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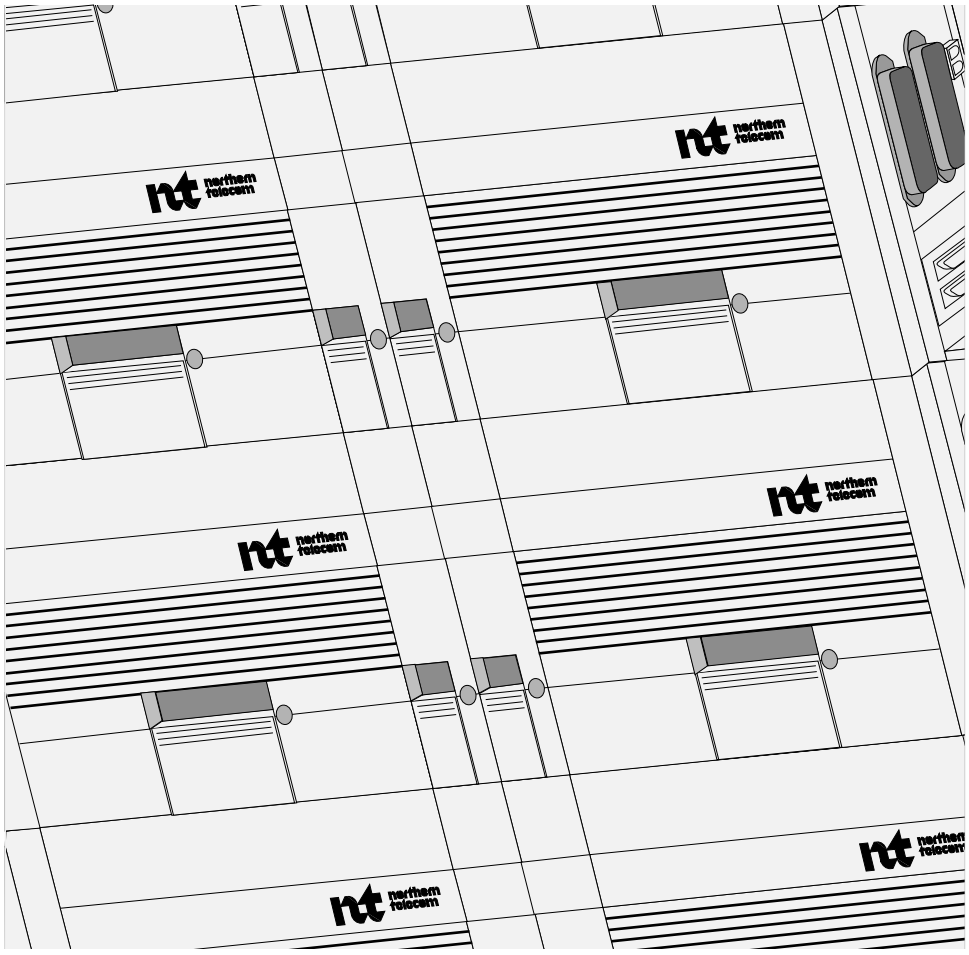
SONET Products

AccessNode

Modular Business Package VTBM Ring User Guide

Issue 1.0 June 1999



NORTEL NETWORKS™

SONET Products

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Modular Business Package VTBM Ring User Guide

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Publication history

June 1999

Release-independent Standard Issue 1.0 of the document.

February 1999

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

- Added new Cooling Unit NT4K18CA
- Added new Breaker Interface Panel (BIP) NT4K14BA

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

June 1998

Release-independent Standard 01.01 release of the document.

September 1997

Standard 01.01 AN14 released for general distribution.

July 1996

Standard 01.01 AN12 released for general distribution. This is a new document that describes the after-service procedures for the modular business package virtual tributary bandwidth manager master and expansion cabinets.

Contents

About this document

This document contains instructions for performing the following user and maintenance activities:

- alarm recognition
- replacing modules and circuit packs
- general maintenance
- shelf/equipment circuit breaker locations and designations
- wiring diagrams (power)

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.

CAUTION
Service-affecting procedures
Some of the procedures in this document are affect service and must be done with the system powered down. Before performing a service-affecting procedure, obtain and have on-site a copy of the AccessNode system *Recovery Procedures*, 323-3001-545, in *Maintenance*, Volume 5C.

Before using this document to use or maintain AccessNode equipment in modular business package (MBP) cabinets, you should already have considered the following list of requirements and developed a floor plan, as described in *Modular Business Package VTBM Ring Installation Guide.*

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

Additional documentation

If you intend to perform a service-affecting procedure, obtain and have on-site the following documents that you may need to restore the system to service:

- *Alarm and Trouble Clearing Procedures*, 323-3001-543, in *Maintenance*, Volume 5A
- *Recovery Procedures*, 323-3001-545, in *Maintenance*, Volume 5C

How to use this document

Read Chapter 1, “Safety guidelines and warnings,” before beginning any user or maintenance procedure:

Perform the procedure steps in the order presented.

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

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 insulation 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.

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.

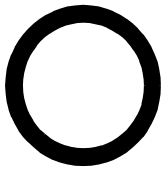
International electrical symbols on equipment

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

Power on

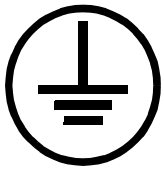
This symbol indicates that a main power on/off switch is in the on position.

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.

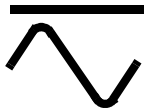
Alternating current

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

Direct current

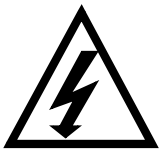
This symbol indicates the location of a terminal that supplies direct current or to which a source of direct current is applied.

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 equipment and cabling configurations

This chapter describes the following:

- configuration of the equipment in the modular business package (MBP) OC-12 virtual tributary bandwidth manager (VTBM) ring master and expansion 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 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 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 the latest system software releases 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 the latest AccessNode software release.

The remote site ABM shelf, operating on the latest AccessNode software release, 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 MBP OC-12 VTBM fiber ring configuration

PC-15557

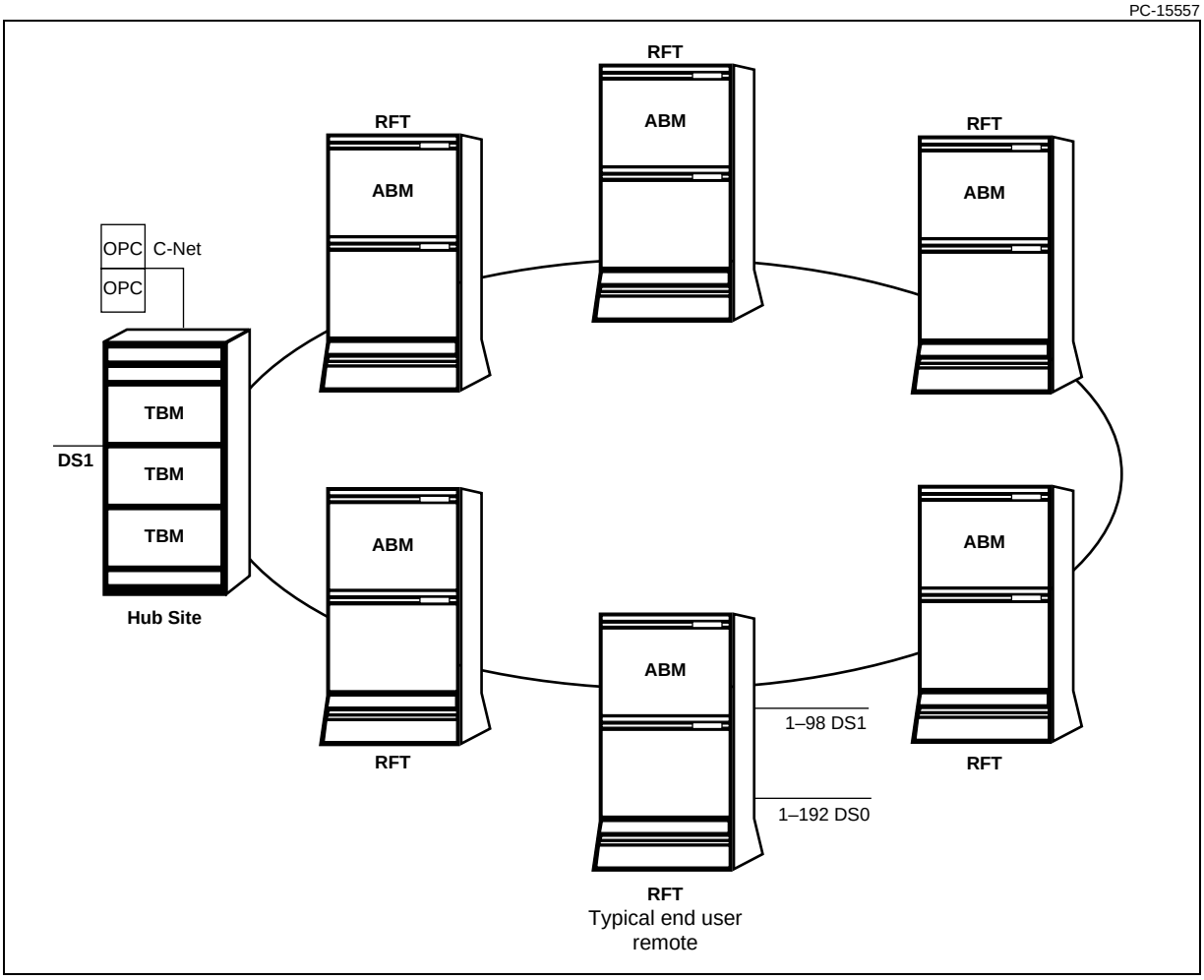
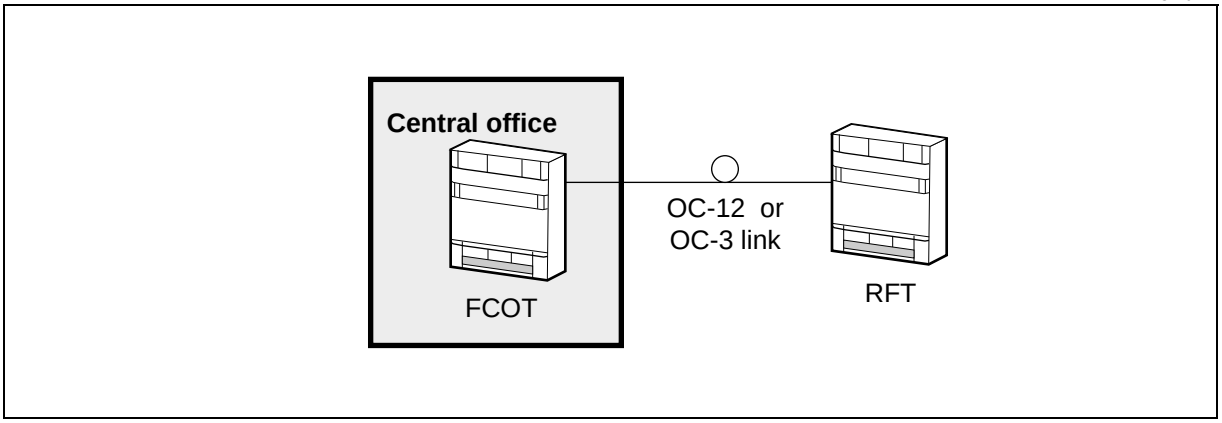


Figure 2-2
Basic fiber-fed AccessNode system

PC-10122



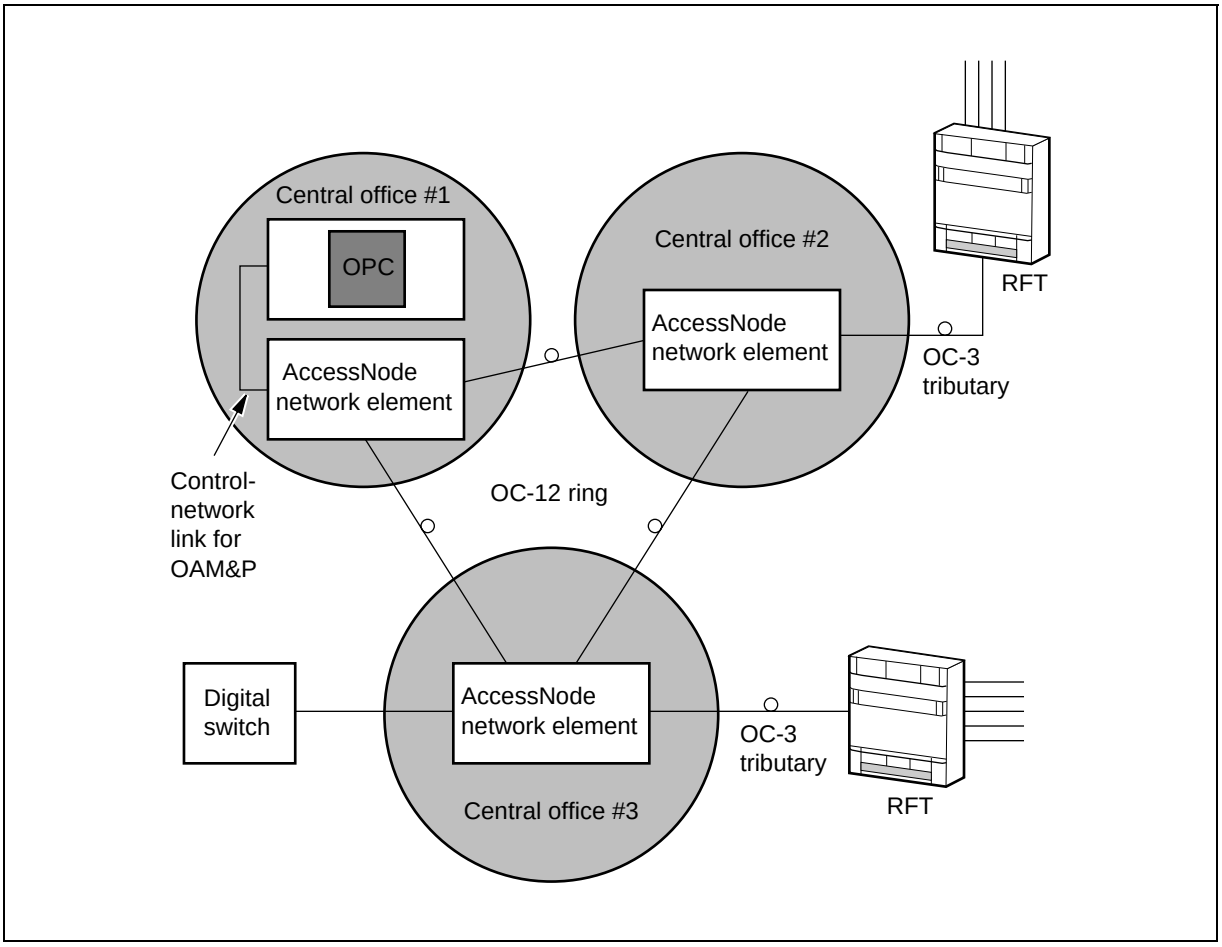
Single-ended

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 the latest AccessNode software release.

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

Figure 2-3
Single-ended AccessNode system

PC-15763



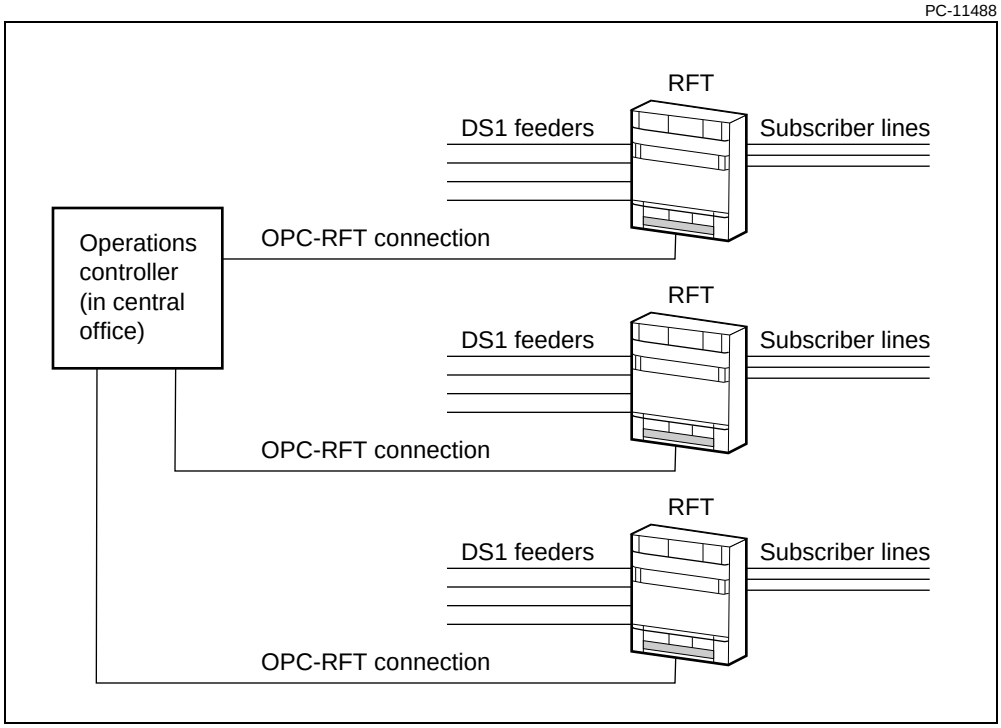
DS1-fed

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

PC-11488



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:

- master cabinet
- expansion cabinet

A two-cabinet system is shown in Figure 2-5.

Master cabinet

A master cabinet consists of a stack of one battery equipment module (BEM), one base equipment module, one pedestal and one dual equipment module (DEM). For a description of the master cabinet equipment see “MBP master cabinet configuration” on page 2-10.

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. One BEM contains a rectifier shelf and a breaker interface panel. The other BEM provides space for back-up batteries.

The MBP master cabinet also provides access connections controlled by the latest software release to copper-distribution shelves (CDS) for DS0 services of up to 96 lines per CDS shelf. Up to two CDS shelves can be installed in the master cabinet for a total of 192 DS0 lines.

Expansion cabinet

An expansion cabinet consists of a stack of one battery equipment module (BEM), one pedestal and up to three single equipment modules (SEMs). For a description of the expansion cabinet equipment see “MBP expansion cabinet configuration” on page 2-12.

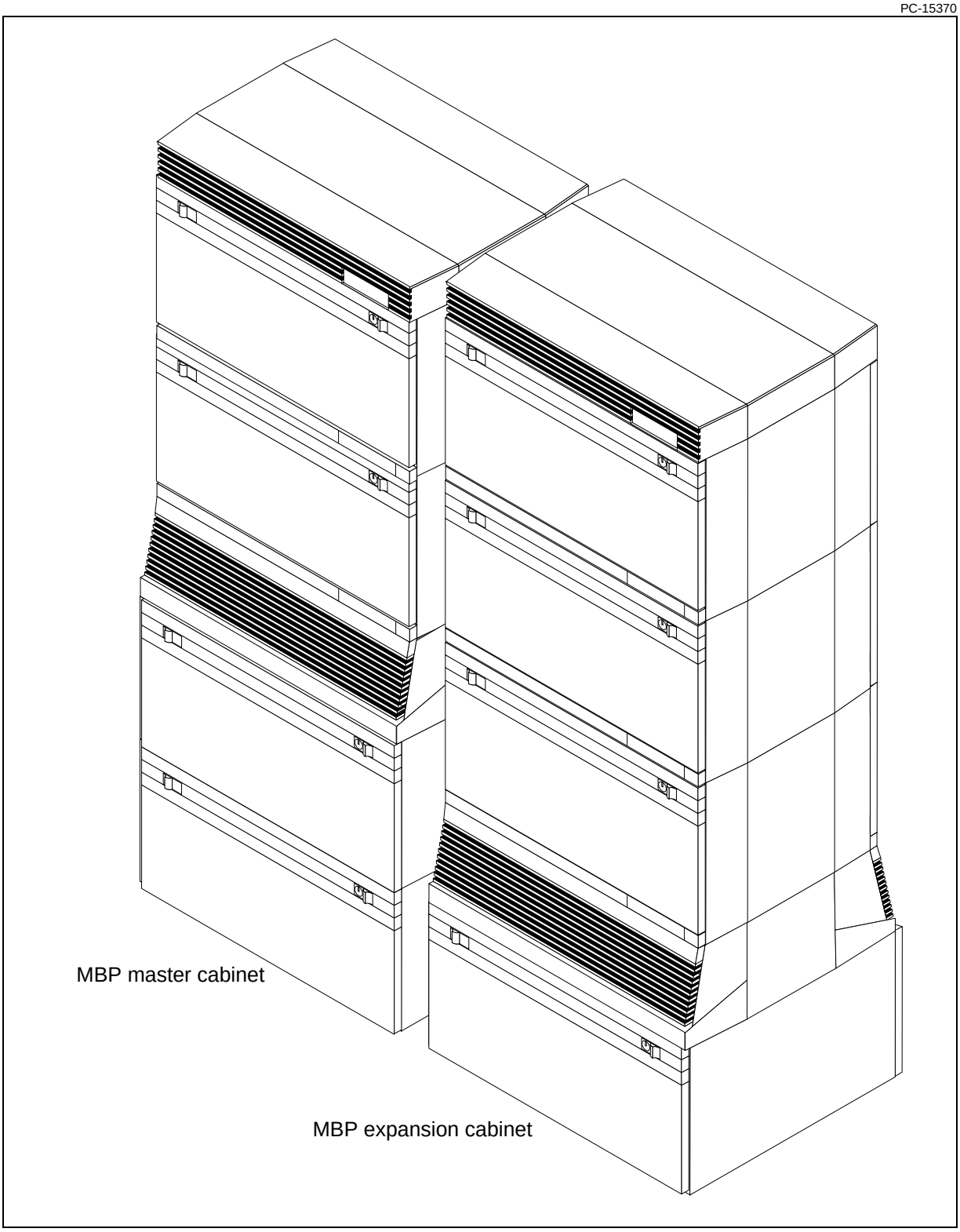
The expansion cabinet SEMs contain up to 5 CDS shelves (two per SEM) for a maximum capacity of 480 DS0 lines. The BEM provides space for additional back-up batteries.

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 (see Figure 2-5).

Figure 2-5
Typical MBP OC-12 VTBM two-cabinet system arrangement

PC-15370



Common features of MBP cabinets

Modular business package 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 or raised floors.

Concrete floors

Standard anchor kits are available for use on concrete floors to secure cabinets in either geographical Zone 2 or Zone 4 seismic locations.

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.

Grille kit

The grille kit covers the pedestal and protects the cabinet equipment and assists air flow through the cabinet.

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 battery equipment module (BEM) provides mounting space for back-up batteries.

Installation in restricted areas and unrestricted areas

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

MBP master cabinet configuration

As a minimum, a system consists of an MBP master cabinet. An expansion cabinet can be added to the system for additional service capability.

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.

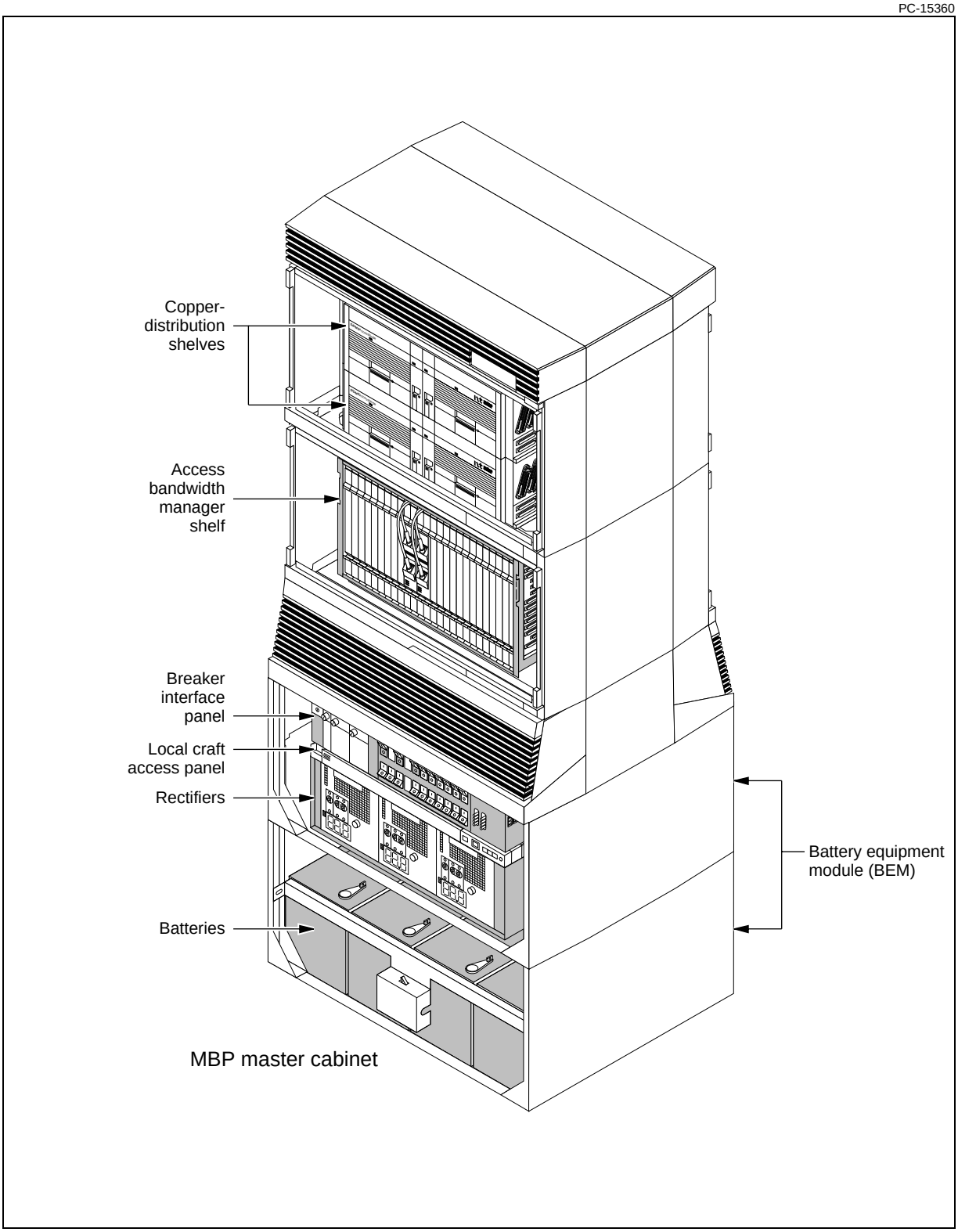
96- to 192-line master cabinet configuration

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

- a top cap kit and grille kit
- a cable extender kit
- a DEM that contains:
  - — up to two CDSs for 1–192 DS0 services
  - — an access bandwidth manager (ABM) shelf for local access processing
- a pedestal containing a blower module with two fans
- a base equipment module that contains:
  - — a breaker interface panel (BIP) for the ABM
  - — a local craft access panel (LCAP) for the ABM
  - — a low voltage disconnect (LVD) unit
  - — a dc distribution unit
  - — one rectifier shelf
- a BEM that contains:
  - — space for a back-up battery string of four batteries

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

PC-15360



MBP expansion cabinet configuration

As a minimum, an MBP expansion cabinet consists of one 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.

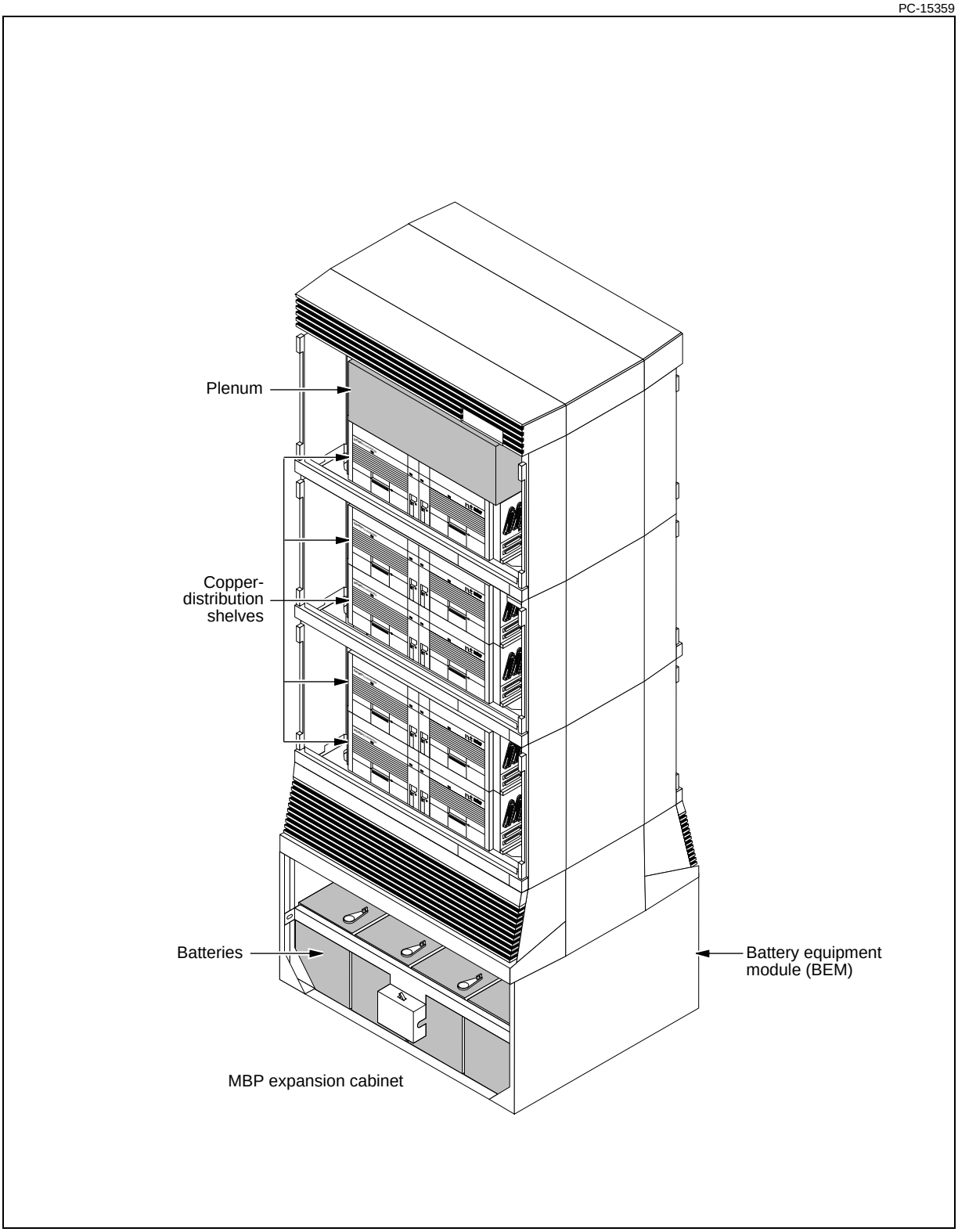
96- to 480-line expansion cabinet configuration

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

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

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

PC-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 requires four supply and return feeds each of which is rated at a nominal –48 V dc at 30 A to supply the ABM breaker interface panel.

Battery backup is provided by the battery equipment modules in the bottom of the MBP master and expansion supplying 125 Ah each of battery backup.

Numbering of equipment shelf and slot positions

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

Rectifiers

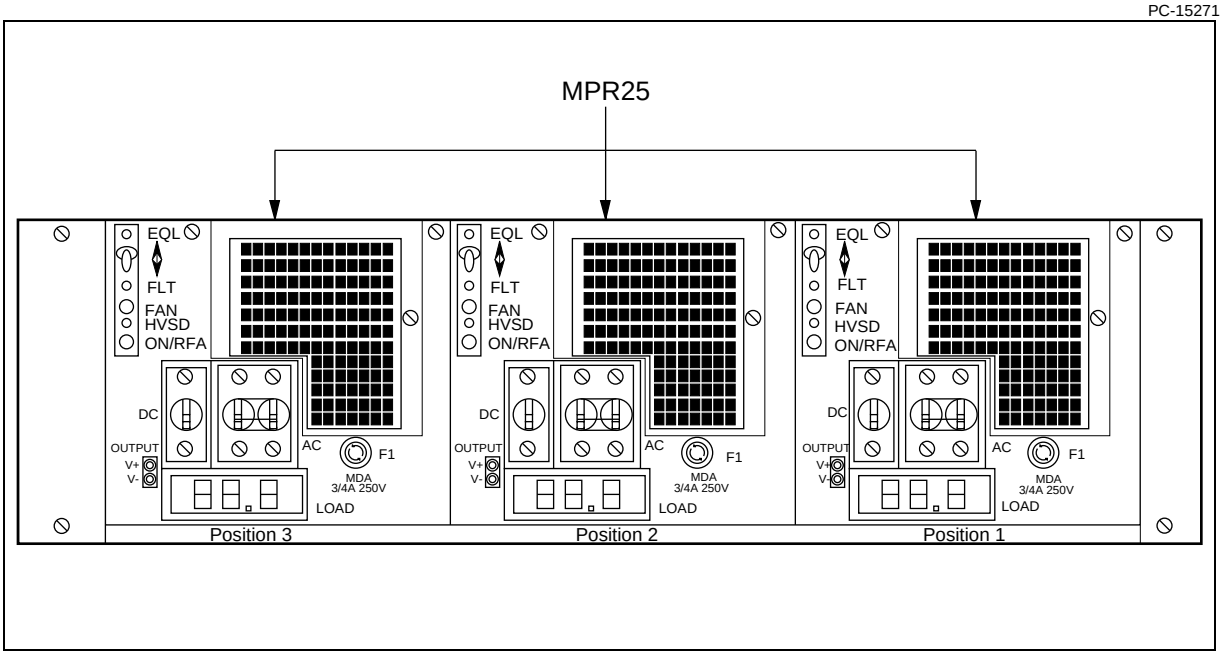
The rectifier shelf, equipped with up to three rectifiers, is standard equipment in the MBP master cabinet. Figure 2-8 shows the MPR25 rectifier positions.

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 positions not installed with rectifiers.

Figure 2-8
MPR25 rectifier positions

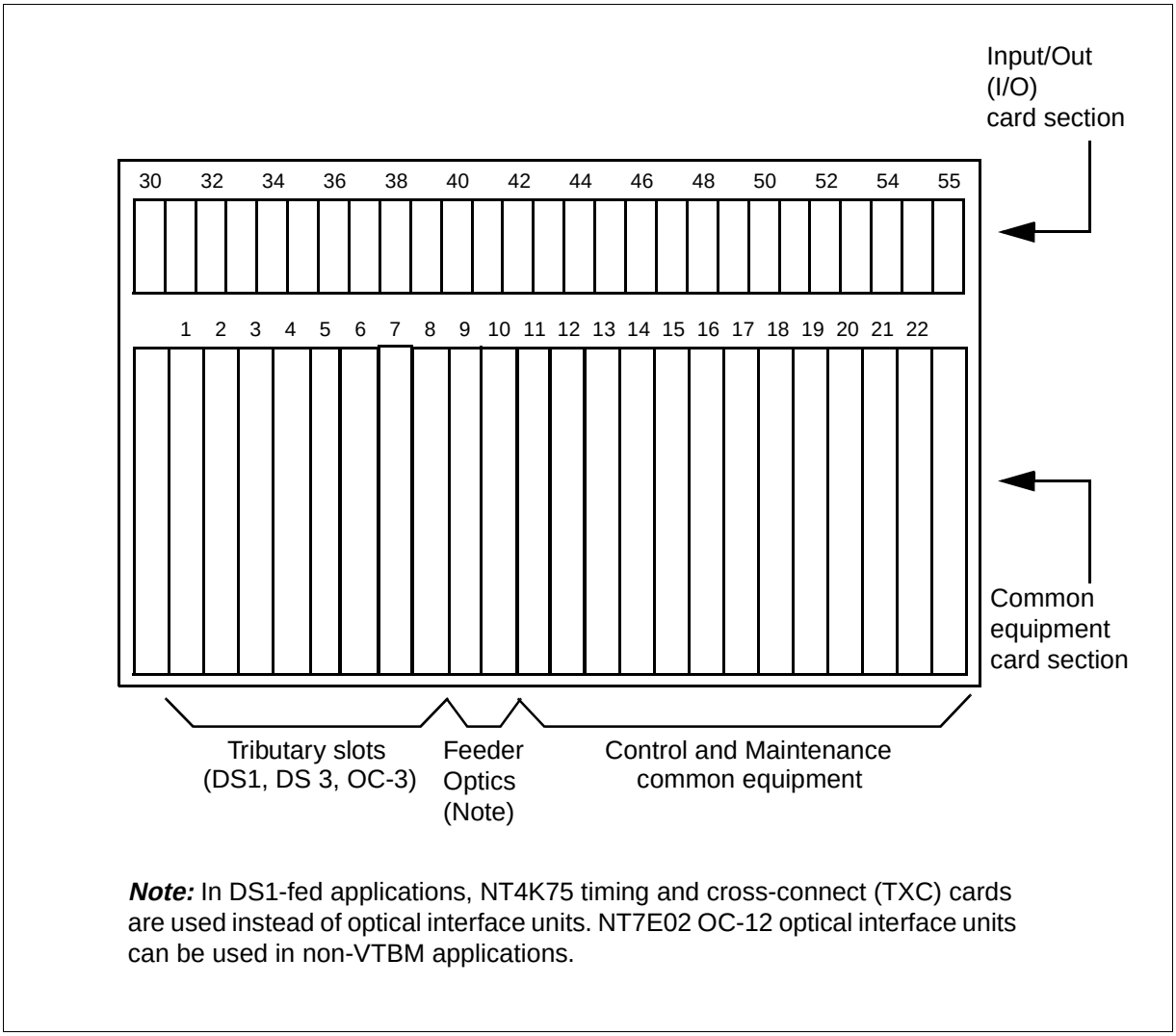
PC-15271



ABM shelf

The ABM shelf circuit pack slot positions are numbered as shown in Figure 2-9.

Figure 2-9
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.

Copper-distribution shelves

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

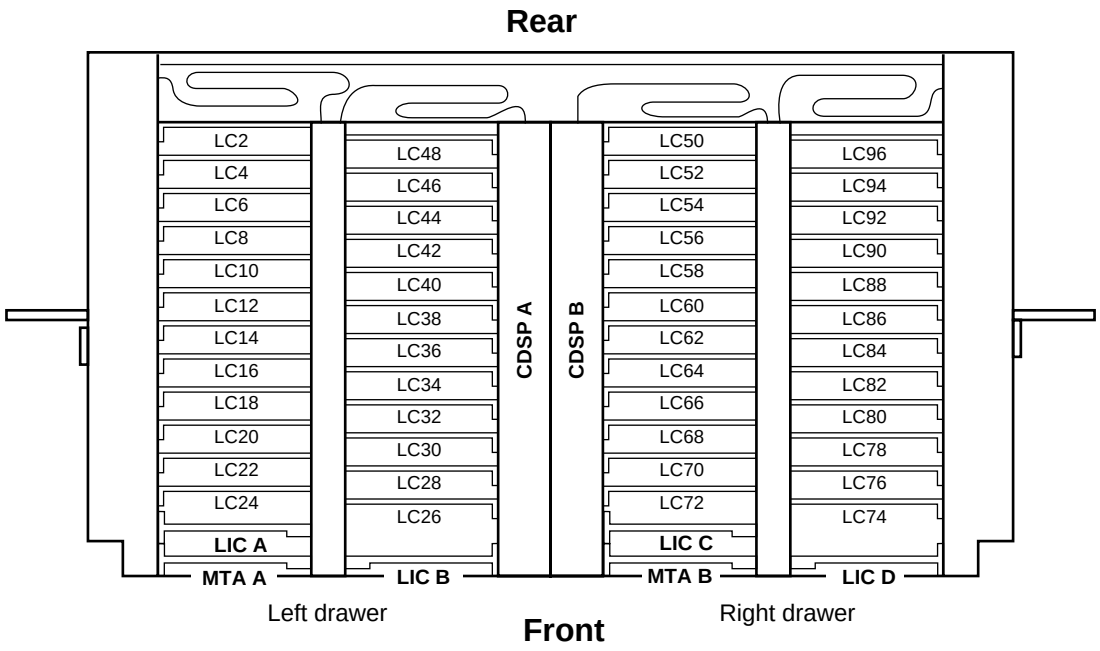
Shelf numbering continues to the lowest CDS in the expansion cabinet up to shelf 7 – the highest CDS in the expansion cabinet.

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

PC-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 NT4K14BA 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 and MIC
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 NT4K14BA BIP,CU A and CU B are 15 A breakers.

Battery equipment module circuit breakers

BEM circuit breaker 1 is located at the bottom of the MBP master cabinet on the front of the battery equipment module. BEM circuit breaker 2 is in the bottom of the expansion cabinet on the front of the battery equipment module.

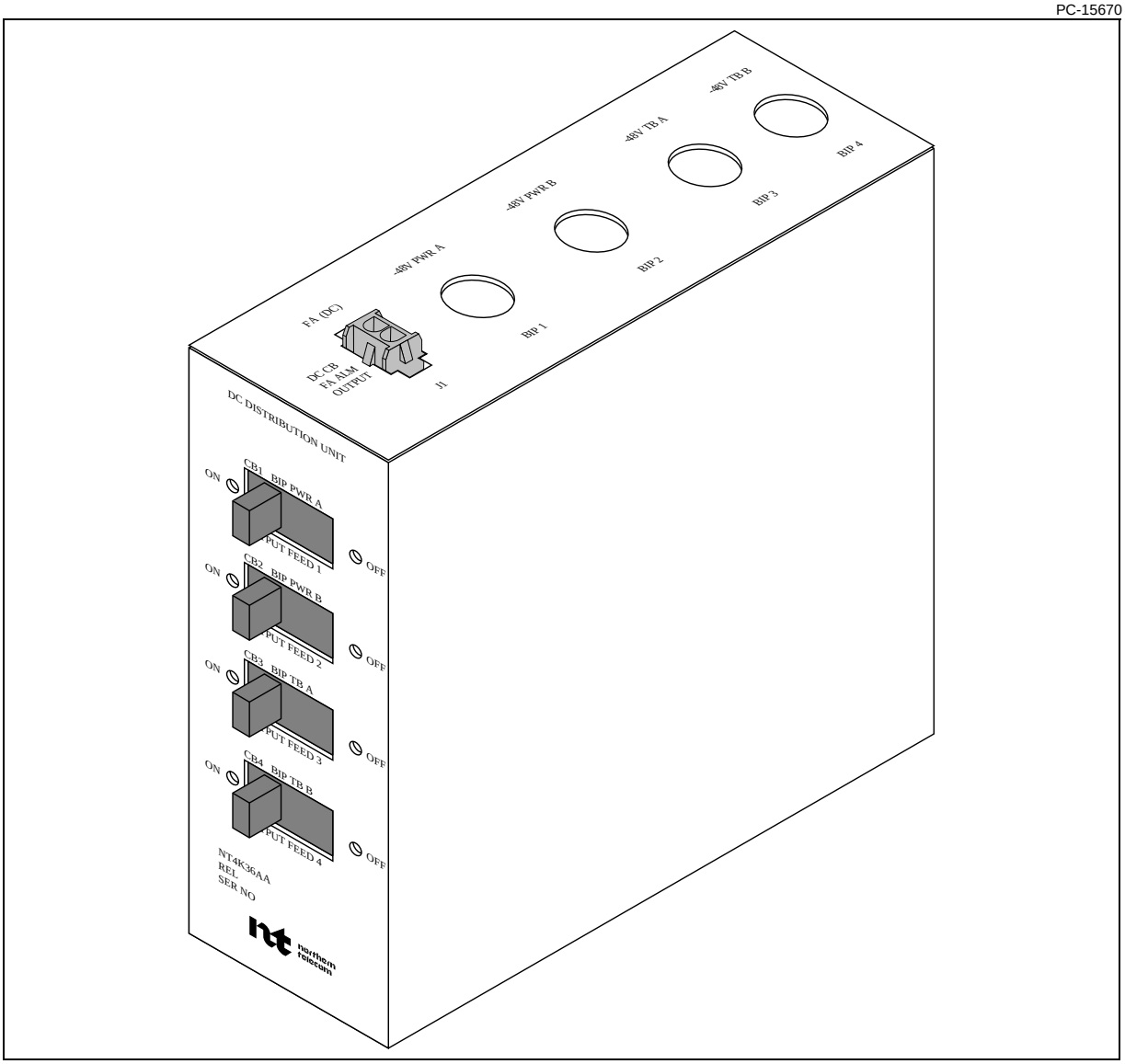
DC distribution unit circuit breakers

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 circuit breakers (CB1–CB4) that provide overload protection for the dc input to the BIP.

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

Figure 2-11
DC distribution unit

PC-15670



System expansion

You can expand a system in a number of ways:

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

When adding DS1 mappers, certain slots should be used first to ensure proper operation. New mappers should be mounted in slots 1 through 8 (DS1 protection in slot 3), always using the odd-numbered slot first and even numbered slot second. Subsequent cards can be added from left to right always using the left-most odd-numbered empty slot first, followed by the next highest even-numbered slot.

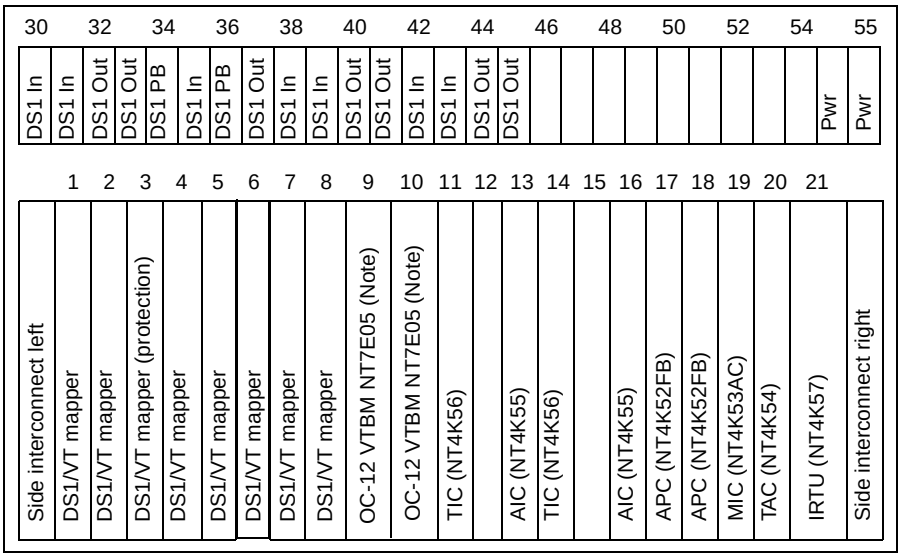
Refer to Chapter 7, “Replacing modules in a common-equipment shelf,” on page 7-1 for the procedure to add new DS1 mappers.

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

ABM circuit pack locations

Figure 2-12 shows typical locations of the common-equipment circuit packs and the I/O card circuit packs installed in the ABM shelf at each RFT using the latest software release for VTBM functionality. Circuit pack locations are variable. Reference your job specifications for circuit pack locations for your installation.

Figure 2-12
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 P DS1 protection bridge card (NT4K31AA) protection

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 OC-12 applications.

Cabling diagrams

This section contains diagrams that show the connection of cables in the MBP master and expansion cabinets. The illustrations are listed in Table 2-3.

Table 2-3
Cables by function

Cable diagrams	See
VTBM MBP cabinet cabling block diagram	Figure 2-13 on page 2-21
Door alarm cabling in the master cabinet	Figure 2-14 on page 2-22
Door alarm cabling in the expansion cabinet	Figure 2-15 on page 2-23
Power and battery cabling to the BIP	Figure 2-16 on page 2-24
BIP power distribution diagram	Figure 2-17 on page 2-25
MBP equipment grounding scheme	Figure 2-18 on page 2-26

Figure 2-13
VTBM MBP cabinet cabling block diagram

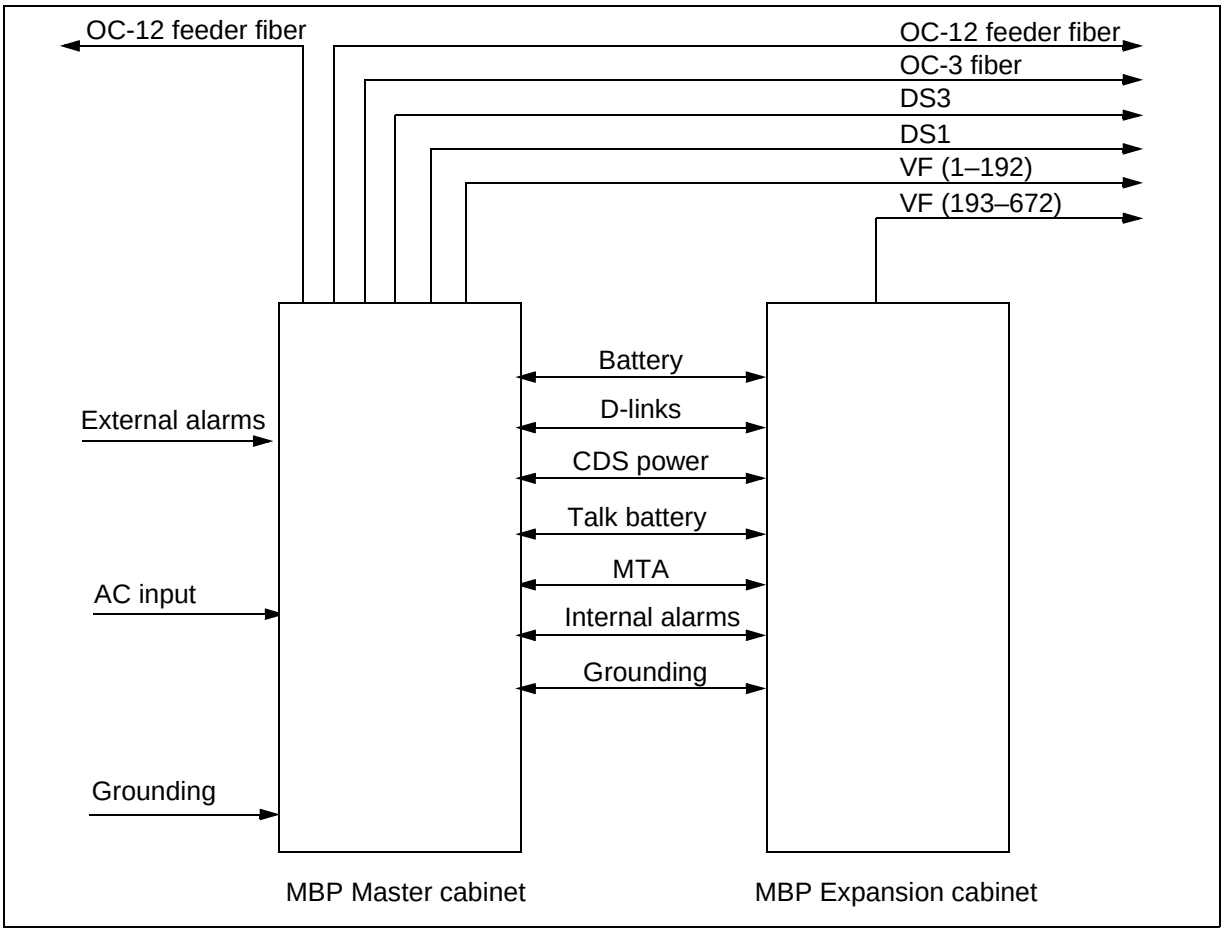


Figure 2-14
Door alarm cabling in the master cabinet

PC-15600

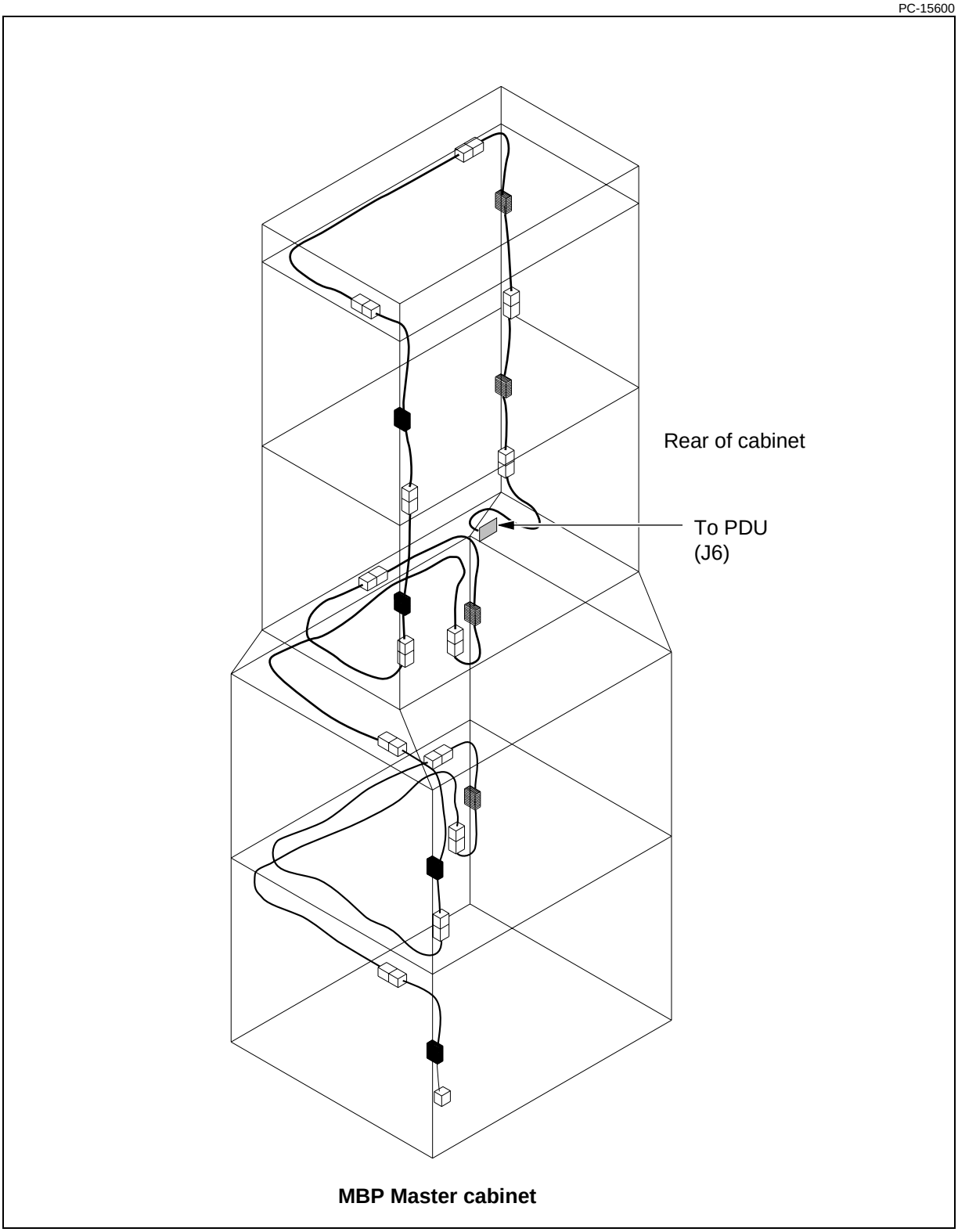
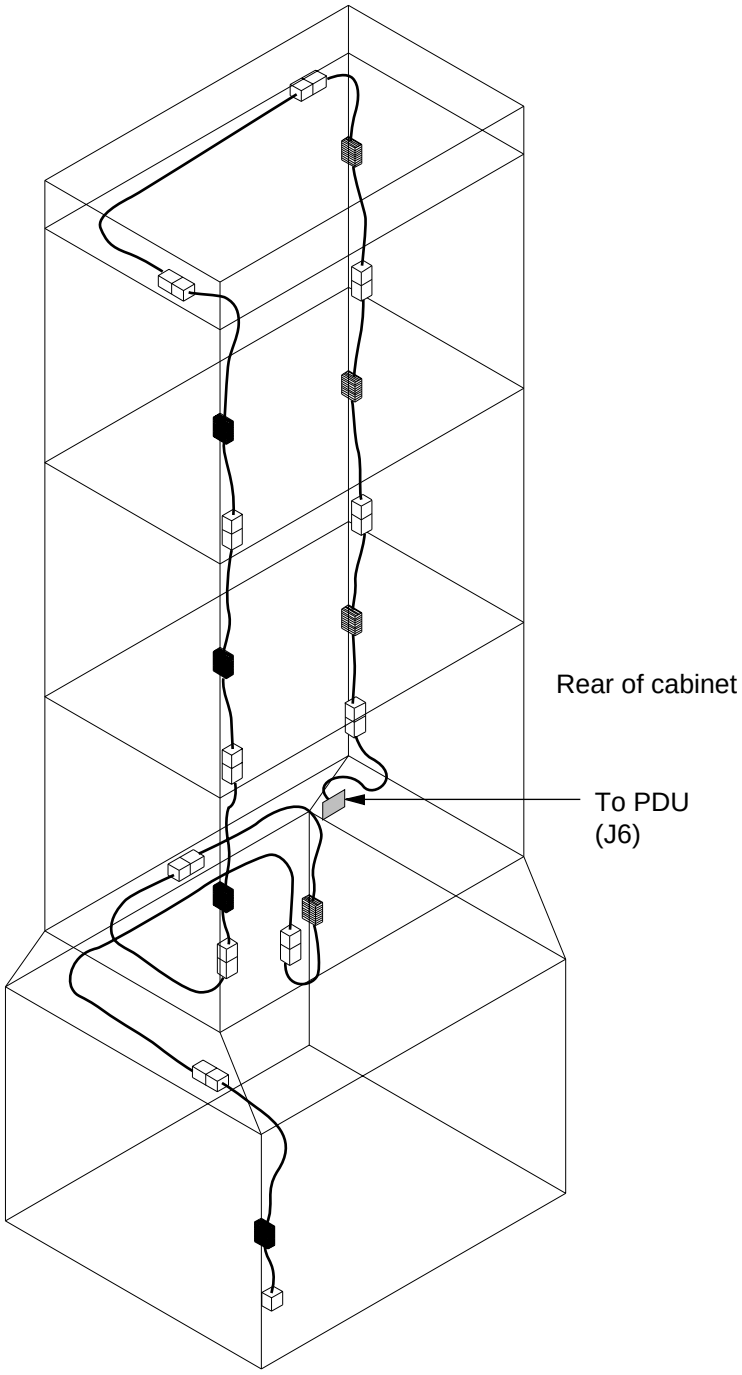


Figure 2-15
Door alarm cabling in the expansion cabinet

PC-15594



MBP Expansion cabinet

Figure 2-16
Power and battery cabling to the BIP

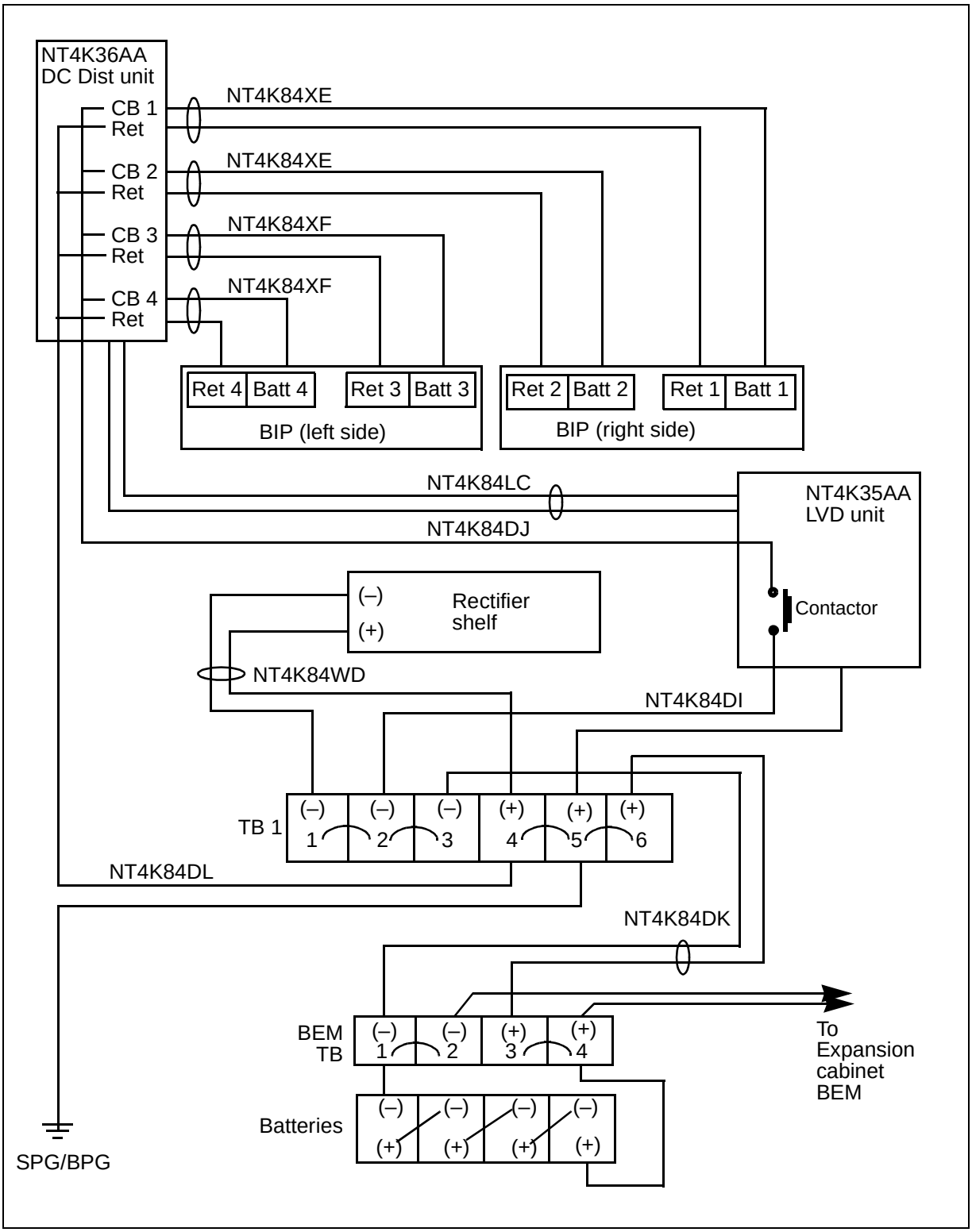


Figure 2-17
BIP power distribution diagram

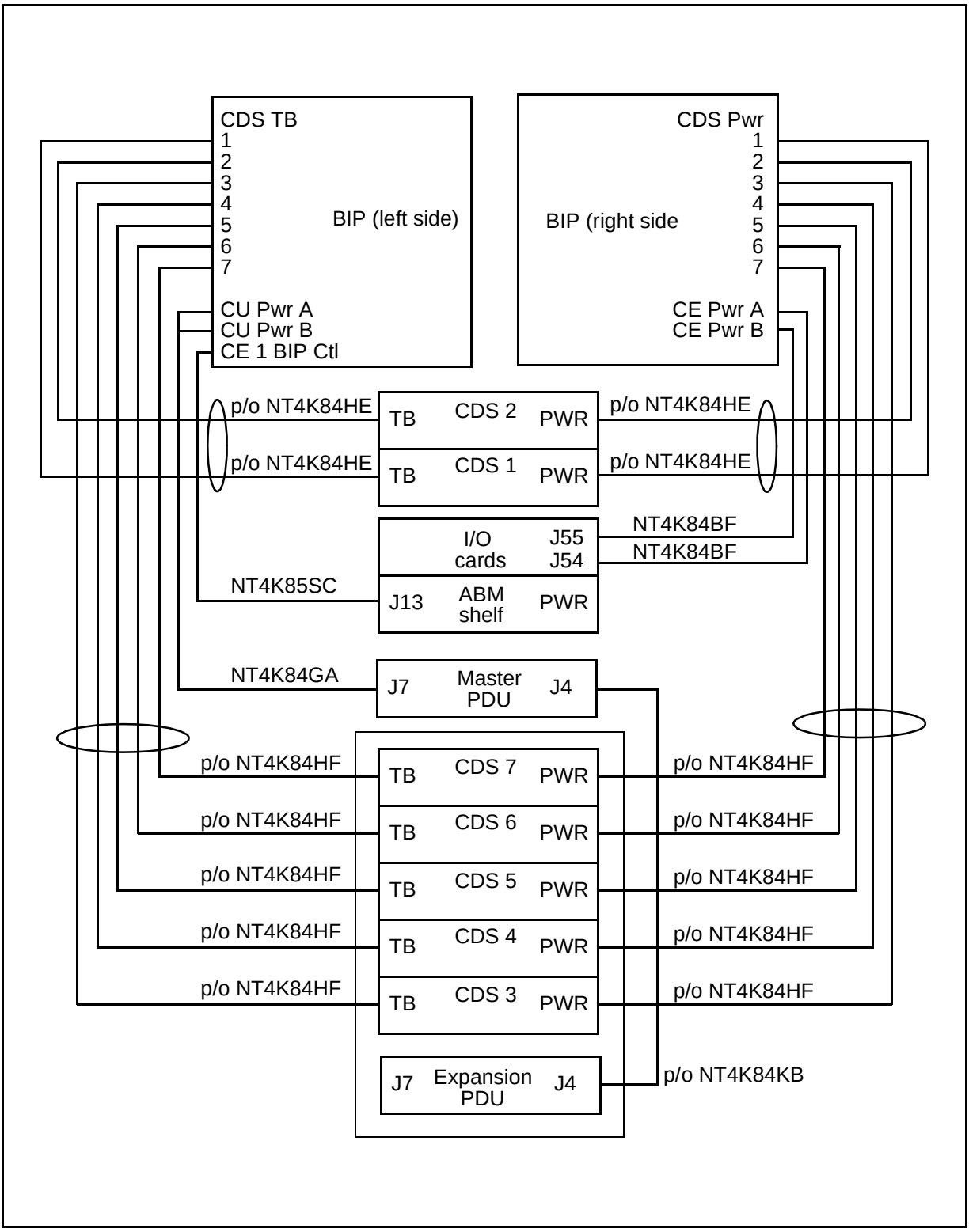
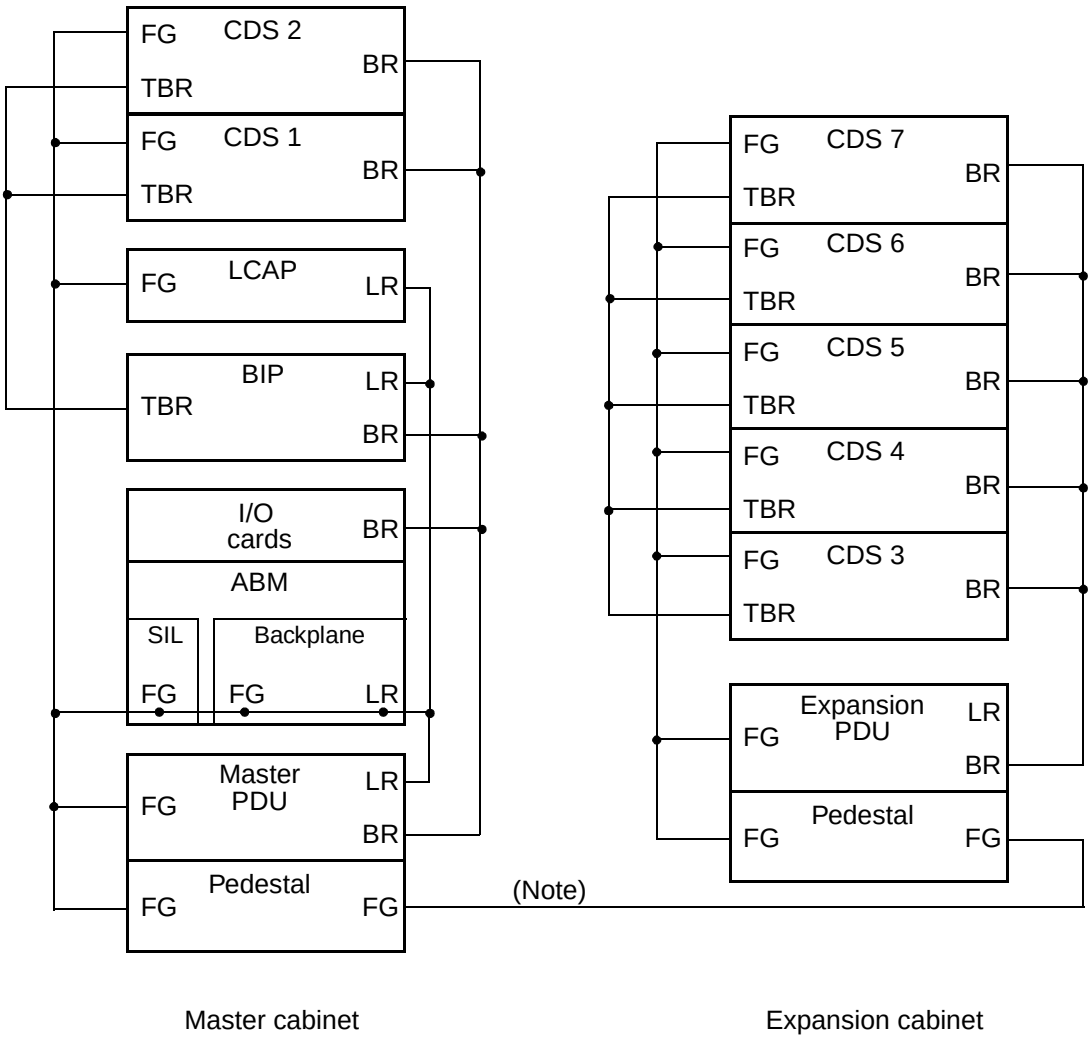


Figure 2-18
MBP equipment grounding scheme



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 modular business package 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)

Removing covers and grilles

This chapter describes common procedures used to access equipment in modular business package (MBP) master or expansion cabinets.

Chapter contents

This chapter contains the following information:

Perform the procedures according to your requirements.

Procedure 3-1
Removing the cabinet covers

Use this procedure to remove the covers from the front and rear of the AccessNode equipment modules and the battery equipment modules on the modular business package (MBP) master or 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 3-1.

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

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 Push 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.

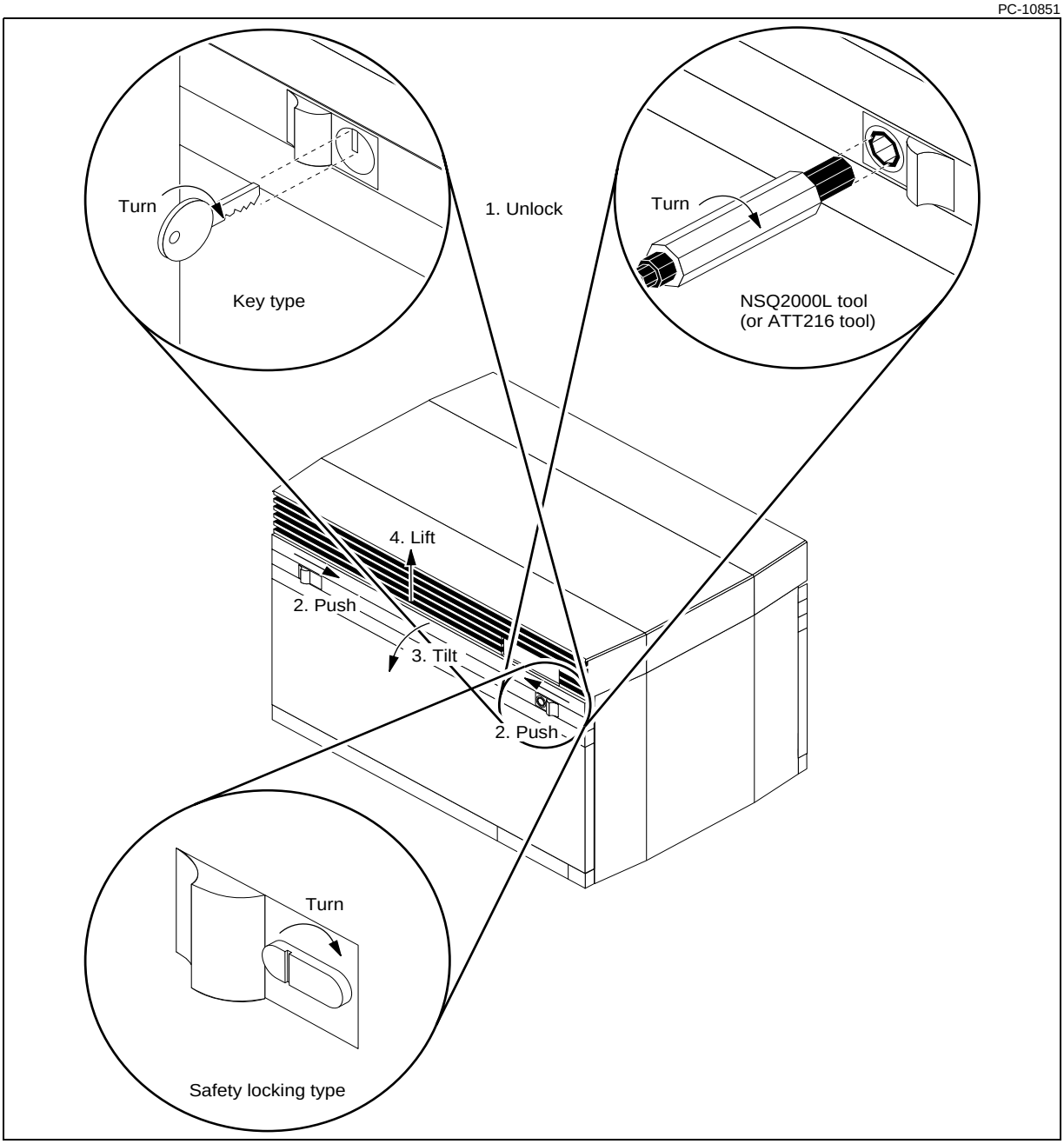
—continued—

Procedure 3-1 (continued)
Removing the cabinet covers

Step	Action

Figure 3-1
Removing an equipment cover

PC-10851



—end—

Procedure 3-2
Removing the side panels

Use this procedure to remove a side panels from modular business package (MBP) master or expansion cabinets.

Requirements

The following tools and materials are required:

- sheets of cardboard or foam on which to rest the access bandwidth manager (ABM) shelf cover while the installation is being performed
- ratchet with 5/16 in. socket

Before performing this procedure, remove the equipment covers as described in Procedure 3-1.

Action

Step	Action
1	At the front of the cabinet, use the 5/16 nut driver to remove the two screws that secure the side panel to the casting, as shown in Figure 3-2.
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.

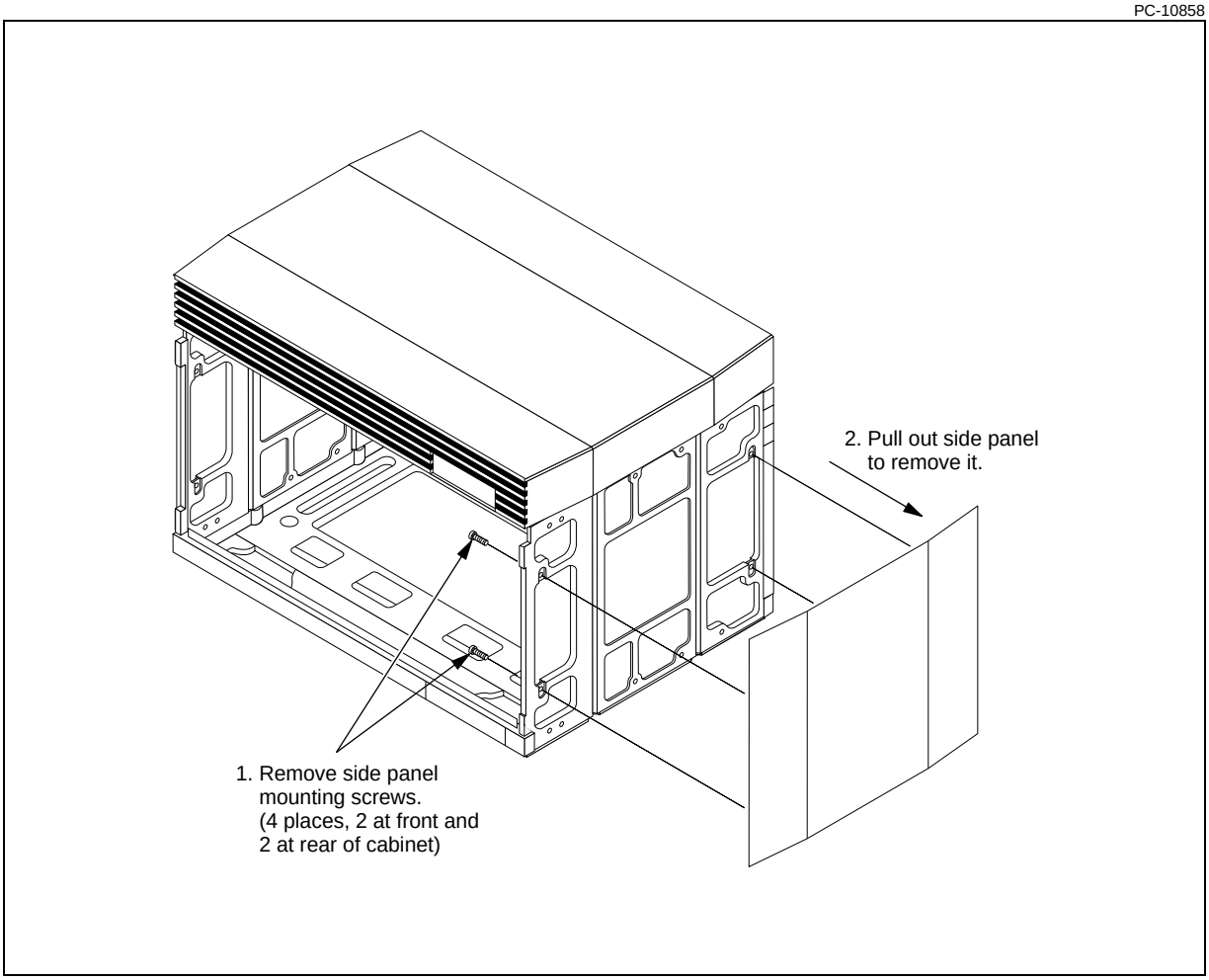
—continued—

Procedure 3-2 (continued)
Removing the side panels

Step	Action

Figure 3-2
Removing a side panel

PC-10858



—end—

Procedure 3-3
Removing the pedestal grilles

Use this procedure to remove the pedestal grilles from modular business package (MBP) master or expansion cabinets.

Requirements

The following tools and materials are required:

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

Action

Step	Action
1	Release the two captive screws that hold the pedestal grille in place as shown in Figure 3-3.
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.

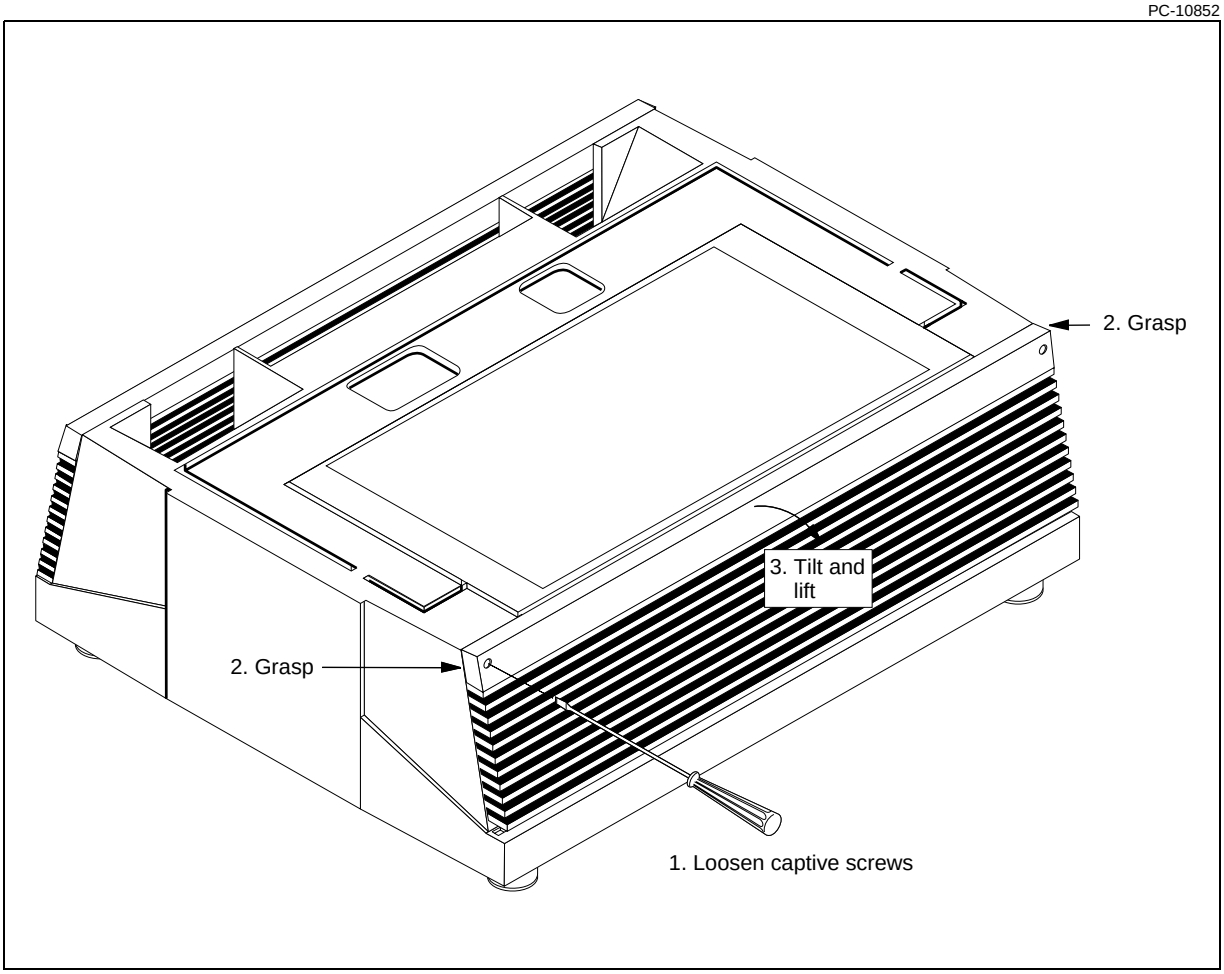
—continued—

Procedure 3-3 (continued)
Removing the pedestal grilles

Step	Action

Figure 3-3
Removing a pedestal grille

PC-10852



—end—

Procedure 3-4
Removing the top cap grilles

Use this procedure to remove the top cap grilles from modular business package (MBP) master or expansion cabinets.

Requirements

Before beginning this procedure, you must remove the equipment cover immediately below the top cap grille, as described in Procedure 3-1.

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 3-4.
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.

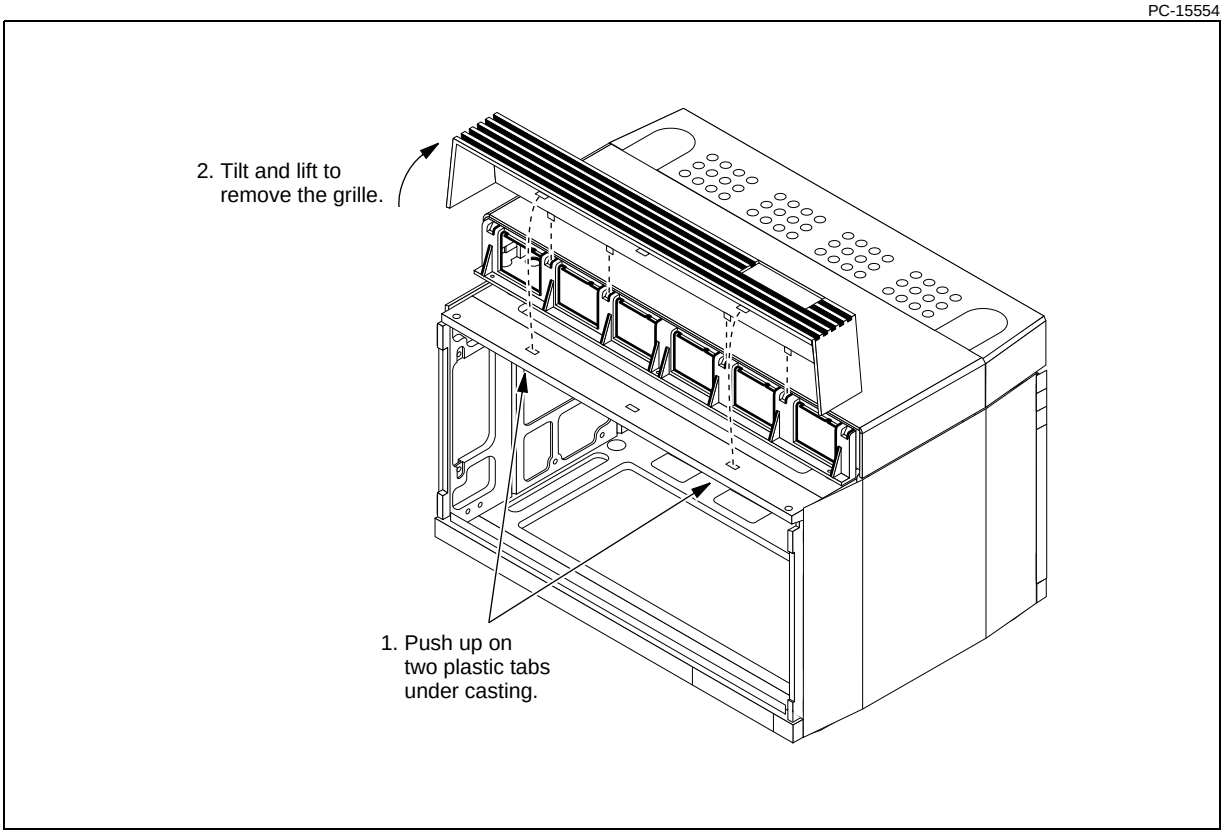
—continued—

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

Step	Action

Figure 3-4
Removing the top cap grilles

PC-15554



—end—

Procedure 3-5
Removing separator bars

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

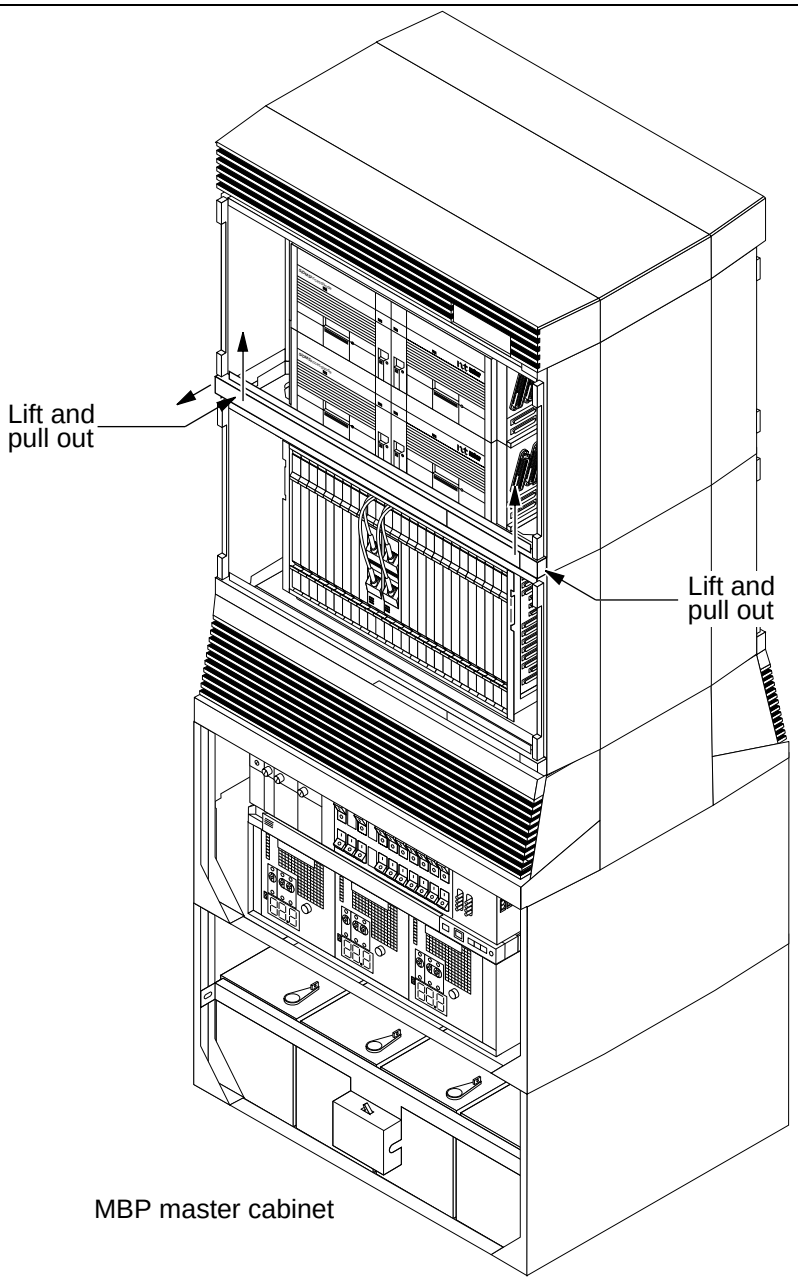
Step	Action
1	Grasp the left and right ends of the separator bar, as shown in Figure 3-5.
2	Lift the separator bar vertically to disengage the guide pins from the cabinet and remove the bar from the cabinet. ***Note:*** It may be necessary to bump the underside of the bar with your fist to disengage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

—continued—

Procedure 3-5 (continued)
Removing separator bars

Figure 3-5
Removing a separator bar

PC-15586



Note: This illustration shows the removal of the separator from the front of the MBP master cabinet. Removal of the bar at the rear of all cabinets is performed in the same way.

—end—

Procedure 3-6
Removing the ABM shelf cover

Use this procedure to remove the cover from the access bandwidth manager (ABM) shelf in the modular business package (MBP) master cabinet. Other procedures in this document will call upon this procedure.

Note: For proper electromagnetic interference (EMI) and thermal management protection, the shelf cover must be replaced after you have finished working inside the ABM shelf.

Requirements

The following tools and materials are required:

- 1/4-inch slotted screwdriver
- sheets of cardboard or foam on which to rest the dual equipment module (DEM) separator bar while the installation is being performed

Action

Step	Action
1	Using a 1/4-inch slot screwdriver, turn the left and right locking screws until the dots are no longer aligned, then pull on the cover latches to remove the cover, as shown in Figure 3-6.

CAUTION
Damage to locking screws and the finish of the equipment covers
Do not use a coin to turn the locking screws on the equipment covers, as it may damage the locking screws and the finish on the covers. Only use a 1/4 in. slot screwdriver to turn the locking screws.

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.

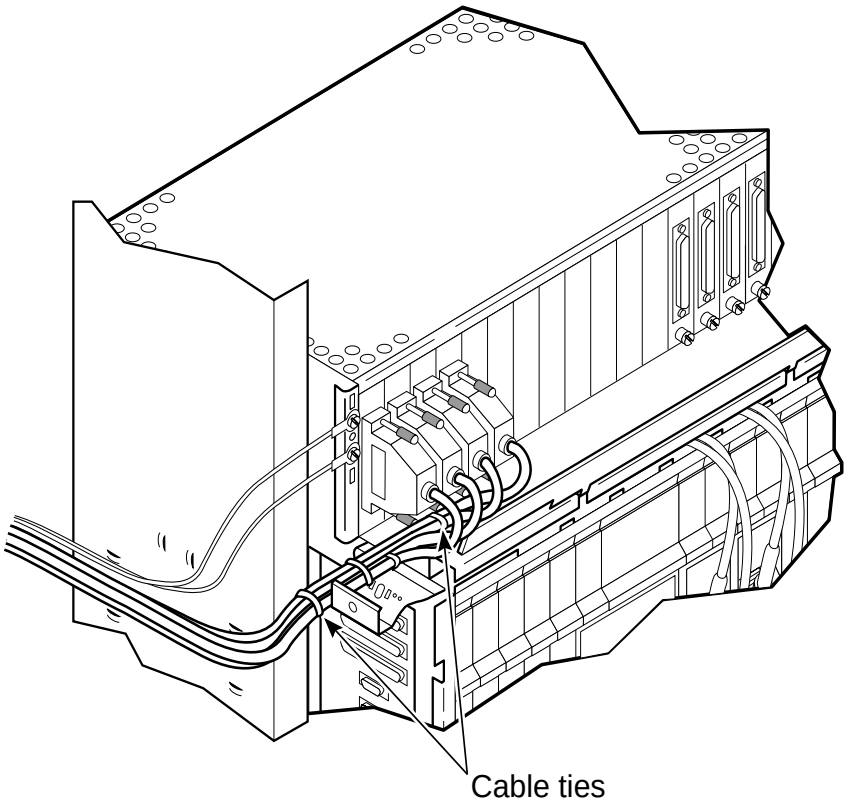
—continued—

Procedure 3-6 (continued)
Removing the ABM shelf cover

Step	Action

Figure 3-6
Unlocking and removing the ABM shelf cover

PC-10534



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.

—end—

Procedure 3-7
Removing the breaker interface panel cover

Use this procedure to remove the cover from the NT4K14 BIP in the modular business package (MBP) master cabinet. Other procedures in this document call upon this procedure.

Action

Step	Action
1	Use a 1/4-inch slot screwdriver to turn the left and right locking screws, until the dots are no longer aligned, then pull on the cover latches to remove the cover. See Figure 3-7.

CAUTION
Damage to locking screws and the finish of the equipment covers
Do not use a coin to turn the locking screws on the equipment covers, as it may damage the locking screws and the finish on the covers. Only use a 1/4 in. slot screwdriver to turn the locking screws.

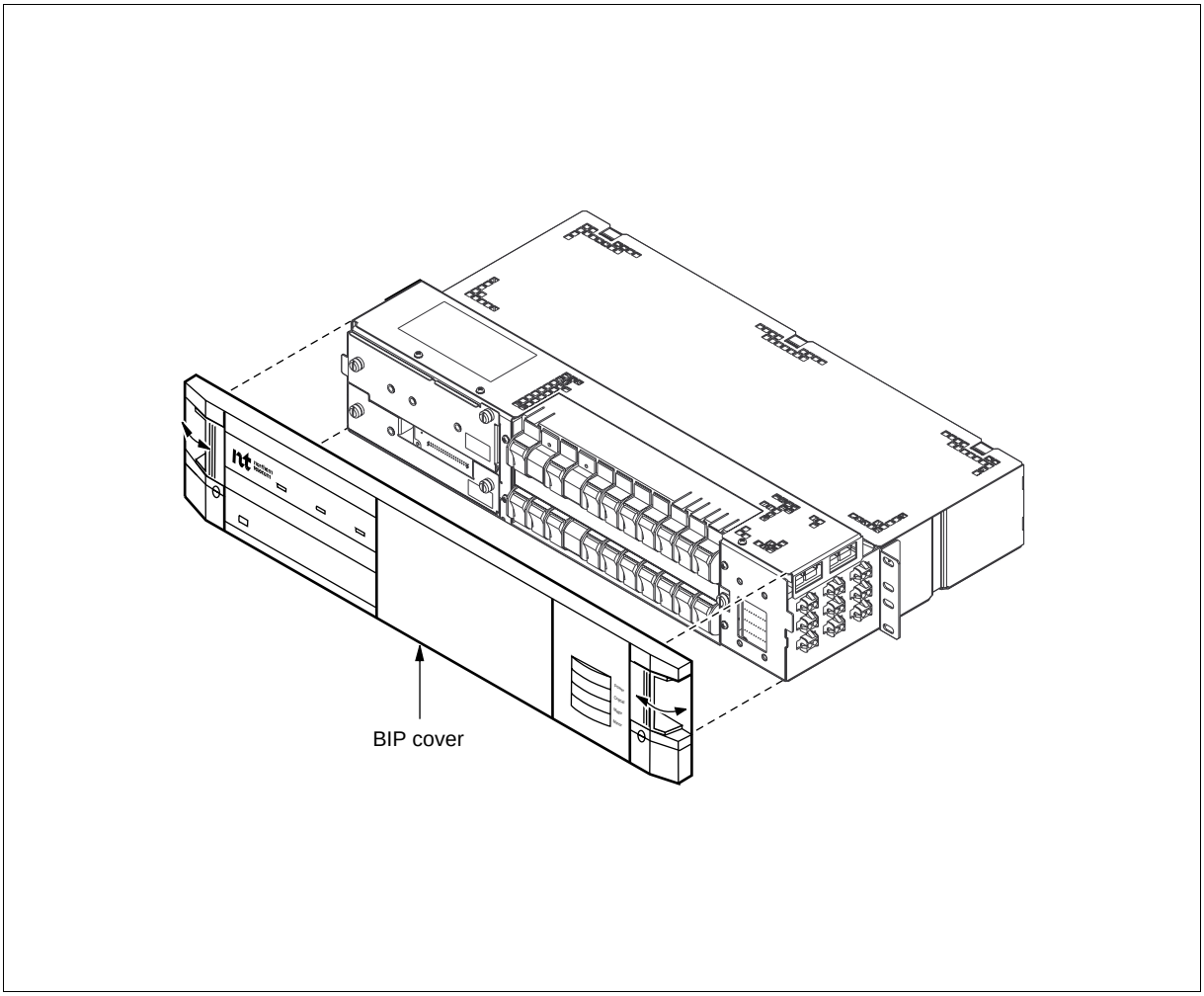
—continued—

Procedure 3-7 (continued)
Removing the breaker interface panel cover

Step	Action

Figure 3-7
Breaker interface panel cover

PC-16505



—end—

Interpreting an LED or lamp

This chapter explains the meaning of the status light-emitting diodes (LEDs) found on the AccessNode modular business package (MBP) top cap, circuit packs, cards and modules, and the lamps and LEDs on the breaker interface panel.

Note: Do not troubleshoot circuit packs from the LEDs. Always troubleshoot an alarm condition from the network element user interface.

Chapter contents

This chapter contains the following information:

Top cap LED

The red LED in the top cap of a MBP indicates the presence of an alarm condition in the system. The top cap LEDs in a master or expansion cabinet indicate the failure of the fan speed controller (FSB) board in the cabinet as well.

Status of in-service equipment LEDs

Table 4-1 shows how to interpret the status of the green Active LED and the red Fail LED for each in-service module, circuit pack, or card in the AccessNode shelves.

Table 4-1
Interpreting status LEDs for in-service modules, circuit packs, and cards

Module, circuit pack, or card	Active LED (green)	Fail LED (red)
Processor (active)	ON	OFF (Note 1)
Processor (standby)	OFF	OFF
MIC	ON	OFF (Note 1)
TAC	ON	OFF
OC-12 (active)	ON	OFF
OC-12 (standby)	OFF	OFF
DS1	ON	OFF
DS1 (protection)	OFF (Note 2)	OFF
ESI (active)	ON	OFF
ESI (standby)	OFF	OFF
TIC (primary)	ON	OFF
TIC (secondary)	ON	OFF
AIC (A)	ON	OFF
AIC (B)	ON	OFF
LIC (primary)	ON	OFF
LIC (secondary)	OFF (Note 3)	OFF
Line card	n/a	OFF
MTAC	n/a	OFF
IRTU	ON	OFF
CDSP	n/a	OFF

Note 1: This LED is ON if a subset of the card has failed (in-service, partial fail).

Note 2: This LED is ON if the DS1 protection card is providing protection.

Note 3: This LED is ON if the secondary LIC is data active.

Status of out-of-service equipment LEDs

Table 4-2 shows how to interpret the green Active LED and the red Fail LED for an out-of-service module, circuit pack, or card in the AccessNode.

Table 4-2
Interpreting status LEDs for out-of-service modules, circuit packs, and cards

Module, circuit pack, or card	Active LED (green)	Fail LED (red)
Processor	OFF	OFF
MIC	OFF	OFF
TAC	OFF	OFF
OC-12	OFF	OFF
DS1	OFF	OFF
ESI	OFF	OFF
TIC	OFF	OFF
AIC	OFF	OFF
LIC	OFF	OFF
Line card	n/a	OFF
MTAC	n/a	OFF
CDSP (Note)	n/a	OFF
IRTU	OFF	OFF

Note: Red LED is ON if there is a failure on the card detected by hardware.

Status of failed equipment LEDs

Table 4-3 shows how to interpret the green Active LED and the red Fail LED for a failed module, circuit pack, or card in the AccessNode shelves.

Table 4-3
Interpreting status LEDs for failed modules, circuit packs, and cards

Module, circuit pack, or card	Active LED (green)	Fail LED (red)
Processor	OFF	ON
MIC	OFF	ON
OPC	OFF	ON
TAC	OFF	ON
OC-12	OFF	ON
DS1	OFF	ON
ESI	OFF	ON
TIC	OFF	ON
AIC	OFF	ON
LIC	OFF	ON
Line card	n/a	ON
MTAC	n/a	ON
CDSP	n/a	ON
IRTU	OFF	ON

Replacing modules in a copper-distribution shelf

This chapter provides procedures for replacing circuit packs, cards, and modules in an AccessNode copper-distribution shelf (CDS). Observe and follow all safety precautions listed in Chapter 1, “Safety guidelines and warnings,” when handling circuit packs.

Chapter contents

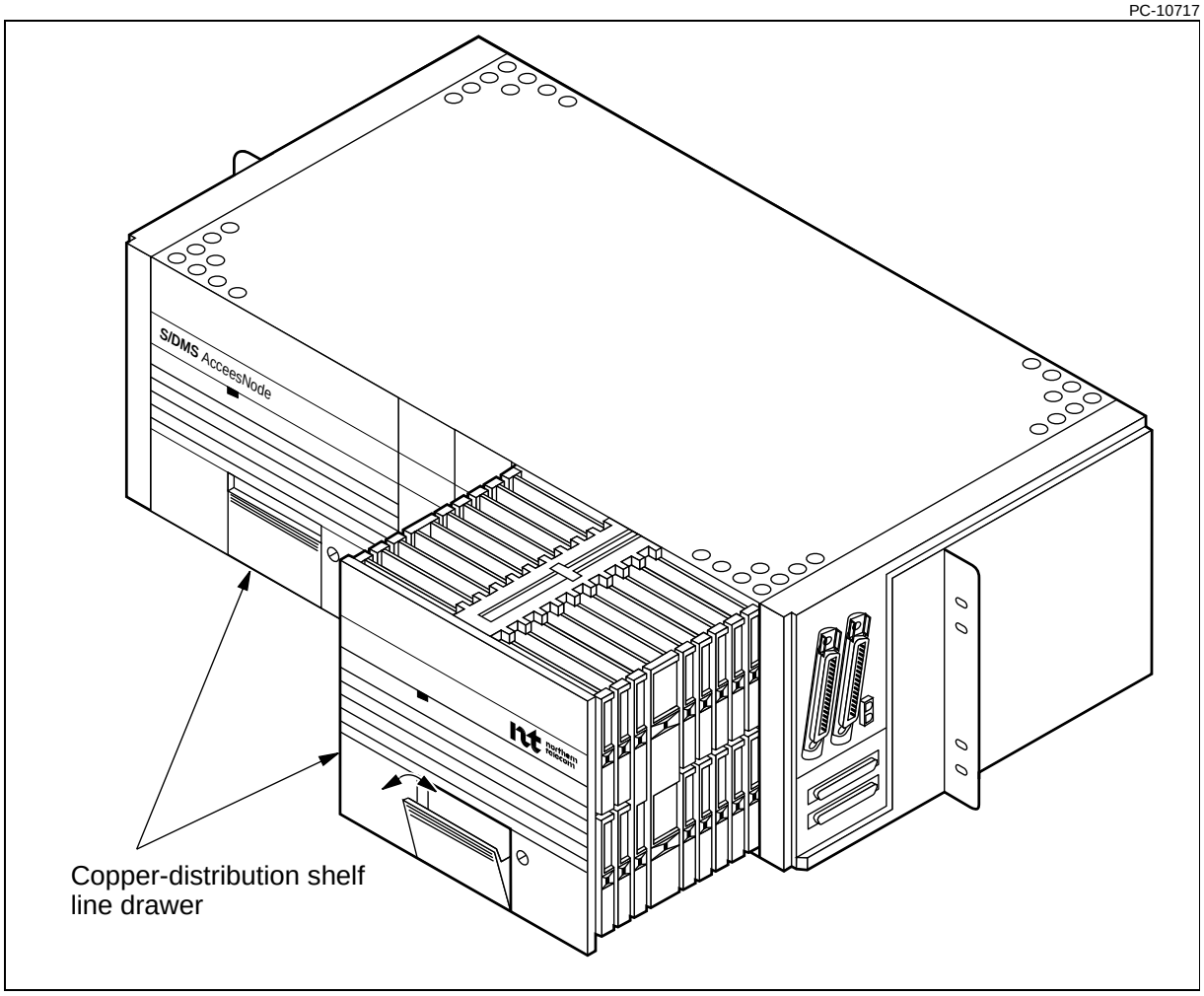
This chapter contains the following information:

Perform the procedure according to your requirements.

A common action for replacing units in the CDS shelf is to pull out the line drawers to access the internal line units. Figure 5-1 shows how to withdraw the line drawer.

Figure 5-1
Withdrawing a line drawer

PC-10717



Procedure 5-1
Replacing the NT4K62 copper-distribution shelf power card

Use this procedure to replace the copper-distribution shelf power (CDSP) card, also known as the power converter.

Action

Step	Action
1	From the network element status screen, display the CDSP screen for the CDSP being replaced: **eq cdsp;dtlcdsp <CDS#> <group>**↵ where <CDS#> number of the copper-distribution shelf: **1** to **7** <group> the group number of the CDSP being replaced: **a** or **b** *The CDSP equipment screen appears.*
2	Change the state of the CDSP to out-of-service (OOS): **chgstate oos**↵ *The system prompts for confirmation of the state change.*
3	Confirm the state change: **y**↵ *The state changes to OOS.*
4	Unlock the CDSP ejector latch by turning the locking screw (located on the CDSP adjacent to the ejector latch) 90 degrees counterclockwise so that the alignment indicators (a small “dot” on the CDSP and on the locking screw) are NOT aligned.
5	Remove the CDSP by pulling the ejector latch as shown in Figure 5-2.
6	Wait at least 50 seconds for the system to stabilize.
7	Insert a replacement CDSP in the shelf.
8	Gently push in the CDSP until the ejector latch comes in contact with the shelf. Then push the latch in to engage the circuit pack with the midplane connector. *The state automatically changes to IS.*
9	Lock the CDSP ejector latch by turning the locking screw 90 degrees clockwise so that the alignment indicators are aligned.

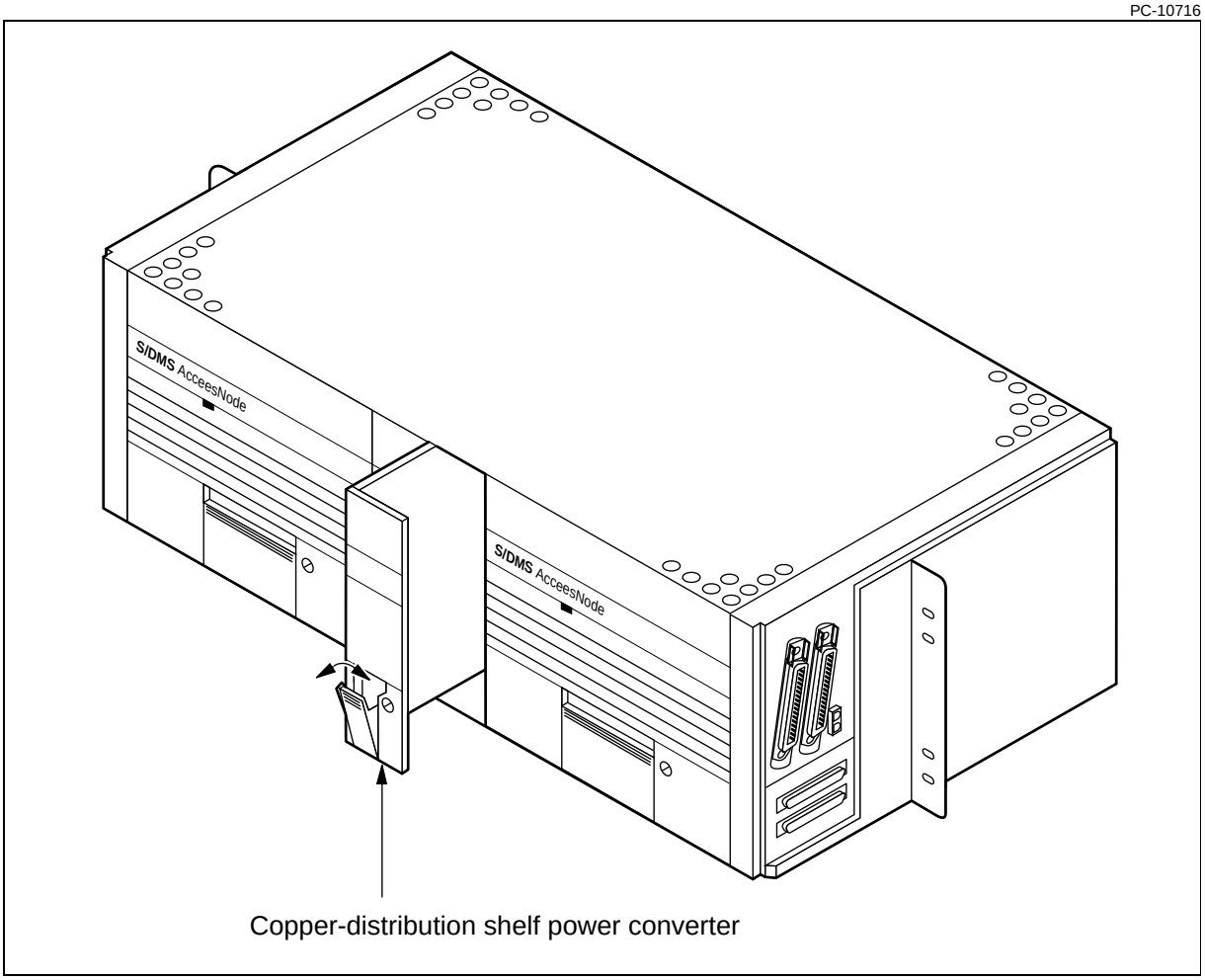
—continued—

Procedure 5-1 (continued)
Replacing the NT4K62 copper-distribution shelf power card

Step	Action

Figure 5-2
Removing a CDS power card

PC-10716



—end—

Procedure 5-2
Replacing the line cards

Use this procedure to replace the following line cards in a copper-distribution shelf line drawer:

- NT4K65 Epsilon 2-wire station line card (E2WS)
- NT4K67 Omega 2-wire station line card (O2WS)
- NT4K68 Omega 2-wire office line card (O2WO)
- NT4K69 Omega 4-wire line card (O4W)
- NT4K77 Omega 6/8-wire line card (O68W)
- NT4K78 Manual ringdown line card (MRD)
- NT4K79 Universal voice grade line card (UVG)

Action

Step	Action
1	From the network element status screen, display the line card equipment screen for the line card being replaced: **eq lc <CDS#> <LC#>**↵ where <CDS#> number of the copper-distribution shelf: **1** to **7** <LC#> line card number: **1** to **96** ***Note:*** for Omega 4-wire and Omega 6/8-wire line cards, use the lowest even slot number occupied by the card. *The line card equipment screen appears.*
2	Change the state of the line card to out-of-service (OOS): **chgstate oos**↵ **y**↵ *The state changes to OOS.*
3	Unlock the CDS line drawer handle by turning the locking screw (located on the CDS adjacent to the ejector latch) 90 degrees counterclockwise so that the alignment indicators (a small “dot” on the CDS and on the locking screw) are NOT aligned.
4	Withdraw the line drawer from the copper-distribution shelf by pulling the drawer handle as shown in Figure 5-1.

—continued—

Procedure 5-2 (continued)
Replacing the line cards

Step	Action
5	Remove the line card from its slot by grasping the tab on the line card faceplate with your thumb and forefinger, and pulling outward. ***Note:*** Figure 5-3 shows a 2-wire Omega or Epsilon line card. Figure 5-4 shows an O4W line card. Figure 5-5 shows an O68W line card.
6	Wait at least 12 seconds for the system to stabilize.
7	Insert a replacement line card into the slot.
8	Gently push in the replacement line card until the ejector latch comes in contact with the drawer. Then push the latch in to engage the circuit pack with the midplane connector.
9	Change the state of the line card to in-service (IS): **chgstate is**↵ **y**↵ *The state changes to IS.*
10	Gently push in the CDS line drawer until the handle comes in contact with the shelf. Then push the line drawer in to engage the handle with the shelf.
11	Lock the CDS line drawer handle by turning the locking screw 90 degrees clockwise so that the alignment indicators are aligned.

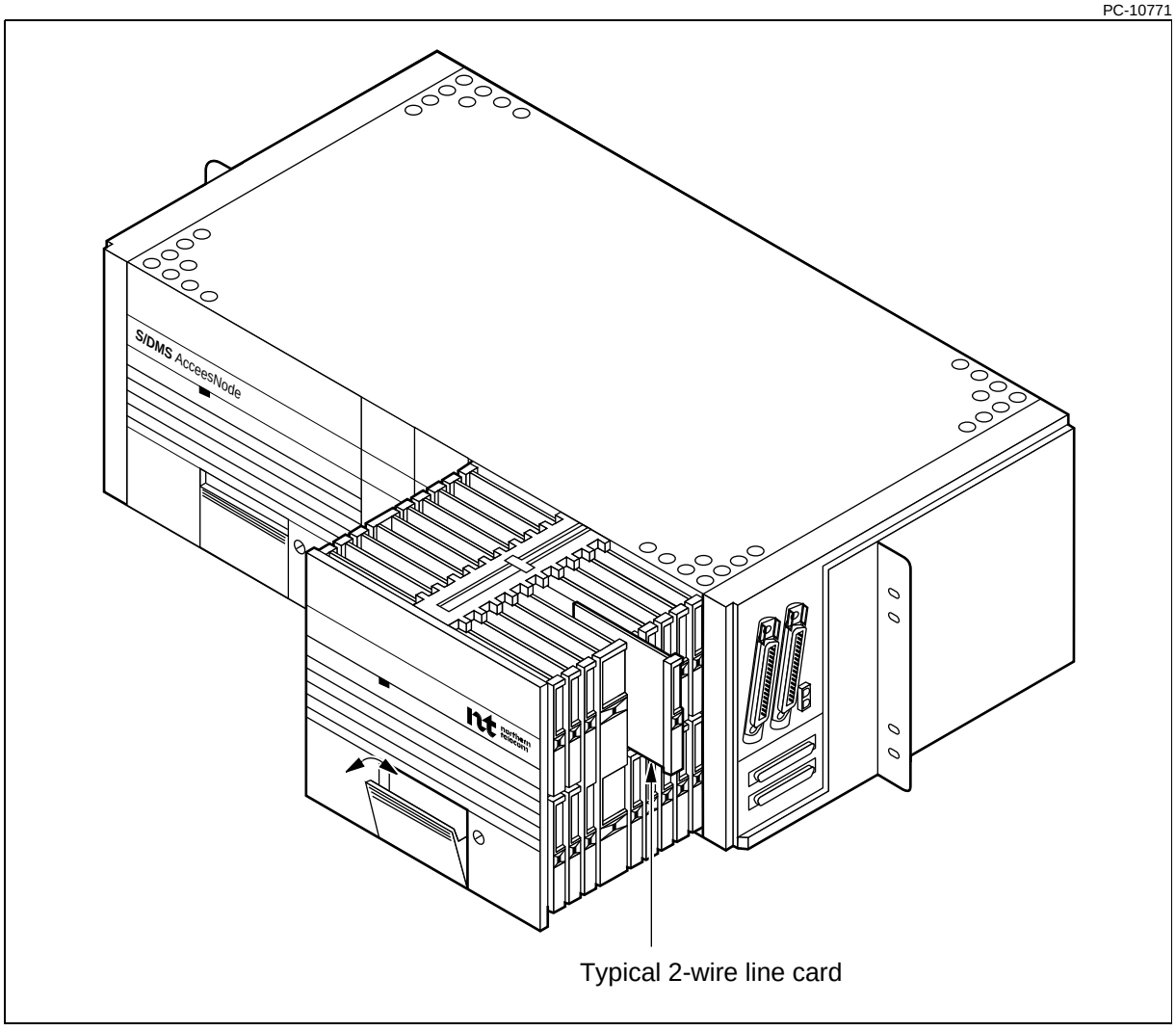
—continued—

Procedure 5-2 (continued)
Replacing the line cards

Step	Action

Figure 5-3
Removing a 2-wire Omega or Epsilon line card

PC-10771



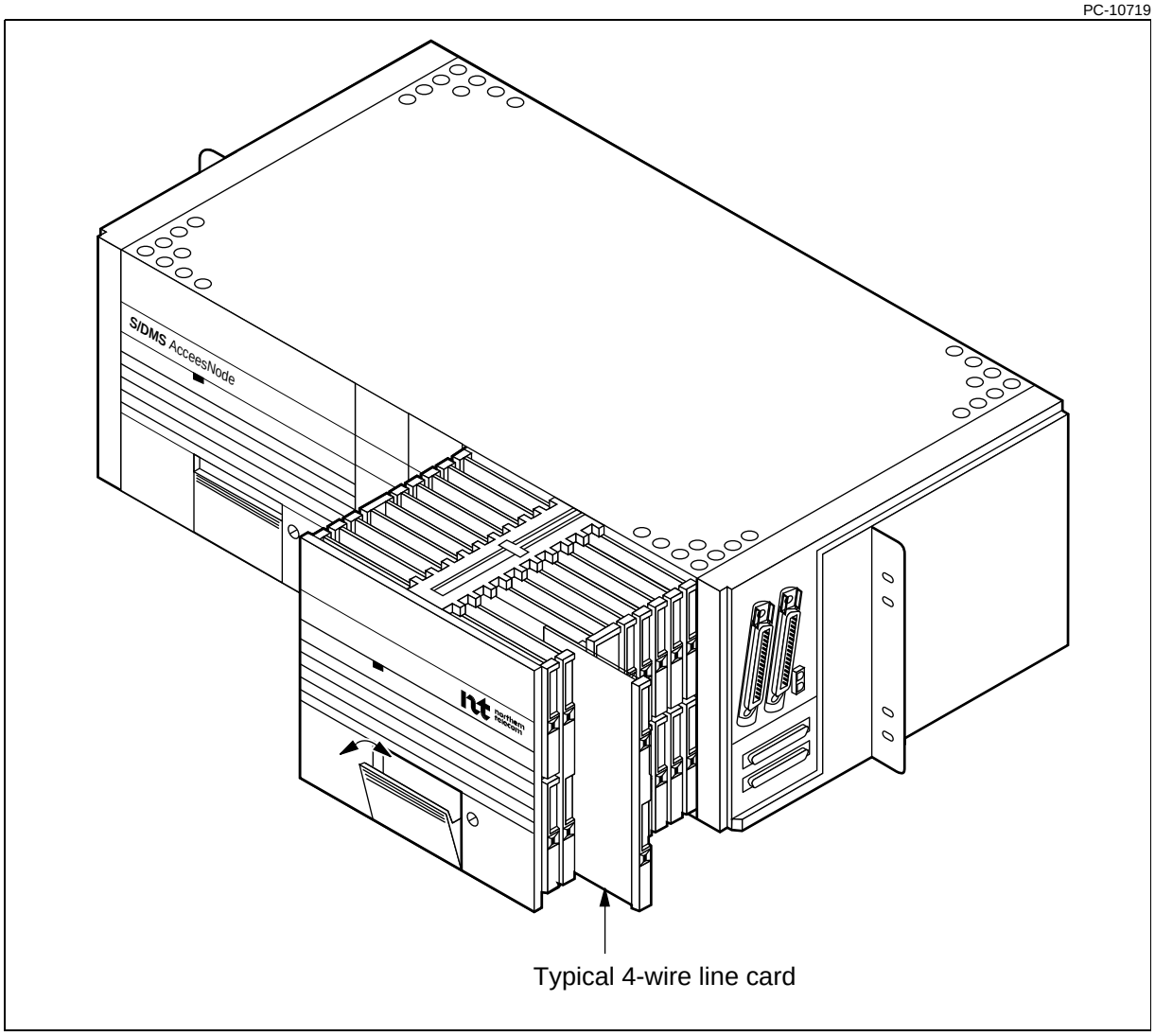
—continued—

Procedure 5-2 (continued)
Replacing the line cards

Step	Action

Figure 5-4
Removing a 4-Wire Omega line card

PC-10719



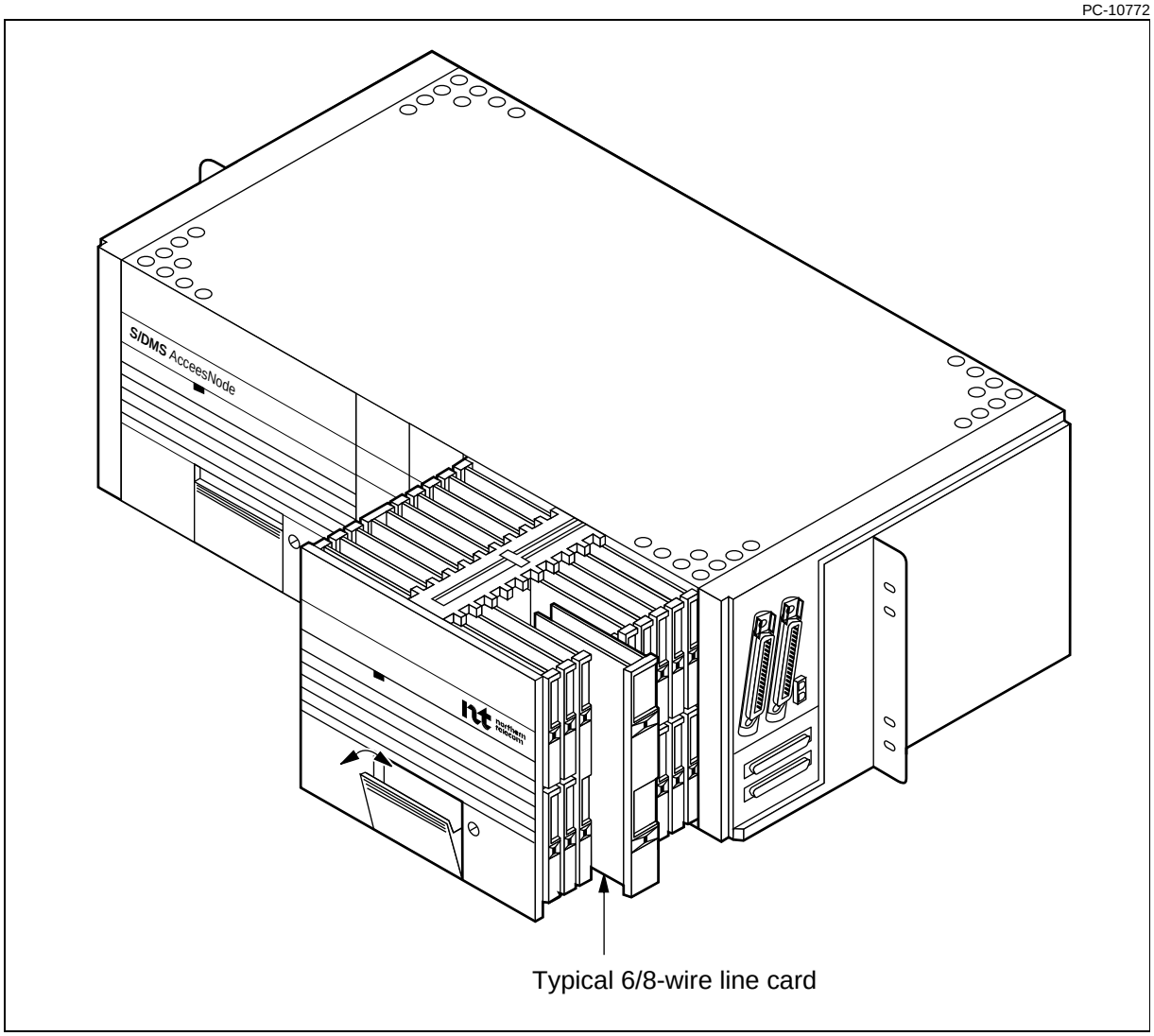
—continued—

Procedure 5-2 (continued)
Replacing the line cards

Step	Action

Figure 5-5
Removing a 6/8-Wire Omega line card

PC-10772



—end—

Procedure 5-3
Replacing the NT4K70 narrowband line interface card

Use this procedure to replace the narrowband line interface (LIC) card in the copper-distribution shelf line drawer.

Action

Step	Action

If replacing	Then go to
a primary in-service LIC	step 1
a secondary in-service LIC	step 1
a failed or out-of-service LIC	step 5

1 From the network element status screen, display the screen for the LIC being replaced:

eq lic;dtllic <CDS#> <group>↵

where

<CDS#> number of the copper-distribution shelf: **1** to **7**

<group> the group number of the LIC being replaced: **a b, c,** or **d**

The LIC equipment screen appears.

If replacing	Then go to
a primary in-service LIC	step 2
a secondary in-service LIC	step 3

2 Switch from the primary to the secondary LIC:

switch↵
y↵

3 Change the state of the LIC to out-of-service (OOS):

chgstate oos↵

The system prompts for confirmation of the state change.

4 Confirm the state change:

y↵

The state changes to OOS.

—continued—

Procedure 5-3 (continued)
Replacing the NT4K70 narrowband line interface card

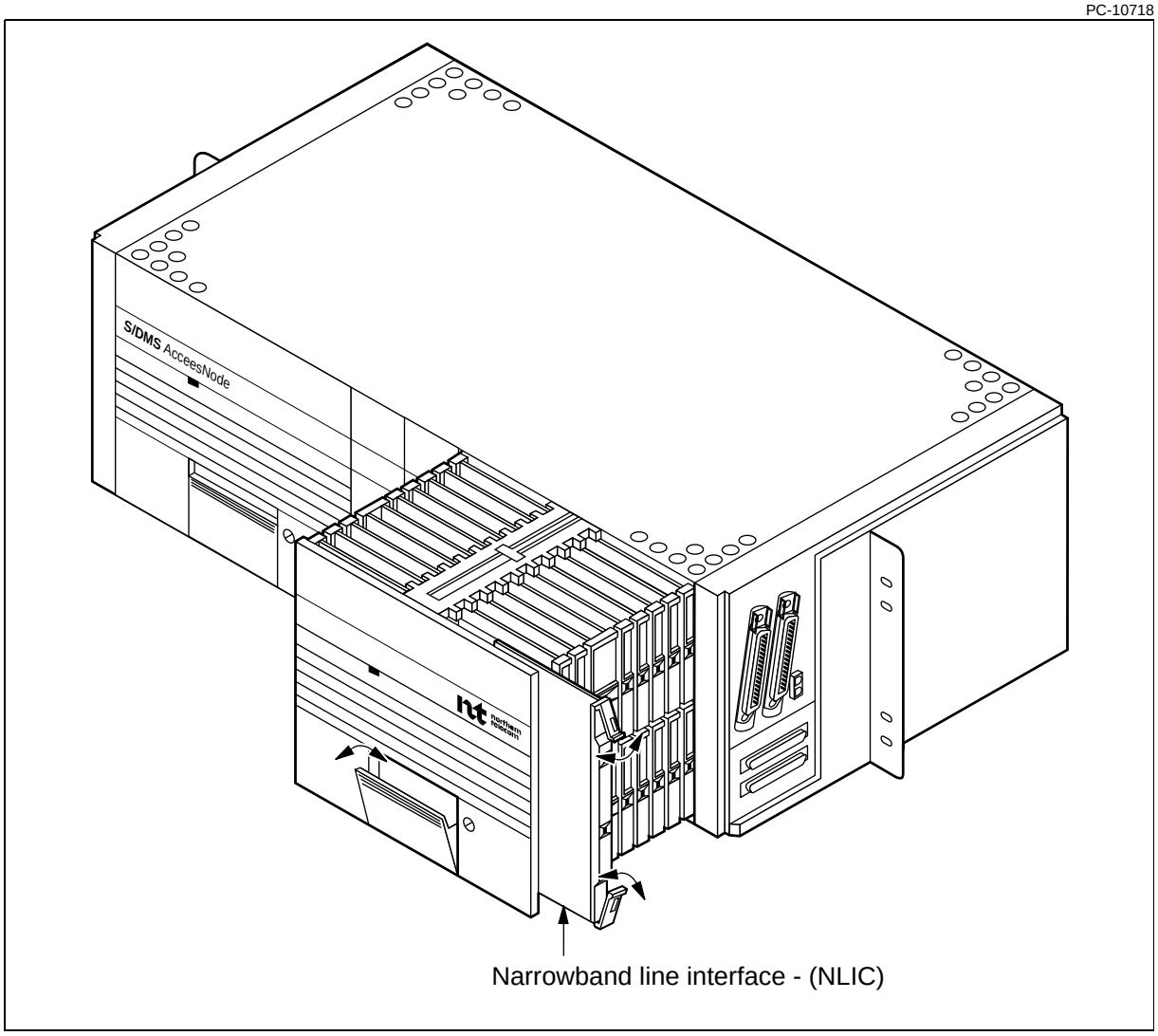
Step	Action
5	Unlock the copper-distribution shelf (CDS) line drawer handle by turning the locking screw (located on the CDS adjacent to the ejector latch) 90 degrees counterclockwise so that the alignment indicators (a small “dot” on the CDS and on the locking screw) are NOT aligned.
6	Withdraw the line drawer from the copper-distribution shelf by pulling the drawer handle as shown in Figure 5-1.
7	Remove the LIC by pulling the ejector latches as shown in Figure 5-6.
8	Wait at least 20 seconds for the system to stabilize.
9	Insert a replacement LIC in the slot.
10	Gently push in the replacement LIC until the ejector latch comes in contact with the drawer. Then push the latch in to engage the circuit pack with the midplane connector.
11	Change the state of the LIC to in-service (IS): **chgstate is.**↵ *The state changes to IS.* ***Note:*** If the automatic-in-service feature is set to on, the state changes to IS automatically. *The state automatically changes to IS.*
12	Gently push in the CDS line drawer until the handle comes in contact with the shelf. Then push the line drawer in to engage the handle with the shelf.
13	Lock the CDS line drawer ejector latch by turning the locking screw 90 degrees clockwise so that the alignment indicators are aligned.

—continued—

Procedure 5-3 (continued)
Replacing the NT4K70 narrowband line interface card

Figure 5-6
Withdrawing a LIC

PC-10718



—end—

Procedure 5-4
Replacing the NT4K73AA or NT4K73CA metallic test access card

Use this procedure to replace the metallic test access card (MTAC) in the copper-distribution shelf (CDS) line drawer.

Action

Step	Action

If replacing	Then go to
an in-service MTAC	step 1
a failed or out-of-service MTAC	step 3

1 From the network element status screen, display the screen for the MTAC being replaced:

eq mtac;dtlmtac <CDS#> <group>↵

where

<CDS#> number of the copper-distribution shelf: **1** to **7**

<group> the group number of the MTAC being replaced: **a** or **b**

The MTAC equipment screen appears.

2 Change the state of the MTAC to out-of-service (OOS):

chgstate oos↵

The state changes to OOS.

3 Unlock the CDS line drawer handle by turning the locking screw (located on the CDS adjacent to the ejector latch) 90 degrees counterclockwise so that the alignment indicators (a small “dot” on the CDS and on the locking screw) are NOT aligned.

4 Withdraw the line drawer from the copper-distribution shelf by pulling the drawer handle as shown in Figure 5-1.

5 Remove the MTAC by pulling the ejector latches as shown in Figure 5-7.

6 Wait at least 20 seconds for the system to detect removal of the MTAC. This can be verified by checking for an un-equipped slot, which appears as “Slot: Ueq” in reverse video on the MTAC equipment screen.

7 Insert a replacement MTAC in the line drawer slot.

8 Gently push in the replacement MTAC in until the ejector latch comes in contact with the drawer. Then push in the latches to engage the circuit pack with the midplane connector.

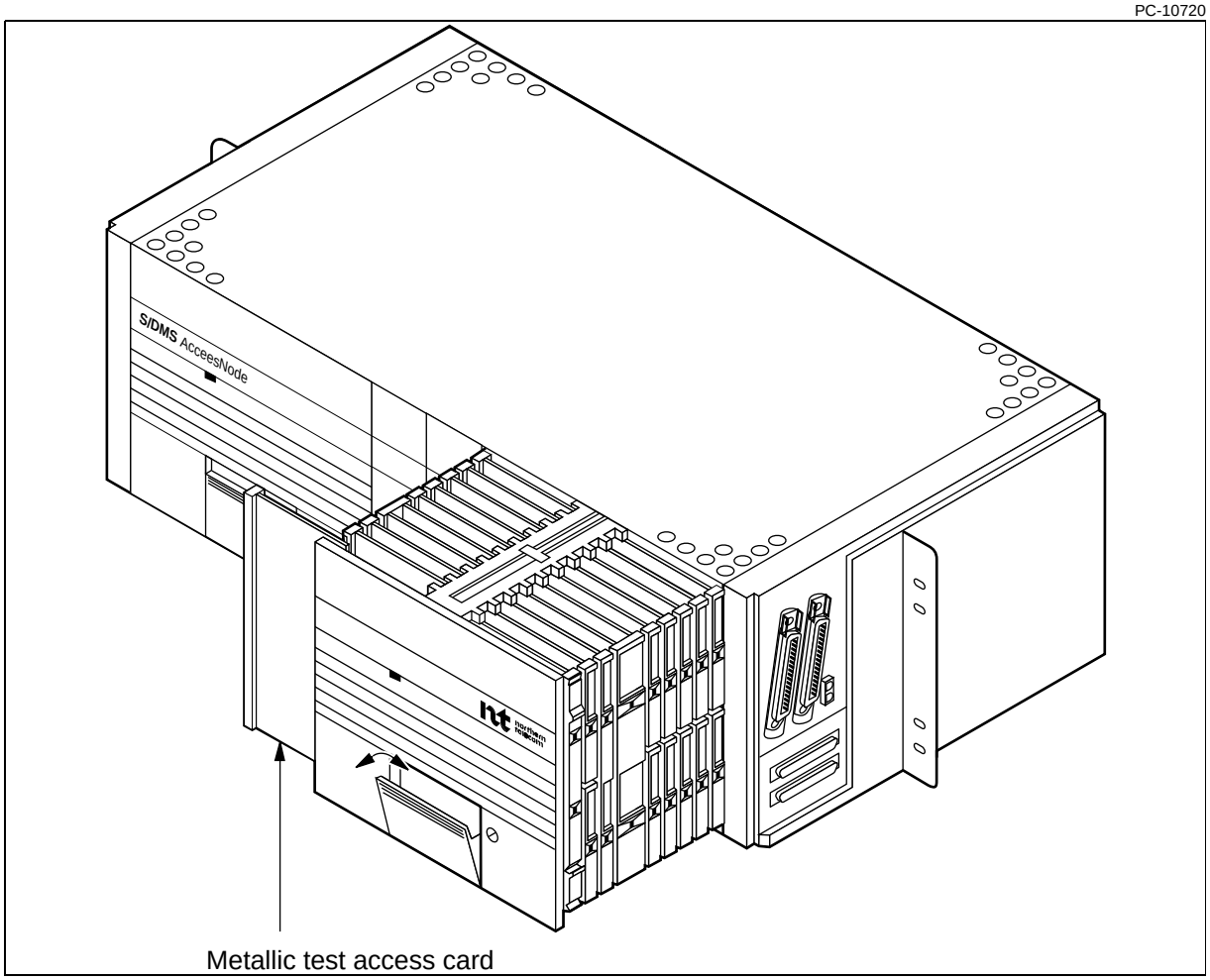
—continued—

Procedure 5-4 (continued)
Replacing the NT4K73AA or NT4K73CA metallic test access card

Step	Action
9	Change the state of the MTAC to in-service (IS): **chgstate is.**↵ *The state changes to IS.* ***Note:*** If the automatic-in-service feature is set to on, the state changes to IS automatically.
10	Gently push in the CDS line drawer until the handle comes in contact with the shelf. Then push the line drawer in to engage the handle with the shelf.
11	Lock the CDS line drawer ejector latch by turning the locking screw 90 degrees clockwise so that the alignment indicators are aligned.

Figure 5-7
Withdrawing an MTAC

PC-10720



—end—

Replacing modules in a BIP

Use this procedure to replace modules in the breaker interface panel (BIP).

Chapter contents

This chapter contains the following information:

Perform the procedures according to your requirements.

Procedure 6-1
Replacing the NT4K64BA Alarm relay card

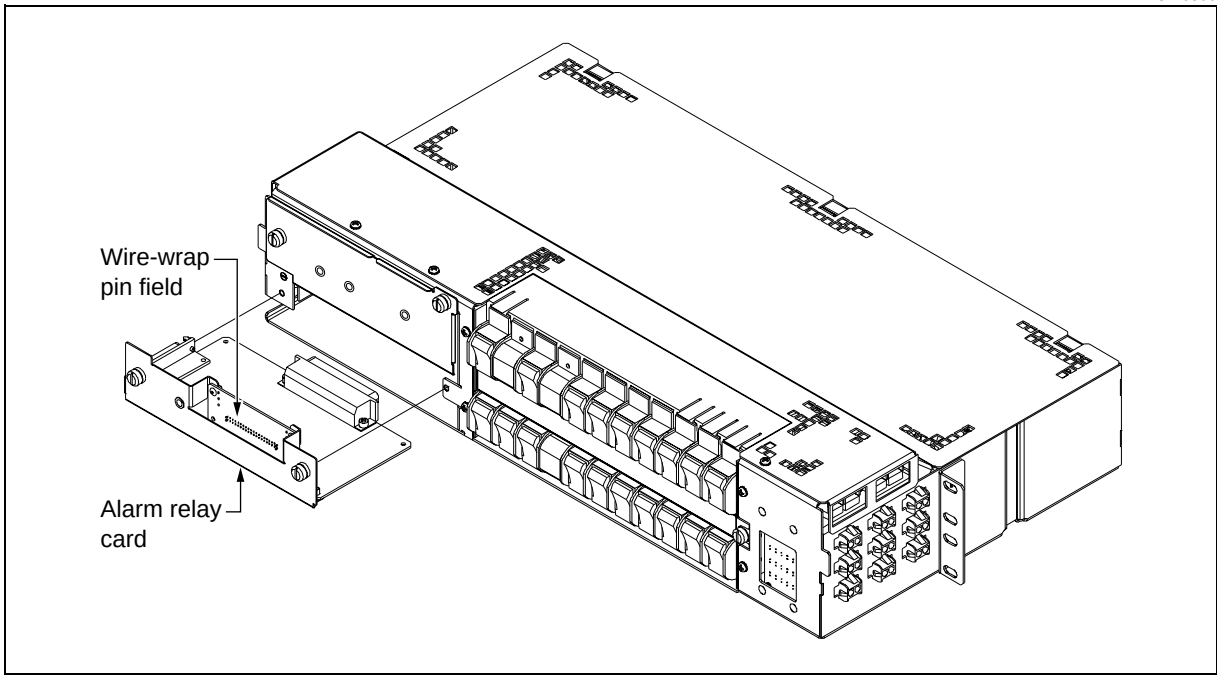
Use this procedure to replace the NT4K64BA alarm relay card in the NT4K14BA breaker interface panel (BIP).

Action

Step	Action
1	Remove the BIP cover as shown in Chapter 3, “Removing covers and grilles.”
2	Loosen the hold-down screw on the faceplate of the alarm relay card. ***Note:*** If necessary removal all wiring from wire-wrap pin field and tag each wire for reassembly before performing step 3
3	Remove the card from the BIP, as shown in Figure 6-1.

Figure 6-1
BIP alarm relay card location

PC-16500



4	Insert a replacement alarm relay card in the BIP and fasten the card into place with hold-down screw. Replace wire-wrap pin field wiring if removed in step 2.

—continued—

Procedure 6-1 (continued)
Replacing the NT4K64BA Alarm relay card

Step	Action
5	Replace the BIP cover. ***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. **—end—**

Procedure 6-2
Replacing the NT4K61BA Talk battery filter card

Use this procedure to replace the NT4K61BA talk battery filter card in the NT4K14BA breaker interface panel (BIP).

Action

Step	Action
1	Remove the BIP cover as shown in Chapter 3, “Removing covers and grilles.”
2	Loosen the hold-down screw on the faceplate of the talk battery filter card.

DANGER
Risk of electric shock
To avoid possible shock hazard when removing the talk battery filter card, handle the card only by the faceplate. Risk of electrical shock is no longer present after 10 seconds, at which time the internal capacitor has fully discharged.

CAUTION
Risk of equipment damage
Do not place the talk battery filter card on a conductive surface, as it contains a large capacitor that can discharge. Place the card on a nonconductive surface for 30 seconds until the capacitor has had a chance to fully discharge internally.

Do not reinsert the same card until it has had a chance to fully discharge, which takes approximately 30 seconds.

3	Hold the talk battery filter card by its faceplate and carefully remove the card from the BIP, as shown in Figure 6-2.

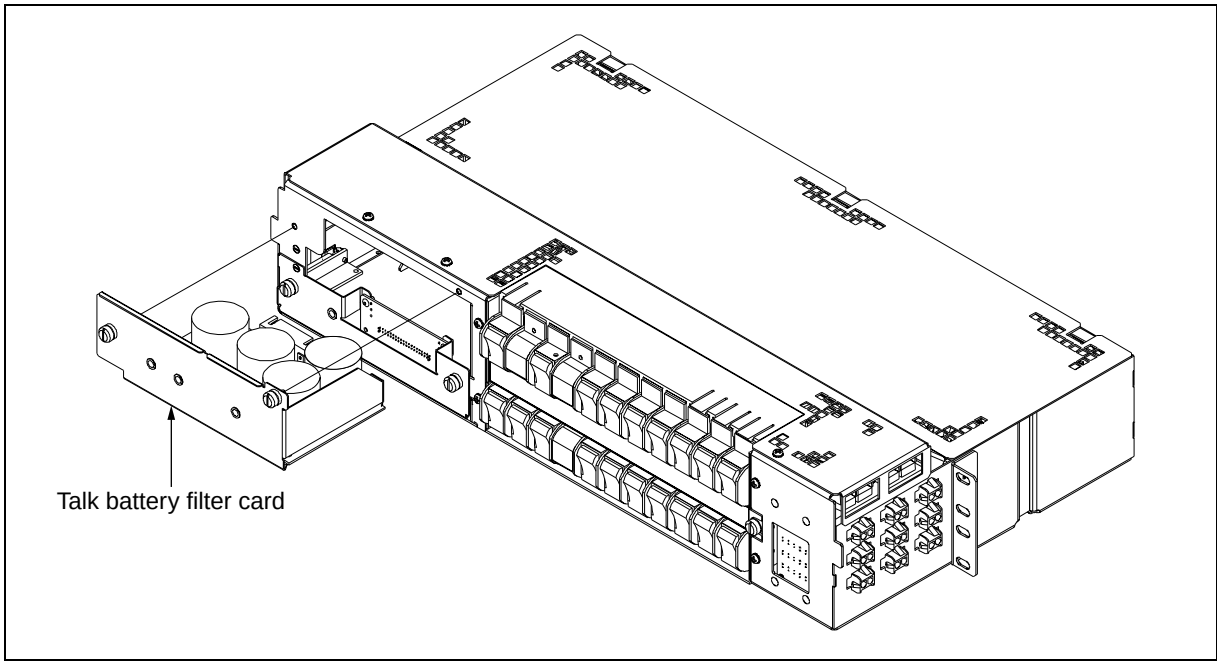
—continued—

Procedure 6-2 (continued)
Replacing the NT4K61BA Talk battery filter card

Step	Action
4	Insert a replacement talk battery filter card in the BIP and fasten the card into place with hold-down screw.
5	Replace the BIP cover.

Figure 6-2
BIP talk battery filter card location

PC-16499



—end—

Procedure 6-3
Replacing the NT4K1472 BIP LED card

Use this procedure to replace the NT4K1472 LED card in the NT4K14AB breaker interface panel (BIP). The LED card is used to provide visual indication of BIP power, and system-level critical, major and minor alarms.

Note: The NT4K1446 LED card provided in the NT4K14BA BIP is not field replaceable.

- a 3/8-inch slot screwdriver

Action

Step	Action
1	Remove the BIP cover as shown in Chapter 3, “Removing covers and grilles.”
2	Disable power to all BIP indicator lamps by following steps 2a and 2b:
	a. Loosen the captive retaining screw on the faceplate of the NT4K64 Alarm Relay Card, as shown in Figure 6-3.
	b. Pull the card forward to disconnect the card from the backplane. When disconnected, all BIP lamps turn off.
	Note: Do not completely remove the card from the BIP. Leave it in its slot for the duration of this procedure.

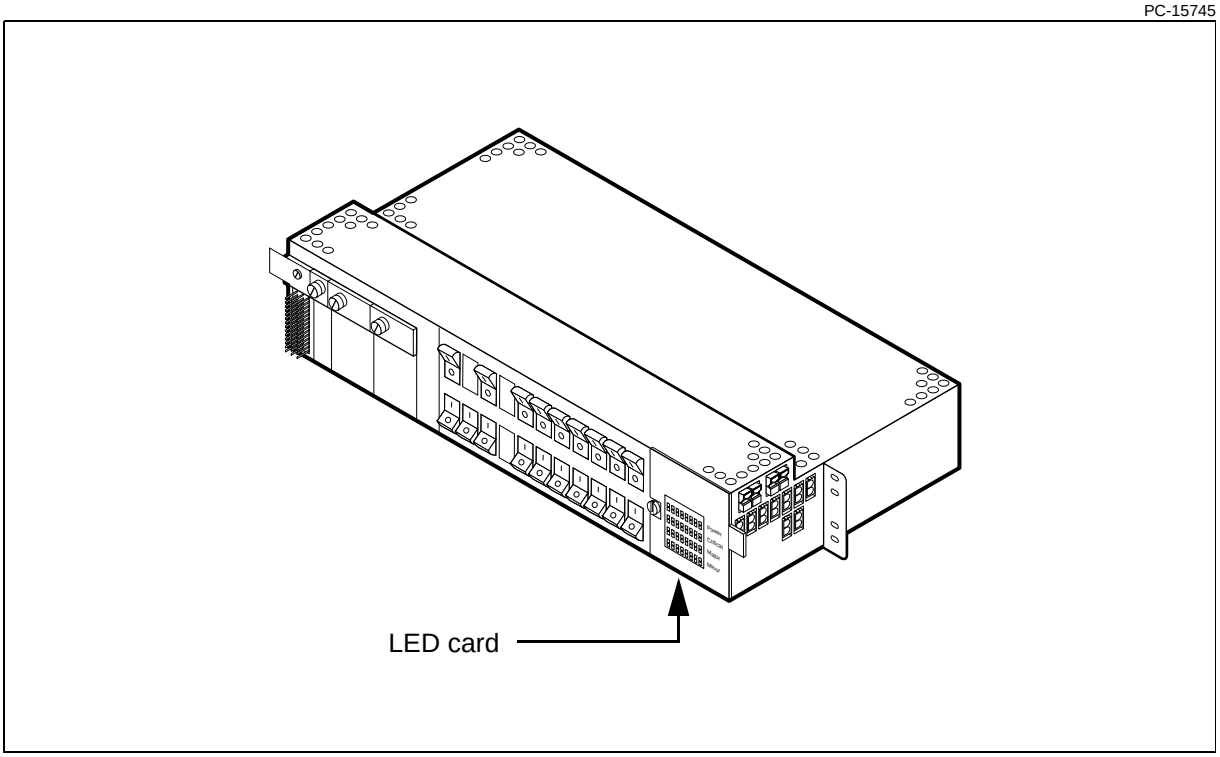
—continued—

Procedure 6-3 (continued)
Replacing the NT4K1472 BIP LED card

Step	Action

Figure 6-3
BIP LED card location

PC-15745



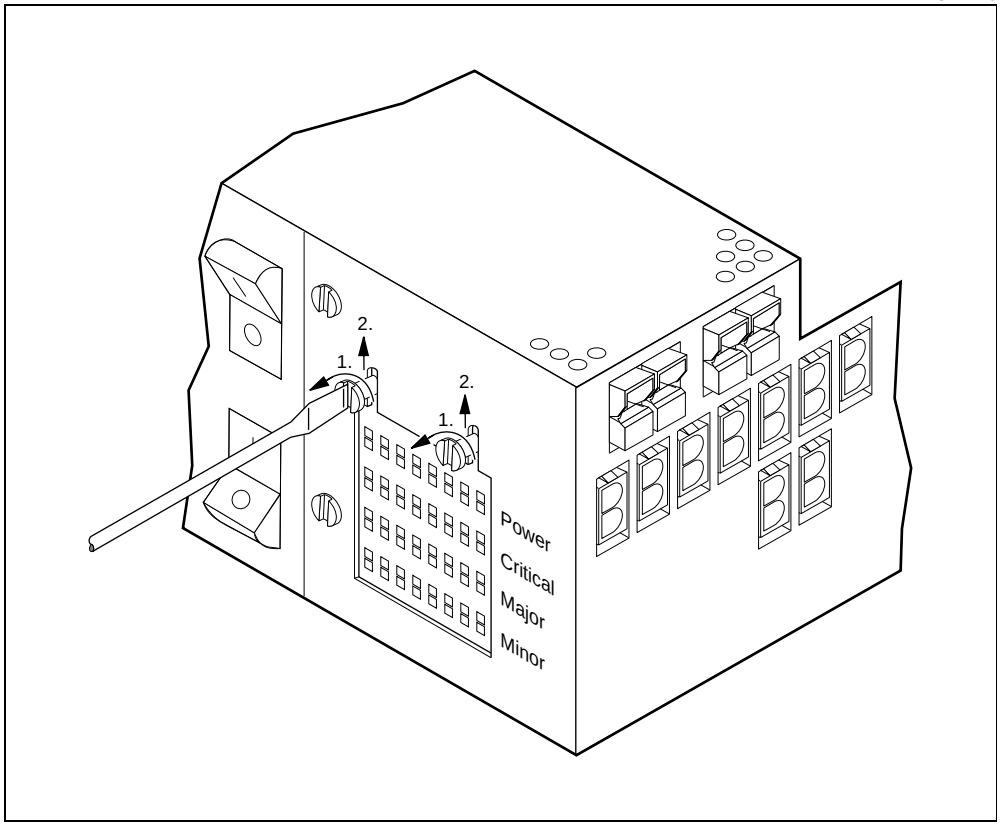
—continued—

Procedure 6-3 (continued)
Replacing the NT4K1472 BIP LED card

Step	Action
3	Using a slotted screwdriver, loosen the two screws on the face of the LED card so they extend about 0.5 inches (13 mm) from the front of the BIP, as shown in Figure 6-4. ***Note:*** Do not completely remove the two screws from the LED card. The two screws must remain in place so they can be used as handles to grasp the LED card during removal.

Figure 6-4
Loosening LED card

PC-11170



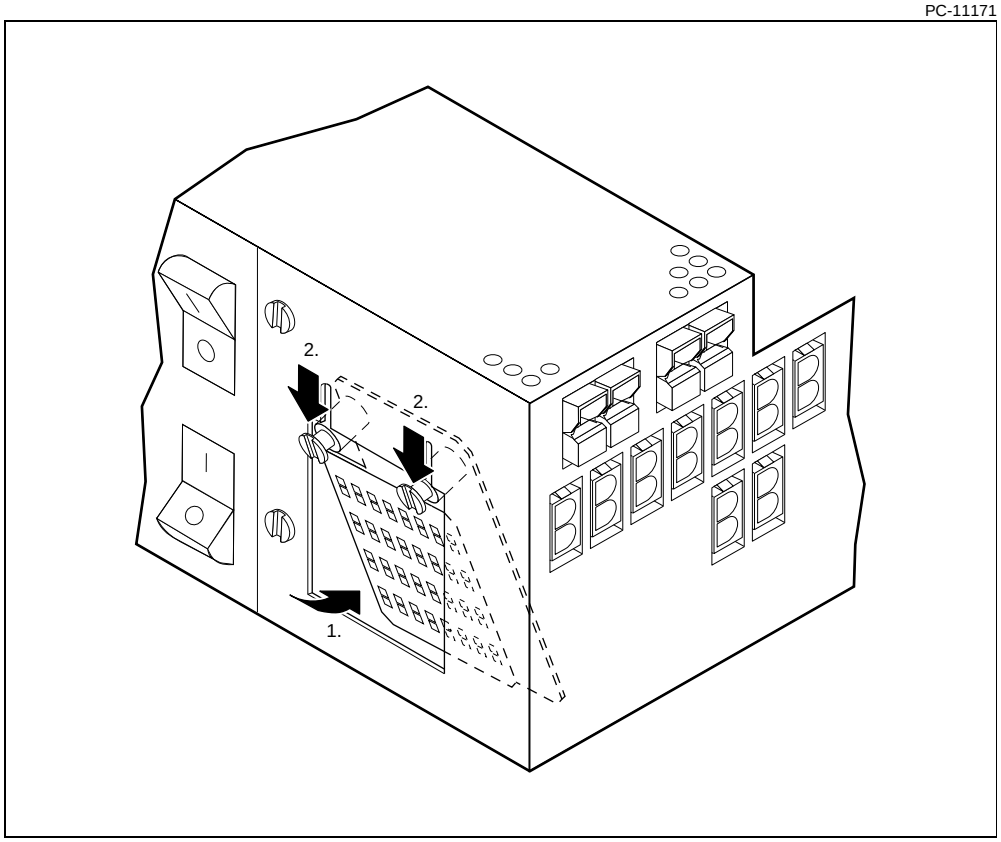
—continued—

Procedure 6-3 (continued)
Replacing the NT4K1472 BIP LED card

Step	Action
4	Grasp the two screws on the LED card and lift the card upward as high as it will go (about 0.4 inches (10 mm), as shown in Figure 6-5.
5	Using the screws on the LED card as handles, push the bottom of the card inward (1.) and lower the screws from their retaining slots (2.).

Figure 6-5
Lifting the LED card upwards

PC-11171



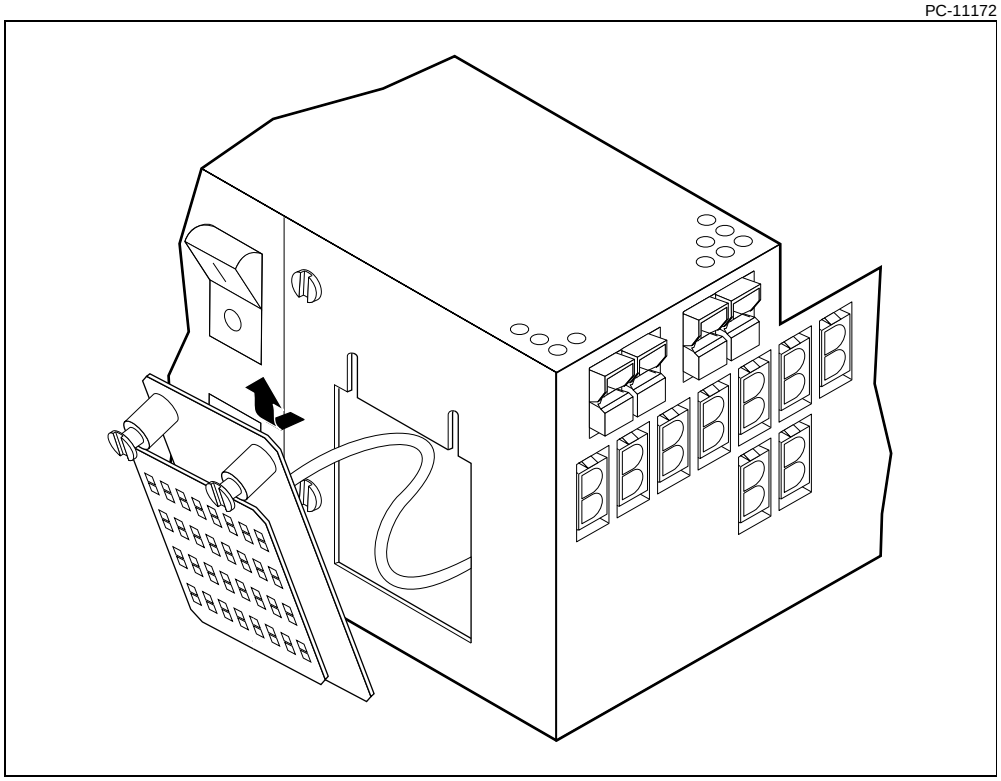
—continued—

Procedure 6-3 (continued)
Replacing the NT4K1472 BIP LED card

Step	Action
6	Carefully pull the card up and out of the BIP, as shown in Figure 6-6. If necessary, use the screws on the LED card as handles. ***Note:*** Avoid putting excessive strain on the cable attached to the back of the LED card. The cable must maintain its “S” shape to help hold and center the card in the opening of the BIP during replacement.

Figure 6-6
Removing the LED card

PC-11172



7	Disconnect the cable from the connector on the back of the LED card.
8	Remove the two screws from the LED card, so they can be used on the replacement card.
9	Screw the two screws part way into the binding posts on the replacement LED card. Leave about 0.5 inches (13 mm) of the screw extended from the binding post so they can be used as handles during the installation of the replacement card.
10	Reconnect the cable to the connector on the back of the replacement LED card. (The connector is keyed to fit only one way).

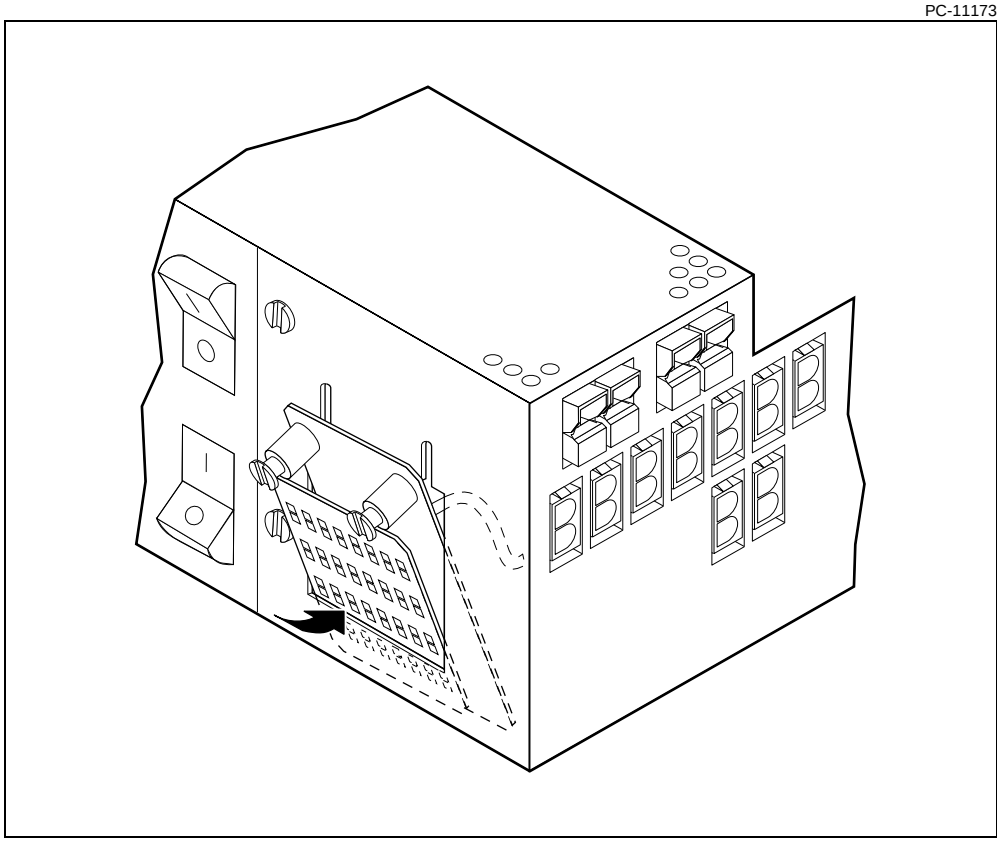
—continued—

Procedure 6-3 (continued)
Replacing the NT4K1472 BIP LED card

Step	Action
11	Hold the replacement LED card on an angle and insert the bottom of the card down into the BIP opening, and continue inserting until the top of the card is completely inside the BIP opening as shown in Figure 6-7. ***Note:*** Ensure the cable maintains its “S” shape to help hold and center the card in the opening of the BIP during replacement.

Figure 6-7
Inserting the replacement LED card

PC-11173



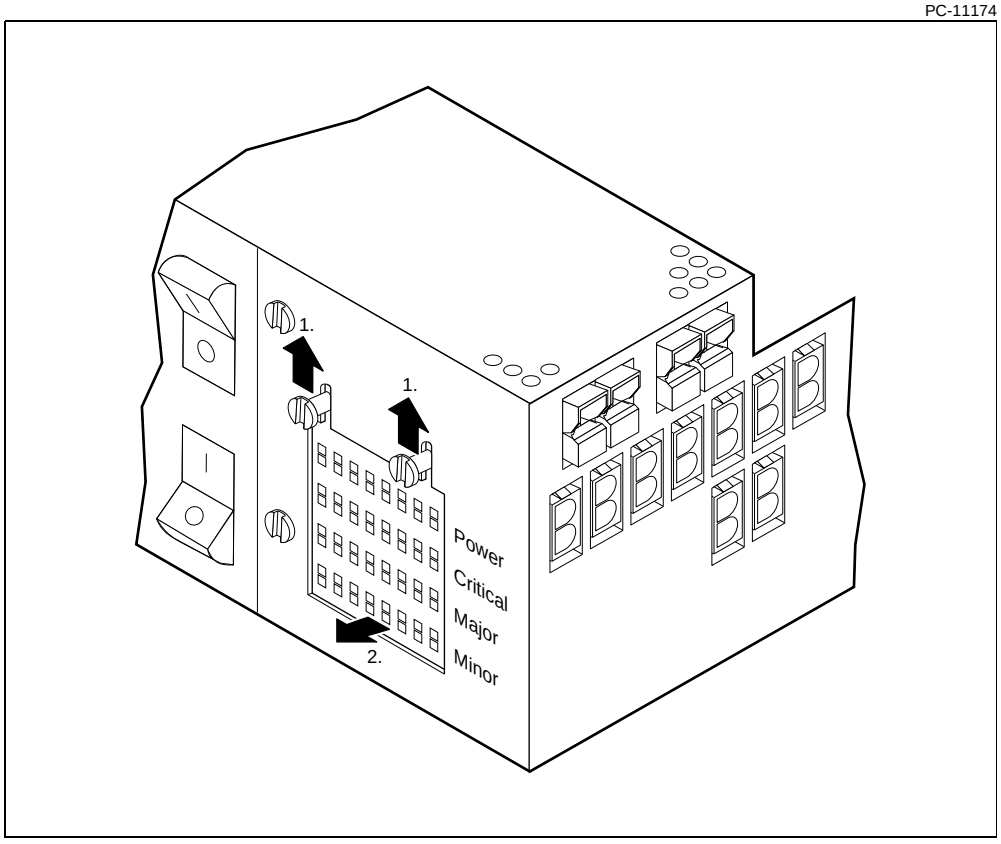
—continued—

Procedure 6-3 (continued)
Replacing the NT4K1472 BIP LED card

Step	Action
12	Using the two retaining screws as handles, lift the LED card up and forward to engage the two screws with the slots on the top of the BIP opening (1.), as shown in Figure 6-8. Using the two screws, lever the bottom of the LED card forward (2.) until it is parallel to the faceplate of the BIP.

Figure 6-8
Positioning the LED card

PC-11174



—continued—

Procedure 6-3 (continued)
Replacing the NT4K1472 BIP LED card

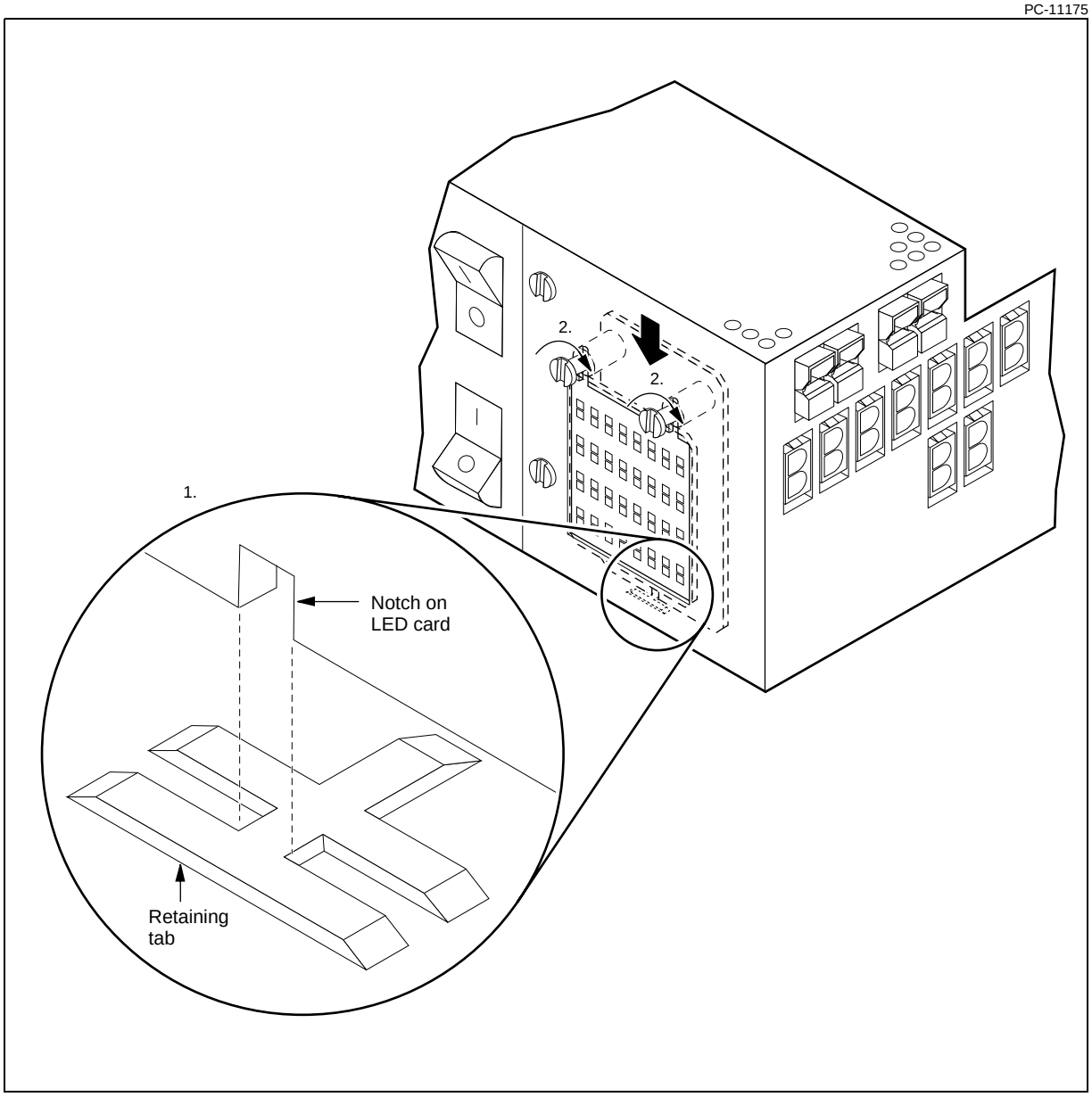
Step	Action
	Note: There is a small retaining tab on the inside of the BIP, at the bottom, just behind the opening, as shown in Figure 6-9. This retaining tab mates with the notch on the bottom edge of the LED card to hold it securely in place.
13	Gently move the bottom part of the LED card around until the notch on the bottom of the card mates with the retaining tab (1.) as shown in Figure 6-9.
14	Check that it is properly in place in the retaining tab by pressing inward on the bottom of the card and making sure that the card does not move. The LED card is properly positioned when the front of the LED card is parallel to, and just behind, the front of the BIP.
15	With the card properly seated in the retaining tab, use a slot screwdriver to tighten the retaining screws (2.) as shown in Figure 6-9.
16	Reinsert the NT4K64 alarm relay card, ensure that it engages with the BIP backplane, and fasten the retaining screw.
17	Test the BIP lamps by pressing the ACO/Lamp test button on the local craft access panel (LCAP). All BIP indicators and the LEDs on all shelf circuit packs should light for 30 seconds.
18	Replace the BIP cover.

—continued—

Procedure 6-3 (continued)
Replacing the NT4K1472 BIP LED card

Step	Action

Figure 6-9
Reinserting the LED card



—end—

Procedure 6-4
Replacing a circuit breaker in the BIP

Use this procedure to replace circuit breakers in the NT4K14AB/BA breaker interface panel (BIP).

Requirements

Read and adhere to all cautions and danger warnings.

DANGER
Risk of electric shock
This procedure is done on live electrical circuits and poses a threat of electrical shock.

Qualified electrician requirement
This procedure should be performed by a qualified electrician in accordance with all National Electrical Code (NEC), federal, state and local code requirements and regulations.

DANGER
Risk of electric shock
To avoid possible shock hazard when removing the circuit breaker, handle the breaker only by the case housing. Do not touch the wiring or terminals with your hands.

DANGER
Risk of electric shock
To avoid possible shock hazard when removing the circuit breaker, use fully insulated tools.

Tools and materials

All tools listed must be fully insulated tools if the system is electrically powered-up or “live.”

- nut driver set
- replacement circuit breaker of the proper rating (see Table 6-1).

—continued—

Procedure 6-4 (continued)
Replacing a circuit breaker in the BIP

Table 6-1 shows the NT4K14 circuit breaker replacement part ordering codes.

Table 6-1
BIP NT4K14 circuit breaker ordering codes

Breaker designation	Rated Amperage	Ordering code
CE A CE B CDS1 PWR CDS2 PWR CDS3 PWR CDS4 PWR CDS5 PWR CDS6 PWR CDS7 PWR CU A (Note) CU B (Note)	15 A	A0381920
TB CE	1 A	A0381921
CDS1 TB CDS2 TB CDS3 TB CDS4 TB CDS5 TB CDS6 TB CDS7 TB	10 A	A0627317
Note: For the NT4K14AB BIP product releases 04 and above and NT4K14BA BIP, CU A and CU B are 15 A breakers. The A0627317 short delay 10 A breaker supplied on the NT4K14BA BIP is backward compatible to earlier versions of the BIP.Verify the amperage of these breakers before you order replacements.		

—continued—

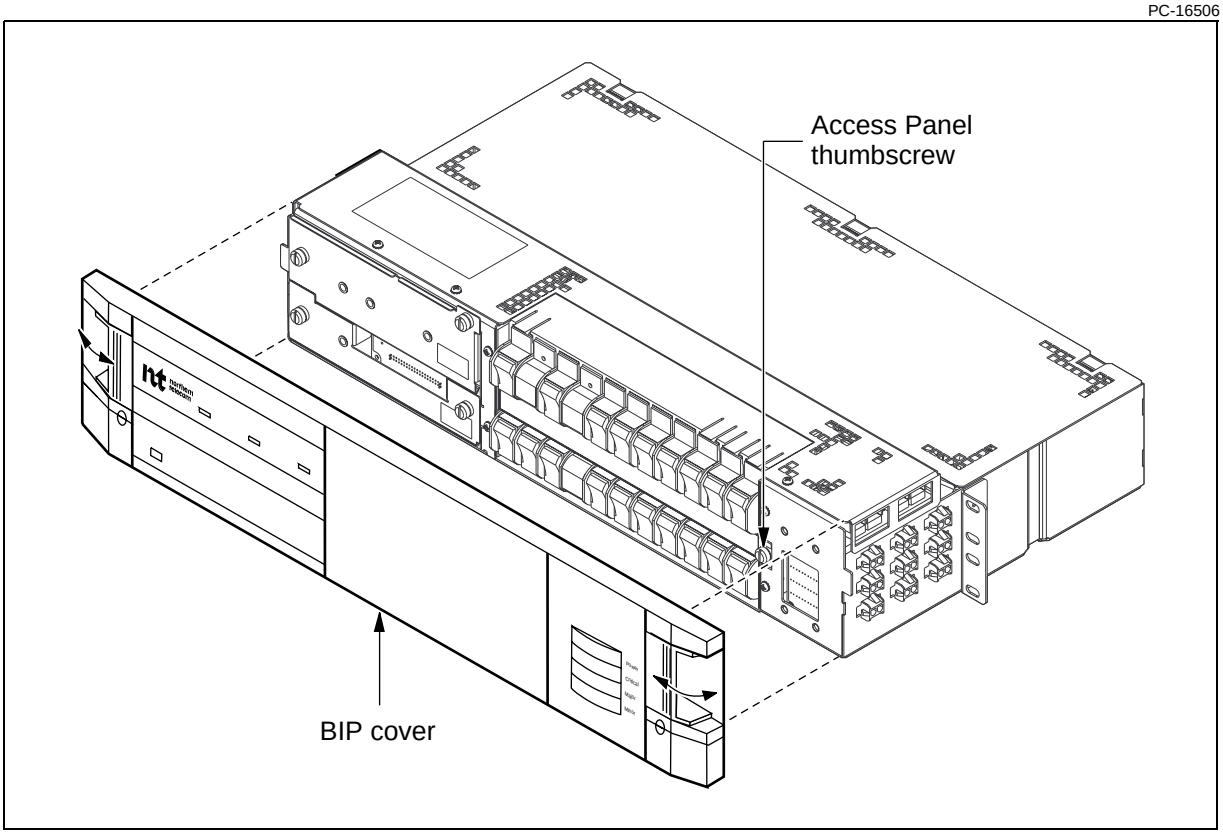
Procedure 6-4 (continued)
Replacing a circuit breaker in the BIP

Action

Step	Action
	Note: If the system you are working on has power connected and active, you must always use fully insulated tools.
1	Remove the BIP cover as shown in Figure 6-10.
2	Loosen the thumb screw on the circuit breaker access panel (see Figure 6-10) and remove the panel.

Figure 6-10
BIP circuit breaker access panel

PC-16506



—continued—

Procedure 6-4 (continued)
Replacing a circuit breaker in the BIP

Step	Action

DANGER
Risk of electric shock
The BIP breaker panel contains live electrical connections which pose a threat of electrical shock. Be extremely careful to ensure that the circuit breaker leads and contact posts do not short out to the grounded BIP framework.

CAUTION
Critical lead length
The wiring leads on the BIP circuit breakers are short. When you pull the breaker out of its slot in the following step, use care and caution to avoid disconnecting the spade lug connections on the rear of the breaker.

3 Disengage the circuit breaker locking latch and grasp the affected circuit breaker and *gently* pull it straight out of the panel slot (see Figure 6-11).

4 Using the insulated needle-nosed pliers, disconnect the –48 V dc In lead from the top contact on the rear of the circuit breaker.

Note: You are working on a powered system. You *must* use fully insulated needle-nosed pliers at all times when grasping connectors or leads.

5 Ensure that the replacement circuit breaker in the OFF position.

6 Remove the alarm leads and move them to the same contact points on the replacement circuit breaker.

7 Remove the –48 V dc Out lead from the bottom contact on the rear of the circuit breaker.

8 Connect the –48 V dc Out lead to the same contact post on the replacement circuit breaker.

9 Connect the –48 V dc In lead to the same contact post on the replacement circuit breaker.

10 Gently reinsert the circuit breaker into its slot in the BIP and ensure that the locking latch is engaged.

11 Reinstall and secure the circuit breaker access panel on the BIP.

12 Turn the circuit breaker to the ON position.

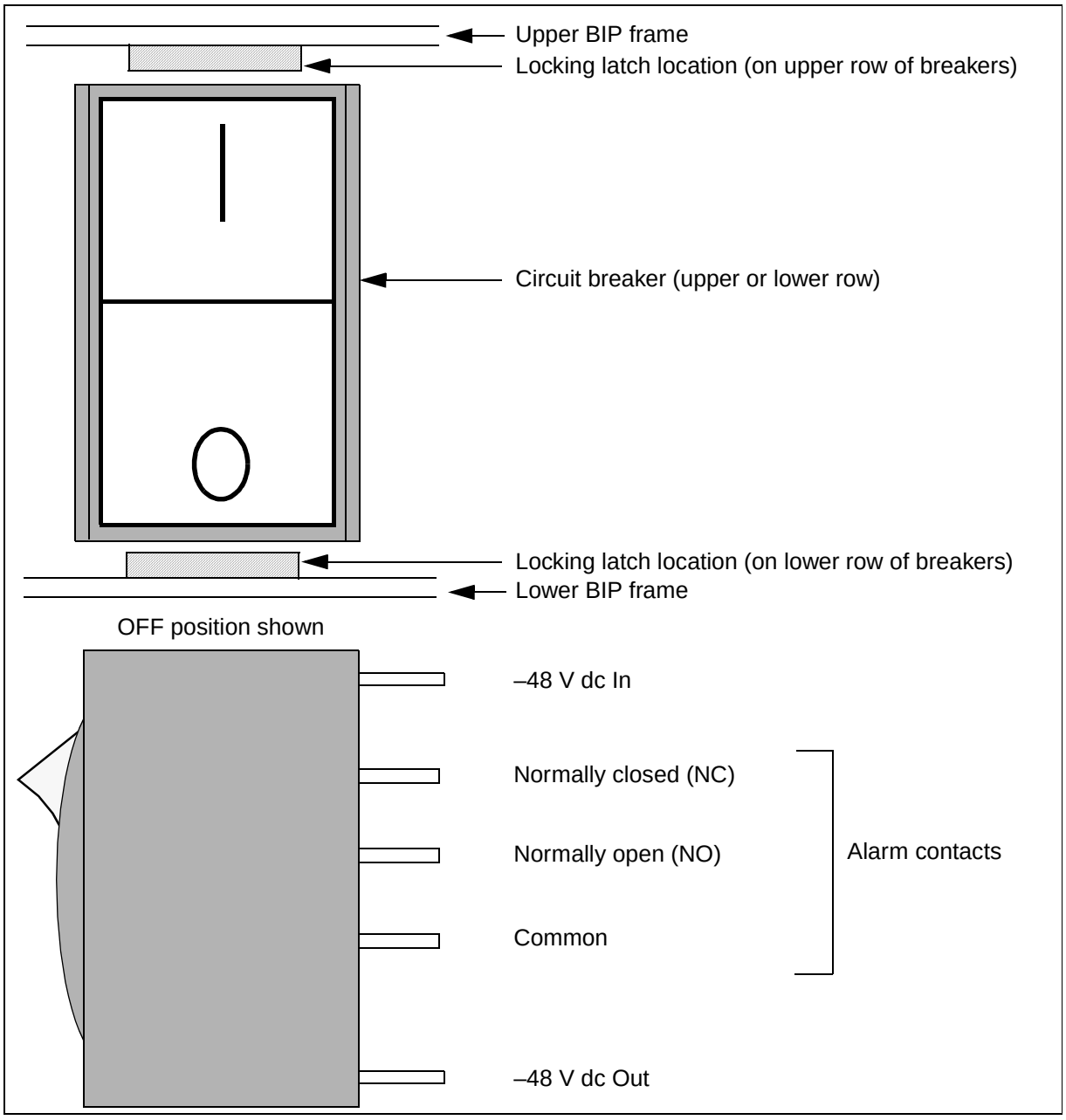
13 Repeat from step 1 for any other circuit breaker requiring replacement.

—continued—

Procedure 6-4 (continued)
Replacing a circuit breaker in the BIP

Step	Action

Figure 6-11
Replacing a BIP circuit breaker



—end—

Replacing modules in a common-equipment shelf

This chapter provides procedures for replacing circuit packs, cards, and modules in an AccessNode access bandwidth manager (ABM) shelf. Observe and follow all safety precautions listed in Chapter 1, “Safety guidelines and warnings,” when handling circuit packs, cards, or modules.

Chapter contents

This chapter contains the following information:

—continued—

Topic	See
Replacing an NT7E05 OC-12 VTBM optical interface (Note 2)	page 7-37
Replacing an NT7E04 DS1/VT mapper	page 7-45
Replacing an NT7E08 DS3 mapper	page 7-50
***Note 1*:** The NT4K75 timing and cross-connect card is not used in fiber-fed applications. It is used in DS1 copper-fed applications. ***Note 2*:** The NT7E05 optical interface unit is required hardware for VTBM functionality. The NT7E02 optical interface unit can be used in non-VTBM OC-12 fiber-fed applications.	
—end—	

Perform the procedures according to your requirements.

If you cannot successfully complete these procedures, contact your next level of support.

Procedure 7-1
Replacing an NT4K30 DS3 I/O card

Use this procedure to replace an NT4K30 DS3 I/O card in an access bandwidth manager (ABM) shelf.

Action

Step	Action

CAUTION
Possible loss of service
Replacing the DS3 I/O card will cause a service failure to the DS3 input and output channel associated with it.

1 Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”

2 Disconnect the DS3 cables from the DS3 I/O card connectors.

Note: If cabling is congested, use a BNC removal/installation tool.

3 Loosen the hold-down screw on the faceplate and remove the DS3 I/O card from the shelf.

4 Install the new DS3 I/O card and tighten the hold-down screw.

5 Re-connect the DS3 cables to the I/O card.

Note: If cabling is congested, use a BNC removal/installation tool.

6 Replace the shelf cover.

—end—

Procedure 7-2
Replacing an NT4K31 DS1 protection bridge card

Use this procedure to replace a DS1 protection bridge card in an access bandwidth manager (ABM) shelf.

CAUTION
Protection unavailable
Removing the DS1 protection bridge card causes protection to be inoperative for all DS1/VT mappers.

Action

Step	Action
1	Lockout the protection bridge card from any possible protection switch attempts: **pr;dtlprot ds1↵** **lockout op p↵** *The system prompts for confirmation. Enter:* **y↵** *An asterisk appears in the lockout columns for the P group.*
2	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”

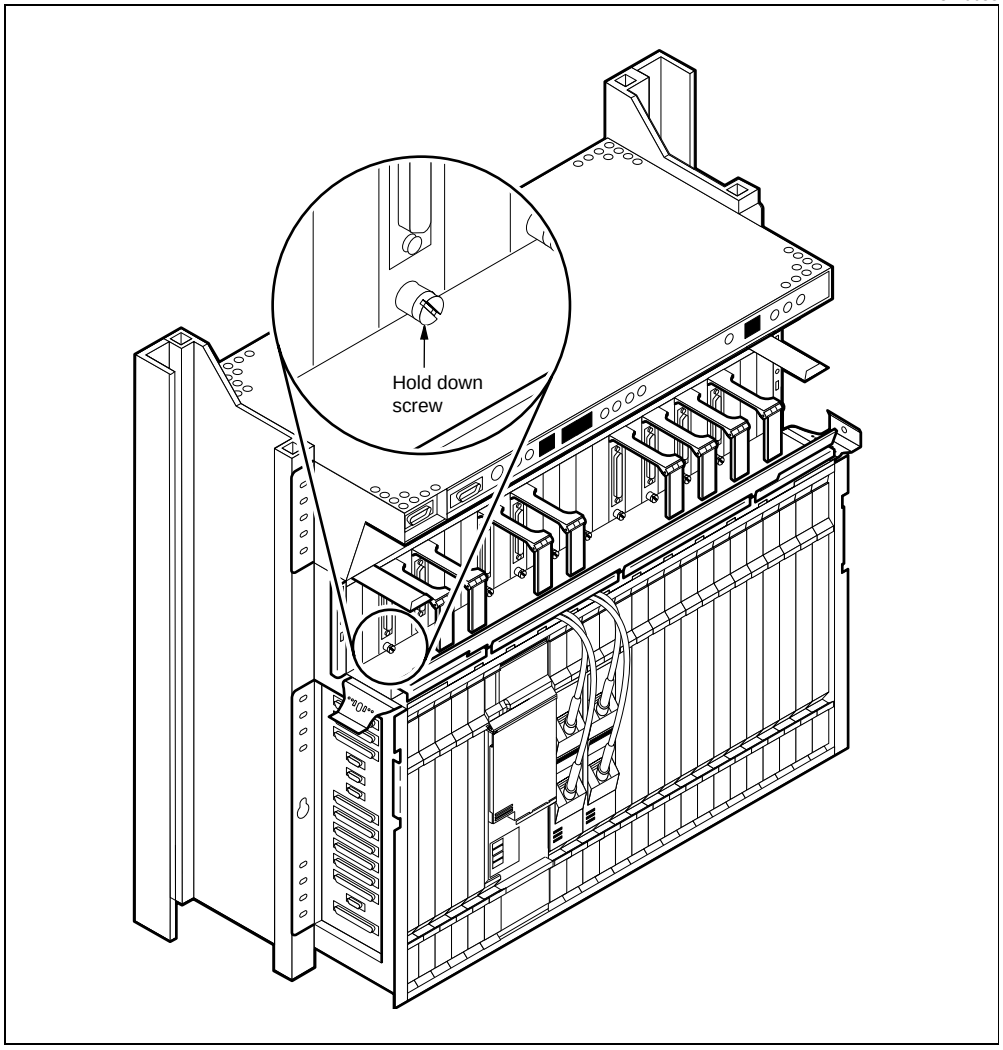
—continued—

Procedure 7-2 (continued)
Replacing an NT4K31 DS1 protection bridge card

Step	Action
3	Unfasten the hold-down screw on the faceplate, as shown in Figure 7-1, and remove the protection bridge card from the shelf by pulling outward on the hanging tab.

Figure 7-1
Unfastening the hold-down screw on the DS1 protection bridge card

PC-10633



—continued—

Procedure 7-2 (continued)
Replacing an NT4K31 DS1 protection bridge card

Step	Action
4	Install the replacement bridge card in the shelf and fasten the hold-down screw on the faceplate.
5	From the detailed protection screen, release the protection switch lockout: **lockout re p**↵ *The system prompts for confirmation. Enter:* **y**↵ *The asterisk in the Lockout column of the screen changes to a period (.).*
6	Replace the shelf cover.

—end—

Procedure 7-3
Replacing an NT4K32 DS1 input card

Use this procedure to replace a DS1 input card in an access bandwidth manager (ABM) shelf.

Action

Step	Action
1	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”

CAUTION
Service interruption
There are up to 14 DS1s associated with a DS1 input card. Removing the connector from a DS1 input card results in a loss of up to 14 DS1s to the corresponding DS1/VT mapper.

2	Disconnect the DS1 signal cable from the DS1 input card, as shown in Figure 7-2.
3	Loosen the hold-down screw on the faceplate and remove the input card from the shelf.
4	Insert a replacement DS1 input card, and tighten the hold-down screw on the faceplate.
5	Re-connect the DS1 cable to the input card and fasten the connector hold-down screw.
6	Replace the shelf cover.

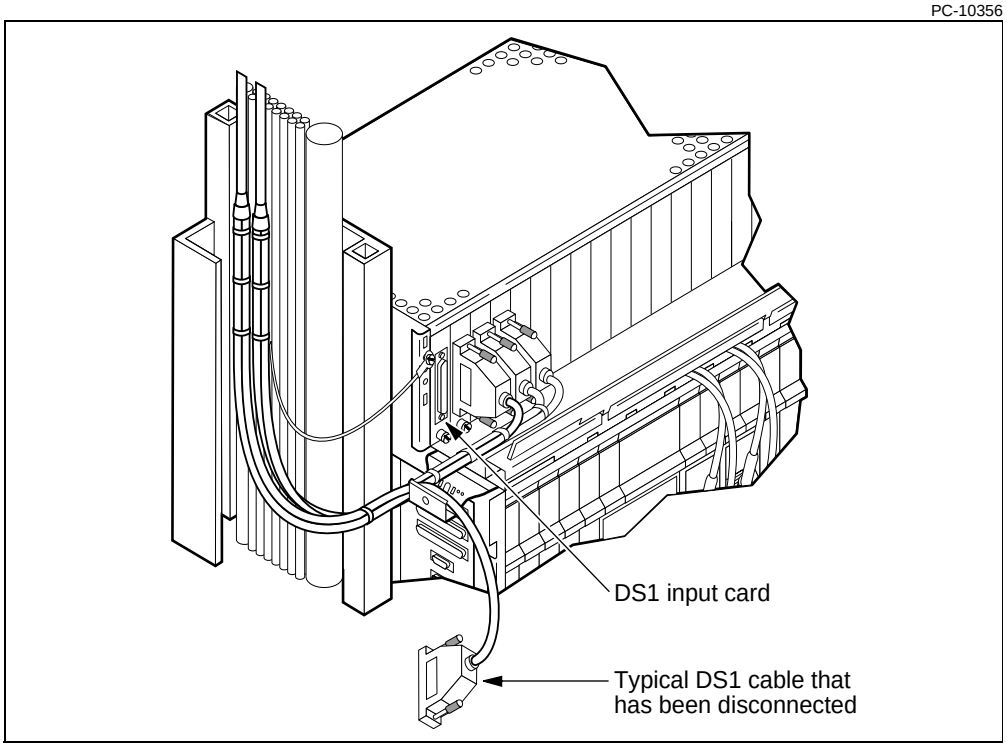
—continued—

Procedure 7-3 (continued)
Replacing an NT4K32 DS1 input card

Step Action

Figure 7-2
Disconnecting the DS1 signal cable

PC-10356



—end—

Procedure 7-4
Replacing an NT4K33 DS1 output card

Use this procedure to replace a DS1 output card in an access bandwidth manager (ABM) shelf.

Action

Step	Action
1	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”

CAUTION
Service interruption
There are up to 14 DS1s associated with each DS1 output card. Removing the connector from a DS1 output card results in a loss of up to 14 DS1s to the DS1/VT mapper.

2	Loosen the hold-down screw on the connector, and disconnect the DS1 cable from the DS1 output card (as shown in Figure 7-3).
3	Loosen the hold-down screw on the faceplate and remove the output card from the shelf.
4	Insert a replacement DS1 output card and tighten the hold-down screw.
5	Reconnect the DS1 cable to the output card and tighten the hold-down screw.
6	Replace the shelf cover.

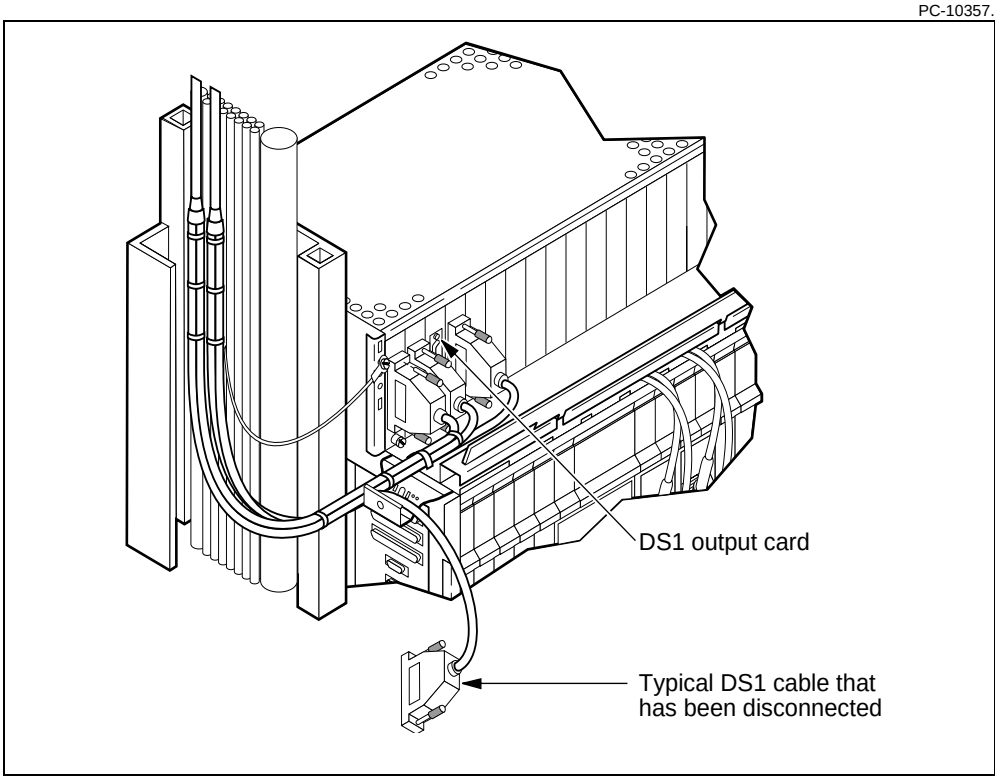
—continued—

Procedure 7-4 (continued)
Replacing an NT4K33 DS1 output card

Step Action

Figure 7-3
Disconnecting the DS1 cable

PC-10357.



—end—

Procedure 7-5
Replacing an NT4K50 side interconnect left

Use this procedure to replace the side interconnect left circuit pack in an access bandwidth manager (ABM) shelf.

CAUTION

Service-affecting

When you pull this circuit pack out of its slot, you thereby remove the terminations for various backplane signals, resulting in signal degradation and possible loss of traffic.

Loss of functionality

All connectors on the side interconnect left must be disconnected before removing the circuit pack. This results in a loss of the following functions:

- backplane signal terminations
- breaker interface panel (BIP) control
- external synchronization interface (ESI)
- parallel telemetry
- control network
- RS-232 DTE
- RS-232 OPC
- serial telemetry
- cooling unit
- orderwire extension
- local craft access panel 1
- local craft access panel 2
- copper-distribution shelf metallic test access

Action

Step	Action
1	Ensure that all connectors are labeled with the same designations as the label on the side interconnect left circuit pack.
2	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”
3	Disconnect all cables from the circuit pack connectors.
4	Loosen the two hexagonal screws located on the side of the circuit pack: one screw is located beside the label *Parallel Telem*; the other is located between the two *LCAP* labels.

—continued—

Procedure 7-5 (continued)
Replacing an NT4K50 side interconnect left

Step	Action
5	Lift the ejector latches to disengage the circuit pack from the shelf, and pull it completely from its slot.
6	Gently push the replacement circuit pack in until the ejector latches come in contact with the shelf. Then push the latches in toward the circuit pack to engage the circuit pack with the backplane connector.
7	Secure the circuit pack by tightening the two hexagonal hold-down screws.
8	Starting from the top connector on the circuit pack, reconnect each of the connectors removed in step 3. Securely fasten each of the hold-down screws on the connectors.
9	Replace the shelf cover.

—end—

Procedure 7-6
Replacing an NT4K51 side interconnect right

Use this procedure to replace the side interconnect right circuit pack in an access bandwidth manager (ABM) shelf.

CAUTION
Loss of service
All connectors on the side interconnect right must be disconnected before removing the circuit pack. This results in a loss of service to all line cards in the copper-distribution shelves.

Action

Step	Action
1	Ensure that all connectors are labeled with the same designations as the label on the side interconnect right circuit pack (CDS 1A through CDS 7B).
2	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”
3	Turn off all circuit breakers on the breaker interface panel labeled CDS1 through to CDS 7.
4	Disconnect all cables from the side interconnect right circuit pack connectors. (These are the cables going to the copper distribution shelves.)
5	Loosen the two screws located on the side of the circuit pack: one screw is located beside the label *CDS 2A (J3)*; the other is located beside label *CDS 6B (J12)*.
6	Pull the ejector latches to disengage the circuit pack from the shelf, and pull it completely from its slot.
7	Gently push the replacement circuit pack in until the ejector latches come in contact with the shelf. Then push the latches in toward the circuit pack to engage the circuit pack with the backplane connector.
8	Secure the circuit pack by tightening the two hexagonal hold-down screws.
9	Starting from the top connector on the circuit pack, re-connect each of the connectors removed in step 4. Securely fasten each of the hold-down screws on the connectors.
10	After all copper distribution shelf connectors are re-connected, return each of the breaker interface panel breakers to the on position.
11	Replace the shelf cover.

—end—

Procedure 7-7
Replacing an NT4K52 processor card

Use this procedure to replace a processor card in an access bandwidth manager (ABM) shelf.

You must use the NT4K52FB processor card for the latest AccessNode software releases.

Action

Step	Action

1 Determine the current status of the processor card you wish to replace.

If replacing	Then go to
the active processor	step 2
the standby processor (ABM only)	step 5
a failed or out-of-service processor	step 8

2 From the network element status screen, display the screen for either processor:

eq proc < group >↵

where

< group > group number of one of the processors: **a** or **b**

The processor equipment screen appears.

Note: Check the “sync” status before performing the switch in step 3. If the processors are in “sync,” this will prevent calls from being dropped when a switch is performed. If the processors are not in “sync,” active calls will be dropped when a switch is performed.

—continued—

Procedure 7-7 (continued)
Replacing an NT4K52 processor card

Step	Action

CAUTION
Possible loss of service
DS1 and DS3 protection switching is unavailable during a switch of activity (SWACT) of the processor cards. If a DS1/VT mapper or a DS3 mapper fails while a SWACT is in progress, traffic cannot be switched to the protection mapper. Protection switching is available (after the SWACT) when the user is prompted to log in to the network element.

3 Switch activity to the standby (redundant) processor:

switch.↵

y.↵

Note 1: During a processor card SWACT, the green active LED on working DS1/VT mappers and DS3 mappers goes out for approximately 20 seconds. The DS1 and DS3 mappers are fully functional during this 20 second interval and there is no loss of DS1/DS3 traffic.

Note 2: You must wait 7 minutes before performing another protection switch on the same processor cards.

4 Log back in to the network element user interface.

Skip to step 6.

5 From the network element status screen, display the screen for the standby processor:

eq proc < group >.↵

where

< group > group number of the standby processors: **a** or **b**

The processor equipment screen appears.

6 To prevent alarms from being raised when the circuit pack is removed, change the state of the processor:

chgstate oos.↵
y.↵

The state changes to out-of-service (OOS).

7 Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”

8 Pull the circuit pack ejector latches to remove the processor card from the shelf.

—continued—

Procedure 7-7 (continued)
Replacing an NT4K52 processor card

Step	Action
9	Wait at least 5 seconds before installing the replacement card. Gently push the replacement circuit pack into the shelf slot until the ejector latches come in contact with the front of the shelf. Then push the latches in toward the circuit pack to engage the circuit pack with the backplane connector. While the software is being downloaded to the replacement processor card, the yellow Init LED on the maintenance interface card (MIC) is lit. The yellow Init LED on the MIC goes off when the software downloading is complete, which takes approximately 12 minutes. ***Note:*** On insertion of an inactive processor card, if the red fail LED lights on both processors, replace the newly inserted processor.
10	If the automatic-in-service feature is set to on, and the circuit pack state automatically changes to in-service (IS), skip to step 12.
11	From the processor equipment screen, change the state of the replaced card to in-service: **chgstate is.**↵ *The state of the replaced processor card changes to in-service (IS).*
12	Replace the shelf cover.

—end—

Procedure 7-8
Replacing an NT4K53 maintenance interface card

Use this procedure to replace the maintenance interface card (MIC) in an access bandwidth manager (ABM) shelf.

Requirements

If a DS1 protection switch is in effect, clear the condition that resulted in the protection switch before replacing the MIC.

Action

Step	Action

CAUTION
Loss of protection switching
Removing the maintenance interface card (MIC) causes DS1 protection switching to be inoperative, and, if a DS1 protection switch is in effect, it is dropped. Before replacing the MIC, clear the condition that caused the DS1 protection switch to occur.

1 Determine the DS1 protection switching status. From the Network Element Status screen, display the protection switching screen:

pr↵

listprot↵

The screen listing protection events appears.

2 On the screen displayed in step 1, is there a number (other than 0) beside the word `Act:` for a DS1? (For example, `Act:1`).

If	Then go to
yes	step 3
no	step 4

—continued—

Procedure 7-8 (continued)
Replacing an NT4K53 maintenance interface card

Step	Action
3	Investigate the condition that caused the DS1 protection switch to occur. Do not continue with this procedure until the DS1 protection switch is cleared.
4	From the Network Element Status screen, display the maintenance interface equipment screen: **eq mic**↵ *The MIC equipment screen appears.*
5	To prevent alarms from being raised when the circuit pack is removed, take the maintenance interface card out of service: **chgstate oos**↵ **y**↵ *The state of the MIC changes to out-of-service (OOS).*
6	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”

CAUTION
Loss of functionality upon MIC removal
Removing the maintenance interface card (MIC) causes the following functions to be inoperative:
• loss of DS1 protection switching.
(For details, see caution box before step 1.)
• Local craft access (orderwire)
• serial and parallel telemetry scan points
• common-equipment LEDs clock monitoring clock
• DTE modem
• external alarm drivers

7	Pull the circuit pack ejector latches to remove the maintenance interface circuit pack from the shelf, as shown in Figure 7-4.
8	Wait at least 5 seconds before installing the replacement card. Insert a replacement maintenance interface card in the shelf. Gently push the replacement circuit pack in until the ejector latches come in contact with the front of the shelf. Then push the latches in toward the circuit pack to engage the circuit pack with the backplane connector.

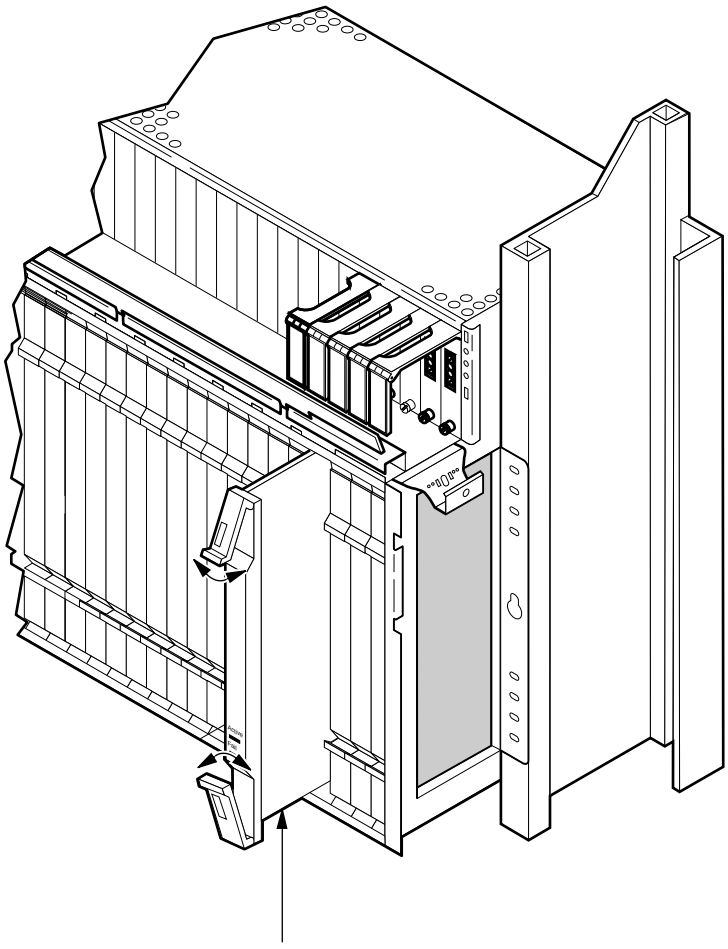
—continued—

Procedure 7-8 (continued)
Replacing an NT4K53 maintenance interface card

Step	Action
9	From the MIC equipment screen, change the state of the MIC to in service: **chgstate is.**↵ *The state of the MIC changes to IS.*
10	Replace the shelf cover.

Figure 7-4
Removing the MIC card

PC-15556



—end—

Procedure 7-9
Replacing an NT4K54 test access card

Use this procedure to replace a test access card (TAC) in an access bandwidth manager (ABM) shelf.

Action

Step	Action
1	From the network element status screen, display the TAC equipment screen: **eq tac**↵ *The TAC equipment screen appears.*
2	To prevent alarms from being raised when the circuit pack is removed, change the state of the TAC group to out-of-service: **chgstate oos**↵ *The system prompts for confirmation of the state change.*
3	Confirm the state change: **y**↵ *The state changes to out-of-service (OOS).*
4	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”
5	Pull the circuit pack ejector latches to remove the circuit pack from its slot as shown in Figure 7-5.
6	Wait at least 10 seconds before installing the replacement card. Insert a replacement TAC in the shelf. Gently push the replacement card in until the ejector latches come in contact with the shelf. Then push the latches in toward the circuit pack to engage the circuit pack with the backplane connector.

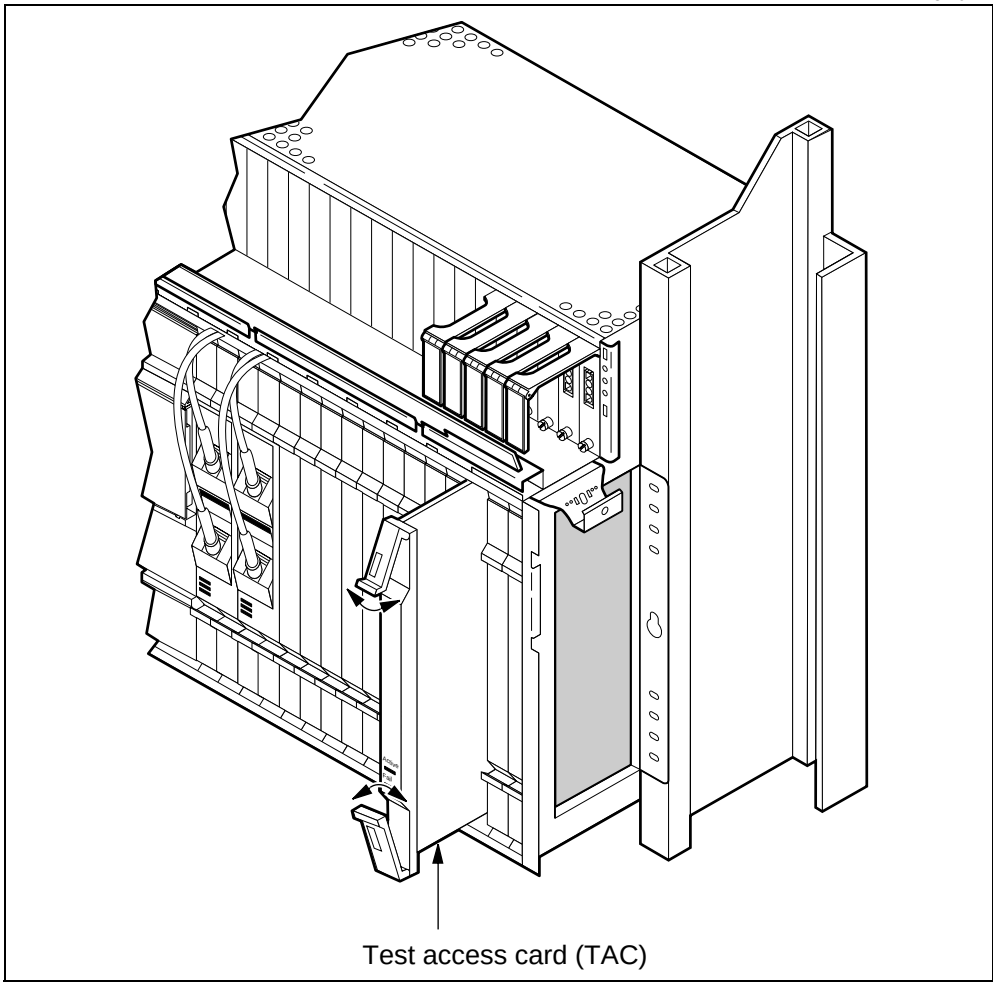
—continued—

Procedure 7-9 (continued)
Replacing an NT4K54 test access card

Step	Action
7	If the automatic-in-service feature is set to on, and the circuit pack state automatically changes to in-service (IS), skip to step 9.
8	From the TAC equipment screen, change the state of the replacement TAC to in-service: **chgstate is.**↵
9	Replace the shelf cover.

Figure 7-5
Removing the TAC card

PC-10711



—end—

Procedure 7-10
Replacing an NT4K55 access interface card

Use this procedure to replace an access interface card (AIC) in an access bandwidth manager (ABM) shelf.

Action

Step	Action

If replacing	Then go to
an in-service AIC	step 1
a failed or out of service AIC	step 4

1 From the network element status screen, display the AIC equipment screen:

eq aic <group>↵

where

< group > group number of the AIC being replaced: **a** or **b**

The AIC equipment screen appears.

2 To prevent alarms from being raised when the circuit pack is removed, change the state of the AIC to out-of-service (OOS):

chgstate oos↵

The system prompts for confirmation of the state change.

3 Confirm the state change:

y↵

The state changes to OOS.

4 Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”

5 Pull the circuit pack ejector latches to remove the circuit pack from its slot as shown in Figure 7-6.

6 Wait at least 10 seconds before installing the replacement card. Insert a replacement AIC in the shelf. Gently push the replacement card in until the ejector latches come in contact with the shelf. Then push the latches in toward the circuit pack to engage the circuit pack with the backplane connector.

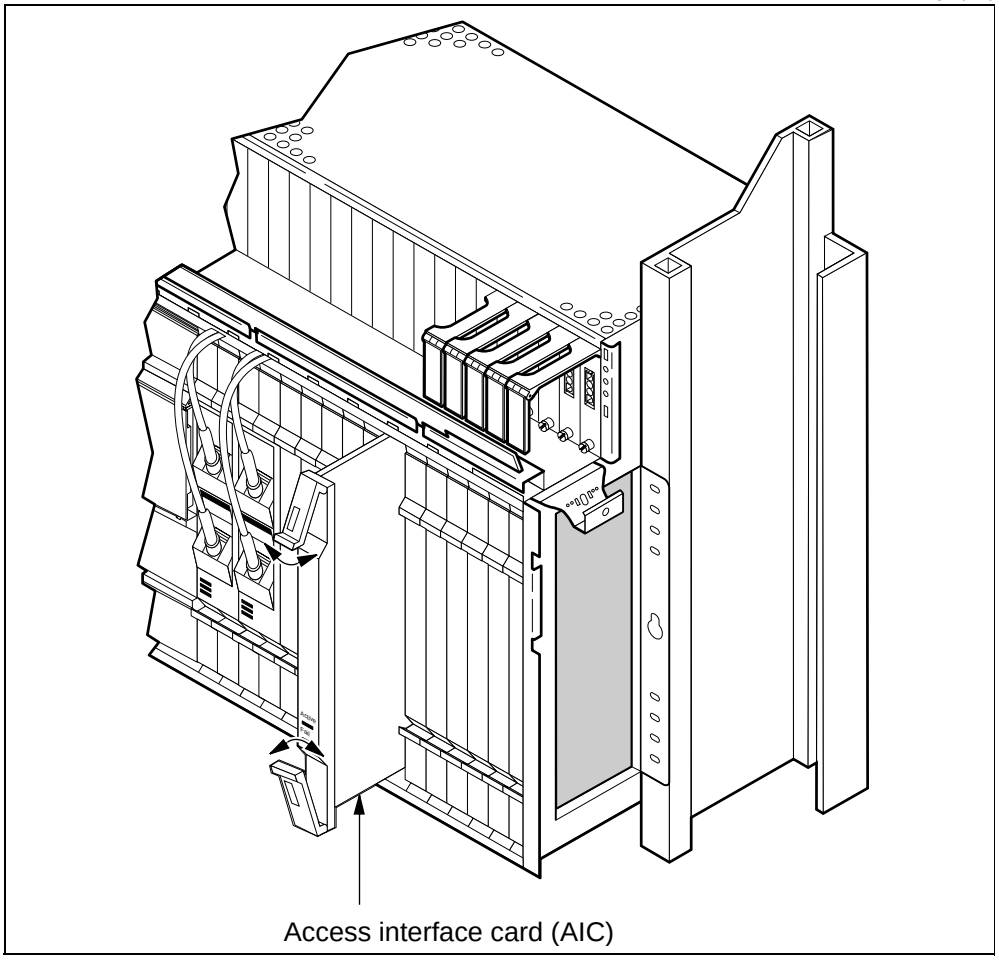
—continued—

Procedure 7-10 (continued)
Replacing an NT4K55 access interface card

Step	Action
7	If the automatic-in-service feature is set to on, and the circuit pack state automatically changes to in-service (IS), skip to step 9.
8	From the AIC equipment screen, change the state of the circuit pack to in-service: **chgstate is.**↵
9	Replace the shelf cover.

Figure 7-6
Removing the AIC card

PC-10710



—end—

Procedure 7-11
Replacing an NT4K56 transport interface card

Use this procedure to replace a transport interface card (TIC) in an access bandwidth manager (ABM) shelf.

Action

Step	Action

If replacing	Then go to
a primary or secondary in-service TIC	step 1
a failed or out-of-service TIC	step 5

1 From the network element status screen, display the equipment screen for the TIC being replaced:

eq tic <plane>↵

where

<plane> is the affected plane: **a** or **b**.

The TIC equipment screen appears.

If replacing	Then go to
a primary in-service TIC	step 2
a secondary in-service TIC	step 3

2 Switch service from the primary TIC to the secondary TIC:

switch↵

y↵

3 To prevent alarms from being raised when the circuit pack is removed, change the state of the TIC to out-of-service (OOS):

chgstate oos↵

The system prompts for confirmation of the state change.

4 Confirm the state change:

y↵

The state changes to OOS.

5 Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”

6 Pull the circuit pack ejector latches to remove the circuit pack from its slot as shown in Figure 7-7.

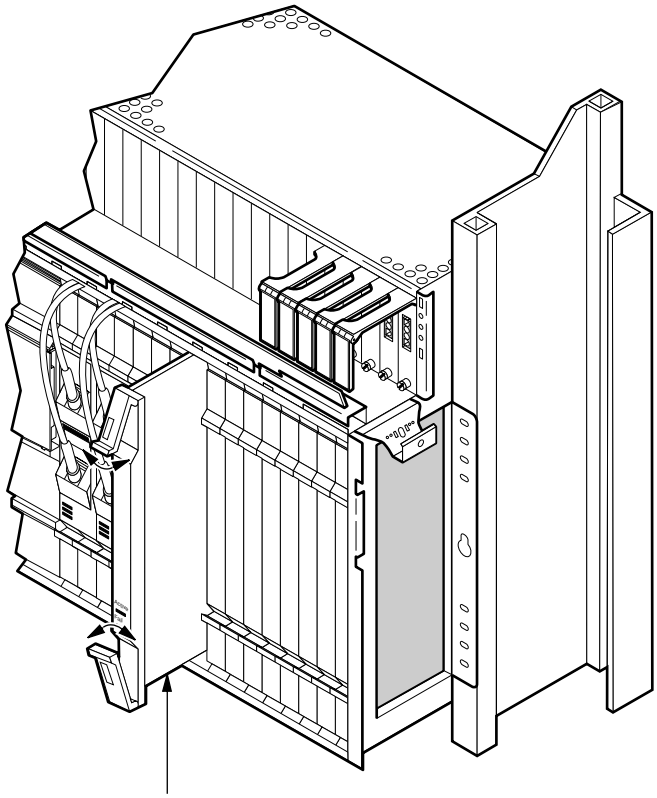
—continued—

Procedure 7-11 (continued)
Replacing an NT4K56 transport interface card

Step	Action
7	Wait at least 10 seconds before installing the replacement card. Insert a replacement TIC in the shelf and gently push the replacement card in until the ejector latches come in contact with the shelf. Then push the latches in toward the circuit pack to engage the unit with the backplane connector.
8	If the automatic-in-service feature is set to on, and the circuit pack state automatically changes to in-service (IS), skip to step 10.
9	From the TIC equipment screen, change the state of the circuit pack to in-service: **chgstate is**↵
10	Replace the shelf cover.

Figure 7-7
Removing the TIC card

PC-10709



—end—

Procedure 7-12
Replacing an NT4K57 integrated remote test unit

Use this procedure to replace the NT4K57 IRTU in an access bandwidth manager (ABM) shelf.

CAUTION
Risk of IRTU damage
The IRTU requires careful handling. When returning the IRTU for repair, observe all handling and transporting precautions described in Chapter 1, “Safety guidelines and warnings,” of this document.

Action

Step	Action

If replacing	Then go to
an in-service IRTU	step 1
a failed or out-of-service IRTU	step 4

1 From the network element status screen, display the IRTU equipment screen:

eq irtu↵

The IRTU equipment screen appears.

2 To prevent alarms from being raised when the circuit pack is removed, change the state of the IRTU to out-of-service (OOS):

chgstate oos↵

The system prompts for confirmation of the state change.

3 Confirm the state change:

y↵

The state changes to OOS.

—continued—

Procedure 7-12 (continued)
Replacing an NT4K57 integrated remote test unit

Step	Action
4	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”
5	Remove the IRTU from the shelf.
6	Wait at least 10 seconds before installing the replacement card. Insert a replacement IRTU into the shelf.
7	If the automatic-in-service feature is set to on, and the circuit pack state automatically changes to in-service (IS), skip to step 9.
8	From the IRTU equipment screen, change the state of the circuit pack to in-service: **chgstate is.**↵ *The IRTU returns to service.*
9	Replace the shelf cover.

—end—

Procedure 7-13
Replacing an NT4K58LA serial I/O card

Use this procedure to replace a serial I/O card in an access bandwidth manager (ABM) shelf.

Action

Step	Action
1	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”
2	Disconnect the cable from the 25-pin D-connector on the serial I/O card, as shown in Figure 7-8.
3	Unfasten the hold-down screw and remove the card currently in the slot by pulling outward on the hanging tab.
4	Install the replacement serial I/O card in the shelf and fasten the hold-down screw on the faceplate.
5	Connect the cable to the 25-pin D-connector on the serial I/O card.
6	Replace the shelf cover.

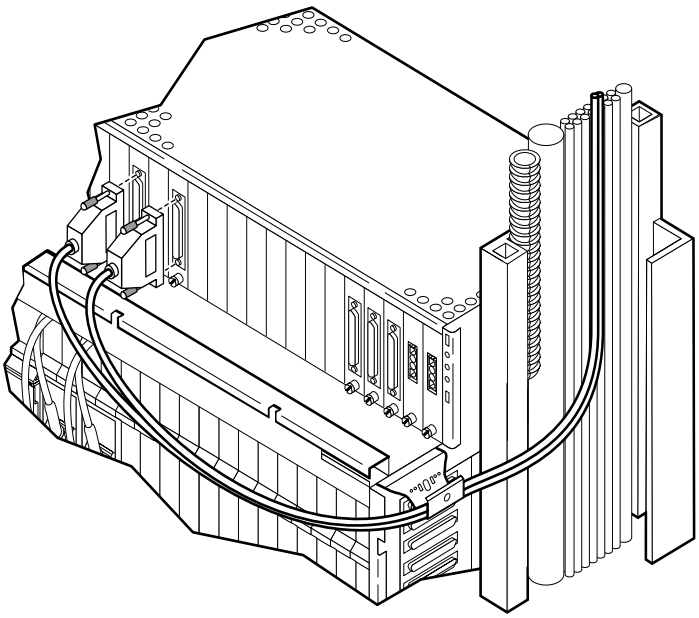
—continued—

Procedure 7-13 (continued)
Replacing an NT4K58LA serial I/O card

Step Action

Figure 7-8
Disconnecting the cable from the serial I/O card

PC-10090



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

—end—

Procedure 7-14
Replacing an NT4K58MA common-equipment power card

Use this procedure to replace a common-equipment power (CEP) card in an access bandwidth manager (ABM) shelf.

Action

Step	Action
1	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”
2	Determine which plane will be affected by the removal of the common-equipment power card. • The card in slot 54 affects all cards on plane A of the common-equipment shelf. • The card in slot 55 affects all cards on plane B of the common-equipment shelf.
3	From the network element status screen, display the equipment screen for the TIC in the affected plane: **eq tic <plane>**↵ where <plane> is the affected plane: **a** or **b**. *The TIC equipment screen appears.*

If the affected plane contains	Then go to
a primary in-service TIC	step 4
a secondary in-service TIC	step 5

4	Switch service from the primary TIC to the secondary TIC: **switch**↵ **y**↵
5	To prevent alarms from being raised when the circuit pack is removed, change the state of the affected TIC to out-of-service (OOS): **chgstate oos**↵ *The system prompts for confirmation of the state change.*

—continued—

Procedure 7-14 (continued)
Replacing an NT4K58MA common-equipment power card

Step	Action
6	Confirm the state change: **y**↵ *The state changes to OOS.*
7	From the TIC equipment screen, display the AIC equipment screen for the AIC in the affected plane: **eq aic <plane>**↵ where <plane> the affected plane: **a** or **b**. *The AIC equipment screen appears.*
8	Ensure that the redundant unit state is (in-service) IS.
9	If the redundant unit is in service, change the state of the affected AIC to out-of-service (OOS), to prevent alarms from being raised when the circuit pack is removed: **chgstate oos**↵ *The system prompts for confirmation of the state change.*
10	Confirm the state change: **y**↵ *The state changes to OOS.*
11	Disconnect the power cable from the common-equipment power card, as shown below.
12	Loosen the hold down screw on the bottom of the common-equipment power card, as shown in Figure 7-9.
13	Insert a replacement common-equipment power card, and fasten it securely into place with the hold down screw.
14	Re-connect the feed cable to the common-equipment power card, as shown in Figure 7-9.

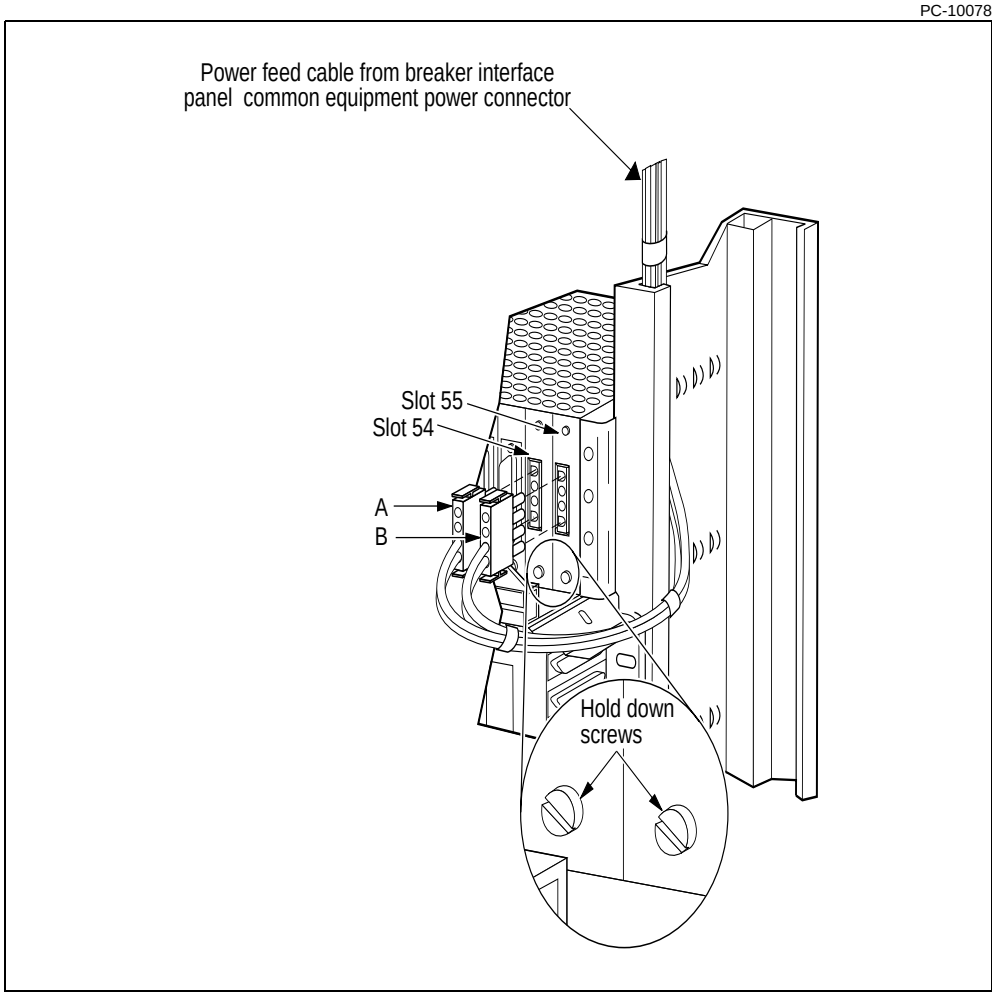
—continued—

Procedure 7-14 (continued)
Replacing an NT4K58MA common-equipment power card

Step Action

Figure 7-9
Disconnecting the power cable to the power card

PC-10078



—continued—

Procedure 7-14 (continued)
Replacing an NT4K58MA common-equipment power card

Step	Action
15	From any screen, select, the AIC on the affected plane: **eq aic <plane>**↵ where <plane> is the affected plane: **a** or **b**. *The AIC equipment screen appears.*
16	Change the state of the AIC to in-service (IS): **chgstate is**↵ *The state changes to in-service.*
17	From the AIC equipment screen, select the TIC on the affected plane: **eq tic < plane>**↵ where < plane > is the affected plane: **a** or **b**. *The TIC equipment screen appears.*
18	Change the state of the TIC to in-service (IS): **chgstate is**↵ *The state changes to in-service.*
19	Replace the shelf cover. **—end—**

Procedure 7-15
Replacing an NT4K75 timing and cross-connect

Use this procedure to replace the NT4K75 timing and cross-connect (TXC) circuit pack in the access bandwidth manager (ABM) shelf. This circuit pack is used only in copper-fed RFT applications. If your application is fiber-fed, this circuit pack will not be in your system.

Action

Step	Action

1 From the network element status screen, display the equipment screen for the TXC card to be replaced:

eq txc <group>↵

where

<group> is the TXC card being replaced: **g1** (slot 9) or **g2** (slot 10).

The TXC equipment screen appears.

If replacing	Then go to
an active TXC card in a duplex configuration	step 2
an active TXC card in a simplex configuration	step 5
an inactive TXC card in either a simplex or duplex configuration	step 5
a failed TXC card	step 6

2 Access the TXC detailed protection screen:

dtlprot txc↵

The TXC protection screen appears.

—continued—

Procedure 7-15 (continued)
Replacing an NT4K75 timing and cross-connect

Step	Action
3	Switch service to the other TXC: **forced op <group>**↵ where <group> is the number of the TXC being replaced: **g1** (slot 9) or **g2** (slot 10). *When a forced switch is operated, the screen displays an asterisk (*) in the `Forced` column. The banner line is updated under the `ActProt` column, and a "Forced switch request" alarm is raised.*
4	Display the TXC equipment screen: **eq txc <group>**↵ where <group> is the number of the TXC being replaced: **g1** (slot 9) or **g2** (slot 10). *The TXC equipment screen appears.*
5	Change the state of the TXC card being replaced, to out-of-service (OOS): **chgstate oos**↵ **y**↵
6	Remove the ABM shelf cover as shown in Chapter 3, "Removing covers and grilles."
7	Pull the TXC card ejector latches to remove the TXC card from the shelf. ***Note:*** Wait at least 5 seconds before installing the replacement card.
8	Insert the replacement TXC card into the shelf as follows: **a.** Gently push the replacement TXC card into the shelf slot until the ejector latches come in contact with the front of the shelf. **b.** Push the latches in toward the circuit pack to engage the circuit pack with the backplane.

—continued—

Procedure 7-15 (continued)
Replacing an NT4K75 timing and cross-connect

Step	Action

9 Change the state of the TXC card to in-service (IS):

chgstate is.↵

The state changes to IS.

10 Did you replace a working or failed TXC card in steps 7 and 8?

If you replaced a	The go to
working TXC card	step 11
failed TXC card	step 14

11 Was a TXC protection switch performed in step 3 before replacing the TXC card?

If	Then go to
yes	step 12
no	step 14

12 Access the TXC protection screen:

dtlprot txc ↵

The TXC protection screen appears.

13 Release the TXC protection switch performed in step 3:

forced re <group>↵

y↵

where

<group> is the number of the TXC that was replaced: **g1** (slot 9) or **g2** (slot 10).

14 Replace the shelf cover.

—end—

Procedure 7-16
Replacing an NT7E05 OC-12 VTBM optical interface

Use this procedure to replace an OC-12 virtual tributary bandwidth manager (VTBM) optical interface in an access bandwidth manager (ABM) shelf.

Certain steps carried out during the replacement of optical interface cards may require the handling of optical fibers without dust caps, and therefore increase the risk of exposure to laser radiation. Exposure either to visible or invisible laser light could cause serious 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
Do not look into, or otherwise expose your eyes to, the laser radiation emitting from optical fibers. Doing this could cause serious eye damage or blindness.

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

Read and observe all warnings and safety notices in Chapter 1, “Safety guidelines and warnings.”

Action

Step **Action**

If replacing	Then go to
the active OC-12	step 1
the standby OC-12	step 4
a failed or out-of-service OC-12	step 6

—continued—

Procedure 7-16 (continued)
Replacing an NT7E05 OC-12 VTBM optical interface

Step	Action
1	From the Network Element Status screen, display the OC-12 detailed protection screen: **pr;dtlprot oc12**↵ *The detailed protection screen appears.*
2	Switch service from the OC-12 being replaced, to the standby OC-12: **manual op <group>**↵ **y**↵ where <group> is the group number of the OC-12 being replaced: **g1** or **g2**. *The system prompts for confirmation.*

If protection switching is set for	Then go to
bidirectional	step 4
unidirectional	step 3

3	When unidirectional protection switching is provisioned, traffic must also be switched at the far-end NE. Log in to the far-end NE and perform a protection switch as was performed in steps 1 and 2. After traffic has been switched at the far-end NE, proceed to step 4.
4	Display the facility screen for the OC-12 to be replaced: **fa oc12 <group>**↵ where <group> is the group number of the OC-12 being replaced: **g1** or **g2**. *The OC-12 facility screen appears.*
5	To prevent alarms from being raised when the circuit pack is removed, change the state of the OC-12 facility to out-of-service (OOS): **chgstate oos**↵ **y**↵ *The state of the OC-12 facility changes to out-of-service (OOS).* For unidirectional protection switching, also take the corresponding OC-12 out of service at the far-end NE. ***Note:*** When the optical facility is taken out of service, the status of the loss of signal (LOS) LED becomes frozen, and will not reflect an actual loss of signal (if one occurs). When the optical facility is placed back in service, the LOS LED correctly indicates the current state of the optical facility.

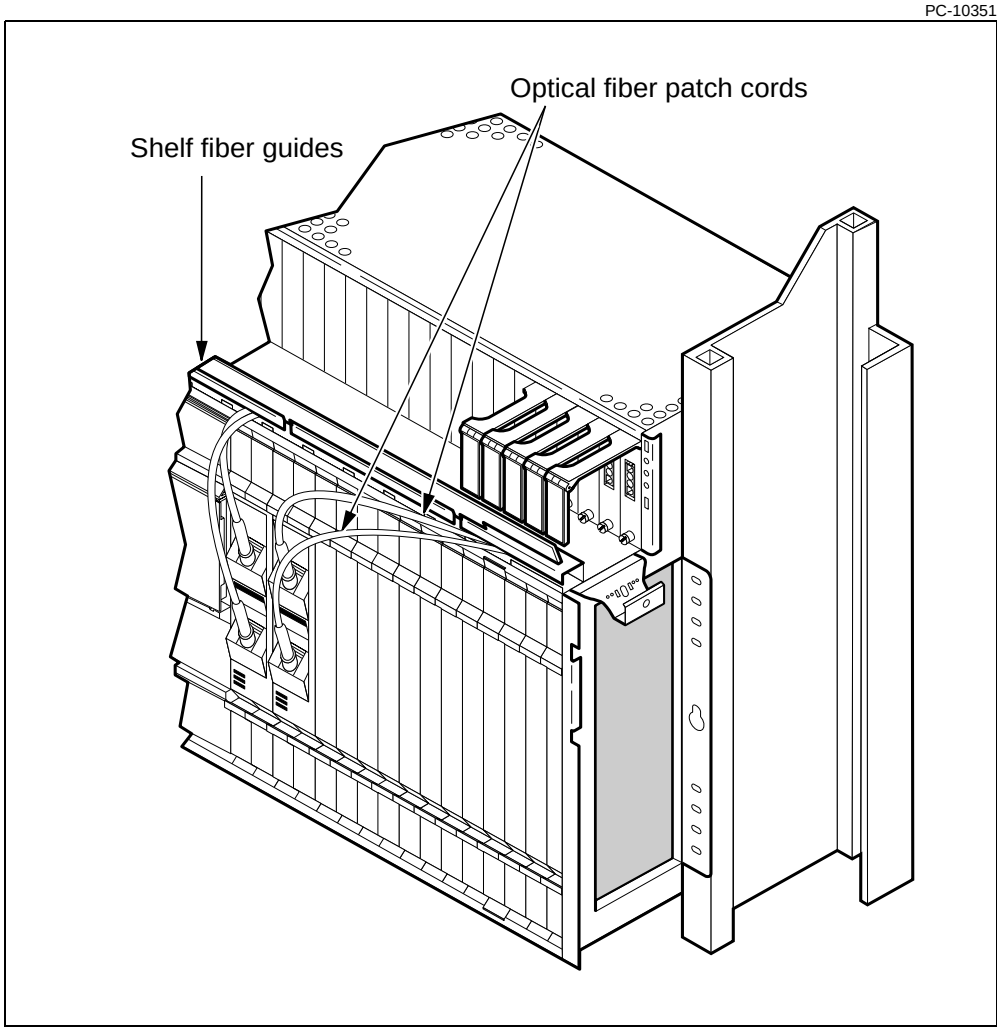
—continued—

Procedure 7-16 (continued)
Replacing an NT7E05 OC-12 VTBM optical interface

Step	Action
6	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”
7	Remove the optical patch cords from the shelf fiber guides to provide sufficient slack for removing the circuit pack (as shown in Figure 7-10).

Figure 7-10
Removing the optical patch cords from the shelf fiber guides

PC-10351



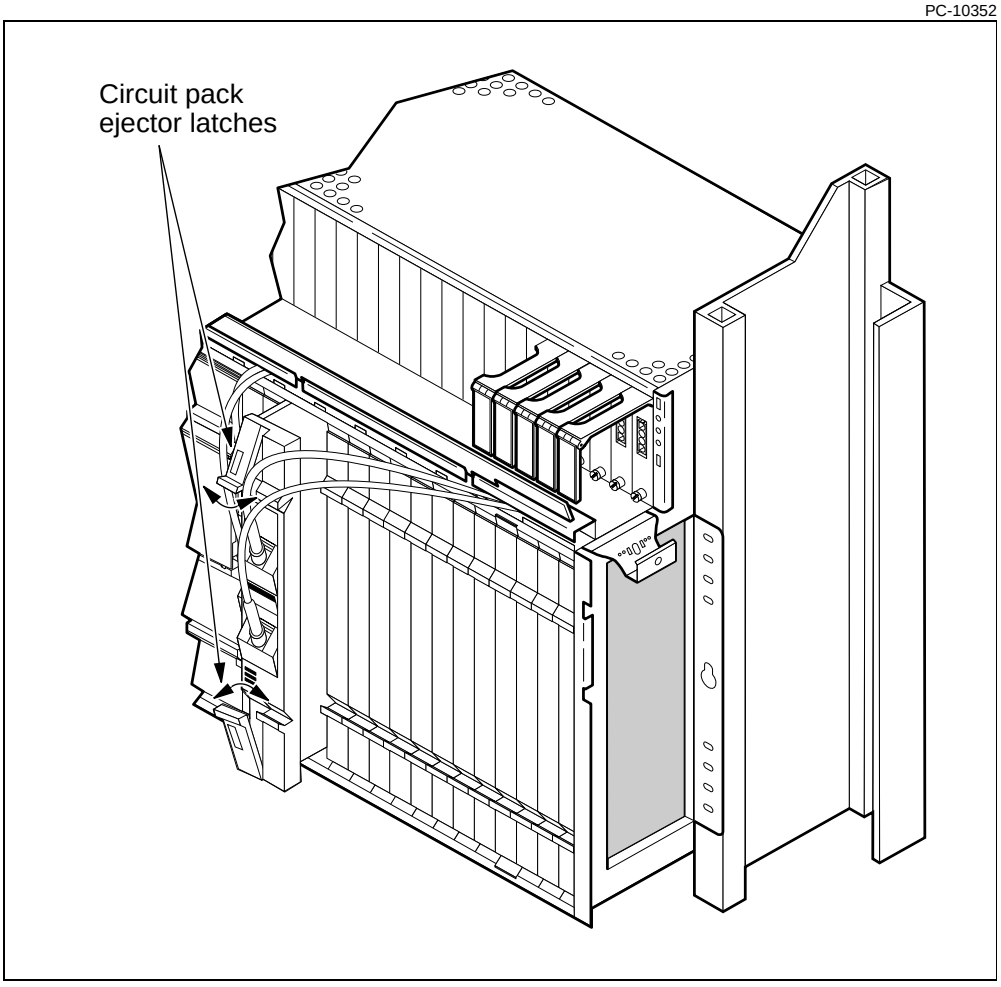
—continued—

Procedure 7-16 (continued)
Replacing an NT7E05 OC-12 VTBM optical interface

Step	Action
8	Pull on the circuit pack ejector latches to slightly withdraw the circuit pack to the extent necessary to disconnect it from the backplane connector (as shown in Figure 7-11). ***Note:*** Take care when withdrawing the circuit pack to prevent straining the optical patch cords or pigtails.

Figure 7-11
Withdrawing the optical circuit pack

PC-10352



—continued—

Procedure 7-16 (continued)
Replacing an NT7E05 OC-12 VTBM optical interface

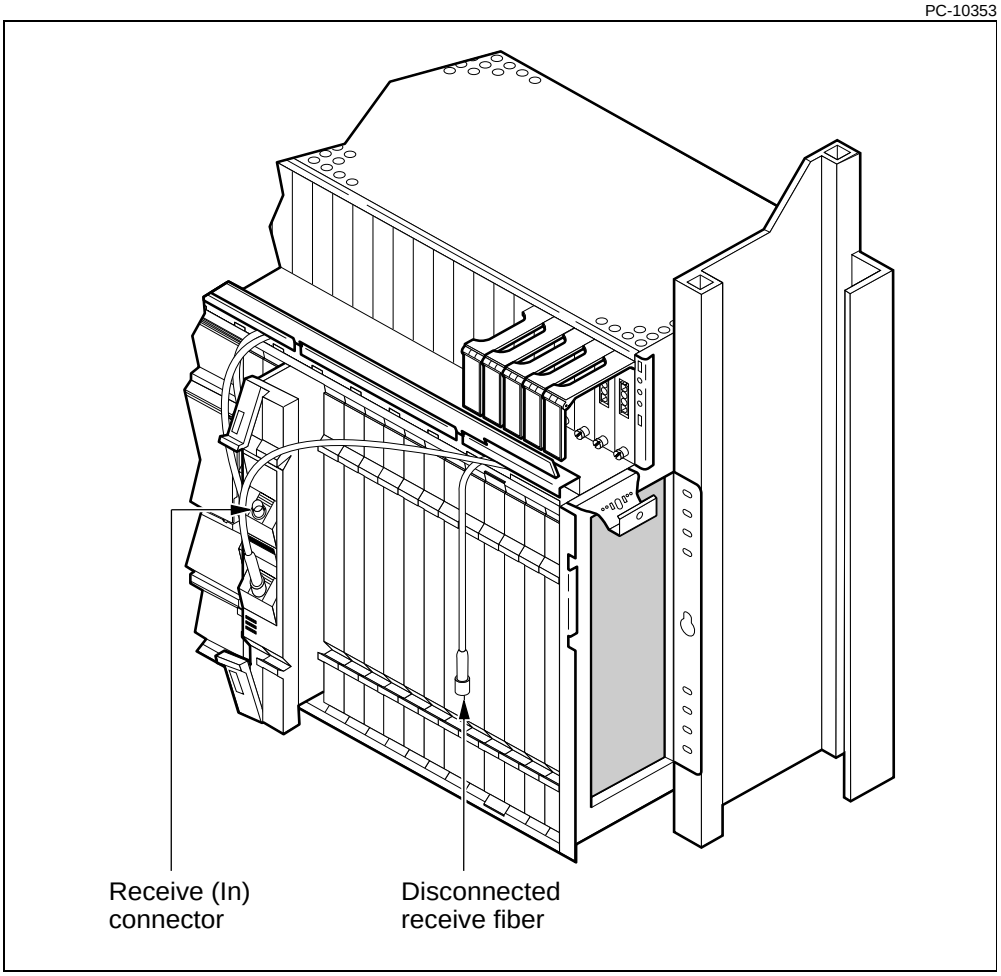
Step	Action

DANGER
Risk of eye injury
Do not look into, or otherwise expose your eyes to, the laser radiation possibly emitting from optical fibers. Doing this could cause serious eye damage.

9 Disconnect the optical patch cord or pigtail from the receive connector as shown in Figure 7-12 and immediately place a cap on the pigtail connector.

Figure 7-12
Disconnecting the receive fiber connector

PC-10353



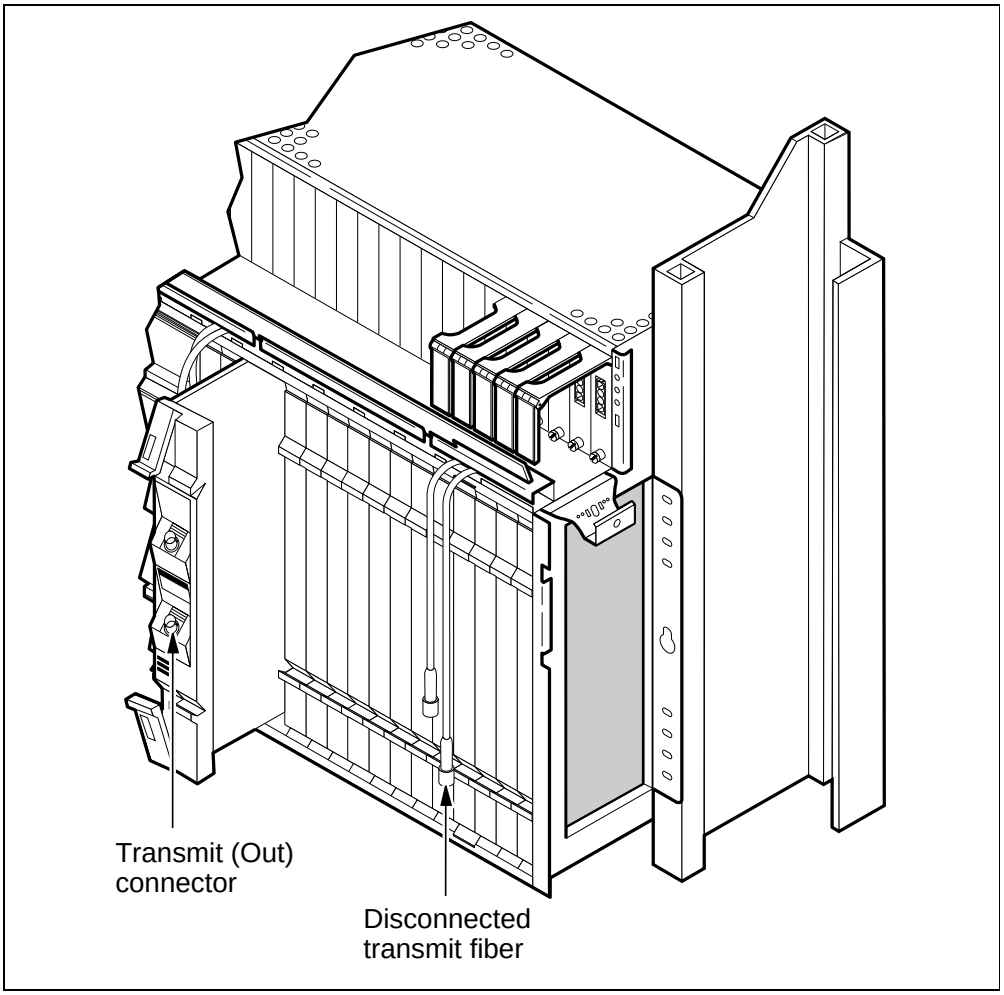
—continued—

Procedure 7-16 (continued)
Replacing an NT7E05 OC-12 VTBM optical interface

Step	Action
10	Disconnect the optical patchcord or pigtail from the transmit biconic connector (as shown in Figure 7-13).

Figure 7-13
Disconnecting the transmit connector

PC-10354



—continued—

Procedure 7-16 (continued)
Replacing an NT7E05 OC-12 VTBM optical interface

Step	Action
11	Remove the circuit pack from the shelf.
12	Wait at least 15 seconds before installing the replacement card. Without engaging the replacement circuit pack with the backplane connector, install the circuit pack in the shelf. Ensure that there is no power to the circuit pack (no LEDs lit).

CAUTION
Possible damage to biconic connectors
If you are re-connecting biconic connectors in step 13 and step 14, prevent friction between optical lenses by gently lifting up on the fiber during the last half turn of the connector.

13	Re-connect the optical patchcord or pigtail to the transmit connector on the replacement circuit pack.
14	Re-connect the optical patchcord or pigtail to the receive connector on the replacement circuit pack.
15	Gently push the replacement circuit pack until the ejector latches come in contact with the shelf. Then push the latches in toward the circuit pack to engage the circuit pack with the backplane connector.
16	Carefully dress the cables in the shelf fiber guides.

—continued—

Procedure 7-16 (continued)
Replacing an NT7E05 OC-12 VTBM optical interface

Step	Action
17	If the automatic-in-service feature is set to on, and the circuit pack state automatically changes to in-service (IS), skip to step 19. If the circuit pack state is out-of-service (OOS), proceed to step 18.
18	Change the state of the OC-12 circuit pack to in-service: **eq oc12 <group>**↵ **chgstate is**↵ where < group > group number of the OC-12 that was replaced: **g1** or **g2** *The state changes to in-service (IS).*
19	Change the state of the OC-12 facility to in-service (IS): **fa oc12 <group>**↵ **chgstate is**↵ For unidirectional protection switching, change the state of the OC-12 facility to in-service at the far-end NE.
20	What type of protection activity was performed before the card was replaced?

If before replacing the OC-12	Then go to
a manual protection switch was performed	step 21
no protection switch was performed	step 23

21	From the OC-12 facility screen, display the detailed protection screen: **dtlprot**↵
22	From the detailed protection screen, release the protection switch: **manual re <group>**↵ **y**↵ where <group> is the OC-12 group from which service was switched (in step 2): **g1** or **g2**. *When a protection switch is released, the screen displays a period (.) in the manual column.*
23	Replace the shelf cover.

—end—

Procedure 7-17
Replacing an NT7E04 DS1/VT mapper

Use this procedure to replace a DS1/VT mapper circuit pack in an access bandwidth manager (ABM) shelf.

CAUTION
Loss of service
If a DS1 is carrying TR-08 traffic, it will be provisioned on an NT7E04CA DS1/VT mapper. The protection DS1/VT mapper must also be an NT7E04CA circuit pack if any of the working mappers on a common-equipment shelf are carrying TR-08 traffic. Otherwise, TR-08 traffic will be lost if a protection switch occurs.

Action

Step	Action
1	From the Network Element Status screen, display the DS1 protection screen: **pr;dtlprot ds1**↵ *The detailed DS1 protection screen appears.*
2	Perform one of the following:

If replacing	Then go to
a protection DS1/VT mapper	step 3
an active DS1/VT mapper	step 7
a failed or out-of-service DS1/VT mapper	step 8

—continued—

Procedure 7-17 (continued)
Replacing an NT7E04 DS1/VT mapper

Step	Action
3	At the Network element user interface (NEUI) detailed DS1 protection screen, ensure that there is no protection switching in effect.

CAUTION
Loss of service
Ensure that there is no protection switching in effect before locking out the protection DS1/VT mapper. Lockout of an active protection DS1/VT mapper can result in loss of service if traffic from the protection DS1/VT mapper is switched back to an out-of-service working DS1/VT mapper.

Note: An asterisk (*) under the `Forced, Auto` or `Manual` heading indicates that protection switching is in effect and indicates that the protection DS1/VT mapper is currently taking over the function of one of the working DS1/VT mappers (reference the detailed DS1 protection screen in step 1).

4 Lockout the protection mapper:

lockout op p↵

y↵

When a lockout is operated, the screen displays an asterisk (*) in the `Lockout` column.

5 Display the equipment screen for the circuit pack to be replaced:

eq ds1 < group >↵

Where < group > is the group number of the DS1/VT mapper being replaced.

Slot and group number of a DS1 mapper in an ABM shelf:

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
G1	G2	P	G4	G5	G6	G7	G8

The DS1 equipment screen appears.

6 Change the state of the circuit pack to out-of-service (OOS):

chgstate oos↵

y↵

The state changes to OOS.
Skip to step 8.

—continued—

Procedure 7-17 (continued)
Replacing an NT7E04 DS1/VT mapper

Step	Action
7	Switch service to the protection DS1/VT mapper: **manual op <group>**↵ **y**↵ where <group> is the group number of the DS1/VT mapper being replaced. *Service is switched to the protection DS1/VT mapper circuit pack*

CAUTION
Loss of service
Leave the DS1/VT mapper, that you performed a manual protection switch on, in-service while you are replacing it; otherwise, traffic will be lost.

8	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”
9	Pull the circuit pack ejector latches (as shown in Figure 7-14) to remove the circuit pack from the shelf. ***Note:*** The position of the circuit pack varies with shelf type and configuration.

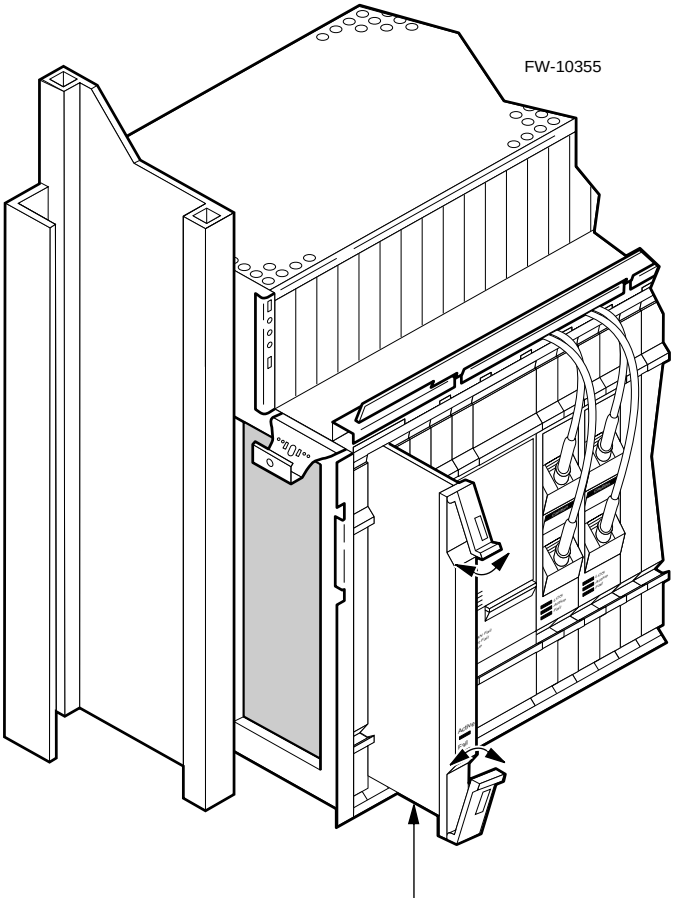
—continued—

Procedure 7-17 (continued)
Replacing an NT7E04 DS1/VT mapper

Step Action

Figure 7-14
Removing the DS1/VT mapper card

PC-10355



10 Wait at least 5 seconds before installing the replacement card. Gently push the replacement circuit pack in until the ejector latches come in contact with the shelf. Then push the latches in toward the circuit pack to engage the circuit pack with the backplane connector.

11 If you put a mapper out of service in step 6, then from the DS1 equipment screen, change the state of the replacement DS1/VT mapper to in-service (IS):

chgstate is.↵

—continued—

Procedure 7-17 (continued)
Replacing an NT7E04 DS1/VT mapper

Step	Action

12 Determine the type of protection activity that was performed before the card was replaced:

If	Then go to
a protection lockout was performed	step 13
a protection switch was performed	step 14
no protection switch was performed	step 15

13 From the detailed protection screen, release the protection lockout:

lockout re p↵

y↵

When the lockout is released, the screen displays a period (.) in the lockout column.

Skip to step 15.

14 From the detailed protection screen, release the protection switch:

manual re <group>↵

y↵

where

<group> is the group number of the DS1/VT mapper that was switched (in step 5).

When a protection switch is released, the screen displays a period (.) in the manual column.

15 Replace the shelf cover.

—end—

Procedure 7-18
Replacing an NT7E08 DS3 mapper

Use this procedure to replace a DS3 mapper circuit pack in an access bandwidth manager (ABM) shelf.

Action

Step	Action

1 From the Network Element Status screen, display the DS3 protection screen:

pr;dtlprot ds3↵

The detailed DS3 protection screen appears.

2 Perform one of the following:

If replacing	Then go to
protection DS3 mapper	step 3
an active DS3 mapper	step 5
a failed or out-of-service DS3 mapper	step 9

3 From the Network element user interface (NEUI) detailed DS3 protection screen, ensure that there is no protection switching in effect.

CAUTION
Loss of service
Ensure that there is no protection switching in effect before locking out the protection DS3 mapper. Lockout of an active protection DS3 mapper can result in loss of service if traffic from the protection DS3 mapper is switched back to an out-of-service working DS3 mapper.

Note: An asterisk (*) under the `Forced, AutoSw` or `Manual` heading indicates if protection switching is in effect and indicates if the protection DS3 mapper is currently taking over the function of one of the working DS3 mappers. (See the detailed DS3 protection screen in step 1.)

4 Lockout the protection mapper:

lockout op p↵

y↵

When a lockout is operated, the screen displays an asterisk (*) in the `Lockout` column.

Skip to step 7.

—continued—

Procedure 7-18 (continued)
Replacing an NT7E08 DS3 mapper

Step	Action
5	Switch service to the protection DS3 mapper: **manual op <group>**↵ **y**↵ where <group> is the group number of the DS3 mapper being replaced. *Service is switched to the protection DS3 mapper circuit pack.*
	CAUTION **Loss of service** Leave the DS3 mapper, that you performed a manual protection switch on in step 5, in-service while you are replacing it; otherwise, traffic will be lost.
6	Go to step 9 and begin the steps for replacing the DS1/VT mapper.
7	Display the equipment screen for the circuit pack to be replaced: **eq ds3 <group>**↵ where <group> is the group number of the DS3 mapper being replaced. *The DS3 equipment screen appears.*
8	Change the state of the circuit pack to out-of-service (OOS): **chgstate oos**↵ **y**↵ *The state changes to OOS.*
9	Remove the ABM shelf cover as shown in Chapter 3, “Removing covers and grilles.”
10	Pull the circuit pack ejector latches (as shown in Figure 7-15) to remove the circuit pack from the shelf. ***Note:*** The position of the circuit pack varies with shelf type and configuration.

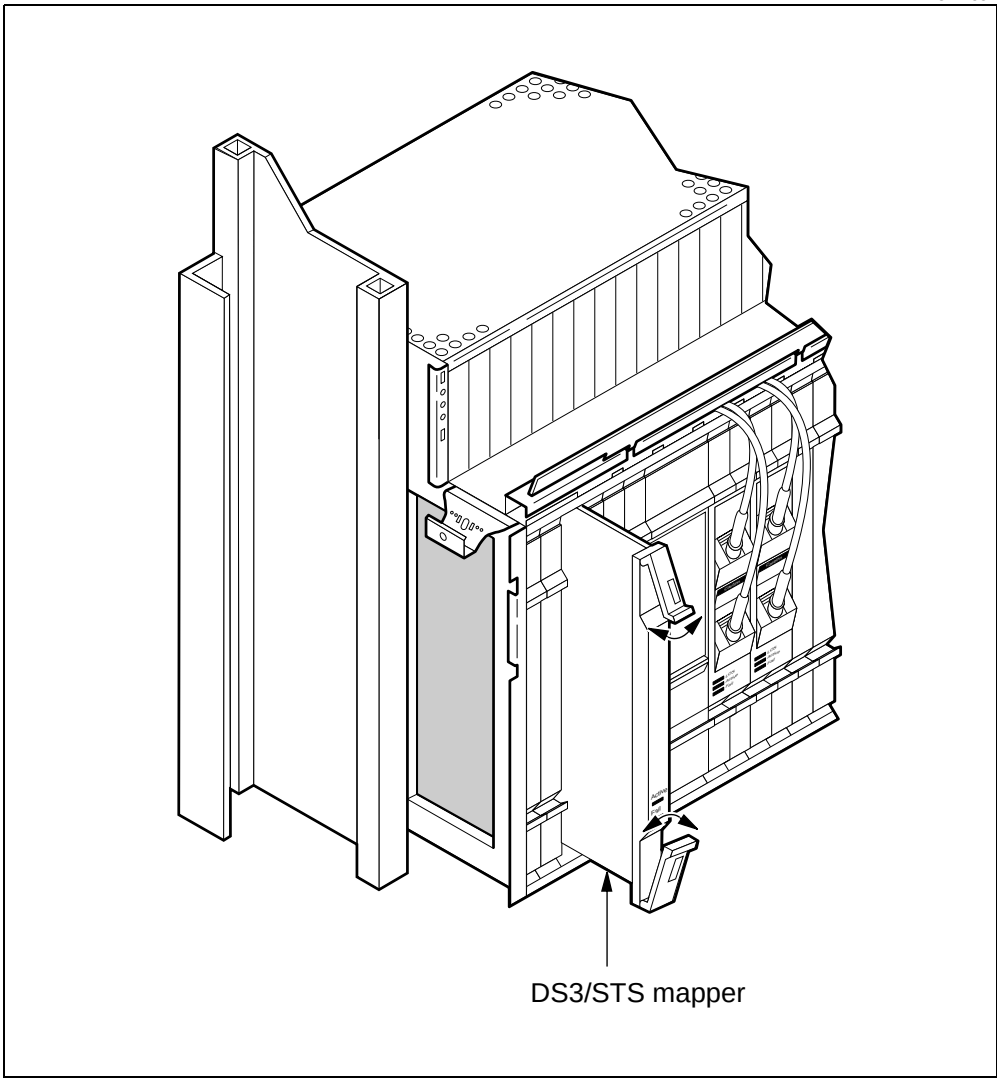
—continued—

Procedure 7-18 (continued)
Replacing an NT7E08 DS3 mapper

Step	Action

Figure 7-15
Removing the DS3 circuit pack

PC-11381



—continued—

Procedure 7-18 (continued)
Replacing an NT7E08 DS3 mapper

Step	Action
11	Wait at least 5 seconds before installing the replacement card. Gently push the replacement circuit pack in until the ejector latches come in contact with the shelf. Then push the latches in toward the circuit pack to engage the circuit pack with the backplane connector.
12	If you put a mapper out of service in step 8, then from the DS1 equipment screen, change the state of the replacement DS1/VT mapper to in-service (IS): **chgstate is**↵
13	Determine the type of protection activity that was performed before the card was replaced:

If	Then go to
a protection lockout was performed	step 14
a protection switch was performed	step 15
no protection switch was performed	step 16

14	From the detailed protection screen, release the protection lockout: **lockout re p**↵ **y**↵ *When the lockout is released, the screen displays a period (.) in the lockout column.* Skip to step 16.
15	From the detailed protection screen, release the protection switch: **manual re <group>**↵ **y**↵ where <group> is the group number of the DS3 mapper that was switched (in step 5). *When a protection switch is released, the screen displays a period (.) in the manual column.*
16	Replace the shelf cover.

—end—

Testing the batteries and rectifiers

This chapter describes the tests to be performed on the rectifiers and batteries prior to acceptance and also to be completed at regular intervals to check the operation of the power system.

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

Chapter contents

This chapter contains the following information:

Perform the procedures according to your requirements. If you are replacing a rectifier, begin with “Replacing a rectifier,” on page 8-14 and continue the procedures, in order, to the end of this chapter.

Warnings and cautions

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

DANGER
Contents corrosive
Do not open or mutilate batteries. Released electrolyte is toxic and corrosive and may damage eyes or skin.

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.

DANGER
Risk of fire or explosion
Use only sealed cell lead-acid type batteries, with pressure release vents, recommended for this equipment.

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

CAUTION
Procedure sequence
Perform the steps in the order shown because the sequence is critical.

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

CAUTION
DC voltage output levels testing
If this is a new installation, 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 manufacturer.
Johnson Control 12V: –54.50 ±0.10 V dc
Note: These ranges are subject to change without notice. For other batteries, see the manufacturer's specifications.

CAUTION
DC input voltage specifications
The input voltage specifications require that the dc input to the BIP does not exceed –56.0 V dc. Set high voltage shutdown to –56.0 V dc.

CAUTION
Handling batteries
Handle batteries with care, to avoid shorting them against conducting materials, such as rings, bracelets, keys, etc.

CAUTION
Do not mix old and new batteries
Do not mix old and new batteries in this product.

CAUTION
Do not mix battery types or sizes
Do not mix batteries of different sizes or from different manufacturers in this product.

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

Procedure 8-1
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 (customer supplied)

Action

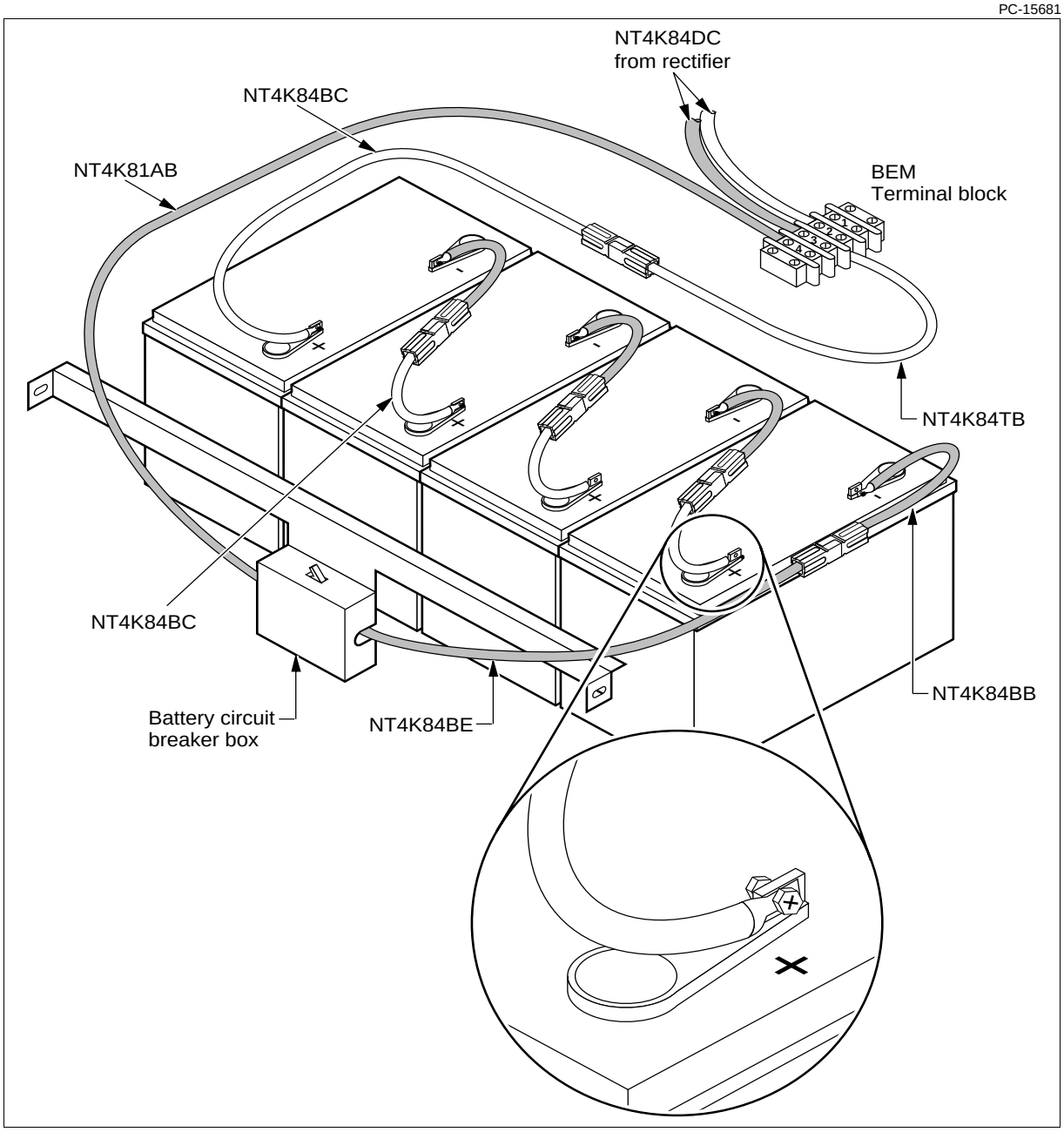
Step	Action
1	Remove the front cover of the BEM.
2	Turn OFF the BEM circuit breaker for the string of batteries to be rejuvenated.
3	Disconnect the negative (–) battery harness power connector in the red lead between the right-most battery and the BEM circuit breaker (see Figure 8-1).
4	Insulate the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

—continued—

Procedure 8-1 (continued)
Rejuvenating the batteries

Step	Action

Figure 8-1
Battery connections



—continued—

Procedure 8-1 (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 reconnecting.
12	If the voltages are not within 0.25 V dc, repeat the rejuvenation process.
13	Remove the electrical tape from the connectors.
14	Reconnect the white (+) and then the red (–) battery harness connectors (see Figure 8-1).
15	Turn ON the BEM circuit breaker.
16	Repeat steps 1 though 15 for each string of batteries to be rejuvenated.
17	Reinstall the BEM covers.

—end—

Procedure 8-2
Testing and replacing the batteries

Use this procedure to test the batteries in the modular business package (MBP) master or expansion cabinets. To perform this test, the batteries have to be disconnected from the cabinet equipment. It is recommended that the batteries be removed from the cabinet and tested off-site.

Note: If the batteries are disconnected and removed, the rectifiers can supply sufficient power to the shelf at the correct operating voltages. However, to prevent any inadvertent loss of power to the equipment the replacement batteries must be fully charged and tested.

Requirements

The following tools are required:

- open- or box-end wrench or socket wrench and socket to fit the following hex heads: 7/16 in., 3/8 in., 5/16 in.

Action

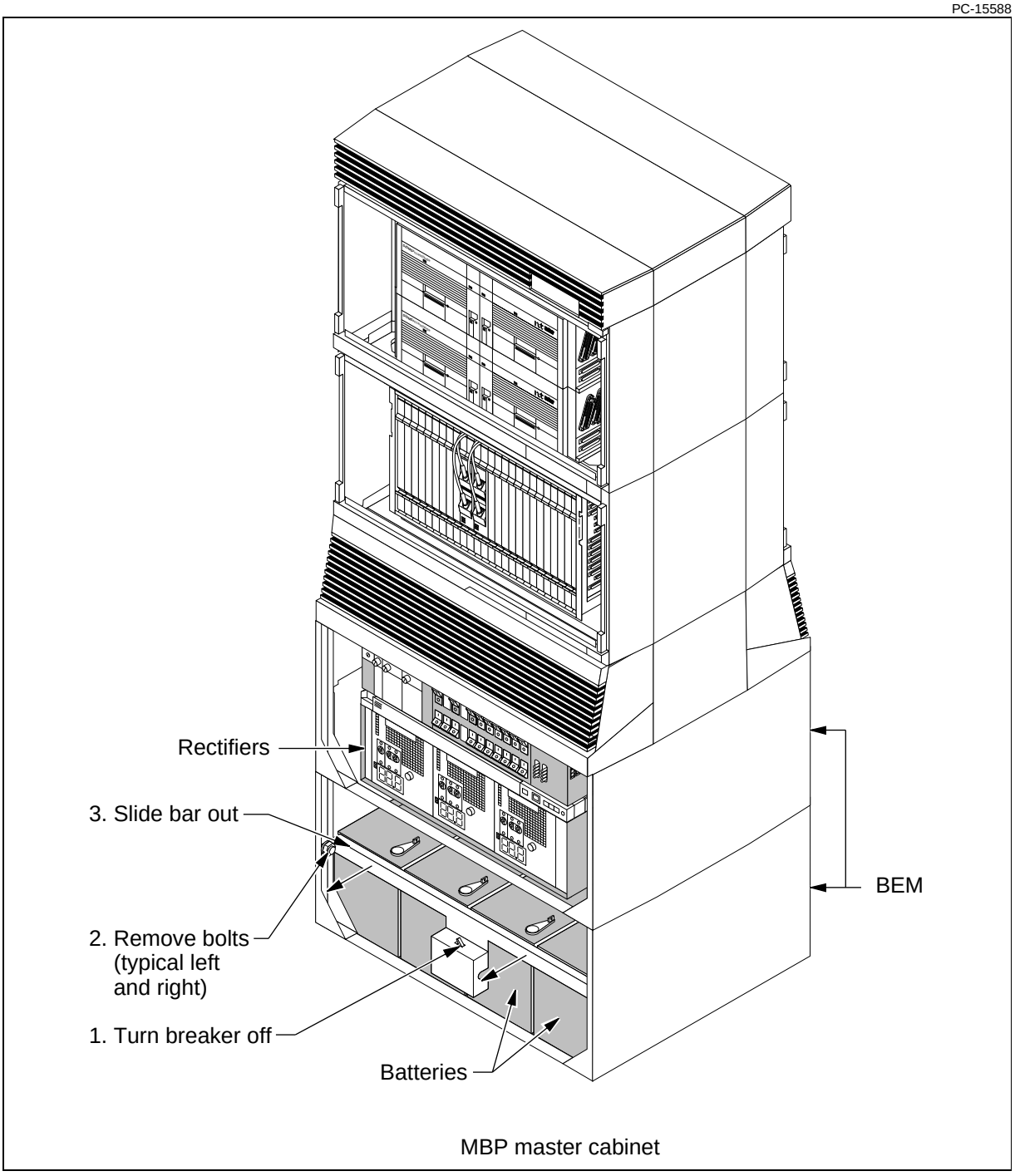
Step	Action
1	Remove the front cover of the battery equipment module (BEM) as shown in Chapter 3, “Removing covers and grilles.”
2	Refer to Figure 8-2 on page 8-9 and Figure 8-3 on page 8-11 now, and as required, while performing the procedure.
3	Turn OFF the BEM circuit breaker.
4	Using the 7/16 in. wrench, remove the two bolts that hold the battery retaining bar in place.
5	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.
6	Disconnect the four batteries from the cabinet equipment by using the quick connects to separate: **a.** the two red cables that join the circuit breaker to the negative (–) terminal on the right-most battery (red cables appear shaded in Figure 8-3). **b.** the two white cables that join the terminal block to the positive (+) terminal on the left-most battery (white cables appear white in Figure 8-3).

—continued—

Procedure 8-2 (continued)
Testing and replacing the batteries

Figure 8-2
Battery retaining bar

PC-15588



—continued—

Procedure 8-2 (continued)
Testing and replacing the batteries

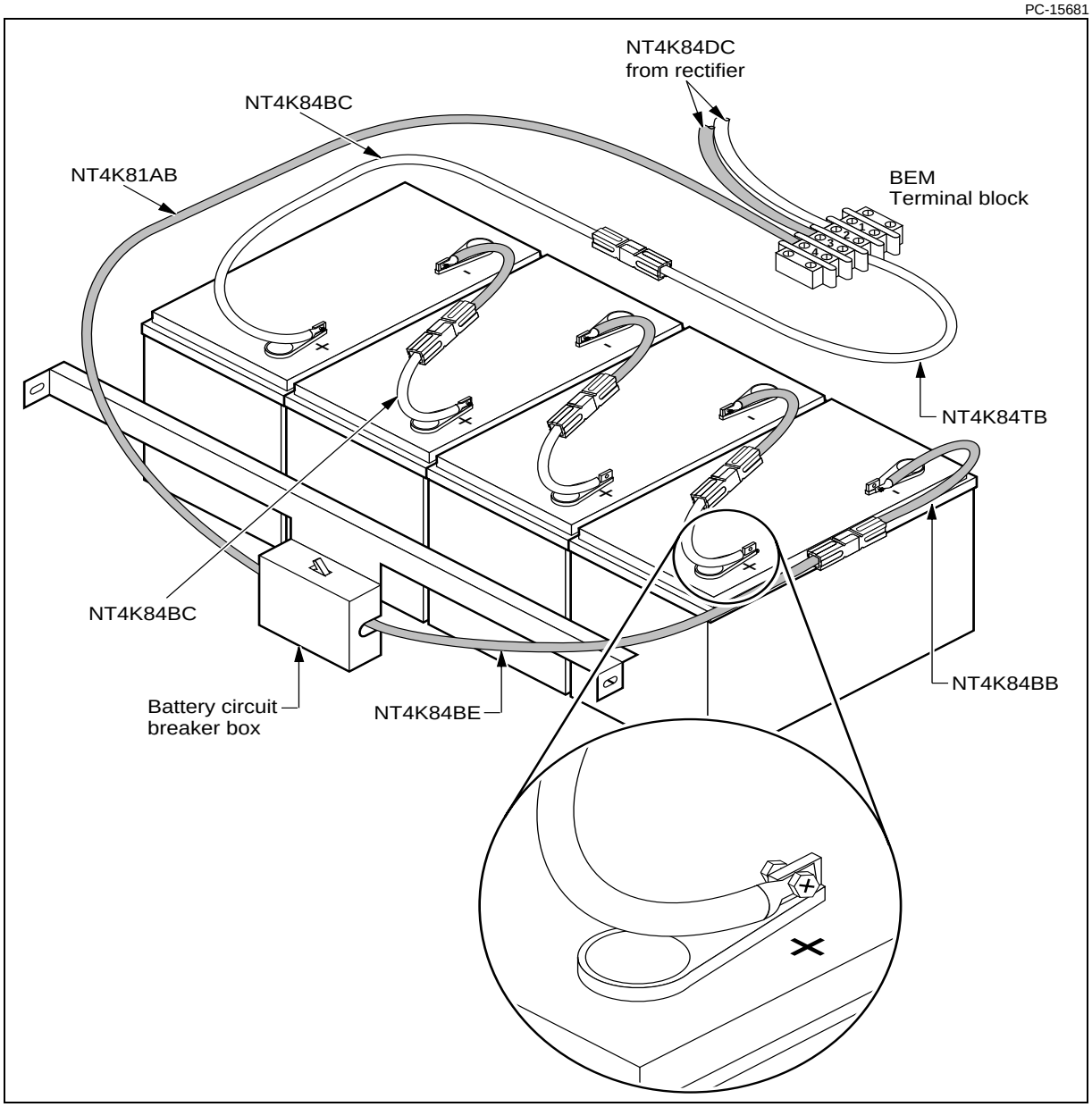
Step	Action
7	Each battery is connected to the next with a red cable that goes from the negative (–) terminal of the battery on the left to a white cable that comes from the positive (+) terminal of the battery on the right. Refer to Figure 8-3. Disconnect the batteries from each other by using the quick connects to separate the red and white cables.
8	Remove the batteries from the module.
9	Measure the output voltage of each battery. The output voltage should be between: **Manufacturer** | **Output voltage** Johnson Control | –13.2 and –14 V dc
10	If the output voltage of any battery is low, recharge the battery.
11	When the batteries are fully charged, perform the following load test for each battery: **a.** Connect a load to the battery to be tested. **b.** Set the load for 50 to 100 A. **c.** Connect the test load for 10 seconds. **d.** After 10 seconds, measure the battery voltage. Recommended battery voltage measurements are: **Manufacturer** | **Output voltage** Johnson Control | –11.3 V dc If the battery does not meet the recommended battery voltage, replace the battery. **e.** Remove the load.

—continued—

Procedure 8-2 (continued)
Testing and replacing the batteries

Step	Action

Figure 8-3
Battery connections



—continued—

Procedure 8-2 (continued)
Testing and replacing the batteries

Step	Action
12	Interconnect four fully charged and tested batteries in the same series configuration as is used in the MPP cabinet. Refer to Figure 8-3.

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

13 If a battery must be replaced:

a. Use the 5/16 in. and 3/8 in. wrenches to remove the hardware that fastens the red and white cables to the battery terminals. Note the orientation of the cable.

b. Reinstall the cables on the replacement battery.
Ensure that the white cable goes on the positive (+) terminal and that the red cable goes on the negative (–) terminal.
Ensure that each cable is fastened to the battery terminal in the same orientation as on the original battery.

Note: Some companies require that batteries only be replaced in sets of four. Check your local practices before replacing an individual battery.

14 Measure the voltage level. Recommended voltage readings are:

Manufacturer	Output voltage
Johnson Control	Between –52.8 and –56.0 V dc

15 If the voltage level is acceptable, disconnect the batteries from each other by using the quick connects to separate the red and white cables.

—continued—

Procedure 8-2 (continued)
Testing and replacing the batteries

Step	Action
16	The batteries can be returned to the location of the MPP cabinet and reinstalled in the battery module. To do so move the batteries onto the shelf so that the positive (+) terminal is at the front. There is enough space on the shelf for about an inch between each battery.
17	Interconnect the four batteries by connecting the red cable from the negative (–) terminal of the battery on the left to the white cable from the positive (+) terminal of the battery on the right. Refer to Figure 8-3 on page 8-11.

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

18	Reconnect 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 • the white cable from the terminal block to the white cable from the positive (+) terminal on the left-most battery
19	Slide the battery retaining bar into place and use the 7/16 in. wrench and the two bolts to refasten the bar to the battery module. Refer to Figure 8-2 on page 8-9.
20	Turn the circuit breaker ON.
21	Reinstall the front cover of the battery module.

—end—

Procedure 8-3
Replacing a rectifier

Use this procedure to replace an NT5C06 MPR25 rectifier in the modular business package (MBP) master cabinet.

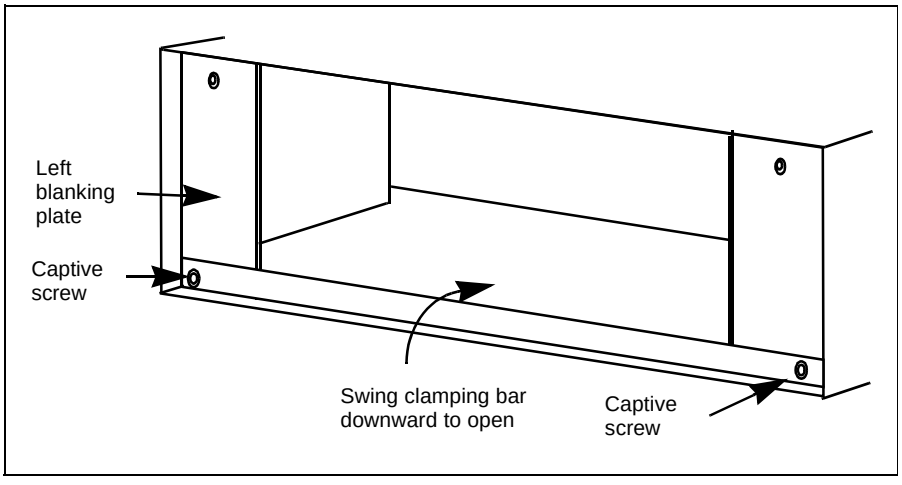
The MPR25 rectifier can be replaced in service without power interruption to the load (hot insert).

Requirements

- screwdriver, flat blade, 1/4-in. blade width

Action

Step	Action
1	Remove the equipment cover below the pedestal on the master cabinet, as outlined in Chapter 3, “Removing covers and grilles.”
2	On the rectifier to be replaced, set first the ac and then the dc circuit breakers to the OFF position.
3	Set the dc distribution shelf sense DIP switch for this rectifier to the OFF position. The sense DIP switch is located on the control circuit pack.
4	At the front of the rectifier shelf, release the two captive screws that hold the clamping bar in place as shown following. Swing the clamping bar downward. ***Note:*** For clarity, the following figure shows a shelf with no rectifiers installed.



—continued—

Procedure 8-3 (continued)
Replacing a rectifier

Step	Action
5	Carefully slide the rectifier out of the shelf, and place it in the packing carton from the replacement rectifier for shipping or storage. ***Note:*** If only the cooling fan on the rectifier is defective, it can be replaced according to the replacement procedure in Nortel Networks Practice 169-2071-500, *Equipment Installation Operation and Maintenance for MPR25 / MPR15 Series Single Phase –48 V, 25 A Switch Mode Rectifier NT5C06*. This document is shipped inside the box with the new rectifier.
6	Make sure the ac and dc circuit breakers on the replacement rectifier are switched to the OFF (down) position, then slide the unit firmly into the shelf, resting it on top of the stored blank panel.
7	Replace the clamping bar and tighten the two captive screws.
8	Set the sense DIP switch for this rectifier to the ON position.
9	Switch the dc circuit breaker to the ON (up) position.
10	Switch the ac circuit breakers to the ON (up) position to power the rectifier.
11	Perform Procedure 8-4, Procedure 8-5, Procedure 8-6 and Procedure 8-7 in order.

—end—

Procedure 8-4
High voltage shutdown adjustments for replacement rectifiers

Use this procedure to adjust a replacement rectifier for high voltage shutdown in a modular business package (MBP) master cabinet that is currently carrying traffic.

If the rectifiers that are to be replaced are installed in a new installation or in a cabinet that is not in-service, see *Modular Business Package VTBM Ring Installation Guide,* for rectifier installation And adjustment.

CAUTION
Risk of service interruption
This procedure is service affecting. Perform the high voltage shutdown adjustment procedures during low traffic hours.

Documentation references

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

Test sets

Voltmeter rms Fluke 8050A (or equivalent)

Tools

Screwdriver, slotted, small (0.1-inch width)

Cautions

Observe all cautions listed in the beginning of this chapter.

—continued—

Procedure 8-4 (continued)
High voltage shutdown adjustments for replacement rectifiers

Rectifier and battery adjustments and connections

Table 8-1 shows the Nortel Networks recommended rectifier settings for the optional battery selections.

Table 8-1
Rectifier adjustment settings

Battery Manufacturer	High Voltage ShutDown (HVSD)	Equalize (EQL)	Float (FLT)	Low Voltage Alarm (LVA)	Low Voltage Disconnect (LVD)
Johnson Control	–56.0 ± 0.1	–55.5 ± 0.1	–54.5 ± 0.1	–47.0 ± 0.1	–42.5 ± 0.

Note: Batteries are individually fused on the BEM.

Action

Step	Action
1	Insert the test leads of the digital voltmeter (DVM) into the test points (negative to negative, positive to positive). ***Note:*** On the faceplate of the rectifier module are test points labeled outputs V+ and V– (see Figure 8-4).
2	Set the EQL/ FLT switch on the rectifier to the FLT position.

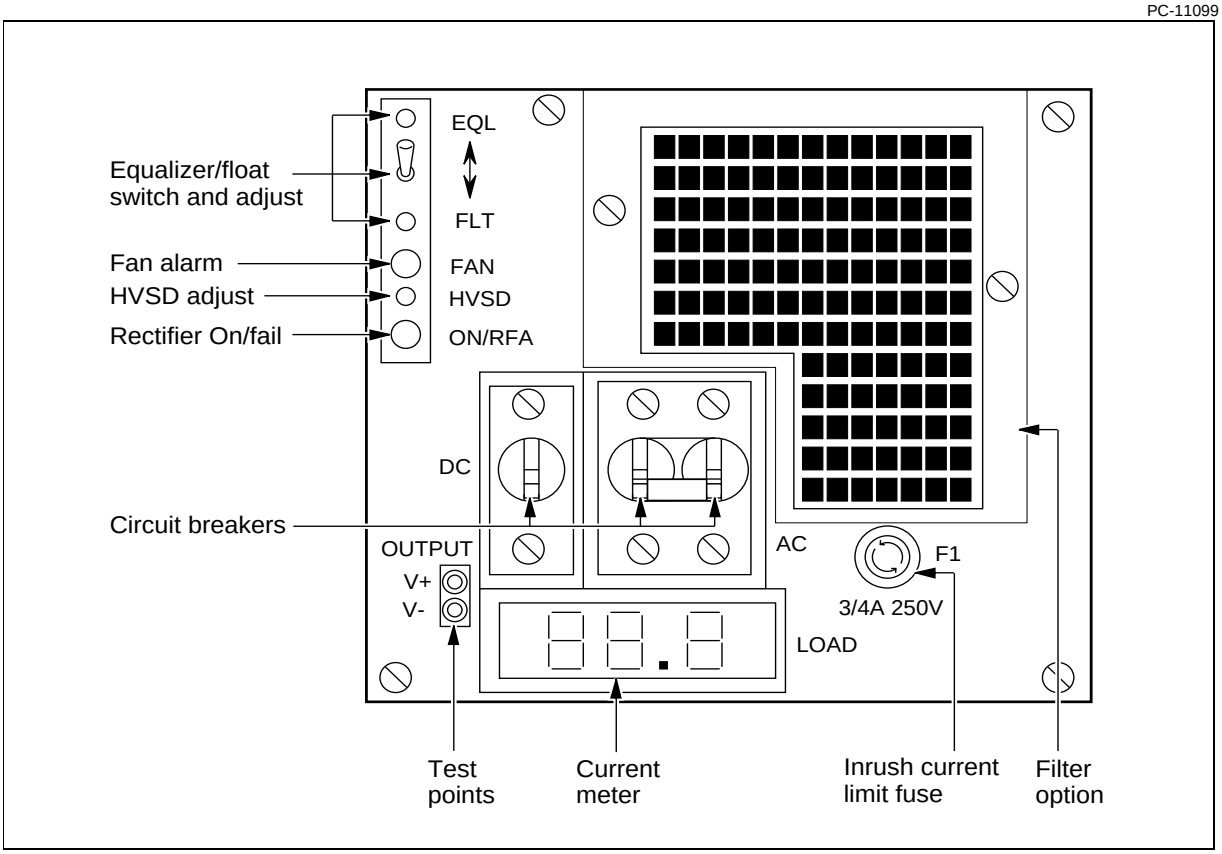
—continued—

Procedure 8-4 (continued)
High voltage shutdown adjustments for replacement rectifiers

Step	Action

Figure 8-4
MPR25 (NT5C05CA-3) rectifier

PC-11099



—continued—

Procedure 8-4 (continued)
High voltage shutdown adjustments for replacement rectifiers

Step	Action

3 Verify the voltage reading on the DVM.

CAUTION
Risk of equipment damage
When increasing or decreasing the float voltage on a working system with batteries connected, always proceed very slowly. Only turn the float potentiometer 1/4 turn at any one time then allow the batteries to stabilize before adjusting the FLT potentiometer again.The batteries require a period of time to stabilize to the new voltage and current levels.

CAUTION
Risk of equipment damage
Do not adjust the voltage above –56.0 V dc as damage to the AccessNode equipment may result.

If the voltage reading on the DVM is	Then SLOWLY adjust the FLT potentiometer
> –56.0 V dc	counterclockwise until the DVM reads –56.0 V dc
< –56.0 V dc	clockwise until the DVM reads –56.0 V dc
= –56.0 V dc	Go to step 4.

4 Slowly and slightly adjust the HVSD potentiometer by turning it counterclockwise to decrease the HVSD limit until HVSD occurs.

Note: The ON/RFA LED illuminates red and the rectifier shuts down.

5 Record the voltage measurement.

6 Turn the FLT potentiometer counterclockwise to reduce the voltage (about two turns).

7 Reset the ac breaker to the ON position.

8 Watch the DVM readings and slowly adjust the FLT potentiometer clockwise to increase the float voltage until either –56.0 V dc is reached or High Voltage Shutdown (HVSD) occurs.

Note 1: If HVSD occurs, the ON/RFA LED illuminates red and the rectifier shuts down. Record the voltage measurement.

Note 2: If the –56.0 V level cannot be reached, hold the FLT/EQL switch in the EQL position while adjusting the FLT potentiometer.

—continued—

Procedure 8-4 (continued)
High voltage shutdown adjustments for replacement rectifiers

Step	Action

9 Verify the HVSD level:

If the HVSD	Then
occurred at –56.0 V dc	Go to step 10.
occurred before –56.0 V dc	Slowly and slightly adjust the HVSD potentiometer clockwise to increase the HVSD limit. Go to step 6.
did not occur before –56.0 V dc was reached	Slowly and slightly adjust the HVSD potentiometer counterclockwise to decrease the HVSD limit. Go to step 6.

10 Continue rectifier adjustments by using Procedure 8-5, “Setting equalize (EQL) voltage level.”

—end—

Procedure 8-5
Setting equalize (EQL) voltage level

Use this procedure to adjust a replacement rectifier for equalize voltage in a modular business package (MBP) master cabinet that is currently carrying traffic.

Documentation references

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

Test sets

Voltmeter rms Fluke 8050A (or equivalent)

Tools

Screwdriver, slotted, small (0.1-inch width)

Cautions

Observe all cautions listed in the beginning of this chapter.

Rectifier and battery adjustments and connections

Table 8-2 shows the Nortel Networks recommended rectifier settings for the optional battery selections.

Table 8-2
Rectifier adjustment settings

Battery manufacturer	High-voltage shutDown (HVSD)	Equalize (EQL)	Float (FLT)	Low-voltage alarm (LVA)	Low-voltage disconnect (LVD)
Johnson Control	–56.0 ± 0.1	–55.5 ± 0.1	–54.5 ± 0.1	–47.0 ± 0.1	–42.5 ± 0.1

Note: Batteries are individually fused on the battery equipment module (BEM).

—continued—

Procedure 8-5 (continued)
Setting equalize (EQL) voltage level

Action

Step	Action
1	Turn the FLT POT counterclockwise to reduce the voltage (about two turns).

CAUTION
Risk of equipment damage
When increasing or decreasing the float voltage on a working system with batteries connected, always proceed very slowly. Only turn the float potentiometer 1/4 turn at any one time then allow the batteries to stabilize before adjusting the FLT potentiometer again.The batteries require a period of time to stabilize to the new voltage and current levels.

2	Adjust the EQL POT counterclockwise two full turns.
3	Reset the ac breaker to the ON position.
4	Hold the FLT/EQL momentary switch to EQL position.
5	Watch the DVM readings and slowly adjust the FLT potentiometer clockwise to increase the EQL voltage to –55.5 V dc.
6	Release the FLT/EQL switch. The unit should operate normally.
7	Continue with Procedure 8-6, “Adjusting the float voltage.”

—end—

Procedure 8-6
Adjusting the float voltage

Use this procedure to adjust a replacement rectifier for float voltage in a modular business package (MBP) master cabinet that is currently carrying traffic.

Documentation references

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

Test sets

Voltmeter rms Fluke 8050A (or equivalent)

Tools

Screwdriver, slotted, small (0.1-inch width)

Cautions

Observe all cautions listed in the beginning of this chapter.

Rectifier and battery adjustments and connections

Table 8-3 shows the Nortel Networks recommended rectifier settings for the optional battery selections.

Table 8-3
Rectifier adjustment settings

Battery manufacturer	High-voltage shutDown (HVSD)	Equalize (EQL)	Float (FLT)	Low-voltage alarm (LVA)	Low-voltage disconnect (LVD)
Johnson Control	–56.0 ± 0.1	–55.5 ± 0.1	–54.5 ± 0.1	–47.0 ± 0.1	–42.5 ± 0.1

Note: Batteries are individually fused on the BEM.

—continued—

Procedure 8-6 (continued)
Adjusting the float voltage

Action

Step	Action
1	Set the EQL/FLT switch to the FLT position. ***Note:*** The EQL/FLT switch on the rectifier must be in the FLT position when adjusting the float voltage.
2	Insert the test leads of the digital voltmeter (DVM) into the test points (negative to negative, positive to positive). ***Note:*** On the faceplate of the rectifier module are test points labeled outputs V+ and V–.
3	Slowly adjust the FLT potentiometer clockwise to raise the float voltage or counterclockwise to lower the float voltage to –54.5 ± 0.1 V dc.
4	Continue with Procedure 8-7, “Load sharing adjustments for replacement rectifiers.”

—end—

Procedure 8-7
Load sharing adjustments for replacement rectifiers

Use this procedure to adjust the load sharing of the replacement rectifier in a modular business package (MBP) master cabinet.

Documentation references

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

Test sets

Voltmeter rms Fluke 8050A (or equivalent)

Tools

Screwdriver, slotted, small (0.1-inch width)

Cautions

Observe all cautions listed in *Module Replacement Procedures,* 323-3001-547, Volume 5C.

Rectifier and battery adjustments and connections

Table 8-4 shows the Nortel Networks recommended rectifier settings for the optional battery selections.

Table 8-4
Rectifier adjustment settings

Battery manufacturer	High-voltage shutDown (HVSD)	Equalize (EQL)	Float (FLT)	Low-voltage alarm (LVA)	Low-voltage disconnect (LVD)
Johnson Control	–56.0 ± 0.1	–55.5 ± 0.1	–54.5 ± 0.1	–47.0 ± 0.1	–42.5 ± 0.1

Note: Batteries are individually fused on the BEM.

—continued—

Procedure 8-7 (continued)
Load sharing adjustments for replacement rectifiers

Action

Step	Action
1	Examine all rectifiers for the status of the RFA LEDs.
2	Perform the load sharing adjustment steps shown in Table 8-5. Table 8-5 lists the RFA LED indications and the associated steps to coarsely adjust the load sharing of multiple rectifiers.

Table 8-5
Rectifier load sharing adjustments

If the RFA LED indication is	And the number of rectifiers installed is	The indication means	Then perform these steps
Only one RFA LED is illuminated GREEN	two or three	that the rectifier with the GREEN RFA LED is floating slightly too high	Slowly and very slightly adjust the FLT potentiometer of the rectifier that has the RFA LED illuminated GREEN counterclockwise until the RFA LEDs of at least one of the other rectifiers illuminate GREEN. Go to step 3.
Only two RFA LEDs are illuminated GREEN	three	that the rectifier with the RED RFA LED is floating slightly too low	Slowly and very slightly adjust the FLT potentiometer of the rectifier that has the RFA LED illuminated RED clockwise until the RFA LED illuminates GREEN. Go to step 3.
All installed rectifier RFA LEDs are illuminated GREEN	any number of rectifiers	that the rectifiers are sharing the load closely	Go to step 4.

3	Repeat from Step 1 until all rectifiers RFA LED are illuminated 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.

—continued—

Procedure 8-7 (continued)
Load sharing adjustments for replacement rectifiers

Step	Action
5	Adjust the FLOAT voltage of the rectifier that has the lowest current reading on the rectifier ammeter display by: **a.** slowly and *very slightly* adjusting the FLT potentiometer clockwise until the ammeter reading is no longer the lowest of the installed rectifiers. ***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: **a.** 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 all rectifiers have RFA LED illuminated GREEN and the ammeter displays all read within 0.1 A of each other.
8	Reinstall the cabinet cover.

—end—

Replacing the low-voltage disconnect unit

This chapter describes the procedures to be performed to replace the low-voltage disconnect (LVD) unit at the rear of the modular business package (MBP) master cabinet.

CAUTION
Service affecting procedure
This is a service-affecting procedure. Perform this procedure during low traffic hours.

Before beginning these procedures, obtain and have on-site the following documents that you may need to restore the system to service:

- *Alarm and Trouble Clearing Procedures*, 323-3001-543, in *Maintenance*, Volume 5A
- *Recovery Procedures*, 323-3001-545, in *Maintenance*, Volume 5C

Chapter contents

This chapter contains the following information:

Perform the procedures in the order listed.

Warnings and cautions

Prior to performing any LVD 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
Procedure sequence
Perform the steps in the order shown because the sequence is critical.

CAUTION
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 manufacturer: Johnson Control 12V, –54.50 ±0.10 V dc.

Note: These ranges are subject to change without notice. For other batteries, see the manufacturer's specifications.

CAUTION
DC input voltage specifications
The input voltage specifications require that the dc input to the BIP does not exceed –56.0 V dc. Set high voltage shutdown to –56.0 V dc.

Procedure 9-1
Removing and installing an LVD

Use this procedure to remove and reinstall an LVD in the modular business package (MBP) master cabinet.

CAUTION
Service affecting procedure
This is a service affecting procedure. Perform this procedure during low traffic hours.

Figure 9-1 shows the location of the LVD unit in the MBP master cabinet.

Requirements

Before beginning this procedure, ensure that you have all tools and materials on-site.

Tools and materials

The following tools and materials are required:

- replacement LVD available on-site
- digital voltmeter
- labels for marking harnesses and wiring to the LVD
- 3/8-inch drive socket set with 1/4-inch socket
- spare fuse, GMT type, 1-1/3 A
- slotted screwdriver (small)

Action

Step	Action
	Preparing to replace the LVD
1	Remove the cover plate from the new LVD by removing the 8 flat-head mounting screws as shown in Figure 9-2 on page 9-5.
2	On the new LVD cover, disconnect the 8-position connector (J1) from the circuit board.
3	Disconnect the 2-position (red and black leads) Molex connectors between the LVD cover and the contactor in the LVD box.
4	Inside of the new LVD, disconnect the 3-position (J9) fuse connector from the circuit board.

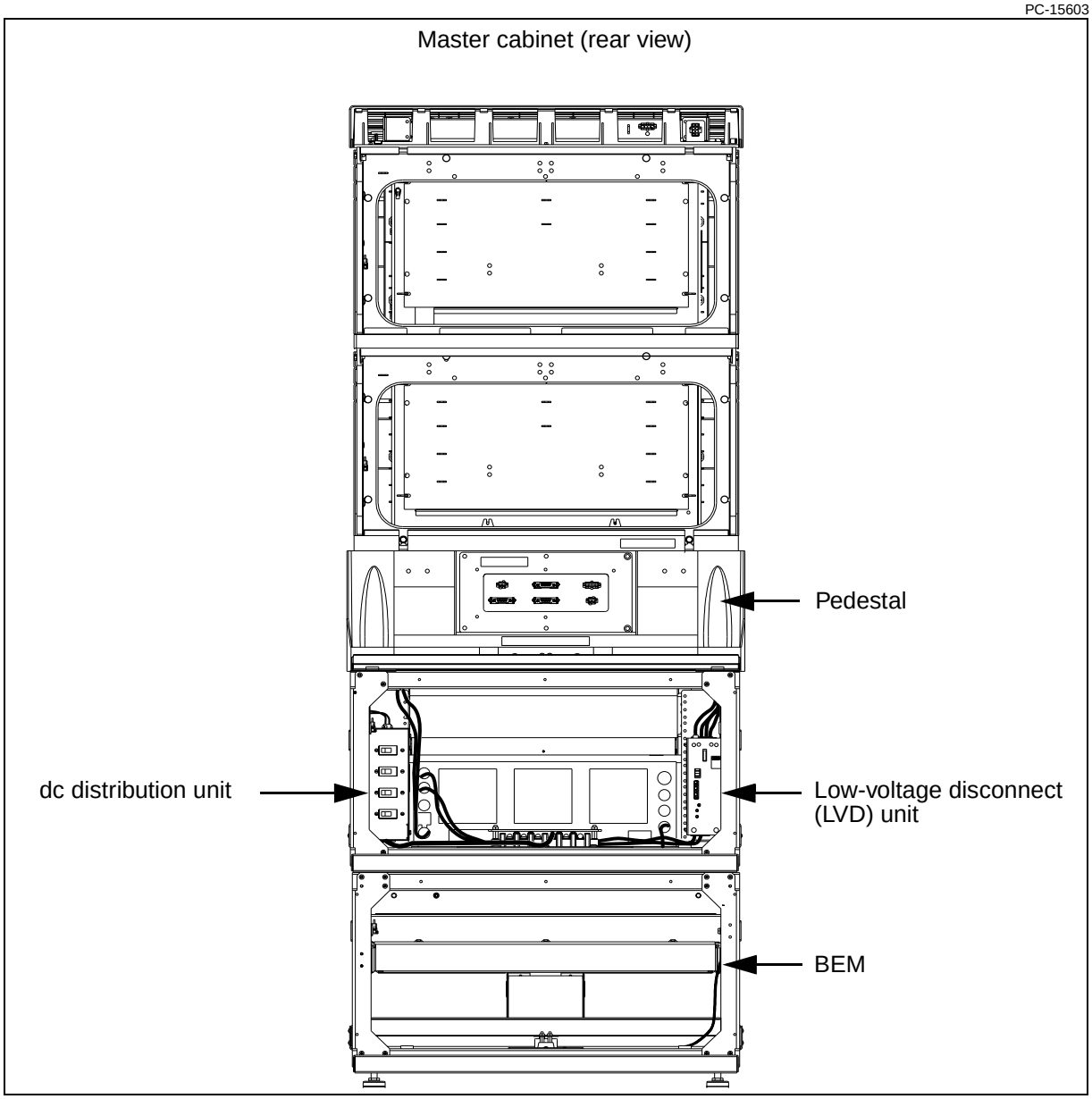
—continued—

Procedure 9-1 (continued)
Removing and installing an LVD

Step	Action

Figure 9-1
LVD location

PC-15603



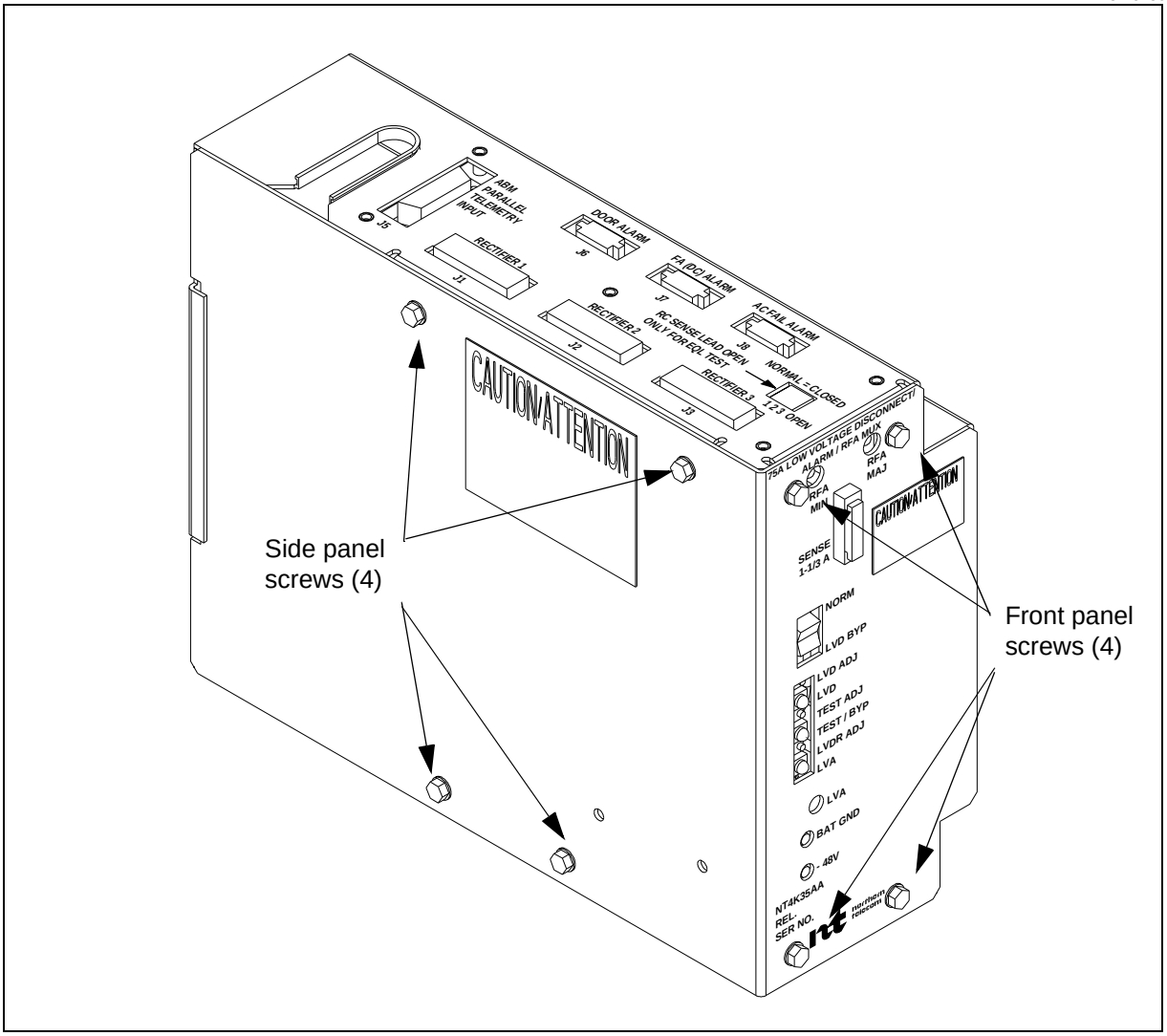
—continued—

Procedure 9-1 (continued)
Removing and installing an LVD

Step	Action
5	Set the new unit and its cover plate aside.

Figure 9-2
Removing the LVD cover plate

PC-15436



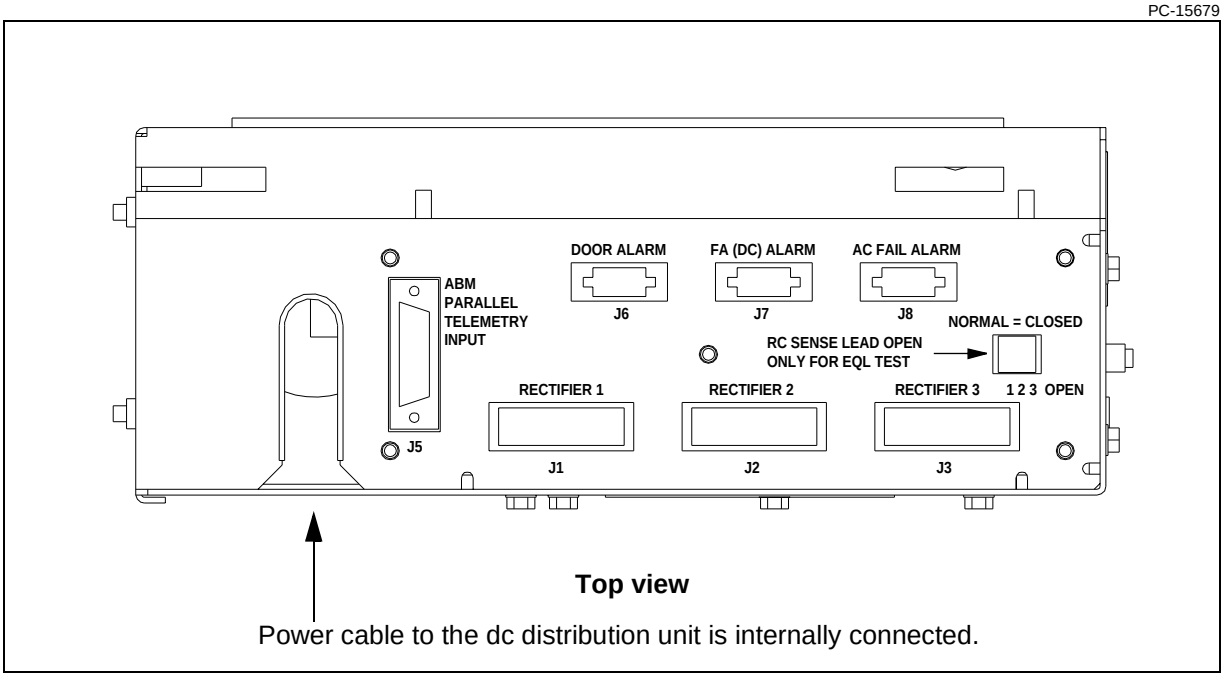
—continued—

Procedure 9-1 (continued)
Removing and installing an LVD

Step	Action
	Powering down the system
6	Remove the front BEM cover panels on the master and expansion cabinets.
7	Access the rear of the master cabinet and remove the upper rear BEM cover panel.
8	Power down the MBP system using steps a–d:
	a. Turn all BEM circuit breakers OFF.
	b. Turn all BIP circuit breakers OFF.
	c. Turn all rectifier ac circuit breakers OFF.
	d. Turn all rectifier dc circuit breakers OFF.
9	Label all cabling and wiring to the LVD with the connector designations on the LVD (J1–J8) as shown in Figure 9-3.
	Disconnecting and removing the LVD unit
10	Disconnect the green ground lead from the rectifier shelf to the LVD cover plate.
11	Disconnect all external cabling and wiring connections from the LVD.
	Note: The power cable to the dc distribution unit is internally connected and is removed in a later step.

Figure 9-3
LVD cabling connections

PC-15679



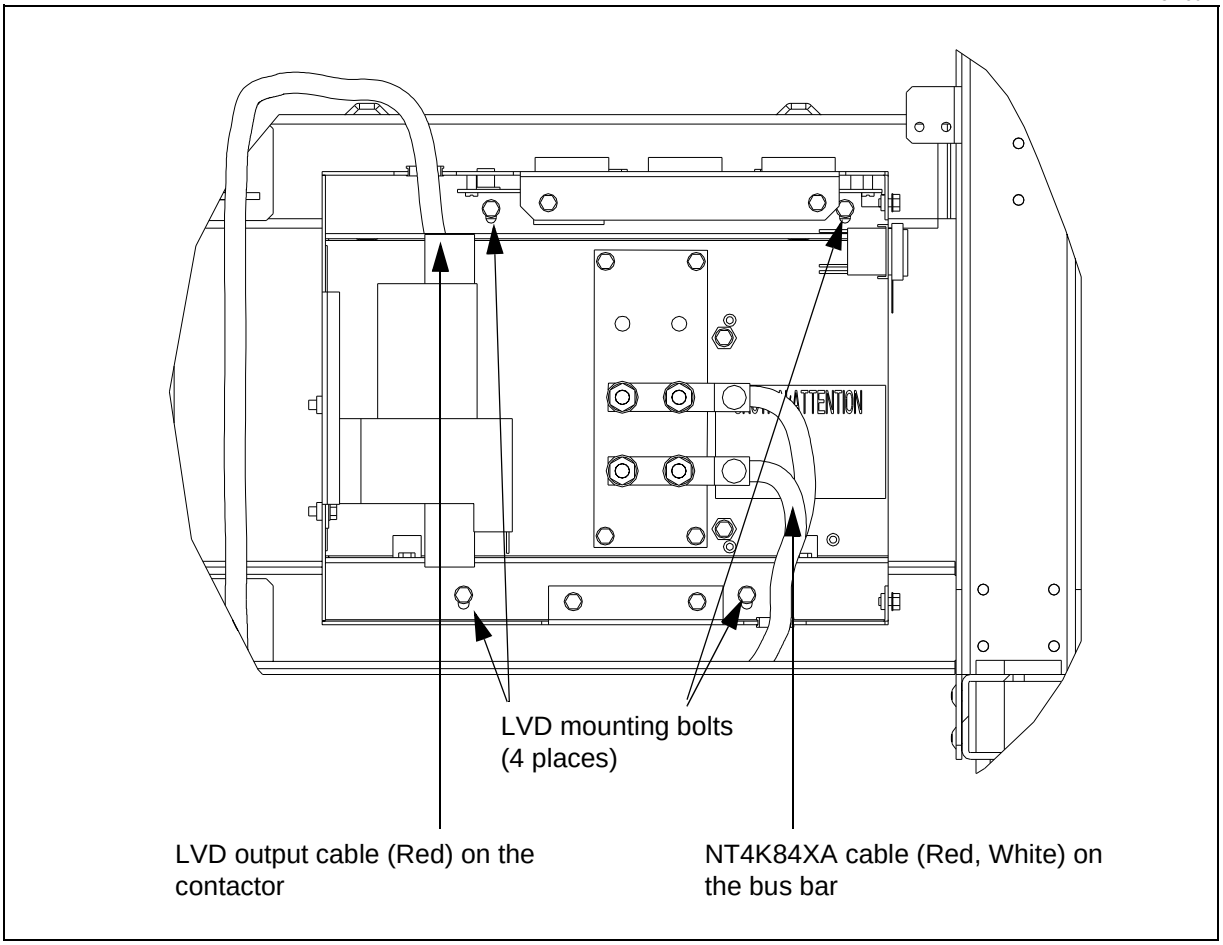
—continued—

Procedure 9-1 (continued)
Removing and installing an LVD

Step	Action
12	Remove the LVD cover plate by removing the 8 flat-head mounting screws as shown in Figure 9-2.
13	Label and then disconnect the red and white leads of the NT4K84XA cable from the LVD bus bar as shown in Figure 9-4.
14	Disconnect the red LVD output cable from the top of the contactor.
15	Dismount the LVD by using the socket set to remove the four 1/4-in. hex LVD mounting bolts.
16	Remove the LVD from the cabinet.

Figure 9-4
Disconnecting the internal wiring and cabling

PC-15674



—continued—

Procedure 9-1 (continued)
Removing and installing an LVD

Step	Action
	Installing the new LVD
17	Set the options switches on the new LVD to the same settings as on the old LVD unit.
18	Mount the replacement LVD into the same place that the old LVD was removed using the same 4 mounting bolts.
19	Reconnect the red LVD output power cable to the contactor.
20	Reconnect the red and white leads of the NT4K84XA cable to the LVD bus bar.
21	On the LVD cover, reconnect the 8-position connector to position J1 on the circuit board.
22	Reconnect the 2-position (red and black leads) Molex connectors between the LVD cover and the contactor in the LVD box.
23	In the LVD box, reconnect the 3-position fuse connector to J9 on the circuit board.
24	Reinstall the LVD cover plate using the same 8 mounting screws.
25	Reconnect the green ground lead from the rectifier shelf to the LVD cover plate.
26	Reconnect the external cables and wiring to the LVD. ***Note:*** Ensure that the cable labels match the connector designation on the new LVD.
27	Go to Procedure 9-2, “Restoring power to the system” on page 9-9.

—end—

Procedure 9-2
Restoring power to the system

Use this procedure to restore power to the MBP system after replacing an LVD unit.

Table 9-1 shows the Nortel Networks recommended rectifier settings for the optional battery selections.

Table 9-1
Rectifier adjustment settings

Battery	Float
Johnson Control, TEL 12/125	–54.5 ± 0.1 V dc

Requirements

Before beginning this procedure, ensure that you have all tools and materials on-site.

Tools and materials

The following tools and materials are required:

- digital voltmeter
- slotted screwdriver (flat-head, 0.1 in. blade)

Action

Step	Action
1	Turn the dc circuit breakers then the ac circuit breakers on all rectifiers ON.
2	Measure the float voltage of each rectifier. If the float voltage does not meet the requirement shown in Table 9-1, adjust the rectifier float voltage as shown in steps a–c. Otherwise, go to step 4. **a.** Set the EQL/FLT switch to the FLT position. **b.** Insert the test leads of the digital voltmeter (DVM) into the test points (negative to negative, positive to positive). ***Note:*** On the faceplate of the rectifier module are test points labeled outputs V+ and V–. **c.** Slowly adjust the FLT potentiometer clockwise to raise the float voltage or counterclockwise to lower the float voltage to –54.5 ± 0.1 V dc.
3	Turn the battery circuit breakers on each BEM to the ON position.
4	Continue with Procedure 9-3, “Verifying the LVD indicators.”

—end—

Procedure 9-3
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 (see Figure 9-5) 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

The rectifiers must be adjusted and verified and remain in the power-up condition (all rectifier circuit breakers are ON).

Tools and materials

No tools and materials are required to perform this procedure.

Caution

DANGER

Risk of injury or damage

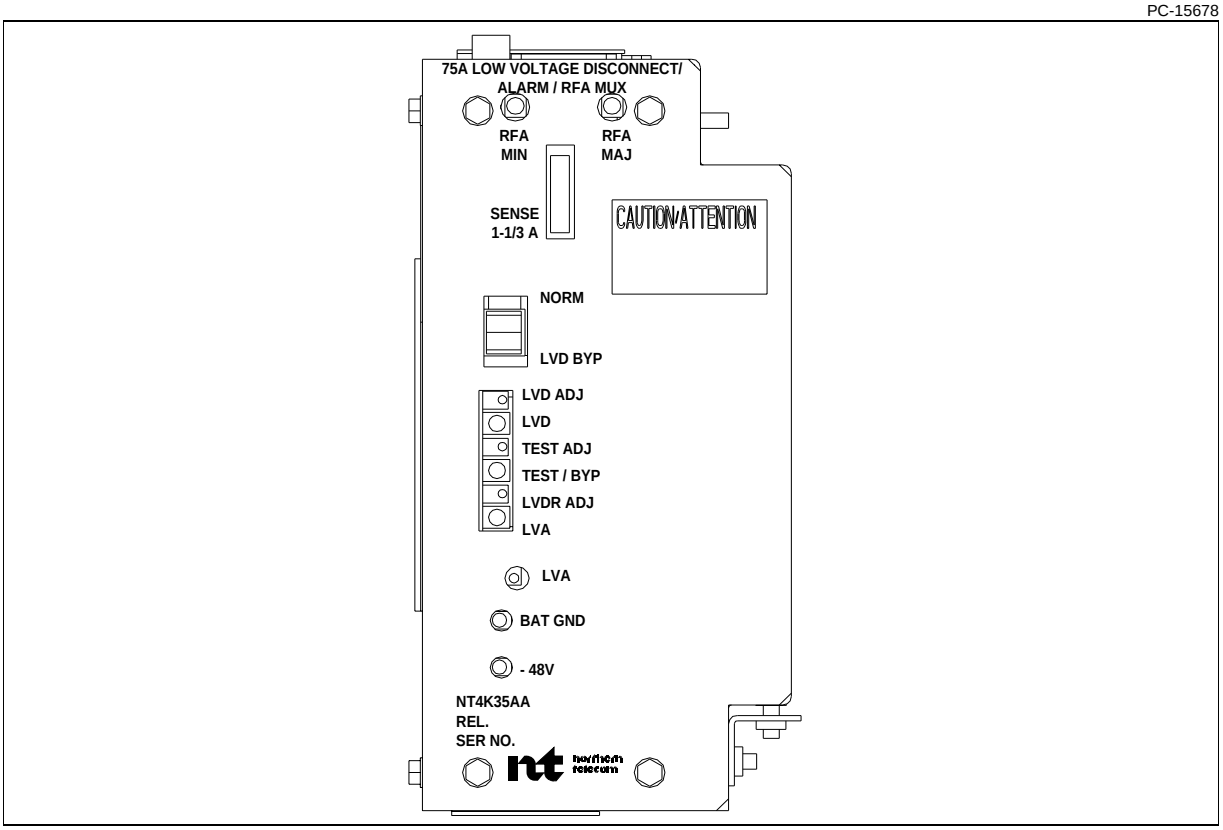
Read the warnings and precautions at the beginning of this chapter to minimize any risk to personnel and equipment.

—continued—

Procedure 9-3 (continued)
Verifying the LVD indicators

Figure 9-5
Low-voltage disconnect (LVD) unit

PC-15678



—continued—

Procedure 9-3 (continued)
Verifying the LVD indicators

Action

Step	Action
	Verify 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 and 2 for each rectifier.
	Verify 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 red 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 red LED remains illuminated.
6	Turn ON the dc and then the ac breakers on the second rectifier.
	The RFA MIN red LED turns off.
	Verify the TEST BYP indicator
7	Set the LVD BYP/NORMAL switch to the BYP position.
	The TEST BYP LED illuminates.
8	Set the LVD BYP/NORMAL switch to the NORM position.
	The TEST BYP LED turns off.
9	Go to Procedure 9-4, “Adjusting the LVD unit.”

—end—

Procedure 9-4
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

The rectifiers must be adjusted and verified and remain in the power-up condition (all rectifier circuit breakers are ON). The BIP circuit breakers must be in the OFF position.

Tools and materials

The following tools are required:

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

Caution

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

—continued—

Procedure 9-4 (continued)
Adjusting the LVD unit

Action

Step	Action
1	Set the BYP/NORM switch to the BYP position.
2	On the dc distribution unit, turn all circuit breakers (CB1–CB4) to the OFF position.
Set the LVA threshold to –47.0 ± 0.2 V dc	
3	Connect the digital multimeter, set to read dc volts, to the test jacks on the faceplate of the LVD unit.
4	Adjust the TEST ADJ potentiometer clockwise (to increase) or counterclockwise (to decrease) the voltage to –50.0 V dc.
5	Slowly turn the TEST ADJ potentiometer counterclockwise and monitor the digital multimeter and the LV ALM LED to determine the LVA threshold.

If the LVA ALM LED	Then go to
does not illuminate before reaching –47.0 ± 0.2 V dc	step 6
illuminates before reaching –47.0 ± 0.2 V dc	step 8

6	If the LVA 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.
7	Slowly turn the LV ADJ potentiometer clockwise until the LVA ALM LED illuminates. Then go to step 11.
8	If the LVA 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.
9	Slowly turn the LVA ADJ potentiometer counterclockwise until the LVA ALM LED extinguishes.
Set the LVD alarm threshold to –42.5 ± 0.2 V dc	
10	Slowly turn the LV ADJ potentiometer clockwise until the LVA ALM LED illuminates.
11	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 12
illuminates before reaching –42.5 ± 0.2 V dc	step 14

12	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.

—continued—

Procedure 9-4 (continued)
Adjusting the LVD unit

Step	Action
13	Slowly turn the LVD ADJ potentiometer clockwise until the LVD ALM LED illuminates. Then go to step 17.
14	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.
15	Slowly turn the LVD ADJ potentiometer counterclockwise until the LVD ALM LED extinguishes.
16	Slowly turn the LVD ADJ potentiometer clockwise until the LVD ALM LED illuminates.
17	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.

Set the LVDR threshold to –50.5 V dc

18 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 19
extinguishes before reaching –50.5 V dc	step 20

19 Slowly turn the low-voltage reconnect (LVR) potentiometer counterclockwise or clockwise until the LVD ALM LED extinguishes.

Return the BIP shelf to normal operation

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

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

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

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

24 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.

25 Go to Procedure 9-5, “Adjusting the load sharing.”

—end—

Procedure 9-5
Adjusting the load sharing

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

Requirements

There are no specific requirements for performing this procedure.

Tools and materials

The following tools are required:

- slotted screwdriver (small, 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 Johnson Control 12/125 batteries. 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 9-5 (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.

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 LVD unit, 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 9-6, “Return the system to service.”

—end—

Procedure 9-6
Return the system to service

Use this procedure to return the system to service after replacing an LVD unit in the modular business package (MBP).

If you can not successfully complete this procedure, contact your next level of support.

Requirements

There are no specific requirements for performing this procedure. However, if you use procedures in other documents, those documents will list any requirements, tools, materials or other documentation.

Tools and materials

No tools or materials are required to perform this procedure.

Documentation references

Before beginning this procedure, obtain and have on-site the following documents that you may need to restore the system to service:

- *Alarm and Trouble Clearing Procedures*, 323-3001-543, in *Maintenance*, Volume 5A
- *Recovery Procedures*, 323-3001-545, in *Maintenance*, Volume 5C

Action

Step	Action
1	Ensure that all circuit breakers on the rectifiers are ON and all BEM circuit breakers are ON.
2	Ensure that all circuit breakers on the dc distribution unit are ON.
3	Turn all circuit breakers on the BIP to the ON position.
4	Observe all alarm indicators throughout the system. ***Note:*** Allow the system to stabilize for 25 minutes.
5	If an alarm is present, troubleshoot the alarm condition according to the procedures listed in *Alarm and Trouble Clearing Procedures*, 323-3001-543, in *Maintenance*, Volume 5A and in *Recovery Procedures*, 323-3001-545, in *Maintenance*, Volume 5C.

—end—

MBP routine maintenance

This chapter provides procedures for performing routine maintenance on modular business package (MBP) master and expansion cabinets.

Chapter contents

This chapter contains the following information:

Perform the procedures according to your requirements.

If you cannot successfully complete these procedures, contact your next level of support.

Routine maintenance intervals

The following table indicates the intervals for performing routine maintenance.

Task	Interval
Check and adjust MBP rectifier voltages	every 6 months
Replace filters	at least every 6 months

Procedure 10-1
Checking and adjusting rectifier voltages

Check rectifier voltage settings in the modular business package (MBP) master cabinet every 6 months.

Documentation references

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

Test sets

Fluke 8050A rms voltmeter (or equivalent)

Tools required

Slotted screwdriver (small, 0.1 in. blade)

Table 10-1 shows the Nortel Networks recommended rectifier settings for a number of battery types. These settings are referenced throughout the procedure.

Table 10-1
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

Action

Step	Action
1	To gain access to the MPR25 rectifiers housed in the MBP master cabinet, remove the equipment covers as shown in Chapter 3, “Removing covers and grilles.”

—continued—

Procedure 10-1 (continued)
Checking and adjusting rectifier voltages

Step	Action
	Adjust the Equalize voltage
2	Ensure that the ac and the dc circuit breakers on all rectifiers are in the OFF position (see Figure 10-1).
3	Turn the rectifier 1 FLT potentiometer 2 turns counterclockwise.
4	Turn ON the dc then the ac circuit breakers on rectifier 1.
5	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.
6	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 10-1). ***Note:*** Johnson Control battery equalize voltage is -55.0 ± 0.1 V dc.
	Adjust the float voltage to -54.5 ± 0.1 V dc
7	Change the EQL/FLT switch on rectifier 1 to the FLT position (see Figure 10-1). ***Note:*** The EQL/FLT switch on the rectifier must be in the FLT position when adjusting the float voltage.
8	Slowly adjust the FLT potentiometer clockwise to raise the float voltage or counterclockwise to lower the float voltage to the recommended value (see Table 10-1). ***Note:*** Johnson Control battery float value is -54.5 ± 0.1 V dc.
9	Turn OFF the ac then the dc circuit breakers on rectifier 1.
10	Repeat step 2 through step 9 for each rectifier installed.
11	Turn ON the ac then the dc circuit breakers on all rectifiers.

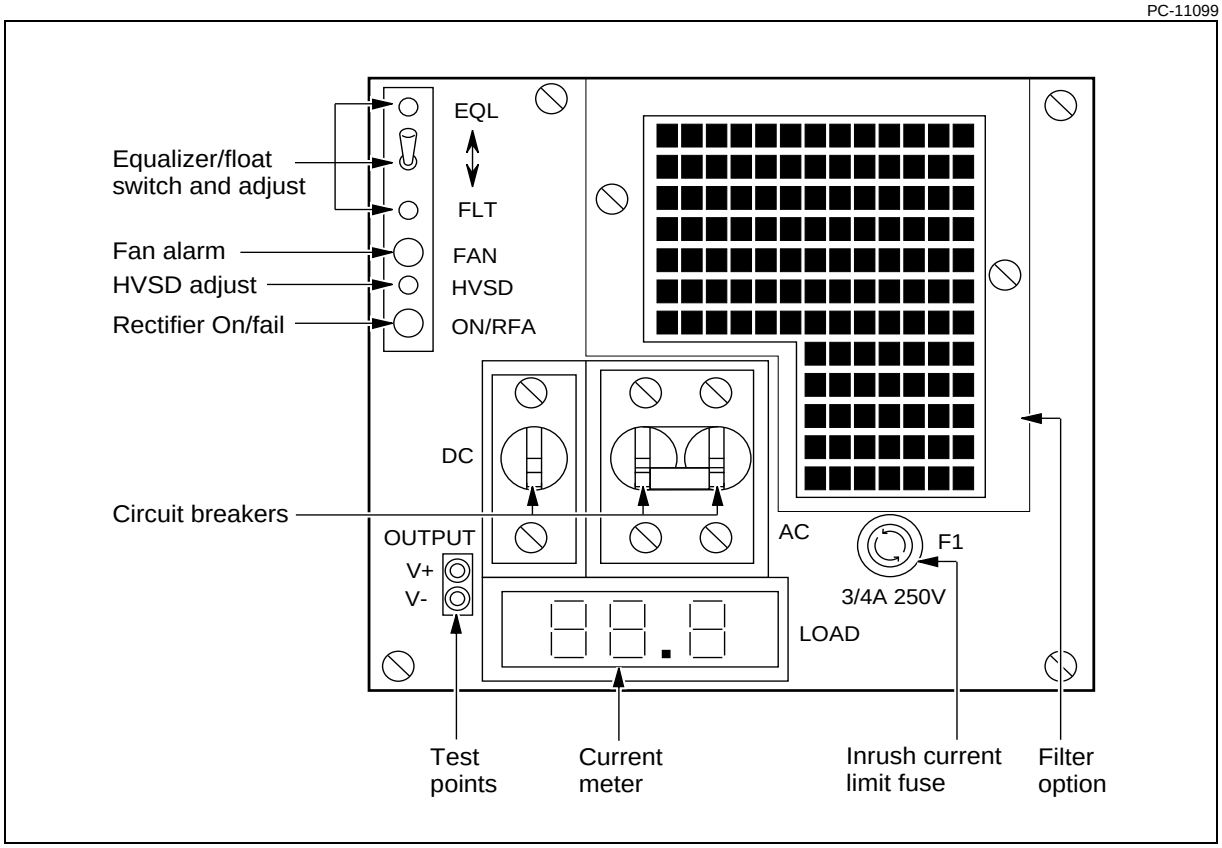
—continued—

Procedure 10-1 (continued)
Checking and adjusting rectifier voltages

Step	Action

Figure 10-1
MPR25 rectifier faceplate

PC-11099



—continued—

Procedure 10-1 (continued)
Checking and adjusting rectifier voltages

Step	Action

Adjust the load sharing

12 Ensure that all rectifiers are ON and all BEM circuit breakers are ON (see Figure 10-1).

13 Examine all rectifiers for the status of the RFA LEDs.

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 14.
the RFA LED on both rectifiers is illuminated green	The rectifiers are sharing the load closely. Go to step 15.

14 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.

15 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.

16 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.

17 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.

18 Repeat from step 15 until the RFA LED on both rectifiers is illuminated green and the ammeter displays read within 0.1 A of each other.

19 When all rectifiers are adjusted (LEDs illuminated green, load sharing within 0.1 A, and float voltages at -54.5 ± 0.1 V dc), you have completed the rectifier adjustment procedures. Re-install the cabinet covers.

—end—

Procedure 10-2
Changing the MBP air filter

Use this procedure to change the air filter in the modular business package (MBP) cabinets every 6 months, or sooner if required. The frequency of replacement depends on the environmental conditions in the equipment location. It is up to the customer to determine the frequency. The air filter unit is located above the blower module.

Requirements

A0383922 air filter assembly

Action

Step	Action
1	Remove the front pedestal grille from the MBP cabinet, as shown in Figure 10-2. **a.** Release the two captive screws that hold the pedestal grille in place. **b.** Grasp the top left and top right edges of the grille. **c.** Tilt the grille outward and lift it upward to remove it.

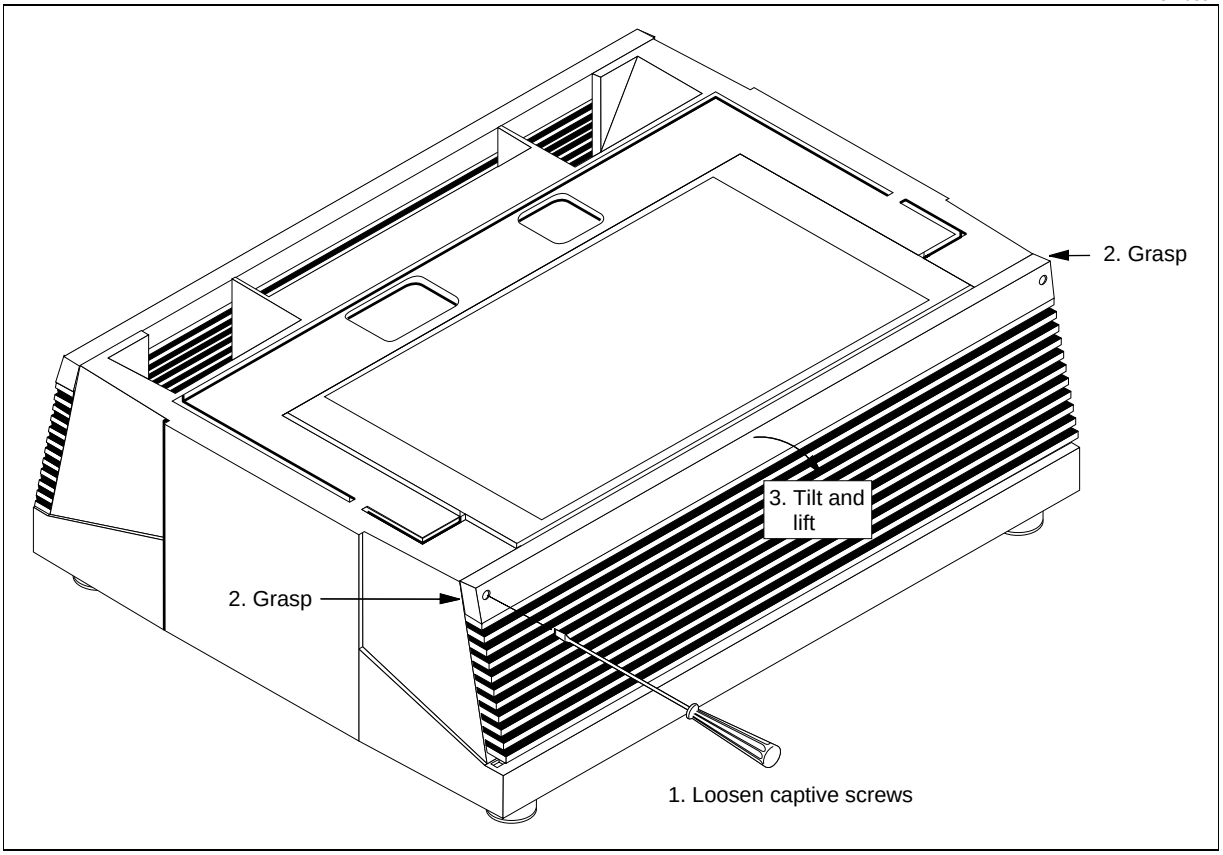
—continued—

Procedure 10-2 (continued)
Changing the MBP air filter

Step	Action

Figure 10-2
Removing the MBP pedestal grille

PC-10852



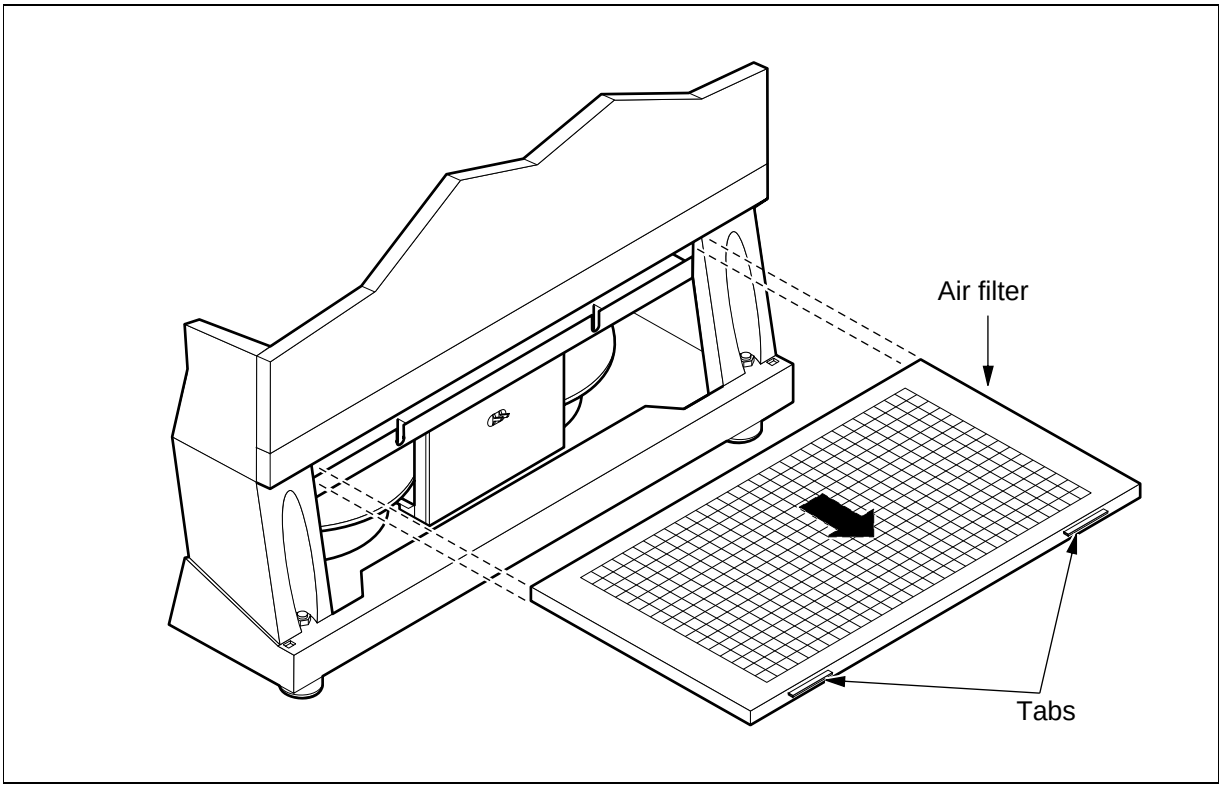
—continued—

Procedure 10-2 (continued)
Changing the MBP air filter

Step	Action
2	Pull the filter toward you to withdraw it from its slot, as shown in Figure 10-3.
3	Insert the replacement filter into the slot.

Figure 10-3
Removing the MBP air filter

PC-10900



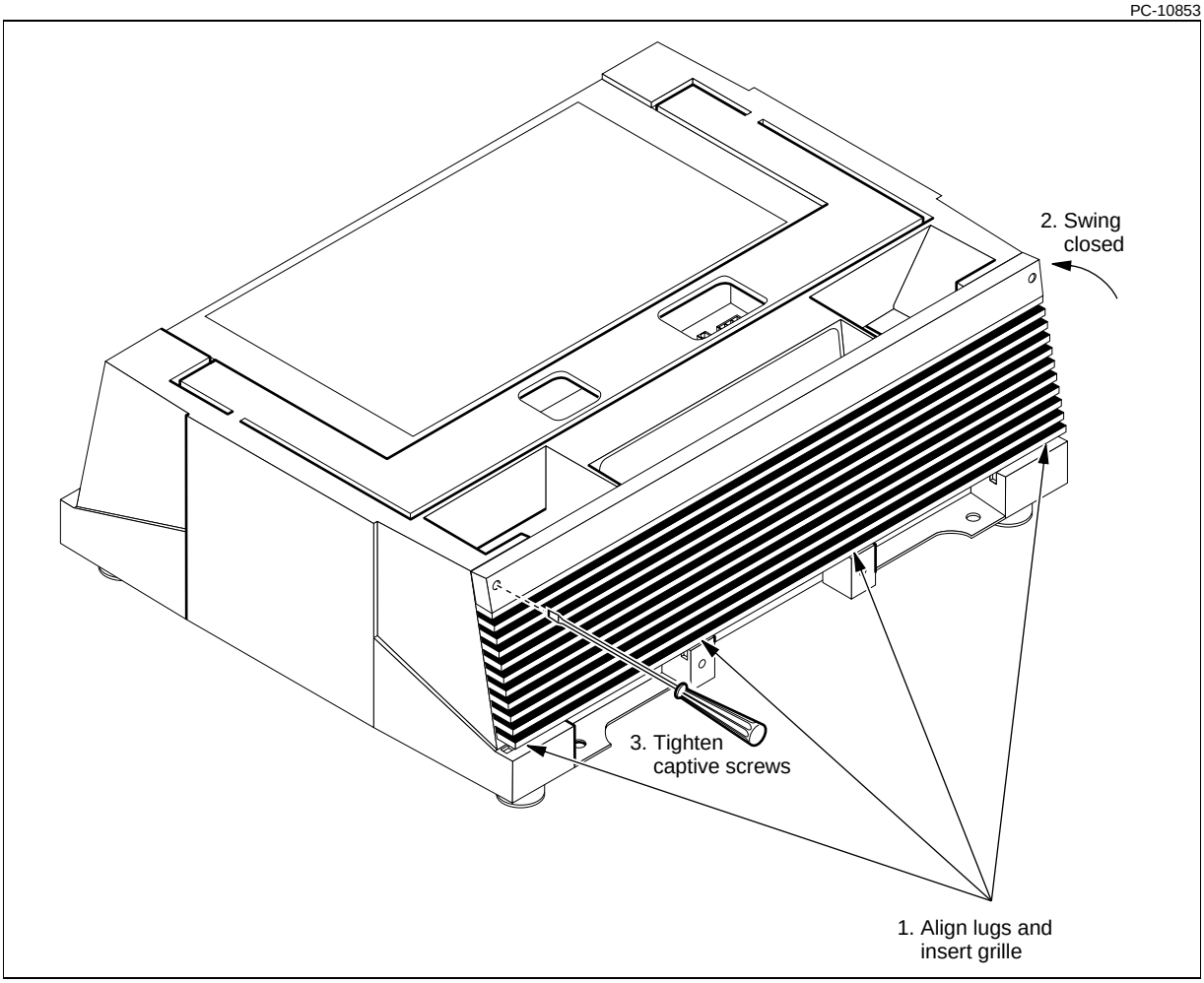
—continued—

Procedure 10-2 (continued)
Changing the MBP air filter

Step	Action
4	Replace the pedestal grille as shown in Figure 10-4.

Figure 10-4
Installing the MBP pedestal grille

PC-10853



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Procedure 10-3
Replacing the NT4K2630 MBP blower module

Use this procedure to replace the NT4K2630 blower module housed in the pedestal of the modular business package (MBP) cabinets.

Action

Step	Action
1	Remove the front pedestal grille from the MBP cabinet, as shown in Figure 10-5: **a.** Release the two captive screws that hold the pedestal grille in place. **b.** Grasp the top left and top right edges of the grille. **c.** Tilt the grille outward and lift it upward to remove it.
2	Set both blower module circuit breakers to the down (off) position.

DANGER
Risk of personal injury from fan blades
Turn blower power off and wait 2 minutes before removing unit.

Fan blades may still be turning after power is turned off.

CAUTION
Service Interruption after 15 minutes
Blower unit power down or removal for more than 15 minutes will cause service interruption.

3	As shown in Figure 10-6, turn the two screws on the blower module counterclockwise until the cam is rotated 90 degrees, then pull firmly to remove the blower from the pedestal.

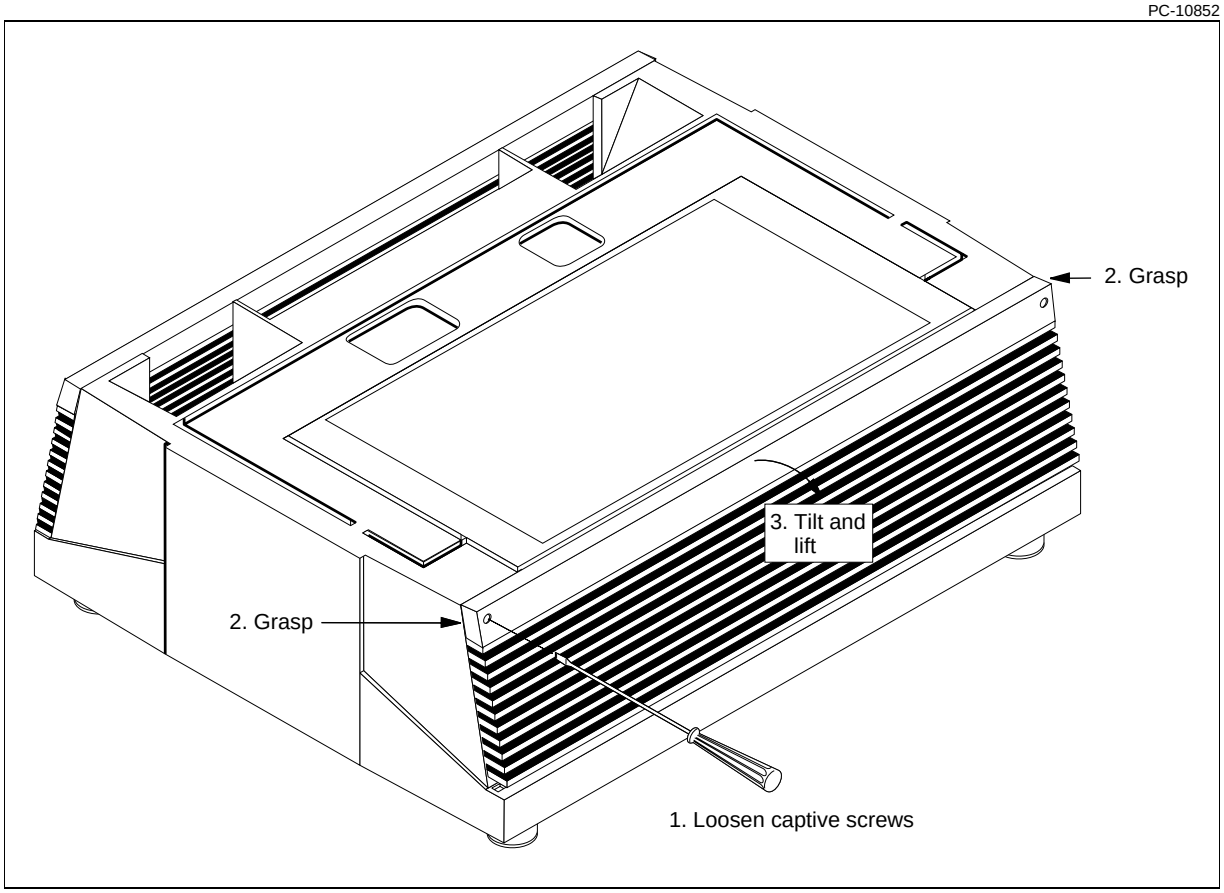
—continued—

Procedure 10-3 (continued)
Replacing the NT4K2630 MBP blower module

Step	Action

Figure 10-5
Removing MBP pedestal grille

PC-10852



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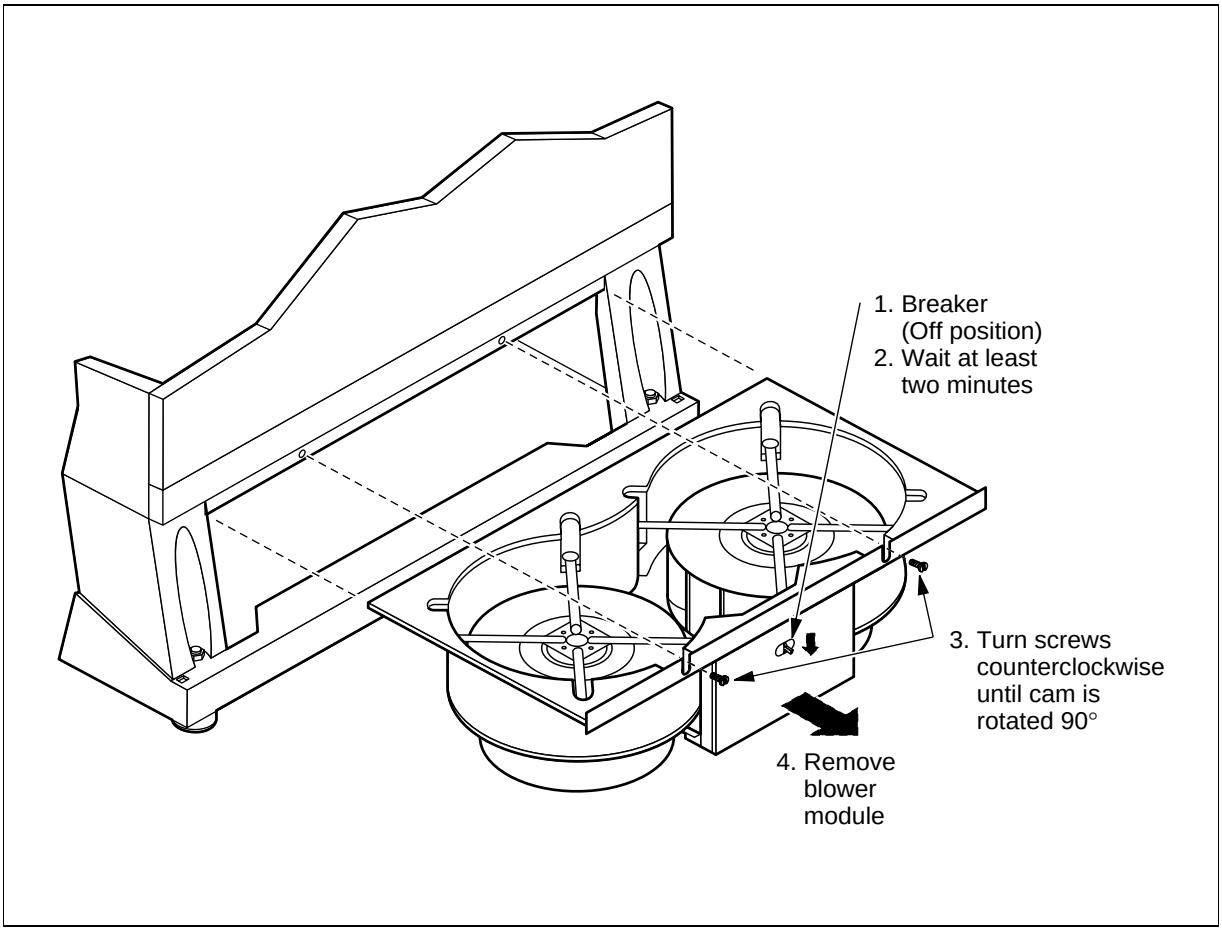
Procedure 10-3 (continued)
Replacing the NT4K2630 MBP blower module

Step	Action
4	Insert the replacement blower module into the pedestal and slide it all the way in until it engages with the connector at the rear of the pedestal.
5	Turn the 2 screws on the blower module clockwise until the cam is rotated 90 degrees. Torque screws to 12 inch-pounds.

Figure 10-6
Removing the blower module

PC-10899



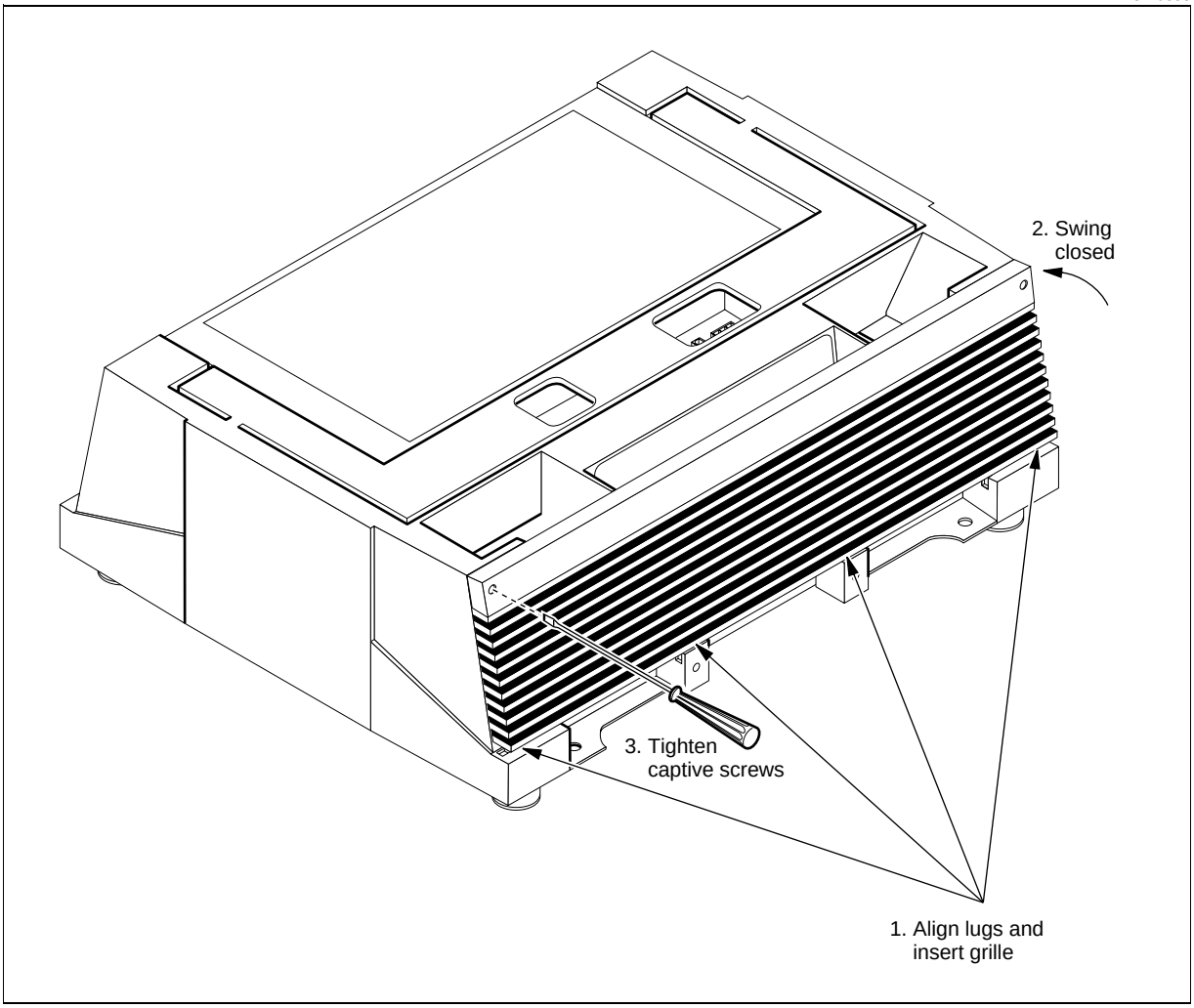
—continued—

Procedure 10-3 (continued)
Replacing the NT4K2630 MBP blower module

Step	Action
6	Set the blower module circuit breaker to the up (on) position.
7	Install the pedestal grille, as shown in Figure 10-7.

Figure 10-7
Installing the MBP pedestal grille

PC-10853



—end—

Ordering information

This chapter lists the description and ordering information for Modular Business Package (MBP) VTBM-ready cabinets.

Engineering and Ordering Information, 323-3001-032, in *Engineering, Configuration, and Ordering*, Volume 1, contains additional information for ordering AccessNode equipment.

Chapter contents

This chapter contains the following information:

In the following tables, look up the item to be ordered and use the corresponding product engineering code (PEC) or common product code (CPC) to order the desired item.

MBP VTBM cabinets

This document and the ordering tables that follow provide ordering information for the MBP VTBM cabinets listed below:

Table 11-1
MBP VTBM cabinet ordering

Cabinet	PEC	CPC
Modular Business Package Virtual Tributary Bandwidth Manager (VTBM) master cabinet	NT4K06ED	A0640302
Modular Business Package Virtual Tributary Bandwidth Manager (VTBM) expansion cabinet	NT4K06BB	A0642147

MBP equipment

Table 11-2 lists the orderable shelves and equipment for the MBP cabinet.

Table 11-2
Ordering codes for MBP shelves and equipment

Description	PEC	CPC
Batteries		A0641578
Blower module	NT4K2630	A0648765
Breaker interface panel (BIP)	NT4K14BA	A0728406
Copper-distribution shelf (CDS)	NT4K12AB	B0237113
DC distribution unit	NT4K36AA	A0652259
Dual equipment module	NT4K24AB	A0638875
Expansion kit	NT8D49AA	A0349081
Fan shelf, 8-fan	NT4K0610	A0646500
Local craft access panel (LCAP)	NT4K16CA	A0398996
Low voltage disconnect (LVD) unit	NT4K35AA	A0646906
Cable organizer panel (COP)	NT4K1937	A0640143
MPR-25 rectifier	NT5C06CA-3	B0231144
Rectifier shelf	NT5C10CC-1	B0233405
Single equipment module	NT4K24BA	A0398973
Top cap assembly	NT4K22CA	A0648763
Overhead cabling top assembly	NT4K09BA	A0398994

Miscellaneous MBP parts

Table 11-3 lists orderable miscellaneous MBP parts.

Table 11-3
Ordering miscellaneous MBP parts

Description	PEC	CPC
Anti-static wrist strap, 2212		A0336175
Cover assembly (BEST-lock)	NT4K08CA	A0619067
CDS label kit	NT4K1222	A0397900
CDS mounting bar		P0834825
DEM separator assembly	NT4K2412	A0398980
Hub and remote spares kit	NTZM00EA	A0631636
Key lock kit, 4-pair, 3-pin brass cam		A0384054
Overhead cable tray kit	NT4K09BA	A0398993
Panel kit	NT4K0624	A0398893
Rear panel		P0737517
Template, cabinet floor mounting	NT4K0601	A0615942
Tool lockable cover assembly	NT4K08BA	A0398992
Tool lockable cover assembly, vented	NT4K08BB	A0632125

MBP cables

Table 11-4 lists the orderable cables for the VTBM-ready MBP cabinets.

Note: Fiber optic cabling options are dependent on the type of optical carrier interface units (OC-12 and OC-3) you are using.

Table 11-4
MBP cables

Description	PEC	CPC
8-fan shelf power cable	NT4K80BA	A0648000
Alarm cable, BEM breaker	NT4K84RB	A0631193
Battery cable, BEM to dc distribution unit	NT4K84DC	A0631189
BIP control cable	NT4K85SC	A0646471
CDS power cable	NT4K84HE	A0647840
CDS talk battery cable	NT4K84HF	A0647841
Common-equipment power cable	NT4K84BF	A0646468
Control net (CNET) cable (3 ft)	NT7E44JB	A0365242
D-link cable, ABM–CDS1	NT4K83DA	A0647832
D-Link cable, ABM–CDS2	NT4K83DB	A0647833
D-Link cable, ABM–CDS3	NT4K83DC	A0647834
D-Link cable, ABM–CDS4	NT4K83DD	A0647835
D-Link cable, ABM–CDS5	NT4K83DE	A0647836
D-Link cable, ABM–CDS6	NT4K83DF	A0647837
D-Link cable, ABM–CDS7	NT4K83DG	A0647838
dc power and alarm cable, master to expansion cabinet	NT4K81CD	A0646478

—continued—

Table 11-4 (continued)
MBP cables

Description	PEC	CPC
DS1 cable, 50 ft	NT4K85HH	A0401069
DS1 cable, 100 ft	NT4K85HA	A0375505
DS1 cable, 150 ft	NT4K85HB	A0395066
DS1 cable, 200 ft	NT4K85HJ	A0401070
DS1 cable, 250 ft	NT4K85HC	A0396268
DS1 cable, 350 ft	NT4K85HD	A0396269
DS1 cable, 450 ft	NT4K85HE	A0396270
DS1 550 ft cable, 550 ft	NT4K85HF	A0396271
DS1 cable, 650 ft	NT4K85HG	A0396272
Ground cable	NT4K84PC	A0398958
Ground cable, bay to bay	NT4K84QB	A0631186
Ground cable assembly, rectifier	NT4K84YB	A0402658
Local craft access panel cable 1	NT4K1683	A0398722
Local craft access panel cable 2	NT4K1684	A0398723
Metallic test pair cable, CDS–CDS	NT4K86NA	A0398951
Metallic test pair cable, CDS2–CDS3	NT4K86NC	A0398953
Metallic test pair cable, ABM–CDS1	NT4K86ND	A0646482
Modem cable 5 ft	NT4K86RA	A0398939
Modem cable, 15 ft	NT4K86RB	A0398940
Modem cable 50 ft	NT4K86RC	A0398941
Orderwire extension cable, 100 ft	NT4K85TA	A0398933
Orderwire extension cable, 200 ft	NT4K85TB	A0398934
Orderwire extension cable, 300 ft	NT4K85TC	A0398936
Parallel telemetry E2A cable	NT4K82FA	A0398922

—continued—

Table 11-4 (continued)
MBP cables

Description	PEC	CPC
PDU fan alarm cable	NT4K82EA	A0398921
PDU power cable	NT4K84GA	A0398920
PDU power and alarm cable to expansion cabinet	NT4K84KB	A0648004
Rectifier to dc panel cable assembly	NT4K84WD	A0648791
Thermal sensor cable harness	NT4K2210	A0398044
Test access cable, 100 ft	NT4K85EA	A0387331
Test access cable, 200 ft	NT4K85EB	A0396263
Test access cable, 300 ft	NT4K85EC	A0396264
Test access cable, 50 ft	NT4K85ED	A0401060
Top cap alarm LED cable	NT4K84RA	A0398962
VF cable, 50 ft	NT4K85FL	A0616988
VF cable, 100 ft	NT4K85FH	A0616985
VF cable, 150 ft	NT4K85FM	A0616989
VF cable, 200 ft	NT4K85FJ	A0616986
VF cable, 250 ft	NT4K85FN	A0616990
VF cable, 300 ft	NT4K85FK	A0616987
Fiber patch cord 5 m (16 ft) (biconic)	NT7E46AA	A0365299
Fiber patch cord 10 m (33 ft) (biconic)	NT7E46AB	A0365300
Fiber patch cord 15 m (49 ft) (biconic)	NT7E46AC	A0365301
Fiber patch cord 20 m (66 ft) (biconic)	NT7E46AD	A0365302
Fiber patch cord 30 m (100 ft) (biconic)	NT7E46AE	A0388571
Fiber patch cord 3 m (10 ft) (FC)	NT7E46BF	A0385575
Fiber patch cord 5 m (16 ft) (FC)	NT7E46BA	A0388303
Fiber patch cord 10 m (33 ft) (FC)	NT7E46BB	A0365304
Fiber patch cord 15 m (49 ft) (FC)	NT7E46BC	A0365305
Fiber patch cord 20 m (66 ft) (FC)	NT7E46BD	A0365306
Fiber patch cord 30 m (100 ft) (FC)	NT7E46BE	A0388572

—continued—

Table 11-4 (continued)
MBP cables

Description	PEC	CPC
Fiber patch cord 3 m (10 ft) (ST)	NT7E46CF	A0351099
Fiber patch cord 5 m (16 ft) (ST)	NT7E46CA	A0351099
Fiber patch cord 10 m (33 ft) (ST)	NT7E46CB	A0351100
Fiber patch cord 15 m (49 ft) (ST)	NT7E46CC	A0351101
Fiber patch cord 20 m (66 ft) (ST)	NT7E46CD	A0351102
Fiber patch cord 30 m (100 ft) (ST)	NT7E46CE	A0388573
Fiber patch cord 5 m (16 ft) (SC)	NT7E46FA	A0408374
Fiber patch cord 10 m (33 ft) (SC)	NT7E46FB	A0408375
Fiber patch cord 15 m (49 ft) (SC)	NT7E46FC	A0408376
Fiber patch cord 20 m (66 ft) (SC)	NT7E46FD	A0408377
Fiber patch cord 30 m (100 ft) (SC)	NT7E46FE	A0408378
Fiber patch cord with MVOA 5 m (16 ft) (biconic)	NT7E47AA	A0358880
Fiber patch cord with MVOA 10 m (33 ft) (biconic)	NT7E47AB	A0365407
Fiber patch cord with MVOA 15 m (49 ft) (biconic)	NT7E47AC	A0365408
Fiber patch cord with MVOA 20 m (66 ft) (biconic)	NT7E47AD	A0365409
Fiber patch cord with MVOA 30 m (100 ft) (biconic)	NT7E47AE	A0388574
Fiber patch cord with MVOA 5 m (16 ft) (FC)	NT7E47BA	A0358876
Fiber patch cord with MVOA 10 m (33 ft) (FC)	NT7E47BB	A0365410
Fiber patch cord with MVOA 15 m (49 ft) (FC)	NT7E47BC	A0365411
Fiber patch cord with MVOA 20 m (66 ft) (FC)	NT7E47BD	A0365412
Fiber patch cord with MVOA 30 m (100 ft) (FC)	NT7E47BE	A0388575
Fiber patch cord with MVOA 5 m (16 ft) (ST)	NT7E47CA	A0358877
Fiber patch cord with MVOA 10 m (33 ft) (ST)	NT7E47CB	A0351096
Fiber patch cord with MVOA 15 m (49 ft) (ST)	NT7E47CC	A0351097
Fiber patch cord with MVOA 20 m (66 ft) (ST)	NT7E47CD	A0351098
Fiber patch cord with MVOA 30 m (100 ft) (ST)	NT7E47CE	A0388576

—continued—

Table 11-4 (continued)
MBP cables

Description	PEC	CPC
Fiber patch cord with MVOA 5 m (16 ft) (SC)	NT7E47FA	A0408379
Fiber patch cord with MVOA 10 m (33 ft) (SC)	NT7E47FB	A0408380
Fiber patch cord with MVOA 15 m (49 ft) (SC)	NT7E47FC	A0408381
Fiber patch cord with MVOA 20 m (66 ft) (SC)	NT7E47FD	A0408382
Fiber patch cord with MVOA 30 m (100 ft) (SC)	NT7E47FE	A0408383
Optical pigtail 20m (66 ft) (biconic)	NT7E48AA	A0365307
Optical pigtail 20m (66 ft) (FC)	NT7E48BA	A0365308
Optical pigtail 20m (66 ft) (ST)	NT7E48CA	A0371187
Optical pigtail 20m (66 ft) (SC)	NT7E48FA	A0408384
Optical pigtail with MVOA 20m (66 ft) (biconic)	NT7E49AA	A0365414
Optical pigtail with MVOA 20m (66 ft) (FC)	NT7E49BA	A0365416
Optical pigtail with MVOA 20m (66 ft) (ST)	NT7E49CA	A0371188
Optical pigtail with MVOA 20m (66 ft) (SC)	NT7E49FA	A0408385
—end—		

Equipment circuit packs and modules

Use the following tables to order circuit packs.

ABM shelf circuit packs

Table 11-5 lists the orderable common-equipment circuit packs in the access bandwidth manager shelf in VTBM-ready MBP cabinets.

Table 11-5
Access bandwidth manager shelf circuit packs

Description	PEC	CPC
Processor card (Note 1)	NT4K52BD	A0618931
Processor card (Note 1)	NT4K52BE	A0618932
Processor card (Note 1)	NT4K52FB	A0628692
Note 1: You must use the NT4K52FB processors. VTBM features are supported by the NT4K52FB unit in applications using the latest software.		
Maintenance interface card	NT4K53AD	A0737185
Test access card	NT4K54AA	A0370303
Access interface card	NT4K55AA	A0370304
Side interconnect left circuit pack (Note 2)	NT4K50AA	A0372474
Side interconnect right circuit pack (Note 2)	NT4K51AA	A0372475
Note 2: This part is included in every access bandwidth manager shelf, and need not be ordered separately.		
Transport interface card	NT4K56AB	A0401231
Transport interface card (Note 3)	NT4K56AC	A0409344
Transport interface card (Note 3)	NT4K56CA	A0748132
Note 3: Only the NT4K56AC and NT4K56CA models of the transport interface card support TR-08 traffic. The NT4K56AC model of the TIC supports TR-08 signaling on STS-1 #1; the NT4K56CA model supports TR-08 signaling on STS-1 #1, #2, and #3.		
Dual test head integrated remote test unit	NT4K57AB	A0619197
Single test head integrated remote test unit	NT4K57BA	A0619197
DS3 protection switch card	NT4K60CA	A0407135
—continued—		

Table 11-5 (continued)
Access bandwidth manager shelf circuit packs

Description	PEC	CPC
Timing and cross-connect card (Note 4)	NT4K75AA	A0617179
Note 4: The timing and cross-connect card is used in the access bandwidth manager shelf in a DS1-fed RFT that connects to its operations controller by way of an OMC DS1. It is also used in an ABM OPC shelf that connects to one or more DS1-fed RFTs by way of OMC DS1s. A second timing and cross-connect card can be installed for protection.		
OC-12 VTBM enhanced long-reach optical interface (FC)	NT7E05AF	A0657272
OC-12 VTBM enhanced long-reach optical interface (ST)	NT7E05AG	A0657273
OC-12 VTBM enhanced long-reach optical interface (SC)	NT7E05AH	A0657274
OC-12 VTBM enhanced intermediate-reach optical interface (FC)	NT7E05BF	A0657275
OC-12 VTBM enhanced intermediate-reach optical interface (ST)	NT7E05BG	A0657276
OC-12 VTBM enhanced intermediate-reach optical interface (SC)	NT7E05BH	A0657277
OC-12 LR (long-reach) 1310 networking interface (biconic)	NT7E02KA	A0398150
OC-12 LR 1310 networking interface (FC)	NT7E02KB	A0398152
OC-12 LR 1310 networking interface (ST)	NT7E02KC	A0398153
OC-12 LR 1310 networking interface (SC)	NT7E02KD	A0398155
OC-12 IR (intermediate-reach) 1310 networking interface (biconic)	NT7E02LA	A0398157
OC-12 IR 1310 networking interface (FC)	NT7E02LB	A0398159
OC-12 IR 1310 networking interface (ST)	NT7E02LC	A0398161
OC-12 IR 1310 networking interface (SC)	NT7E02LD	A0398162
OC-3 SRP LR (biconic)	NT7E01CA	A0398142
OC-3 SRP LR (FC)	NT7E01CB	A0398143
OC-3 SRP LR (ST)	NT7E01CC	A0398144
OC-3 SRP LR (SC)	NT7E01CD	A0398145
OC-3 SRP IR (biconic)	NT7E01DA	A0398146
OC-3 SRP IR (FC)	NT7E01DB	A0398147
OC-3 SRP IR (ST)	NT7E01DC	A0398148

—continued—

Table 11-5 (continued)
Access bandwidth manager shelf circuit packs

Description	PEC	CPC
OC-3 SRP IR (SC)	NT7E01DD	A0398149
Note 5: The NT7E05 OC-12 optical interface units are required to support VTBM and OC-3 tributary features for applications using AN12 software release or higher. VTBM features are not supported by AN11 software release.		
DS1/VT synchronous mapper	NT7E04BA	A0357485
DS1/VT synchronous mapper (Note 6)	NT7E04CA	A0357485
Note 6: Only the NT7E04CA model of the DS1/VT synchronous mapper can support TR-08 traffic. If any one of the working mappers is the NT7E04CA model and if there is a protection mapper, the protection mapper must also be an NT7E04CA		
DS3/STS mapper	NT7E08AA	A0341503
Operations controller (OPC) module with tape	NT7E24BC	A0399043
Operations controller (OPC) module with tape (portable OPC)	NT7E24CC	A0399044
Filler card, 0.8 in. wide (Note 7)	NT7E39AA	A0373397
Filler card, 1.0 in. wide (Note 7)	NT4K40AA	A0399108
Filler card, 1.4 in. wide (Note 7)	NT4K40BA	A0399109
Filler card, 1.6 in. wide (Note 7)	NT7E39CA	A0373399
Note 7: Filler cards are installed in unused slots in the lower level of a common-equipment shelf.		
BNC I/O card	NT4K30AA	A0389285
DS1 protection bridge card	NT4K31AA	A0389517
DS1 input card	NT4K32AA	A0389518
DS1 output card	NT4K33AA	A0389519
Test bypass pair card	NT4K58CA	A0372867
PGTC/MTA card	NT4K58DA	A0372868
Test access path card	NT4K58KA	A0372871
Serial I/O card	NT4K58LA	A0394109
Common-equipment power card (Note 8)	NT4K58MA	A0394110
Note 8: This part is included in every access bandwidth manager shelf, and need not be ordered separately.		
—end—		

Copper-distribution shelf circuit packs

Table 11-6 lists the orderable copper distribution shelf circuit packs for the AccessNode system in VTBM-ready MBP cabinets.

Table 11-6
Copper-distribution shelf circuit packs

Description	PEC	CPC
Copper-distribution drawer midplane	NT4K21AA	A0370341
Copper-distribution shelf power converter	NT4K62AA	A0370318
Power-converter backplane	NT4K23AA	A0370340
Epsilon station line card	NT4K65AA	A0370308
Omega 2W station line card	NT4K67AB	A0398096
Omega 2W office line card	NT4K68AA	A0367099
Omega 4W line card	NT4K69AA	A0367100
Omega 6/8W line card	NT4K77AA	A0367098
Manual ringdown 2-wire line card	NT4K78AA	A0397226
Universal voice grade station line card	NT4K79AA	A0407104
Narrowband line-interface card (NLIC)	NT4K70AA	A0370311
Metallic test access card	NT4K73AA	A0370314
Metallic test access card	NT4K73AB	A0399659
Metallic test access card II	NT4K73BA	A0631570
Power filter	NT4K63AA	A0373213

Breaker interface panel

Table 11-7 lists the orderable NT4K14AB/BA breaker interface panel components for the AccessNode system in VTBM-ready MBP cabinets.

Table 11-7
Breaker interface panel circuit packs

Description	PEC	CPC
Talk battery filter card for the NT4K14AB BIP	NT4K61AA	A0389030
Talk battery filter card for the NT4K14BA BIP	NT4K61BA	A0730618
Note : Two NT4K61AA talk battery filter cards are required if the AccessNode contains one or more copper-distribution shelves (CDS). These cards can be used in the NT4K14AB BIP. Only one NT4K61BA talk battery filter card is required for the NT4K14BA BIP whether the system is equipped with CDSs or not.		
Alarm relay card for the NT4K14AB BIP	NT4K64AA	A0389031
Alarm relay card for the NT4K14BA BIP	NT4K64BA	A0730617
Circuit breaker, 1 A		A0381921
Circuit breaker, 10 A		A0381919
Circuit breaker, 15 A		A0381920
Circuit breaker, 10 A short delay		A0627317
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. Verify the amperage of these breakers before you order replacements. The NT4K14BA BIP uses the short delay A0627317 10 A breakers.		

Cooling unit

Table 11-8 lists the orderable cooling unit components for the AccessNode system in VTBM-ready MBP cabinets.

Table 11-8
Cooling unit components

Description	PEC	CPC
Fan shelf, 8-fan	NT4K0610	A0646500
Cooling unit, 8-fan	NT4K18CA	A0728849
Air filter unit	NT4K15AA	A0373216
Air filter element		A0379322
Fiber storage tray	NT4K13CA	A0406457

Related documentation

The documentation related to the MBP and their ordering codes (where applicable) are listed below:

- Complete set AccessNode NTPS
- Quick Reference Guide
- MBP VTBM Ring Installation Guide
- Software booklet
- CD-ROM

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 through Friday	(800) ASK-TRAN (800) 275-8726
All other times (for urgent software upgrade support only)	(800) ASK-ETAS (800) 275-3827
Canada Normal business hours 8:00 am–4:00 pm local time Monday through Friday	Call your regional field service engineering support group.
All other times (for urgent software upgrade support only)	(800) ASK-ETAS (800) 275-3827

Standard repair service: USA

This section explains how to contact US standard repair service.

US standard repair service consists of like-for-like replacement: a replacement circuit pack is shipped within five (5) working days after receiving the order.

Call customer service	and...	ship defective unit prepaid to...
(800) 251-1758 and request a Repair Order Number. 7:00 am–6:00 pm CST Monday through Friday	Mark the defective item with the following: • assigned repair order number • explanation of the problem.	Nortel Networks 917 Air Park Center Drive Nashville, TN 37217 Attn: Repair and Return

Standard repair service: Canada

This section explains how to contact Canadian standard repair service. Canadian standard repair service consists of the following options:

- **Like-for-like replacement**: A replacement circuit pack is shipped within five (5) working days after receiving the order.
- **Repair of the circuit pack**: The repaired circuit pack is shipped within fourteen (14) days after receipt of the defective circuit pack.

Call customer service	and...	ship defective unit prepaid to...
(800) 668-1717 (English) (800) 668-1748 (French) and request a Repair Order Number. Monday through 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 through 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

ACO
Alarm cut-off

AIC
Access interface card

BDFB
Battery distribution fuse board

BEM
Battery equipment module

BIP
Breaker interface panel

CDS
Copper-distribution shelf

CDSP
Copper-distribution shelf power

CSA
Canadian Standards Association

DEM
Dual equipment module

DS0
Digital signal level 0

DS1
Digital signal level 1

DS3
Digital signal level 3

DSX-1
Digital signal cross connect

FEM
Field expansion module

I/O
Input/Output

IRTU
Integrated remote test unit

LED
Light emitting diode

LCAP
Local craft access power

LIC
Line interface card

MBP
Modular business package

MIC
Maintenance interface card

MPR
Modular power rectifier

MTAC
Metallic test access card

MVOA
Miniature variable optical attenuator

NLIC
Narrowband line interface card

OC-3
Optical carrier signal level 3

OC-12
Optical carrier signal level 12

PDU

Power distribution unit

RFT

Remote fiber terminal

SEM

Single equipment module

STS-1

SONET transport signal level 1

STS-3

SONET transport signal level 3

STSBM

SONET transport signal bandwidth manager

VT

Virtual tributary

VTBM

Virtual tributary bandwidth manager

Index

D

E

F

H

I

L

M

N

O

P

R

S

T

U

V

W

SONET Products

AccessNode

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