dc _____ V dc _____ V dc _____ V dc _____ V dc _____ V dc _____ V dc

Page	Procedure and items tested	Results
	Verifying power at the BIP (if applicable) (reqt: –42 to –56 V dc) with breakers: OFF ON A feed: _____ V dc_____ V dc B feed: _____ V dc_____ V dc	Difference _____ V dc _____ V dc
	Inserting circuit packs Hub Remote site	 pass _____ pass _____
	Powering up the common equipment Hub Remote site	 pass _____ pass _____
	Downloading software to the network element Hub Remote site	 pass _____ pass _____
	Setting the network element name Hub Remote site	 pass _____ pass _____
	Transferring data from the portable OPC to the primary OPC (if applicable)	pass _____
	Setting the time zone, date, or time (if applicable)	pass _____
	Transferring data from the primary OPC to the backup OPC (if applicable)	pass _____

DS1/3 Mapper Layout Form (ABM configuration)
Use a copy of this form to record the slot location for DS1/VT and DS3/STS mappers, and their corresponding input/output cards, for ABM-ABM configurations.

Remote site shelf serial number _____

	Slot #							
Circuit pack	1	2	3	4	5	6	7	8
DS1/VT mapper								
DS1 input card								
DS1 output card								
DS3/VT mapper								
DS3 Output card								
DS3 Input card								

DS1/3 Mapper Layout Form (TBM configuration)
Use a copy of this form to record the slot location for DS1/VT and DS3/STS mappers, and their corresponding input/output cards, for TBM-ABM configurations.

OPC shelf serial number _____

	Slot #												
Circuit pack	1	2	3	4	11	12	13	14	15	16	17	18	19
DS1/VT mapper													
DS1 input card													
DS1 output card													

Remote site shelf serial number_____ _____

	Slot #												
Circuit pack	1	2	3	4	5	6	7	8	-	-	-	-	
DS1/VT mapper													
DS1 input card													
DS1 output card													
DS3/VT mapper													
DS3 Output card													
DS3 Input card													

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.

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, Class 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 your 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.

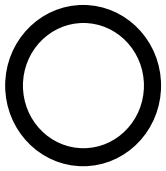
International electrical symbols on equipment

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

Power on

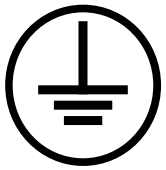
This symbol indicates that a main power on/off switch is in the on position.

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.

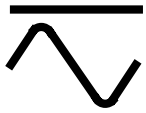
Alternating current

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

Direct current

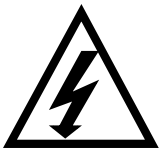
This symbol indicates the location of a terminal that supplies direct current or to which a source of direct current is applied.

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.

Electrostatic discharge

This symbol indicates a danger of damage to equipment due to the presence of static electricity. The presence of static electricity may damage equipment. Always use an electrostatic discharge (ESD) grounding strap when working on or handling equipment circuit packs.

Introduction to the VTBM MBP

This chapter describes the following:

- configuration of the equipment in the Virtual Tributary Bandwidth Manager (VTBM) Modular Business Package (MBP) cabinets
- configuration of the internal and external signal cables
- dc distribution shelf and breaker interface panel (BIP) circuit breaker designations

Chapter contents

This chapter contains the following information:

Product description

The AccessNode system consists of a central office equipment hub site and a remote equipment site and can be configured for several different applications such as:

- OC-12 fiber ring
- OC-12 single-ended (SE)
- DS1-fed

The AccessNode Modular Business Package (MBP) is usually installed as customer-located equipment at a remote site. Customer-located equipment is owned by the operating telephone company but located on the premises of the customer.

The NT4K06ED Virtual Tributary Bandwidth Manager (VTBM) MBP master cabinet and the NT4K06BB VTBM MBP expansion cabinet can be used in any of these applications. However, the VTBM functionality is supported by system software releases AN12 and above running in OC-12 fiber ring applications using NT7E05 VTBM optical interface circuit packs. Table 2-1 shows the software and hardware requirements for VTBM compatibility in the AccessNode MBP VTBM cabinets.

Table 2-1
MBP applications and requirements

Application	System software requirement	Optical interface circuit pack requirement	Other hardware requirement	VTBM functionality
OC-12 fiber ring	AN12 and above	NT7E05	NT4K0610 fan shelf	Yes
Note: All other applications and combinations of system software and hardware do not support VTBM functionality.				

No other applications and configurations support VTBM functionality.

This document details the installation procedures for the remote site OC-12 fiber ring application. However, throughout this document, installation options for the different applications are included.

OC-12 fiber ring application

The OC-12 fiber ring configuration incorporates the transport bandwidth manager (TBM) bay hub with operations controller (OPC) shelves and the VTBM MBP remote cabinet sites with an access bandwidth manager (ABM) shelf operating in a fiber ring application controlled by AccessNode software.

The remote site ABM shelf contains the OC-12 VTBM ring connections. VTBM services include:

- DS1
- DS3
- OC-3 tributaries
- DS0 based services
  - 2W (POTS, CENTREX, ISDN)
  - 4W (DDS)
  - 6/8W (4WE&M, PLR)

A typical MBP VTBM ring remote can support up to 192 DS0 lines and 168 DS1 lines in one master cabinet. An expansion cabinet supporting up to an additional 480 DS0 lines can be added for a total of 672 DS0 lines.

Figure 2-1 illustrates a typical OC-12 VTBM fiber ring configuration.

Digital fiber access

The digital fiber access configuration incorporates a fiber central office terminal (FCOT) that contains equipment that multiplexes the traffic and transports it via fiber optic cable to a remote fiber terminal (RFT).

Figure 2-2 illustrates a typical digital fiber access configuration.

Figure 2-1
Typical OC-12 VTBM fiber ring configuration

FW-15557

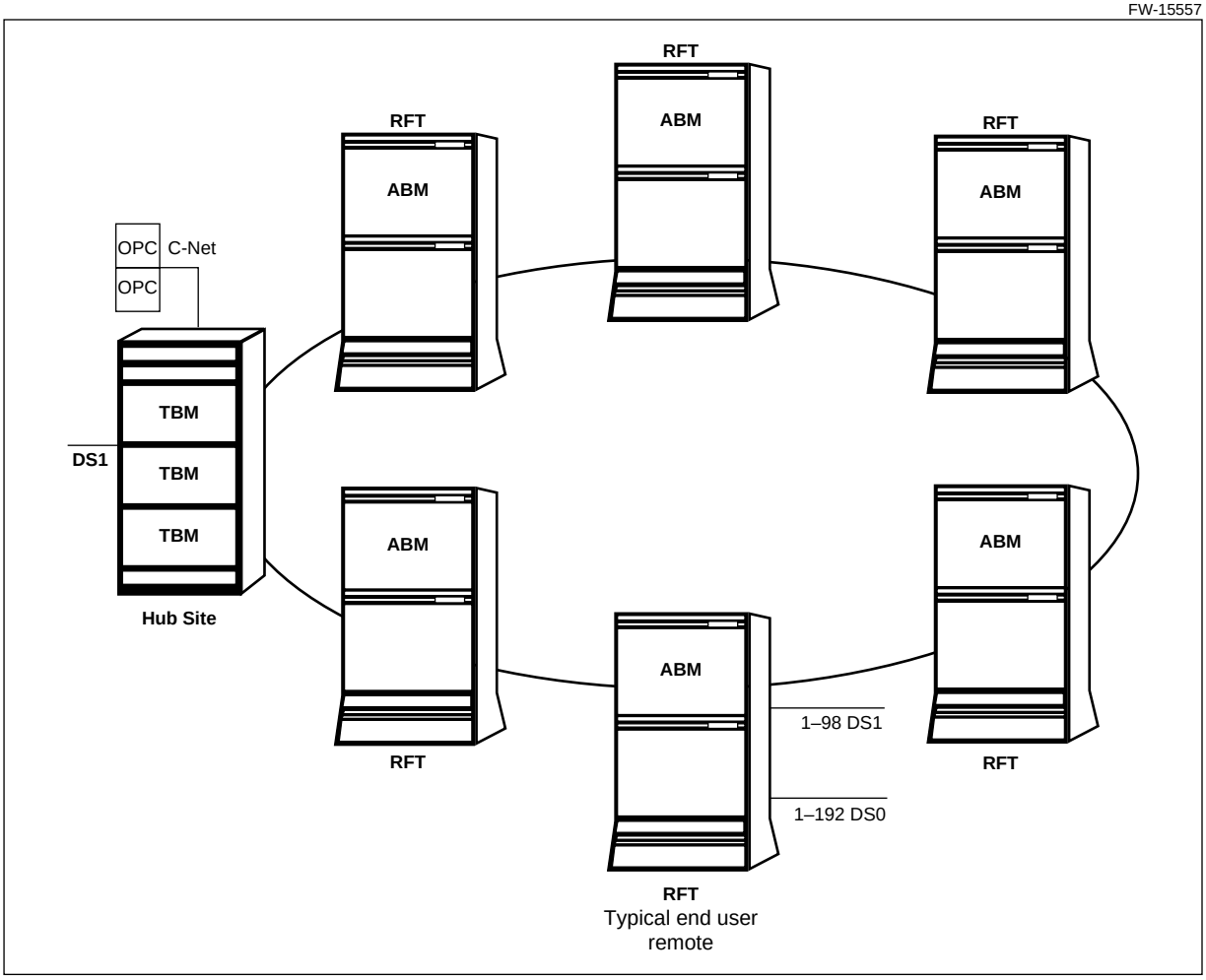
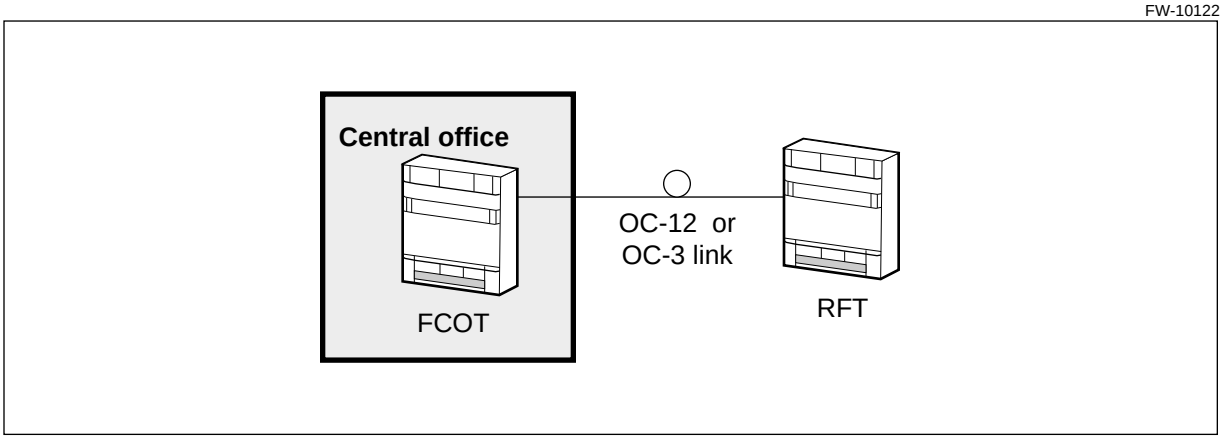


Figure 2-2
Basic fiber-fed AccessNode system

FW-10122



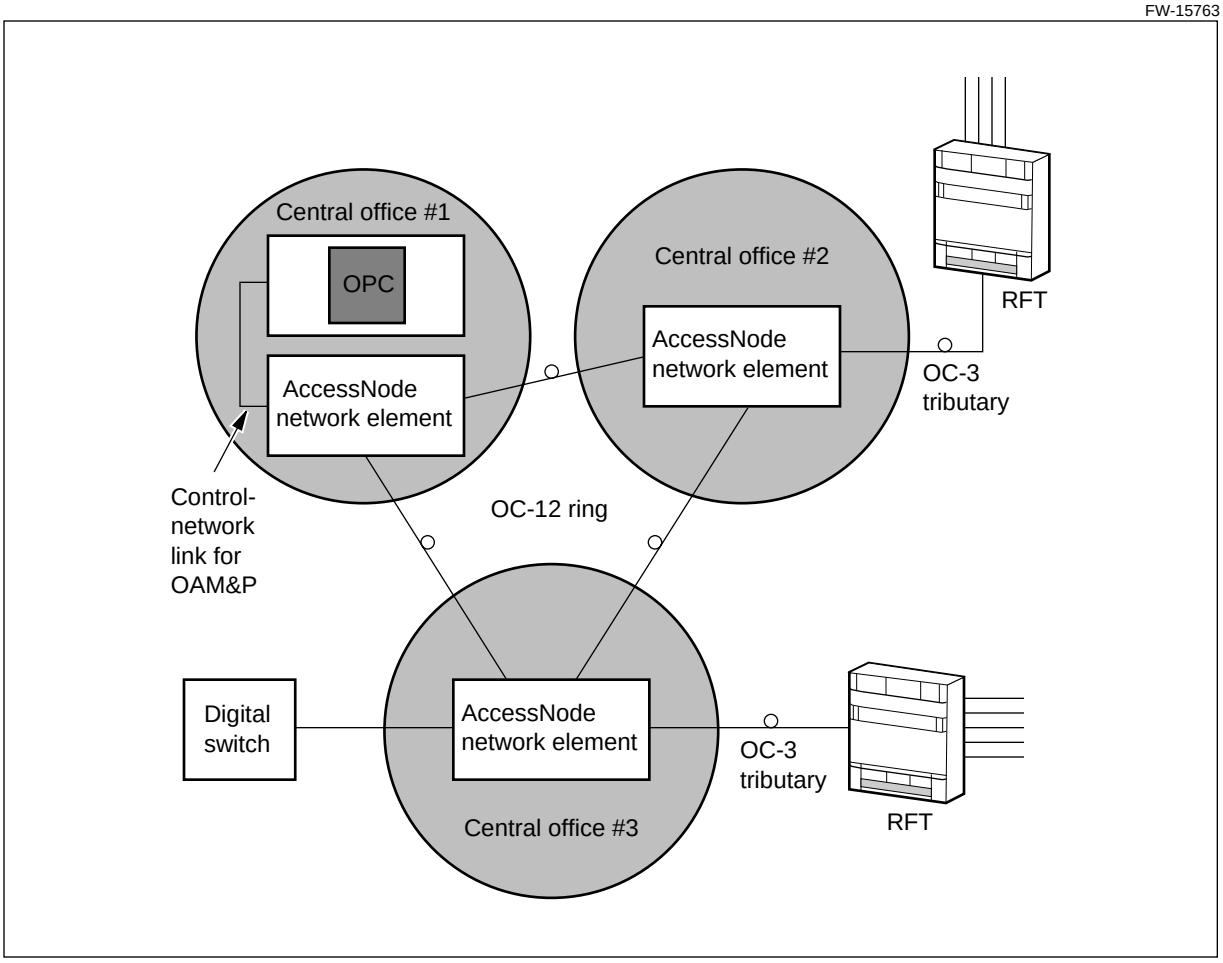
Single-ended

The OC-12 fiber ring configuration incorporates the transport bandwidth manager (TBM) bay hub with operations controller (OPC) shelves and the VTBM MBP remote cabinet sites with an access bandwidth manager (ABM) shelf operating in a fiber ring application controlled by AccessNode software.

Figure 2-3 illustrates a typical single-ended configuration.

Figure 2-3
Single-ended AccessNode system

FW-15763

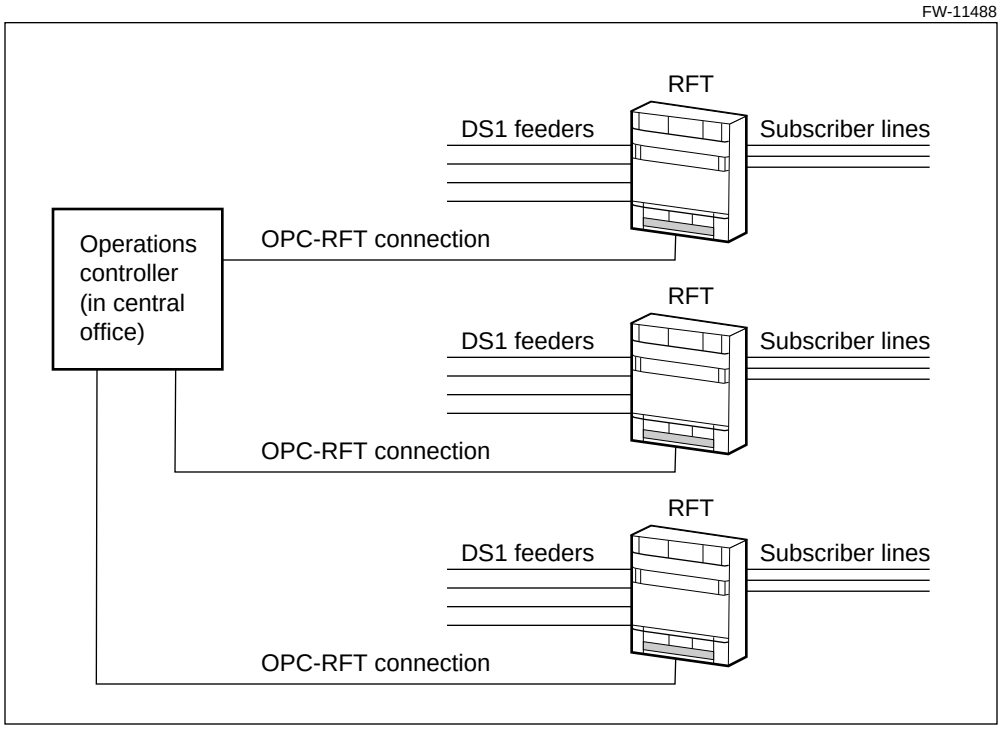


DS1-fed

The DS1-fed configuration incorporates DS1 feeders to the RFT. Fiber optic feeders are not used in this application.

Figure 2-4 illustrates a typical DS1-fed configuration.

Figure 2-4
DS1-fed AccessNode system



Types of cabinet

An AccessNode remote system is available in cabinets 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.

A system consists of from one to two cabinets as follows:

- a master MBP cabinet (0–192 lines)
- an expansion MBP cabinet (lines 193–672)

Cabinet arrangement

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

Figure 2-5 shows the MBP VTBM two-cabinet arrangement.

Master cabinet

A master cabinet consists of a stack of one dual equipment module (DEM), one base equipment module, one battery equipment module (BEM) and one pedestal. For a description of the master cabinet equipment, see “MBP master cabinet configuration” on page 2-11.

The master cabinet converts a supply of 208/240 V ac to supplies of -48 V dc for powering the equipment inside the master and expansion MBP cabinets. The base equipment module contains a rectifier shelf and a breaker interface panel. The BEM provides space for back-up batteries.

The standard MBP master cabinet also provides access connections controlled by AccessNode software to one copper-distribution shelf (CDS) for DS0 services of up to 96 lines. An optional second CDS shelf can be installed in the master cabinet for a total of up to 192 DS0 lines.

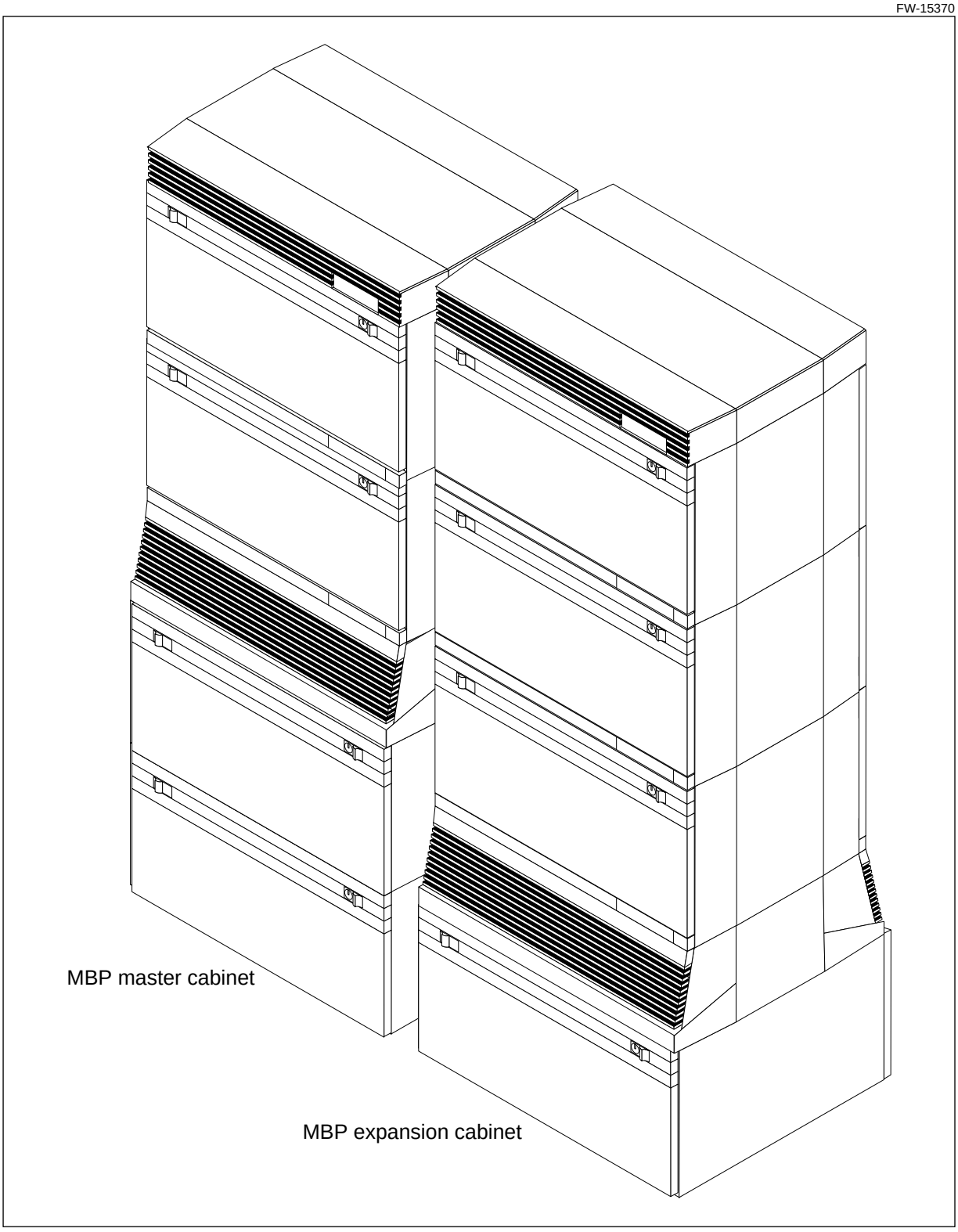
Expansion cabinet

An expansion cabinet consists of a stack of up to three single equipment modules (SEMs), one BEM and one pedestal. For a description of the expansion cabinet equipment, see “MBP expansion cabinet configuration” on page 2-13.

The expansion cabinet SEMs can contain up to 5 CDS shelves (two per SEM) for a maximum capacity of 480 DS0 lines. The BEM provides space for additional back-up batteries

Figure 2-5
Typical MBP VTBM two-cabinet arrangement

FW-15370



Common features of MBP cabinets

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

Covers

MBP cabinets are supplied with key lockable covers that can be locked with a common key. The Access Bandwidth Manager (ABM) shelf and the Breaker Interface Panels (BIP) located inside the MBP master cabinet are equipped with covers that can be installed or removed with a screwdriver that has a flat blade 1/4 in. wide.

Anchoring kits

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

Concrete floors

Two anchor kits are available for the VTBM MBP cabinets. They are:

If your floor thickness is	And the anchor strength you want is	Then order these products
4–6 in.	standard	NT4K0650/53 NT4K0602
4–6 in.	seismic Zone 3–4 compliant	NT4K0650/53 NT4K0605

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.

Raised floors

MBP 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.

Top cap kit

The top cap kit consists of the upper cabinet covers which protect the cabinet equipment and assist in ventilation flow through the cabinet. The NT4K09AA top cap kit is standard in the VTBM MBP. An optional NT4K09BA top cap kit is used in concrete floor-mounted applications for overhead cabling.

Cable extender kit

The cable extender kit provides a point for securing external cabling that is routed into the top of the cabinet in concrete floor applications. It is not needed in raised floor applications where external cabling enters the cabinet through the bottom.

Battery equipment module

The BEM provides space for mounting four, 12 V 125 AH Johnson Control batteries (TEL125-12) for supplying battery back-up power.

Installation in restricted areas and unrestricted areas

The Underwriter's Laboratory (UL) has approved modular business package MBP cabinets for use in unrestricted and restricted areas.

MBP master cabinet configuration

As a minimum, a system consists of an NT4K06ED MBP master cabinet. An NT4K06BB expansion cabinet can be added to the system for additional service capability (see “MBP expansion cabinet configuration” on page 2-13).

The equipment layout for the MBP master cabinet is shown in Figure 2-6.

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

96- to -192-line master cabinet configuration

This configuration is contained in a single cabinet and consists of:

- a top cap kit
- a cable extender kit
- a DEM that contains:
  - — up to two 96-line CDSs for DS0 services (lines 0–192)
  - — an access bandwidth manager (ABM) shelf for local access processing
- a base equipment module that contains:
  - — a breaker interface panel (BIP) for the ABM
  - — a local craft access panel (LCAP) for the ABM
  - — one rectifier shelf
  - — one dc distribution shelf
  - — one low voltage disconnect (LVD) unit
- a pedestal containing a grille kit and a blower module with two fans
- a BEM that contains:
  - — space for a back-up battery string of four batteries

Numbering of copper-distribution shelves

In MBP cabinets, standard copper-distribution shelf 1 (CDS 1) is the lowermost CDS in the master cabinet (above the ABM shelf). Optional CDS shelf number 2 (CDS 2) is the CDS immediately above shelf 1.

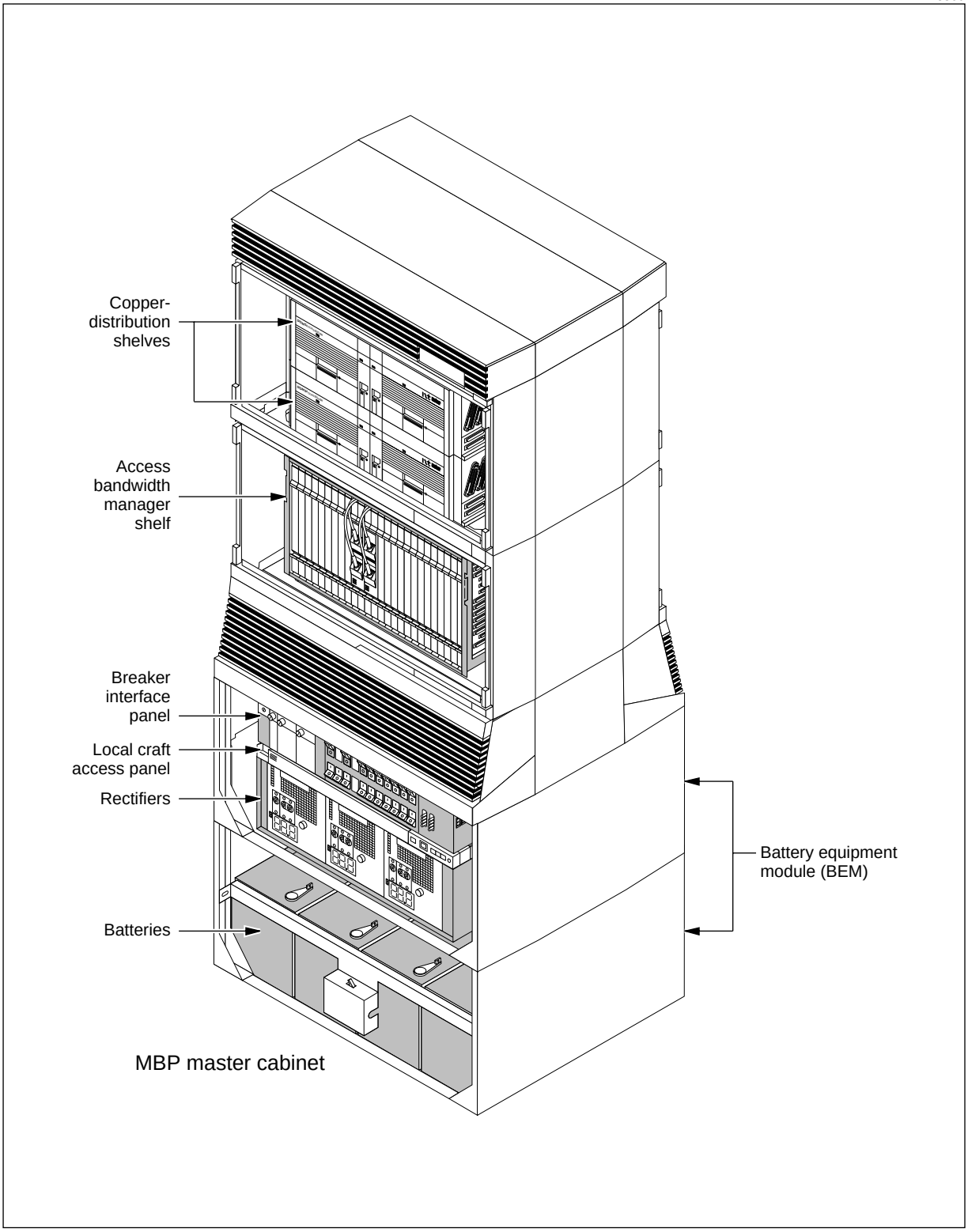
Shelf numbering continues at CDS 3 (the lowermost CDS in the expansion cabinet) on up to CDS 7 (the topmost CDS in the expansion cabinet).

Numbering of rectifier positions

The rectifier shelf, equipped with up to three rectifiers, is standard equipment in the MPP master cabinet. Rectifier 1 (Rect1) is the rectifier located in the right-most rectifier position on the shelf. The shelf also contains rectifier positions 2 and 3 (the middle and the left-most positions respectively). Blank cover plates must be installed to cover empty rectifier positions.

Figure 2-6
192-line configuration in an MBP VTBM master cabinet

FW-15360



MBP expansion cabinet configuration

As a minimum, the optional NT4K06BB MBP expansion cabinet consists of one 96-line copper-distribution shelf (CDS) and a battery equipment module (BEM). Up to 5 CDSs can be installed in the expansion cabinet to provide up to 480 lines of DS0 services.

The equipment layout for the MBP expansion cabinet is shown in Figure 2-7.

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

96- to 480-line expansion cabinet configuration

This configuration is contained in a single cabinet and consists of:

- a cable extender kit
- a top cap kit
- two single equipment modules (SEMs) that contain:
  - — up to two CDS shelves each (lines 193–576)
- a single equipment module (SEM) that contains:
  - — up to one CDS shelf (lines 577–672)
- a pedestal containing a grille kit and a blower module with two fans
- a BEM that contains:
  - — space for a back-up battery string of four batteries

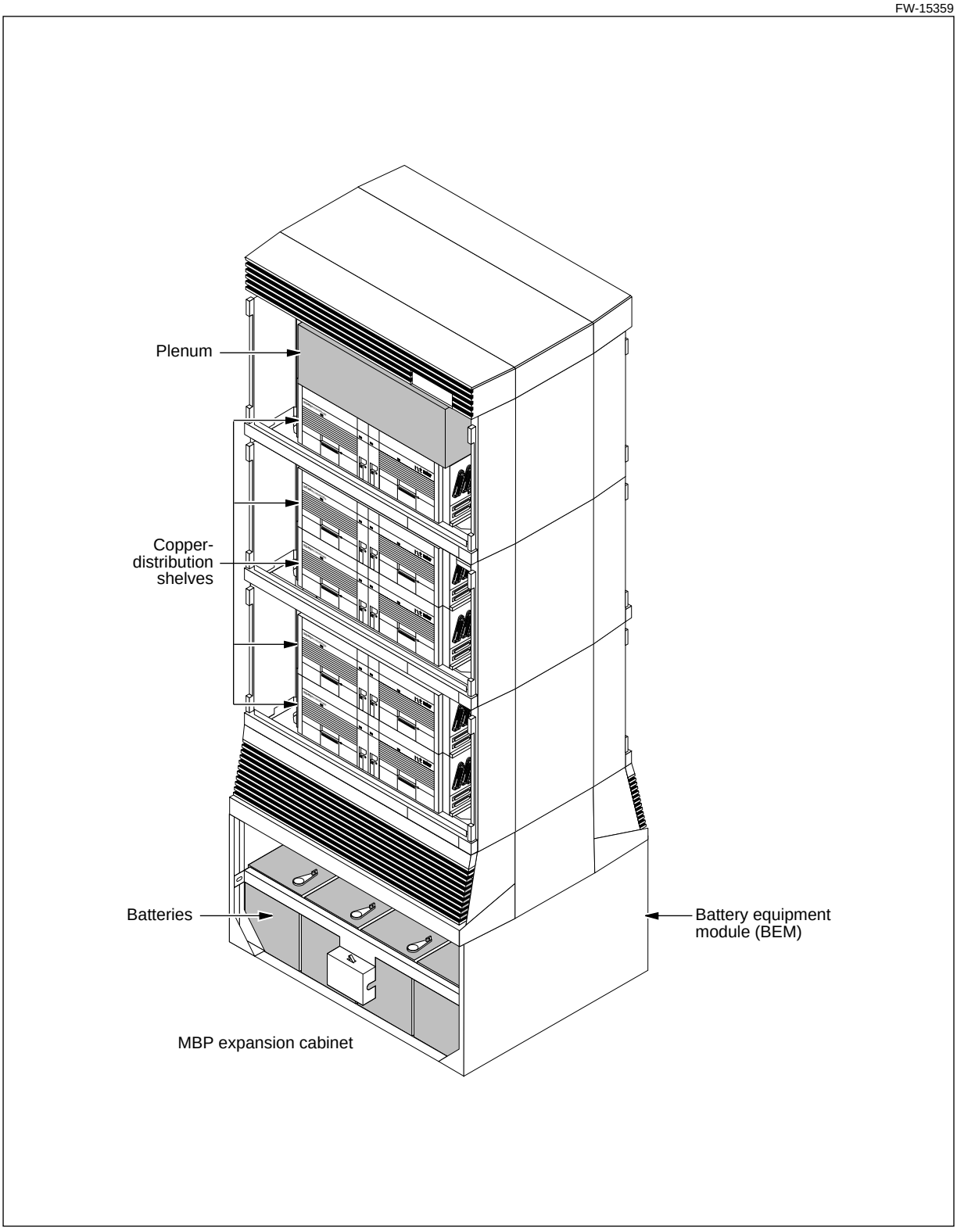
Numbering of copper-distribution shelves

In MBP expansion cabinets, standard copper-distribution shelf 3 (CDS 3) is the lowermost CDS in the expansion cabinet (above the pedestal). Shelf numbering continues at the optional CDS 4 (above CDS 3) on up to CDS 7 (the topmost CDS in the expansion cabinet).

CDS 1 and CDS 2 are located in the master cabinet.

Figure 2-7
480-line configuration in an MBP VTBM expansion cabinet

FW-15359



Powering

The MBP master cabinet requires one 40A, 208/240 V ac feed from a commercial power source per rectifier shelf.

AccessNode equipment in MBP cabinets require four dc supply and return feeds (from the dc distribution unit) each of which is rated at a nominal -48 V dc at 30 A to supply the ABM breaker interface panel.

Space for battery backup is provided by a battery equipment module (BEM) in the bottom of the MBP master and expansion cabinets. A string of 4 batteries in each BEM can supply 100 AH each of battery backup.

Equipment shelf and slot positions

This section describes the numbering of equipment shelves and circuit pack slots and positions.

Rectifiers

The three rectifier positions are numbered right-to-left with position 1 in the right-most slot on the rectifier shelf.

Blank cover plates must be installed to cover positions not installed with rectifiers.

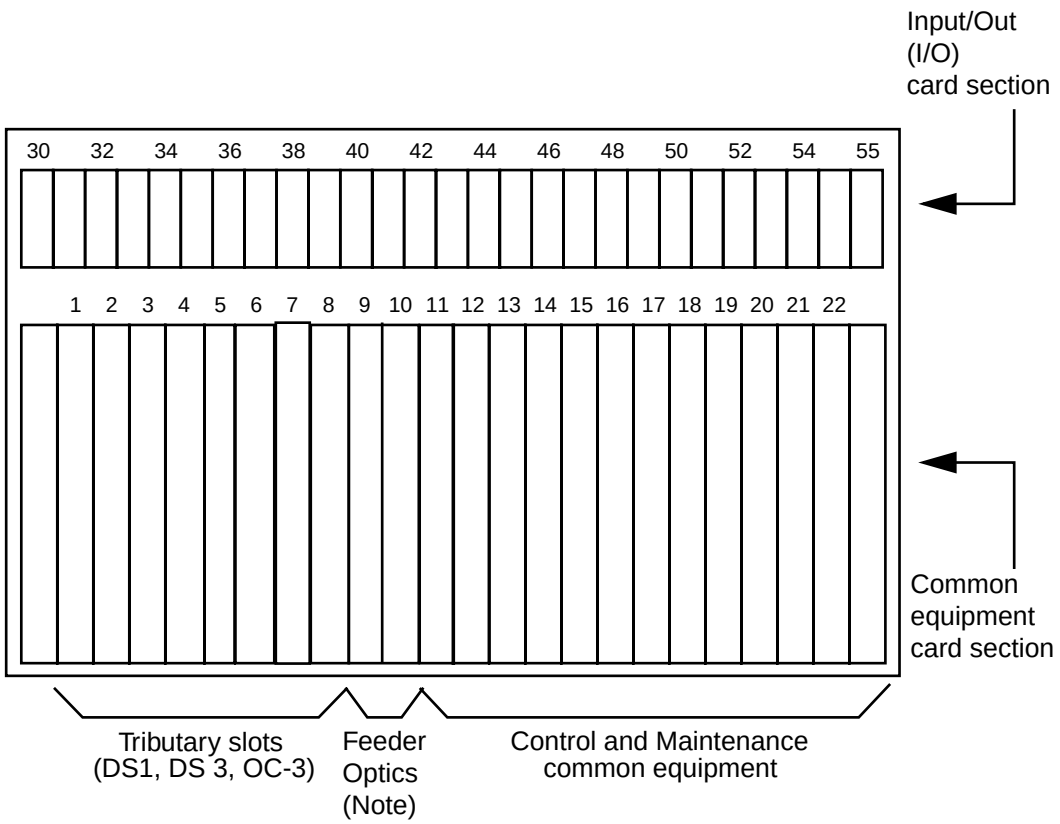
ABM shelf

General ABM shelf and slot position information for VTBM applications is described in the following paragraphs. For detailed ABM shelf circuit pack locations, reference *Mapper Layouts Planning Guide*, 323-3001-154, in the *Engineering, Configuration and Ordering Guide*, Volume 1.

ABM shelf slot positions

The ABM shelf circuit pack slot positions are numbered as shown in Figure 2-8.

Figure 2-8
ABM shelf slot numbering

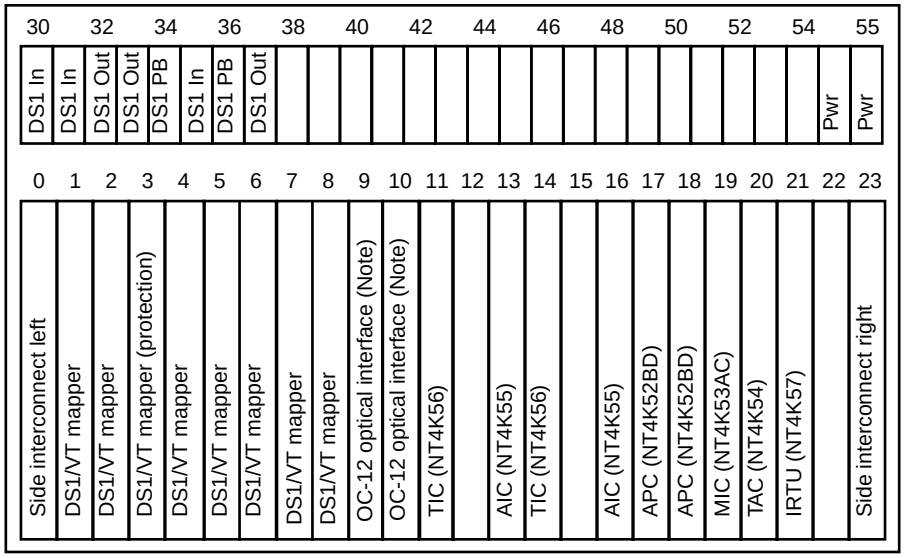


Note: In DS1-fed applications, NT4K75 timing and cross-connect (TXC) cards are used instead of optical interface units. NT7E02 OC-12 optical interface units can be used in non-VTBM applications.

ABM circuit pack locations

Figure 2-9 shows typical locations of the common-equipment circuit packs and the I/O card circuit packs installed in the ABM shelf at each RFT. Circuit pack locations are variable. Reference your job specifications for circuit pack locations for your installation.

Figure 2-9
Typical ABM circuit pack locations



Mappers		I/O cards			
DS1	1	DS1 In	30	DS1 Out	32
DS1	2	DS1 In	31	Ds1 Out	33
DS1 P	3	DS1 PB	34	DS1 PB	36
DS1	4	DS1 In	35	DS1 Out	37

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

Note: In ABM shelf slot numbers 9 and 10, you can install the following circuit packs:

OC-12 optical interface (NT7E05) for VTBM applications
OC-12 optical interface (NT7E02) for other OC-12 applications
Timing and cross-connect (NT4K75) for DS1-fed applications

Copper-distribution shelves

In VTBM MBP cabinets, copper-distribution shelf (CDS) 1 is the lower-most CDS in the master cabinet (above the ABM shelf). CDS 1 is standard equipment in a master cabinet. The optional CDS shelf number 2 is the CDS shelf immediately above CDS 1.

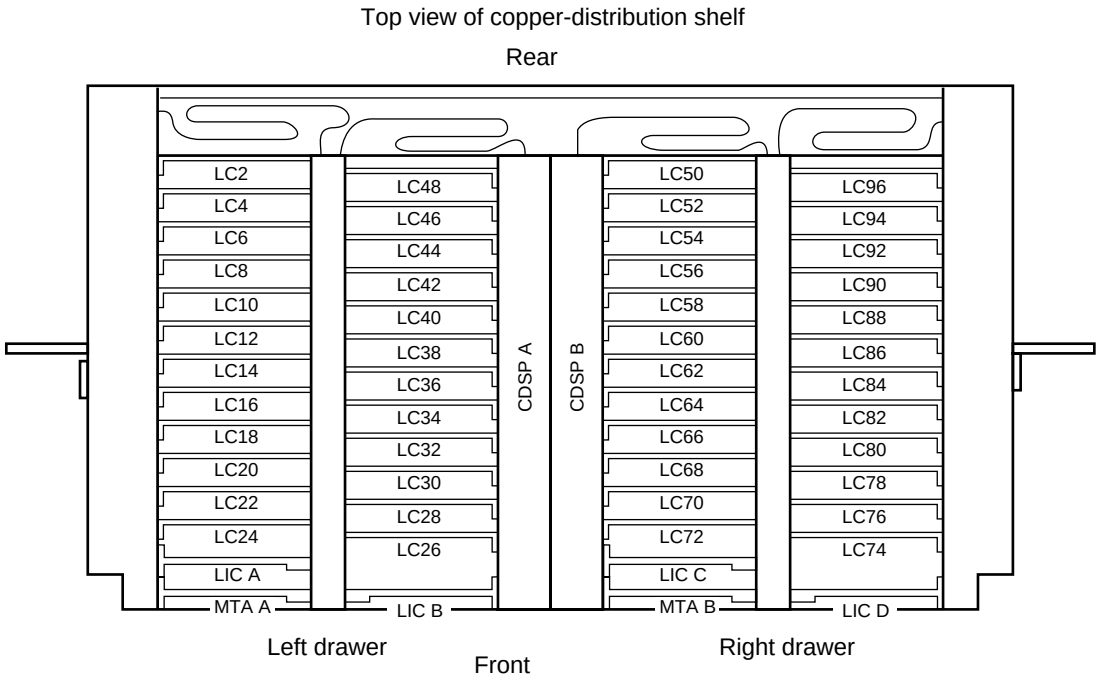
Shelf numbering continues to the lower-most CDS in the expansion cabinet up to CDS shelf 7 – the upper-most CDS in the expansion cabinet.

CDS line drawer slot positions

CDS shelf line drawer slot positions are numbered as shown in Figure 2-10.

Figure 2-10
Slot numbering in CDS line drawers

FW-10750



Note 1: The odd-numbered line card slots are not visible from the top, only from the side.

Note 2: The narrowband line-interface cards (LIC A-D) and metallic test access cards (MTA A and B) are full-height common cards.

Circuit breaker designations

This section describes the circuit breaker locations and designations.

ABM breaker interface panel (NT4K14BA) circuit breakers

Table 2-2 shows the ABM BIP (NT4K14BA) breaker designations.

Table 2-2
BIP NT4K14AB breaker designations

Breaker	Amperage	Function
CE A	15A	ABM shelf power feed A
CE B	15A	ABM shelf power feed B
CDS1 PWR	15A	CDS1 power converters
CDS2 PWR	15A	CDS2 power converters
CDS3 PWR	15A	CDS3 power converters
CDS4 PWR	15A	CDS4 power converters
CDS5 PWR	15A	CDS5 power converters
CDS6 PWR	15A	CDS6 power converters
CDS7 PWR	15A	CDS7 power converters
TB CE	1A	ABM talk battery for TAC
CU A (Note)	15A	Power to PDU
CU B (Note)	15A	Power to PDU
CDS1 TB	10A	CDS1 talk battery
CDS2 TB	10A	CDS2 talk battery
CDS3 TB	10A	CDS3 talk battery
CDS4 TB	10A	CDS4 talk battery
CDS5 TB	10A	CDS5 talk battery
CDS6 TB	10A	CDS6 talk battery
CDS7 TB	10A	CDS7 talk battery

Note: For the NT4K14AB BIP product releases 03 and below, CU A and CU B are 10 A breakers. For the NT4K14AB BIP product releases 04 and above and the NT4K14BA BIP, CU A and CU B are 15 A breakers.

Battery equipment module circuit breakers

BEM circuit breaker 1 is located at the lower BEM of the MBP master cabinet. BEM circuit breaker 2 is in the BEM of the expansion cabinet.

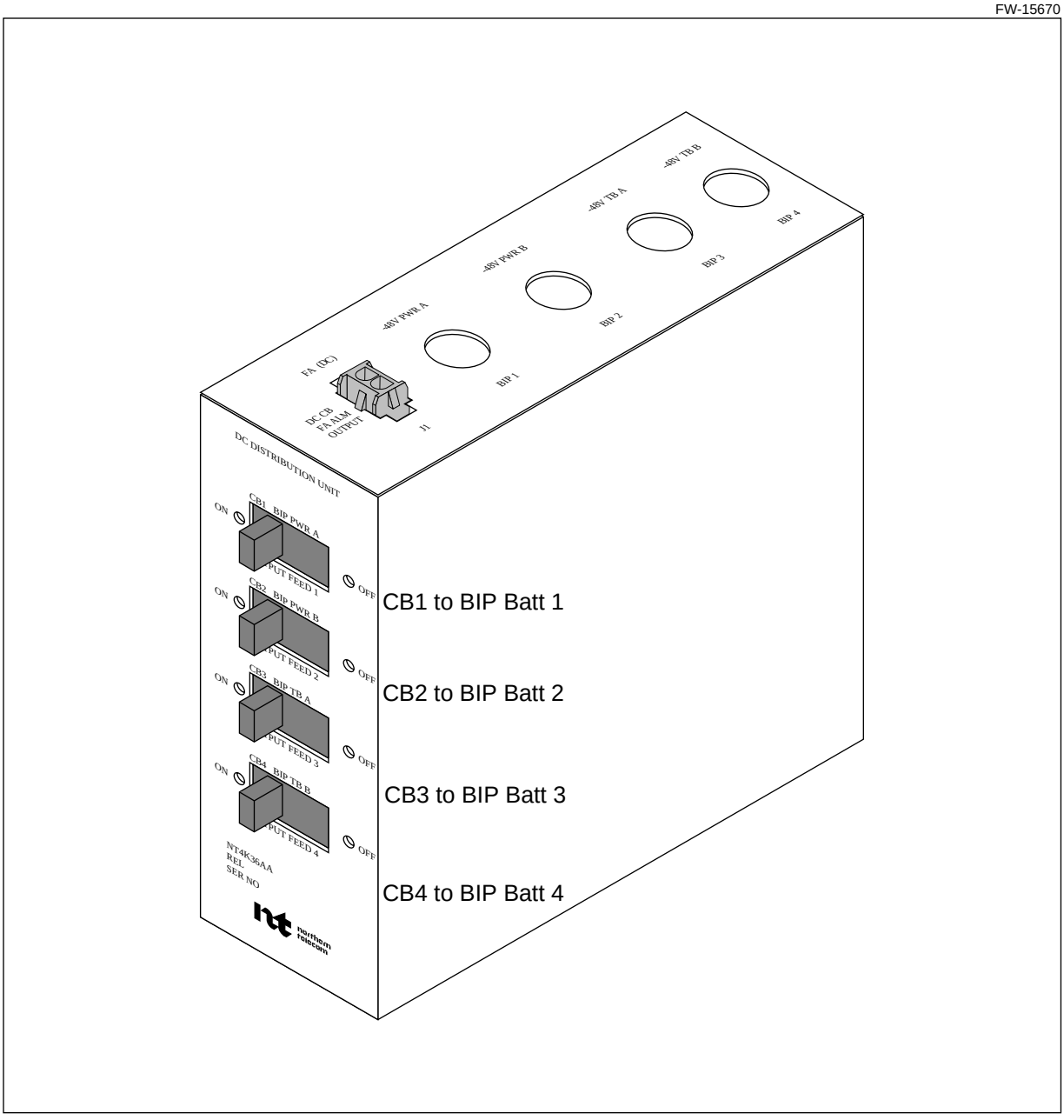
DC distribution unit circuit breakers

The NT4K36AA dc distribution unit is mounted in the rear of the MBP master cabinet on the left-hand side of the upper BEM. It has four 30 A circuit breakers (CB1–CB4) that provide overload protection for the four dc inputs to the BIP.

Figure 2-11 shows the dc distribution unit circuit breaker numbering.

Figure 2-11
DC distribution unit

FW-15670



System expansion

You can expand a system in a number of ways:

- by adding second, optional copper-distribution shelf into an empty shelf space in an MBP master cabinet
- by adding an MBP expansion cabinet that contains the desired configuration of copper-distribution shelves
- by adding optional copper-distribution shelves into an empty shelf space in an MBP expansion cabinet
- by adding modules or circuit cards to the ABM shelf.

When adding DS1 mappers to the ABM shelf, certain slots should be used first to ensure proper operation. New mappers should be mounted in slots 1 through 8, always using the odd-numbered slot 7 first and slot 8 second. Subsequent cards can be added from right to left always using the left-most odd-numbered empty slot first, followed by the next highest even-numbered slot.

> ***Note:*** Never install mappers in an even-numbered slot if there is no working mapper installed in the lower odd-numbered slot.

AccessNode system expansion information is found in *System Expansion Procedures*, 323-3001-324, in *Operations, Administration, and Provisioning*, Volume 4C, and *Modular Business Package VTBM Ring User Guide*.

Cabling diagrams

This section contains illustrations that show the connection of cables in the MBP cabinets.

External cabling

The master and expansion cabinets require field-installed external cabling for power and signalling connections as shown in Figure 2-12.

Master cabinet

Field-installed external cabling for the master cabinet includes the following:

- ac input
- electrical grounding
- fiber optics (OC-12 primary/secondary and OC-3 tributaries)
- DS1/DS3
- voice frequency (VF) lines 1–192
- external alarm reporting
- serial and parallel telemetry
- orderwire (OW) extension
- external modem

Expansion cabinet

Field-installed external cabling for the expansion cabinet includes the following:

- voice frequency (VF) lines 193–672
- electrical grounding

Figure 2-12 shows a block diagram of VTBM MBP cabling.

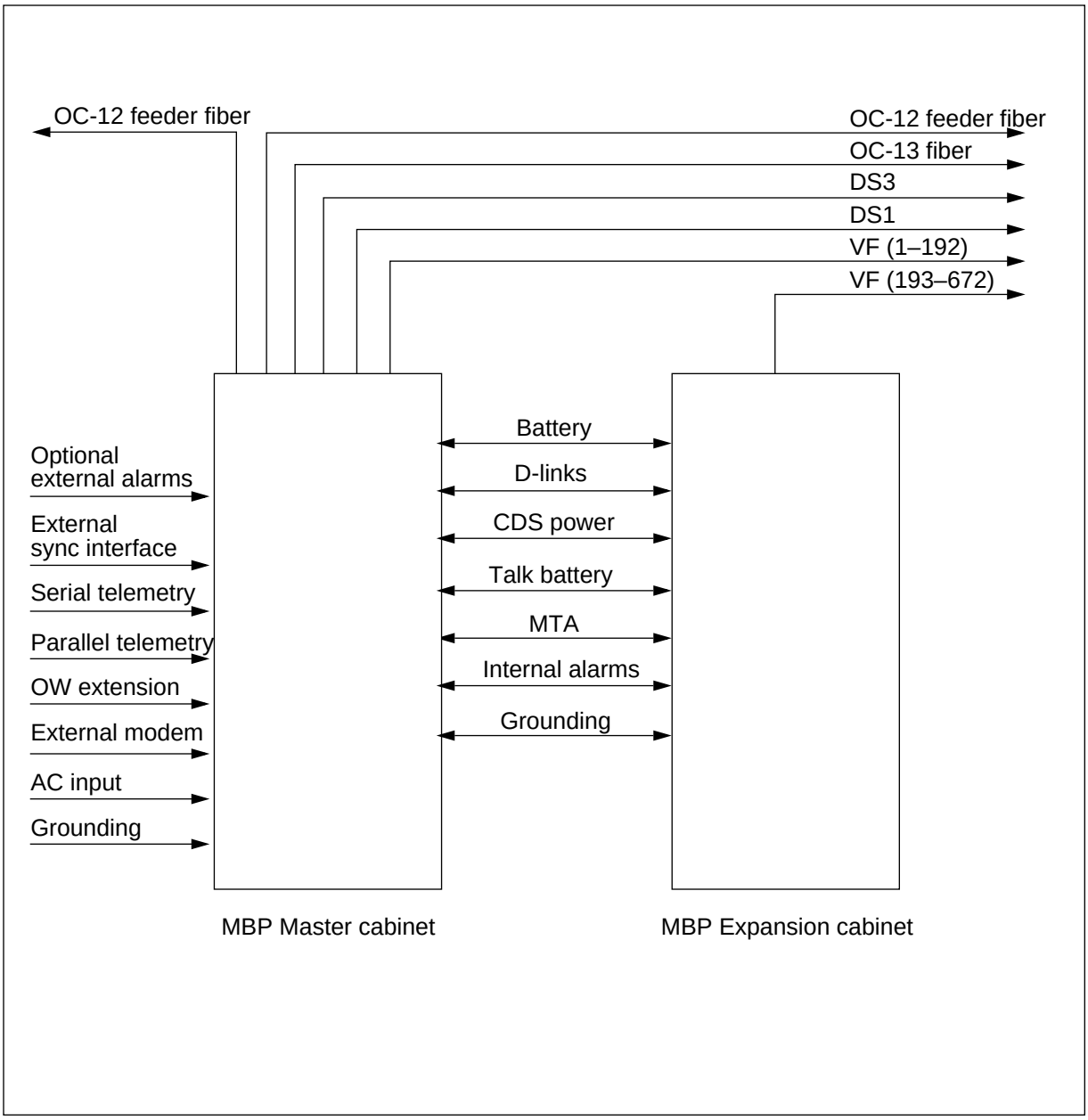
Inter-cabinet cabling

The master and expansion cabinets require field-installed inter-cabinet cabling for power and signalling connections as shown in Figure 2-12.

Inter-cabinet cabling between the master and expansion cabinets includes the following:

- power and talk battery
- battery back-up
- electrical grounding
- internal alarm
- metallic test access (MTA)
- DS0 signaling

Figure 2-12
VTBM MBP cabinet cabling block diagram



Internal cabling

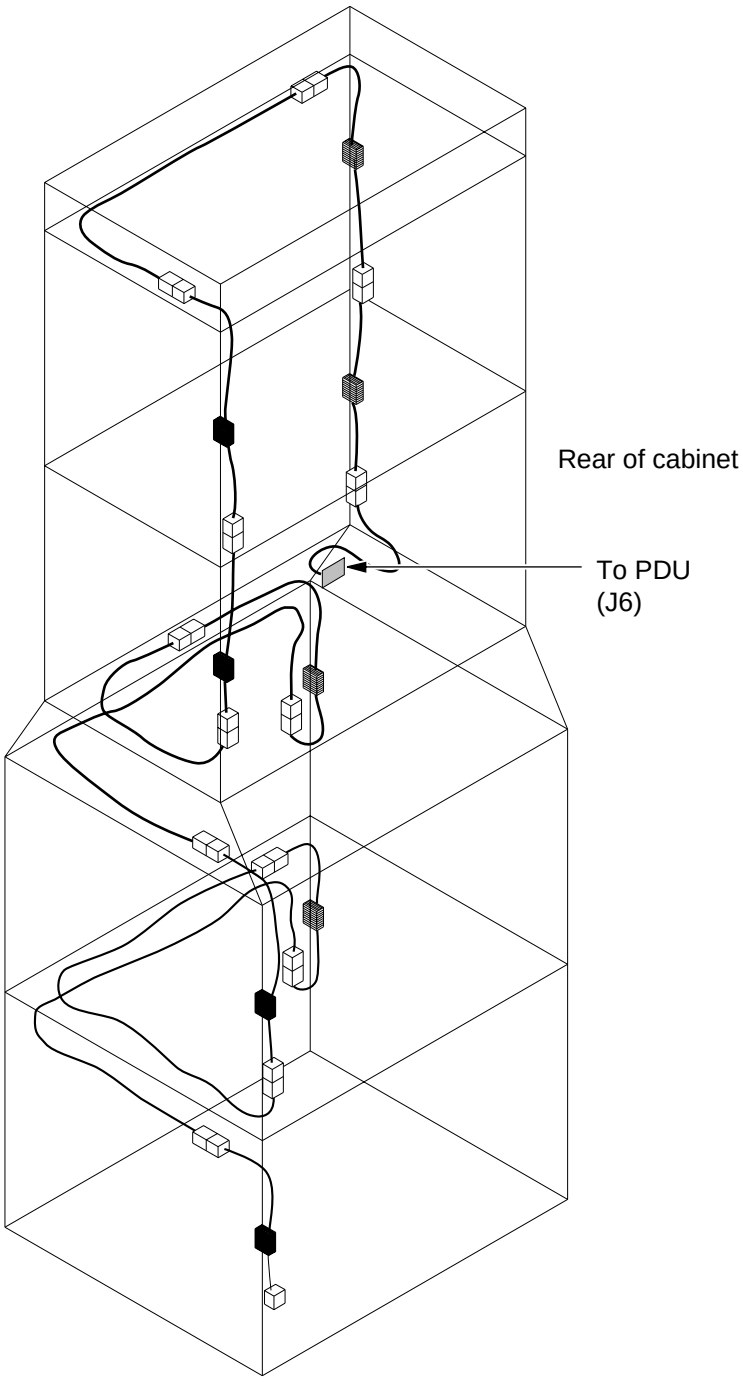
The MBP master and expansion cabinet intra-bay cabling is factory installed. This section shows wiring and cabling diagrams for the intra-bay internal cabling. The diagrams are listed in Table 2-3.

Table 2-3
Cables by function

Cabling	See
Door alarm cabling in the master cabinet	Figure 2-13 on page 2-25
Door alarm cabling in the expansion cabinet	Figure 2-14 on page 2-26
Power and battery cabling to the BIP	Figure 2-15 on page 2-27
BIP power distribution diagram	Figure 2-16 on page 2-28
MBP equipment grounding scheme	Figure 2-17 on page 2-29

Figure 2-13
Door alarm cabling in the master cabinet

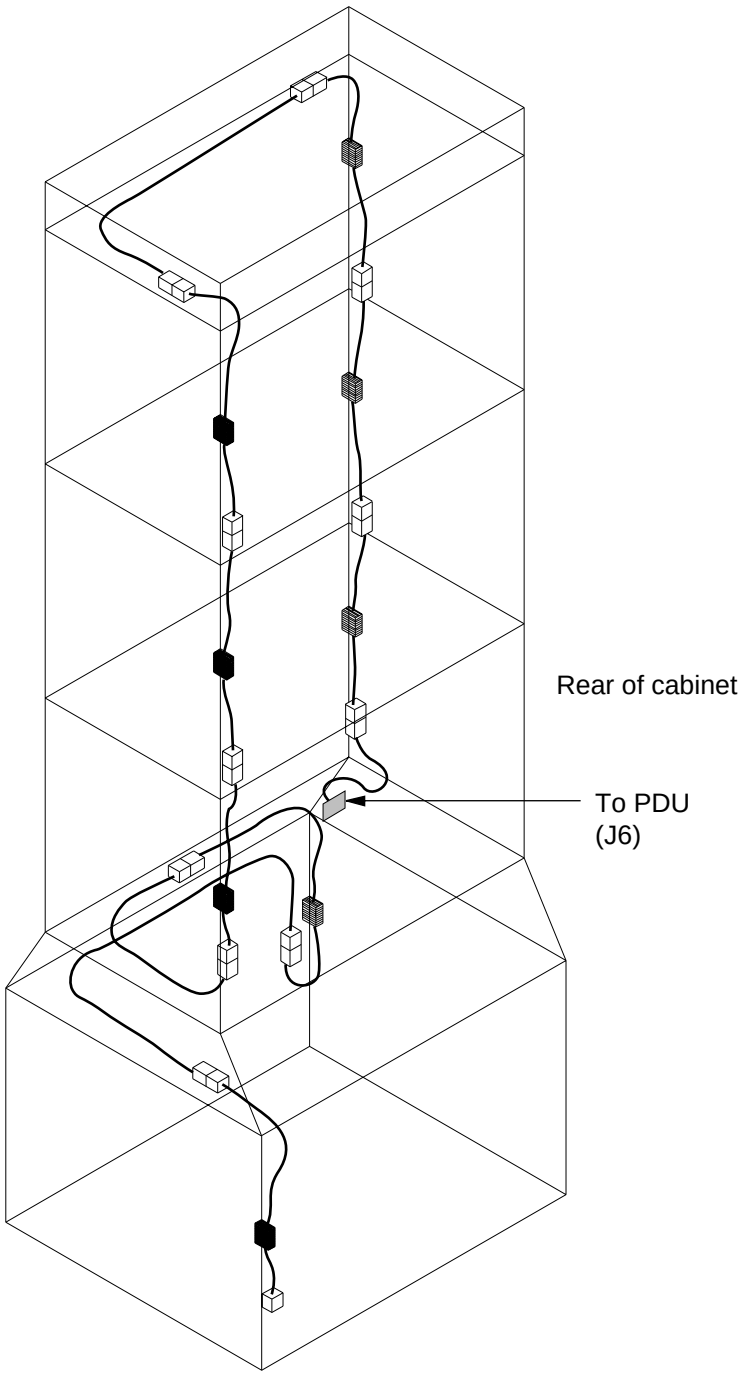
FW-15600



MBP Master cabinet

Figure 2-14
Door alarm cabling in the expansion cabinet

FW-15594



MBP Expansion cabinet

Figure 2-15
Power and battery cabling to the BIP

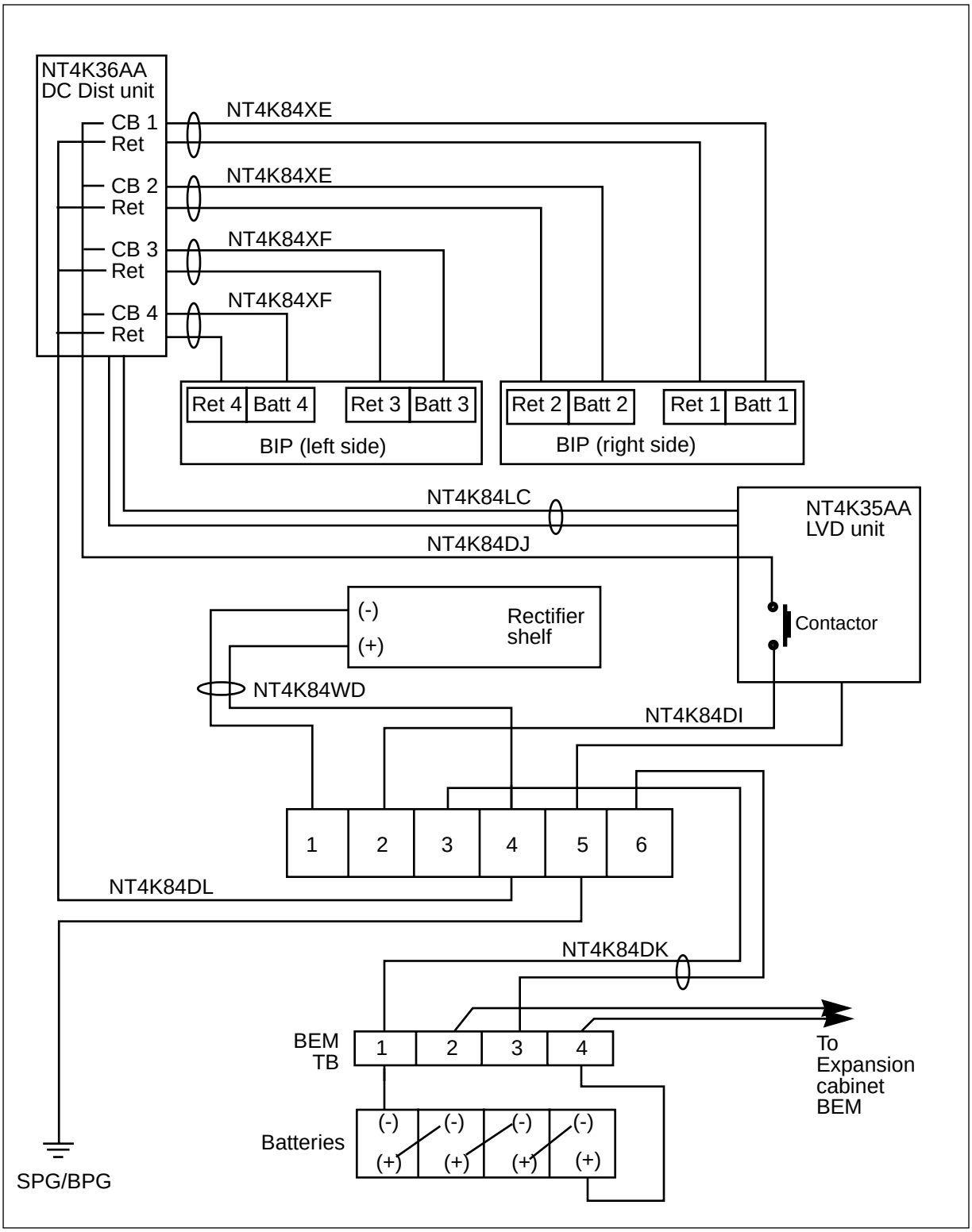


Figure 2-16
BIP power distribution diagram

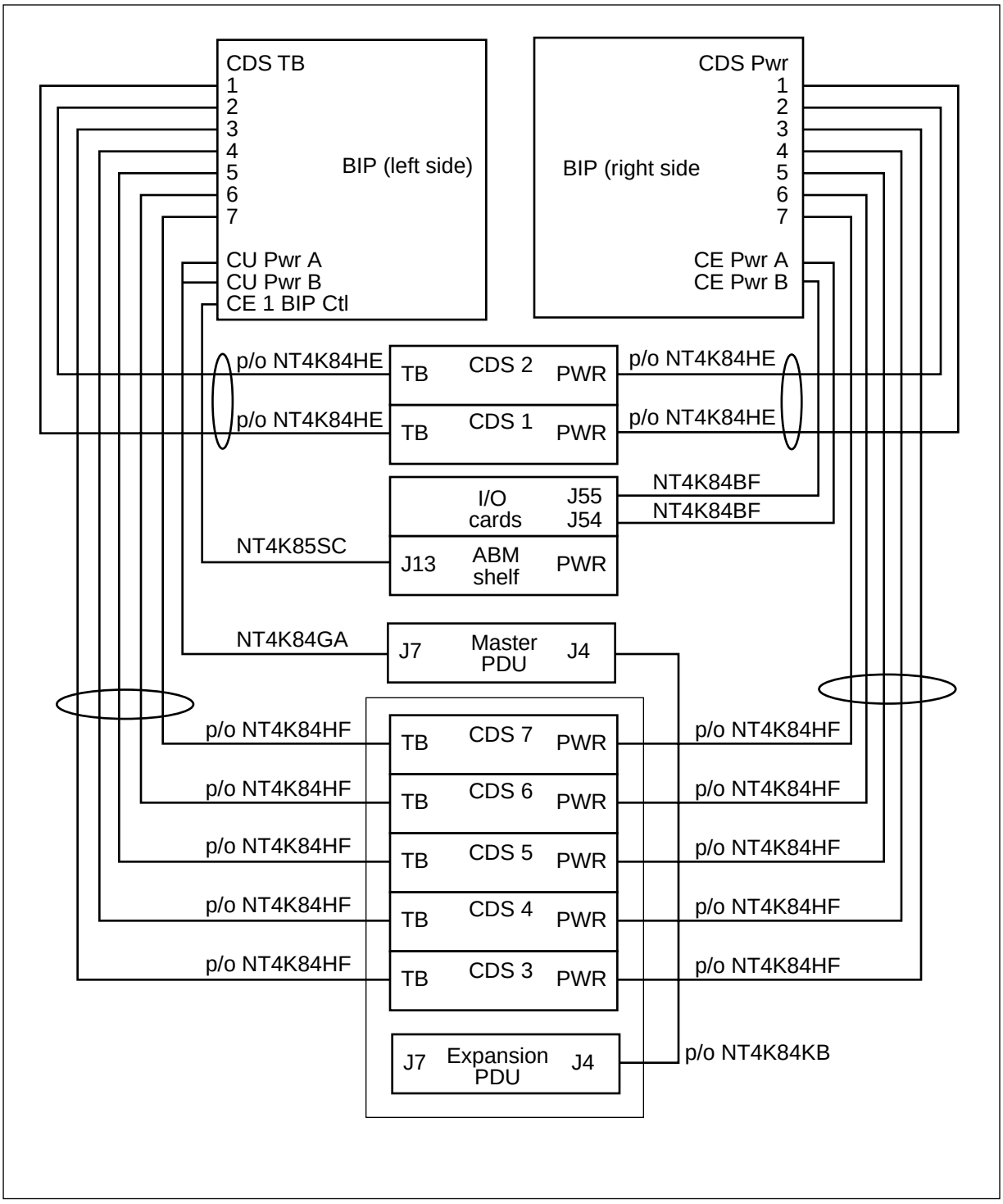
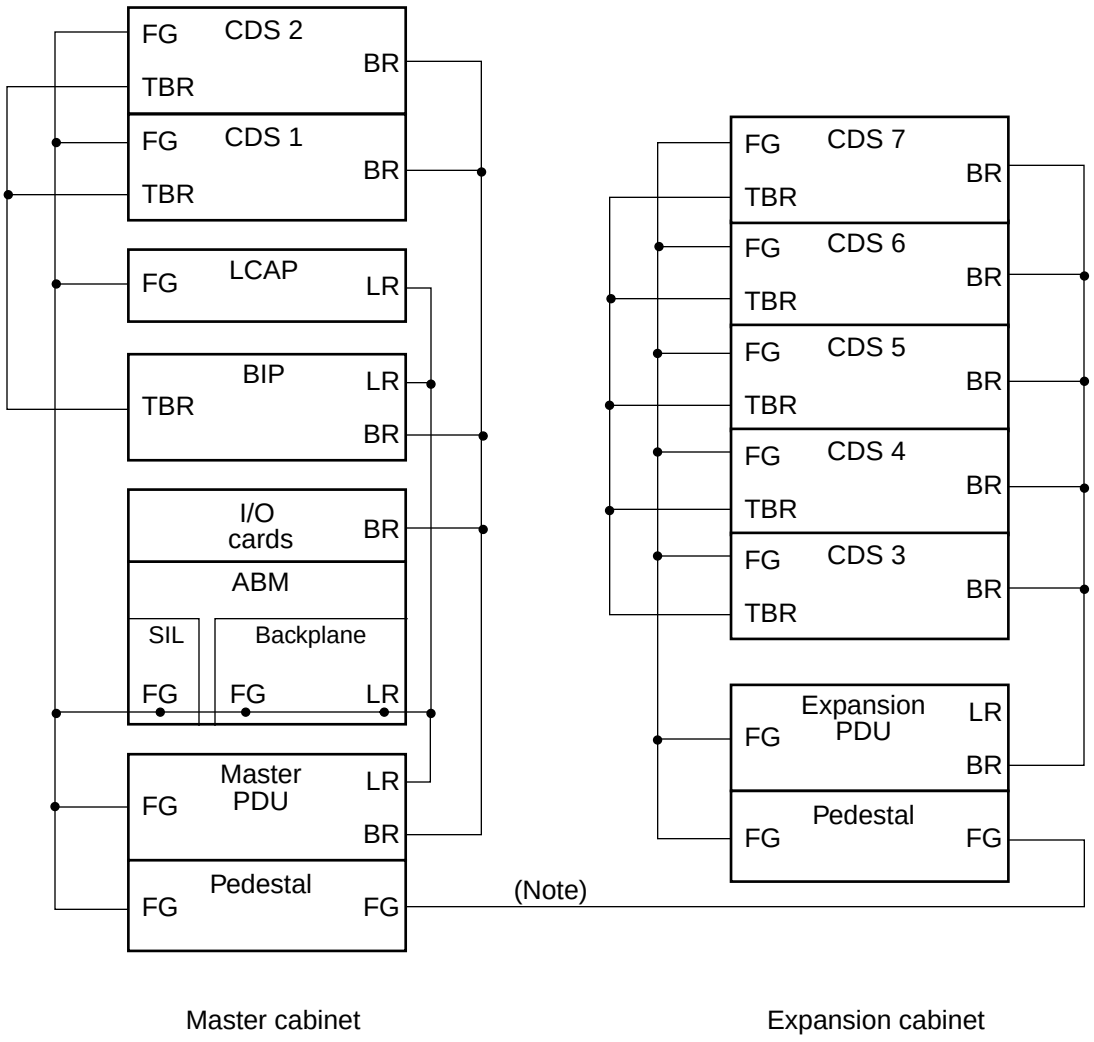


Figure 2-17
MBP equipment grounding scheme



Note: In applications using a ground collector, this connection is not made. It routes from the master cabinet FG to the building ground collector. If an expansion cabinet is installed, a separate FG lead routes from the expansion cabinet pedestal FG to the building ground collector.

Environmental requirements

This section outlines the characteristics of the environment that must be present at the installation site if AccessNode equipment is to operate within design specifications.

> ***Note:*** For complete AccessNode specifications, see *System Specifications*, 323-3001-180, in the *Description*, Volume 2B.

Temperature

The MBP meets or exceeds the requirements and objectives as specified in TR-TSY-000057 (DLC) and TR-NWT-000063 (NEBS):

- operating temperature: 0° C (32° F) to +50° C (122° F)
- short-term temperature: -40° C (-40° F) to +50° C (122° F)

  Note: Short-term operating temperature is for no more than 72 consecutive hours and no more than 15 days total each year.

Altitude

operating	up to 4000 m (13,000 ft) above mean sea level
shipping or storage	up to 15,000 m (50,000 ft) above mean sea level

Relative humidity

operating	5% to 95% (not to exceed 3.6 kPa water vapor pressure over the normal operating temperature)
shipping or storage	5% to 95% (not to exceed 5.3 kPa water vapor pressure for temperatures above +35∞ C)

Atmospheric dust

AccessNode MBP cabinets have been designed with an air filter in the inlet of the bay that meets the ASHRAE 80% dust arrestant requirements.

Electrostatic discharge (ESD)

AccessNode MBP cabinets and equipment comply with section 4.5.2 of Bellcore TR-EOP-000063.

Mechanical shock

Vibration in the cabinet equipment area must be limited to a frequency range of 0.5 to 200 Hz and a G-force magnitude of 0.1 G, according to Bellcore TR-EOP-000063.

Technical specifications

This section contains technical specifications for the MBP cabinets.

Weight

MBP master cabinet:		
192-lines (as shipped)	689.8 lb	(312.9 kg)
Batteries	100.0 lb	(45.7 kg)
Fully equipped (without batteries)	792.5 lb	(359.5 kg)
Fully equipped (with batteries)	1192.5 lb	(540.9 kg)
Maximum floor loading	97.1 lbs/ft^2	(474.0 kg/m^2)
MBP expansion cabinet:		
192-lines (as shipped)	550.2 lb	(249.6 kg)
384-lines (as shipped)	614.2 lb	(278.6 kg)
480-lines (as shipped)	646.2 lb	(293.1 kg)
Batteries	100.0 lb	(45.7 kg)
Fully equipped (without batteries)	658.0 lb	(298.5 kg)
Fully equipped (with batteries)	1058.0 lb	(479.9 kg)
Maximum floor loading	86.2 lbs/ft^2	(420.8 kg/m^2)

AC input

Power input required: 40A, 3-wire, single phase, 208/240 V ac per rectifier shelf

DC power

Power calculation load data: -54.5 V dc
50% Omega line cards @ 12 ccs (POTS)
50% Epsilon line cards @ 6 ccs (POTS)

Power consumption

Master cabinet only (fully loaded 192-lines)	1002 W
Master and expansion cabinets (fully loaded 672-lines)	2118 W
One copper-distribution shelf	137.0 W

Power dissipation

Master cabinet only (fully loaded 192-lines)	762 W (2600.6 Btu/hr)
Master and expansion cabinet (fully loaded 672-lines)	1607 W (5484.5 Btu/hr)
One copper-distribution shelf	125.3 W (427.6 Btu/hr)

Cabinet dimensions

The cabinet dimensions are shown in Table 2-4.

Table 2-4
MBP cabinet dimensions

Dimension	Value
width	80.9 cm (31.85 in.)
depth	64.8 cm (25.5 in.)
height	The height of a cabinet varies from 762 mm (30.5 in.) to 2037 mm (81.5 in.) according to the number of single-equipment modules and dual-equipment modules in the cabinet. Heights of individual modules are as follows: • top cap 8.9 cm (3.5 in.) • single equipment module (SEM) 42.5 cm (16.75 in.) • dual equipment module (DEM) 85.1 cm (33.5 in.) • base equipment module 42.5 cm (16.75 in.) • battery equipment module (BEM) 42.5 cm (16.75 in.) • pedestal 25.4 cm (10.0 in.) • allowance for casters or levelling feet 8.8 cm (3.5 in.) • allowance shipping pallet and packaging material 20.3 cm (8.0 in.)
clearance between mounting rails	54.6 cm (21.5 in.)
horizontal mounting centers	56.6 cm (22.3 in.)

Marking and drilling the floor

This chapter contains the procedures to mark and drill floors for the modular business package (MBP) master and expansion cabinets.

Chapter contents

This chapter contains the following information:

Perform the procedures according to the configuration you are installing.

Procedure 3-1
Preparing a concrete floor for mounting cabinets

Use this procedure to mark concrete floors for modular business package (MBP) master and expansion 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. If you are installing the cabinets on a concrete floor with no anchor bolts required, then disregard and skip the steps detailing the drilling of 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
- sheet 1 of the plastic drilling template, NT4K0606

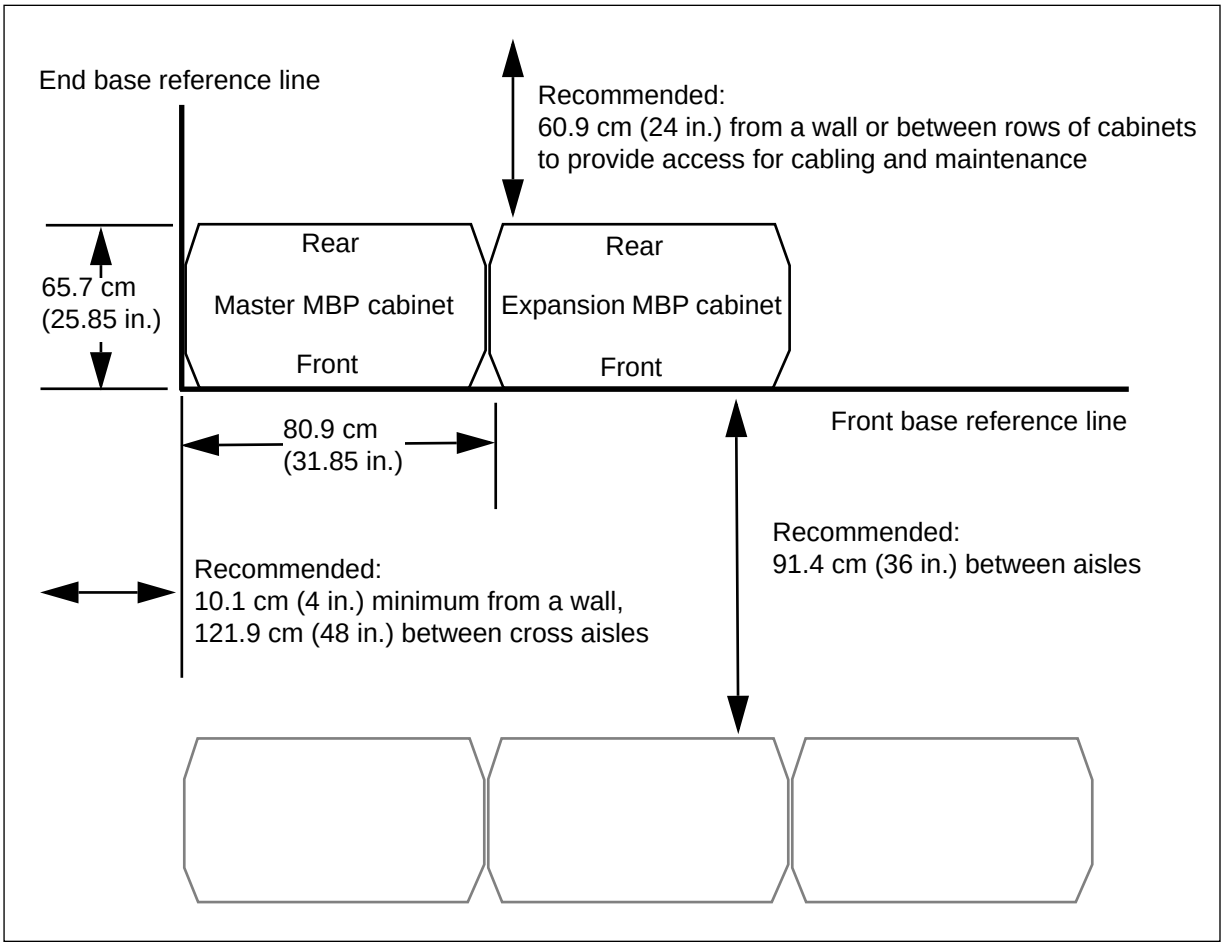
—continued—

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



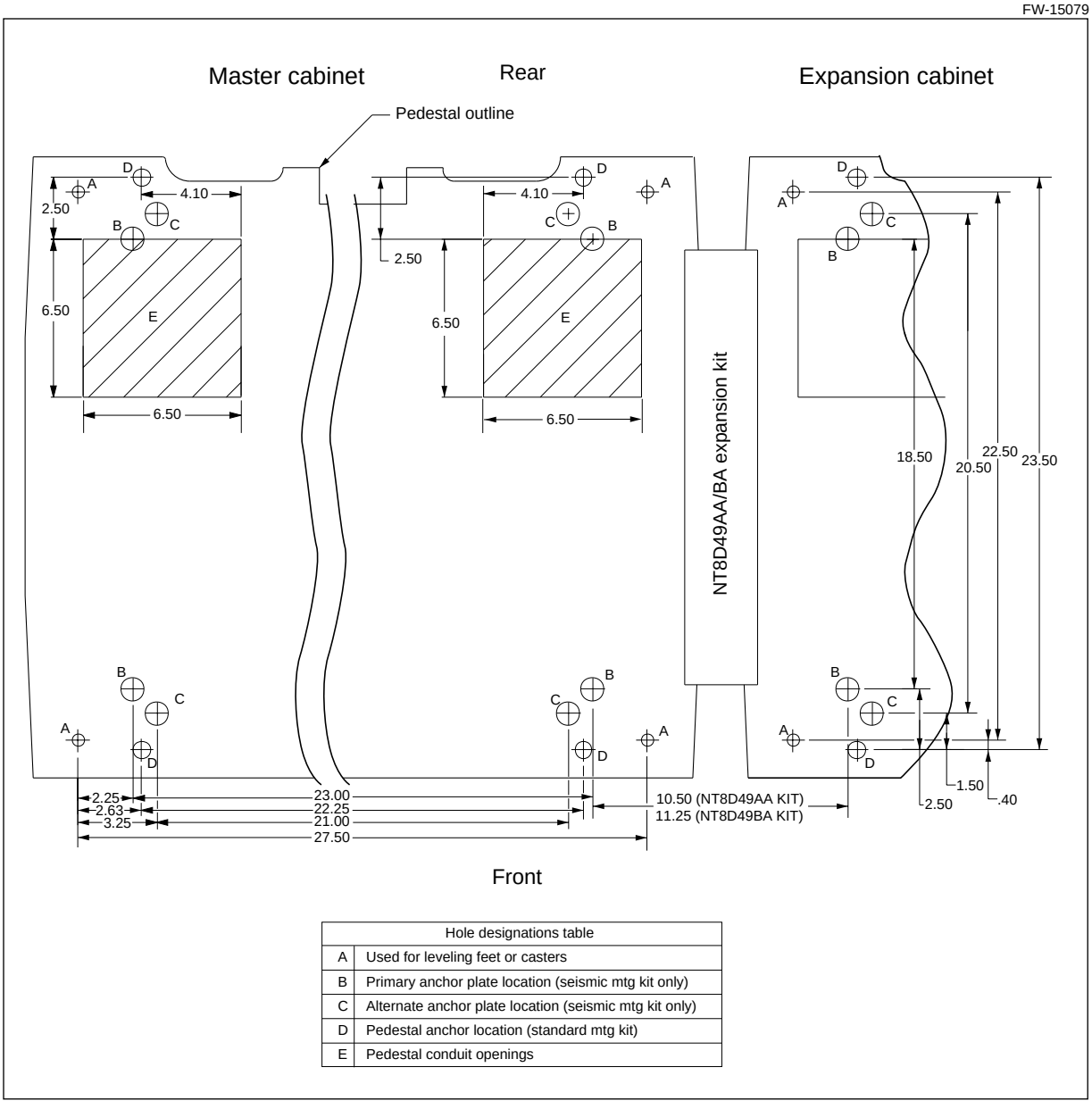
—continued—

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 is intended for use on concrete floors.

Figure 3-2
NT4K0606 MBP 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 NT4K0606 plastic template on the floor, so that the cabinet outline aligns with the front and rear baselines 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 10

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	Remove the template.
11	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
12	Using the Roto-hammer drill and the carbide drill bit, drill the anchoring holes to the depth specified by the anchor bolt kit manufacturer.

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.

13	Blow debris out of the holes with the rubber bulb, then vacuum up the debris.
14	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.
15	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 and to cut cable entry openings for modular business package (MBP) master and expansion cabinets installed on raised floors.

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

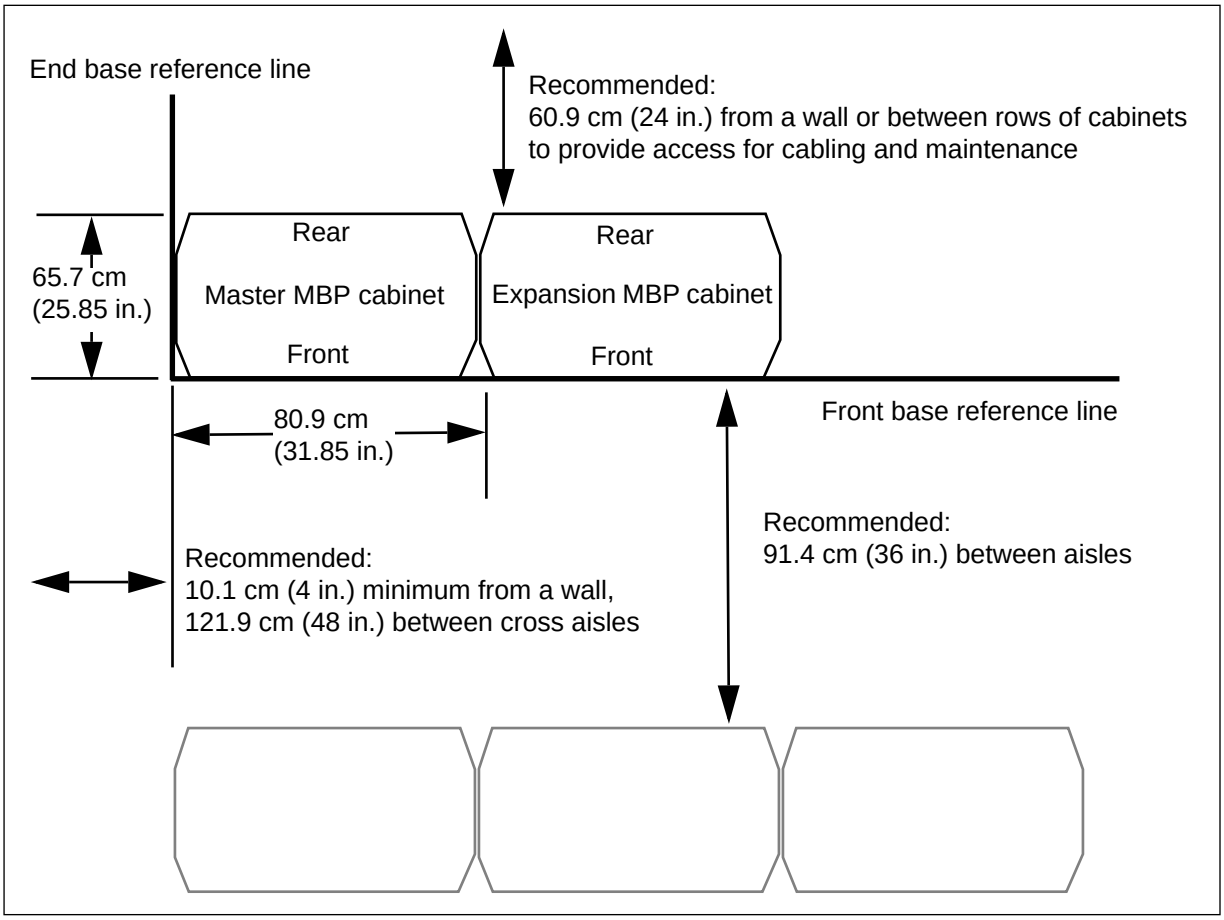
—continued—

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 3-3. ***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	Select sheet 2 of the NT4K0606 plastic template as shown in Figure 3-4. ***Note:*** This sheet applies to cabinets equipped with the NT8D49BA expansion kit. This kit is intended for use on raised floors.
4	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.
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. ***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.
7	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.
8	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 9
no other cabinet is to be installed	step 11

9	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.
10	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.

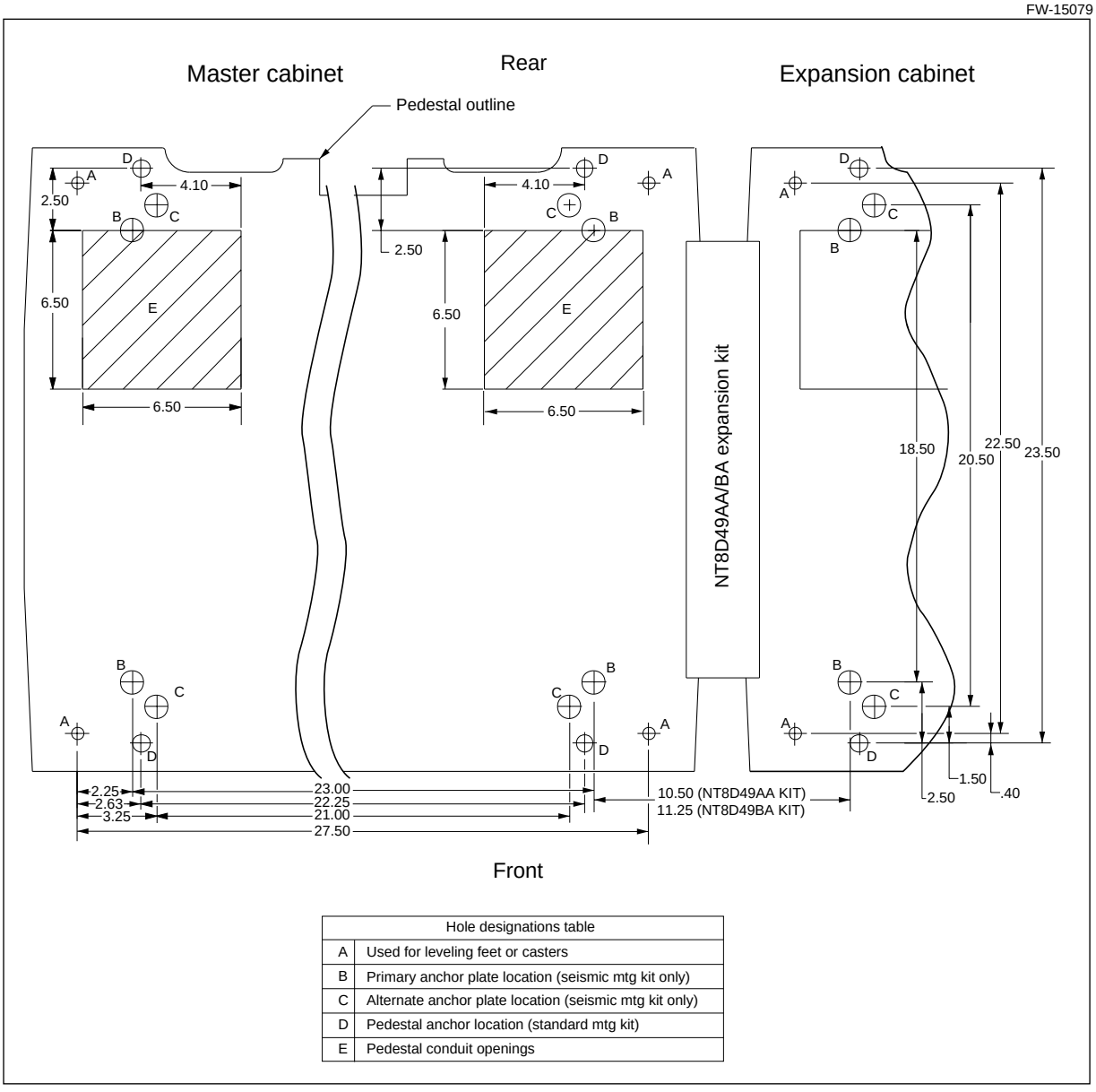
—continued—

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

Step Action

Figure 3-4
NT4K0606 MBP floor layout template

FW-15079

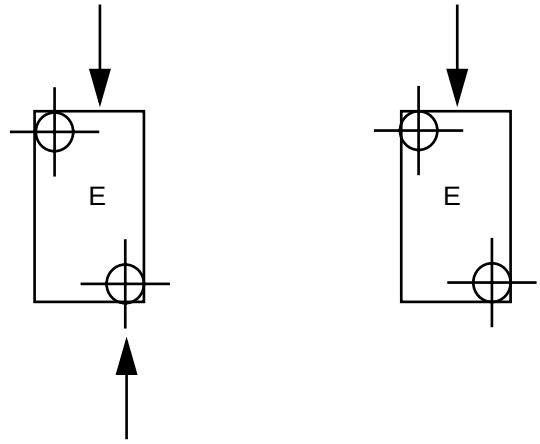


Hole designations table	
A	Used for leveling feet or casters
B	Primary anchor plate location (seismic mtg kit only)
C	Alternate anchor plate location (seismic mtg kit only)
D	Pedestal anchor location (standard mtg kit)
E	Pedestal conduit openings

—continued—

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

Step	Action
11	Remove the template.
12	Using the drill and the hole saw, drill two holes at opposite corners of each square openings labelled “E” on the floor, as follows:



Shaded areas “E” on the NT4K0606 floor template.

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

13	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

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

—end—

Unpacking the cabinets

This chapter provides the procedures for unpacking the modular business package (MBP) master and expansion cabinets.

In preparation for unpacking the cabinets, verify that you have done the following:

- marked, drilled and 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 against the information contained in the *Site Installation Planning and Engineering, Addendum 1 (MBP)*, 323-3001-200
- provided a clean dust-free area to allow for the unpacking of crated cabinets and modules
- identified an unpacking area that is clean and as close to the equipment room as possible

Chapter contents

This chapter contains the following information:

Perform the procedures in the order listed.

Procedure 4-1
Unpacking the cabinets

Use this procedure to unpack the crated AccessNode MBP master and expansion 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 or pallet jack to move pallets
- hammer
- screwdriver, 15.2 cm (6 in.) Phillips
- sheet metal shears 25.4 cm (10 in.)
- ratchet wrench with 1.43 cm (9/16 in.) socket
- claw hammer
- work gloves, safety glasses, and safety boots

—continued—

Procedure 4-1 (continued)
Unpacking the cabinets

Action

Step	Action
	Note: Prior to beginning this procedure, check the shock and tilt sensors on the cabinet packing. If the shock and/or tilt sensors indicate excessive handling, notify Nortel Networks immediately.
1	Move the pallets that contain the crated cabinets to the unpacking area.
2	Using the sheet metal shears, cut the banding surrounding the carton, as shown in Figure 4-1.

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.

3	Split open the cardboard carton by perforating the carton and pulling on the “zipper” symbol, as shown in Figure 4-1.

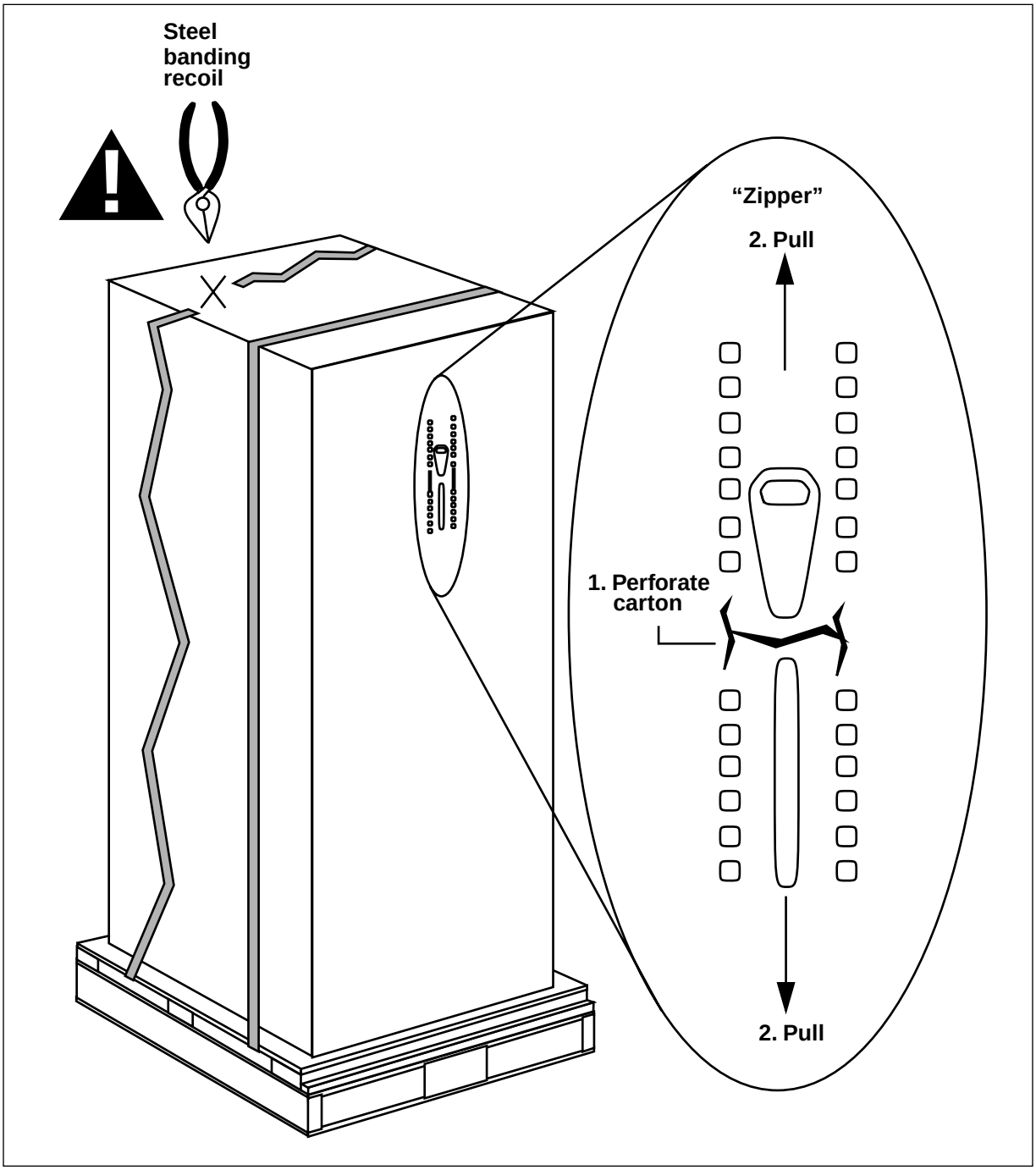
CAUTION
Risk of damage to the equipment
To avoid scratching the equipment, do not use a knife to split the carton open. Use the “zipper” provided on the carton.

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

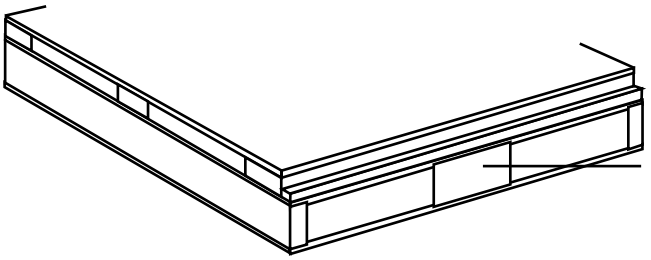
Figure 4-1
Removing the carton



—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. Shipping containers and packing material must be maintained in good condition until the decision is made that the cabinet will not require return to Nortel Networks. If you need to return the cabinet to Nortel Networks, re-install all packing material and shipping containers. Use local customer-supplied material to secure the shipping containers and packing material for shipment.
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	Using the lift truck or pallet jack, 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	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.



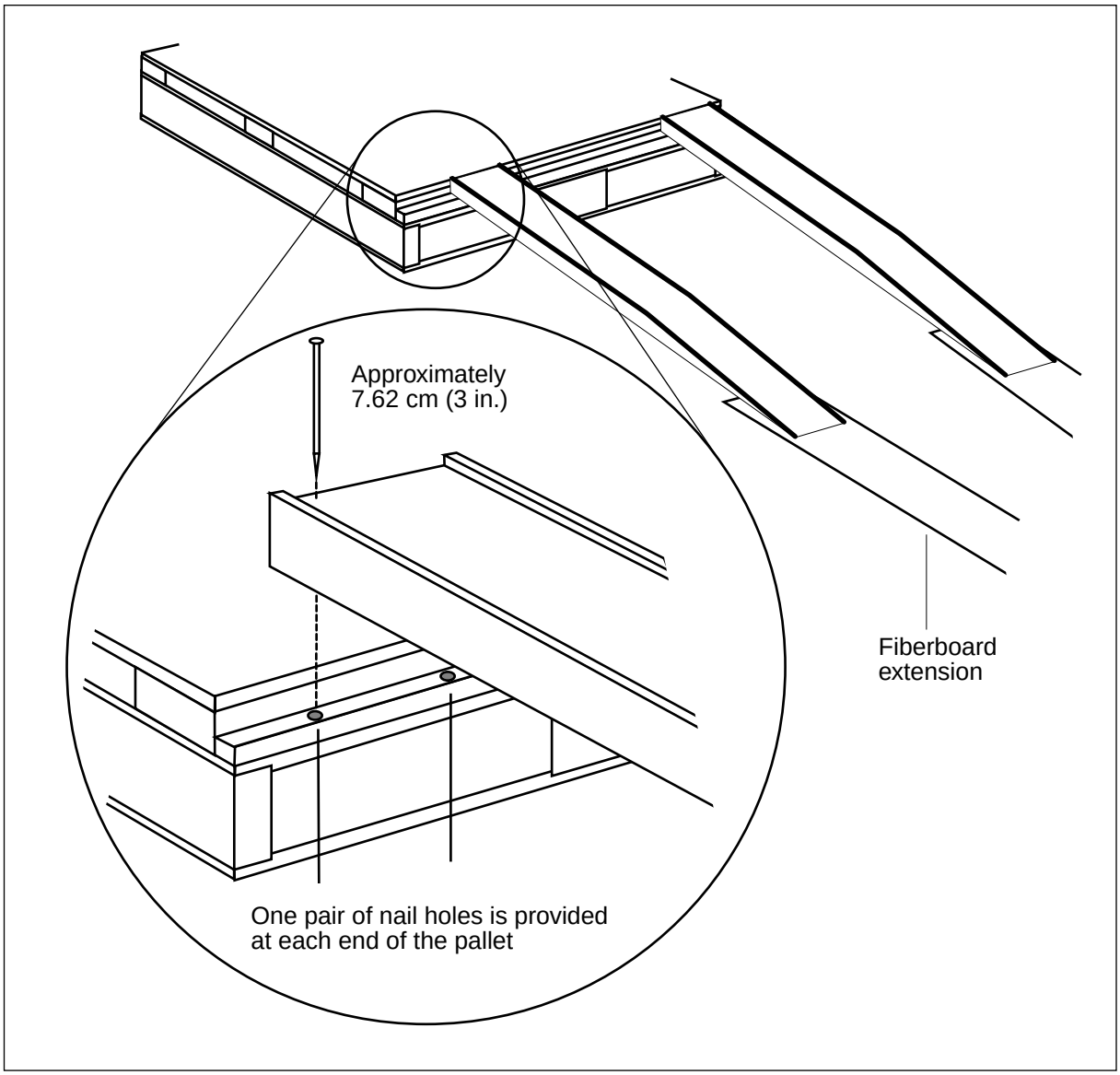
9	Withdraw the ramps from the pallet.

—continued—

Procedure 4-1 (continued)
Unpacking the cabinets

Step	Action
10	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.
11	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
12	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.

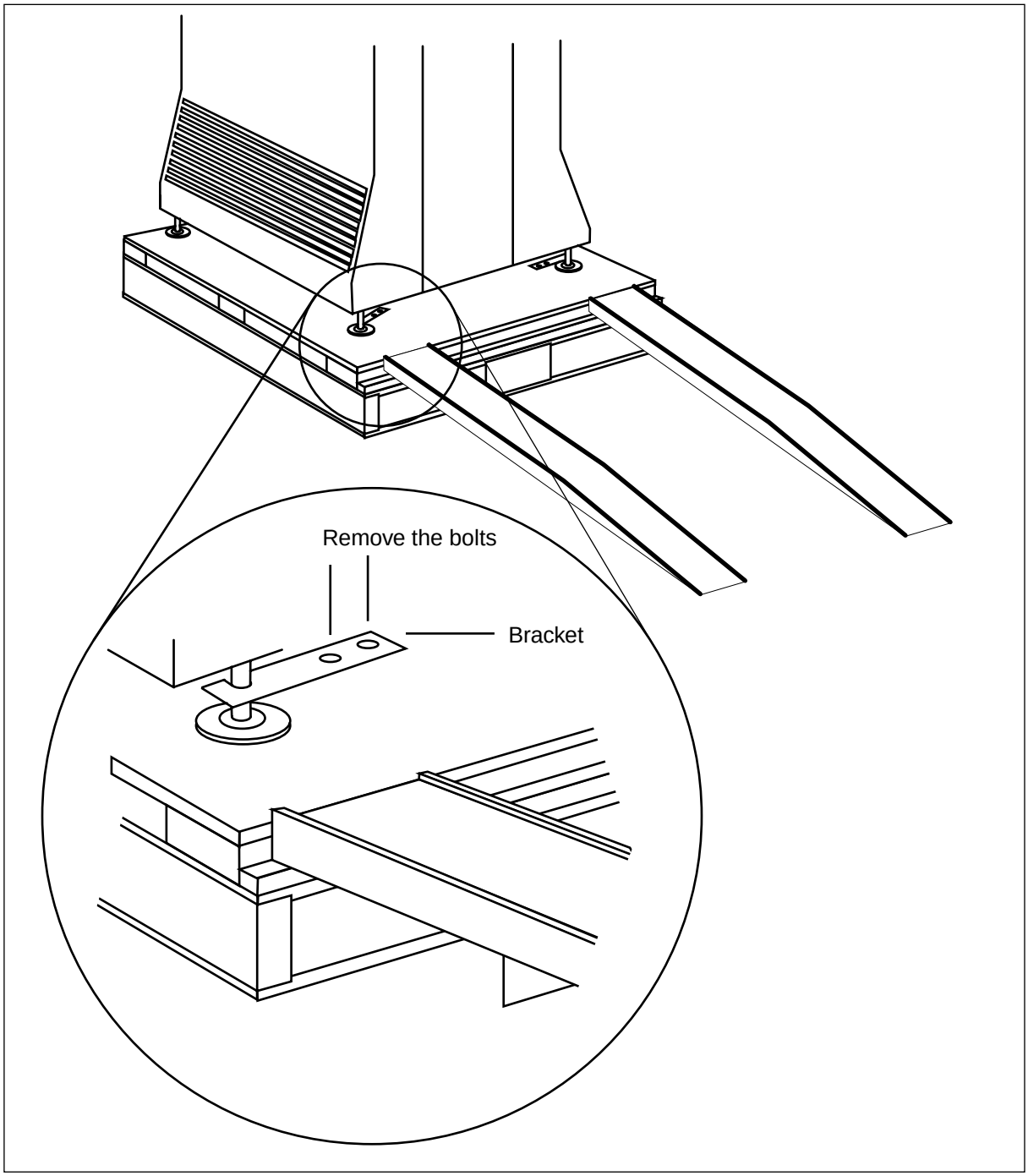
DANGER
Risk of injury
To avoid injury and possible damage to equipment, use three people for the following step: two people to guide the front of the cabinet down the ramps and a third person to guide the cabinet, and ensure that it does not slide off the ramps.

13	Carefully slide the cabinet off the pallet, down the ramps and onto the fiberboard extensions.
14	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—

Procedure 4-2
Removing equipment covers

Use this procedure to remove equipment covers from the front and rear of modular business package (MBP) master and expansion cabinets.

Note: The keys for the lockable cabinet covers are shipped inside the cabinet and are tie-wrapped to the side of the cabinet equipment frames.

Requirements

The following tools and materials are required:

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

Action

Step	Action

1 Unlock the latches as shown in Figure 4-4.

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 and right sides of the cover.

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.

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 your finger tips and tilt the top of the cover out towards you.

4 Lift the cover upward to remove it.

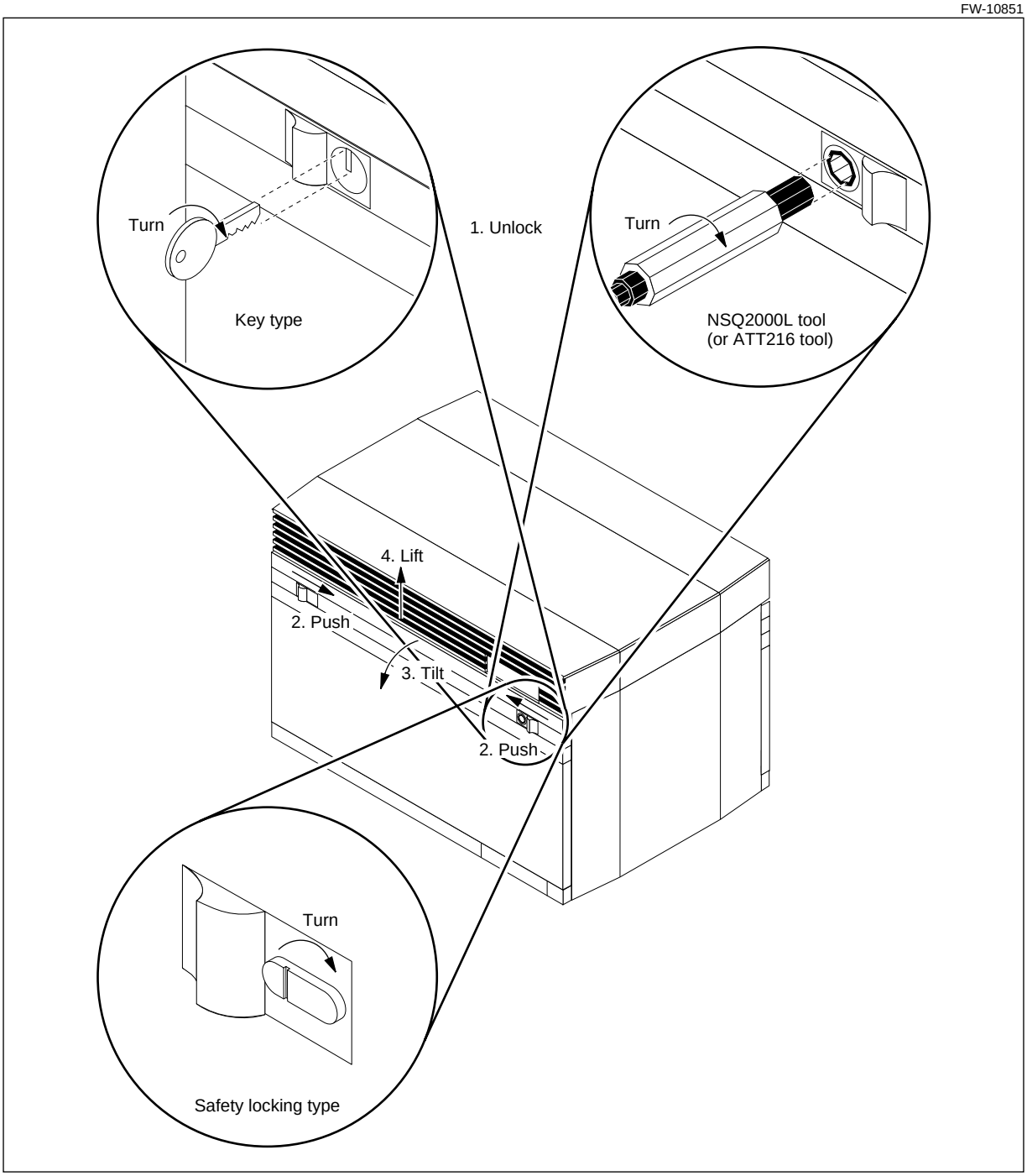
5 Store the cover on cardboard or foam to protect its finish while you perform the installation. For key-lockable covers, ensure that the keys are taped to one of the panels to avoid loss during the installation.

—continued—

Procedure 4-2 (continued)
Removing equipment covers

Figure 4-4
Removing an equipment cover

FW-10851



—end—

Procedure 4-3
Removing the top cap grilles

Use this procedure to remove a top cap grille from modular business package (MBP) master and expansion cabinets.

Requirements

Before beginning this procedure, you must remove the equipment cover immediately below the top cap grille, as described in Procedure 4-2.

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 4-5.
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.

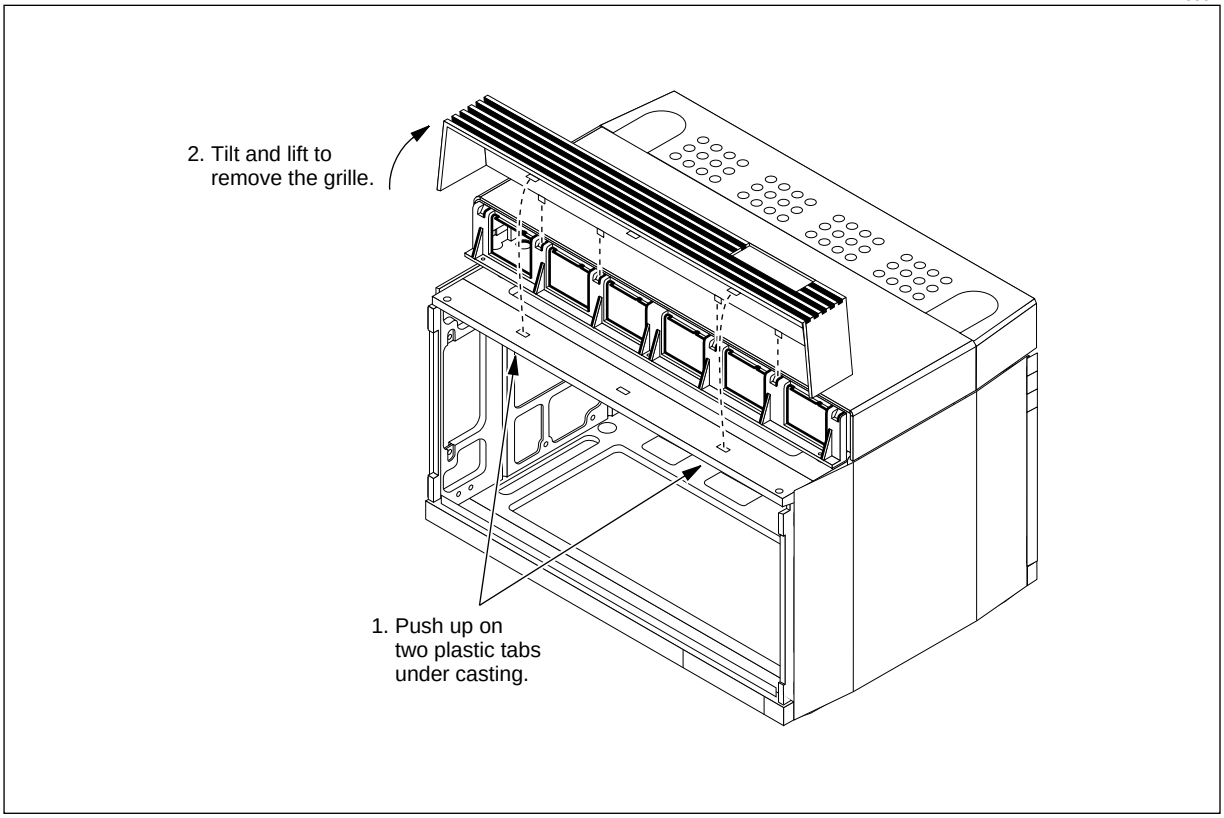
—continued—

Procedure 4-3 (continued)
Removing the top cap grilles

Step	Action

Figure 4-5
Removing the top cap grilles

FW-15554



—end—

Procedure 4-4
Removing the pedestal grilles

Use this procedure to remove a pedestal grille from modular business package (MBP) master and expansion cabinets.

Requirements

The following tools and materials are required:

- screwdriver, flat blade, 0.635 cm (1/4 in.) wide
- 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 4-6.
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.

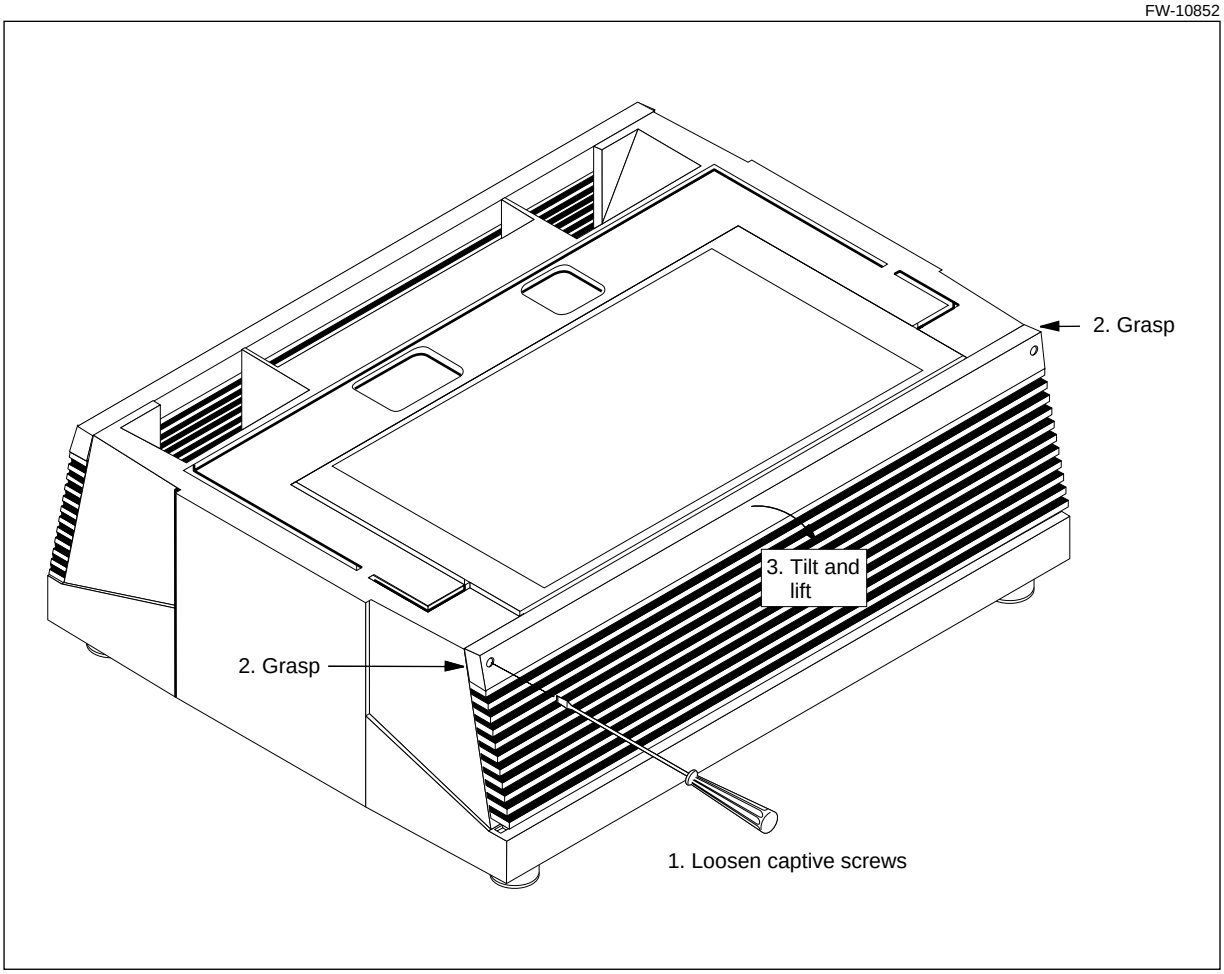
—continued—

Procedure 4-4 (continued)
Removing the pedestal grilles

Step	Action

Figure 4-6
Removing a pedestal grille

FW-10852



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Procedure 4-5
Removing separator bars

Use this procedure to remove the separator bars from the front or rear of modular business package (MBP) master and expansion cabinets.

Requirements

The following tools and materials are required:

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

Action

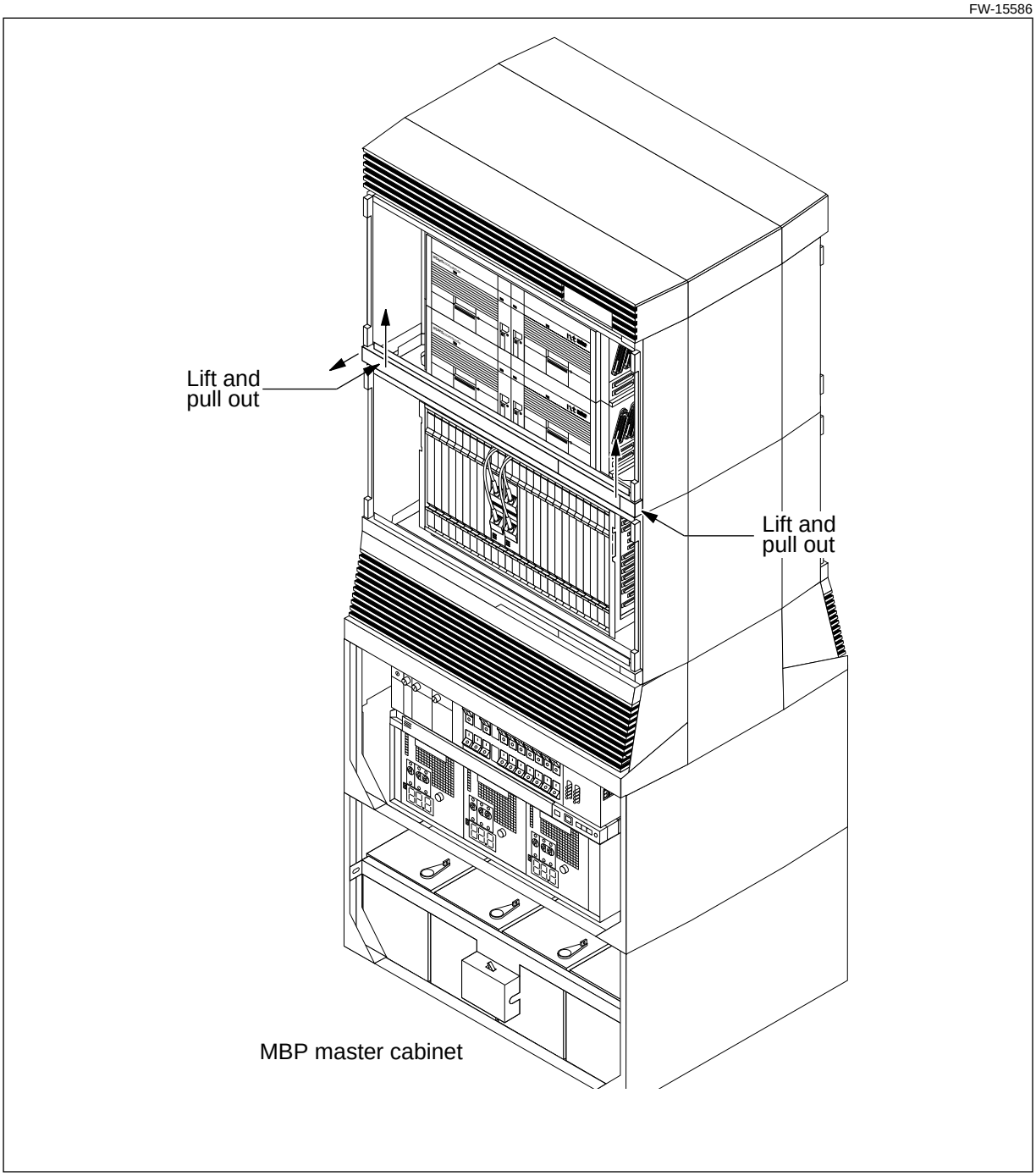
Step	Action
1	Grasp the left and right ends of the separator bar, as shown in Figure 4-7.
2	Lift the separator bar vertically to disengage the guide pins from the cabinet and remove the bar from the cabinet. ***Note:*** It may be necessary to bump the underside of the bar with your fist to disengage it from the cabinet.
3	Store the separator bar on cardboard or foam to protect its finish while you perform the installation. ***Note:*** Figure 4-7 shows the removal of the separator from the front of the MBP master cabinet. Removal of the bar at the front or rear of all cabinets is performed in the same way.

—continued—

Procedure 4-5 (continued)
Removing separator bars

Figure 4-7
Removing a separator bar

FW-15586



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Procedure 4-6
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 modular business package (MBP) master cabinet.

Requirements

The following tools and materials are required:

- screwdriver, flat blade, 0.635 cm (1/4 in.) wide
- 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 4-5.

Action

Step	Action
1	Using the screwdriver, turn the locking screws so that the dots no longer line up, as shown in Figure 4-8.
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.

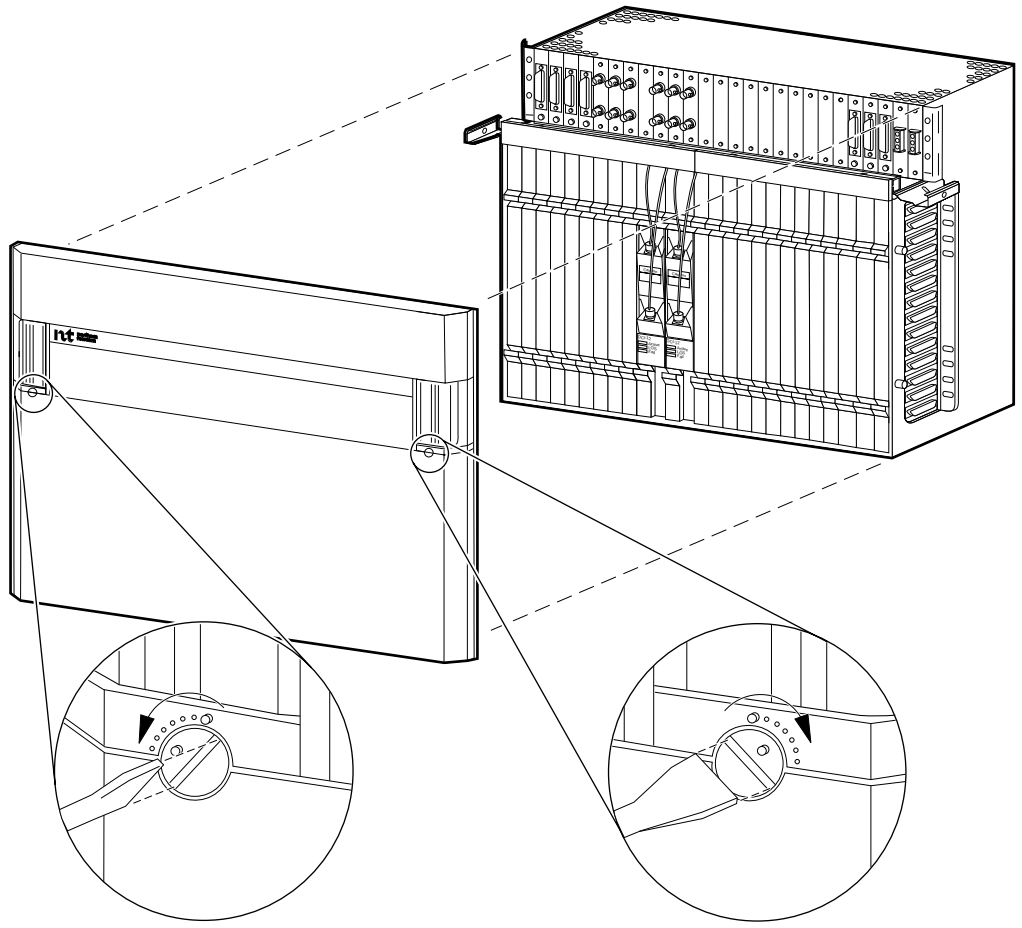
—continued—

Procedure 4-6 (continued)
Removing the front cover from an ABM shelf

Step	Action

Figure 4-8
Removing the front cover from the ABM shelf

FW-10017



Note: Turning in the direction shown unlocks the locking screws.

—end—

Procedure 4-7
Removing the side panels

Use this procedure to remove a side panel from Modular business Package (MBP) master and expansion cabinets.

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
- ratchet with 0.793 cm (5/16 in.) socket

Before performing this procedure, remove the equipment covers as described in Procedure 4-2.

Action

Step	Action
1	At the front of the cabinet, use the 5/16-inch nut driver to remove the two screws that secure the side panel to the casting, as shown in Figure 4-9.
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.

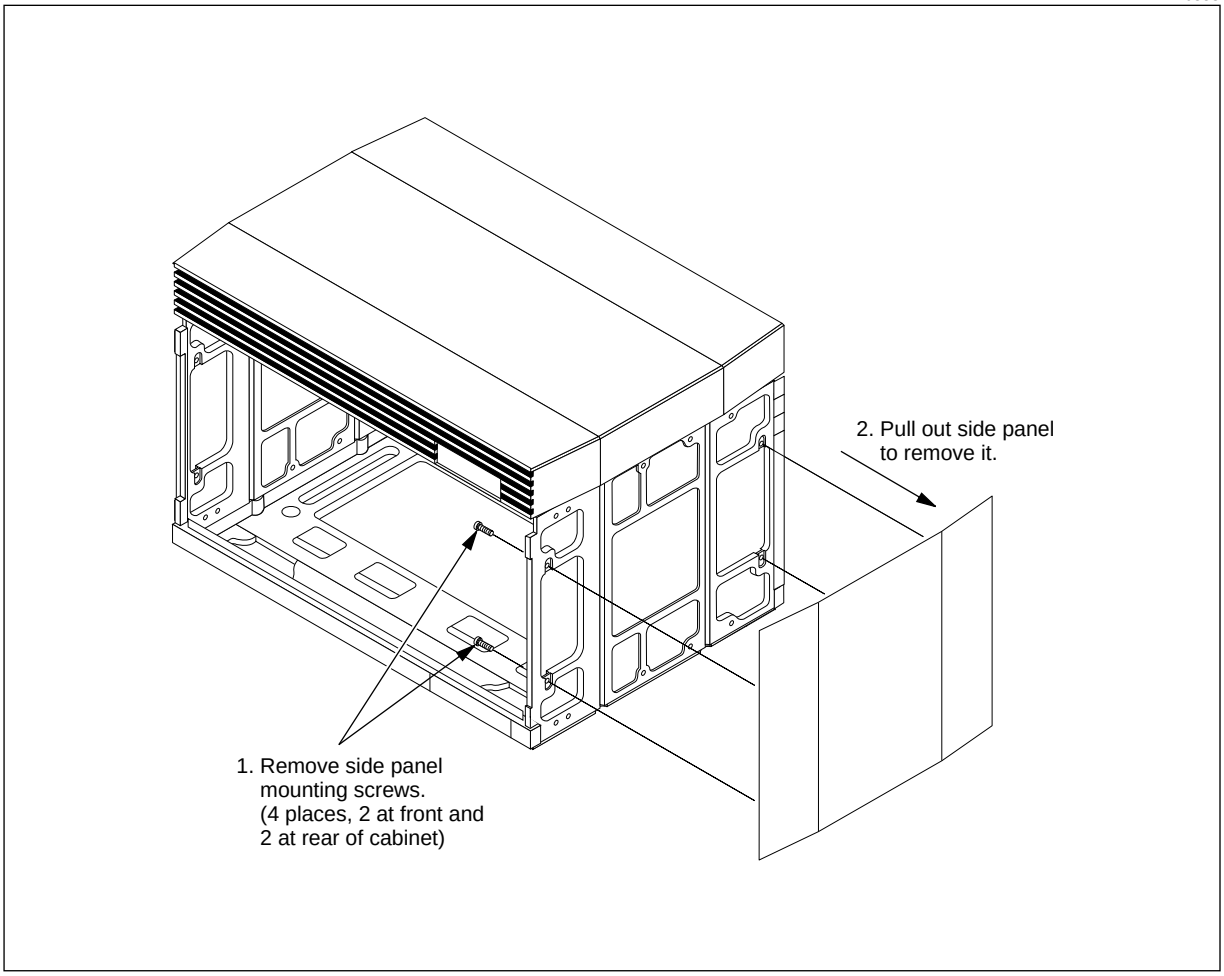
—continued—

Procedure 4-7 (continued)
Removing the side panels

Step	Action

Figure 4-9
Removing a side panel

FW-10858



—end—

Installing the cabinets

This chapter contains the procedures to position the modular business package (MBP) master and expansion cabinets and secure them in place.

Chapter contents

This chapter contains the following information:

Perform the procedures according to the configuration you are installing.

Procedure 5-1
Installing the bracing rods and tie bars

Use this procedure to install the bracing rods and tie bars into the modular business package (MBP) master and expansion cabinets. The bracing rod kits are optional except for earthquake Zones 3 and 4 where they are required.

Nortel Networks offers four bracing rod kits as listed in the following table:

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

Note: An SEM 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

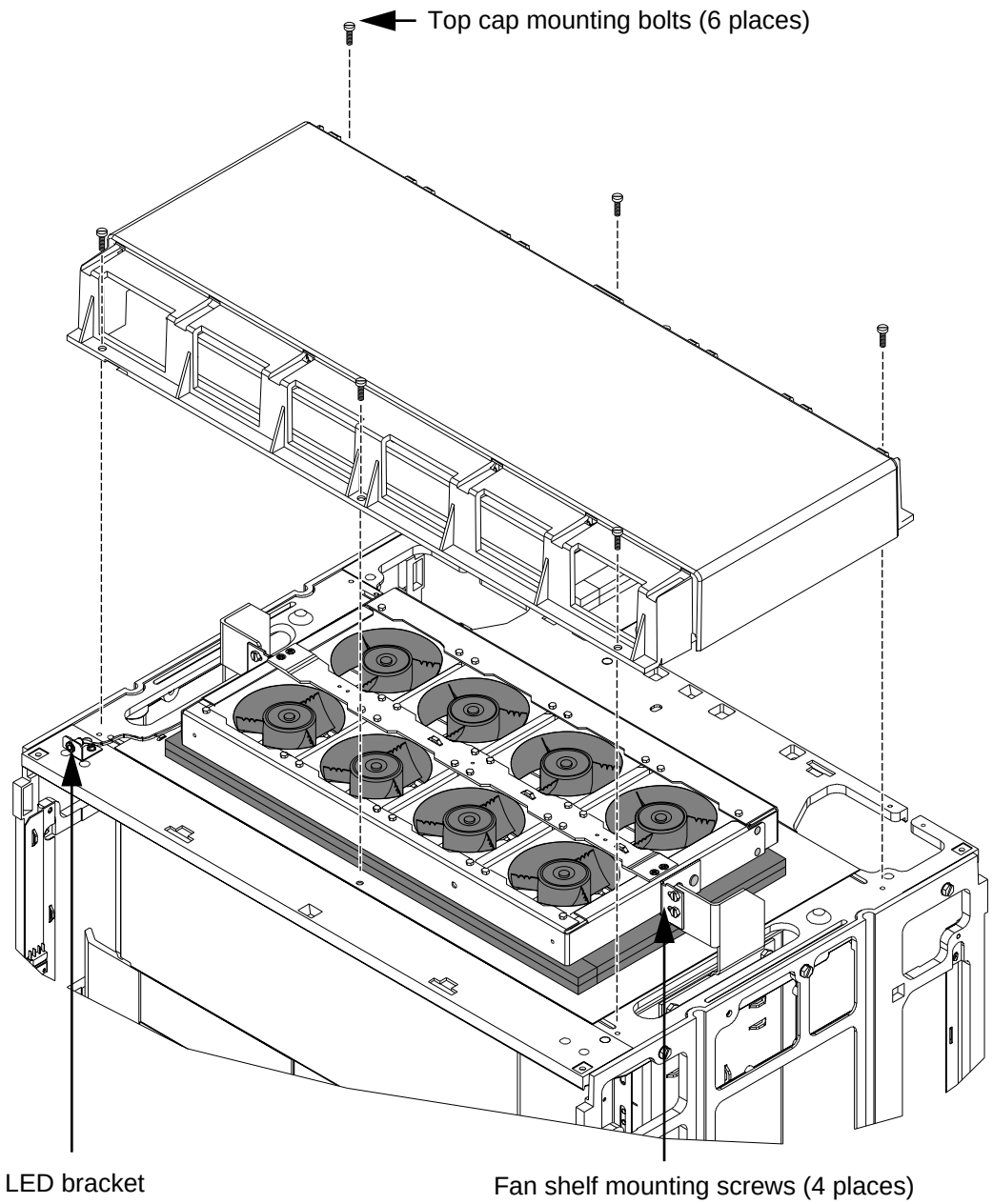
Step	Action
	Removing the fan shelf
1	Remove the six bolts that secure the top cap in place at the locations shown in Figure 5-1.
2	Lift the top cap clear of the cabinet.
3	Disconnect the alarm LED from the bracket at the top front of the cabinet.
4	Disconnect the fan shelf power connector from the rear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

—continued—

Procedure 5-1 (continued)
Installing the bracing rods and tie bars

Figure 5-1
Removing the top cap and fan shelf

FW-15616



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

—continued—

Procedure 5-1 (continued)
Installing the bracing rods and tie bars

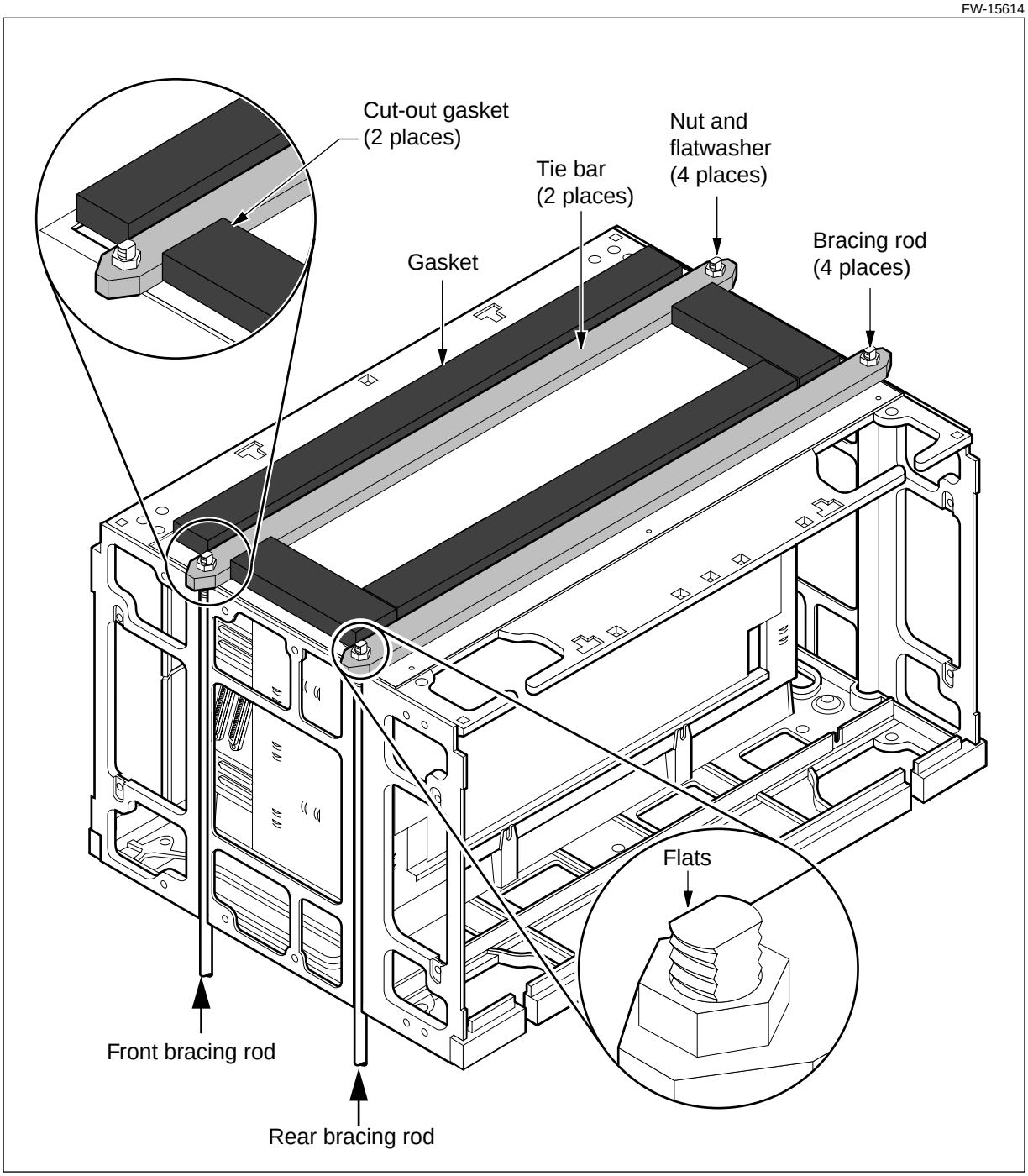
Step	Action
	Installing the bracing rod kit
7	Orient a bracing rod so that the end with the flats points upward, and lower it into one of the four locations shown in Figure 5-2.
8	Lower bracing rods into the other three locations in a similar fashion.
9	Start threading the bracing rods into the threads 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 5-2.
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 5-1 (continued)
Installing the bracing rods and tie bars

Figure 5-2
Installing the bracing rods and tie bars

FW-15614



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Procedure 5-2
Positioning and securing cabinets with anchor kits

Use this procedure to position, level, and secure modular business package (MBP) master and expansion 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.

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

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 footwear 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 5-2 (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 master cabinet or the 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.

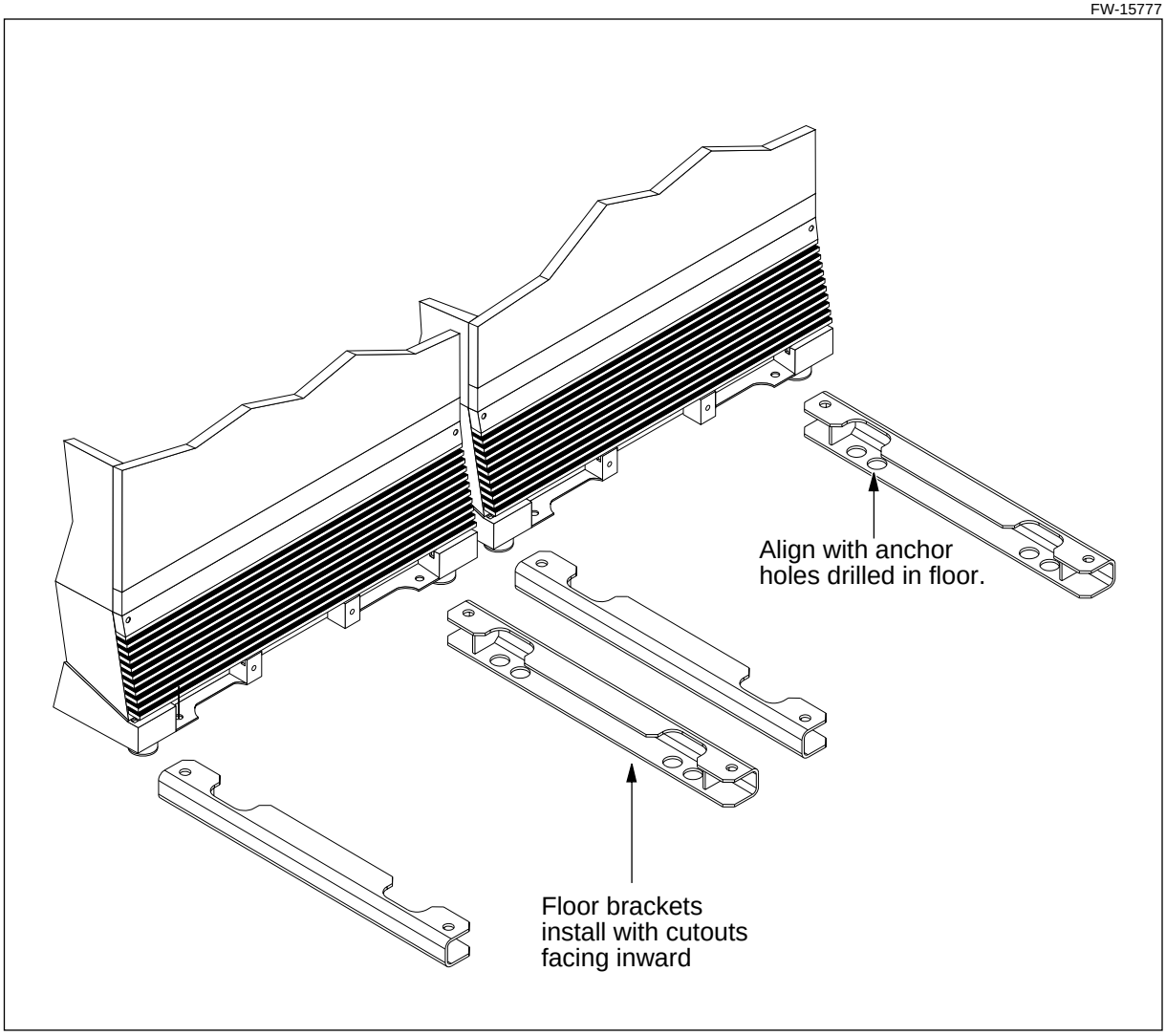
—continued—

Procedure 5-2 (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 5-3 and Figure 5-4.
3	Tighten the anchor bolts just enough to prevent the floor brackets from shifting. Do not tighten fully.

Figure 5-3
Placement of the seismic floor brackets

FW-15777



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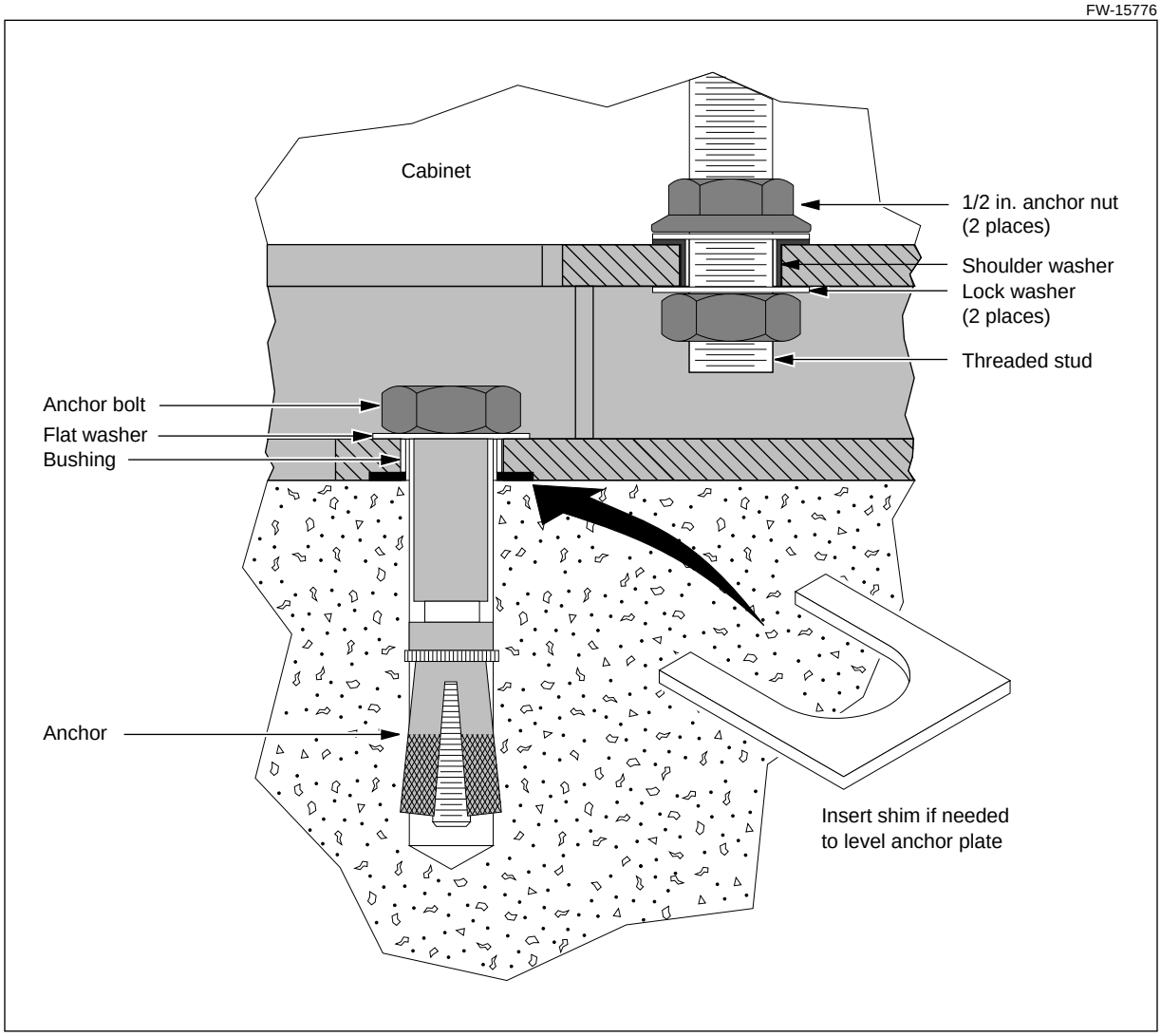
Procedure 5-2 (continued)
Positioning and securing cabinets with anchor kits

Step	Action

Figure 5-4
Placement of the anchor bolts

FW-15776



—continued—

Procedure 5-2 (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 5-4).
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 5-4, 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 5-2 (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 5-4 on page 5-9).

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 5-4, 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 to the next cabinet

19 Insert the hardware that secures the expansion kit to the second cabinet as shown in Figure 5-5, and tighten it using a 5/16 in. socket wrench.

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.

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

Installing the expansion kit on the cabinet

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 5-5.

22 Go to step 2 to install the next cabinet.

23 Perform Procedure 5-4, “Installing an NT4K09BA overhead cable extender kit” on page 5-18.

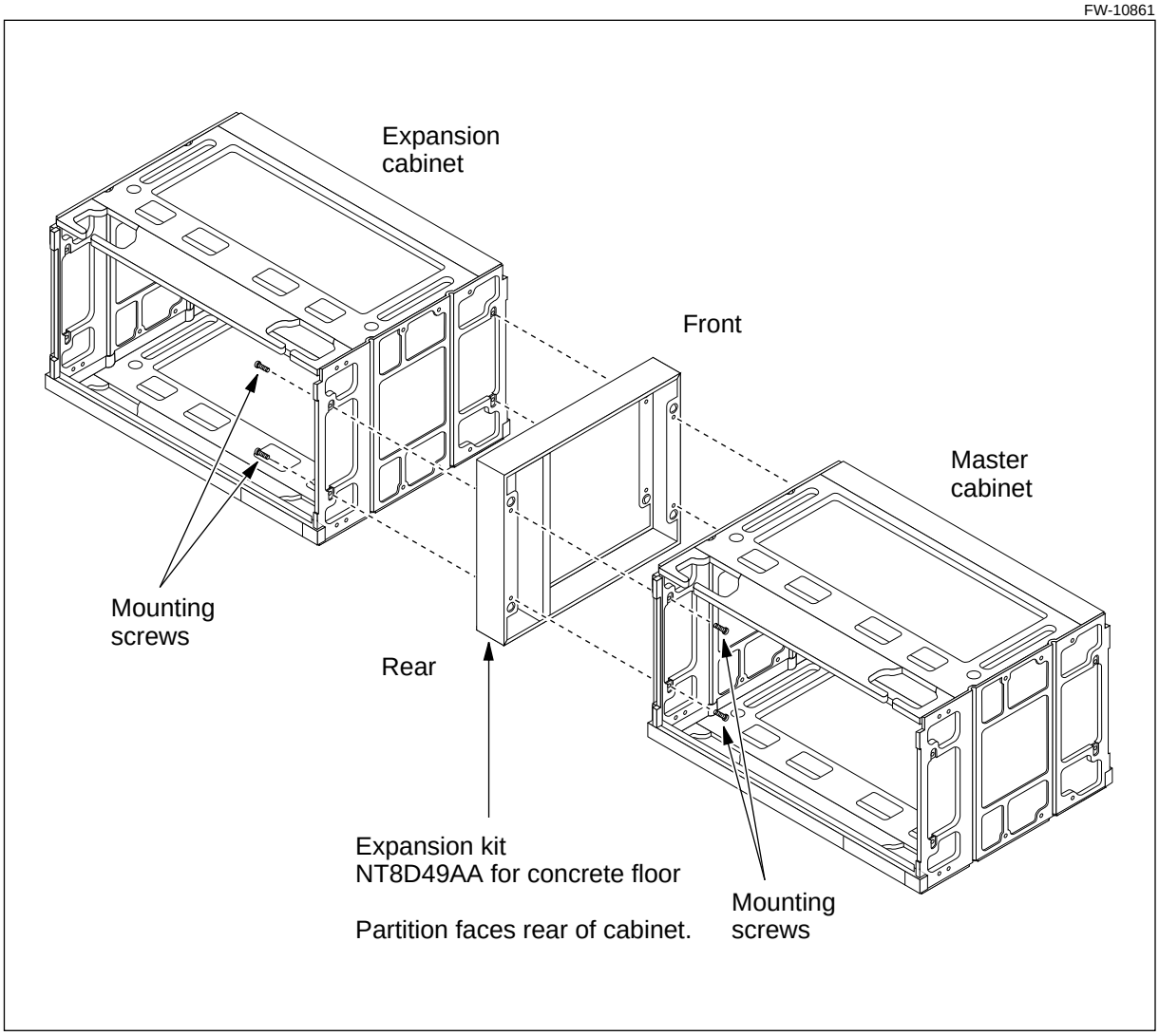
—continued—

Procedure 5-2 (continued)
Positioning and securing cabinets with anchor kits

Step	Action

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

FW-10861



—end—

Procedure 5-3
Positioning cabinets with no anchor kits

Use this procedure to position modular business package (MBP) master and expansion 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 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.

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 raised 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 5-3 (continued)
Positioning cabinets with no anchor kits

Action

Step	Action

Installing the cabinets

1 Select a cabinet to install: MBP 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 Maneuver the cabinet into position so that the pedestal aligns with the base reference line marked on the floor.

3 Adjust the levelling feet (or casters) on the 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.

4 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).

5 Go to one of the following steps:

If	Then go to
another cabinet is to be installed	step 6
no other cabinet is to be installed	step 8

6 Use four 5/16 in. screws included in each NT8D49 expansion kit to secure an expansion kit to this cabinet on the side that will connect to the next cabinet, as shown in Figure 5-7.

7 Go to step 2 to install the second cabinet.

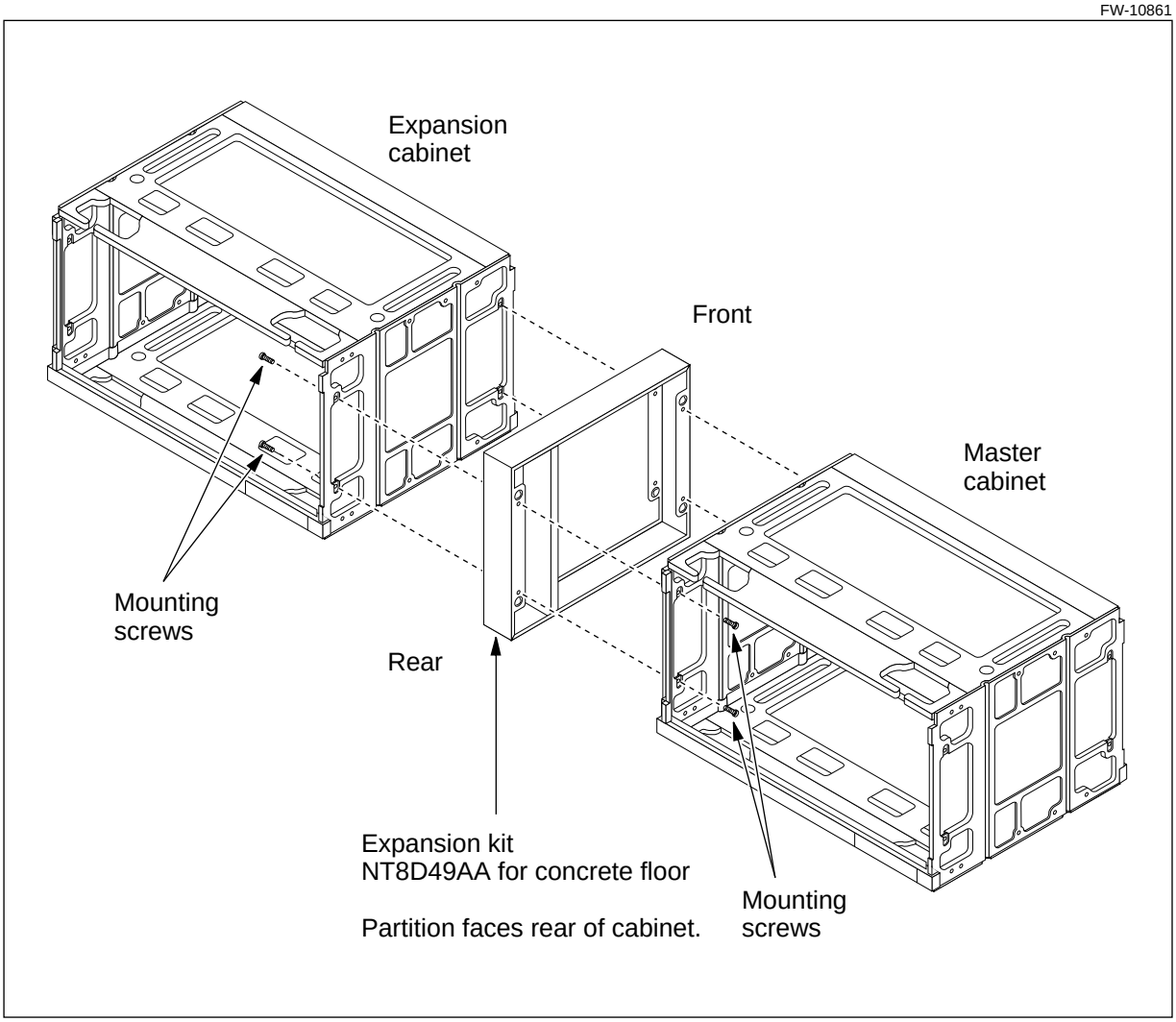
—continued—

Procedure 5-3 (continued)
Positioning cabinets with no anchor kits

Step	Action

Figure 5-6
Installing an expansion kit

FW-10861



—continued—

Procedure 5-3 (continued)
Positioning cabinets with no anchor kits

Step	Action

Aligning the expansion kits

8 If only one cabinet is to be installed go to step 10, otherwise, verify the alignment of the following:

- the front of the cabinet with the base reference line on the floor.
- the 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 levelling feet (or casters) as necessary.

9 Insert and tighten the four 5/16 in. screws that secure the expansion kits to the second cabinet, as shown in Figure 5-7.

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.

10 If you are installing overhead cabling, go to Procedure 5-4, “Installing an NT4K09BA overhead cable extender kit” on page 5-18. Otherwise, continue the installation using Chapter 6, “Connecting power and ground cables” on page 6-1.

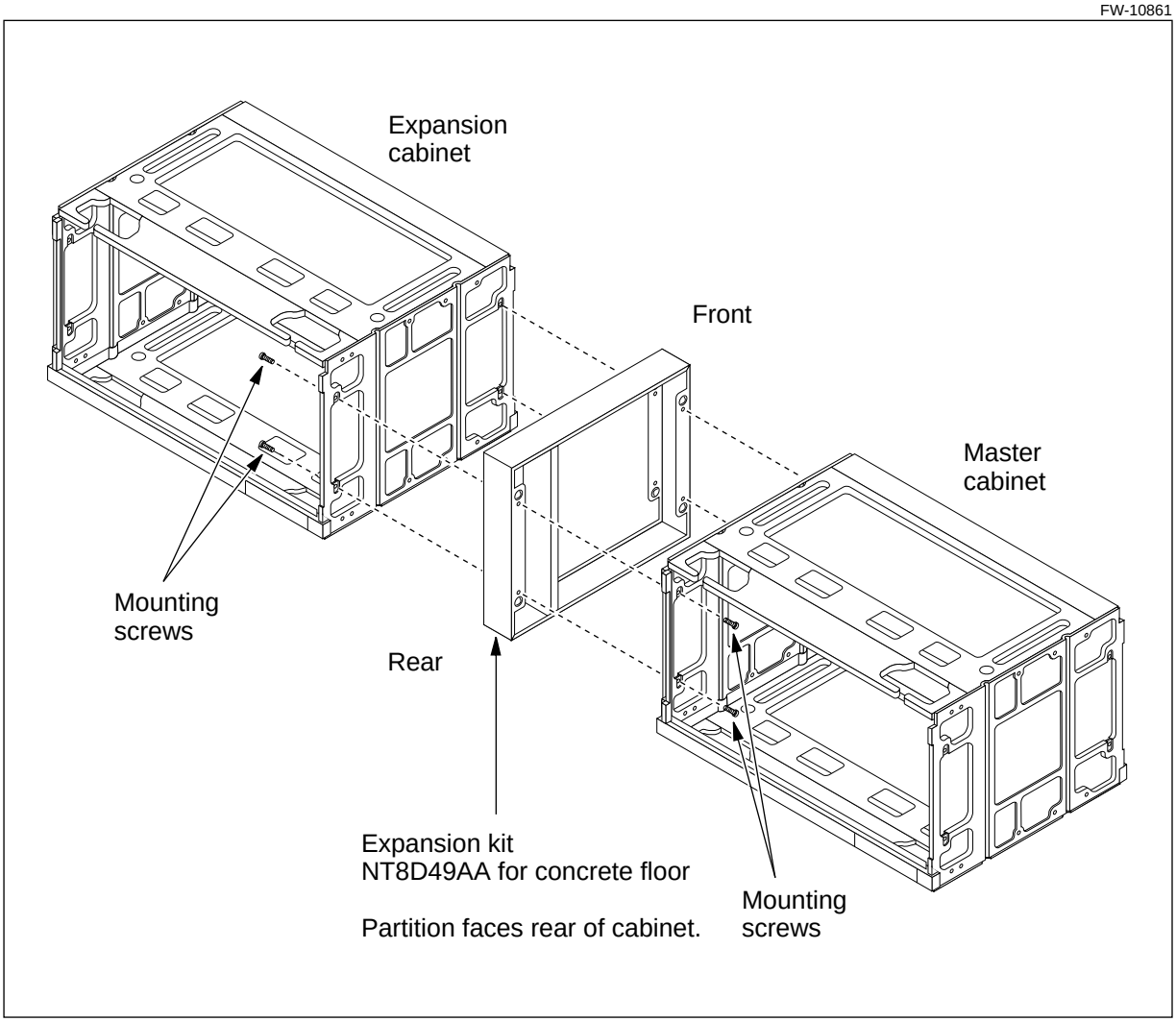
—continued—

Procedure 5-3 (continued)
Positioning cabinets with no anchor kits

Step	Action

Figure 5-7
Installing an expansion kit

FW-10861



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Procedure 5-4
Installing an NT4K09BA overhead cable extender kit

Use this procedure to install an NT4K09BA overhead cable extender kit onto modular power package (MPP) cabinets and modular business package (MBP) master and expansion cabinets whenever over-head cable routing is used.

Requirements

The following tools and materials are required:

- nut driver, 1.43 cm (9/16 in.)

Before performing this procedure, remove the top cap and equipment covers as described in Procedure 5-1, “Installing the bracing rods and tie bars” on page 5-2. Then perform this procedure for each cabinet.

Action

Step	Action
1	Install one helical spring washer onto each of four cable extender mounting bolts.
2	Insert the cable extender mounting bolts, with the spring washers installed, through the end holes in the cable extender cross bars.
3	Install the support posts onto the bolts.
4	Mount the cable extender assemblies on top of the cabinet in alignment with the framework’s cable extender mounting holes located adjacent to the top cap as shown in Figure 5-8. ***Note:*** The cross bars run across the top of the cabinet top cap from front to rear.
5	Use the 9/16 nut driver to securely install the four bolts into the top of the cabinet.
6	Go to Chapter 6, “Connecting power and ground cables” on page 6-1.

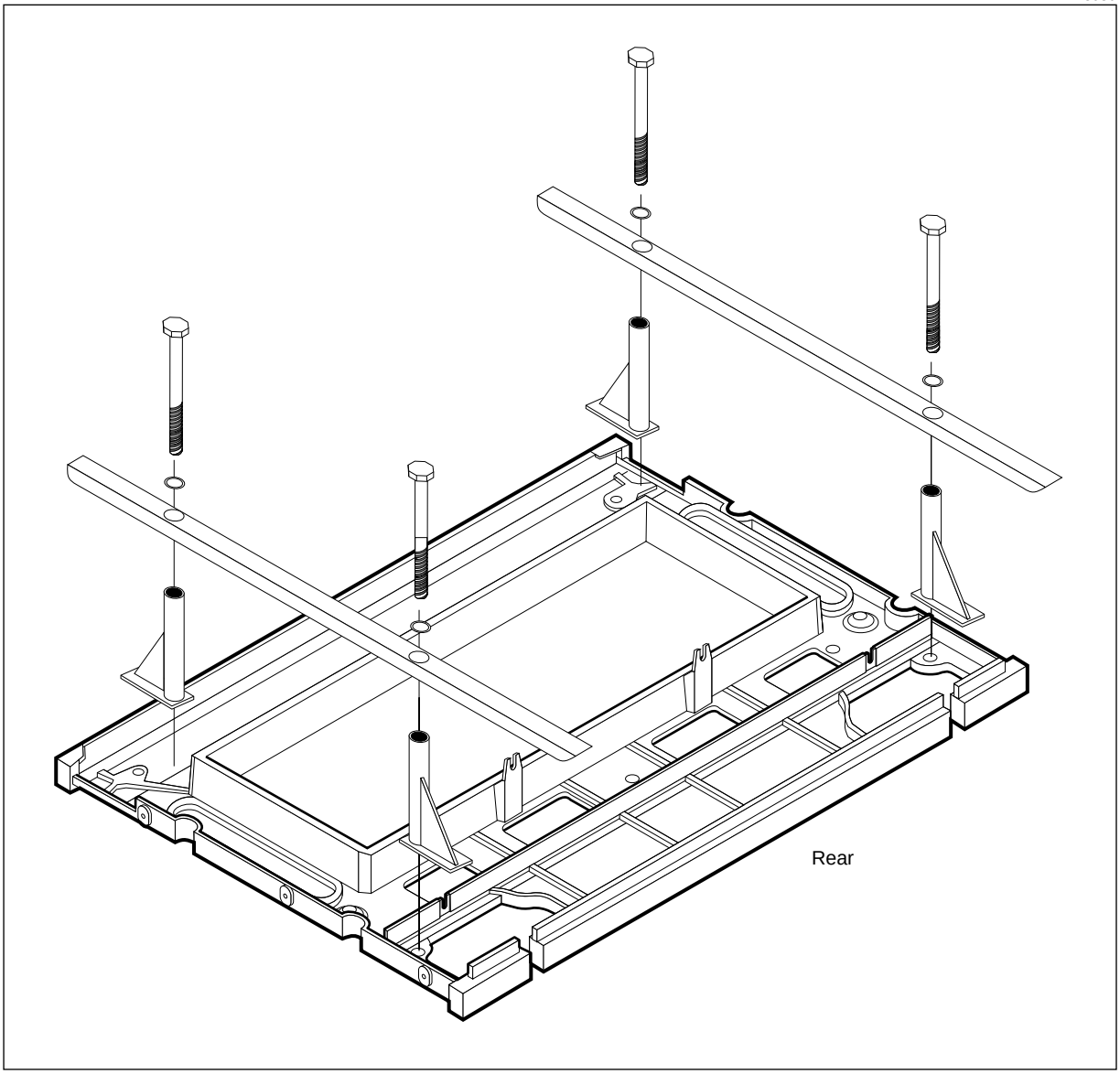
—continued—

Procedure 5-4 (continued)
Installing an NT4K09BA overhead cable extender kit

Step	Action

Figure 5-8
Cable extender installation exploded view

FW-15080



—end—

Connecting power and ground cables

This chapter provides the procedures to install the modular business package (MBP) master and expansion cabinet grounding cables, the dc battery feed harnesses between cabinets, the power distribution unit (PDU) alarm cable and the ac power cabling.

> ***Note:*** All cabling routed from cabinet to cabinet must be routed through the 20.3 cm by 20.3 cm (8 in. by 8 in.) cut-outs in the cabinet side framework. Do not route cabinet-to-cabinet cables through any other framework cut-outs.

Chapter contents

This chapter contains the following information:

Perform the procedures according to the configuration you are installing.

Field installed power and ground cables

Table 6-1 list the external cabinet level cables that you can install.

Table 6-1
External cables (field installed)

Cable	PEC	From	Terminal	To	Terminal
Cabinet ground junction cable	NT4K84QB (5 ft)	MBP master cabinet	pedestal ground bar	MBP expansion cabinet	pedestal ground bar
Ground cable 6 AWG	NT4K84YA (35 ft)	Common ground point (SPG/BPG)		MBP Master cabinet	pedestal ground bar
Ground cable 6 AWG	NT4K81BA (50 ft)	Common ground point (SPG/BPG)		MBP master cabinet	TB1-12
Ground cable 6 AWG (green)	(customer supplied)	1/0 ground collector		MBP master cabinet	pedestal ground bar
Ground cable 6 AWG (green)	(customer supplied)	1/0 ground collector		MBP expansion cabinet	pedestal ground bar
208/240 V ac power feed	(customer supplied)	ac panel Black Red Green	 L1 L2 GND	Rectifier shelf	 L1 L2 GND
Note: In isolated bonding network (IBN) applications, the green ground wire is not connected to the rectifier shelf. Insulate and fold back the green ground lead in the rectifier shelf. The armored cable must be fully insulated from the cabinet and its equipment.					
Battery harness	6 AWG (Red, White)	master cabinet BEM 1	TB-2 (Red) TB-4 (White)	Expansion cabinet BEM 2	TB-1 TB-3
Note: The battery harnesses are installed in Chapter 9, “Installing the batteries and adjusting the rectifiers” on page 9-1.					

Procedure 6-1
Connecting the ground cables (no ground collector)

Use this procedure to connect ground cables to modular business package (MBP) master and expansion cabinets in sites that do not use a ground collector for equipment grounding. For sites that do use a ground collector, go to Procedure 6-2, “Connecting the ground cables (with ground collector)”.

Two pairs of lugs on the pedestal of each cabinet are electrically connected to a common ground point to provide cabinet grounding. All ground leads connected to the pedestal are 6 AWG green stranded single-conductor wire.

In buildings that use a common bonding network (CBN) grounding scheme, the common ground point is a frame ground bar (FGB).

In buildings that use an isolated bonding network (IBN) grounding scheme, the common ground point is a single point ground (SPG).

> ***Note:*** 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.

For additional explanations of grounding schemes, see *Site Installation Planning and Engineering*, 323-3001-200, in *Engineering, Configuration, & Ordering Guide*, Volume 1.

The MBP cabinets and the battery racks are daisy-chained and the last unit in the chain is connected to the common ground point with a 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.

—continued—

Procedure 6-1 (continued)
Connecting the ground cables (no ground collector)

Requirements

The following tools and materials are required:

- 6 AWG stranded conductor, with green jacket
- 6 AWG, 2-hole ground lugs with holes spaced 1.58 cm (5/8 in.) apart and 0.635 cm (1/4 in.) in diameter
- cable cutter
- power knife
- hex nut driver set
- crimping tool for ground lugs
- cable ties
- lacing cord
- torque wrench, capacity 1.18 kg-m (100 in-lb)

Action

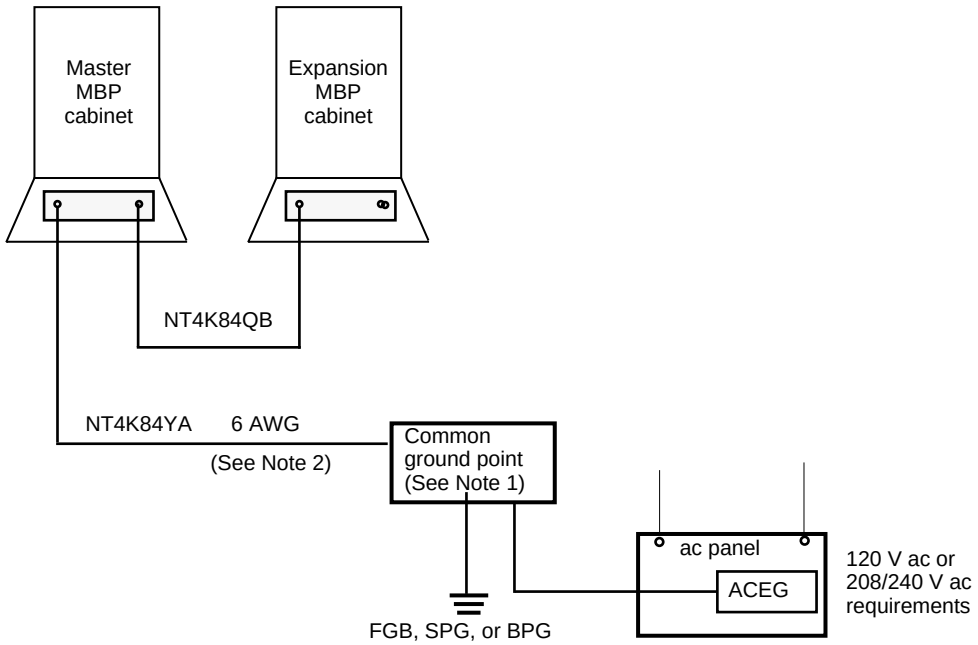
Step	Action
1	Refer to the block diagram in Figure 6-1 for a layout of the ground cables to be installed.

—continued—

Procedure 6-1 (continued)
Connecting the ground cables (no ground collector)

Step	Action

Figure 6-1
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 frame 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 6-1 (continued)
Connecting the ground cables (no ground collector)

Step	Action
2	Route an NT4K84QB bay-bay ground cable between the pedestals of the MBP master cabinet and the MBP expansion cabinet. Refer to Figure 6-2 for routing details of the ground cable.
3	At each end of the cable, attach the two-hole ground lug to the ground studs on the pedestal with two nuts.
4	Tighten the nuts on the ground studs to a torque of 67 in-lb.
5	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.
6	Attach the ground lead to the ground point on the battery rack according to the manufacturer's instructions.
7	Strip the pedestal end of the ground lead 13 mm (0.5 in.) and crimp a 6 AWG 2-hole ground lug to the free end of the lead.

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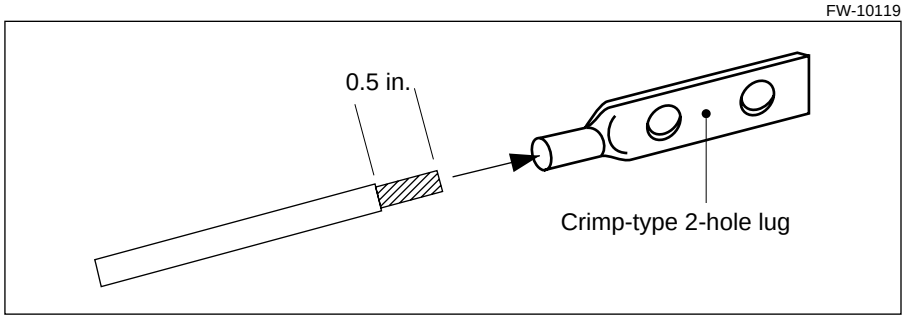


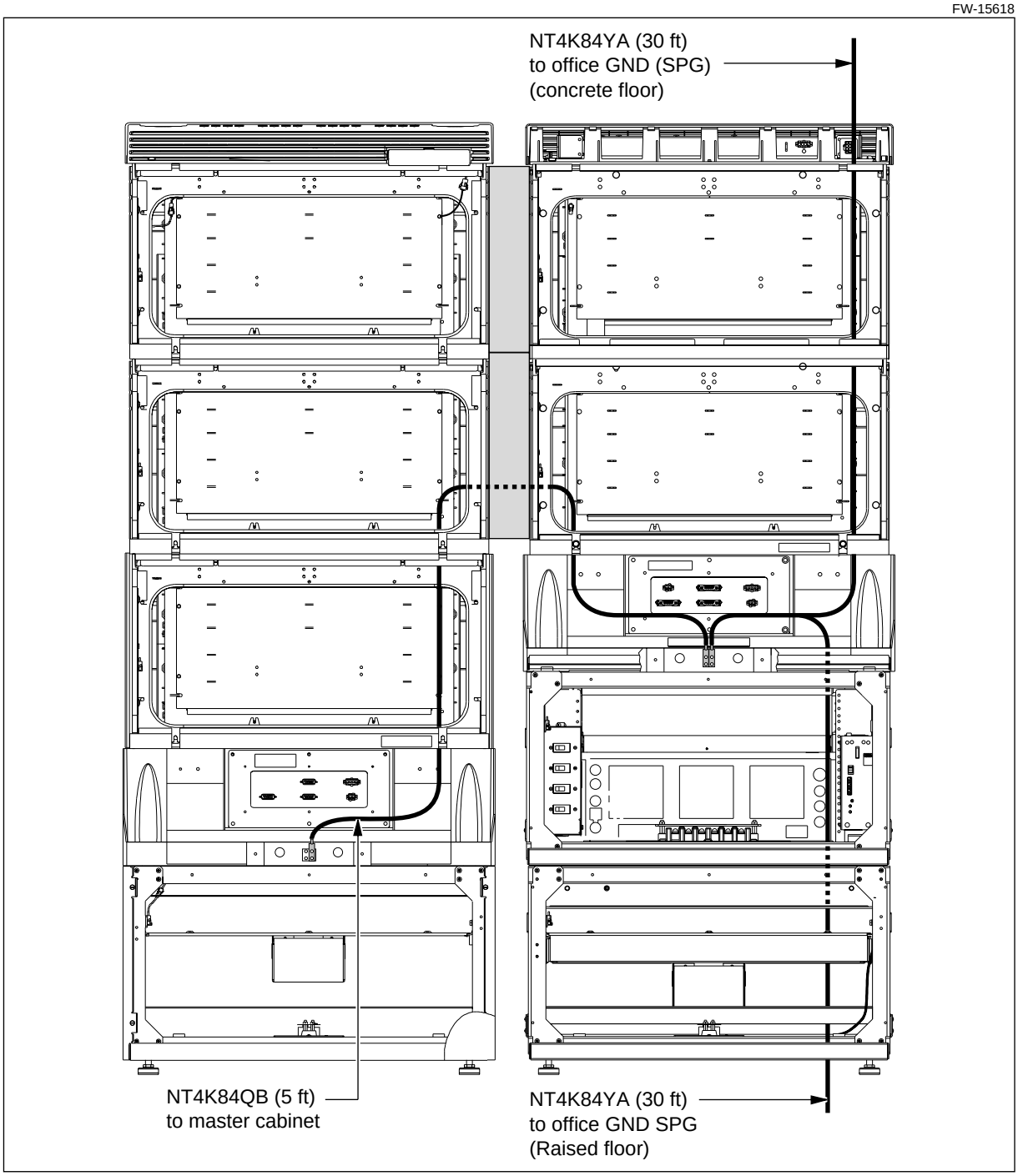
8	Attach the two-hole ground lug to the ground studs on the expansion cabinet (or the master cabinet, if an expansion cabinet is not used) using two nuts.
9	Tighten the nuts on the ground studs to a torque of 67 in-lb.
10	Route an NT4K84YA ground cable or a 6 AWG ground lead from the remaining ground lugs on the pedestal of the MBP master cabinet to the common ground point.
11	Attach the ground lead to the common ground point according to the local electrical codes.
12	If you routed a 6 AWG lead, 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.
13	Attach the two-hole ground lug on the pedestal end of the lead to the frame ground point on the pedestal of the MBP master cabinet using two nuts.
14	Tighten the nuts on the ground studs to a torque of 67 in-lb.

—continued—

Procedure 6-1 (continued)
Connecting the ground cables (no ground collector)

Figure 6-2
Routing an NT4K84QB or NT4K84YA ground cable between cabinets (rear view)

FW-15618



—end—

Procedure 6-2
Connecting the ground cables (with ground collector)

Use this procedure to connect ground cables to modular business package (MBP) master and expansion cabinets in sites that use a ground collector for equipment grounding.

All ground leads connected to the pedestal are 6 AWG green stranded single-conductor wire.

For additional explanations of grounding schemes, see *Site Installation Planning and Engineering*, 323-3001-200, in *Engineering, Configuration, & Ordering Guide*, Volume 1.

In grounding schemes using a ground collector, each unit is bonded to the 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.

Requirements

The following tools and materials are required:

- 1/0 stranded conductor,
- 2 AWG stranded conductor,
- 6 AWG stranded conductor, with green jacket
- 6 AWG, 2-hole ground lugs with holes spaced 1.58 cm (5/8 in.) apart and 0.635 cm (1/4 in.) in diameter
- cable cutter
- power knife
- hex nut driver set
- crimping tool for ground lugs
- cable ties
- lacing cord
- torque wrench, capacity 1.18 kg-m (100 in-lb)

—continued—

Procedure 6-2 (continued)
Connecting the ground cables (with ground collector)

Action

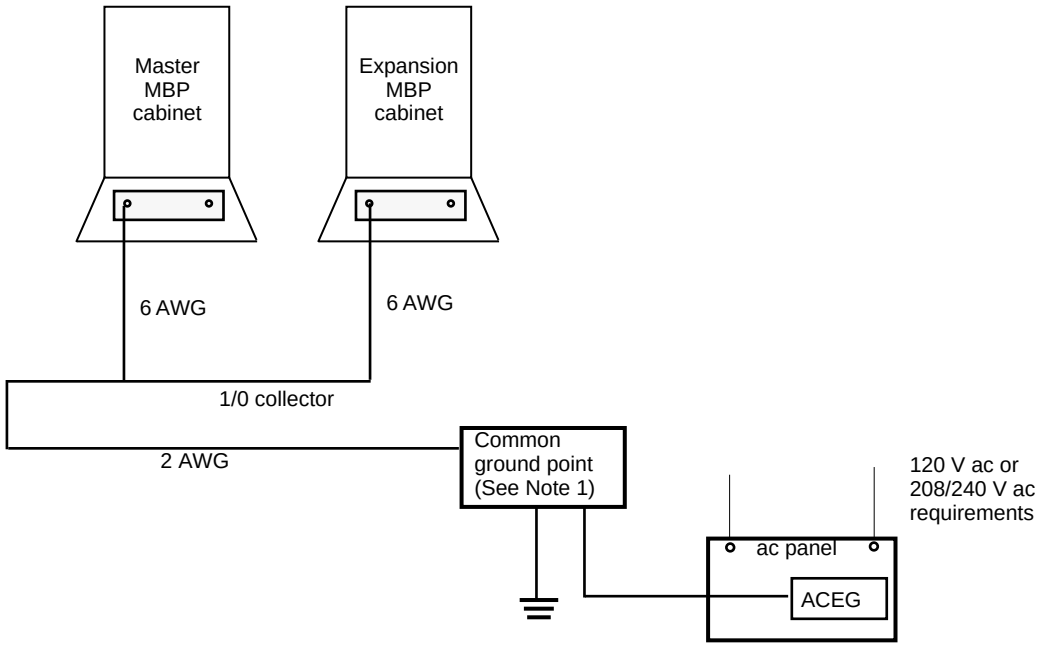
Step	Action
1	See the block diagram in Figure 6-3 for a layout of the ground cables to be installed.
2	Attach a 1/0 collector to the common ground point by means of 2 AWG wire in accordance with local electrical codes.
3	Route 6 AWG green jacket ground leads from the 1/0 AWG collector to the components shown in Figure 6-3.
4	Attach one end of each of the 6 AWG leads to the 1/0 AWG collector in accordance with local electrical codes.
5	Connect the free end of the 6 AWG lead to the frame ground point on the battery rack (if installed in accordance with the manufacturer's instructions.

—continued—

Procedure 6-2 (continued)
Connecting the ground cables (with ground collector)

Step	Action

Figure 6-3
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 frame 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 (BPG) is used as the common ground point.

—continued—

Procedure 6-2 (continued)
Connecting the ground cables (with ground collector)

Step	Action
6	Strip the free end of the remaining 6 AWG ground leads 13 mm (0.5 in.) and crimp 6 AWG, 2-hole ground lugs to the stripped leads.

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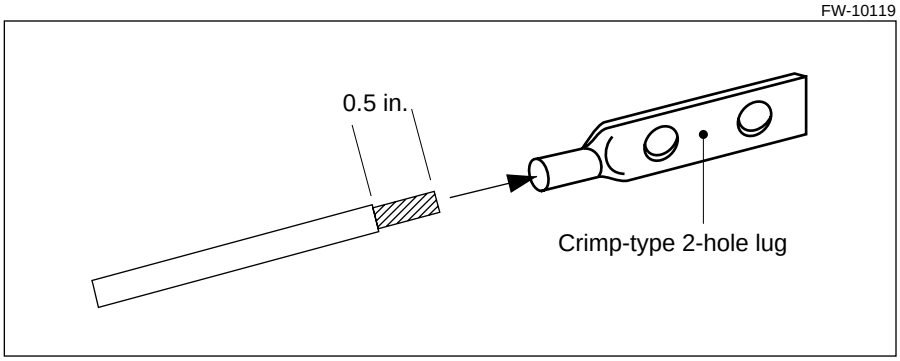


7	Attach the ground lugs on the free ends of the unconnected ground leads to the ground studs on the pedestals of each cabinet (see Figure 6-2) using two nuts for each ground lug.
8	Tighten the nuts on the ground studs to a torque of 67 in-lb.

—end—

Procedure 6-3
Verifying the -48 V dc battery feed cables

Use this procedure to verify the factory installed connections for the -48 V dc battery feed cables from the rectifier shelf to the battery and battery return terminal blocks and to the ABM shelf in the rear of the MBP master cabinet.

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

Requirements

The cabinets must have been positioned, levelled, and secured as described in Chapter 5, “Installing the cabinets” on page 5-1.

Tools and materials

The following tools and materials are required:

- flat-bladed screwdriver, 0.635 cm (1/4 in.) wide blade

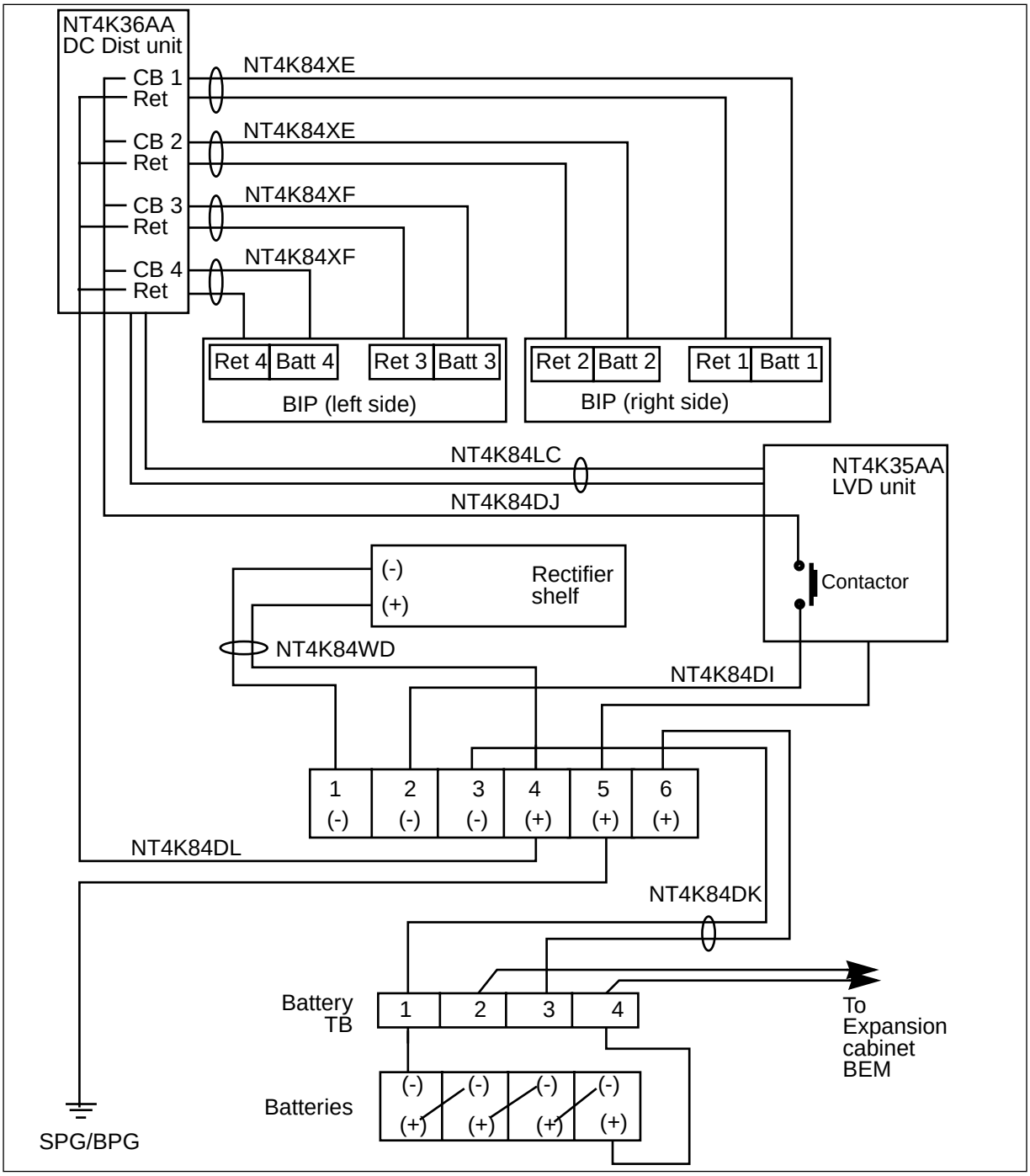
Action

Step	Action
1	At the rear of the MBP master cabinet, remove the safety covers from the battery/battery return terminal blocks and store them for re-installation.
2	Verify the factory cabling and connections as shown in Figure 6-4 and Figure 6-5.
3	Reinstall the safety covers on the terminal blocks.
4	Go to Procedure 6-4, “Connecting the alarm cables between the MBP master and expansion cabinets”.

—continued—

Procedure 6-3 (continued)
Verifying the -48 V dc battery feed cables

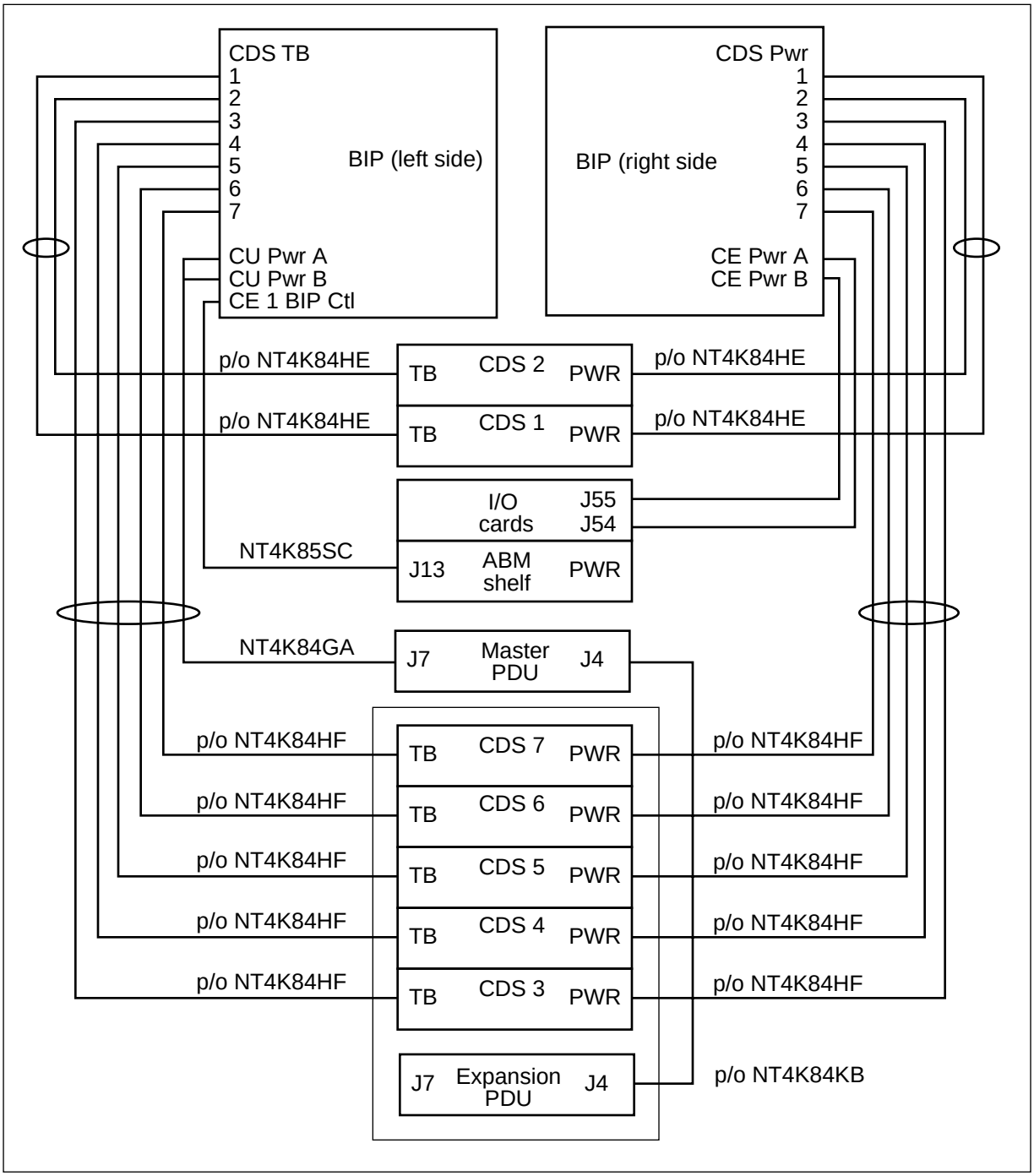
Figure 6-4
Power and battery cabling to the ABM BIP



—continued—

Procedure 6-3 (continued)
Verifying the -48 V dc battery feed cables

Figure 6-5
ABM BIP power distribution diagram



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Procedure 6-4
Connecting the alarm cables between the MBP master and expansion cabinets

Use this procedure to route and connect the alarm and power cables between the MBP master cabinet and the MBP expansion cabinet.

If no expansion cabinet is installed, skip this procedure and continue the MBP installation using Procedure 6-5, “Connecting the ac feeds to the MBP master cabinet” on page 6-21.

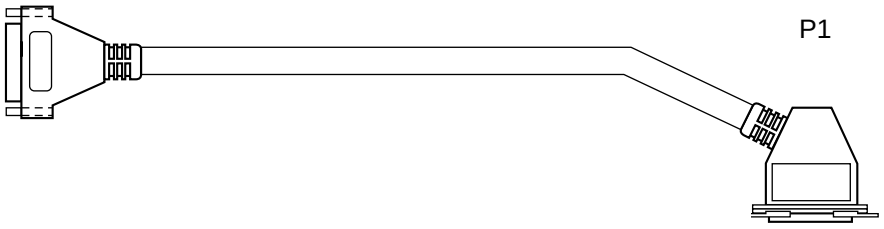
There are two cables to be routed from the master cabinet to the expansion cabinet:

- the NT4K81CD PDU alarm cable
- the NT4K84KB alarm and power extension cable

The NT4K81CD cable comes factory-installed in the master cabinet. It is routed from the LVD unit ABM parallel telemetry input connector (J5) to the master cabinet PDU alarm connector J1. It must be disconnected from connector J1 on the PDU in the master cabinet and re-routed to connector J1 on the PDU in the expansion cabinet. The diagram below shows the NT4K81CD cable.

FW-15626

NT4K81CD



Grey-jacketed 8-pair 26 AWG solid wire, connectorized on both ends.

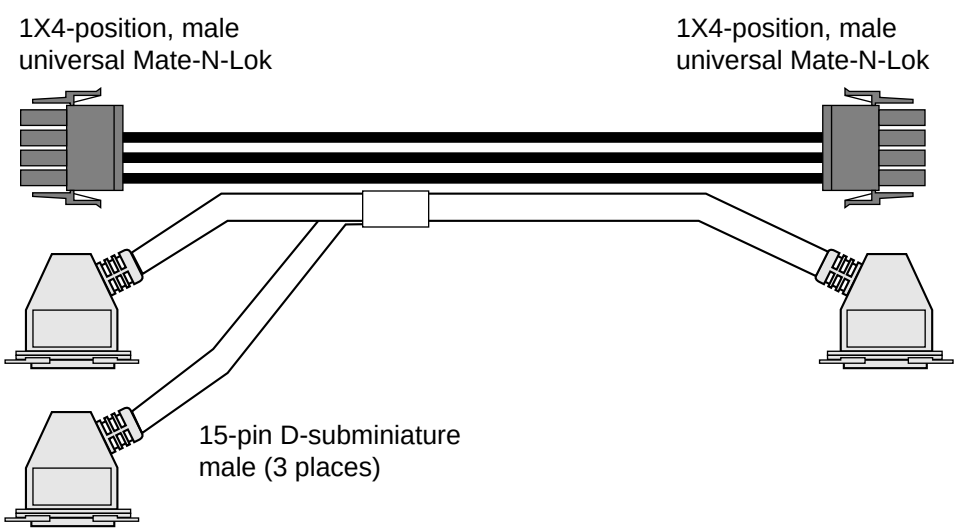
10 ft (3.08 m) NT4K81CD

—continued—

Procedure 6-4 (continued)
Connecting the alarm cables between the MBP master and expansion cabinets

The NT4K84KB alarm and power extension harness is factory-installed in the expansion cabinet and the loose end that routes to the master cabinet is coiled up and secured to the expansion cabinet framework for shipping. In the expansion cabinet, it connects to PDU connectors E2A alarm (J2), fan alarm (J3), and dc power (J4). It then routes to the master cabinet to connect to PDU connectors alarm (J1) and power (J4). The diagram below shows the NT4K84KB harness.

NT4K84KB alarm and power harness



This harness consists of:
Grey-jacketed 12-pair 24 AWG solid wire, switchboard cable connectorized on both ends with 15-pin D-subminiature connectors.
10 AWG solid wire, 4 conductors (2 red, 2 black) connectorized on both ends with 1X4 male MATE-N-LOK connectors.

73 in. (185 cm) NT4K84KB

—continued—

Procedure 6-4 (continued)
Connecting the alarm cables between the MBP master and expansion cabinets

Requirements

The following tools and materials are required:

- cable ties

Action

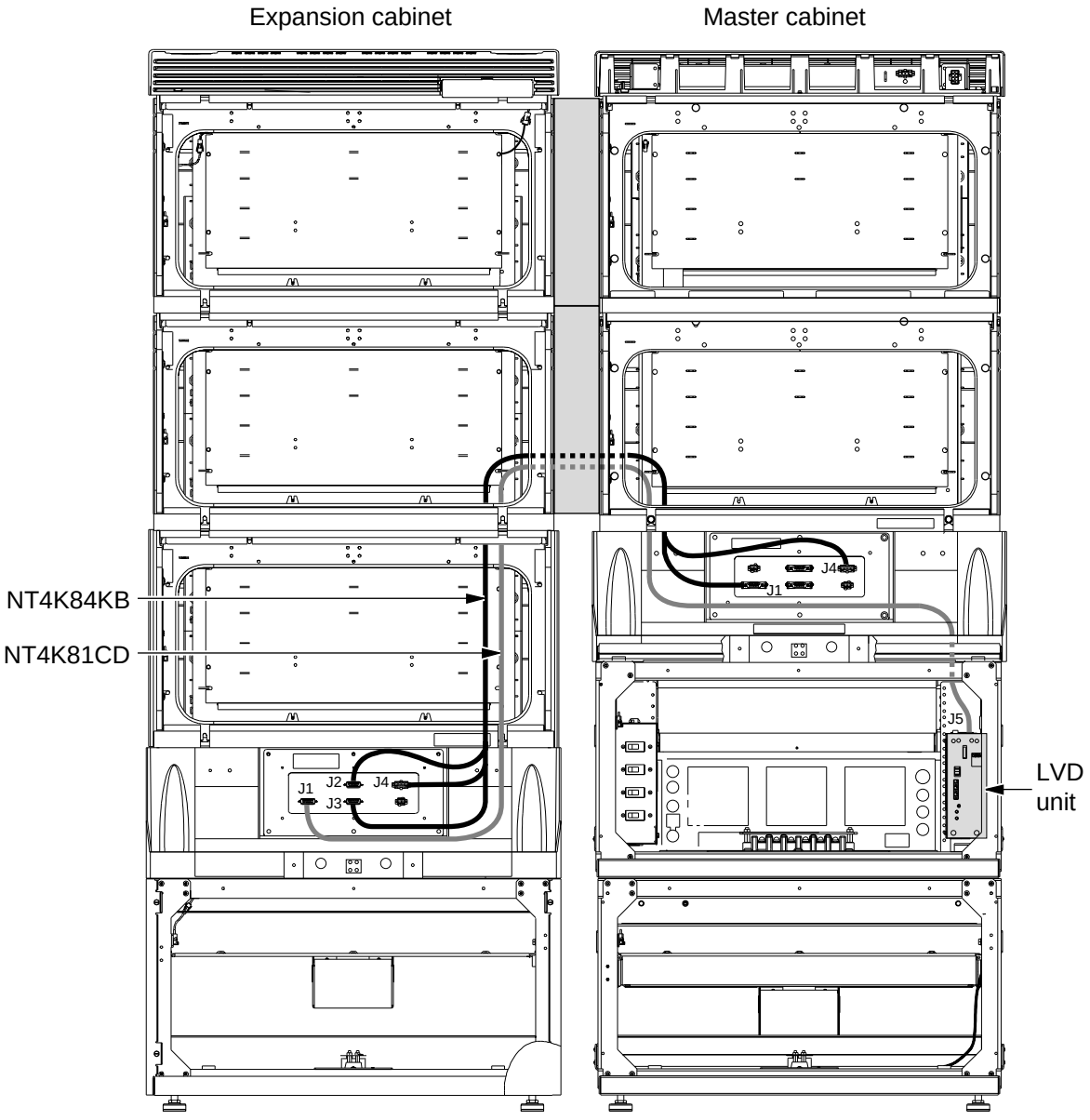
Step	Action
	Re-route the NT4K81CD alarm cable
1	At the master cabinet PDU, disconnect the NT4K81CD cable connector from PDU connector J1.
2	Route the cable through the 8X8 holes in the right-hand side of the master cabinet framework, through the expansion kit, and into the left side of expansion cabinet.
3	Route the cable down the left sid of the expansion cabinet to the PDU.
4	Connect the NT4K81CD cable plug to connector J1 on the expansion cabinet PDU.
5	Secure the cable with cable ties in the master and expansion cabinets. ***Note:*** Table 6-2 shows the pin-outs for the NT4K81CD cable.
	Re-route the NT4K84KB alarm and power cable
6	Locate the NT4K84KB cable that is coiled up in the expansion cabinet and undo the cable tie that hold it in place. ***Note:*** Cable plugs P1 and P4 will be unconnected and hanging loose.
7	Route the cable thought the 8X8 holes in the left-hand side of the expansion cabinet framework, through the expansion kit, and into the right side of master cabinet.
8	Route the cable down the right sid of the master cabinet to the PDU.
9	Connect the NT4K84KB cable plug P1 to the PDU connector J1 on the master cabinet.
10	Connect the NT4K84KB cable plug P4 to the PDU connector J4 on the master cabinet.
11	Secure the cable with cable ties in the master and expansion cabinets. ***Note:*** Table 6-3 shows the pin-outs for the NT4K84KB cable.
12	Go to Procedure 6-5, “Connecting the ac feeds to the MBP master cabinet”.

—continued—

Procedure 6-4 (continued)
Connecting the alarm cables between the MBP master and expansion cabinets

Figure 6-6
Installing an alarm cables in the MBP master and expansion cabinets

FW-15619



Rear view of cabinets

—continued—

Procedure 6-4 (continued)
Connecting the alarm cables between the MBP master and expansion cabinets

Step Action

Table 6-2 shows the cable pin-outs for the NT4K81CD cable.

Table 6-2
NT4K81CD cable pin-outs

From			To	
Connector	**Pin**	**Color**	**Connector**	**Pin**
P1	1			
P1	2	O2W	P1	3
P1	3	G1W	P1	4
P1	4	G2W	P1	5
P1	5	BR1W	P1	6
P1	6	BR2W	P1	15
P1	10	S1W	P15	3
P1	11	S2W	P15	5
P1	12	BL1W	P15	12
P1	13	BL1R	P15	13
P1	14	BL2R	P15	14
P1	15	O1R	P15	15
P15	1	O2R	P15	12
P15	2	BL2W	P15	13
P15	6	G1R	P15	8
P15	8	G2R	P15	15

—continued—

Procedure 6-4 (continued)
Connecting the alarm cables between the MBP master and expansion cabinets

Step Action

Table 6-3 shows the pin-outs for the NT4K84KB alarm/power cable.

Table 6-3
NT4K84KB cable pin-outs

From			To	
Connector	**Pin**	**Color**	**Connector**	**Pin**
P1	1	O2W	P2	4
P1	2	G1W	P3	1
P1	3	O1W	P3	2
P1	4	G2W	P3	3
P1	5	BR1W	P3	4
P1	6	BR2W	P3	5
P1	7	S1W	P2	5
P1	8	S1R	P3	9
P1	9	S2W	P3	10
P1	10	BL1R	P2	2
P1	11	BL2R	P2	6
P1	12	O1R	P2	7
P1	13	O2R	P2	8
P1	14	G1R	P2	1
P1	15	BR1R	P3	15
P1	15	BR2R	P2	15

—end—

Procedure 6-5
Connecting the ac feeds to the MBP master cabinet

Use this procedure to connect one 208/240 V ac, 40 A feed to each rectifier shelf in a modular business package (MBP) master cabinet.

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

Do NOT turn on the breakers in the ac panel or the cabinet at this time. They will be turned on later in the installation process.

Installation of the ac cabling must comply with the building distribution and grounding scheme. See *Site Installation Planning and Engineering*, 323-3001-200, in the *Engineering, Configuration and Ordering Guide*, Volume 1, 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 (black, red, green) 8 AWG cable.

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 individually cabled directly to the ac panel. Receptacles cannot be used.

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.

CAUTION
Isolated bonding network grounding alert
In isolated bonding network (IBN) applications, there must be no electrical ground connection from the ac ground to the cabinet or its equipment.

—continued—

Procedure 6-5 (continued)
Connecting the ac feeds to the MBP master cabinet

Requirements

The following tools and materials are required:

- TECH-90 (or equivalent) armored cable
- cable ties
- cable cutters
- flat-bladed screwdriver, 0.635 cm (1/4 in.) wide blade
- power knife
- cable ripper for stripping armored cable

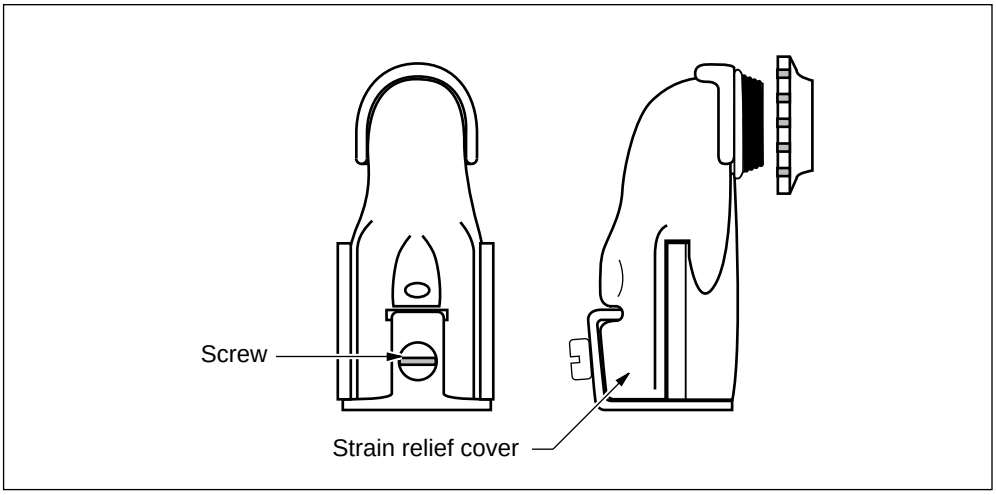
The ac panel must have been installed by a qualified electrician as described in *Site Installation Planning and Engineering*, 323-3001-200, in *Engineering, Configuration & Ordering Guid*e, Volume 1.

Action

Step	Action
1	At the rear of the rectifier shelf in the MBP master 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 6-7.
2	Ensure that the strain relief connector is oriented downward and to the left as shown in Figure 6-9 on page 6-25. Correct the orientation if necessary.

Figure 6-7
Removing and installing a strain relief cover

FW-15528

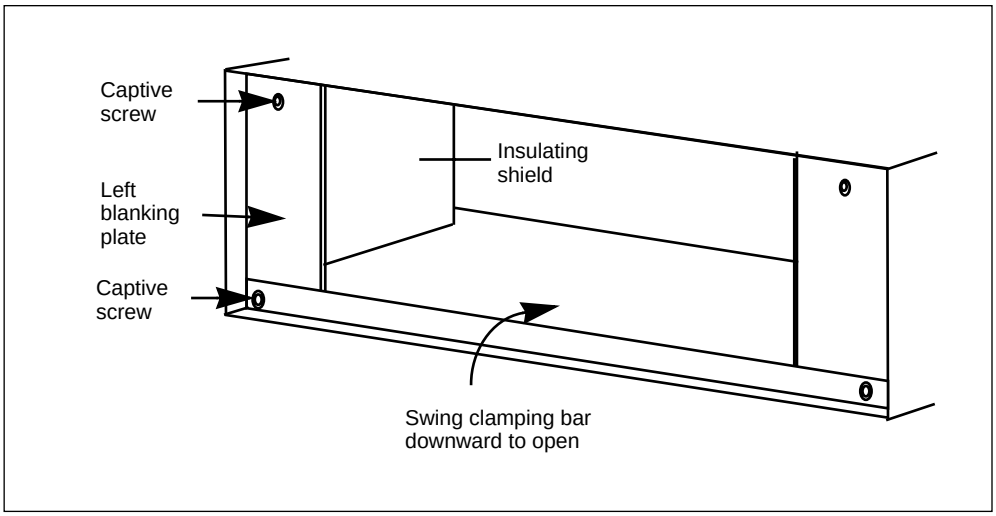


—continued—

Procedure 6-5 (continued)
Connecting the ac feeds to the MBP master cabinet

Step	Action
3	At the front of the rectifier shelf, release the two captive screws that hold the clamping bar in place as shown in Figure 6-8.
4	Swing the clamping bar downward.

Figure 6-8
Gaining access to the ac terminal



5 Release the retaining screw at the top of the left blanking plate and remove the left blanking plate by lifting it upward and outward.

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

7 Ensure that the right angle strain relief on the rear of the rectifier shelf is oriented correctly as shown in Figure 6-9.

8 Are you installing the MBP 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 lengths of 2-1/2 in. conduit between the ac panel and the two knockouts that are located at the bottom right rear of the MBP master cabinet underneath the BEM. If conduit is not required, run armored cable or TECK-90 cable.

—continued—

Procedure 6-5 (continued)
Connecting the ac feeds to the MBP master cabinet

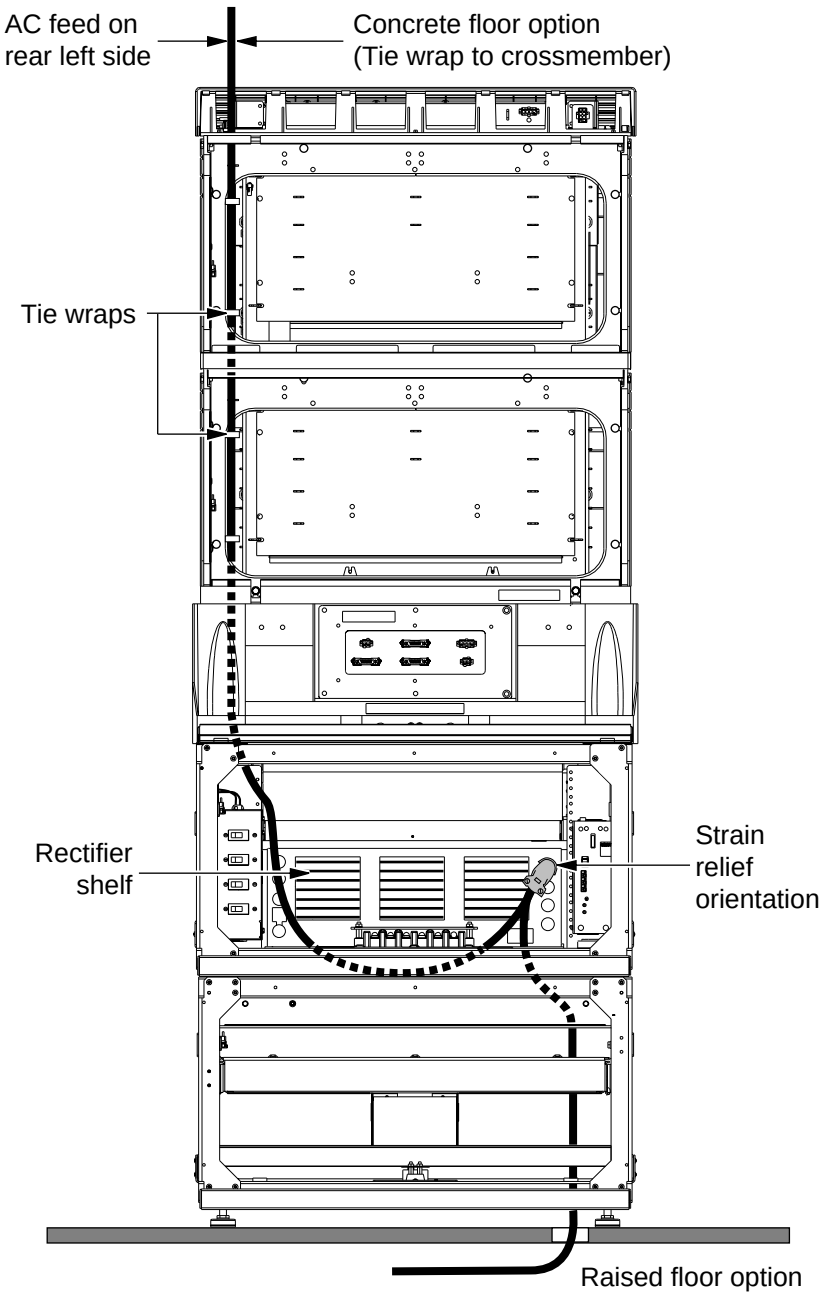
Step	Action
10	Run the armored (or TECK-90) cable for a 208/240 V ac 40 A feed from the ac panel into the rear of the MBP master cabinet as shown in Figure 6-9. ***Note:*** For systems that only require one rectifier shelf, power can be connected to the shelf by a receptacle. For systems that require two rectifier shelves, the shelves must ne individually cabled directly to the ac distribution panel. Receptacles cannot be used.
11	Strip back the armored cable about 250 mm (10 in.) to expose the wires inside the cable.
12	Push the wires through the strain relief and into the rectifier shelf.
13	Strip each of the wires in the cable back about 5 mm (1/2 in.) to expose the conductors.

—continued—

Procedure 6-5 (continued)
Connecting the ac feeds to the MBP master cabinet

Figure 6-9
Routing the ac feeds into the rear of the MBP master cabinet

FW-15620



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

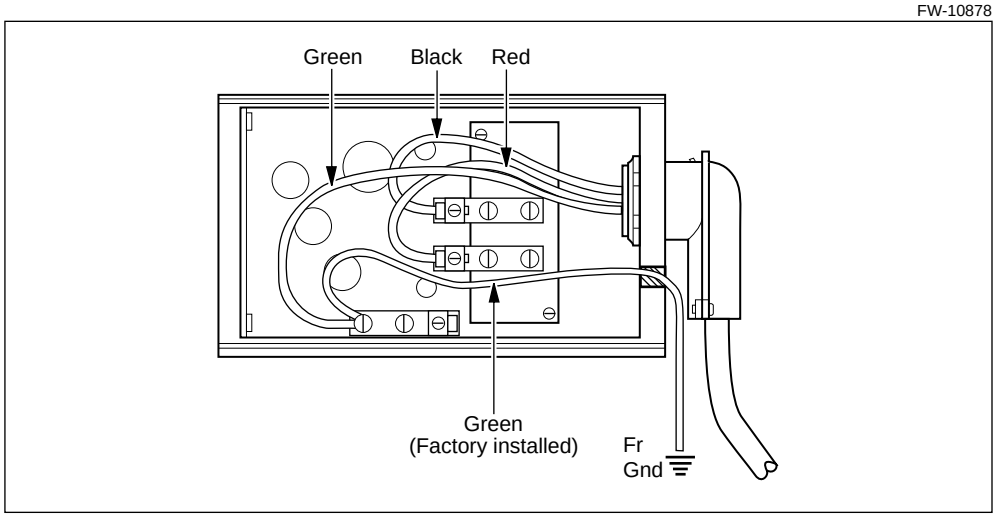
—continued—

Procedure 6-5 (continued)
Connecting the ac feeds to the MBP master cabinet

Step	Action
14	Insert the conductors into the screw-down terminals, as shown in Figure 6-10 and tighten the terminal screws.
15	At the rear of the cabinet, reinstall the strain relief cover. ***Note:*** In isolated bonding network (IBN) applications, ensure that the armored cable cladding is insulated from the rectifier shelf strain relief. There must be no electrical ground connection from the conduit to the cabinet.
16	Dress and secure the armored cable with tie-wraps as shown in Figure 6-9. ***Note:*** In isolated bonding network (IBN) applications, ensure that the armored cable cladding is insulated from the rectifier shelf and the equipment cabinet frame. There must be no electrical ground connection from the conduit to the cabinet or its equipment.
17	At the front of the cabinet, reinstall the insulating shield and blanking plate. ***Note:*** Blank cover plates must be installed in all un-occupied rectifier positions.
18	Swing the clamping bar upward and tighten the captive screws that secure the clamping bar and the blanking plate in place. ***Note:*** Do NOT switch on ac power to the Modular power package (MPP) cabinet. Switching on the ac power and setting up the rectifiers is done in a later procedure.

Figure 6-10
Connecting the conductors of the ac cable to the terminal screws inside the rectifier shelf

FW-10878



—end—

Procedure 6-6
Connecting the BEM alarm cable to the MBP cabinet

Use this procedure to connect the battery breaker alarm leads in a modular business package (MBP) expansion cabinet to the BIP wire-wrap pin field in the MBP master cabinet.

Do NOT turn on the BEM circuit breakers in the MBP.

Requirements

The following tools and materials are required:

- cable ties
- cable cutters
- wire strippers
- wire wrapping tool

Action

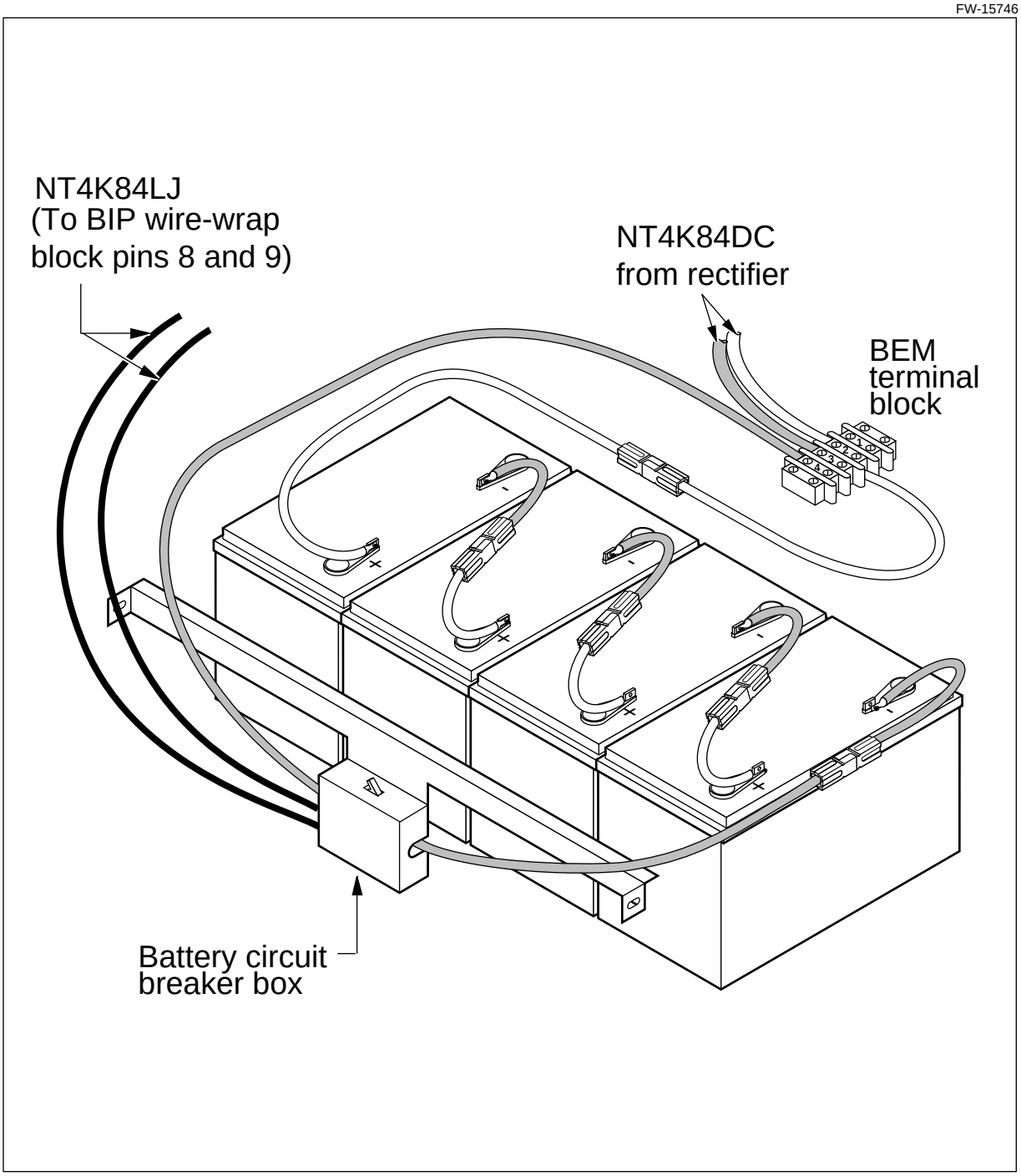
Step	Action
1	Locate the two leads of the NT4K84LJ alarm cable that exits the MBP expansion cabinet BEM circuit breaker box (see Figure 6-11). ***Note:*** The two leads are factory installed in the breaker box and coiled up in the MBP expansion cabinet
2	Uncoil the leads and route them through the expansion kit into the MBP master cabinet.
3	Route the leads to the BIP wire-wrap pin field.
4	Connect the leads to pins 8 and 9 on the pin field. ***Note:*** The order of the leads is not relevant. The alarm contact is normally closed (NC).

—continued—

Procedure 6-6 (continued)
Connecting the BEM alarm cable to the MBP cabinet

Figure 6-11
BEM alarm lead connections

FW-15746



—end—

Routing and connecting MBP cabling

Use this chapter to verify internal factory-installed cabling and to install external field-installed cabling in the modular business package (MBP) master and expansion cabinets.

Table 7-1 on page 7-4 shows the major factory-installed internal cabling and Table 7-2 on page 7-8 shows the field-installed external cabling requirements.

Chapter contents

This chapter contains the following information:

Chapter task lists

This section lists the procedures to perform according to the cabinets installed. While these procedures may be performed individually in any order, they are arranged in this chapter so the master cabinet cabling is installed first and then the expansion cabinet cabling is installed.

In overhead cabling applications, route and connect cabling for the lower-most shelf first and then proceed towards the top of the cabinet. In raised-floor applications, cable the top-most shelf first and then proceed down toward the bottom of the cabinet.

Cables can be tie-wrapped to the side framework of the cabinet equipment modules (the DEMs, SEMs, or both) to secure them in place and to the cable lancing stamped into the chassis of each equipment shelf. Use protective fiberboard on all framework edges that the cables touch.

Master cabinet

For installing a master cabinet, perform the following tasks:

Task	See
Installing miscellaneous external cabling in the master cabinet	page 7-15
Installing the ABM I/O cards and DS1 cables	page 7-22
Installing customer-reserved optional alarms cabling	page 7-34
Installing VF cabling to the CDS	page 7-37
Installing D-link cables	page 7-45
Installing CDS power and talk battery harnesses	page 7-50
Installing metallic test access cables	page 7-55

Expansion cabinet

For installing an expansion cabinet, perform the following tasks:

Task	See
Installing VF cabling to the CDS	page 7-37
Installing D-link cables	page 7-45
Installing CDS power and talk battery harnesses	page 7-50
Installing metallic test access cables	page 7-55

Tool and material requirements

You will need the following tools and materials to route and terminate the cabling in the cabinets:

- cable ties
- lacing cord
- fiberboard
- wire cutters (flush cutting)
- cable cutters
- wire strippers
- wire termination tools (wire-wrap gun or tool)
- flat-bladed screwdriver, 0.32 cm (1/8 in.) wide blade
- screwdriver, Phillips no. 1
- heat shrinkable tubing, black, 0.96 cm (3/8 in.) in diameter (Nortel Networks ordering code R0113153) or equivalent.

MBP cabinet cabling

The MBP master and expansion cabinets contain factory-installed and field-installed cabling.

Intra-cabinet cabling is the cabling connecting the components within a cabinet. Inter-cabinet cabling connects one cabinet to the other. External cabling terminates cabinet signals at connection points outside the cabinet such as cross-connect facilities and fiber management trays.

When the master cabinet is installed as a stand-alone unit, the cabling to the expansion cabinet is not supplied. All intra-cabinet cabling is installed and connected at the factory. External cabling is supplied and field-installed.

When the expansion cabinet is installed at the same time as the master cabinet, the inter-cabinet cabling between the two cabinets is factory-installed in the expansion cabinet and coiled up inside the cabinet. To install the inter-cabinet cabling, first uncoil the cables in the expansion cabinet and then route them to the master cabinet. External cabling for both the master and the expansion cabinets is supplied and field-installed.

When the expansion cabinet is installed as a system upgrade or as a system expansion, the inter-cabinet cabling between the master and the expansion cabinets is supplied and field-installed. The external cabling for the expansion cabinet is also supplied and field-installed.

Cabling tables

The following tables list the intra-cabinet, the inter-cabinet and the external cabling for the MBP master and expansion cabinets. The field-installed cabling procedures follow the cabling tables.

Table 7-1 lists the major MBP master and expansion cabinet cables and their connection points.

Table 7-1
MBP master and expansion cabinet cabling

Cable	PEC	From	Terminal	To	Terminal
VF (note)	NT4K85FL NT4K85FH NT4K85FM NT4K85FJ NT4K85FN NT4K85FK	 CDS (left) CDS (right)	Connectors: 1-25 26-50 51-75 76-96	 VF Cross-connect	 Customer assigned
Note: VF cable routing is identical for all CDS shelves. CDSs 1 and 2 are mounted in the master cabinet and CDSs 3-7 are in the expansion cabinet.					
CDS Metallic test access (daisy chain from ABM to each CDS)	NT4K86ND	ABM (left side)	CDS MTA (J01)	CDS 1 (left side)	CDS MTA In
	NT4K86NA	CDS 1 (left side)	MTA Out	CDS 2 (left side)	CDS MTA In
	NT4K86NC	CDS 2 (left side)	MTA Out	CDS 3 (left side)	CDS MTA In
	NT4K86NA	CDS 3 (left side)	MTA Out	CDS 4 (left side)	CDS MTA In
	NT4K86NA	CDS 4 (left side)	MTA Out	CDS 5 (left side)	CDS MTA In
	NT4K86NA	CDS 5 (left side)	MTA Out	CDS 6 (left side)	CDS MTA In
	NT4K86NA	CDS 6 (left side)	MTA Out	CDS 7 (left side)	CDS MTA In
Note: CDS MTA cabling is a daisy chain. CDSs 1 and 2 are mounted in the master cabinet and CDSs 3-7 are in the expansion cabinet.					
DS1	NT4K85HH NT4K85HA NT4K85HB NT4K85HJ	ABM	I/O cards	External cross-connect	Customer assigned

—continued—

Table 7-1 (continued)
MBP master and expansion cabinet cabling

Cable	PEC	From	Terminal	To	Terminal
Fiber optics	See Chapter 8, "Installing the fiber cables", Table 8-1.	ABM OC-12 primary optics or OC-3 tributaries	Tx and Rx	External fiber splice tray	customer supplied
Local craft access panel 1	NT4K1683	ABM (left side)	LCAP1 (J03)	LCAP (NT4K16)	Internal connections
Local craft access panel 2	NT4K1684	ABM (left side)	LCAP2 (J02)	LCAP (NT4K16)	Internal connections
Cooling unit interface (master cabinet)	NT4K82EA	ABM (left side)	CU IF (J05)	Master cabinet PDU	J3
Cooling unit interface (expansion cabinet)	NT4K84KB	Master cabinet PDU	J1, J4	Expansion cabinet PDU	J2, J3, J4
Control network termination plug	NT7E5072	ABM (left side)	Ctl Net Out (J09)	-	-
Parallel telemetry	NT4K82FA	ABM (left side)	Parallel telemetry (J11)	Power distribution unit	J2
BIP control	NT4K85SC	ABM (left side)	BIP Ctl (J13)	BIP (left side)	BIP Ctl CE1
CDS 1 talk battery	p/o NT4K84HE	BIP (left side)	CDS TB-1	CDS 1 (left side)	TB
CDS 2 talk battery	p/o NT4K84HE	BIP (left side)	CDS TB-2	CDS 2 (left side)	TB
CDS 3 talk battery	p/o NT4K84HF	BIP (left side)	CDS TB-3	CDS 3 (left side)	TB
CDS 4 talk battery	p/o NT4K84HF	BIP (left side)	CDS TB-4	CDS 4 (left side)	TB
CDS 5 talk battery	p/o NT4K84HF	BIP (left side)	CDS TB-5	CDS 5 (left side)	TB
CDS 6 talk battery	p/o NT4K84HF	BIP (left side)	CDS TB-6	CDS 6 (left side)	TB
CDS 7 talk battery	p/o NT4K84HF	BIP (left side)	CDS TB-7	CDS 7 (left side)	TB

—continued—

Table 7-1 (continued)
MBP master and expansion cabinet cabling

Cable	PEC	From	Terminal	To	Terminal
CDS 1 Power	p/o NT4K84HE	BIP (right side)	CDS Pwr-1	CDS 1 (right side)	CDS PWR
CDS 2 Power	p/o NT4K84HE	BIP (right side)	CDS Pwr-2	CDS 2 (right side)	CDS PWR
CDS 3 Power	p/o NT4K84HF	BIP (right side)	CDS Pwr-3	CDS 3 (right side)	CDS PWR
CDS 4 Power	p/o NT4K84HF	BIP (right side)	CDS Pwr-4	CDS 4 (right side)	CDS PWR
CDS 5 Power	p/o NT4K84HF	BIP (right side)	CDS Pwr-5	CDS 5 (right side)	CDS PWR
CDS 6 Power	p/o NT4K84HF	BIP (right side)	CDS Pwr-6	CDS 6 (right side)	CDS PWR
CDS 7 Power	p/o NT4K84HF	BIP (right side)	CDS Pwr-7	CDS 7 (right side)	CDS PWR
Note: CDSs 1 and 2 are mounted in the master cabinet and CDSs 3-7 are in the expansion cabinet.					
Common equipment power	NT4K84BF	BIP (right side)	CE Pwr-A	ABM I/O	Slot 54
Common equipment power	NT4K84BF	BIP (right side)	CE Pwr-B	ABM I/O	Slot 55
D-link access 1	NT4K83DA	ABM (right side)	CDS 1A CDS 1B	CDS 1 (right side)	CDS A CDS B
D-link access 2	NT4K83DB	ABM (right side)	CDS 2A CDS 2B	CDS 2 (right side)	CDS A CDS B
D-link access 3	NT4K83DC	ABM (right side)	CDS 3A CDS 3B	CDS 3 (right side)	CDS A CDS B
D-link access 4	NT4K83DD	ABM (right side)	CDS 4A CDS 4B	CDS 4 (right side)	CDS A CDS B
D-link access 5	NT4K83DE	ABM (right side)	CDS 5A CDS 5B	CDS 5 (right side)	CDS A CDS B
D-link access 6	NT4K83DF	ABM (right side)	CDS 6A CDS 6B	CDS 6 (right side)	CDS A CDS B
D-link access 7	NT4K83DG	ABM (right side)	CDS 7A CDS 7B	CDS 7 (right side)	CDS A CDS B

—continued—

Table 7-1 (continued)
MBP master and expansion cabinet cabling

Cable	PEC	From	Terminal	To	Terminal
DS1	NT4K85HH NT4K85HA NT4K85HB NT4K85HJ	ABM	I/O cards (In and Out)	External cross-connect	Customer assigned
Battery power (red leads)	NT4K84BB	Battery 1	Negative (-) terminal	NT4K84BE	Connector
	NT4K84BE	NT4K84BB	Connector	BEM 1	BEM circuit breaker
	NT4K81AB	BEM 1	BEM circuit breaker	BEM 1	TB1-4
	p/o NT4K84DC (red lead)	BEM 1	TB-3	Master cabinet	TB-1
Battery return (white leads)	NT4K84BC	Battery 4	Positive (+) terminal	NT4K84TB	Connector
	NT4K84TB	NT4K84BC	Connector	BEM1	TB-2
	p/o NT4K84DC (white lead)	BEM 1	TB-2	Master cabinet	TB-12
Note: Batteries are daisy chained positive (+) to negative (-) using battery harnesses NT4K84BC.					
Battery chassis ground	NT4K84AB	BEM 1	TB-1	BEM 1	chassis ground lug
—end—					

Table 7-2 lists the cables that may require field installation depending on the arrangement and configuration that you are installing.

Table 7-2
MBP master and expansion cabinet field-installed cabling

Cable	PEC	From	Terminal	To	Terminal
ABM					
Control Network In (termination plug)	NT7E5072	ABM (left side)	ContNetIn (J09)	-	-
Modem	NT4K86RA (5 ft) NT4K86RB (15 ft) NT4K86RC (50 ft)	ABM (left side)	Modem (J08)	External modem	Customer assigned
	NT7E44MA Null modem adaptor (optional)	External modem	Customer assigned	NT4K86RA NT4K86RB NT4K86RC	Connector
Orderwire extension	NT4K85TA/TB/TC	ABM (left side)	Orderwire extension (J04)	External orderwire equipment	Customer assigned
DS1	NT4K85HH (50 ft) NT4K85HA (100 ft) NT4K85HB (150 ft) NT4K85HJ (200 ft)	ABM	I/O cards	External cross-connect	Customer assigned
D-link access 3	NT4K83DC	ABM (right side)	CDS 3A CDS 3B	CDS 3 (right side)	CDS A CDS B
D-link access 4	NT4K83DD	ABM (right side)	CDS 4A CDS 4B	CDS 4 (right side)	CDS A CDS B
D-link access 5	NT4K83DE	ABM (right side)	CDS 5A CDS 5B	CDS 5 (right side)	CDS A CDS B
D-link access 6	NT4K83DF	ABM (right side)	CDS 6A CDS 6B	CDS 6 (right side)	CDS A CDS B
D-link access 7	NT4K83DG	ABM (right side)	CDS 7A CDS 7B	CDS 7 (right side)	CDS A CDS B

—continued—

Table 7-2 (continued)
MBP master and expansion cabinet field-installed cabling

Cable	PEC	From	Terminal	To	Terminal
BIP					
Customer alarms	Customer provided	BIP	wire-wrap terminal block	External alarm points	Customer assigned
CDS					
CDS Metallic test access (note)	NT4K86NC	CDS 2	MTA Out	CDS 3	MTA In
Note: CDS MTA cabling is a daisy chain. CDSs 1 and 2 are mounted in the master cabinet and CDSs 3-7 are in the expansion cabinet.					
VF (note)	NT4K85FL (50 ft) NT4K85FH (100 ft) NT4K85FM (150 ft) NT4K85FJ (200 ft) NT4K85FN (250 ft) NT4K85FK (300 ft)	CDS (left) CDS (right)	Connectors: 1-25 26-50 51-75 76-96	VF Cross-connect	Customer assigned
Note: VF cable routing is identical for all CDS shelves. CDSs 1 and 2 are mounted in the master cabinet and CDSs 3-7 are in the expansion cabinet.					
CDS 3 talk battery	p/o NT4K84HF	BIP (left side)	CDS TB-3	CDS 3 (left side)	TB
CDS 4 talk battery	p/o NT4K84HF	BIP (left side)	CDS TB-4	CDS 4 (left side)	TB
CDS 5 talk battery	p/o NT4K84HF	BIP (left side)	CDS TB-5	CDS 5 (left side)	TB
CDS 6 talk battery	p/o NT4K84HF	BIP (left side)	CDS TB-6	CDS 6 (left side)	TB
CDS 7 talk battery	p/o NT4K84HF	BIP (left side)	CDS TB-7	CDS 7 (left side)	TB

—continued—

Table 7-2 (continued)
MBP master and expansion cabinet field-installed cabling

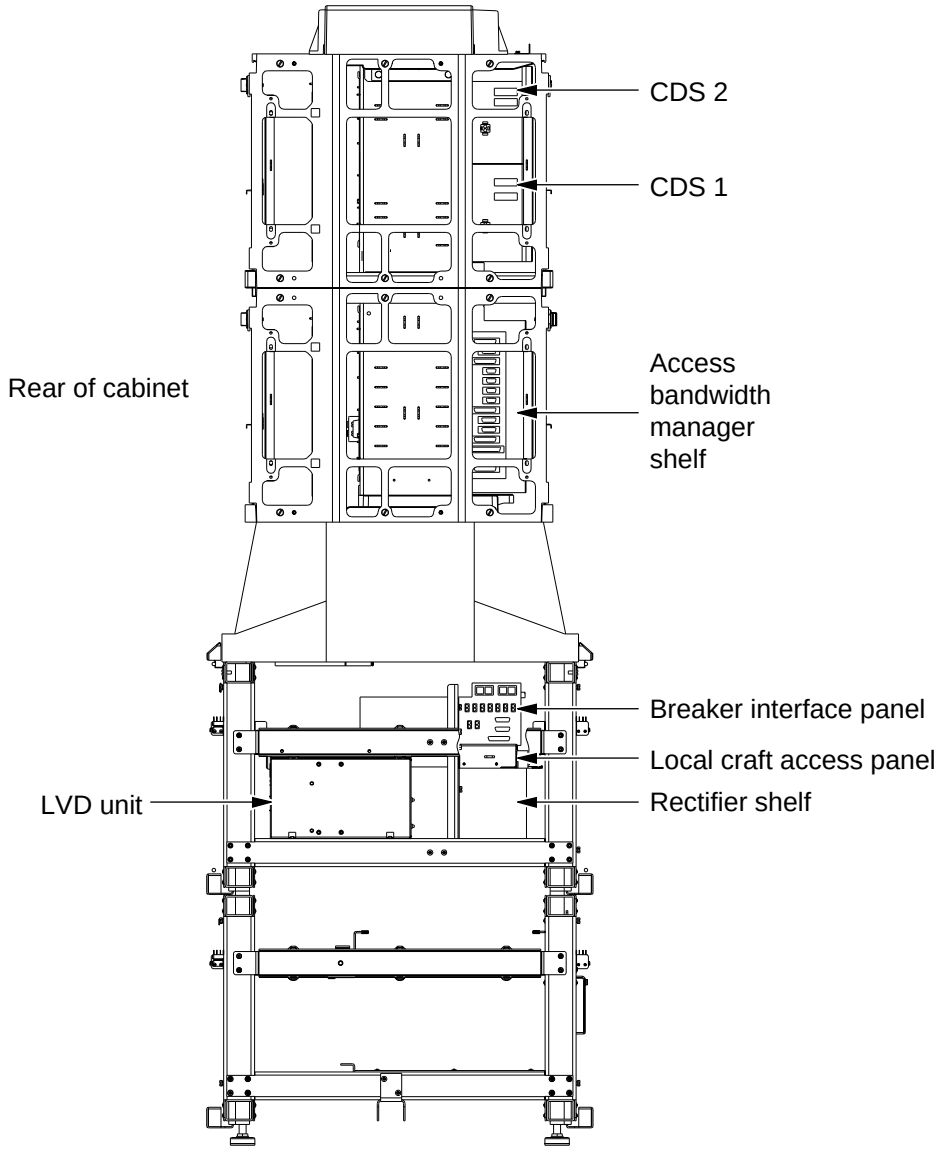
Cable	PEC	From	Terminal	To	Terminal
CDS 3 Power	p/o NT4K84HF	BIP (right side)	CDS Pwr-3	CDS 3 (right side)	CDS PWR
CDS 4 Power	p/o NT4K84HF	BIP (right side)	CDS Pwr-4	CDS 4 (right side)	CDS PWR
CDS 5 Power	p/o NT4K84HF	BIP (right side)	CDS Pwr-5	CDS 5 (right side)	CDS PWR
CDS 6 Power	p/o NT4K84HF	BIP (right side)	CDS Pwr-6	CDS 6 (right side)	CDS PWR
CDS 7 Power	p/o NT4K84HF	BIP (right side)	CDS Pwr-7	CDS 7 (right side)	CDS PWR
Note: NT4K84HE CDS power and talk battery cabling is factory-installed and connected for CDS 1 and CDS 2 in the master cabinet. For the expansion cabinet, the NT4K84HF CDS 3-7 cabling is factory-installed and connected in the expansion cabinet, coiled up and secured in the rear of the expansion cabinet for field-routing from the expansion cabinet to the master cabinet.					
—end—					

Cabinet views

Figure 7-1 through Figure 7-4 show the side views of the master and expansion cabinets. Use these figures throughout the procedures in this chapter to aid you in cable routing.

Figure 7-1
MBP master cabinet left side view

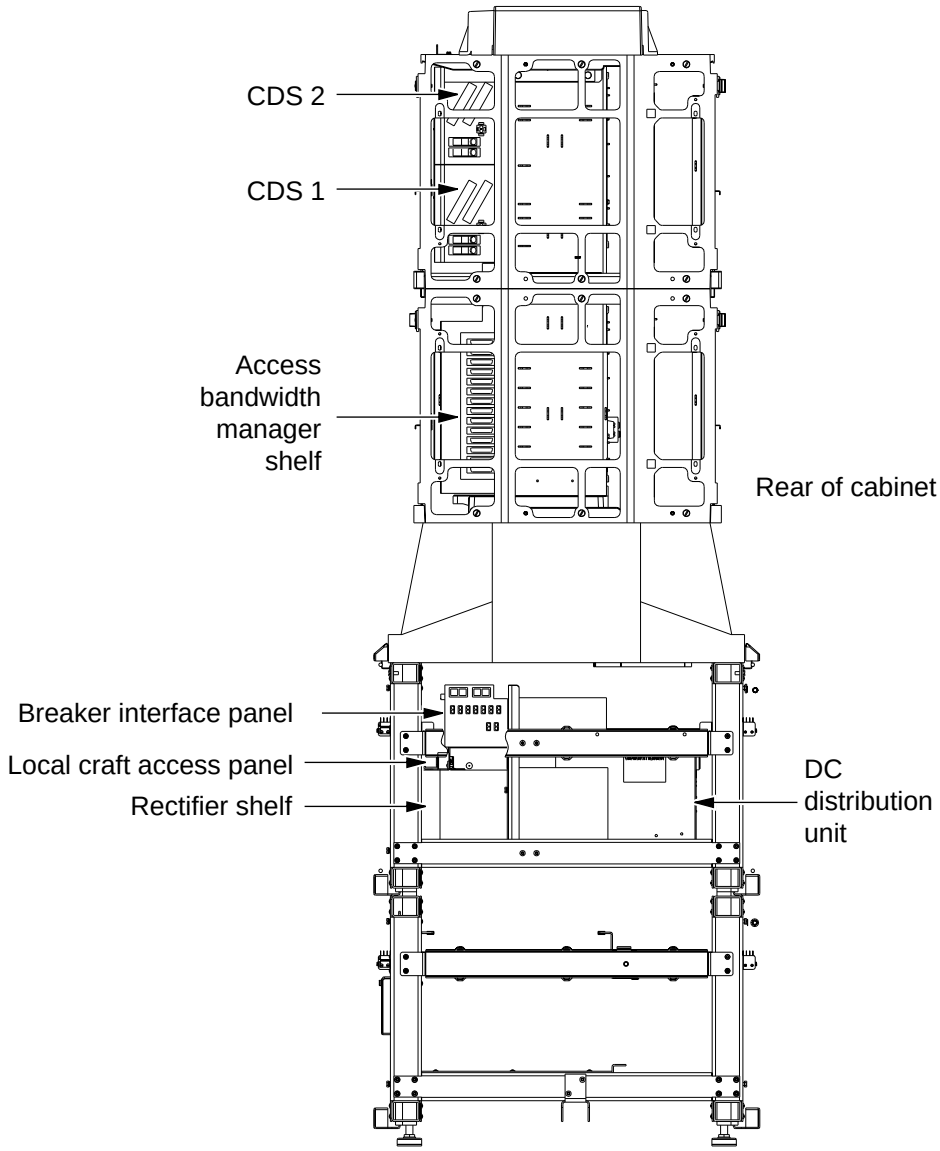
FW-15602



Left side view

Figure 7-2
MBP master cabinet right side view

FW-15604



Right side view

Figure 7-3
MBP expansion cabinet left side view

FW-15596

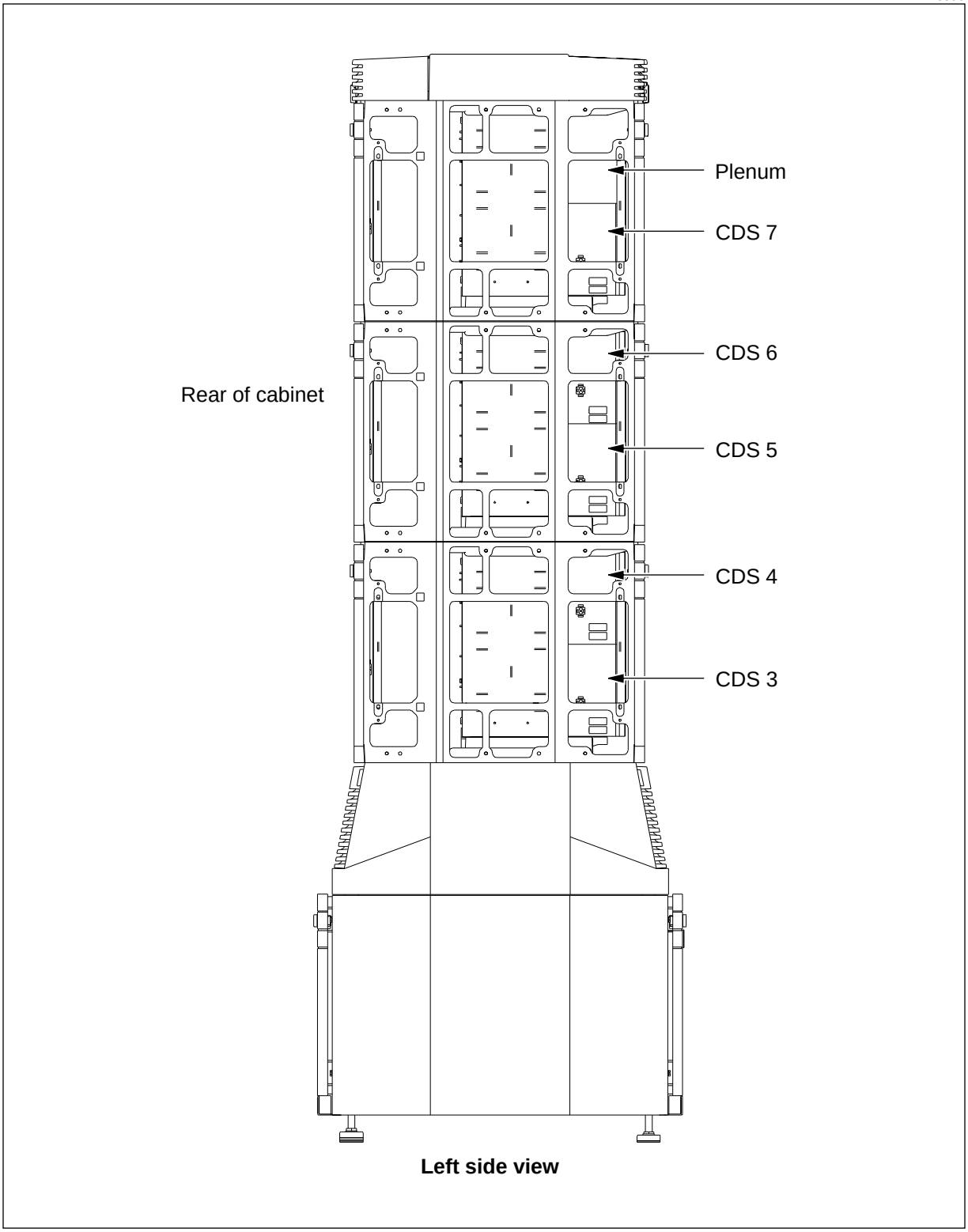
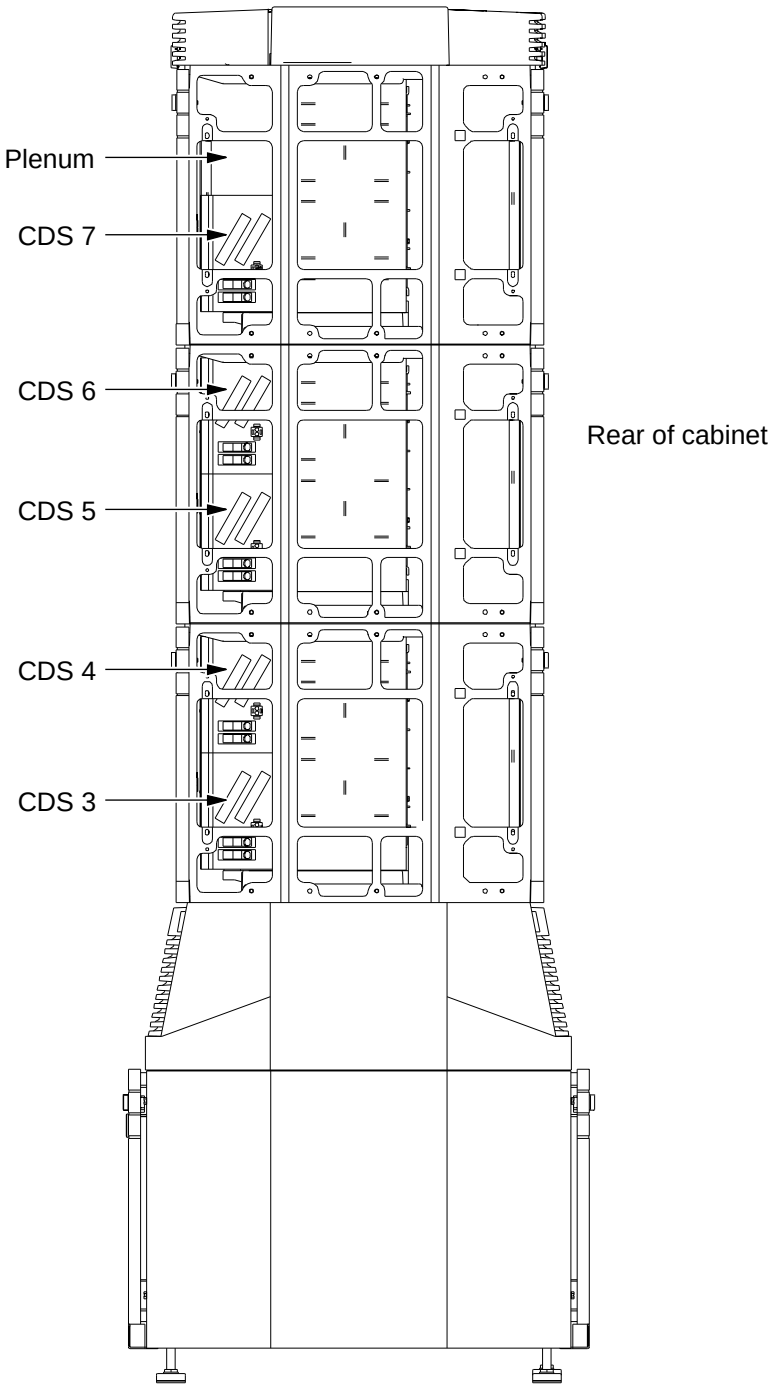


Figure 7-4
MBP expansion cabinet right side view

FW-15597



Right side view

Procedure 7-1
Installing miscellaneous external cabling in the master cabinet

Use this procedure to install the modular business package (MBP) master cabinet miscellaneous external cabling to the access bandwidth manager (ABM) shelf left-side connectors.

The miscellaneous MBP master cabinet cabling consists of the following:

- external modem cabling
- control network termination plug
- external orderwire extension cabling
- serial telemetry (E2ABOS) cabling
- parallel telemetry cabling

Figure 7-5 shows the ABM shelf left-side connectors locations.

After you route each cable or harness, always neatly dress and secure the cables in the cabinets using cable ties. You may tie-wrap the cables to the framework of the cabinets. Lancings are provided at strategic points throughout the cabinet for dressing and securing cables.

Requirements

You will need the following tools and material to route and terminate the miscellaneous external cabling in the cabinets:

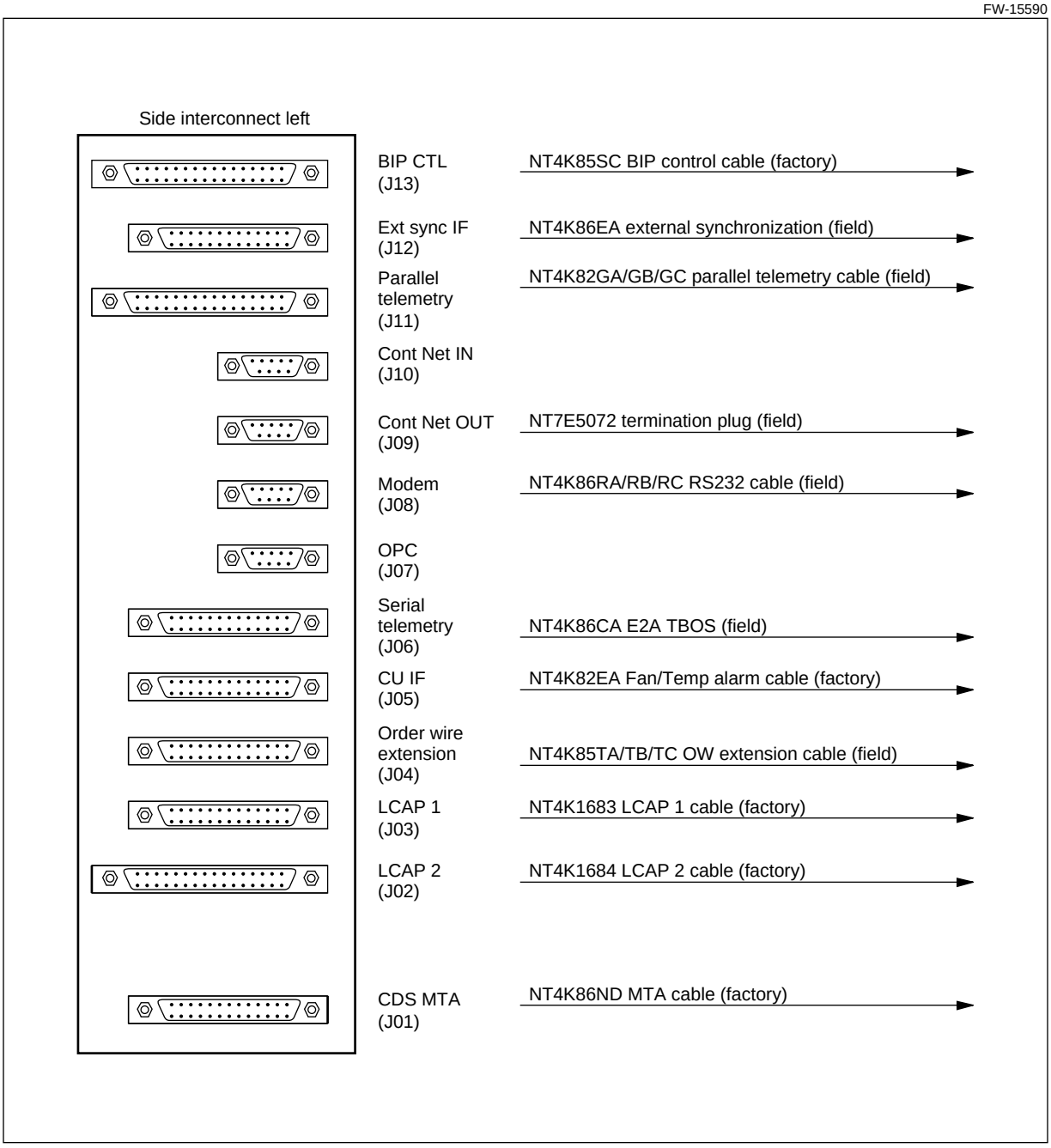
- cable ties
- wire cutters (flush cutting)
- cable cutters
- wire strippers
- wire termination tools (wire-wrap gun or tool)
- flat-bladed screwdriver, 0.32 cm (1/8 in.) wide blade

—continued—

Procedure 7-1 (continued)
Installing miscellaneous external cabling in the master cabinet

Figure 7-5
ABM shelf left-side connector locations and designations

FW-15590



—continued—

Procedure 7-1 (continued)
Installing miscellaneous external cabling in the master cabinet

Action

Step	Action

Modem (NT4K86RA/RB/RC) and Null Modem Adapter (NT7E44MA) cables

If a modem cable is not required as per job specifications, go to step 2.

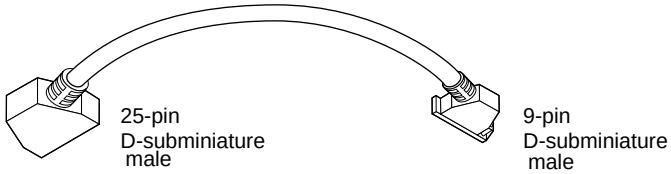
1 If an external modem is used as per job specifications, connect the modem cable NT4K86RA/RB/RC from the ABM shelf Modem (J08) connector to the external modem, CRT, or printer.

Note: If the connection is made to a printer or a VT-100 terminal, insert the Null Modem Adapter cable NT7E44MA between the modem cable and the device.

If no modem cable is required as per job specifications, go to step 3.

FW-15255

NT4K86RA, RB, RC modem cables

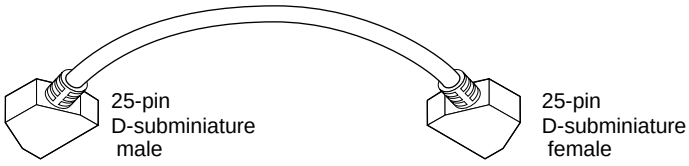


4-pair, twisted, 26 AWG solid wires with shielding, connectorized at both ends. One end connects to the 9-pin connector on the ABM shelf and the other end connects to the 25-pin connector on a remote modem. This cable is available in the following lengths.

1.5 m	(5 ft)	NT4K86RA
4.6 m	(15 ft)	NT4K86RB
15 m	(50 ft)	NT4K86RC

FW-15254

NT7E44MA null modem adaptor for direct connection to a printer or a VT-100-type terminal



4-pair, 26 AWG solid wires 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 printer or terminal.

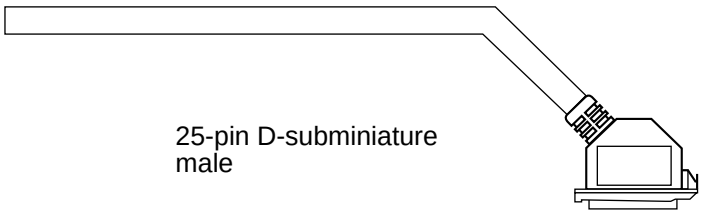
—continued—

Procedure 7-1 (continued)
Installing miscellaneous external cabling in the master cabinet

Step	Action
	Control Network In termination plug (NT7E5072)
2	Connect one CNet termination plug to the ABM shelf ContNet OUT (J09) connector as shown in Figure 7-5 on page 7-16.
	Orderwire extension cable (NT4K85TA/TB/TC)
	If an orderwire extension is not required as per job specifications, skip these steps and go to step 6.
3	Route the orderwire extension cable from the external orderwire equipment into the left side of the master cabinet to the ABM shelf.
4	Connect the orderwire extension cable to the ABM shelf Orderwire Extension (J04) connector.
5	Connect the cable to the external orderwire equipment using the cable pin-outs as shown in Table 7-3.

FW-15627

NT4K85TA/TB/TC order extension cables



26-conductor, twisted, 26 AWG solid wires with shielding, connectorized at one end. The connector connects to the 25-pin Orderwire Extension (J04) connector on the ABM shelf and the other end terminates at the customer-defined orderwire cross-connect facility. This cable is available in the following lengths:

30 m	(100 ft)	NT4K85TA
61 m	(200 ft)	NT4K85TB
91 m	(300 ft)	NT4K85TC

—continued—

Procedure 7-1 (continued)
Installing miscellaneous external cabling in the master cabinet

Step Action

Table 7-3 lists the NT4K85TA/TB/TC cable pin-outs.

Table 7-3
Orderwire extension cables (NT4K85TA/TB/TC)

Pin	Pair	Function	Color	Pin	Pair	Function	Color
1	1	2W OW (jacks) (tip)	W	15	8	Select Exp OW	R
2		2W OW (jacks) (ring)	BL	16		Common Return	GR
3	2	4W OW (handset) (T1)	W	17		Common Return	
4		4W OW (handset) (T2)	O			(jumpered to pin 16)	
5	3	4W OW (handset) (Ring 1)	W	18	9	4W Local OW Tip (Tx)	R
6		4W OW (handset) (Ring 2)	GR	19		4W Local OW Ring (Rx)	BR
7	4	4W OW (handset) (Sleeve 1)	W	20	10	4W Local OW Tip (Tx)	R
8		4W OW (handset) (Sleeve 2)	BR	21		4W Local OW Ring (Rx)	S
9	5	Broadcast call	W	22	11	4W Exp OW Tip (Tx)	BK
10		Bell extension OW	S	23		4W Exp OW Ring (Tx)	BL
11	6	Bell return	R	24	12	4W Exp OW Tip (Rx)	BK
12		LED Local OW	BL	25		4W Exp OW Ring (Rx)	O
13	7	LED Exp OW	R				
14		Select Local OW	O				

—continued—

Procedure 7-1 (continued)
Installing miscellaneous external cabling in the master cabinet

Step	Action

Serial telemetry (E2A TBOS) cabling (NT4K86CA)

If serial telemetry cable is not required as per job specifications, skip these steps and go to step 9.

6 Route the serial telemetry (E2A TBOS) cable (NT4K86CA) from the alarm points of the customer-defined external equipment into the left side of the master cabinet to the ABM shelf.

7 Connect the serial telemetry cable to the ABM shelf Serial Telemetry (J06) connector.

8 Connect the cable to the alarm points of the customer-defined external equipment using the cable pin-outs as shown in Table 7-4.

Table 7-4 lists the pin-outs for the NT4K86CA cable.

Table 7-4
Serial telemetry wiring cable (NT4K86CA)

Pin	Function	Color	Pin	Function	Color
1	not connected		14	Port 2 Tx-	O1R
2	not connected		15	Port 2 Tx +	O2R
3	not connected		16	Port 2 Rx+	BL2W
4	Port 2 Rx-	BL1W	17	Port 1 Rx+	O2W
5	Port 1 Rx-	O1W	18	Port 1 Tx+	G2W
6	Port 1 Tx-	G1W	19	not connected	
7	not connected		20	not connected	
8	not connected		21	future	
9	not connected		22	future	
10	not connected		23	future	
11	future		24	future	
12	future		25	future	
13	future				

—continued—

Procedure 7-1 (continued)
Installing miscellaneous external cabling in the master cabinet

Step	Action
	Parallel telemetry cabling (NT4K85GA/GB/GC)
9	Connect the NT4K85GA/GB/GC parallel telemetry cable from the ABM shelf connector Parallel Telemetry (J11) to the customer-defined normally open alarm points on the external equipment. Table 7-5 lists the pin-outs for the NT4K85GA/GB/GC cables.

Table 7-5
Parallel telemetry wiring table (NT4K85GA/GB/GC cable)

Pin	Function	Color	Pin	Function	Color
1	Output 1	BL1W	23	Input 3	O1BK
2	Output 2	W1BL	24	Input 4	BK1O
3	Output 3	O1W	25	Input 5	G1BK
4	Output 4	W1O	26	Input 6	BK1G
5	Output 5	G1W	27	Input 7	BR1BK
6	Output 6	W1G	28	Input 8	BK1BR
7	Output 7	BR1W	29	Input 9	S1BK
8	Output 8	W1BR	30	Input 10	BK1S
9	Output 9	S1W	31	Input 11	BL1Y
10	Output 10	W1S	32	not connected	Y1BL
11	Output 11	BL1R	33	not connected	O1Y
12	Output 12	R1BL	34	not connected	Y1O
13	Output 13	O1R	35	not connected	G1Y
14	Output 14	R1O	36	not connected	Y1G
15	Output 15	G1R	37	not connected	BR1Y
16	Output 16	R1G	38	not connected	Y1BR
17	Output 17	BR1R	39	not connected	S1Y
18	Output 18	R1BR	40	not connected	Y1S
19	Output RETURN	S1R	41	not connected	BL1V
20	Output RETURN	R1S	42	not connected	V1BL
21	Input 1	BL1BK	43	Input RETURN	O1V
22	Input 2	BK1BL	44	Output RETURN	V1O

—end—

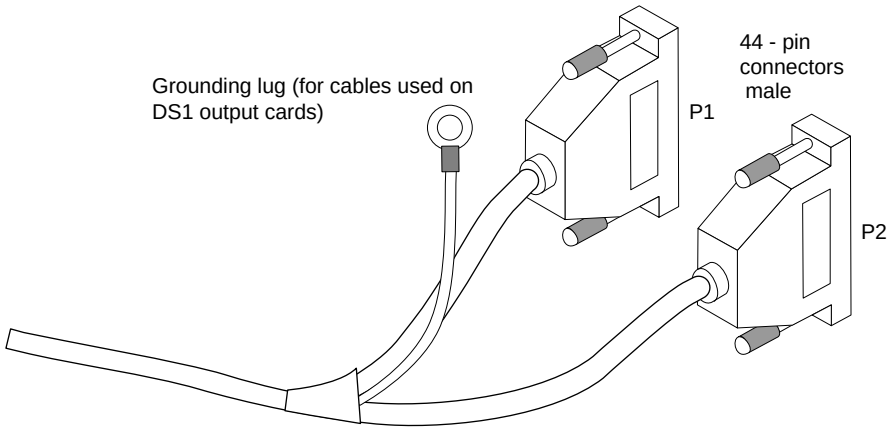
Procedure 7-2
Installing the ABM I/O cards and DS1 cables

Use this procedure to install the DS1 cables (NT4K85HA through HJ) from an external DSX-1 cross-connect facility to the DS1 input and output cards on the access bandwidth manager (ABM) shelf in the modular business package (MBP) master cabinet.

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

FW-15252

NT4K85HA through HJ DS1 cables



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 connects 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 7-2 (continued)
Installing the ABM I/O cards and DS1 cables

Requirements

The following tools and materials are required:

- cable ties
- cable cutters
- wire cutters (flush cutting)
- wire strippers
- wire termination tools (wire-wrap gun or tool)
- flat-bladed screwdriver, 0.32 cm (1/8 in.) wide blade
- screwdriver, Phillips no. 1
- heat shrinkable tubing, black, 0.96 cm (3/8 in.) diameter (Nortel Networks ordering code R0113153) or equivalent

Mapper and I/O slots

DS1 cables connect to DS1 I/O cards mounted in the upper ABM shelf. One DS1 In (Tx) and one DS1 Out (Rx) card is installed for each DS1 signal. The two I/O cards connect to a DS1 mapper card installed in a corresponding lower ABM shelf slot position.

I/O card to mapper card relationships are defined. You must install I/O cards in the proper slots that correspond to the mapper card positions installed as per job specifications.

Table 7-6 and Figure 7-6 show the slots where the DS1 mapper circuit packs can be installed in the ABM shelf at the remote fiber terminal (RFT) and also show the I/O card slots that correspond to each of the mapper card slot positions.

Table 7-6
Relationship between ABM 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)	37 (protection bridge card)
4	35	37

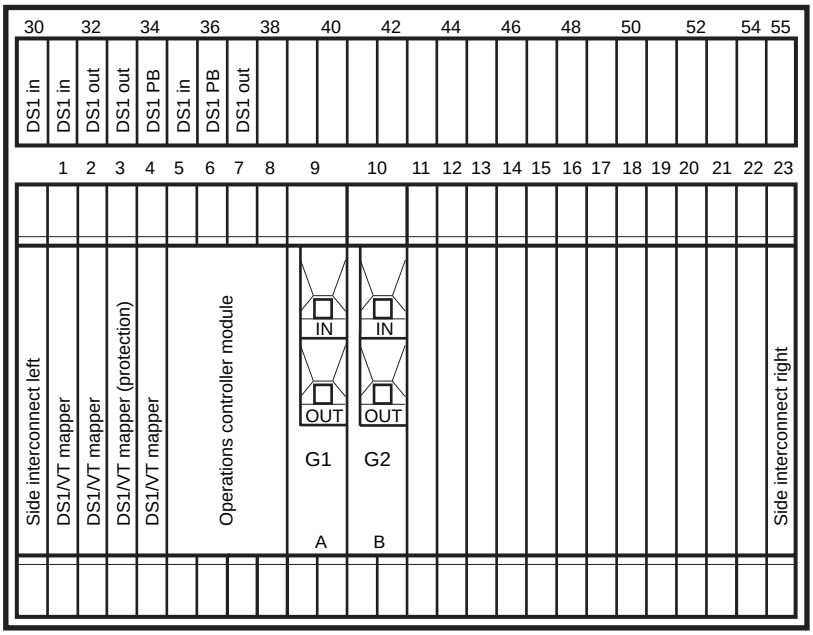
—continued—

Procedure 7-2 (continued)
Installing the ABM I/O cards and DS1 cables

Figure 7-6 shows the locations of the ABM mapper circuit packs and the I/O card circuit packs installed in the ABM shelf at each RFT.

Figure 7-6
Installing ABM I/O cards

FW-16212



Mappers		I/O cards			
DS1	1	DS1 In	30	DS1 Out	32
DS1	2	DS1 In	31	DS1 Out	33
DS1 P	3	DS1 PB	34	DS1 PB	36
DS1	4	DS1 In	35	DS1 In	37

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

—continued—

Procedure 7-2 (continued)
Installing the ABM I/O cards and DS1 cables

Action

Step	Action

Install the I/O cards

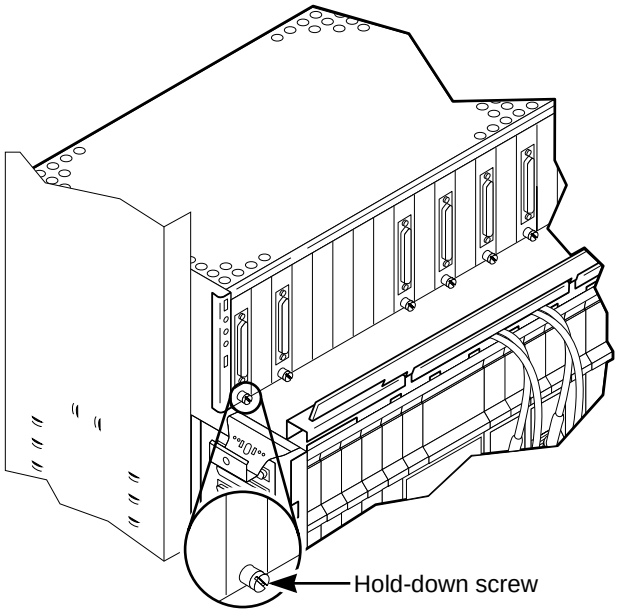
1 Remove the blank I/O faceplate cards (NT4K58ZA) from the ABM shelf (see Figure 7-6).

2 Insert the proper I/O cards into the slots from which you removed the blank faceplates.

3 Tighten the hold-down screw at the bottom of each card faceplate as shown in Figure 7-7.

Figure 7-7
Location of the cable connector hold-down screws on the ABM

FW-10913



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

—continued—

Procedure 7-2 (continued)
Installing the ABM I/O cards and DS1 cables

Step	Action

Route the cables

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

ABM shelf slot containing working mapper	Number of transmit cables	Number of receive cables
ABM		
1-2 (1-28 DS1s)	1	1
3-4 (29-54 DS1s)	1	1

5 Label both ends of each DS1 cable to be routed from the external cross-connect facility 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 cross-connect facility. Transmit cables carry signals away from the cross-connect facility, and receive cables carry signals toward the cross-connect facility.

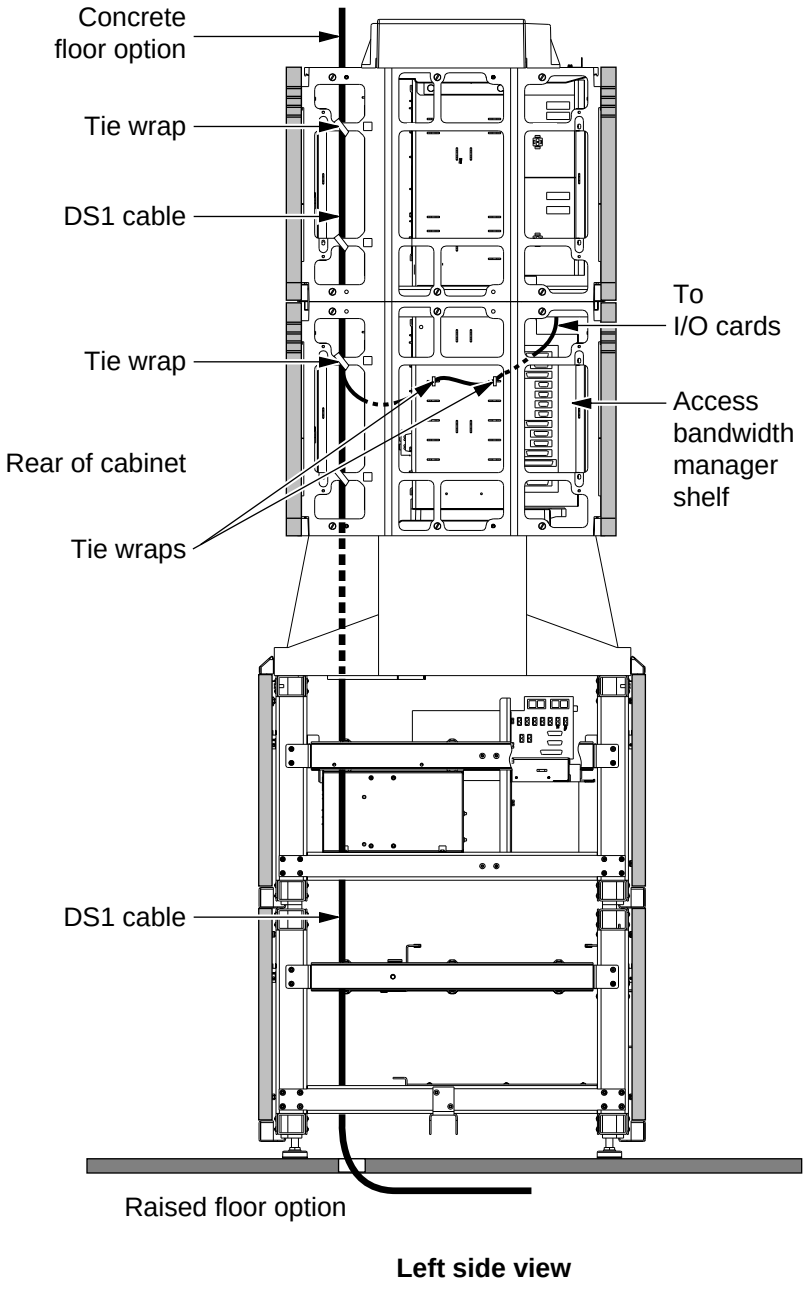
6 Route the ABM transmit and receive DS1 cables that are to be connected from the cross-connect facility to the ABM shelf mapper positions 1-4 (see Table 7-6 on page 7-23 and Figure 7-6 on page 7-24) on the left side of the cabinet as shown in Figure 7-8.

—continued—

Procedure 7-2 (continued)
Installing the ABM I/O cards and DS1 cables

Figure 7-8
Routing DS1 cables into the ABM on the left side of the master cabinet

FW-15621



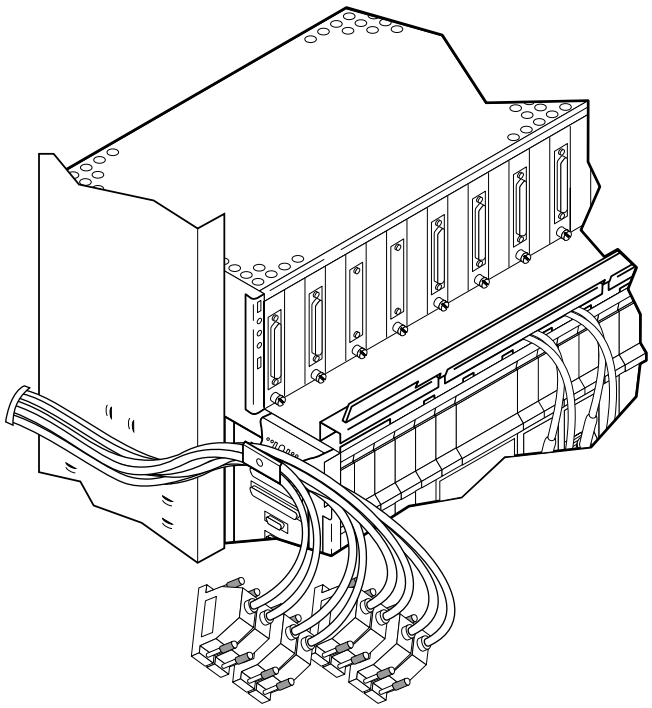
—continued—

Procedure 7-2 (continued)
Installing the ABM I/O cards and DS1 cables

Step	Action
7	Hang the cable connectors temporarily in the cable tray as shown in Figure 7-9.

Figure 7-9
Hanging the ABM left-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 7-2 (continued)
Installing the ABM I/O cards and DS1 cables

Step	Action

Connect the cables to the I/O cards

8 Connect the ABM DS1 cable connectors P1 and P2 to the ABM shelf I/O cards as shown in Figure 7-10.

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

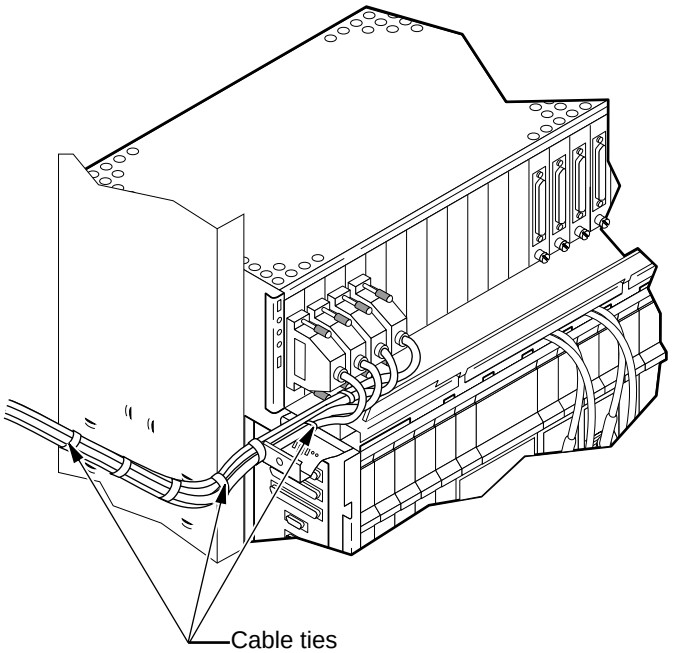
Note 1: Reference Table 7-6 on page 7-23 and Figure 7-6 on page 7-24 for mapper slot and I/O card associations.

Note 2: ABM shelf mapper position 3 is used for the protection switch. The protection switch DS1B I/O cards mount in I/O slots 34 and 36. They are not cabled and have no external cable connection points on the faceplates.

9 Tighten the connector hold-down screws on the I/O cards just enough to draw the connectors into position (2 inch-pounds maximum).

Figure 7-10
Connecting the left-side ABM DS1 cable connectors and dressing the cables

FW-15536



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 7-2 (continued)
Installing the ABM I/O cards and DS1 cables

Step	Action

Connecting the ground straps

10 Attach the ground lugs on each DS1 cable to the ABM shelf frame with hex screws as shown in Figure 7-11.

Dress and secure the cables

11 Label each DS1 cable for future reference. Indicate the DS1 input of DS1 output slot numbers and the direction of signal (transmit or receive).

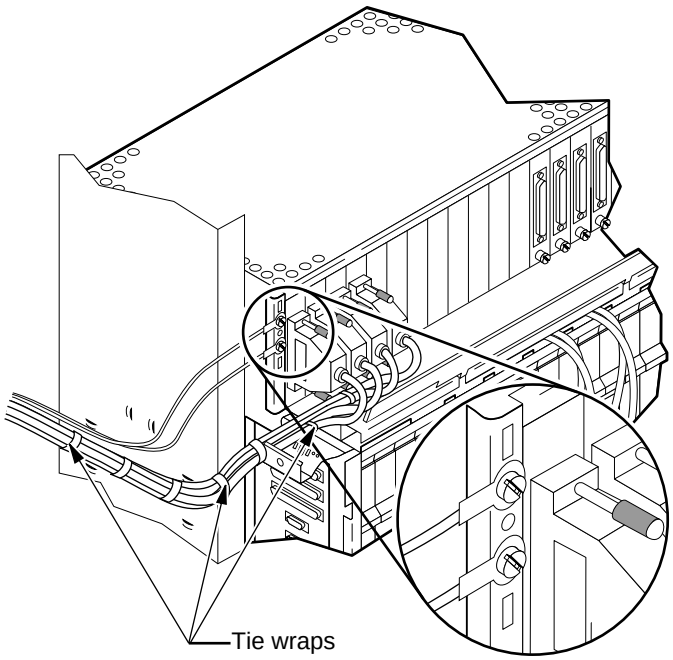
12 Dress and secure the DS1 cables into the cable trough and use cable ties to fasten them to the lances provided in the trough as shown in Figure 7-11.

13 Connect the DS1 leads to the cross-connect facility (refer to Table 7-7).

14 Continue the cabling procedures for the MBP using Procedure 7-3.

Figure 7-11
Attaching the ABM left-side ground lugs

FW-15535



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 7-2 (continued)
Installing the ABM I/O cards and DS1 cables

Step	Action

Table 7-7 lists the pin-outs for the DS1 cable connectors P1 and P2 at the ABM shelf. Use the table to terminate the DS1 cables to the external DSX-1 cross-connect facility.

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

Table 7-7
ABM 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

—continued—

—continued—

Procedure 7-2 (continued)
Installing the ABM I/O cards and DS1 cables

Step Action

Table 7-7 (continued)
ABM 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**	
10	Tip	25	R	1S
	Ring	40	S	1R
11	Tip	26	BK	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	1BL
	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

—continued—

—continued—

Procedure 7-2 (continued)
Installing the ABM I/O cards and DS1 cables

Step Action

Table 7-7 (continued)
ABM 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**	
20	Tip	21	Y	1S
	Ring	36	S	1Y
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 7-3
Installing customer-reserved optional alarms cabling

Use this procedure to install and connect the modular business package (MBP) master cabinet customer-reserved optional alarms cable for external equipment alarm reporting.

Requirements

You will need the following tools and materials to route and terminate the external cabling:

- cable ties
- wire cutters (flush cutting)
- cable cutters
- wire strippers
- wire termination tools (wire-wrap gun or tool)

Action

Step	Action
1	Route the customer-supplied reserved optional alarm cable from the customer-defined alarm monitoring points for the external equipment into the left side of the master cabinet to the BIP shelf.
2	Connect the cable to the BIP wire-wrap block (see Figure 7-12 on page 7-36) and to the customer-defined alarm monitoring points for the external equipment (see job specifications). ***Note 1:*** Relays or switches for alarm reporting must have normally open (NO) contacts. ***Note 2:*** Standard alarm configurations may be changed (by reconnecting the jumpers) based on local requirements. ***Note 3:*** Wire wrap all optional jumpers between the terminations pins of the BIP wire-wrap block on the top of the wire-wrapped terminations of the factory installed alarm cable. Alarm definitions are described in Table 7-8 and Figure 7-12 on page 7-36 shows the BIP alarms block pin field layout.
3	Continue the cabling procedures for the MBP using Procedure 7-4.

—continued—

Procedure 7-3 (continued)
Installing customer-reserved optional alarms cabling

Step	Action

Table 7-8 lists the provisionable CRO alarm definitions and connection points on the BIP wire-wrap block.

Table 7-8
Provisionable CRO alarm definitions

Provisionable CRO alarms	Definition	Wire-wrap block pin
CRAUD	Critical Audible	31
CRAUD1	Critical Audible Return	34
CRVIS	Critical Visual	32
CRVIS1	Critical Visual Return	35
MJAUD	Major Audible	33
MJAUD1	Major Audible Return	36
MNAUD	Minor Audible	37
MNAUD1	Minor Audible Return	40
MJVIS	Major Visual	38
MJVIS1	Major Visual Return	41
MNVIS	Minor Visual	39
MNVIS1	Minor Visual Return	42
LGND	Logic Ground	5, 8, 11, 18

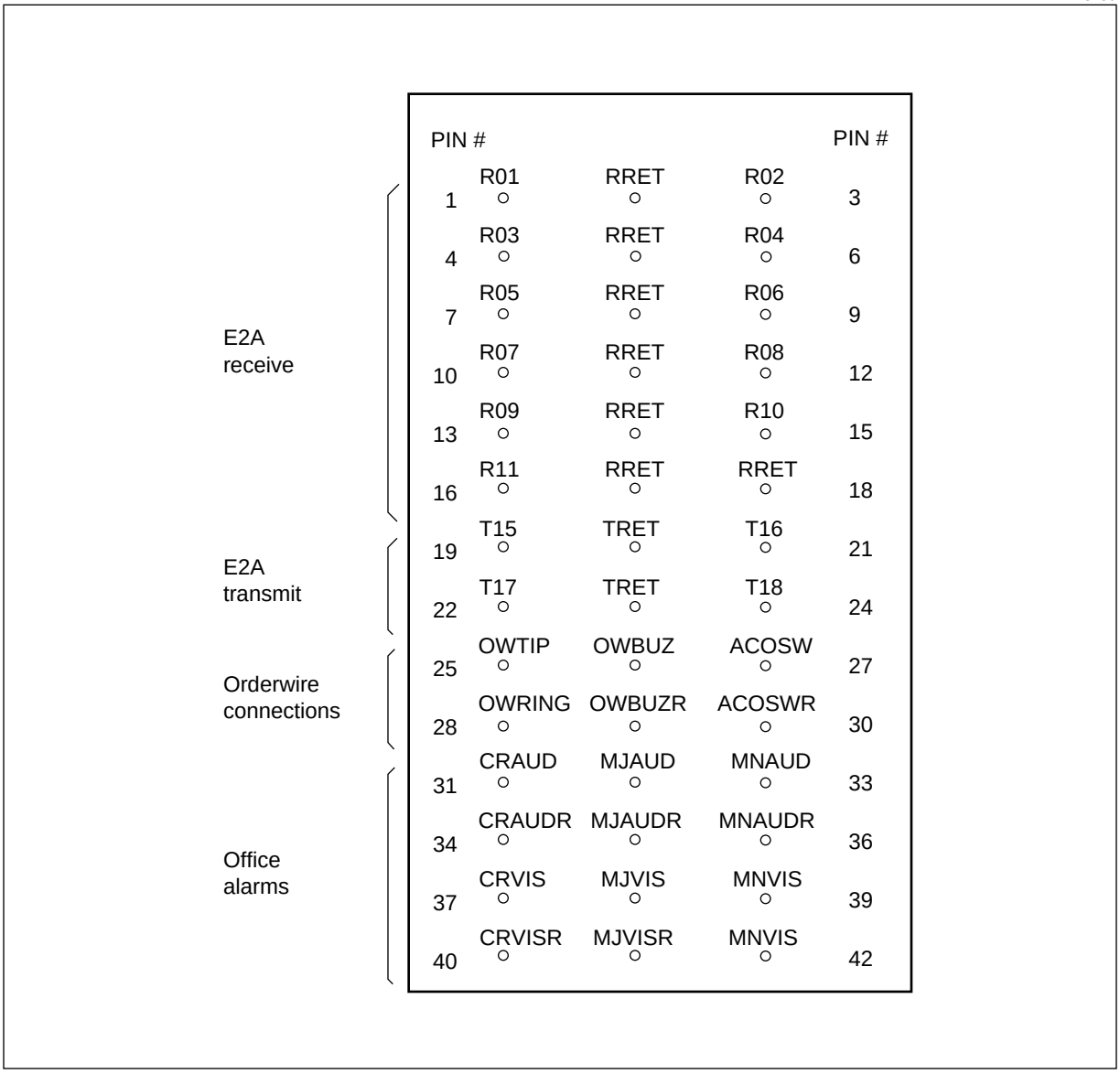
—continued—

Procedure 7-3 (continued)
Installing customer-reserved optional alarms cabling

Step	Action

Figure 7-12
BIP wire-wrap block pin field layout and connections

FW-15150



Note: On the NT4K14BA BIP the wire-wrap pin field is rotated 90˚ clockwise from the position shown in Figure 7-12.

—end—

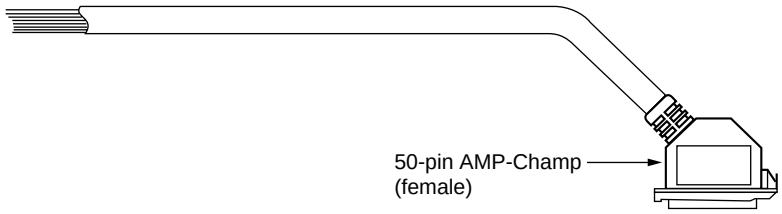
Procedure 7-4
Installing VF cabling to the CDS

Use this procedure to install the NT4K85-- VF cabling to the modular business package (MBP) master and expansion cabinet copper-distribution shelves to an external cross-connect facility. If the installation is for a master cabinet only, disregard the procedure steps for routing VF cabling to the expansion cabinet.

Copper-distribution shelves (CDSs) are mounted in both the master and the expansion cabinets (up to a maximum of 7 CDS shelves for 672 lines). CDS 1 and CDS 2 are in the master cabinet and CDSs 3-7 are mounted in the expansion cabinet.

FW-16211

NT4K85FH, FJ, FK, FL, FM or FN VF cables



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

—continued—

Procedure 7-4 (continued)
Installing VF cabling to the CDS

Requirements

The following tools and materials are required:

- labeling materials
- cable ties
- cable cutters
- wire cutters (flush cutting)
- wire strippers
- wire termination tools (wire-wrap gun or tool)

Action

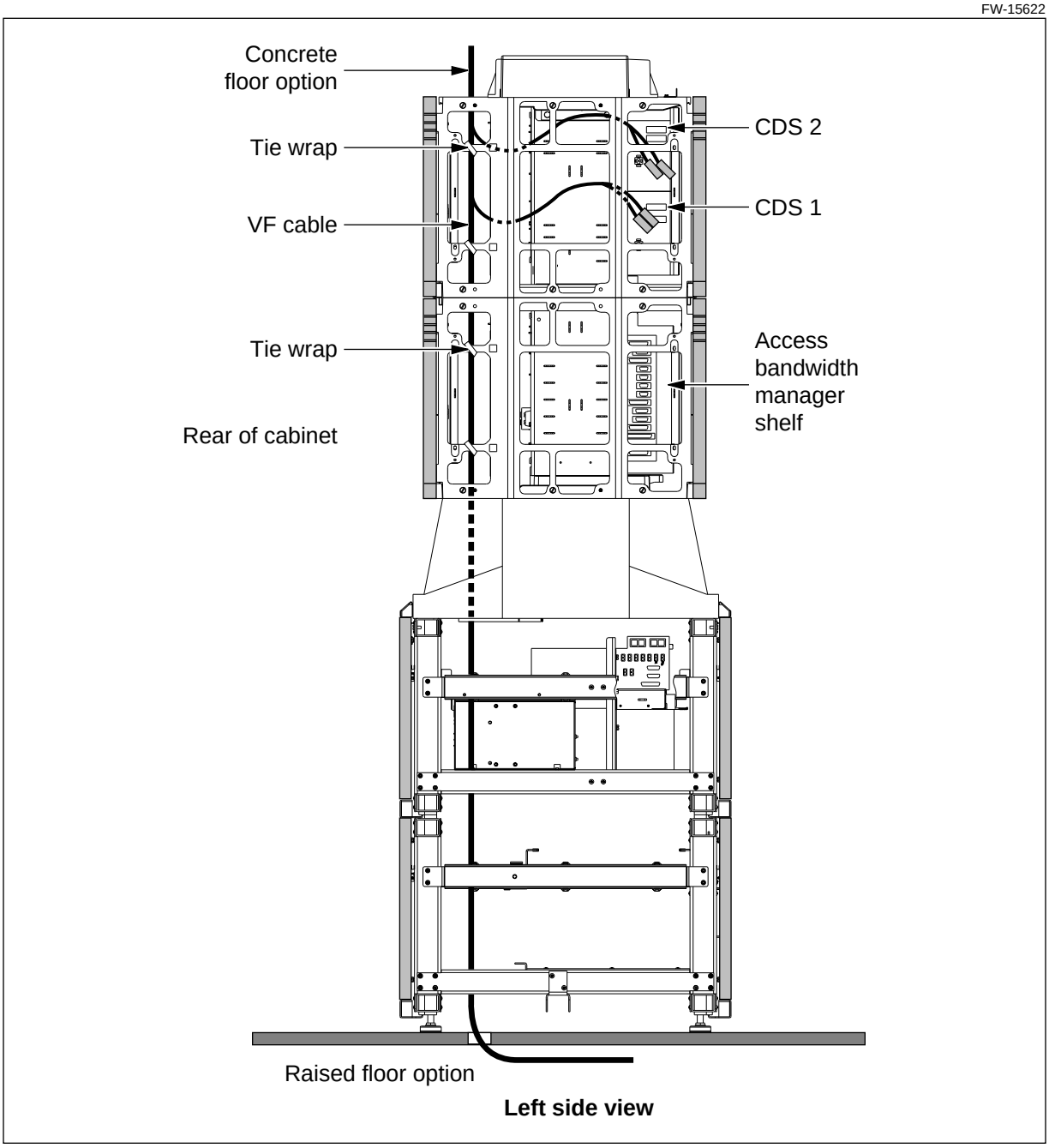
Step	Action
1	Label the ends of the VF cables according to the VF pair number, the CDS shelf number and the CDS connectors (see Table 7-9 on page 7-41).
2	Route the two VF cables for VF pairs 1-25 and pairs 26-50 into the left side of the master cabinet to CDS 1 (see Figure 7-13).
3	Connect the VF cables to the CDS shelf according to Table 7-9 on page 7-41 and Figure 7-15 on page 7-42.
4	Secure the cables to the master cabinet frame using cable ties.
5	Route the two VF cables for VF pairs 51-75 and pairs 76-96 into the right side of the master cabinet to CDS 1 (see Figure 7-14 on page 7-40).
6	Connect the VF cables to the CDS shelf according to Table 7-9 on page 7-41 and Figure 7-15 on page 7-42.
7	Secure the cables to the master cabinet frame using cable ties.
8	Dress and secure the cables all the way back to the cross-connect facility.
9	Repeat steps 2-8 for CDS 2-7 VF cabling. ***Note:*** CDSs 1-2 are mounted in the master cabinet and CDSs 3-7 are mounted in the expansion cabinet.
10	Connect the VF leads to the cross-connect facility using Table 7-10 on page 7-43.
11	Continue the cabling procedures for the MBP using Procedure 7-5.

—continued—

Procedure 7-4 (continued)
Installing VF cabling to the CDS

Figure 7-13
Routing VF cables into the left side of the master cabinet

FW-15622

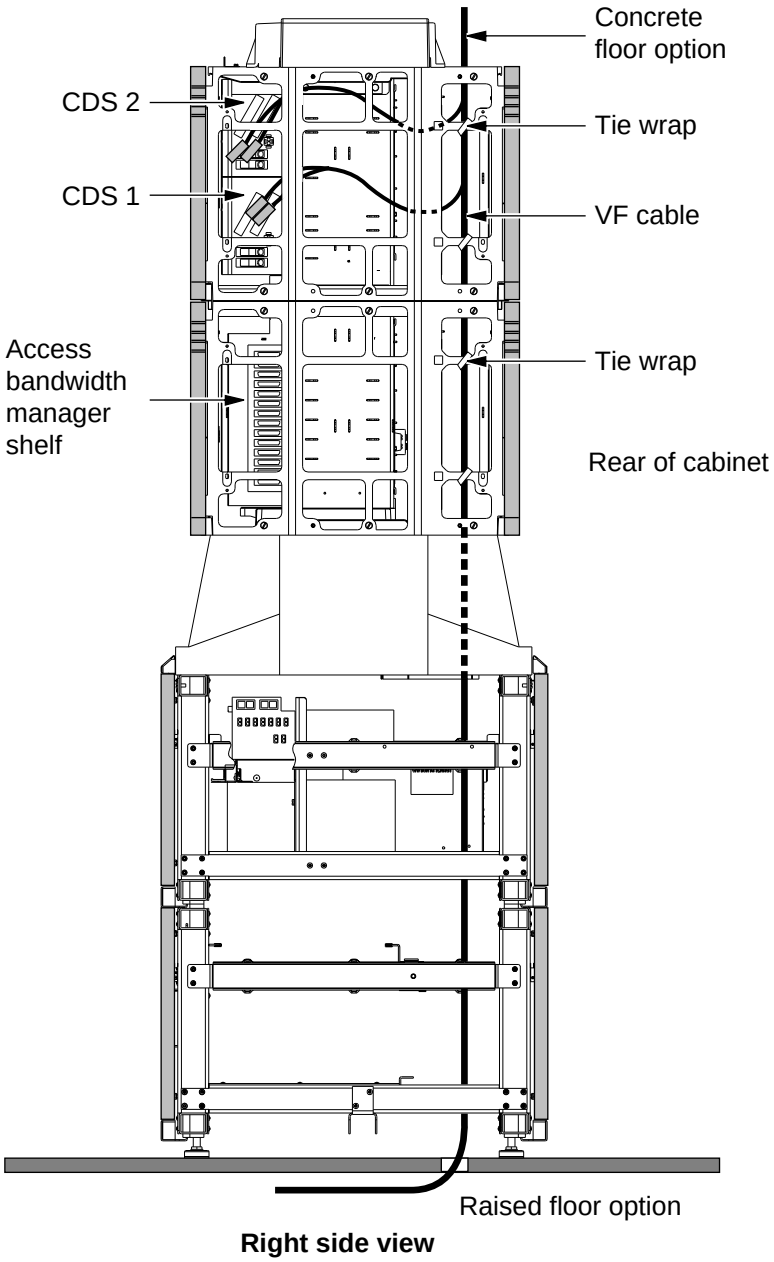


—continued—

Procedure 7-4 (continued)
Installing VF cabling to the CDS

Figure 7-14
Routing VF cables into the right side of the master cabinet

FW-15623



Right side view

—continued—

Procedure 7-4 (continued)
Installing VF cabling to the CDS

Step Action

Table 7-9 shows the VF cable connection points for a 672-line system. If the installation is for a master cabinet only, disregard information for CDSs 3-7.

Table 7-9
VF cable pairs and connection points

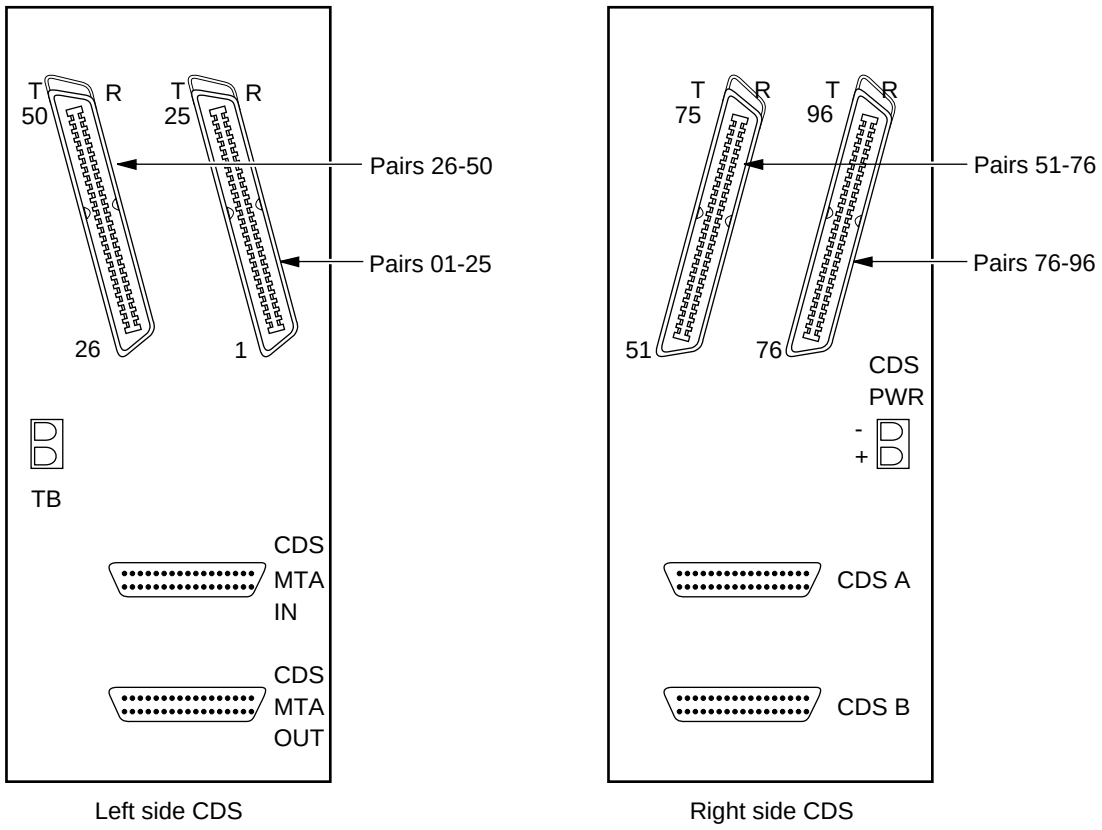
VF pair number	CDS number	Connector designation	Cable pair number
1-25 26-50 51-75 76-96	CDS 1	1-25 26-50 51-75 76-96	1-25 1-25 1-25 1-25 (Note)
97-121 122-146 147-171 172-192	CDS 2	1-25 26-50 51-75 76-96	1-25 1-25 1-25 1-25 (Note)
193-217 218-242 243-267 268-288	CDS 3	1-25 26-50 51-75 76-96	1-25 1-25 1-25 1-25 (Note)
289-313 314-338 339-363 364-384	CDS 4	1-25 26-50 51-75 76-96	1-25 1-25 1-25 1-25 (Note)
385-409 410-434 435-459 460-480	CDS 5	1-25 26-50 51-75 76-96	1-25 1-25 1-25 1-25 (Note)
481-505 506-530 531-555 556-576	CDS 6	1-25 26-50 51-75 76-96	1-25 1-25 1-25 1-25 (Note)
577-601 602-626 627-651 652-672	CDS 7	1-25 26-50 51-75 76-96	1-25 1-25 1-25 1-25 (Note)
Note: Connector pins 22-25 are not used in the CDS connector designated “76-96” on the right side of each CDS. The cable pairs (pairs 22-25) in this cable should not be used and should be spared-out at the VF cross-connect facility. There are 96 lines available from each CDS shelf.			

Procedure 7-4 (continued)
Installing VF cabling to the CDS

Step	Action

Figure 7-15
VF cable connection points on the CDS

FW-15173



Note: VF pairs 97-192 originate in CDS 2. The last four pairs (pairs 22-25) in the VF cable that connects to the right-side CDS connector labeled “Pairs 76-97” are not used. Spare these pairs out at the cross-connect facility.

—continued—

Procedure 7-4 (continued)
Installing VF cabling to the CDS

The following table contains the pin-outs for the VF cable connectors at the CDS shelf. Use Table 7-10 to terminate the VF cable to the cross-connect facility.

Note: Cable pairs 22-25 are not used in the VF cable that connects to the CDS shelf connector labeled Pairs 76-96 located on the right side of the CDS. Spare these pairs out at the cross-connect facility. The CDS shelf outputs 96 VF lines only.

Table 7-10
VF cable connector pin-outs

Pair number	Tip or Ring	Pin number	Color Code	
1	Tip Ring	1 26	W BL	1BL 1W
2	Tip Ring	2 27	W O	1O 1W
3	Tip Ring	3 28	W GR	1G 1W
4	Tip Ring	4 29	W BR	1BR 1W
5	Tip Ring	5 30	W S	1S 1W
6	Tip Ring	6 31	R BL	1BL 1R
7	Tip Ring	7 32	R O	1O 1R
8	Tip Ring	8 33	R GR	1G 1R
9	Tip Ring	9 34	R BR	1BR 1R
10	Tip Ring	10 35	R S	1S 1R
11	Tip Ring	11 36	BK BL	1BL 1BK
12	Tip Ring	12 37	BK O	1O 1BK
—continued—				

—continued—

Procedure 7-4 (continued)
Installing VF cabling to the CDS

Table 7-10 (continued)
VF cable connector pin-outs

Pair number	Tip or Ring	Pin number	Color Code	
13	Tip Ring	13 38	BK G	1G 1BK
14	Tip Ring	14 39	BK BR	1BR 1BK
15	Tip Ring	15 40	BK S	1S 1BK
16	Tip Ring	16 41	Y BL	1BL 1Y
17	Tip Ring	17 42	Y O	1O 1Y
18	Tip Ring	18 43	Y G	1G 1Y
19	Tip Ring	19 44	Y BR	1BR 1Y
20	Tip Ring	20 45	Y S	1S 1Y
21	Tip Ring	21 46	V BL	1BL 1V
Note: Pairs 22-25 are not used in the VF cable connected to the CDS connector labeled 76-96 located on the right side of the CDS. Spare these pairs out at the cross-connect facility.				
22	Tip Ring	22 47	V O	1O 1V
23	Tip Ring	23 48	V G	1G 1V
24	Tip Ring	24 49	V BR	1BR 1V
25	Tip Ring	25 50	V S	1S 1V
—end—				

—end—

Procedure 7-5
Installing D-link cables

Use this procedure to install the drawer link (D-link) cables in the modular business package (MBP) master and expansion cabinets. If the installation is for a master cabinet only, skip this procedure and go to the next procedure.

D-link cables connect the access bandwidth manager (ABM) shelf to the copper-distribution shelves (CDSs) in the master and expansion cabinets. In the master cabinet, the D-link cables are factory-installed from the ABM to CDS 1 and CDS 2. D-link cables for CDS 3 through CDS 7 are factory-connected to the CDSs in the expansion cabinet and field installed from the expansion to the master cabinet.

Figure 7-16 on page 7-46 shows the ABM shelf right-side connectors.

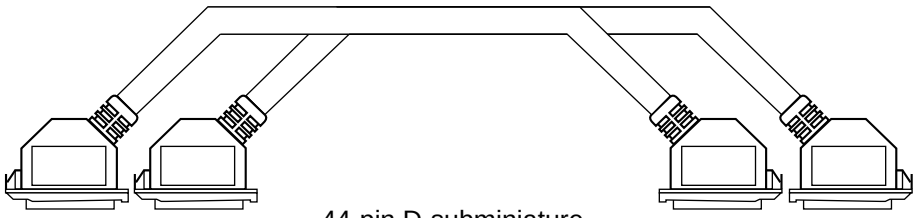
Requirements

You will need the following tools and materials to route and terminate the D-link cabling:

- cable ties
- cable tie cutters

FW-15628

NT4K83DA/DB/DC/DD/DE/DF/DG D-link cables



44-pin D-subminiature
male (4 places)

4-pair, twisted, 26 AWG stranded wires with shielding, connectorized at both ends. One end connects to the 44-pin connector on the ABM shelf (right side) and the other end connects to the 44-pin connector on the CDS. This cable is available in the following lengths:

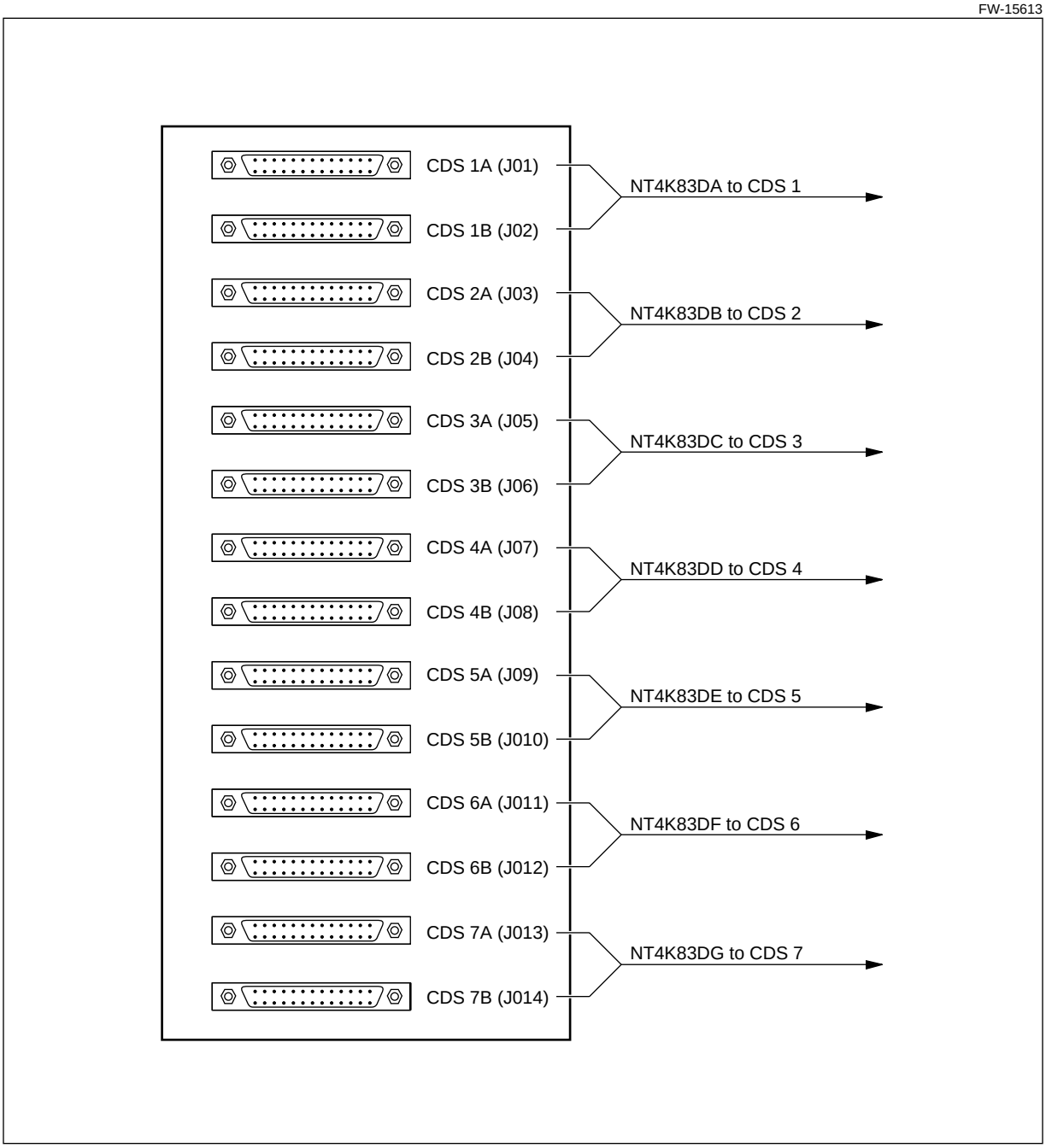
66 cm	(26 in.)	NT4K83DA	200 cm	(79 in.)	NT4K83DE
71 cm	(28 in.)	NT4K83DB	206 cm	(81 in.)	NT4K83DF
246 cm	(97 in.)	NT4K83DC	228 cm	(90 in.)	NT4K83DG
228 cm	(90 in.)	NT4K83DD			

—continued—

Procedure 7-5 (continued)
Installing D-link cables

Figure 7-16
ABM shelf right side connection points

FW-15613

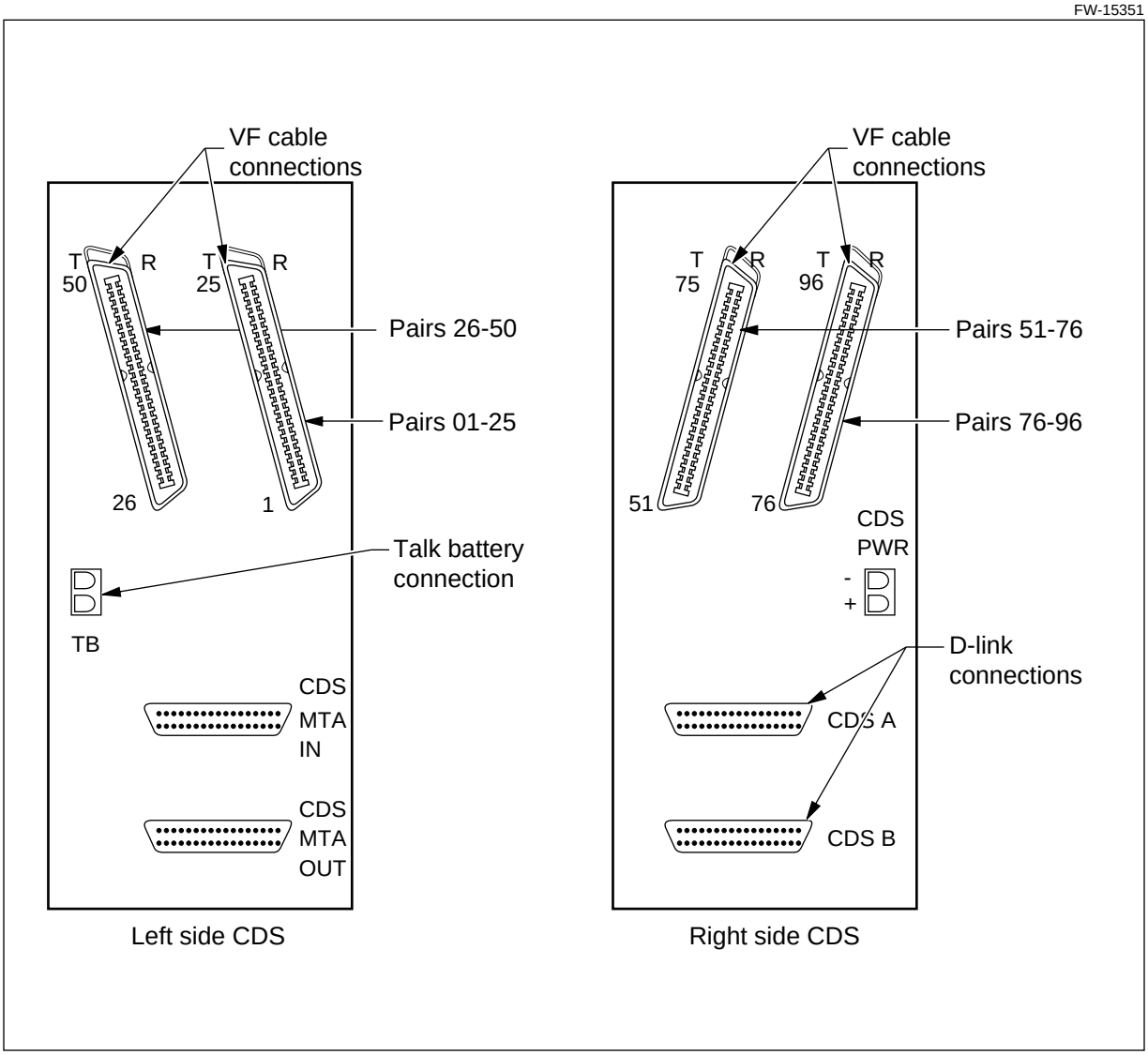


—continued—

Procedure 7-5 (continued)
Installing D-link cables

Figure 7-17
Right side CDS connection points for D-link cables

FW-15351



—continued—

Procedure 7-5 (continued)
Installing D-link cables

Action

Step	Action
1	Uncoil the D-link cables that are bundled and secured in the rear of the expansion cabinet. ***Note:*** The D-link cable connectors are labeled according to the CDS shelf destination.
2	Dress and secure the cables to the right side of the master cabinet framework with cable ties to prevent damage to the ABM-end connectors. ***Note:*** Use fiberboard on all edges of the framework that the cables touch to prevent damage to the cables.
3	Route the cables through the 8X8 holes in the master cabinet framework, through the expansion kit and into the expansion cabinet.
4	Route the cables to the right side of the expansion cabinet to the copper-distribution shelves according to the label on the D-link cable (two cables per CDS). ***Note:*** The D-link cable connectors are labeled according to the CDS shelf destination. CDS numbering is from bottom to top so the CDS 3 is the bottom-most CDS shelf).
5	Connect two D-link cable connectors to the CDS shelves on the right side of each CDS shelf.
6	Dress and secure the cables in the expansion cabinet to the cabinet framework. ***Note:*** Use fiberboard on all edges of the framework that the cables touch to prevent damage to the cables.
7	Dress and secure the D-link cables over the entire cable route.
8	Continue the cabling procedures for the MBP using Procedure 7-6.

—continued—

Procedure 7-5 (continued)
Installing D-link cables

Step Action

Table 7-11 shows the pin-outs for the NT4K83 D-link cables.

Table 7-11
NT4K83 D-link cable pin-outs

From connector P1			To connector P2		
Pin number	**Pair number**	**Color**	**Pin number**	**Pair number**	**Color**
9	1 (Ring)	WBL	9	1 (Ring)	WBL
10	1 (Tip)	BLW	10	1 (Tip)	BLW
11	1 (Gnd)		11	1 (Gnd)	
12	2 (Ring)	WO	12	2 (Ring)	WO
13	2 (Tip)	OW	13	2 (Tip)	OW
14	2 (Gnd)		14	2 (Gnd)	
39	3 (Ring)	WG	39	3 (Ring)	WG
40	3 (Tip)	GW	40	3 (Tip)	GW
41	3 (Gnd)		41	3 (Gnd)	
42	4 (Ring)	WBR	42	4 (Ring)	WBR
43	4 (Tip)	BRW	43	4 (Tip)	BRW
44	4 (Gnd)		44	4 (Gnd)	
Note: There are no connections (N/C) to any other pins in these cables.					

—end—

Procedure 7-6
Installing CDS power and talk battery harnesses

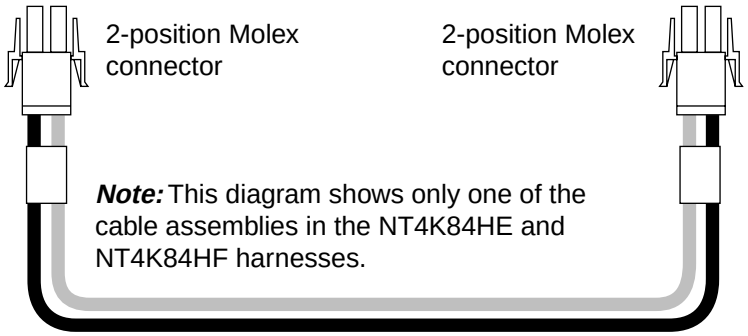
Use this procedure to install modular business package (MBP) master and expansion cabinet power and talk battery harnesses to the copper-distribution (CDS) shelves. If the installation is for a master cabinet only, skip this procedure and go to the next procedure.

Copper-distribution shelves 1 and 2 (CDS 1 and CDS 2) are mounted in the master cabinet. CDSs 3-7 are mounted in the expansion cabinet. In the master cabinet, the CDS power and CDS talk battery harnesses are factory-installed for the BIP to CDS 1 and CDS 2. CDS power and CDS talk battery harnesses for CDS 3 through CDS 7 are factory-connected to the CDSs in the expansion cabinet and field installed from the expansion to the master cabinet.

If only a master cabinet is installed, you only have to verify the harness connections in the master cabinet. If an expansion cabinet is installed, verify the harness connections in the expansion cabinet and then route the inter-cabinet harnesses from the expansion to the master cabinet as shown in Table 7-12.

FW-15630

NT4K84HE/HF CDS power and talk battery harness



Each cable assembly in the harness consists of 2-conductors (Red and Black), 10 AWG stranded wire harness, connectorized at both ends. One end connects to a 2-pin connector on the BIP shelf and the other end connects to a 2-pin connector on a CDS. This wire harness is available in the following lengths:

1.4 m	(4.7 ft)	NT4K84HE
3.6 m	(11.6 ft)	NT4K84HF

—continued—

Procedure 7-6 (continued)
Installing CDS power and talk battery harnesses

Requirements

You will need the following material for this procedure:

- cable ties and cutters

Cable connection points

Table 7-12 shows the CDS power and talk battery harnesses connection points. Figure 7-18 on page 7-52 and Figure 7-19 on page 7-53 show views of the BIP and the CDS side panels where the connection points are located.

Table 7-12
CDS talk battery and CDS power cabling connection points

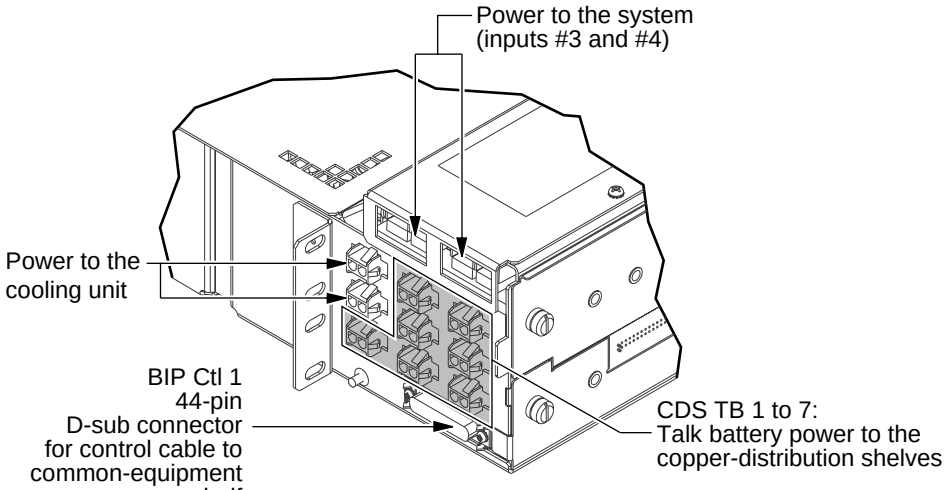
Cable	PEC	From	Terminal	To	Terminal
CDS power harness (routing on the right side of the cabinets and shelves)					
CDS 1	NT4K84HE	BIP	CDS Pwr-1	CDS 1	CDS PWR
CDS 2	NT4K84HE	BIP	CDS Pwr-2	CDS 2	CDS PWR
CDS 3	NT4K84HF	BIP	CDS Pwr-3	CDS 3	CDS PWR
CDS 4	NT4K84HF	BIP	CDS Pwr-4	CDS 4	CDS PWR
CDS 5	NT4K84HF	BIP	CDS Pwr-5	CDS 5	CDS PWR
CDS 6	NT4K84HF	BIP	CDS Pwr-6	CDS 6	CDS PWR
CDS 7	NT4K84HF	BIP	CDS Pwr-7	CDS 7	CDS PWR
CDS talk battery harness (routing on the left side of the cabinets and shelves)					
CDS 1	NT4K84HE	BIP	CDS TB-1	CDS 1	TB
CDS 2	NT4K84HE	BIP	CDS TB-2	CDS 2	TB
CDS 3	NT4K84HF	BIP	CDS TB-3	CDS 3	TB
CDS 4	NT4K84HF	BIP	CDS TB-4	CDS 4	TB
CDS 5	NT4K84HF	BIP	CDS TB-5	CDS 5	TB
CDS 6	NT4K84HF	BIP	CDS TB-6	CDS 6	TB
CDS 7	NT4K84HF	BIP	CDS TB-7	CDS 7	TB
Note: NT4K84HE CDS power and talk battery cabling is factory-installed and connected for CDS 1 and CDS 2 in the master cabinet. For the expansion cabinet, the NT4K84HF CDS 3-7 cabling is factory-installed and connected in the expansion cabinet, coiled up and secured in the rear of the expansion cabinet for field-routing from the expansion cabinet to the master cabinet.					

—continued—

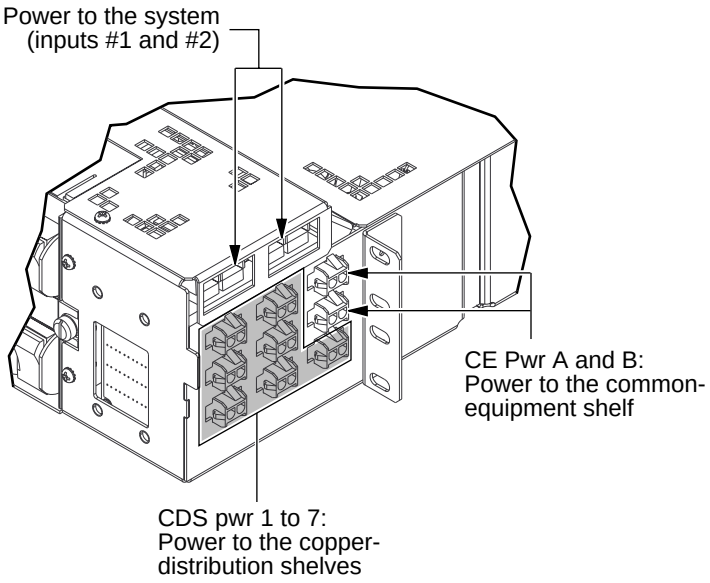
Procedure 7-6 (continued)
Installing CDS power and talk battery harnesses

Figure 7-18
CDS talk battery and CDS power harness connection points on the BIP

FW-16510



Left side of BIP



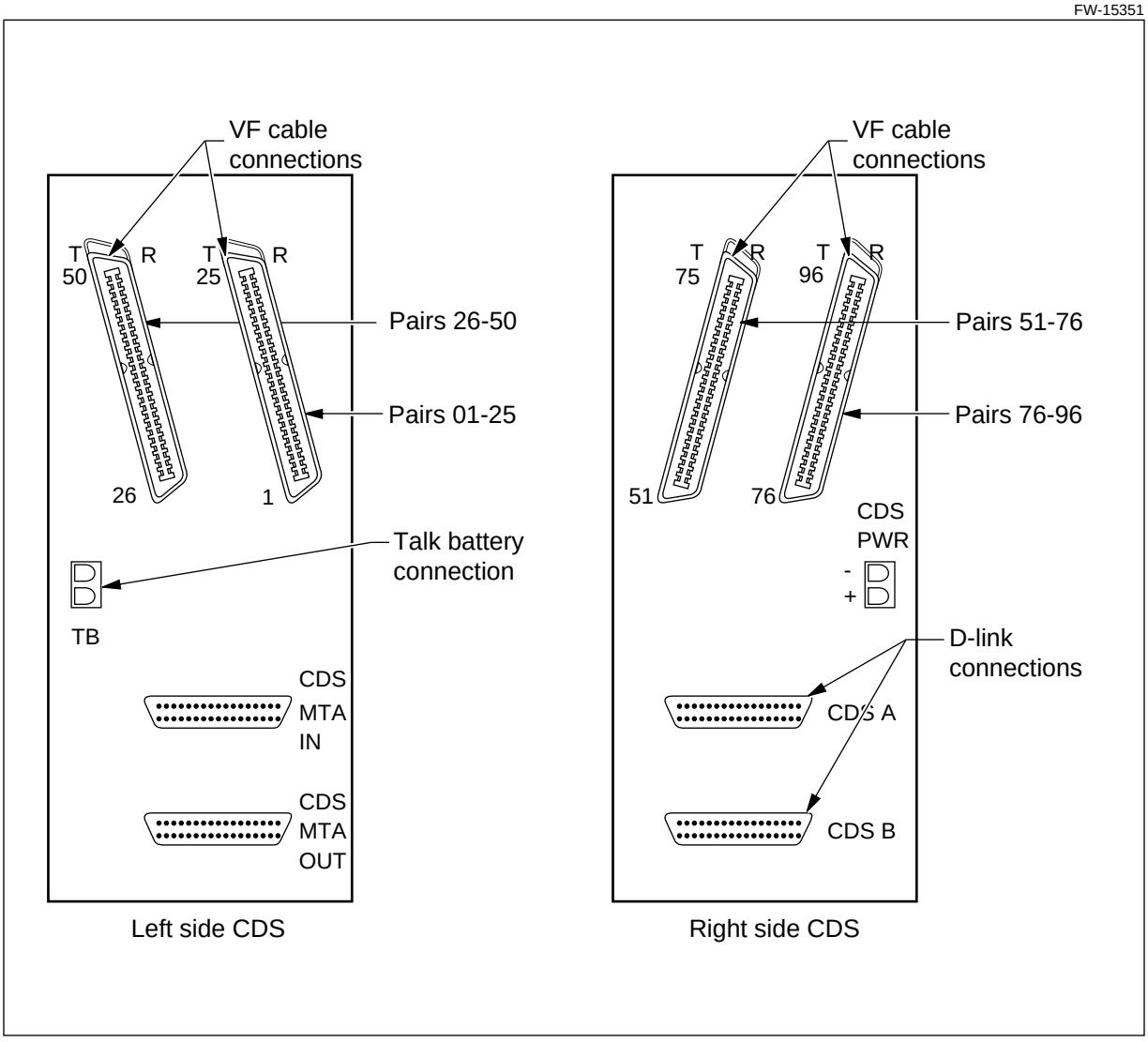
Right side of BIP

—continued—

Procedure 7-6 (continued)
Installing CDS power and talk battery harnesses

Figure 7-19
CDS talk battery and CDS power harness connection points on the CDS

FW-15351



—continued—

Procedure 7-6 (continued)
Installing CDS power and talk battery harnesses

Action

Step	Action
	Verify the factory-installed harnesses
1	Verify that the CDS power and talk battery cable connection for CDS 1 and CDS 2 in the master cabinet are correct as shown in Table 7-12, Figure 7-18 and Figure 7-19.
2	If the expansion cabinet is installed, go to step 3. If not, go to step12.
3	Verify that the CDS power and CDS talk battery harness connections for CDSs 3-7 in the expansion cabinet are correct as shown in Table 7-12, Figure 7-18 and Figure 7-19.
	Routing and connecting the inter-cabinet harnesses
4	Uncoil the CDS power and talk battery wire harnesses at the rear of the expansion cabinet.
5	Route the CDS talk battery harnesses for CDSs 3-7 through the 8X8 opening in the expansion cabinet right-side framework, through the expansion kit, and into the master cabinet.
6	Route the CDS power harnesses to the master cabinet using the same route.
7	Dress and secure all harnesses in the expansion cabinet. Use cable ties to secure the harnesses to the expansion cabinet framework.
8	In the master cabinet, route the CDS talk battery harnesses on the left side of the cabinet to the BIP and route the CDS power harnesses on the right side of the cabinet to the BIP.
9	Dress and secure all harnesses in the master cabinet. Use cable ties to secure them to the expansion cabinet framework.
10	Connect the CDS power and talk battery harnesses to the BIP as shown in Figure 7-18 on page 7-52. ***Note:*** The connectors on the harnesses are labelled according to its BIP destination.
11	Dress and secure all harnesses with cable ties.
12	Continue the cabling procedures for the MBP using Procedure 7-7.

—end—

Procedure 7-7
Installing metallic test access cables

Use this procedure to install the modular business package (MBP) master and expansion cabinets metallic access (MTA) cabling. If the installation is for a master cabinet only, skip this procedure and go to the next procedure.

The MBP cabinet MTA cabling consists of the following:

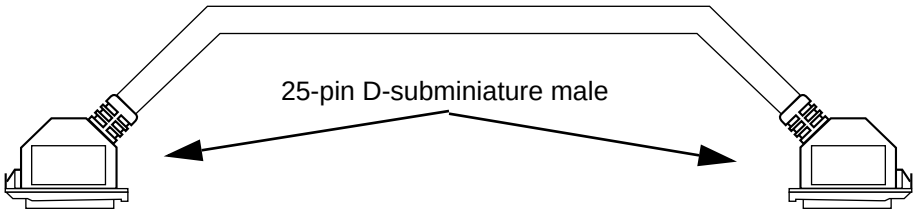
- ABM shelf to CDS 1 cabling
- CDSs 1-2 daisy chain cabling
- CDSs 2-3 inter-cabinet cabling
- CDSs 3-7 daisy chain cabling

Metallic test access cables from the ABM shelf to CDS 1 to CDS 2 are factory-installed and connected in the master cabinet. The cable that routes from CDS 2 in the master cabinet to CDS 3 in the expansion cabinet is coiled up and secured in the back of the expansion cabinet by the factory.

If only a master cabinet is installed, you only have to verify the cabling connections in the master cabinet. If an expansion cabinet is installed, verify the cabling connections in the master and expansion cabinets and then route the inter-cabinet cable from the expansion to the master cabinet.

FW-15629

NT4K86NA/NC/ND metallic test access cables



12-pair, twisted, 26AWG stranded wires with shielding, connectorized at both ends. The NT4K86ND cable connects to the 25-pin CDS MTA (J01) connector on the ABM shelf to the 25-pin connector on CDS 1. The NT4K86NA cable connects CDSs in the same cabinet. The NT4K86NC cable connects CDS 2 in the master cabinet to CDS 3 in the expansion cabinet. The cables are available in the following lengths:

1.6 m	(2 ft)	NT4K86NA
3 m	(10 ft)	NT4K86NC
1 m	(3 ft)	NT4K86ND

—continued—

Procedure 7-7 (continued)
Installing metallic test access cables

Requirements

You will need the following tools and materials to route and terminate the miscellaneous external cabling in the cabinets:

- cable ties
- cable tie cutters

Action

Step	Action

Verify the factory-installed cables

1 Verify that the CDS MTA cable daisy chain connection from the ABM shelf to CDS 1 and CDS 2 in the master cabinet are correct as shown in Table 7-13, Figure 7-20 and Figure 7-21 on page 7-59.

2 If the expansion cabinet is installed, go to step 3. If not, go to step 10.

Table 7-13
MTA cabling connection points

Cable	PEC	From	Terminal	To	Terminal
MTA cable routing on the left side of the cabinets and shelves					
CDS 1	NT4K86ND	ABM	CDS MTA (J01)	CDS 1	MTA In
CDS 2	NT4K86NA	CDS 1	MTA Out	CDS 2	MTA In
CDS 3	NT4K86NC	CDS 2	MTA Out	CDS 3	MTA In
CDS 4	NT4K86NA	CDS 3	MTA Out	CDS 4	MTA In
CDS 5	NT4K86NA	CDS 4	MTA Out	CDS 5	MTA In
CDS 6	NT4K86NA	CDS 5	MTA Out	CDS 6	MTA In
CDS 7	NT4K86NA	CDS 6	MTA Out	CDS 7	MTA In
Note: NT4K86ND and NT4K86NA CDS metallic test access cabling is factory-installed and connected for CDS 1 and CDS 2 in the master cabinet. For the expansion cabinet, the NT4K86NA CDS 3-7 cabling is also factory-installed and connected. The NT4K86NC CDS 2 to CDS 3 cable is field-installed from the master cabinet to the expansion cabinet.					

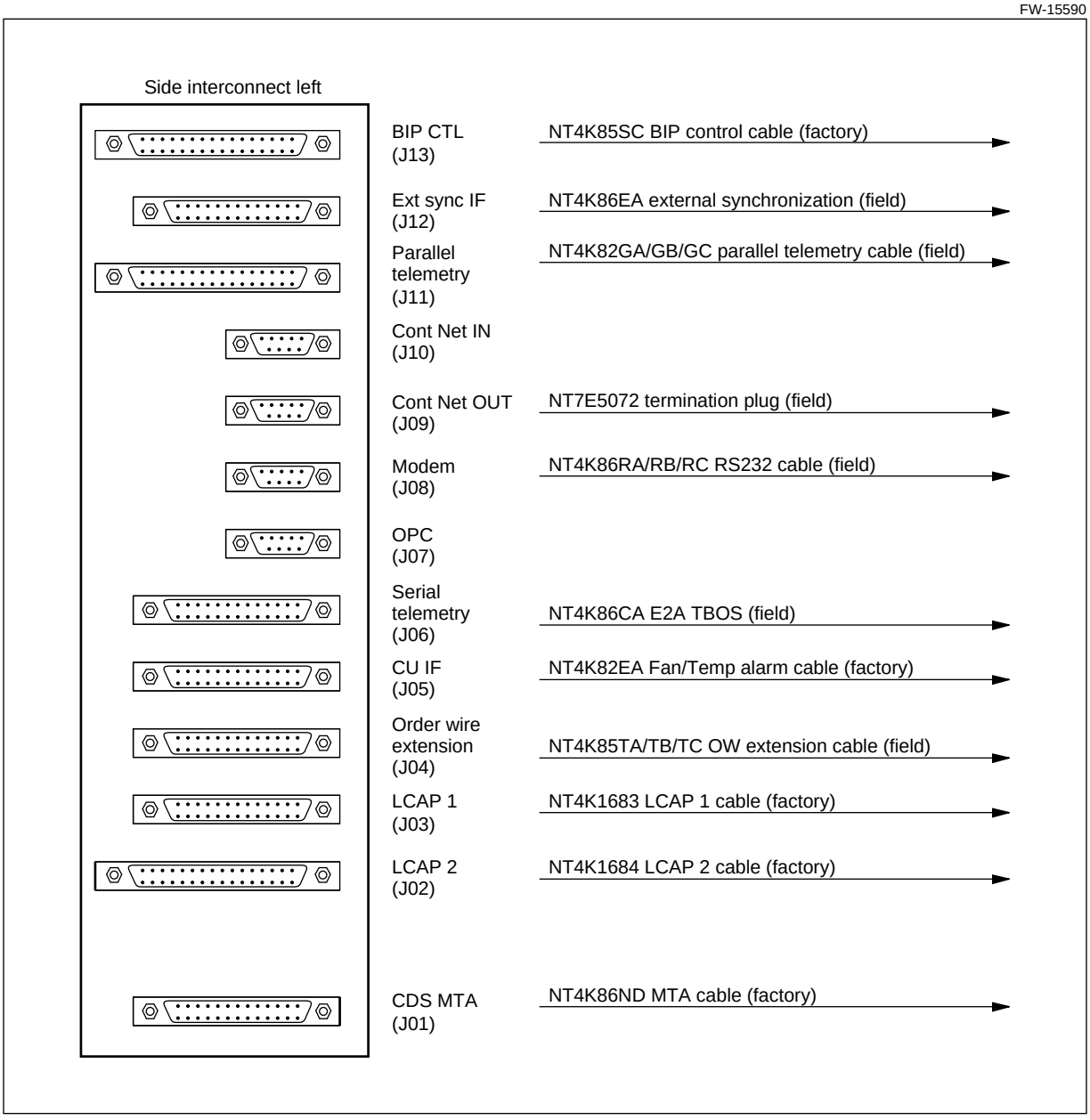
—continued—

Procedure 7-7 (continued)
Installing metallic test access cables

Step	Action

Figure 7-20
ABM shelf left side connector locations and designations

FW-15590



—continued—

Procedure 7-7 (continued)
Installing metallic test access cables

Step	Action
	Routing and connecting the NT4K86NC inter-cabinet cable
3	Verify that the CDS MTA cable daisy chain connections for CDSs 3-7 in the expansion cabinet are correct as shown in Table 7-13 on page 7-56 and Figure 7-21.
4	Uncoil the NT4K86NC MTA cable from CDS 3 (MTA In connector) at the rear of the expansion cabinet.
5	Route it through the 8X8 opening in the expansion cabinet right-side framework, through the expansion kit and into the master cabinet.
6	Dress and secure the cable in the expansion cabinet. Use cable ties to secure the harnesses to the master cabinet framework.
7	In the master cabinet, route the NT4K86NC MTA cable on the left side of the cabinet to CDS 2
8	Connect the MTA cable to the CDS 2 MTA Out connector (see Figure 7-21).
9	Dress and secure all cabling with cable ties.
10	Go to Procedure 7-1, “Installing miscellaneous external cabling in the master cabinet”.

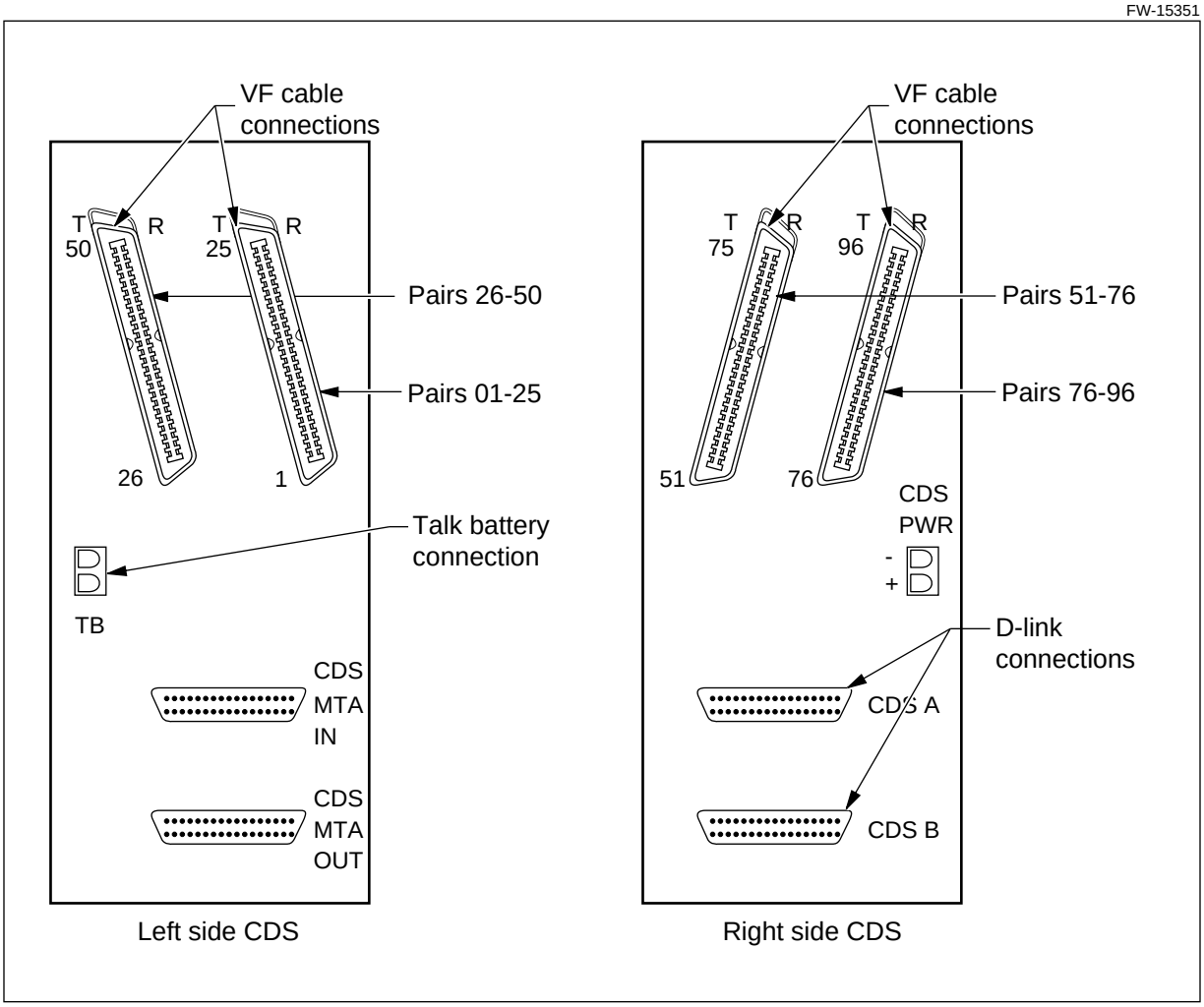
—continued—

Procedure 7-7 (continued)
Installing metallic test access cables

Step	Action

Figure 7-21
MTA cable connection points on the left side of the CDS

FW-15351



—end—

Installing the fiber cables

This chapter provides the procedure to route the optical fiber cables into the modular business package (MBP) master cabinet to the access bandwidth manager (ABM) shelf. The outside plant (OSP) fibers terminate at a customer-supplied external fiber management system. Fiber patchcords or pigtails will be installed from the fiber management system to the ABM.

Fiber patchcords can be installed for the primary optics to the NT7305 OC-12 virtual tributary bandwidth manager (VTBM) fiber interface cards and to OC-3 virtual tributary (VT) fiber interface cards.

Table 8-1 shows the orderable fiber patchcords and pigtails.

Chapter contents

This chapter contains the following information:

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

Fiber cabling tables

Table 8-1 lists the fiber cables that you can install.

Table 8-1
Fiber patchcords and pigtails

Cable	PEC	From	Terminal	To	Terminal
Fiber patchcords	Biconic-Biconic NT7E46AA (16.4 ft) NT7E46AB (32.8 ft) NT7E46AC (49.2 ft) NT7E46AD (65.6 ft) NT7E46AE (98.4 ft) FC-FC NT7E46BF (9.8 ft) NT7E46BA (16.4 ft) NT7E46BB (32.8 ft) NT7E46BC (49.2 ft) NT7E46BD (65.6 ft) NT7E46BE (98.4 ft) ST-ST NT7E46CF (9.8 ft) NT7E46CA (16.4 ft) NT7E46CB (32.8 ft) NT7E46CC (49.2 ft) NT7E46CD (65.6 ft) NT7E46CE (98.4 ft)	Fiber management facility: OC-12 fiber ring	In Out	ABM shelf fiber interface unit ABM shelf fiber interface unit	OC-12 In OC-12 Out
Fiber patchcords with miniature variable attenuators (mVOA)	Biconic-Biconic NT7E47AA (16.4 ft) NT7E47AB (32.8 ft) NT7E47AC (49.2 ft) NT7E47AD (65.6 ft) NT7E47AE (98.4 ft) FC-FC NT7E47BA (16.4 ft) NT7E47BB (32.8 ft) NT7E47BC (49.2 ft) NT7E47BD (65.6 ft) NT7E47BE (98.4 ft) ST-ST NT7E47CA (16.4 ft) NT7E47CB (32.8 ft) NT7E47CC (49.2 ft) NT7E47CD (65.6 ft) NT7E47CE (98.4 ft)	Fiber management facility: OC-12 fiber ring	In Out	ABM shelf fiber interface unit ABM shelf fiber interface unit	OC-12 In OC-12 Out

—continued—

Table 8-1 (continued)
Fiber patchcords and pigtails

Cable	PEC	From	Terminal	To	Terminal
Fiber pigtails	Biconic NT7E48AA (65.6 ft) FC NT7E48BA (65.6 ft) ST NT7E48CA (65.6 ft)	Fiber management facility: OC-12 fiber ring	In Out	ABM shelf fiber interface unit ABM shelf fiber interface unit	OC-12 In OC-12 Out
Fiber pigtails with miniature variable attenuators (mVOA)	Biconic NT7E49AA (65.6 ft) FC NT7E49BA (65.6 ft) ST NT7E49CA (65.6 ft)	Fiber management facility: OC-12 fiber ring	In Out	ABM shelf fiber interface unit ABM shelf fiber interface unit	OC-12 In OC-12 Out
—end—					

Procedure 8-1
Installing the ABM fiber optic cabling

Use this procedure to install fiber patch cords or pigtails from the faceplate of the OC-12 VTBM optical interface cards and OC-3 VT cards in the access bandwidth manager (ABM) shelf to an external fiber patch panel or fiber management facility mounted outside the MBP cabinet.

Card locations in the ABM are job and configuration specific. Reference your job specifications and local records for actual card location assignments in your system. It is important that you know the fiber quantities and the card locations in your system before you route the fiber optic cables to the ABM shelf.

The OC-12 and OC-3 optical interface cards do not have to be installed at this time. Cards are in installed Chapter 10, “Powering up the equipment and installing the circuit packs”.

Note 1: Optical patchcords and pigtails with miniature variable optical attenuators (mVOA) install at the receiver of the OC-12 and OC-3 optical interface cards.

Note 2: Fiber patchcords, encased in split flex tubing for protection, are routed along the rail on the left side of the cabinet. Typically, 18 mm (0.75 in.) split tubing accommodates 4 to 14 fiber patchcords. The length of the split tubing corresponds to the length required for the fiber cabling.

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.

—continued—

Procedure 8-1 (continued)
Installing the ABM fiber optic cabling

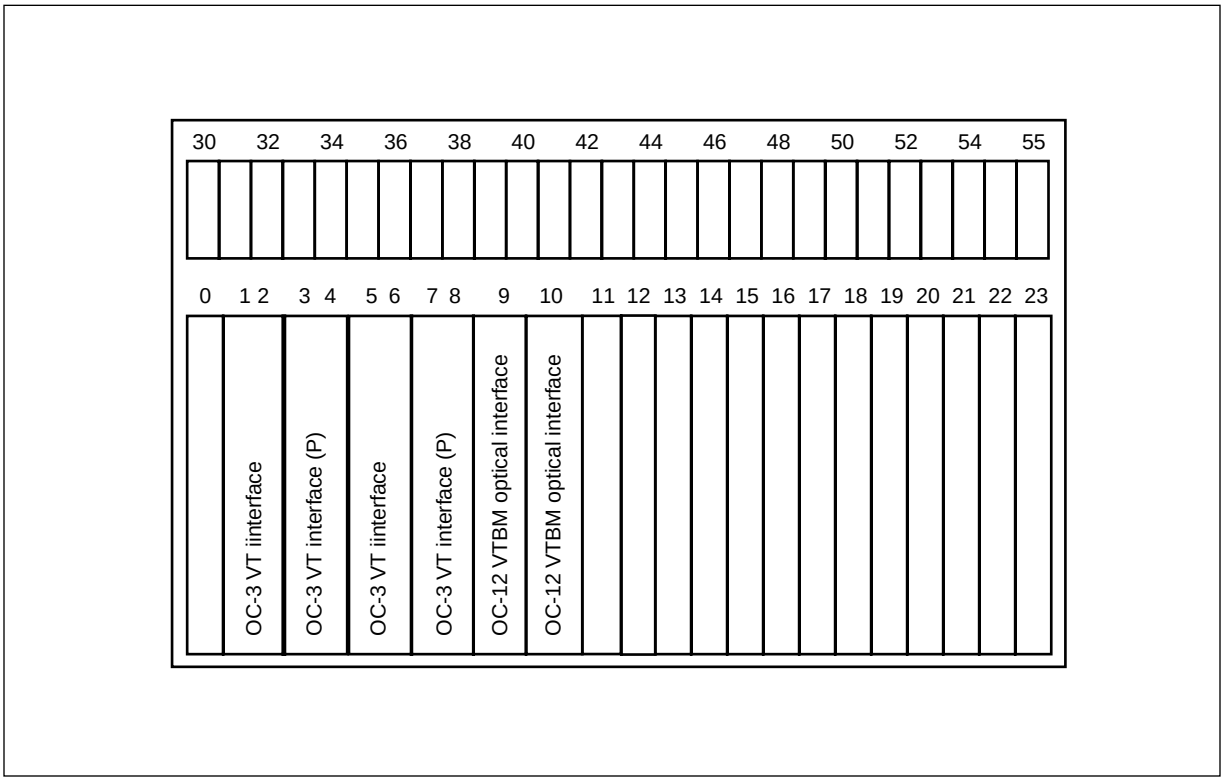
Requirements

You will need the following tools and material to route and terminate most of the cabling in the cabinets:

- cable labeling materials
- cable ties
- lacing cord
- fiberboard
- split tubing, 1.8 cm (0.75 in.)
- spiral wrap tubing 1.3 cm (0.5 in.)

Figure 8-1 shows possible OC-12 VTBM and OC-3 VT card locations in the ABM shelf.

Figure 8-1
ABM shelf layout showing possible OC-12 VTBM and OC-3 VT card positions



—continued—

Procedure 8-1 (continued)
Installing the ABM fiber optic cabling

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.

Action

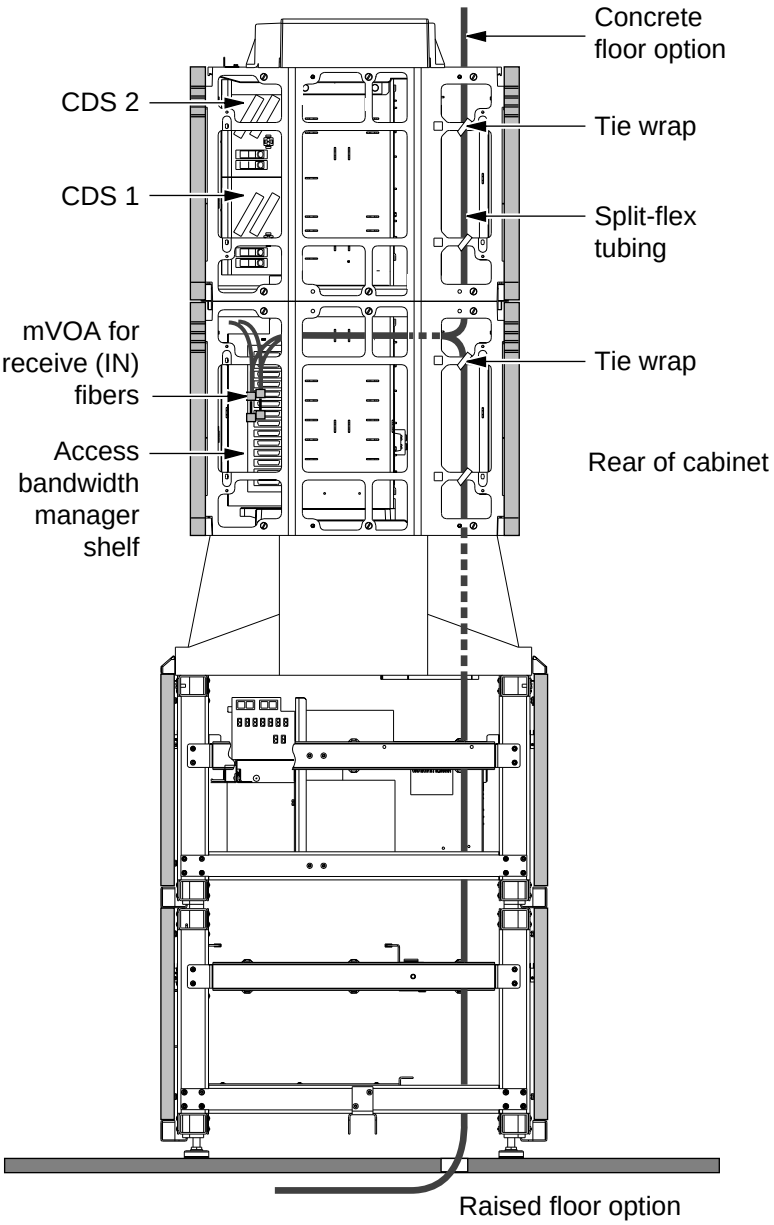
Step	Action
1	Label both ends of the fiber patchcords or pigtails with the following information: • the slot number in the ABM shelf for the intended OC-12 VTBM and OC-3 VT optical interface cards (see Figure 8-1) • the direction of signal: transmit (Tx) or receive (Rx) ***Note:*** Reference job specifications and local records for actual slot assignments for the optical interface cards.
2	For overhead access, locate the access hole at the rear of the top cap module as shown in Figure 8-2. For raised floor access, locate the access hole at the bottom rear left of the MBP master cabinet.
3	Enclose the fiber patchcords or pigtails in the split tubing starting at the right side of the ABM shelf and continuing 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 management system.
4	Route the split tubing with the fibers inside into the master cabinet to the ABM shelf as shown in Figure 8-2. Refer to Figure 8-2 and note that the Rx fiber connects to the mVOA that is tie-wrapped to the left side of the TBM shelf. The mVOA then connects to the optical interface card. ***Note:*** Installation of the mVOA as shown in Figure 8-2 assumes the use of the mVOA fiber cables listed in Table 8-1. Installation may differ if other optical patchcords or optical pigtails are used. The mVOAs may be located in an external fiber management shelf.

—continued—

Procedure 8-1 (continued)
Installing the ABM fiber optic cabling

Figure 8-2
Routing optical fibers to the ABM shelf

FW-15624



Right side view

—continued—

Procedure 8-1 (continued)
Installing the ABM fiber optic cabling

Step	Action
5	Secure the split tubing with the fibers inside with cable ties to the cabinet side framework. Use fiberboard to protect the split tubing when crossing any sharp edges.
6	Hang the connector ends of the patch cords out of the trough at the intended locations of the OC-12 VTBM and OC-3 VT optical interface cards as determined by your job specifications or local records.

.

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 might snag and become damaged when an adjacent card is removed.

Note: Leave enough slack to reach the intended Rx (top) or Tx (bottom) connectors of the optical interface cards.

7	Secure the split tubing with the fibers inside for the remaining length of the split tubing run. Use fiberboard to protect the split tubing when crossing any sharp edges.
8	Connect the fibers to the external fiber patch panel according to the manufacturer's instructions.

—end—

Installing the batteries and adjusting the rectifiers

This chapter contains the procedures that you perform on the batteries, rectifiers and the modular business package (MBP) master and expansion cabinet equipment to power up the system.

Note: Some of these tests can only be completed on initial installations as the batteries and the rectifier have to be isolated from the equipment.

Chapter contents

This chapter contains the following information:

Perform the procedures in the order listed.

Warnings

Prior to performing any rectifier replacement procedures, read each warning carefully. Important battery and rectifier information is presented here.

DANGER 1
Risk of fire
Remove all paper and any other combustible materials from inside the cabinet before the cabinet is powered up. Failure to comply with this warning could result in a fire.

DANGER 2
Risk of fire or explosion
Only new, sealed cell lead-acid type batteries, with pressure release vents, are recommended for this equipment.

DANGER 3
Contents corrosive
Do not open or mutilate batteries. Released electrolyte is corrosive and toxic if swallowed.

DANGER 4
Do not heat batteries
Batteries may explode when heated. Check with local codes for possible special disposal instructions

CAUTION 1
Procedure sequence
Perform the steps in the order shown because the sequence of turning the breakers on and off is critical.

CAUTION 2
DC voltage output levels testing
The dc voltage output level from each rectifier module *must* be tested and adjusted according to Nortel Networks recommended float voltages for the following battery manufacturers.
Johnson Control 12V: -54.50 ± 0.10 V dc
Note: These ranges are subject to change without notice.

CAUTION 3
DC input voltage specifications
The input voltage specifications require that the dc input to the BIP does not exceed -56.0 V dc. Battery float, equalize, and high voltage shutdown levels *must* be set below this maximum regardless of the type of batteries installed.

CAUTION 4
Handling batteries
Handle batteries with care to avoid shorting them against conducting materials.

CAUTION 5
Do not mix battery ages, types or sizes
Do not mix old and new batteries, batteries of different sizes or from different manufacturers in this product.

CAUTION 6
Observe polarities at all times
Observe proper polarity orientation between batteries and battery charger.

CAUTION 7
Battery charging instructions and limitations
Charge batteries only in accordance with the instructions and limitations specified in this manual.

Procedure 9-1
Testing the batteries

Use this procedure to test the batteries. Test the individual batteries before you mount them in the battery equipment module (BEM). If you find a defective battery or one that does not meet the voltage requirements, replace the battery before you mount it in the BEM.

You will need a string of four tested batteries for each BEM to be equipped.

Requirements

The following tools are required:

- Fluke 8050A rms voltmeter (or equivalent)
- battery loading device for testing batteries (customer-supplied)

Action

Step	Action

Measuring the battery voltages

1 Measure the output voltage of a battery by performing the following sub-steps:

a. Set the load for 50 to 100 A.

b. Connect a load to the battery to be tested.

c. Connect the test load for 10 seconds.

d. After 10 seconds, measure the battery voltage. The battery voltage should measure:

Battery manufacturer	Output voltage range requirement
Johnson Control	-13.2 and -14.0 V dc

—continued—

Procedure 9-1 (continued)
Testing the batteries

Step	Action

2 Perform the following:

If the battery	Then go to
meets the voltage requirement	step 3
does not meet the voltage requirement	step 4

3 Remove the load and proceed as follows:

If you have	Then go to
less than four good batteries for each BEM to be equipped	step 1
four good batteries for each BEM to be equipped	step 6

4 Remove the load and recharge or replace the battery.
If a battery is recharged, go to step 1 after recharging is completed.
If a battery must be replaced, replacement batteries may be ordered from Nortel Networks. Contact your Nortel Networks regional sales support office for assistance in ordering. When the new battery comes in, test it using this procedure beginning at step 1.

5 Go to step 1 to test the next battery for voltage requirements.

6 You have finished the battery testing procedure. Go to Procedure 9-2, “Installing the battery harnesses”.

—end—

Procedure 9-2
Installing the battery harnesses

Use this procedure to install the battery harness cables to the batteries in the modular business package (MBP) master and expansion cabinets.

Requirements

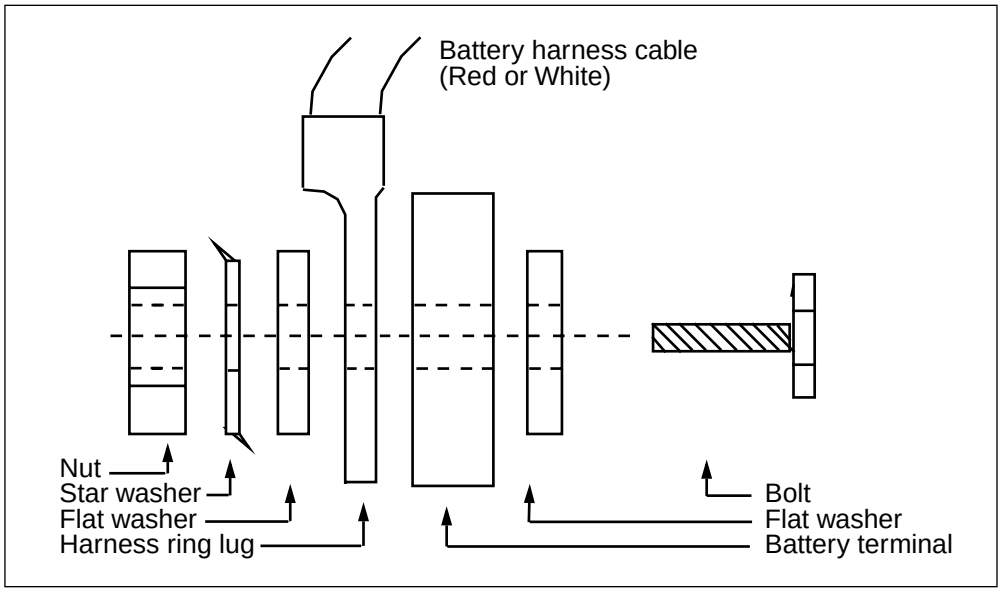
The batteries must be tested, and proven acceptable, as described in Procedure 9-1, “Testing the batteries” before installing the battery harnesses.

The following tools are required:

- One red and one white battery harness cable for each battery
- mounting hardware (one bolt, two flat washers, one star washer, one nut) for each battery harness
- open- or box-end wrench or socket set for 1.1 cm (7/16 in.), 0.95 cm (3/8 in.), and 0.95 cm (5/16 in.)

Action

Step	Action
1	Connect one RED battery harness cable to the negative (–) battery terminal on each battery as shown below.
2	Connect one WHITE battery harness cable to the positive (+) battery terminal on each battery as shown below.



—end—

Procedure 9-3
Installing the batteries in the BEM

Use this procedure to install the batteries equipped with battery harnesses into the battery equipment module (BEM) in the modular business package (MBP) master and expansion cabinets.

Requirements

The batteries must be tested, and proven acceptable, as shown in Procedure 9-1, “Testing the batteries” before installing the battery harness cables. The batteries must have the cable harnesses installed according to Procedure 9-2, “Installing the battery harnesses”.

The following tools are required:

- open- or box-end wrench or socket set for 7/16 in., 3/8 in., and 5/16 in.
- Fluke 8050A rms voltmeter (or equivalent)

Action

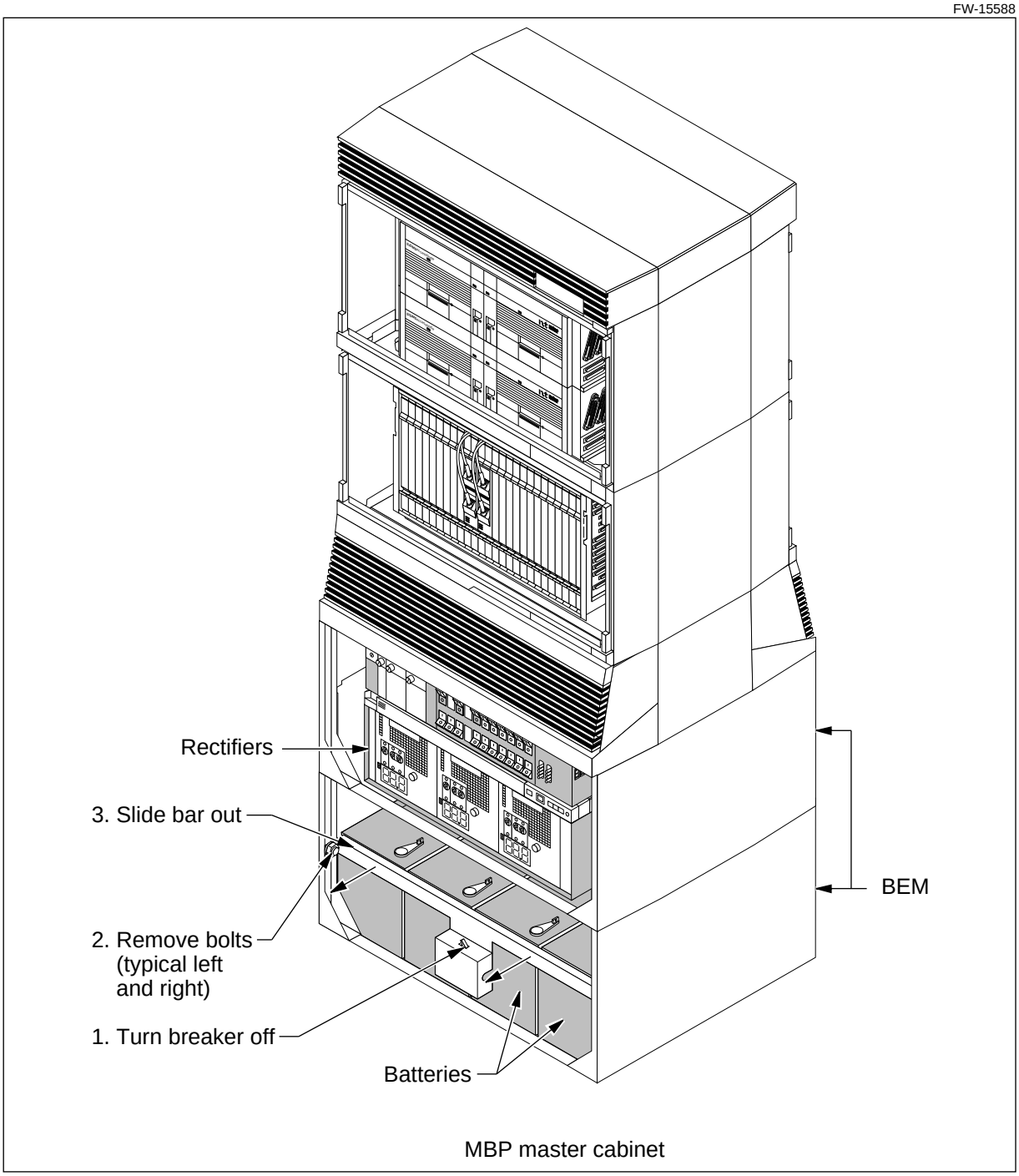
Step	Action
	Preparing the BEM
1	Turn all circuit breakers in the MBP to the OFF position (O). ***Note:*** Be sure to turn the battery circuit breaker on the BEMs to the OFF position.
2	Remove the front cover of the battery equipment module (BEM).
3	Refer to Figure 9-1 and Figure 9-2 now and as required while performing the procedure.
4	Using the 7/16 in. wrench, remove the two bolts that hold the battery retaining bar in place.
5	Cut the tie-wraps that secure the battery cables to the front retaining bar.
6	Slide the retaining bar outward until it clears the tracks at either end and swing it out of the way. Do not swing it so far that the cables to the circuit breaker are strained.
7	Fold back the battery leads to in the BEM to avoid damaging them.

—continued—

Procedure 9-3 (continued)
Installing the batteries in the BEM

Figure 9-1
Battery retaining bar

FW-15588

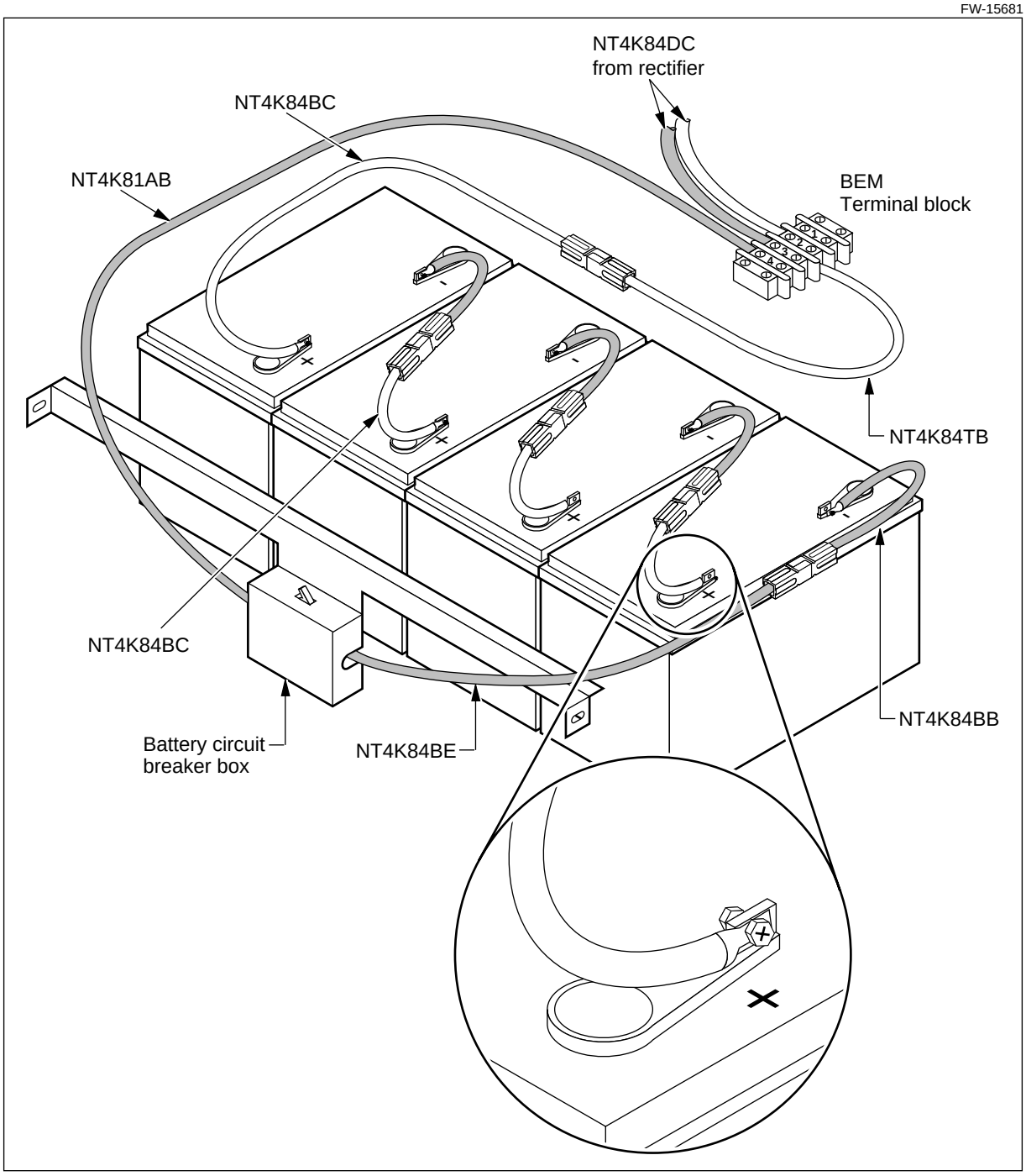


—continued—

Procedure 9-3 (continued)
Installing the batteries in the BEM

Figure 9-2
Battery connections

FW-15681



—continued—

Procedure 9-3 (continued)
Installing the batteries in the BEM

Step	Action

Placing the batteries into the BEMs

8 Place the batteries into the BEMs with the orientation as shown in Figure 9-2.

Note: The batteries mount with the positive (+) terminal closest to the front of the cabinet.

Connecting the battery strings

DANGER
Risk of fire or explosion
Be extremely careful not to connect two cables from the same battery together.

9 Connect the left-most battery to the next with a red cable that goes from the negative (–) terminal of the battery on the left to a white cable that comes from the positive (+) terminal of the battery on the right. Refer to Figure 9-2.

10 Interconnect all four batteries but do NOT connect the factory installed leads (one red, one white) that connect to the terminal block at the rear of the BEM.

Note: Your should have one loose red battery lead connected to the right-most battery negative (-) terminal and one loose white battery led that is connected to the left-most battery positive (+) terminal.

11 Measure the voltage level of the four-battery string across the two loose battery leads. Recommended voltage readings are:

Battery manufacturer	Output voltage range requirement
Johnson Control	Between -52.8 and -56.0 V dc

12 If the battery string voltage requirement is not met, replace the entire battery string and re-start this procedure from step 1 with the new batteries.

If the voltage level is acceptable, continue this procedure.

—continued—

Procedure 9-3 (continued)
Installing the batteries in the BEM

Step	Action
	Connecting the battery string to the BEM
13	Connect the four batteries to the cabinet equipment by using the quick connects to connect: • the red cable from the circuit breaker to the red cable from the negative (-) terminal on the right-most battery as shown in Figure 9-2. • the white cable from the terminal block to the white cable from the positive (+) terminal on the left-most battery as shown in Figure 9-2.
14	Slide the battery retaining bar into place and use the 7/16 in. wrench and the two bolts to re-fasten the bar to the battery module. Refer to Figure 9-1.
15	Turn the battery breaker circuit breaker on the BEM to the ON position (I).
16	Reinstall the front cover of the battery equipment module.
17	Repeat this procedure for each battery string that you install.
18	When all battery strings are installed and connected, go to Procedure 9-4, “Powering up the rectifiers”.

—end—

Procedure 9-4
Powering up the rectifiers

Use this procedure to install the rectifiers into the rectifier shelf in the modular business package (MBP) master cabinet and to check the power input to the rectifiers. This procedure also checks the operation of the rectifier.

Note: This procedure assumes that the batteries are fully tested, charged and installed according to Procedures 9-1 through 9-3.

Requirements

Procedure 9-1 through Procedure 9-3 have all been completed.

The following tools are required:

- slotted screwdriver, 0.254 cm (0.1 in.) blade
- Fluke 8050A rms voltmeter (or equivalent)

Documentation references

- *Equipment Installation Operation and Maintenance for MPR25/MPR15 Series Single Phase -48 V, 25 A Switch Mode Rectifier NT5C06,* 169-2071-500

Action

Step	Action
1	Remove the blank cover plates from the rectifier shelf located in the MBP master cabinet. ***Note:*** Loosen the thumbscrews at the bottom corners of the rectifier shelf and fold down the retaining bar.
2	Unpack the rectifiers and install them into the rectifier shelf. ***Note:*** Insert rectifiers in the slots right-to-left. Position 1 is on the right.
3	Re-install a blank cover plate in all positions that do not contain a rectifier.
4	Fold up the retaining bar and tighten the thumbscrews.

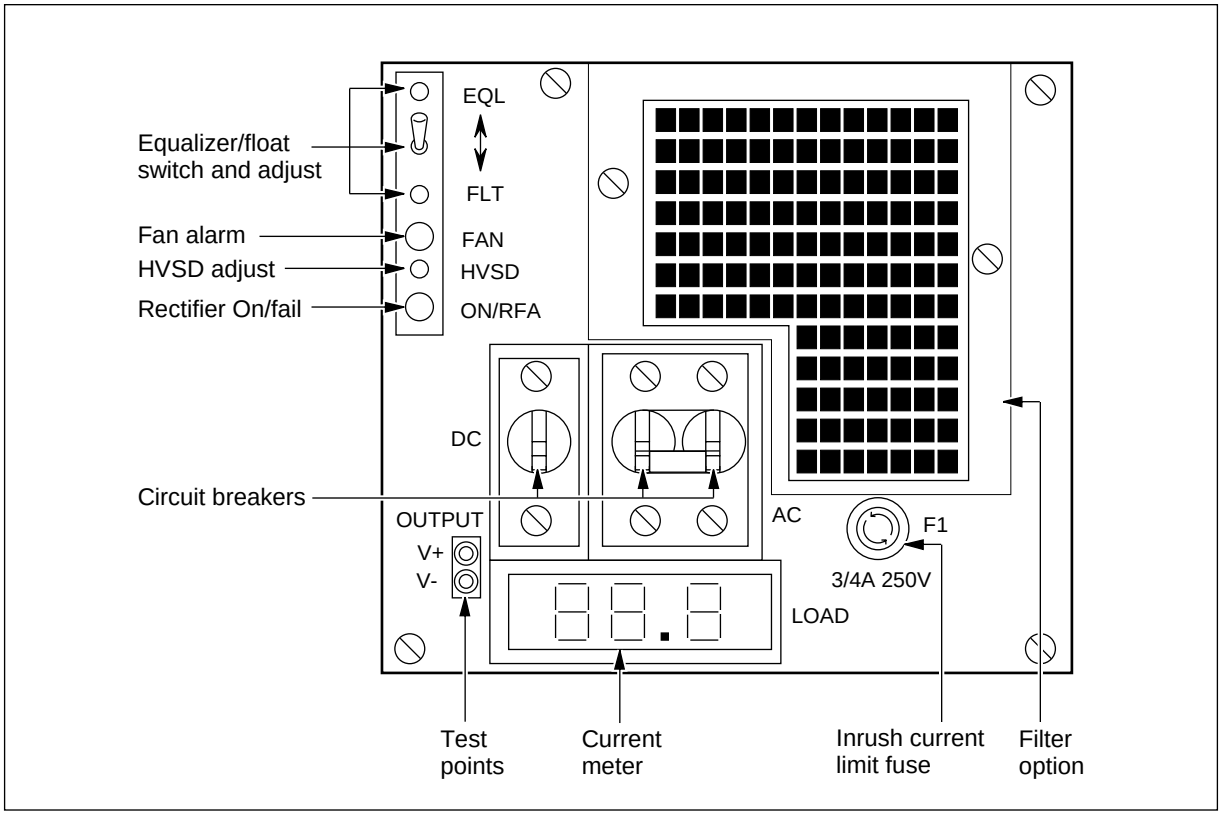
—continued—

Procedure 9-4 (continued)
Powering up the rectifiers

Step	Action
5	Remove the front covers of the pedestal module and the BEM.
6	Turn all ac, rectifier, BEM and BIP circuit breakers to the OFF position. Refer to Figure 9-4.
7	Switch the dc circuit breaker on rectifier 1 to the ON position (see Figure 9-3).
8	Switch the ac circuit breaker on rectifier 1 to the ON position. ***Note:*** When the rectifier is initially powered ON, the rectifier OK/FAIL alarm (ON/RFA) LED illuminates red.
9	Turn OFF the ac then the dc circuit breakers on the rectifier.
10	Repeat the procedure from step 1 for each rectifier.
11	Continue the rectifier adjustment procedures using Procedure 9-5, “Adjusting the high voltage shutdown”.

Figure 9-3
MPR25 rectifier faceplate

FW-11099

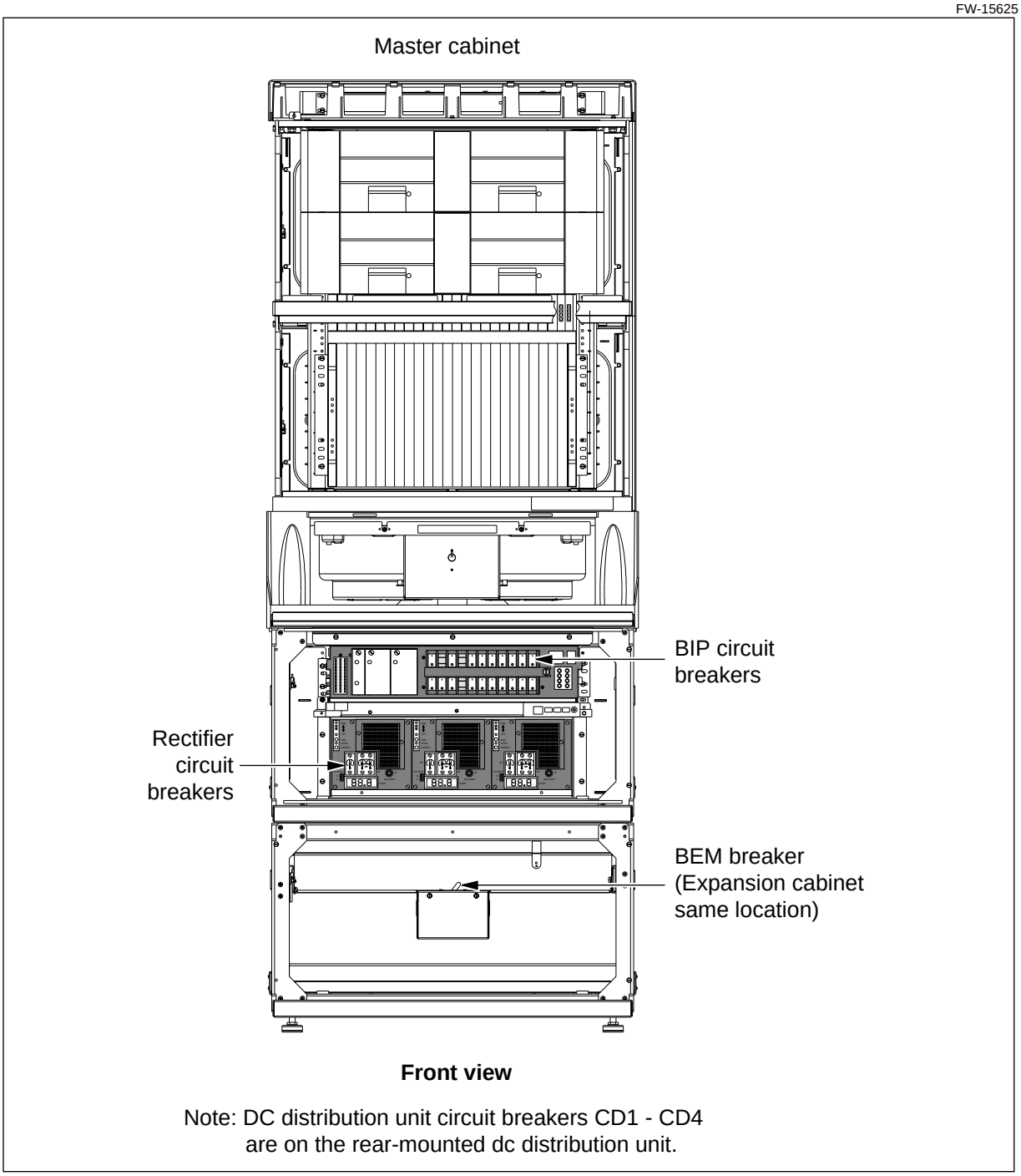


—continued—

Procedure 9-4 (continued)
Powering up the rectifiers

Figure 9-4
MBP cabinet showing locations of circuit breakers

FW-15625



Note: DC distribution unit circuit breakers CD1 - CD4 are on the rear-mounted dc distribution unit.

—end—

Procedure 9-5
Adjusting the high voltage shutdown

Use this procedure to set the modular business package (MBP) rectifier high voltage shutdown (HVSD) threshold to -56.0 ± 0.1 V dc.

Requirements

Procedure 9-1 through Procedure 9-4 have all been completed.

The following tools are required:

- slotted screwdriver, 0.254 cm (0.1 in.) blade
- Fluke 8050A rms voltmeter (or equivalent)

Documentation references

- *Equipment Installation Operation and Maintenance for MPR25/MPR15 Series Single Phase -48 V, 25 A Switch Mode Rectifier NT5C06,* 169-2071-500

Table 9-1 shows the Nortel Networks recommended rectifier settings for a number of battery types. These settings are referenced throughout the procedure.

Table 9-1
Rectifier adjustment settings

Battery manufacturer	High voltage shutdown (HVSD)	Equalize	Float
Johnson Control	-56.0 ± 0.1	-55.0 ± 0.1	-54.5 ± 0.1

—continued—

Procedure 9-5 (continued)
Adjusting the high voltage shutdown

Step	Action
1	Turn OFF the ac then the dc circuit breakers on all rectifiers.
2	Ensure that the following switches on the dc distribution shelf are set as shown: EQL switch = OFF Norm/Byp = NORM
3	Insert the test leads of the digital voltmeter into the V+ and V- test points on the faceplate of rectifier 1. Connect the leads so that negative goes to negative, positive to positive.
4	Turn ON the dc then the ac circuit breakers on rectifier 1.
5	Ensure that the EQL/ FLT switch on the rectifier is in the FLT position.
6	To verify the initial HVSD setting on the rectifier, slowly adjust the FLT potentiometer clockwise until one of the following events occurs.

If	Then
the ac circuit breaker on the rectifier trips before -56.0 V dc is reached ***Note:*** The RFA LED will illuminate RED.	Record the voltage measurement at which the HVSD occurred. Go to step 7.
the voltage level reaches -56.0 V dc before the ac circuit breaker on the rectifier trips	Go to step 8.
the ac circuit breaker trips at -56.0 V dc	Go to step 9.

Note: Nortel Networks recommends setting the HVSD level at -56.0 ± 0.1 V dc. See Table 9-1. If the -56.0 V level cannot be reached, hold the FLOAT/EQL switch in the EQL position while adjusting the FLT potentiometer.

CAUTION
Damage to equipment hazard
Do not adjust the voltage shutdown above -56.0 V dc because damage to the equipment can result.

—continued—

Procedure 9-5 (continued)
Adjusting the high voltage shutdown

Step	Action

7 To adjust the rectifier when the HVSD occurs before -56.0 V dc, perform the following:

a. Turn the FLT potentiometer one complete turn counterclockwise.

b. Reset the ac breaker to the ON position to turn the rectifier back on.

c. Slightly turn the HVSD potentiometer clockwise to increase HVSD limit.

d. Slowly adjust the FLT potentiometer clockwise again until HVSD occurs or -56.0 V dc is reached.

If	Then
the ac circuit breaker on the rectifier trips before -56.0 V dc is reached ***Note:*** The RFA LED will illuminate RED.	Record the voltage measurement at which the HVSD occurred. Go to step 7.
the voltage level reaches -56.0 V dc before the ac circuit breaker on the rectifier trips	Go to step 8.
the ac circuit breaker trips at -56.0 V dc	Go to step 9.

8 To adjust the rectifier when the float voltage level reaches -56.0 V dc and HVSD does not occur, perform the following:

a. Leave the FLT voltage set at -56.0 V dc.

b. Slowly turn the HVSD potentiometer counterclockwise until the system shuts down (the ON/RFA LED illuminates red).

c. Slowly turn the FLT potentiometer counterclockwise one-half (1/2) turn.

d. Reset the ac breaker to turn the rectifier back on.

e. Slowly turn the FLT potentiometer clockwise (no farther than -56.0 V dc).

If	Then
the ac circuit breaker on the rectifier trips before -56.0 V dc is reached ***Note:*** The RFA LED will illuminate RED.	Record the voltage measurement at which the HVSD occurred. Go to step 7.
the voltage level reaches -56.0 V dc before the ac circuit breaker on the rectifier trips	Go to step 8.
the ac circuit breaker trips at -56.0 V dc	Go to step 9.

9 Repeat steps 1 through 8 for each rectifier installed.

10 Turn OFF the ac then the dc circuit breakers on all rectifiers.

11 Continue the rectifier adjustment procedures using Procedure 9-6.

—end—

Procedure 9-6
Adjusting the equalize voltage

Use this procedure to adjust the modular business package (MBP) rectifier equalize voltage to -55.0 ± 0.1 V dc.

Requirements

Procedure 9-1 through Procedure 9-5 have all been completed.

The following tools are required:

- slotted screwdriver, 0.254 cm (0.1 in.) blade
- Fluke 8050A rms voltmeter (or equivalent)

Documentation references

- *Equipment Installation Operation and Maintenance for MPR25/MPR15 Series Single Phase -48 V, 25 A Switch Mode Rectifier NT5C06,* 169-2071-500

Table 9-2 shows the Nortel Networks recommended rectifier settings for a number of battery types. These settings are referenced throughout the procedure.

Table 9-2
Rectifier adjustment settings

Battery manufacturer	High voltage shutdown (HVSD)	Equalize (EQL)	Float (FLT)
Johnson Control	-56.0 ± 0.1	-55.0 ± 0.1	-54.5 ± 0.1

—continued—

Procedure 9-6 (continued)
Adjusting the equalize voltage

Step	Action
1	Ensure that the ac and the dc circuit breakers on all rectifiers are in the OFF position.
2	Turn the rectifier 1 FLT potentiometer 2 turns counterclockwise.
3	Turn ON the dc then the ac circuit breakers on rectifier 1.
4	Hold the FLOAT/EQL momentary switch to EQL for local equalize and measure the equalize voltage at the test points labeled V+ and V- on the rectifier.
5	Adjust the EQL voltage by turning the EQL potentiometer clockwise to increase the EQL voltage or counterclockwise to reduce the EQL voltage to the recommended value (see Table 9-2). ***Note:*** Johnson Control battery equalize voltage is -55.0 ± 0.1 V dc.
6	Turn OFF the ac then the dc circuit breakers on rectifier 1.
7	Repeat step 1 through step 6 for each rectifier installed.
8	Ensure that the ac and the dc circuit breakers on all rectifiers are in the OFF position.
9	Continue the rectifier adjustment procedures using Procedure 9-7, “Adjusting the float voltage and charging the batteries”.

—end—

Procedure 9-7
Adjusting the float voltage and charging the batteries

Use this procedure to adjust the modular business package (MBP) rectifier float voltage to -54.5 ± 0.1 V dc and to charge the batteries.

Requirements

Procedure 9-1 through Procedure 9-6 have all been completed.

The following tools are required:

- slotted screwdriver, 0.254 cm (0.1 in.) blade
- Fluke 8050A rms voltmeter (or equivalent)

Documentation references

- *Equipment Installation Operation and Maintenance for MPR25/MPR15 Series Single Phase -48 V, 25 A Switch Mode Rectifier NT5C06,* 169-2071-500

Table 9-3 shows the Nortel Networks recommended rectifier settings for a number of battery types. These settings are referenced throughout the procedure.

Table 9-3
Rectifier adjustment settings

Battery manufacturer	High voltage shutdown (HVSD)	Equalize (EQL)	Float (FLT)
Johnson Control	-56.0 ± 0.1	-55.0 ± 0.1	-54.5 ± 0.1

—continued—

Procedure 9-7 (continued)
Adjusting the float voltage and charging the batteries

Step	Action

Adjusting the float voltage to -54.5 ± 0.1 V dc

1 Turn ON the dc then the ac circuit breakers for rectifier 1.

2 Ensure that the EQL/FLT switch on rectifier 1 is in the FLT position.

Note: The EQL/FLT switch on the rectifier must be in the FLT position when adjusting the voltage.

3 Slowly adjust the FLT potentiometer clockwise to raise the float voltage or counterclockwise to lower the float voltage to the recommended value (see Table 9-3).

Note: Johnson Control battery float value is -54.5 ± 0.1 V dc.

4 Turn OFF the ac then the dc circuit breakers on the rectifier.

5 Repeat step 1 to step 4 for all rectifiers installed.

Charging the batteries

6 Turn ON the dc then the ac circuit breakers for rectifier 1.

Note: The rectifier should be ON and the RFA LEDs illuminated green.

7 Turn one BEM circuit breaker to the ON position.

Note: The breaker is located at the front of the battery module.

8 Verify the rectifier ac circuit breakers, as follows:

If a rectifier circuit breaker	**Then**
trips	Turn the BEM circuit breakers to the OFF position. Turn the FLT potentiometer on the rectifier slowly and slightly about 1/2 turn, counterclockwise. Reset the ac circuit breaker on the rectifier. Go to step 7.
does not trip	Go to step 9.

9 Allow the batteries to charge for approximately 10 minutes.

10 Slowly adjust the FLT potentiometer on the rectifier clockwise to increase the float voltage to the normal level (see Table 9-3).

Note: Johnson Control battery float voltage is 54.5 ± 0.1 V dc.

11 Repeat step 6 through step 10 for the next rectifier and the second BEM.

12 Turn ON the dc then the ac circuit breakers on all remaining rectifiers.

13 Continue the rectifier adjustment procedures using Procedure 9-8, “Adjusting the load sharing”

—end—

Procedure 9-8
Adjusting the load sharing

Use this procedure to adjust the modular business package (MBP) rectifier load sharing to within 0.1 A.

Requirement

Procedure 9-1 through Procedure 9-7 have all been completed.

The following tools are required:

- slotted screwdriver, 0.254 cm (0.1 in.) blade
- Fluke 8050A rms voltmeter (or equivalent)

Documentation references

- *Equipment Installation Operation and Maintenance for MPR25/MPR15 Series Single Phase -48 V, 25 A Switch Mode Rectifier NT5C06,* 169-2071-500

Table 9-4 shows the Nortel Networks recommended rectifier settings for a number of battery types. These settings are referenced throughout the procedure.

Table 9-4
Rectifier adjustment settings

Battery manufacturer	High voltage shutdown (HVSD)	Equalize (EQL)	Float (FLT)
Johnson Control	-56.0 ± 0.1	-55.0 ± 0.1	-54.5 ± 0.1

—continued—

Procedure 9-8 (continued)
Adjusting the load sharing

Action

Step	Action

1 Ensure that all rectifiers are ON and all BEM circuit breakers are ON.

2 Examine all rectifiers for the status of the RFA LEDs (see Figure 9-3).

To coarsely adjust the load sharing of multiple rectifiers, determine the condition that applies to your installation and go to the step indicated:

If	Then
only one RFA LED is illuminated green	The rectifier with the green RFA LED is floating slightly too high. Go to step 3.
the RFA LED on both rectifiers is illuminated green	The rectifiers are sharing the load closely. Go to step 4.

3 On the rectifier that has the RFA LED illuminated green, slowly and *very slightly* adjust the FLT potentiometer counterclockwise until the RFA LED of the other rectifier illuminates green.

4 Examine and compare the display of the ammeters on the rectifiers.

Note: Nortel Networks recommends that the ammeters of all installed rectifiers read within 0.1 A of each other for proper load sharing.

5 Adjust the FLOAT voltage of the rectifier that has the lowest current reading on the rectifier ammeter display by slowly and *very slightly* adjusting the FLT potentiometer clockwise until the ammeter reading is no longer the lowest.

Note: The FLT potentiometer load sharing adjustment is very sensitive. Small adjustments can reflect large changes in the ammeter readings.

6 Adjust the FLOAT voltage of the rectifier that has the highest current reading on the rectifier ammeter display by slowly and *very slightly* adjusting the FLT potentiometer counterclockwise until the ammeter reading is no longer the highest of the installed rectifiers.

Note: The FLT potentiometer load sharing adjustment is very sensitive. Small adjustments can reflect large changes in the ammeter readings.

7 Repeat from step 4 until the RFA LED on both rectifiers is illuminated green and the ammeter displays read within 0.1 A of each other.

8 On the dc distribution shelf, turn the SENSE DIP switch positions 1 and 2 to the right.

9 When all rectifiers are adjusted, you have completed the rectifier adjustment procedures and the rectifiers are ready for service. Go to Procedure 9-9, “Verifying the LVD indicators”.

—end—

Procedure 9-9
Verifying the LVD indicators

Use this procedure to verify the operation of the LED indicators in the modular business package (MBP) low voltage disconnect (LVD) unit mounted in the rear of the master cabinet.

The LEDs on the LVD unit indicate alarm and status conditions for the rectifiers and the LVD. The LED indicator definitions and causes are listed in the following table:

LED	Color	Definition	Cause
RFA MIN	Red	Rectifier fail alarm - minor	There is a tripped circuit breaker on one rectifier.
RFA MAJ	Red	Rectifier fail alarm - major	There are tripped circuit breakers on more than one rectifier.
Test BYP	Red	Test bypass indication	The LVD bypass switch is in the BYP position.

Requirements

DANGER
Risk of injury or damage
Read the warnings and precautions, in Chapter 1, to minimize any risk to personnel and equipment.

- The rectifiers have been adjusted and verified according to Procedure 9-1 through Procedure 9-8, and remain in the power-up condition (all rectifier circuit breakers are ON).
- The BIP circuit breakers are OFF and the rectifier breakers are ON.

Tools

No tools are required to perform this procedure.

—continued—

Procedure 9-9 (continued)
Verifying the LVD indicators

Action

Step	Action
	Verifying the RFA MIN alarm indicator
1	Turn the ac and then the dc breakers on rectifier 1 to the OFF position. *The RFA MIN red LED illuminates, indicating a minor rectifier failure alarm.*
2	Turn the dc and then the ac breakers on rectifier 1 to the ON position. *The RFA MIN red LED turns off.*
3	Repeat steps 1 to 2 for each rectifier.
	Verifying the RFA MAJ alarm indicator
4	Turn the ac and then the dc breakers on two rectifiers to the OFF position. *The RFA MAJ red and the RFA MIN yellow LEDs illuminate, indicating a major rectifier failure alarm.*
5	Turn ON the dc then the ac breakers on one rectifier. *The RFA MAJ red LED turns off, and the RFA MIN yellow LED remains illuminated.*
6	Turn ON the dc and then the ac breakers on the second rectifier. *The RFA MIN red LED turns off.*
	Verifying the TEST BYP indicator
7	Set the LVD BYP/NORMAL switch to the BYP position. *The TEST BYP LED illuminates.*
8	Go to Procedure 9-10, “Adjusting the LVD unit”.

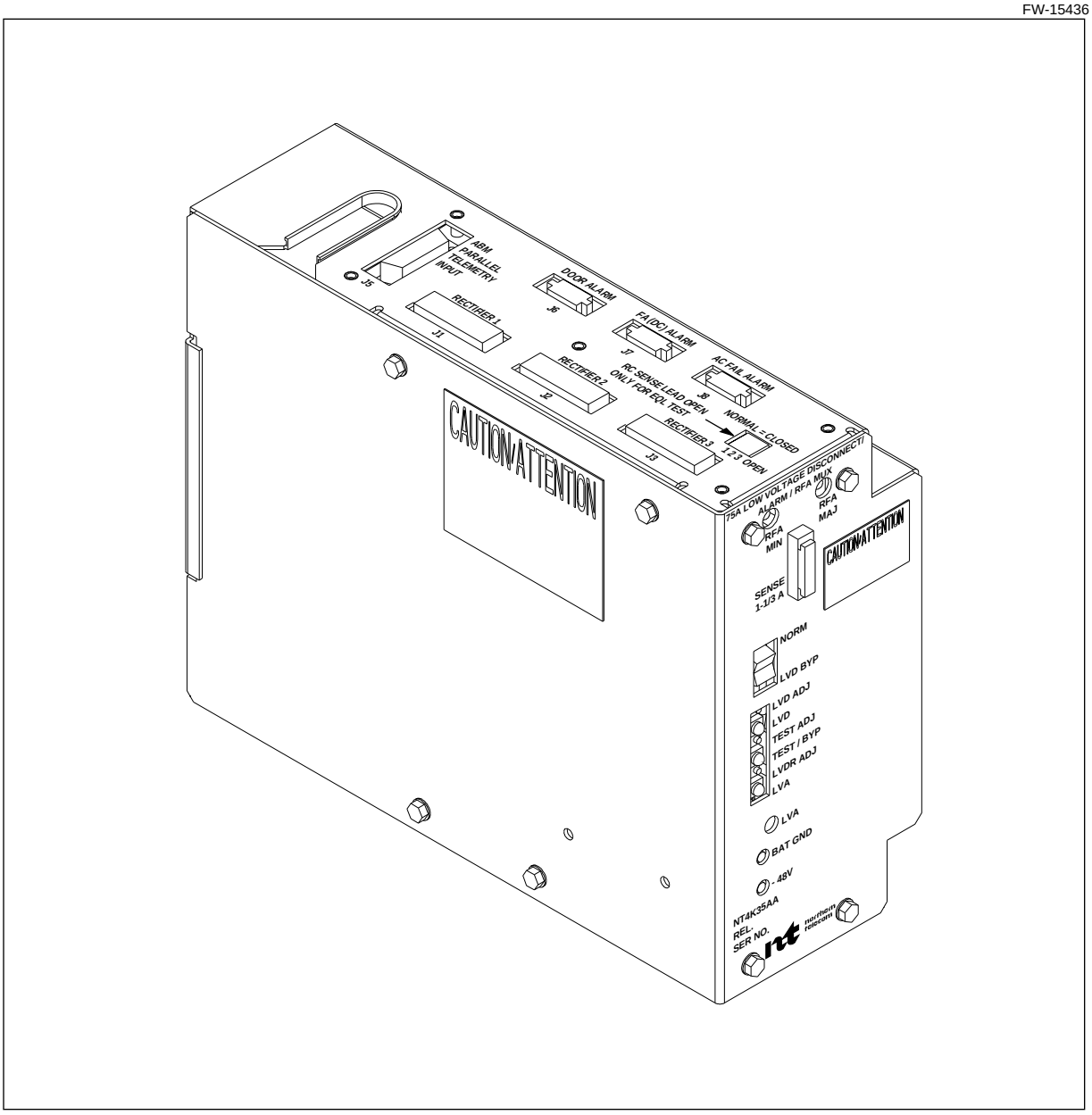
—continued—

Procedure 9-9 (continued)
Verifying the LVD indicators

Step	Action

Figure 9-5
LVD unit

FW-15436



—end—

Procedure 9-10
Adjusting the LVD unit

Use this procedure to adjust and verify the operation of the modular business package (MBP) low voltage disconnect (LVD) unit mounted in the rear of the master cabinet.

The threshold adjustments and settings for the LVD unit and the float voltage for the batteries are:

Threshold	**Setting (V dc)**
Low voltage alarm (LVA)	-47.0 ± 0.2
Low voltage disconnect (LVD)	-42.5 ± 0.2
Low voltage disconnect return (LVDR)	-50.5 ± 0.1
Float voltage (FLT)	-54.5 ± 0.1

Requirements

Before beginning this procedure, the following requirements must be met:

- The rectifiers must be adjusted and verified according to Procedure 9-1 through Procedure 9-9, and remain in the power-up condition (all rectifier circuit breakers are ON).
- The BIP circuit breakers must be in the OFF position.

Tools

The following tools are required:

- slotted screwdriver, 0.254 cm (0.1 in.) blade
- Fluke 8050A rms voltmeter (or equivalent)

Cautions

DANGER
Risk of injury or damage
Read the warnings and precautions, in Chapter 1, to minimize any risk to personnel and equipment.

—continued—

Procedure 9-10 (continued)
Adjusting the LVD unit

Action

Step	Action
1	On the dc distribution unit, turn the circuit breakers to the OFF position.
Setting the LVA threshold to -47.0 ± 0.2 V dc	
2	Connect the digital multimeter, set to read dc volts, to the test jacks on the faceplate of the LVD unit.
3	Adjust the TEST ADJ potentiometer clockwise (to increase) or counterclockwise (to decrease) the voltage to -50.0 V dc.
4	Slowly turn the TEST ADJ potentiometer counterclockwise and monitor the digital multimeter and the LV ALM LED to determine the LVA threshold.

If the LV ALM LED	Then go to
does not illuminate before reaching -47.0 ± 0.2 V dc	step 5
illuminates before reaching -47.0 ± 0.2 V dc	step 7

5	If the LV ALM LED does not illuminate before reaching -47.0 ± 0.2 V dc, use the TEST ADJ potentiometer to set the voltage reading to -47.0 V dc
6	Slowly turn the LV ADJ potentiometer clockwise until the LV ALM LED illuminates. Then go to step 10.
7	If the LV ALM LED illuminates before reaching -47.0 ± 0.2 V dc, continue to turn the TEST ADJ potentiometer counterclockwise until the voltage reading reaches -47.0 V dc.
8	Slowly turn the LV ADJ potentiometer counterclockwise until the LV ALM LED extinguishes.
Setting the LVD alarm threshold to -42.5 ± 0.2 V dc	
9	Slowly turn the LV ADJ potentiometer clockwise until the LV ALM LED illuminates.
10	Slowly turn the TEST ADJ potentiometer counterclockwise and monitor the digital multimeter and the LVD ALM LED to determine the LVD threshold.

If the LVD ALM LED	Then go to
does not illuminate before reaching -42.5 ± 0.2 V dc	step 11
illuminates before reaching -42.5 ± 0.2 V dc	step 13

11	If the LVD ALM LED does not illuminate before reaching -42.5 ± 0.2 V dc, use the TEST ADJ potentiometer to set the voltage reading to -42.5 V dc
12	Slowly turn the LVD ADJ potentiometer clockwise until the LVD ALM LED illuminates. Then go to step 16.

—continued—

Procedure 9-10 (continued)
Adjusting the LVD unit

Step	Action
13	If the LVD ALM LED illuminates before reaching –42.5 ± 0.2 V dc, continue to turn the TEST ADJ potentiometer counterclockwise until the voltage reading reaches -42.5 V dc.
14	Slowly turn the LVD ADJ potentiometer counterclockwise until the LVD ALM LED extinguishes.
15	Slowly turn the LVD ADJ potentiometer clockwise until the LVD ALM LED illuminates.
16	Slowly turn the TEST ADJ potentiometer clockwise until the LV ALM LED extinguishes.

CAUTION
Risk of service outage
If you switch the BYPASS/NORMAL switch back to NORMAL position before the LVD and LVR potentiometer adjustments are fully verified, you may cause a loss of power to the load.

Setting the LVDR threshold to -50.5 V dc

17 Continue to adjust the TEST ADJ potentiometer clockwise and monitor the digital multimeter and the LVD ALM LED until the LVD ALM LED extinguishes or -50.5 V dc is reached.

If the LVD ALM LED	Then go to
does not extinguish before reaching -50.5 V dc	step 18
extinguishes before reaching -50.5 V dc	step 19

18 Slowly turn the low voltage re-connect (LVR) potentiometer counterclockwise or clockwise until the LVD ALM LED extinguishes.

Returning the BIP shelf to normal operation

19 Set the LVD BYP/NORMAL switch to the NORMAL position.

20 Ensure that all circuit breakers on all the rectifiers are in the ON position.

21 Turn the circuit breakers on the dc distribution unit to the ON position.

22 Ensure that all circuit breakers on the BIP are in the OFF position.

23 Verify that the system float voltages are set to the battery manufacturer's requirement.

Note: Johnson control battery float voltage is -54.5 ± 0.1 V dc.

—end—

Procedure 9-11
Rejuvenating the batteries

Use this procedure to rejuvenate batteries used in the modular business package (MBP) master and expansion cabinets after the batteries have been placed in-service.

Requirements

CAUTION
DC input voltage specifications
The input voltage specifications require that the dc input to the BIP does not exceed -56.0 V dc. Battery float, equalize, and high voltage shutdown levels *must* be set below this maximum regardless of the type of batteries installed.

Tools

The following tools are required:

- electrical tape
- Fluke 8050A rms voltmeter (or equivalent)
- portable battery rejuvenating device

Action

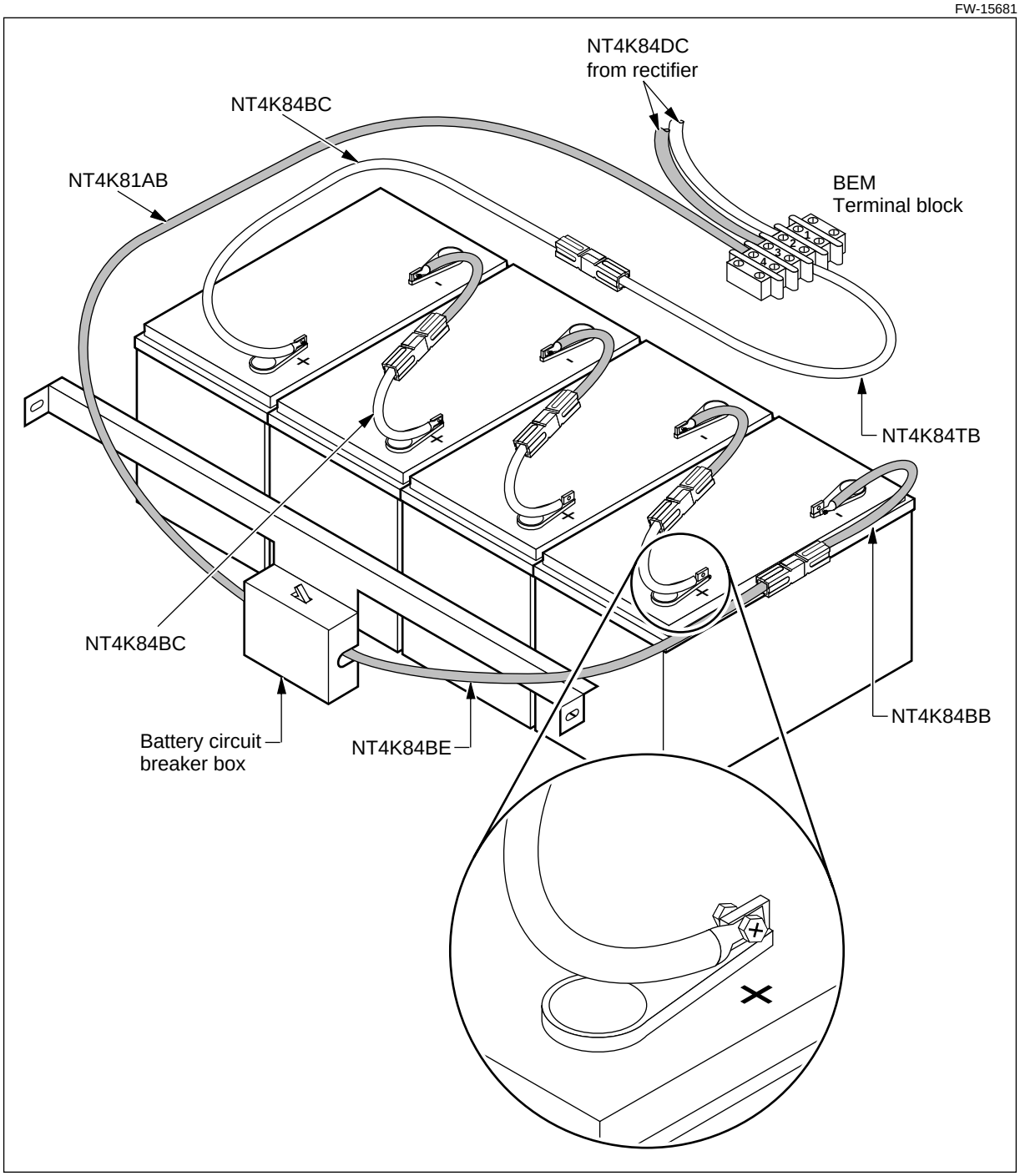
Step	Action
1	Remove the front cover of the BEM.
2	Turn OFF the BEM circuit breaker for the string of batteries to be rejuvenated.
3	Disconnect the negative (-) battery harness power connector in the red lead between the right-most battery and the BEM circuit breaker (see Figure 9-6).
4	Insulate the red connector with electrical tape to prevent shorting.
5	Disconnect the positive (+) battery harness power connector in the white lead between the left-most battery and the BEM terminal block (see Figure 9-6).
6	Insulate the white connector with electrical tape to prevent shorting.
7	Connect the battery rejuvenating device to the batteries according to the device's manufacturers recommendations and local practices and codes.
8	Rejuvenate the batteries to levels specified by the battery manufacturer.

—continued—

Procedure 9-11 (continued)
Rejuvenating the batteries

Figure 9-6
Battery connections

FW-15681



—continued—

Procedure 9-11 (continued)
Rejuvenating the batteries

Step	Action
9	After the rejuvenation process is completed, disconnect the battery rejuvenating device.
10	Check the battery voltage on the newly rejuvenated string.
11	Compare the voltage to the other strings. ***Note:*** The voltages should match as closely as possible (within 0.25 V dc) before re-connecting.
12	If the voltages are not within 0.25 V dc, repeat the rejuvenation process.
13	Remove the electrical tape from the connectors.
14	Re-connect the white (+) and then the red (-) battery harness connectors (see Figure 9-6).
15	Turn ON the BEM circuit breaker.
16	Repeat steps 1 though 15 for each string of batteries to be rejuvenated.
17	Re-install the BEM covers.

—end—

Powering up the equipment and installing the circuit packs

This chapter contains the procedures that you perform on the modular business package (MBP) master and expansion cabinets to verify power wiring, power up the equipment and install circuit packs.

These are the last installation procedures. When you successfully complete these procedures, notify the HUB site personnel that the remote site is ready for commissioning.

Chapter contents

This chapter contains the following information:

Perform the procedures in the order listed.

Warnings

Prior to performing any rectifier replacement procedures, read each warning carefully. Important battery and rectifier information is presented here.

DANGER
Risk of fire
Remove all paper and any other combustible materials from inside the cabinet before the cabinet is powered up. Failure to comply with this warning could result in a fire.

CAUTION 1
Procedure sequence
Perform the steps in the order shown because the sequence of turning the breakers on and off is critical.

CAUTION 2
DC voltage output levels testing
The dc voltage output level from each rectifier module *must* be tested and adjusted according to Nortel Networks recommended float voltages for the following battery manufacturers.
Johnson Control 12V: -54.50 ± 0.10 V dc
Note: These ranges are subject to change without notice.

CAUTION 3
DC input voltage specifications
The input voltage specifications require that the dc input to the BIP does not exceed -56.0 V dc. Battery float, equalize, and high voltage shutdown levels *must* be set below this maximum regardless of the type of batteries installed.

CAUTION 4
Observe polarities at all times
Observe proper polarity orientation between batteries and battery charger.

Procedure 10-1
Verifying the wiring and powering up the equipment

Use this procedure to verify the power wiring and blower module operation in the modular business package (MBP) master and expansion cabinets.

Requirements

Prior to beginning this procedure, these actions must be completed:

- The batteries must be installed and tested.
  (See Procedure 9-1 through Procedure 9-3.)
- The rectifiers and the LVD unit must be powered up and adjusted and the ABM BIP battery feed power connectors must be disconnected.
  (See Procedure 9-4 through Procedure 9-10.)
- All circuit breakers in the breaker interface panel (BIP) in the MBP master cabinet must be in the OFF position.

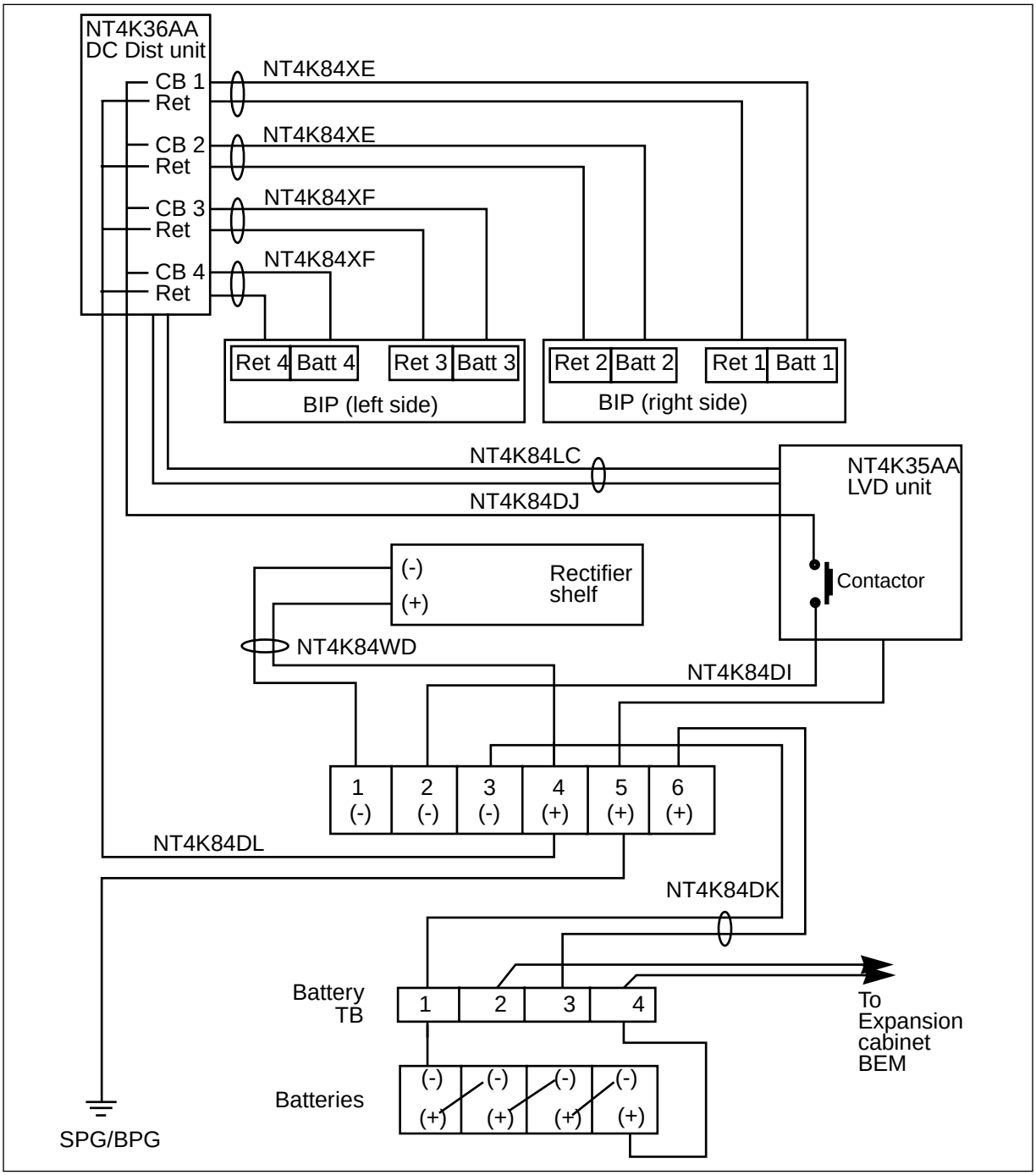
Action

Step	Action
	Verifying the power wiring
1	Verify the power wiring in MBP master and expansion cabinets. Figure 10-1 shows the power cabling to the BIP and Figure 10-2 shows the BIP dc distribution wiring. ***Note:*** Be sure to verify the polarity of the cabling and wiring also.

—continued—

Procedure 10-1 (continued)
Verifying the wiring and powering up the equipment

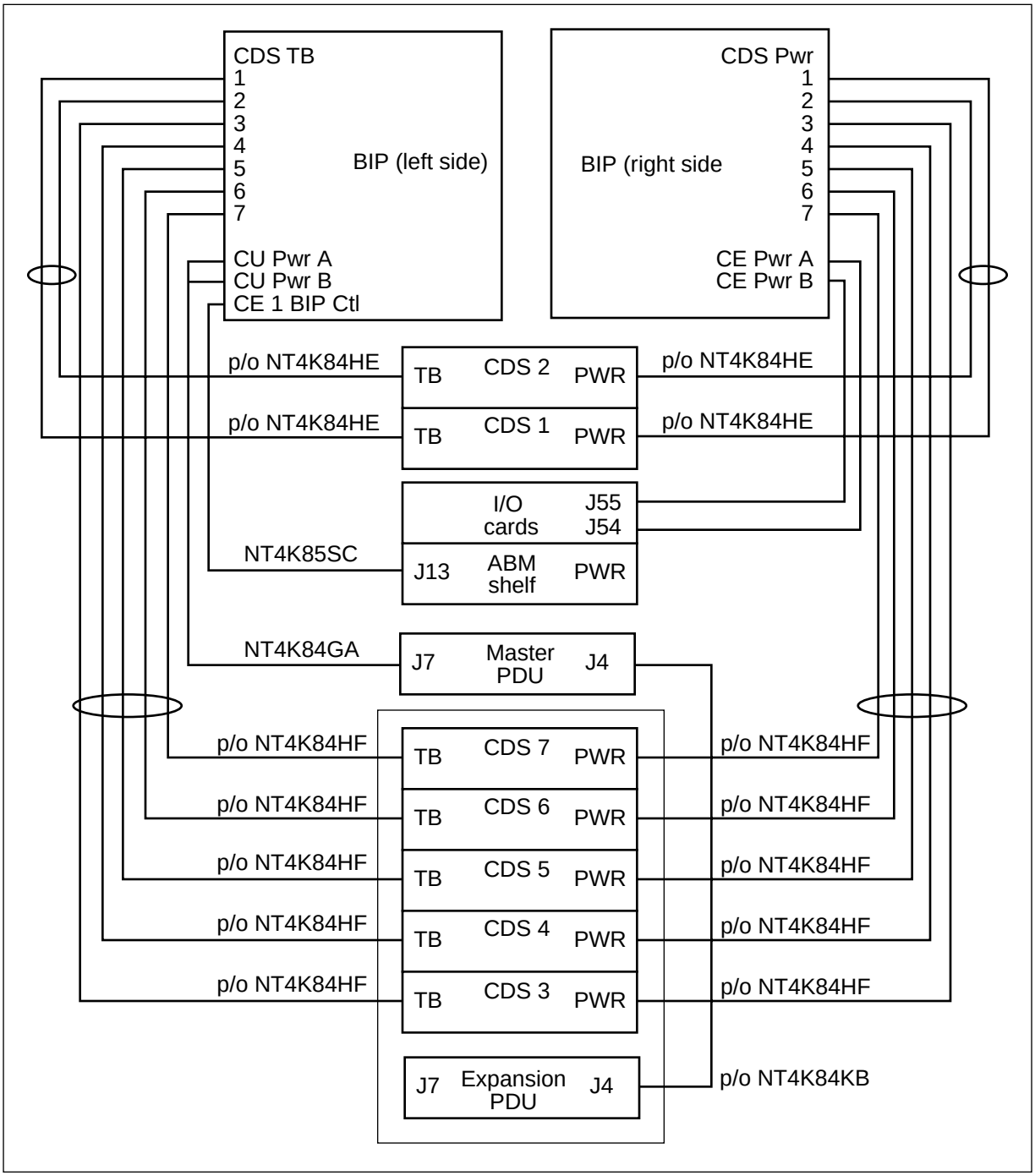
Figure 10-1
Power and battery cabling to the BIP



—continued—

Procedure 10-1 (continued)
Verifying the wiring and powering up the equipment

Figure 10-2
BIP power distribution diagram



—continued—

Procedure 10-1 (continued)
Verifying the wiring and powering up the equipment

Step	Action

Verifying the battery feeds to the ABM BIP

2 Disconnect the BIP battery feed cable connectors (Batt 1, Batt 2, Batt 3 and Batt 4) on the sides of the BIP (see Figure 10-3).

3 Turn ON the CB1 circuit breaker on the dc distribution unit.

4 Use the voltmeter to check for battery feed presence and polarity on the Batt1/Ret1 cable connector at the right side of the ABM BIP.

Battery (-) should be on the Red lead and Battery Return (+) should be on the White lead.

If the battery voltage is	Then go to
not present or is reversed	step 5
correct	step 8

5 Turn OFF the CB1 circuit breaker on the dc distribution shelf.

6 Re-check and correct all battery feed wiring from the dc distribution shelf to the BIP battery feed connectors (see Figure 10-1 and Figure 10-2).

7 Go to step 3.

8 Turn OFF the CB1 circuit breaker on the dc distribution shelf.

9 Connect the Batt1/Ret1 connector to the Batt1/Ret1 receptacle on the BIP.

10 Repeat steps 3 through 9 for CB2/Batt 2, CB3/Batt 3 and CB4/Batt 4.

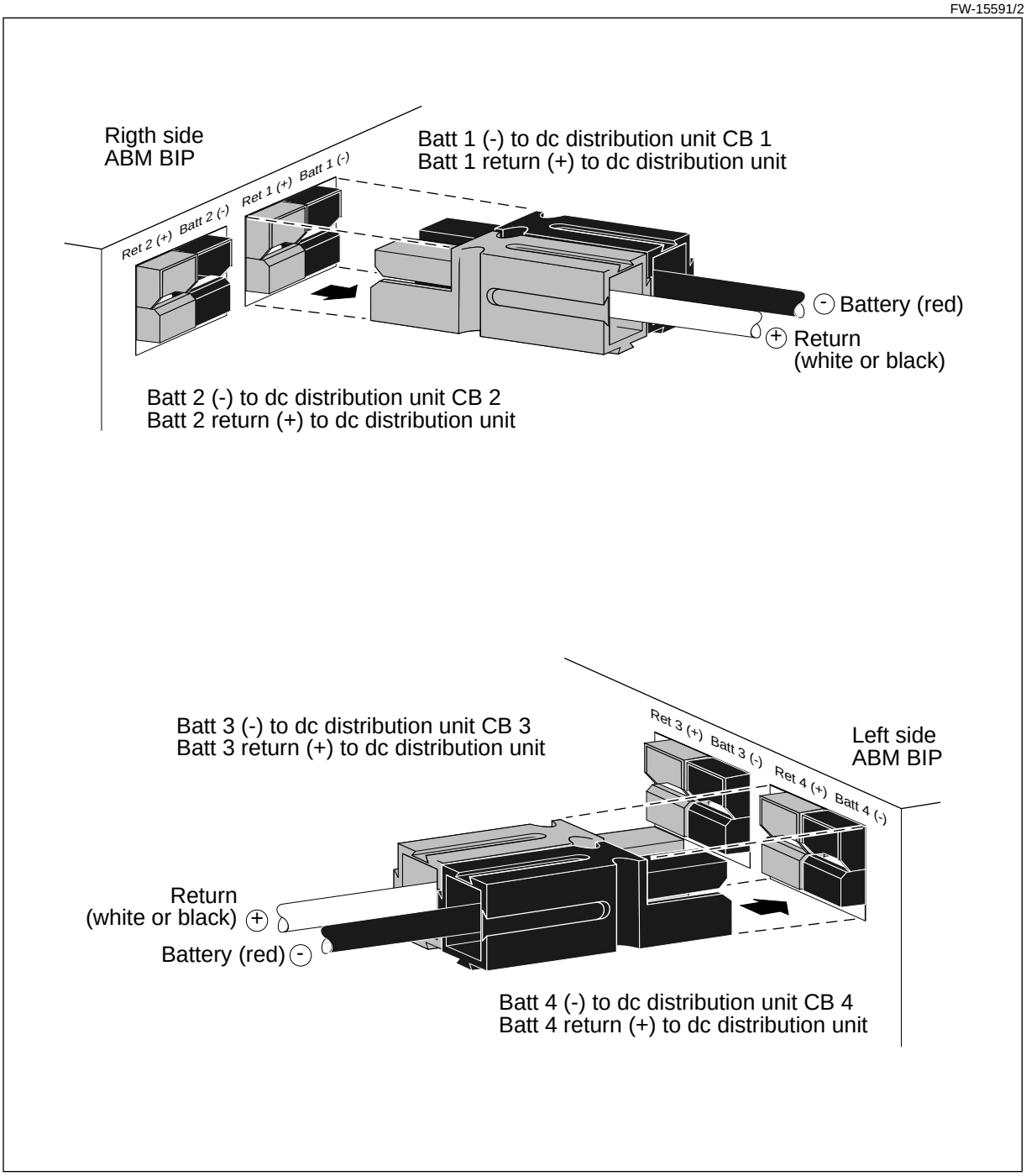
11 Turn ON all four circuit breakers (CB1–CB4) on the dc distribution unit.

—continued—

Procedure 10-1 (continued)
Verifying the wiring and powering up the equipment

Figure 10-3
BIP power connectors for the ABM shelf

FW-15591/2



—continued—

Procedure 10-1 (continued)
Verifying the wiring and powering up the equipment

Step	Action
	Verifying the MBP master cabinet blowers and power output
12	Turn ON (I) the CU A circuit breaker on the BIP.
13	Turn ON (I) the MBP master cabinet blower module circuit breaker.
14	Verify that the blowers in the MBP master cabinet turn ON (I). ***Note:*** The blowers will not operate if the power wiring is reversed.
	Verifying the MBP expansion cabinet blowers
15	Turn OFF (O) all of the circuit breakers on the BIP.
16	Turn the circuit breaker on the MBP expansion cabinet blower to the ON (I) position.
17	Power up the MBP master cabinet blower module by turning the CU A circuit breaker on the BIP to the ON position.
18	Verify that the blowers in the MBP master cabinet turn ON (I).
19	Turn OFF CU A and then turn ON CU B.
20	Verify that the blowers in the MBP expansion cabinet turn ON (I). ***Note:*** The blowers will not operate if the power wiring is reversed.
21	Turn ON (I) all of the circuit breakers on the BIP.

—end—

Procedure 10-2
Installing the circuit packs

Use this procedure to install the circuit packs in the modular business package (MBP) master and expansion cabinets after the batteries and rectifiers have been installed and adjusted and the cabinets have been powered up.

Requirements

Prior to beginning this procedure, these actions must be completed:

- The wiring must be verified and cabinet powered up. (See Procedure 10-1.)

Action

Step	Action
	Installing the BIP circuit packs
1	Put on an anti-static wrist strap and connect it to the ESD jack on the LCAP located in the MBP master cabinet.
2	Install the NT4K61BA talk battery filter card into the BIP (see).
3	Install the NT4K64BA alarm relay card below the talk battery filters. ***Note:*** Ensure that both cards are fully seated.T
4	Turn all circuit breakers in the BIP to the ON (I) position. ***Note:*** If the power to the BIP is applied and the load is powered on the left and right side of the BIP, you may hear the relay chattering. This is normal and will stop as soon as the load is applied to either side. To apply a load turn on at least one cooling unit connected to the left side of the BIP and plug in at least one circuit pack in the ABM shelf or turn on power to one of the CDS shelves.

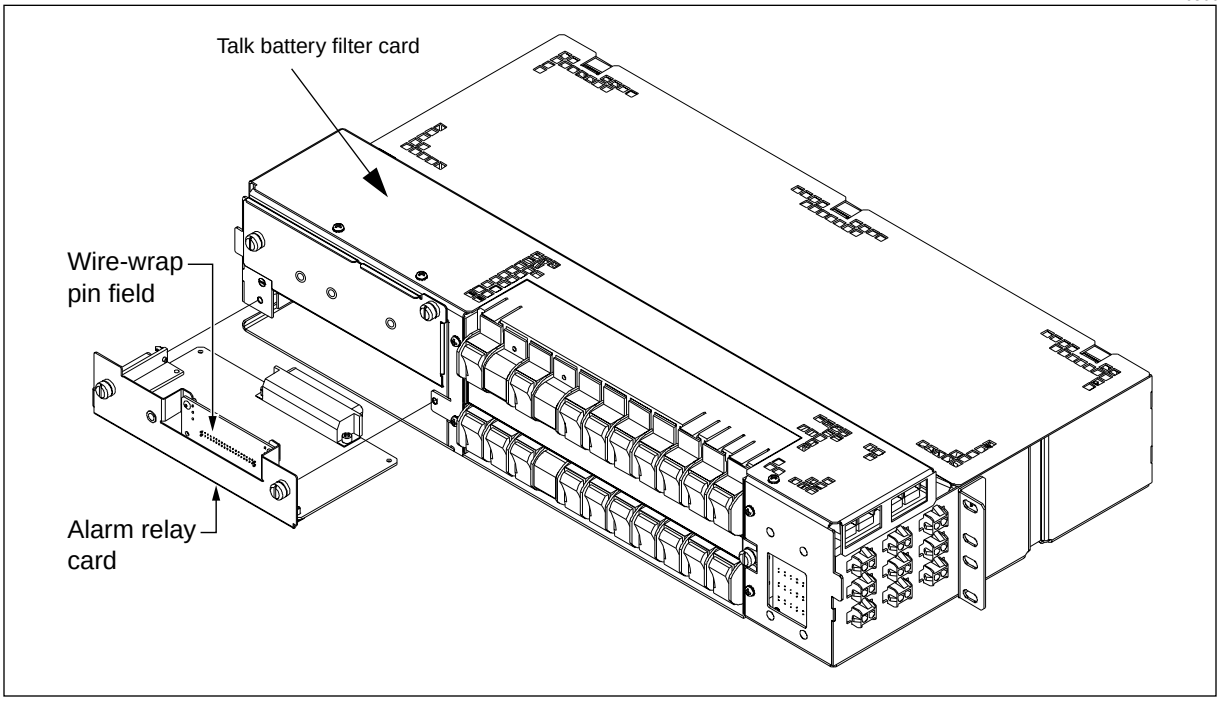
—continued—

Procedure 10-2 (continued)
Installing the circuit packs

Step	Action

Figure 10-4
Installing BIP circuit packs

FW-16500



Installing the CDS shelf common-equipment circuit packs

5 Install the circuit packs in the CDS as shown in Table 10-1 and Figure 10-5.

6 Repeat step 5 for each CDS shelf installed.

—continued—

Procedure 10-2 (continued)
Installing the circuit packs

Step Action

Table 10-1
CDS shelf circuit pack installation

Circuit pack	CSDS shelf slot
Left drawer	
NT4K73 Metallic test access card (MTA)	Slot MTA A
NT4K70 Line interface cards (LIC)	Slots LIC A and LIC B
Line cards	As required by job specifications
Right drawer	
NT4K73 Metallic test access card (MTA)	Slot MTA B
NT4K70 Line interface cards (LIC)	Slots LIC C and LIC D
Line cards	As required by job specifications
Front of CDS shelf	
NT4K62 CDS power units	CDSP A and CDSP B

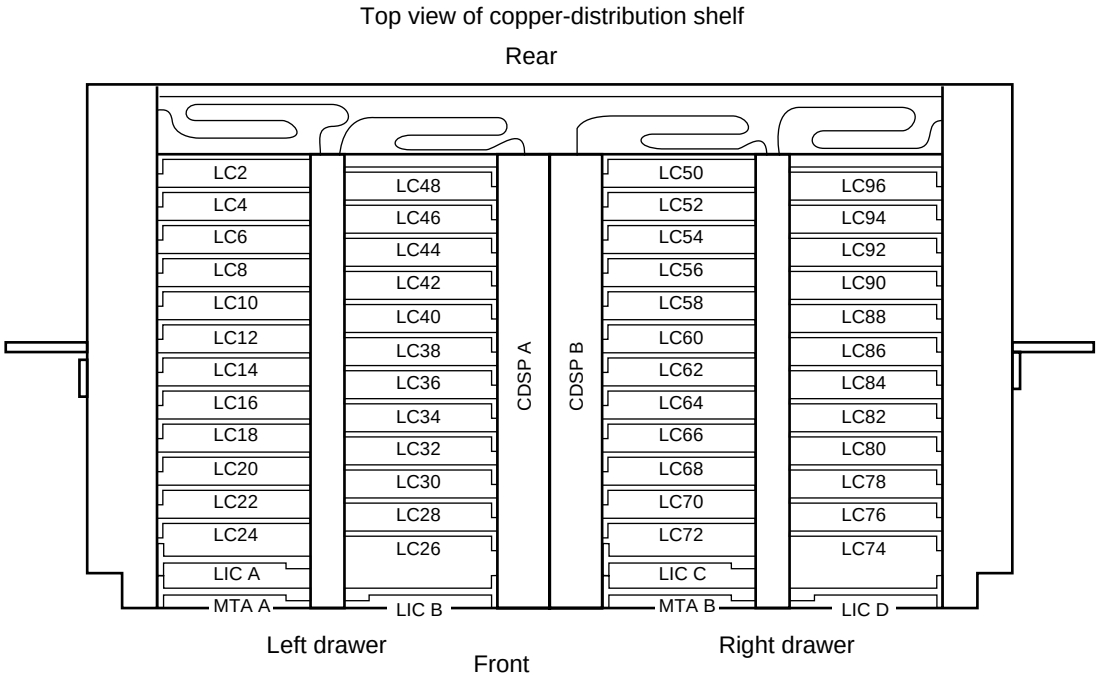
—continued—

Procedure 10-2 (continued)
Installing the circuit packs

Step	Action

Figure 10-5
CDS drawer layout

FW-10750



Note 1: The odd-numbered line card slots are not visible from the top, only from the side.

Note 2: The narrowband line-interface cards (LIC A-D) and metallic test access cards (MTA A and B) are full-height common cards.

—continued—

Procedure 10-2 (continued)
Installing the circuit packs

Step	Action
	Installing the ABM circuit packs
	It is recommended that the ABM circuit pack installation be deferred, at this time, to the commissioning and testing activities which follow the mechanical installation processes defined in this document. Refer to *Commissioning and Testing*, Volume 3.
	Note: Quantities and locations of ABM shelf circuit packs may differ according to job specifications. Reference the job specifications and local records to determine the exact circuit pack slot assignments in the ABM.
7	Remove and disconnect the anti-static wrist strap.
	Re-checking the rectifier load sharing
8	Re-check the load sharing on the rectifiers.
	Note: All rectifier ammeters should read within 0.1 A of each other. If load sharing re-adjustment is required, reference Procedure 9-8, “Adjusting the load sharing”.
	Installing the covers
9	Remove all tools, test equipment and combustible materials from inside all cabinets.
10	Install all shelf equipment covers.
11	Install and lock all cabinet covers.
12	Turn over the keys to the responsible contacts.
13	Clean up the area and turn out the lights.
14	You have completed the installation process. Notify the HUB site that the remote site is ready for commissioning and testing.
15	Turn over the commissioning data forms (if you have filled them out) to the responsible contacts.

—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. (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 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 from Nortel within five working days after receiving the order.
- **Repair of the circuit pack**: The repaired circuit pack is shipped from Nortel within fourteen 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 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

List of acronyms

ABM

Access bandwidth manager

AC

Alternating current

ACEG

Alternating current equipment ground

ACO

Alarm cut off

AIC

Access interface card, a plug-in module for the common-equipment shelf

APC

Access processor card, a plug-in module for the common-equipment shelf

AWG

American wire gauge, defines the size of electrical conductors

BDFB

Battery distribution fuse bay

BEM

Battery equipment module. The BEM provides internal mounting space for back-up batteries in modular business package applications.

BIP

Breaker interface panel. The BIP provides external interface and shelf distribution of battery power, and processes system alarm and telemetry signals.

CBN

Common bonding network. CBN defines a set of metallic components intrinsic to buildings that are deliberately interconnected to form an equal potential network. These components include structural steel or reinforcing rods, ac mains power conduit, and ACEG connections, cable racks, and bonding conductors.

CDS

Copper-distribution shelf

CDSP

Copper-distribution shelf power card, a plug-in module to supply power for the copper-distribution shelf

CNET

Control network

COP

Cable organizer panel. The COP provides external cabling management facility for the AccessNode ABM shelf.

CSA

Canadian Standards Association

DEM

Dual equipment module

DS0

Digital signal, level 0, having a transmission rate of 64 kb/s

DS1

Digital signal, level 1, having a transmission rate of 1.544 Mb/s carrying 24 DS0s plus overhead bits

DS3

Digital signal, level 3, having a transmission rate of 44.7 Mb/s carrying 28 DS1s plus overhead bits

DSX-1

Digital signal cross-connect

ESD

Electrostatic discharge. ESD protection is provided for AccessNode on the LCAP, to allow for a wrist strap connection by local maintenance personnel.

EQL

Equalize voltage

FEM

Field expansion module

FGB

Floor ground bar

HVSD

High voltage shutdown

IBN

Isolated bonding network. IBN defines an equipment area having a single point ground (SPG) connection to either a common bonding network or other IBN.

IRTU

Integrated remote test unit

LED

Light emitting diode

LCAP

Local craft access panel

LIC

Line interface card, a plug-in module for the line drawer in the copper-distribution shelf

LVD

Low voltage disconnect

LVDR

Low voltage disconnect return

MBP

Modular business package

MIC

Maintenance interface card, a plug-in module for the common-equipment shelf

MPR

Modular power rectifier

MTAC

Metallic test access card, a plug-in module for the line drawer in the copper-distribution shelf

MVOA

Miniature variable-optical attenuator

NLIC

Narrowband line interface card, a plug-in module for the line drawer in the copper-distribution shelf

OC-n

Optical signal carrier, where n defines the level (1, 3, 9, 12, 24, 36, or 48) equal to the STS signal of the same level

OPC

Operations controller

OSP

Outside Plant

PDU

Power distribution unit

PEC

Product engineering code, used by Northern Telecom for product identification

RFT

Remote fiber terminal

SEM

Single equipment module

SIL

Side interconnect left

SIR

Side interconnect right

SPG

Single-point ground, used to reference equipment or systems to a single ground through which no dc current flows, unless a fault condition exists. The SPG is the point of reference for the frame grounds, logic returns, battery return bus, and ACEG conductors of the ac circuits serving the system.

STSBM

SONET transport signal bandwidth manager

TAC

Test access card, a plug-in module for the common-equipment shelf

VF

Voice frequency

VTBM

Virtual tributary bandwidth manager

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Modular Business Package VTBM Ring Installation Guide

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