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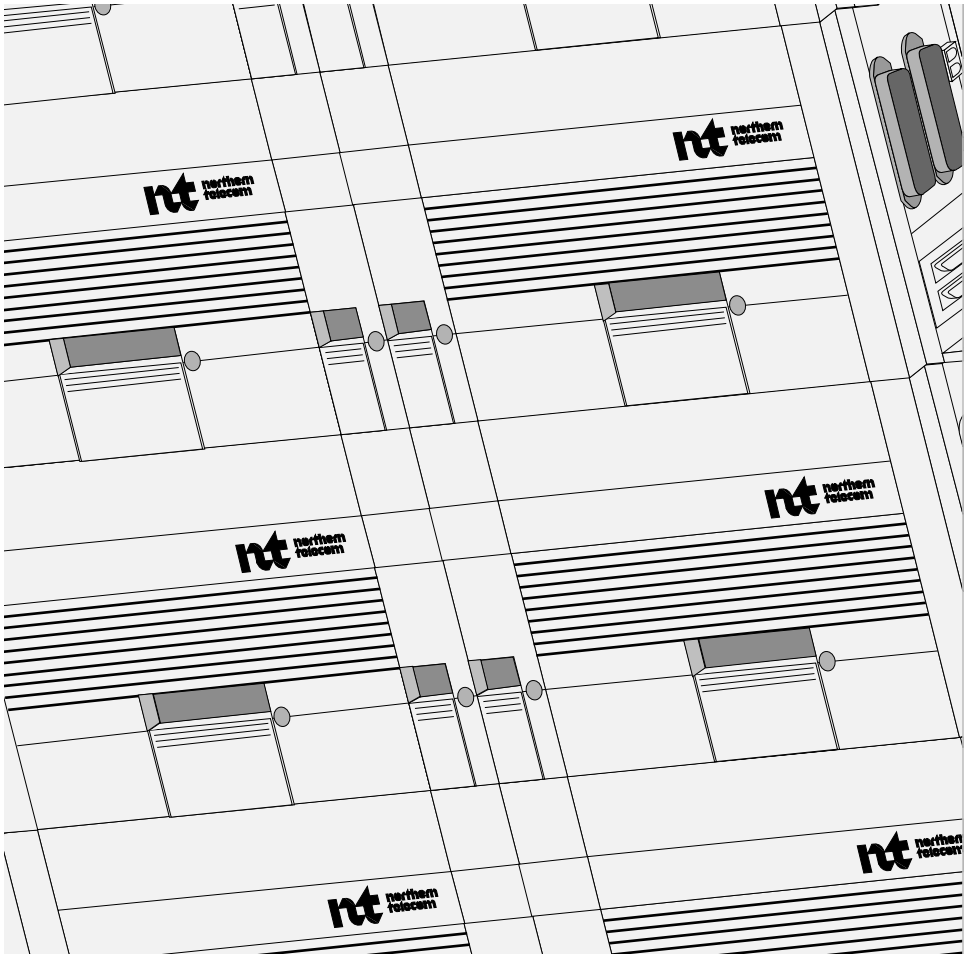
SONET Products

AccessNode

Modular Business Package Description

Issue 1.0 February 1999



NORTEL NETWORKS™

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Modular Business Package Description

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AN10 Standard release of the document.

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Reissue of AN07 standard.

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AN07 Standard release of the document.

May 1993

FWP06 Standard release of the document.

Contents

About this document

This document describes the Modular Business Package (MBP), which is one of the packaging options available for AccessNode system. This document contains the following chapters and packaging information:

- Chapter 1 provides an introduction and overview of the MBP packaging options.
- Chapter 2 describes the MBP shelf modules.
- Chapter 3 describes the MPP shelf modules.
- Chapter 4 describes the cabinet line-up arrangements.

Audience

The intended audience for this document includes the following groups:

- strategic and current planners
- provisioners
- transmission engineers
- equipment installers
- network administrators

How to use this document

This document has been updated to include information for the AccessNode product line. Use this document when you are installing an AccessNode system contained in an MBP cabinet configuration.

References for this document

Reference the following AccessNode documentation for additional AccessNode information.

Engineering, Configuration, and Ordering Guide, Volume 1

- *Engineering and Ordering Information*, 323-3001-032
- *Site Installation Planning and Engineering*, 323-3001-200

Description, Volume 2A

- *Configuration and Equipment Description*, 323-3001-100
- *Features and Services Description*, 323-3001-101
- *Signal Flow and Circuit Pack Description*, 323-3001-102

Description, Volume 2B

- *System Specifications*, 323-3001-180

Separately bound

- *MBP Site Installation Planning and Engineering*, 323-3001-200, *Addendum 1*

Overview of the packaging option

This document describes the modular business package (MBP) packaging options that are available for the AccessNode system. These packaging options are used only for remote fiber terminals (RFTs). MBP-housed RFTs can be installed as customer-located equipment, or as central office installations.

Customer-located equipment is equipment owned by the operating telephone company but located on the premises of the customer. When used to house customer-located equipment, an MBP may be located in an equipment room or in a non-traditional location such as an office, a stairwell, or an open area.

An equipment room is a centralized space used for telecommunications equipment, such as private branch exchanges, mainframe computers, or video switches that are common to the occupants of a building. A large business building may have an equipment room on each floor. The equipment room may be restricted or unrestricted. A restricted equipment room is one that is locked, allowing access only to authorized personnel. An unrestricted equipment room is one that is not locked.

MBP applications

The MBP can be used in the following applications:

- multiplexer
- universal
- integrated
- synchronous transport signal bandwidth manager (STSBM)
  OC-12 fiber rings
- virtual tributary bandwidth manager (VTBM)
  OC-12 fiber rings

Description of the modular business packages

An MBP package consists of an AccessNode system mounted in upright cabinets for mounting at indoor remote customer sites. The MBP package is modular in design. It can be ordered in several different configuration options to provide custom AccessNode services.

The MBP packaging option can be configured with up to three cabinets:

- one or two MBP cabinets that contain the shelf modules that compose the RFT (see Chapter 2, “MBP cabinets”)
- one MPP cabinet that converts a supply of alternating current to -48 V dc for powering the AccessNode (see Chapter 3, “MPP cabinets”)

Cabinet modules

Each MBP or MPP cabinet is composed of the following modules:

- a pedestal
- a top cap module
- one or more equipment modules

Pedestal

The pedestal houses a power distribution unit (PDU), a cooling unit, and an air filter assembly. The cooling unit and air filter are front accessible and the power distribution unit is rear accessible.

The cooling unit contains two impeller blowers, a fan speed controller and a circuit breaker for the fans only. The cooling method is a positive pressure, vertical airflow system. Air enters the pedestal through the horizontal grille slots on the front surface, the rear surface and the holes in the bottom plate. Inside the pedestal, the air turns 90° into the blower housing. The blowers force the air up through a removable air filter mounted in a tray at the top of the pedestal and passes through the equipment modules to cool the electronics.

The 2-speed fan controller in the cooling unit is connected to a temperature sensor (located in the top cap) that adjusts the airflow velocity (half-speed or full-speed) to minimize acoustical noise while keeping the internal air temperature nearly constant.

An alarm is generated if the speed controller fails, or if a blower fails.

The pedestal dimensions are:

- 31.85 in. (80.9 cm) wide
- 25.5 in. (64.8 cm) deep
- 10.0 in. (25.4 cm) high

Top cap module

The top cap module is mounted on the top module of each column. The top cap provides air exhaust, a place to mount the earthquake bracing kit, overhead cable entry and exit, and overhead cable rack mounting. Three heat sensors are located in the top cap unit. One of the sensors connects to the fan speed controller in the pedestal. When this sensor exceeds a given threshold, the fans operate at a higher speed to increase cooling. The other two sensors operate at

a much higher threshold. They are connected to the power distribution unit and generate the critical high temperature alarm. In VTBM-ready cabinets, an 8-fan cooling shelf mounts in the top cap to enhance cabinet cooling capacity.

An alarm LED is located in the top left corner of the top cap. If there is an alarm (critical, major, or minor) anywhere in the RFT, the LED in the top cap of the MBP master cabinet is lit. (The MBP master cabinet is the cabinet that contains the access bandwidth manager shelf.)

The top cap module dimensions are:

- 31.5 in. (80.0 cm) wide
- 22.0 in. (55.9 cm) deep
- 3.5 in. (8.9 cm) high

Equipment modules

The equipment modules contain the AccessNode shelf modules. The following types of equipment modules can be used:

- dual equipment modules (DEMs)
- single equipment modules (SEMs)
- battery equipment modules (BEMs)
- field expansion modules (FEMs)

The equipment modules are constructed of die cast aluminum. Internally they contain standard mounting rails for equipment mounting. Each module has lockable and removable front and rear covers for easy access.

Dual equipment module

Each MBP cabinet has one DEM. In most MBP configurations, the DEM houses an access bandwidth manager shelf, a breaker interface panel, and a local craft access panel. Optionally, it can also house a copper-distribution shelf and a fiber patch panel. In MBP VTBM ring applications, the DEM houses the ABM shelf and at least one 96-line copper-distribution shelf.

DEMs are not used in MBP expansion cabinets.

At least one DEM is used in each MPP cabinet. It houses a power distribution shelf, and up to two rectifier shelves.

The dual equipment module (DEM) dimensions are:

- 31.5 in. (80.0 cm) wide
- 22.0 in. (55.9 cm) deep
- 33.5 in. (85.1 cm) high

Single equipment module

The MBP master cabinet can contain one or two single equipment modules SEMs) for most applications. In an MBP expansion cabinet, all equipment modules are SEMs except for the BEM used in MBP VTBM ring applications. SEMs are not used in the MPP.

Each SEM can house one or two copper-distribution shelves, or a DSX-1 cross-connect shelf and a DS1 repeater shelf.

The single equipment module (SEM) dimensions are:

- 31.5 in. (80.0 cm) wide
- 22.0 in. (55.9 cm) deep
- 16.75 in. (42.5 cm) high

Battery equipment module

Each BEM can house one 4-unit string of back-up batteries provide backup battery power to equipment for the MBP package. The BEMs, when used, are always located at the bottom of the cabinet stack. In most applications, BEMs are located in the MPP cabinet. The MBP VTBM application uses two BEMs in the master cabinet (one for the back-up batteries and one for a rectifier shelf, a breaker interface panel and a local craft access panel) and one in the expansion cabinet for additional back-up batteries.

The battery equipment module (BEM) dimensions are:

- 31.5 in. (80.0 cm) wide
- 22.0 in. (55.9 cm) deep
- 16.75 in. (42.5 cm) high

Field expansion module

The field expansion module (FEM) is used when additional shelves are added to an MBP cabinet that is already installed in the field. When you add an FEM, you always add it as the topmost equipment module in an existing cabinet. You can add multiple FEMs to a master or expansion cabinet, provided that you not exceed the maximum allowable height of four tiers. FEMs are not used in MPP cabinets.

Each FEM can house one or two copper-distribution shelves, or a DSX-1 cross-connect shelf and a DS1 repeater shelf.

The field expansion module (FEM) dimensions are:

- 31.5 in. (80.0 cm) wide
- 22.0 in. (55.9 cm) deep
- 16.75 in. (42.5 cm) high

Features of the cabinets

MBP and MPP cabinets share common features that are described in the following sections.

Types of covers

MBP cabinets and MPP cabinets can be purchased with the following types of covers: key-lockable covers that can be locked with a common key, tool-lockable covers that can be opened and closed with an NSQ2000 tool or an ATT216 tool, and safety locking covers that can be opened and closed without tools.

Cable access

The cables for MBP cabinets can run overhead or can run beneath a raised floor.

Overhead cable access means that the external cables run overhead, in cable trays, and enter each cabinet at the top. The overhead cable trays are the responsibility of the operating company. An overhead tray grille kit (NT4K09BA) is available for routing cables through the top of the cabinet.

Anchoring and seismic kits

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

Concrete floors

A standard anchor kit is available for use on 4–6 in. thick concrete floors. The kit secures the cabinets in installations that do not need to meet earthquake Zone requirements.This kit consists of standard concrete anchors, anchoring brackets, bracing rods, and tie bars. For the standard anchor kit, an optional bracing kit that provides additional floor anchoring strength can be ordered.

The seismic anchor kit is available for installing cabinets on 4–6 in. thick concrete floors. The seismic kit meets requirements for earthquake Zones 2–4 seismic areas. This kit consists of heavy-duty concrete anchors, anchoring brackets, bracing rods, and tie bars.

> ***Note:*** Seismic kits are available for cabinets that are up to three tiers high. They are not available for cabinets that are four tiers high. (See the section titled “Dimensions of the cabinets and modules” on page 1-6.)

Raised floors

MBP cabinets and MPP cabinets can be installed on raised floors in non-seismic applications. If a customer required the installation of special hardware to secure the cabinets in non-seismic installations, such hardware must be site-engineered, with assistance from Northern Telecom. This special anchoring hardware is not supplied because of the variations in the construction of raised floors. A Zone 4 seismic kit for use on raised floors is not available at this time.

Expandability

Existing MBP cabinets are readily expandable. You can expand a system by adding an MBP expansion cabinet, or by adding one or more field expansion modules (FEMs) to an existing MBP cabinet. (See page 1-4 for more information on field expansion modules.)

Additional rectifier units can be inserted into empty slots in the rectifier shelves in an MPP cabinet to support the additional power requirements of expanded systems.

Dimensions of the cabinets and modules

Physical dimensions for the MBP and MPP cabinets and modules are shown in the following paragraphs.

Module heights

The heights of the individual modules used in the MBP and MPP cabinets are shown in Table 1-1.

Table 1-1
MBP Module heights

Module	Height	
top cap	3.5 in.	(8.89 cm)
single equipment module (SEM)	16.75 in.	(42.5 cm)
dual equipment module (DEM)	33.5 in.	(85.1 cm)
field expansion module (FEM)	16.75 in.	(42.5 cm)
battery equipment module (BEM)	16.75 in.	(42.5 cm)
pedestal	10.0 in.	(25.4 cm)
allowance for casters or leveling feet	up to 3.5 in.	(8.89 cm)

Cabinets

The height of an MBP cabinet or an MPP cabinet can be expressed in tiers, each tier being the height of one SEM or FEM.

MBP master cabinet

A master cabinet can have two, three, or four tiers. If it contains only a DEM, it is a two-tier cabinet. If it contains a DEM and one single-height module (SEM or FEM), it is a three-tier cabinet. If it contains a DEM and two single-height modules, it is a four-tier cabinet.

MBP expansion cabinet

An expansion cabinet can have up to four tiers. The number of tiers equals the number of single-height modules (SEMs and FEMs) in the cabinet.

MPP cabinet

An MPP cabinet can have up to four tiers (two BEMS and two SEMS or FEMs). Table 1-2 lists the dimension for the MBP and MPP cabinets. The height of a cabinet varies depending on the number of single equipment modules and dual equipment modules in the cabinet.

Table 1-2
Cabinet dimensions

Cabinet	Height	Width	Depth	Floor space (Note)	Cabinet modules
MBP Master cabinets					
NT4K006AA	50.5 in. (128.2 cm) to 84.0 in. (213.4 cm)	31.85 in. (80.9 cm)	25.5 in. (64.8 cm)	812 sq. in. 5235 sq. cm	1 DEM to 1 DEM, 2 SEMs
NT4K06EA NT4K06EC	84.0 in. (213.4 cm)	31.85 in. (80.9 cm)	25.5 in. (64.8 cm)	812 sq. in. 5235 sq. cm	2 DEMS
NT4K06ED	84.0 in. (213.4 cm)	31.85 in. (80.9 cm)	25.5 in. (64.8 cm)	812 sq. in. 5235 sq. cm	2 BEMs, 1 DEM
MBP Expansion cabinets					
NT4K06BA	33.75 in. (85.7 cm) to 84.0 in. (213.4 cm)	31.85 in. (80.9 cm)	25.5 in. (64.8 cm)	812 sq. in. 5235 sq. cm	1 SEM to 3 SEMs
NT4K06BB	84.0 in. (213.4 cm)	31.85 in. (80.9 cm)	25.5 in. (64.8 cm)	812 sq. in. 5235 sq. cm	1 BEM, 3 SEMs

—continued—

Table 1-2
Cabinet dimensions (continued)

Cabinet	Height	Width	Depth	Floor space (Note)	Cabinet modules
MPP power cabinets					
NT4K07AA	50.5 in. (128.2 cm)	31.85 in. (80.9 cm)	25.5 in. (64.8 cm)	812 sq. in. 5235 sq. cm	1 DEM
NT4K07BA NT4K07BB NT4K07BD	84.0 in. (213.4 cm)	31.85 in. (80.9 cm)	25.5 in. (64.8 cm)	812 sq. in. 5235 sq. cm	2 BEM, 1 DEM
Note: Floor space dimensions shown here do not include additional space for cabinet accessibility. The figures represent the actual floor space required by the cabinet footprint.					
—end—					

Product documentation

The MBP/MPP package is supported by detailed AccessNode documentation. To order AccessNode MBP documentation refer to *Engineering and Ordering Information*, 323-3001-032, in the *Engineering, Configuration, and Ordering Guide*, Volume 1.

MBP cabinets

The available documentation for MBP cabinets, in addition to the AccessNode documents listed above, is as follows:

- *Modular Business Package Description*, 323-3001-110
  - — This is the document that you are now reading. It provides descriptive information for all MBP configurations.
- *Modular Business Package Installation*, 323-3001-206
  - — This document provides installation information to users of the standard MBP configurations.
- *Modular Business Package VTBM Ring User Guide*
  - — This document provides maintenance and module replacement information to users of the VTBM OC-12 fiber ring configuration.
- *Modular Business Package VTBM Ring Installation Guide*
  - — This document provides installation information to users of the VTBM OC-12 fiber ring configuration.

MBP cabinets

Modular business package (MBP) cabinets contain shelf modules that compose the AccessNode remote fiber terminal (RFT). Cabinet configurations are modular in design to support various applications and services. MBP cabinets contain the AccessNode equipment modules that make up the configuration for the your application.

For detailed information on the equipment modules, see *Configuration and Equipment Description*, 323-3001-100, in *Description*, Volume 2A.

MBP cabinet description

Up to two modular business package (MBP) cabinets house the AccessNode equipment – the master MBP cabinet and the expansion MBP cabinet. These cabinets are available in several configurations and can be filled with a variety of optional AccessNode equipment shelves for custom configurations. The MBP cabinets can consist of a pedestal, a DEM containing the common-equipment and a BEM containing battery-backup or equipment.

Reference *Engineering and Ordering Information,* 323-3001-032, in the *Engineering, Configuration, and Ordering Guide*, Volume 1, for ordering the optional modules of the MBP cabinet configurations.

Master cabinet

The first MBP cabinet is the master cabinet. The master cabinet contains the AccessNode common-equipment, equipment supporting up to 192 lines for DS0 services, a local craft access panel (LCAP) and a breaker interface panel (BIP). Other cabinet and equipment modules can be added to the standard cabinet as orderable options.

Expansion cabinet

The second MBP cabinet, which is optional, is the expansion cabinet. An expansion cabinet is equipped when needed to house additional peripheral shelves or to expand DS0 services. The expansion cabinet is attached to the master cabinet by means of a cable duct called an expansion kit, and is on the right of the master cabinet when the system is viewed from the front. Expansion cabinets can contain a repeater shelf, a DSX-1 cross-connect shelf or up to 5 copper-distribution shelves for 480-lines of DS0 service.

MBP cabinet configurations

The MBP master cabinets are similar in appearance. They each use the same types of equipment covers, the same seismic kit, and have an identical footprint (see Chapter 1, “Overview of the packaging option”).

Master cabinet

The standard MBP configuration uses only an MBP master cabinet in a multiplexer application.

Master cabinets are also available in defined configurations for specific applications and services such as OC-12 synchronous transport signal bandwidth manager (STSBM) applications and OC-12 virtual tributary bandwidth manager (VTBM) applications.

The MBP master cabinet configurations are:

- NT4K06AA Standard MBP master cabinet (see Figure 2-1)
- NT4K06AB Standard VTBM-ready MBP master cabinet (see Figure 2-1)
- NT4K06EA Zone 2 STSBM ring configuration (see Figure 2-3 on page 2-5)
- NT4K06EC Zone 4 STSBM ring configuration (see Figure 2-3)
- NT4K06ED Zone 4 VTBM ring configuration (see Figure 2-4 on page 2-6)

The NT4K06AA and NT4K06AB MBP master cabinets can be used in multiplexer applications. It can be expanded by adding one copper-distribution shelf to the multiplexer configuration for up to 96 lines of DS0 services or by adding equipment modules for space to mount additional copper-distributions shelves for up to 480 DS0 lines. Figure 2-1 shows a standard MBP master cabinet multiplexer configuration and Figure 2-2 on page 2-4 shows an expanded master cabinet for 480 lines.

The NT4K06EA and NT4K06EC master cabinets are identical except that one is Zone 2 compliant and the other is Zone 4 compliant.

The NT4K06ED master cabinet is Zone 4 compliant and includes space for mounting battery-backup.

NT4K06AA/AB Standard MBP master cabinets

The standard MBP master cabinets consist of a pedestal, a top cap assembly, internal cabling, and a DEM equipped with the ABM shelf, a local craft access panel and a breaker interface panel. This configuration can be used as a multiplexer. An optional copper-distribution shelf can be added to this configuration to supply up to 96 lines of DS0 services. SEMs and optional equipment are ordered separately. Your NT4K06AA/AB master cabinets may include up to two additional SEMs containing up to two copper-distribution shelves each. Figure 2-1 shows the standard master cabinet (multiplexer configuration) and Figure 2-2 shows a 480-line configuration.

Figure 2-1
NT4K06AA MBP standard master cabinet configuration

FW-15320

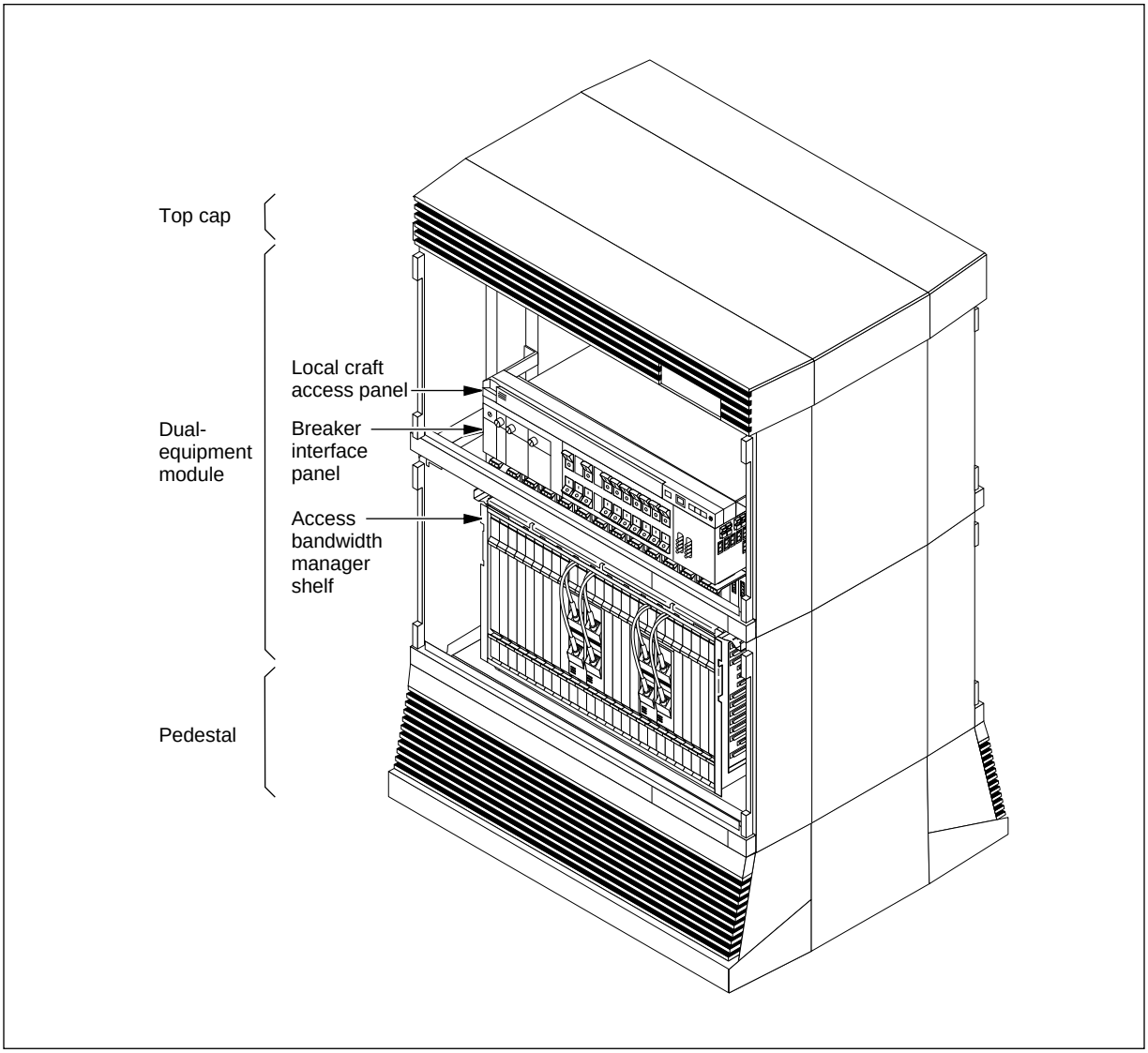
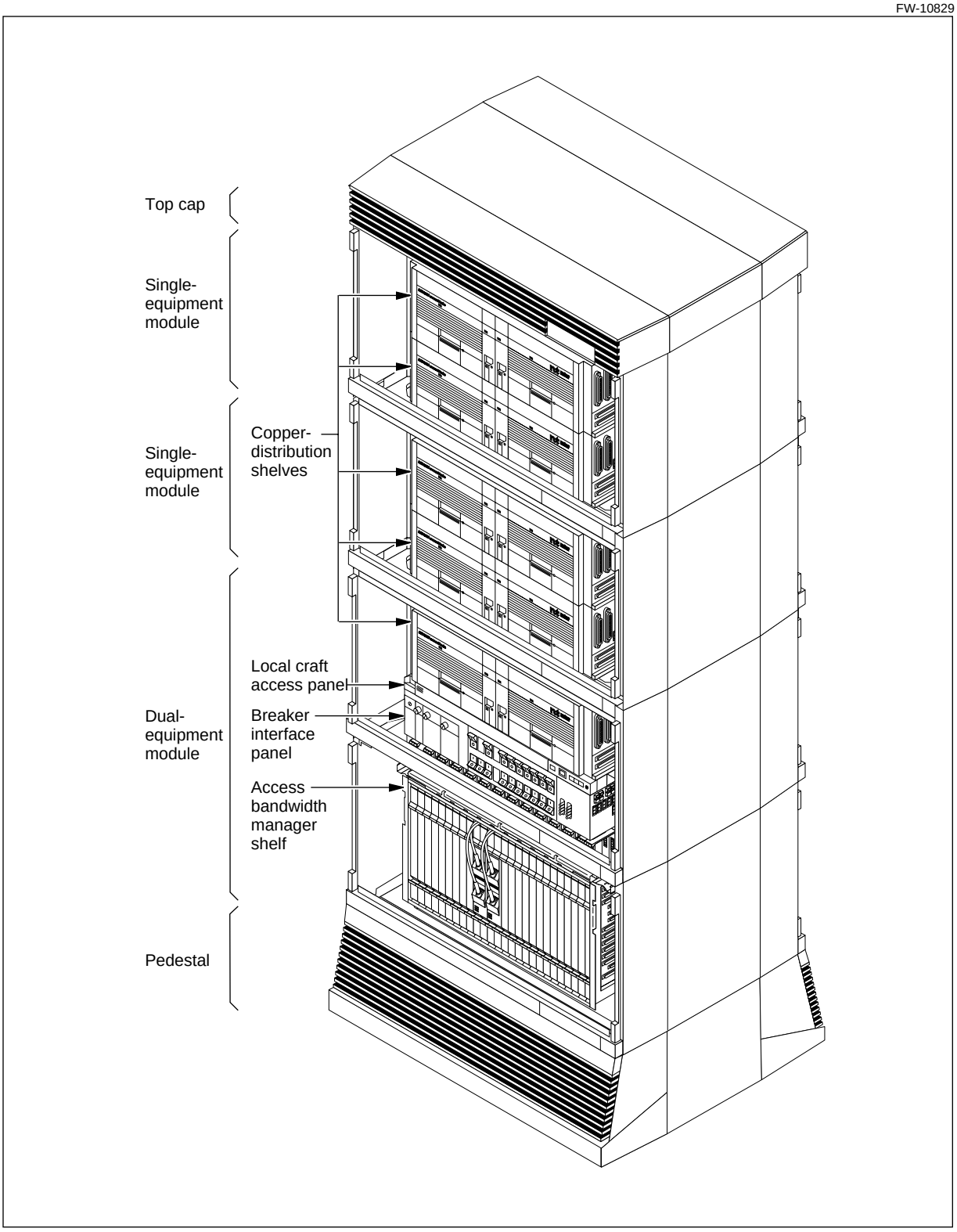


Figure 2-2
NT4K06AA 480-line MBP standard master cabinet configuration

FW-10829

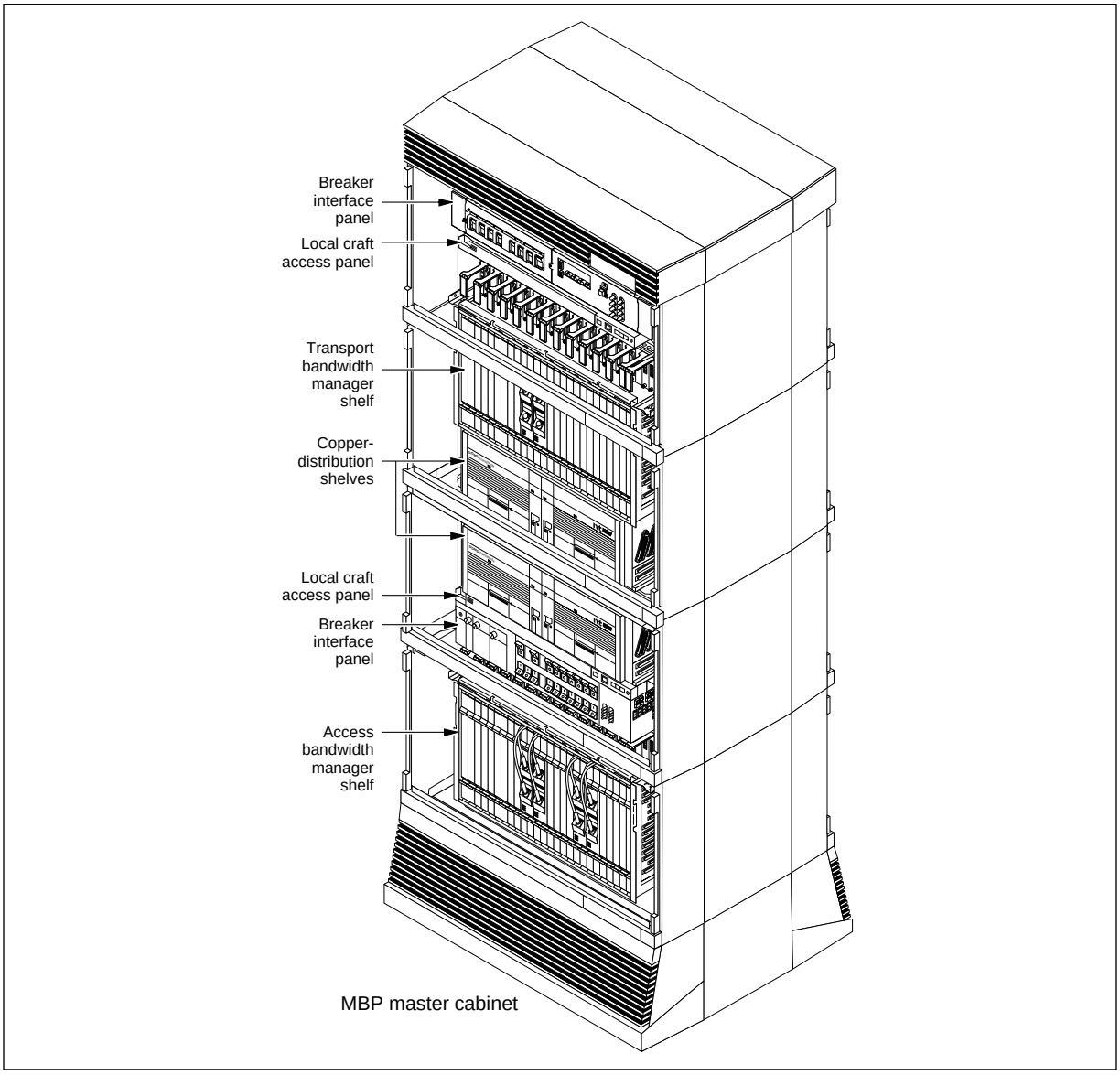


NT4K06EA/EC STSBM ring configuration

The NT4K06EA Zone 2 STSBM fiber ring configuration master cabinet consists of a pedestal, a top cap assembly, internal cabling and two DEMs. One DEM is equipped with an ABM shelf, a local craft access panel, a breaker interface panel and one copper-distribution shelf. The other DEM is equipped with a TBM shelf a cable organizer panel, a local craft access panel, a breaker interface panel and an optional copper-distribution shelf. The NT4K06EC master cabinet, equipped with special floor mounting brackets, is Zone 4 compliant and it has a higher-capacity cable organizer panel. Figure 2-3 shows the STSBM ring configuration master cabinet.

Figure 2-3
NT4K06EA/EC MBP STSBM fiber ring master cabinet configuration

FW-15366

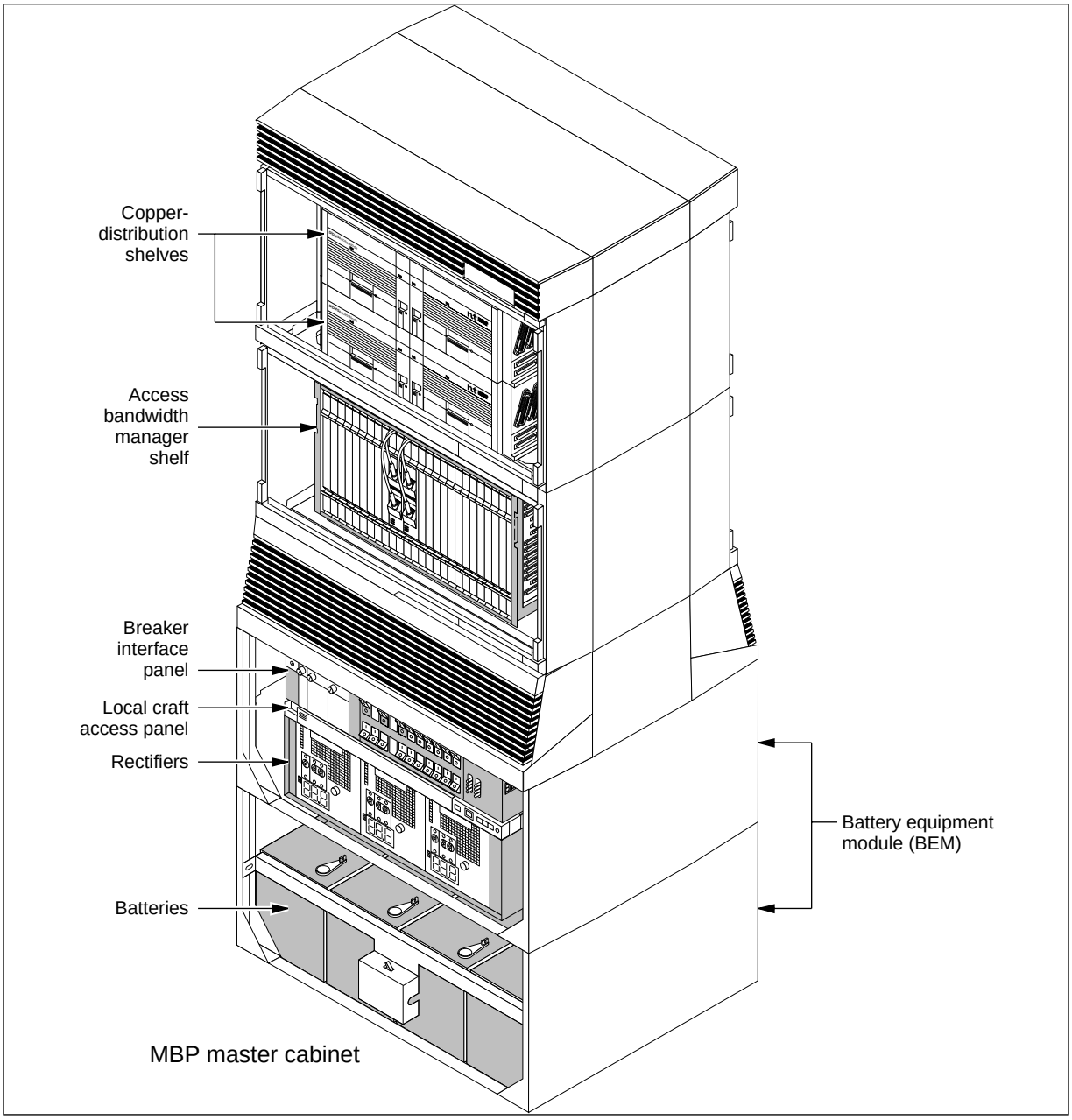


NT4K06ED Zone 4 VTBM ring configuration

The NT4K06ED Zone 4 VTBM fiber ring configuration master cabinet consists of a two BEMs (one contains space for back-up batteries and the other contains a rectifier shelf, a local craft interface panel and a breaker interface panel), a pedestal, a top cap assembly, internal cabling and a DEM containing the ABM shelf, a cable organizer panel and up to two copper-distribution shelves. Figure 2-4 shows the VTBM ring configuration master cabinet.

Figure 2-4
NT4K06ED MBP VTBM fiber ring master cabinet configuration

FW-15360



Expansion cabinet

The MBP expansion cabinets are similar in appearance. They each use the same types of equipment covers, the same seismic kit, and have an identical footprint (see Chapter 1, “Overview of the packaging option”).

Expansion cabinets are available in optional standard configurations and in defined configurations for specific applications such as synchronous transport signal bandwidth manager (STSBM) applications and OC-12 virtual tributary bandwidth manager (VTBM) applications.

The MBP expansion cabinet configurations are:

- NT4K06BA standard configuration MBP expansion cabinet (see Figure 2-5 on page 2-8)
- NT4K06BB Zone 4 STSBM and VTBM OC-12 fiber ring MBP configuration expansion cabinet (see Figure 2-6 on page 2-9)

The NT4K06BA MBP expansion cabinet is used in the standard MBP cabinet configurations. It is expanded by ordering additional cabinet and equipment modules. Figure 2-5 shows a standard MBP expansion cabinet configuration with three SEMs containing two copper-distribution shelves, a repeater shelf and a DSX-1 cross-connect shelf.

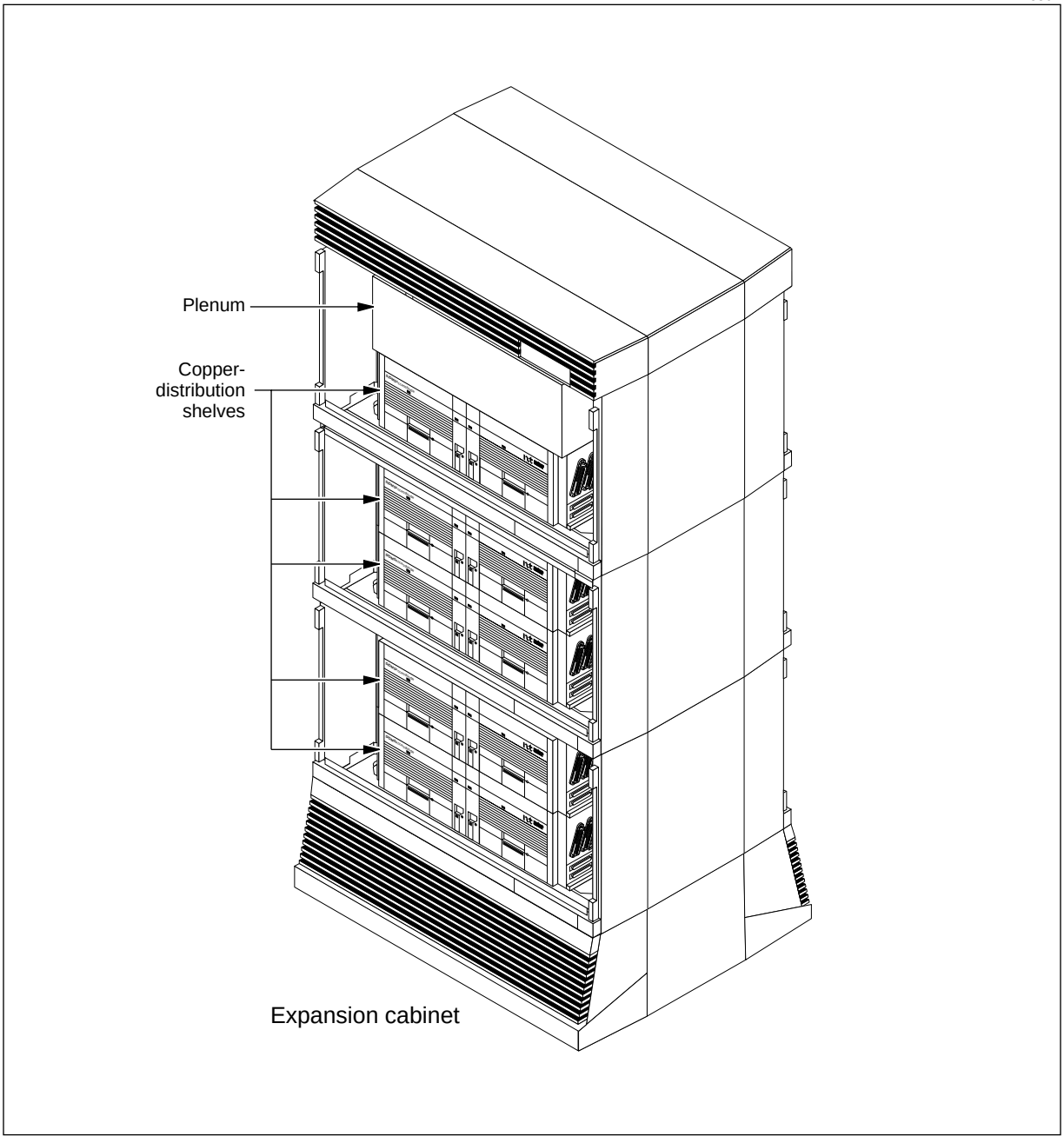
The NT4K06BB expansion cabinet is used in the STSBM and VTBM fiber ring cabinet configurations. It is defined by a more detailed product structure and can be expanded by adding copper-distribution shelves. Figure 2-6 shows the Zone 4 STSBM/VTBM expansion cabinet with batteries and five copper-distribution shelves.

NT4K06BA Standard MBP expansion cabinet

The NT4K06BA standard expansion cabinet consists of a pedestal, a top cap assembly and internal cabling. SEMS are ordered separately. It is used in the standard MBP configuration. Figure 2-5 shows the NT4K06BA expansion cabinet configuration equipped with three SEMs.

Figure 2-5
NT4K06BA expansion cabinet configuration with three SEMs

FW-15362

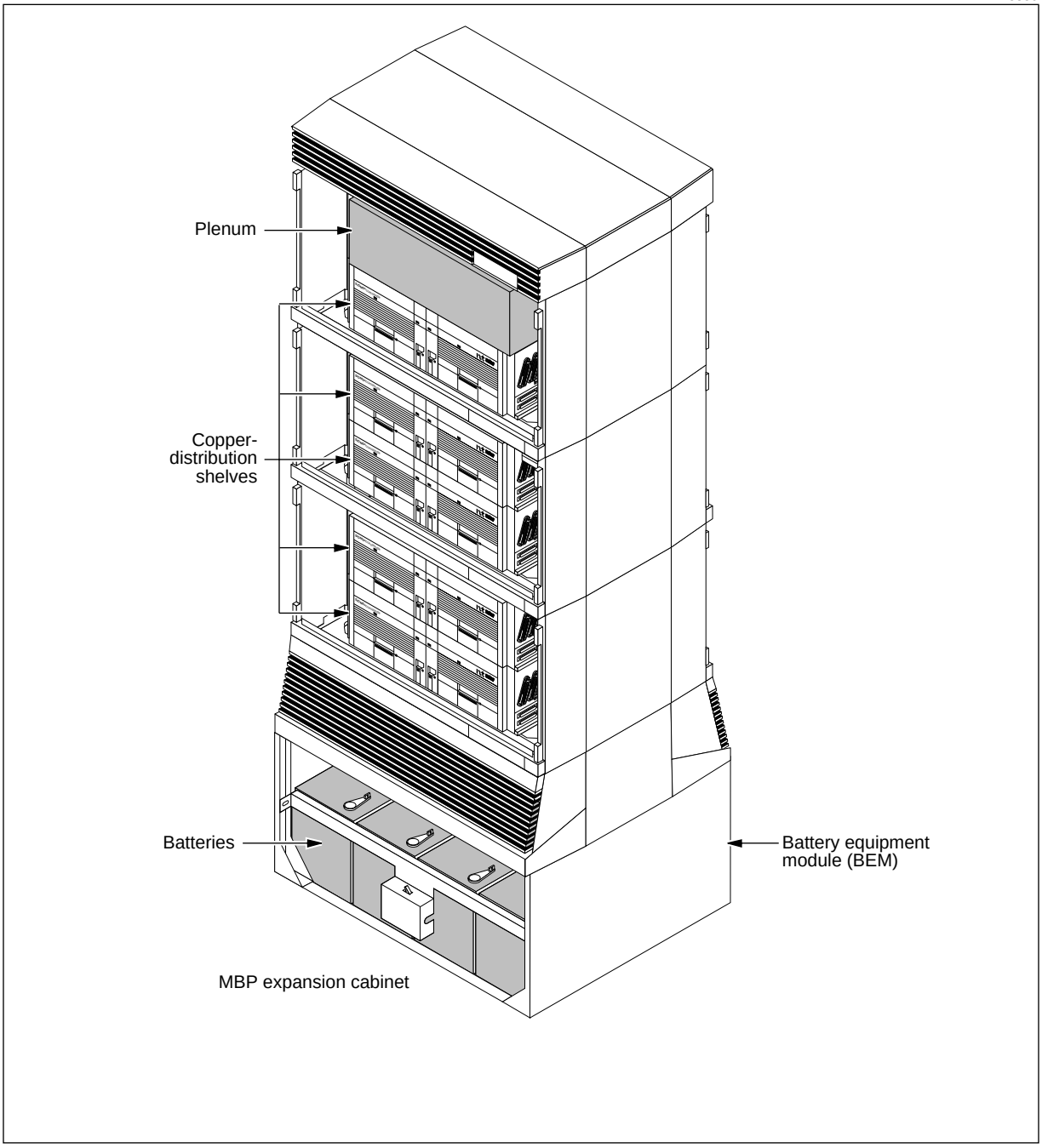


NT4K06BB Zone 4 MBP STSBM/VTBM expansion cabinet

The NT4K06BB Zone 4 VTBM fiber ring configuration expansion cabinet consists of a battery equipment module, a pedestal, three SEMs, a top cap assembly and internal cabling. Figure 2-6 shows the NT4K06BB expansion cabinet equipped with five copper-distribution shelves.

Figure 2-6
NT4K06BB expansion cabinet STSBM/VTBM configuration

FW-15359



Shelf modules for MBP cabinets

The shelf modules used in MBP cabinets are installed in the equipment modules. Table 2-1 shows the shelf modules that can be installed in an MBP cabinet.

Note: The installation of some of the shelf modules listed is dependent on the application and configuration ordered.

Table 2-1
Shelf modules in the MBP cabinets

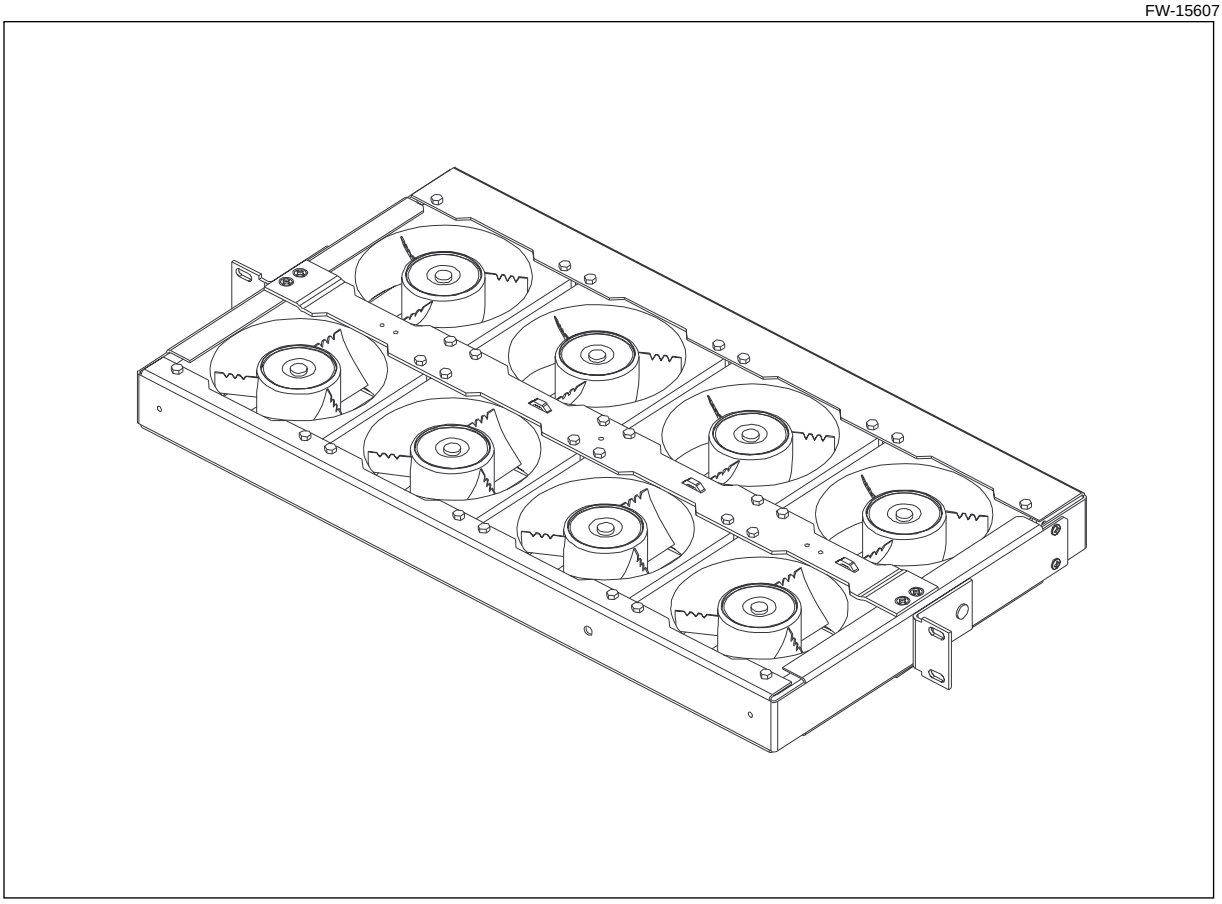
Shelf module	See
NT4K0610 8-fan cooling unit	page 2-11
NT4K10 access bandwidth manager shelf (ABM)	page 2-12
NT4K12 copper-distribution shelf (CDS)	page 2-13
NT4K14 breaker interface panel (BIP)	page 2-16
NT4K16 local craft access panel (LCAP)	page 2-17
NT4K19 transport bandwidth manager shelf (TBM)	page 2-18
NT4K1930 cable organizer panel (COP)	page 2-19
NT4K35 low voltage disconnect unit (LVD)	page 2-20
NT4K36 dc distribution shelf	page 2-21
NT7E56 breaker interface panel (BIP)	page 2-22
NT5C10CC rectifier shelf	page 2-23
Fiber patch panel (FPP)	page 2-25
56-position DSX-1 cross-connect shelf	page 2-26
28-position DS1 repeater shelf	page 2-28

Cooling unit, 8-fan NT4K0610

The NT4K0610 8-fan cooling unit, as shown in Figure 2-7, provides enhanced cooling capacity for VTBM-ready cabinets. It mounts in the top cap above the upper-most equipment module.

Figure 2-7
NT4K0610 8-fan cooling unit

FW-15607



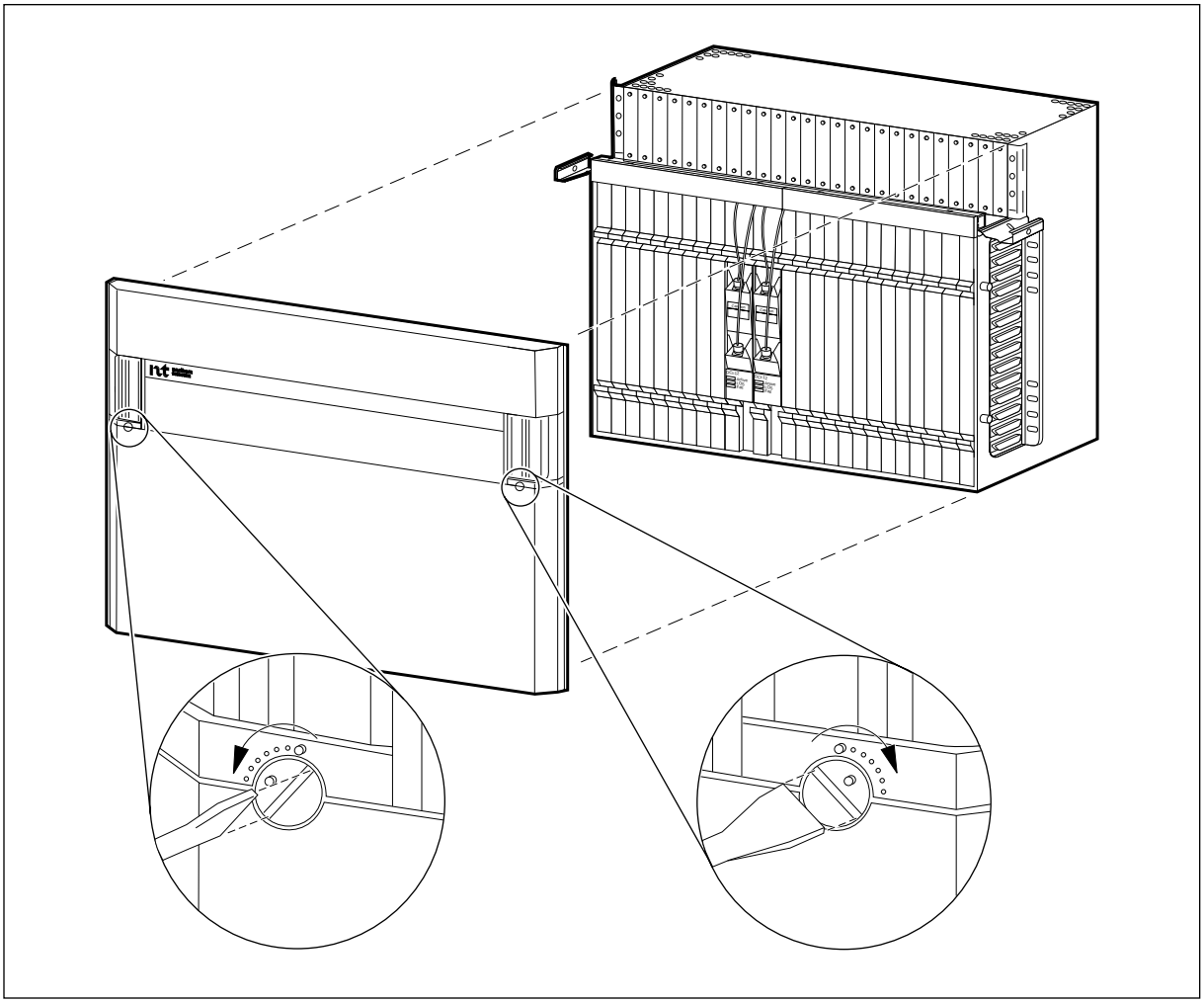
Access bandwidth manager shelf NT4K10

The NT4K10 access bandwidth manager (ABM) shelf, as shown in Figure 2-8, contains the AccessNode common equipment for:

- terminating the primary and secondary fiber optic feeders (standard MBP configurations)
- terminating the primary and secondary DS1 and DS3 feeders
- signal flow control
- DS0 services control

Figure 2-8
NT4K10 Access bandwidth manager shelf, cover removed

FW-10534



Copper-distribution shelves NT4K12

The NT4K12 copper-distribution shelves (CDSs), as shown in Figure 2-9 on page 2-14, contain the line cards that interface the AccessNode equipment to the local subscriber loops.

CDS numbering

In MBP cabinets, CDS shelf 1 is the lowest copper-distribution shelf in the master cabinet (above the access bandwidth manager shelf), as shown in Figure 2-10 on page 2-15. CDS shelf number 2 is the copper-distribution shelf immediately above shelf 1, and so on up to the top of the master cabinet. Shelf numbering continues at the lowest CDS shelf in the expansion cabinet, and on up to CDS shelf 7, the uppermost copper-distribution shelf in the expansion cabinet.

CAUTION

Risk of damage to equipment

During initial setup of the AccessNode, Nortel Networks recommends that the equipment side remains disconnected from the outside plant loops (at the protection modules) until the line cards are installed and powered up. For example, when using five-pin protector modules, pull the modules out slightly, to the first detent.

Figure 2-9
NT4K12 Copper-distribution shelf

FW-10717

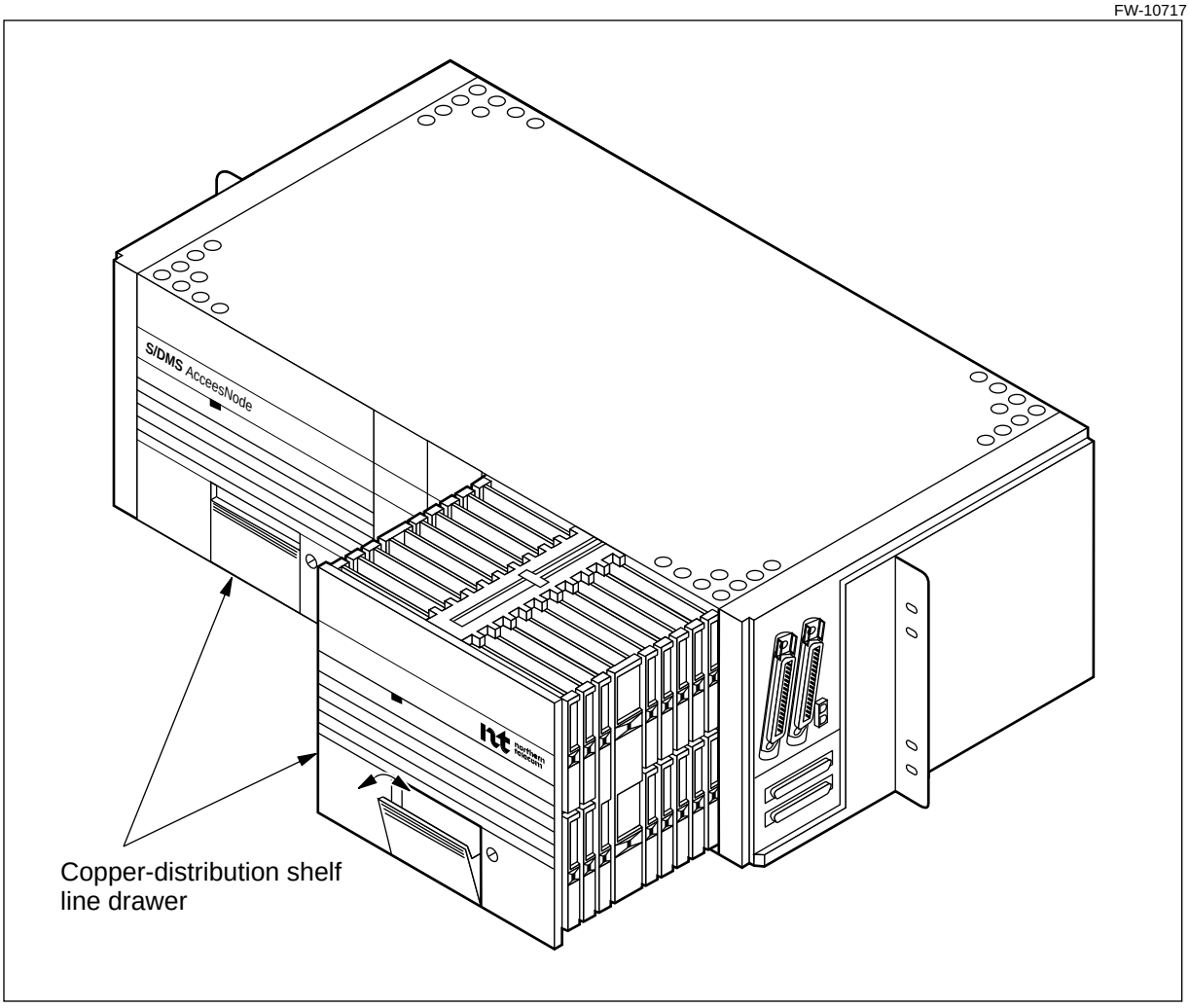
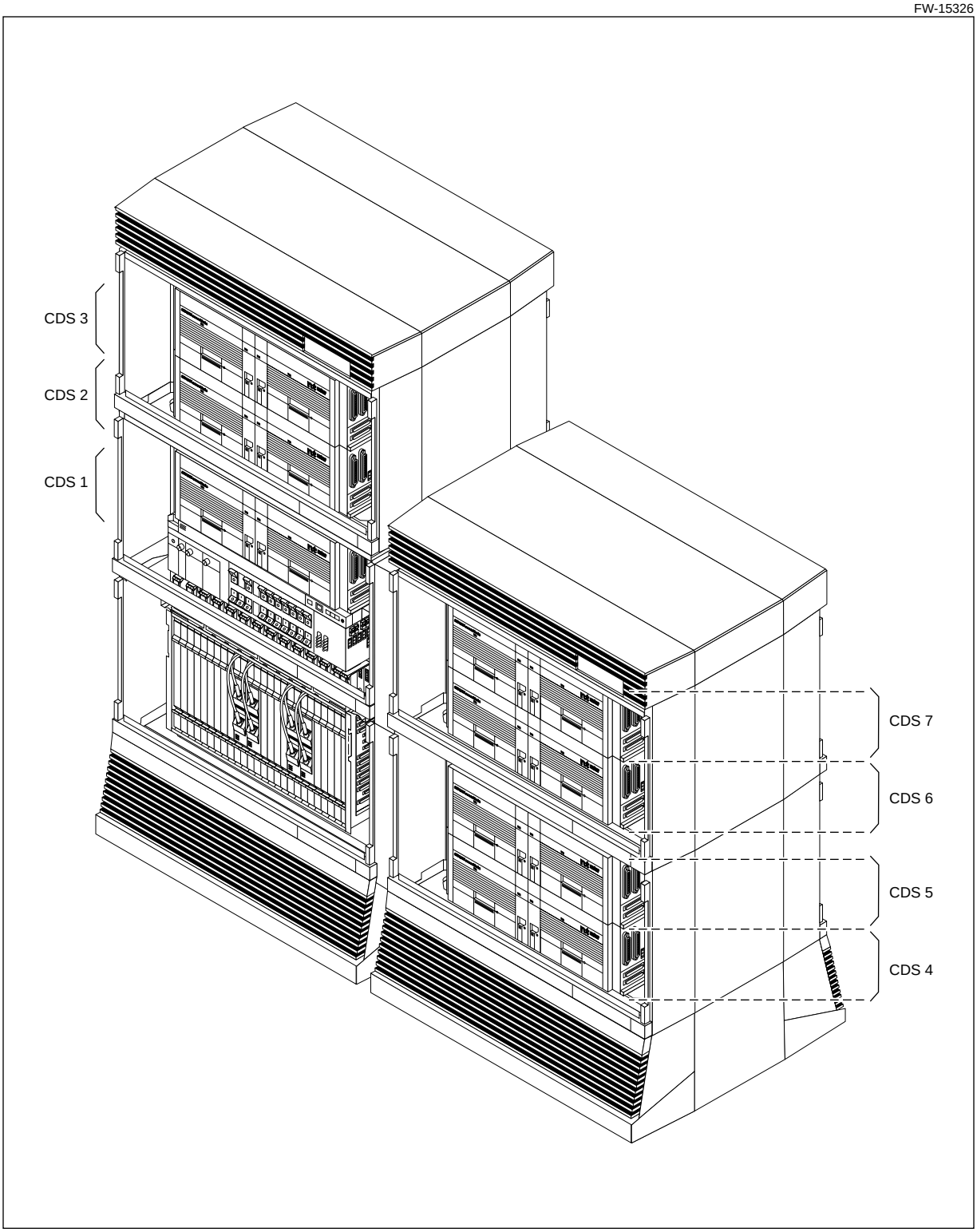


Figure 2-10
Numbering of copper-distribution shelves in an standard RFT housed in MBP cabinets

FW-15326



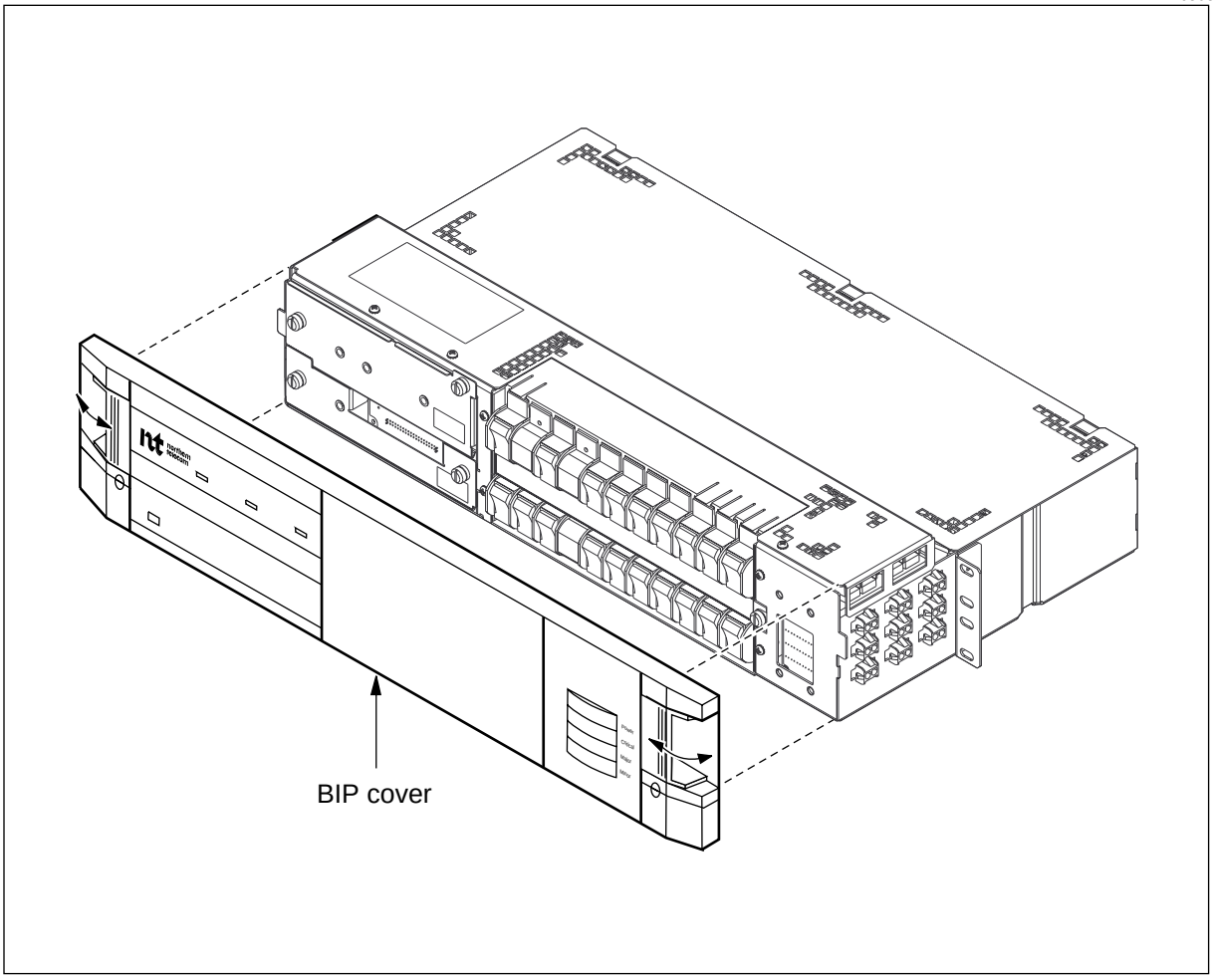
Breaker interface panel NT4K14

The NT4K14BA breaker interface panel (BIP), as shown in Figure 2-11, contains circuit breakers to distribute the -48 V dc power feed from the MPP rectifier shelf and the batteries to the MBP equipment modules.

The NT4K14BA BIP is used in the standard MBP configurations.

Figure 2-11
NT4K14BA breaker interface panel, cover removed

FW-16505

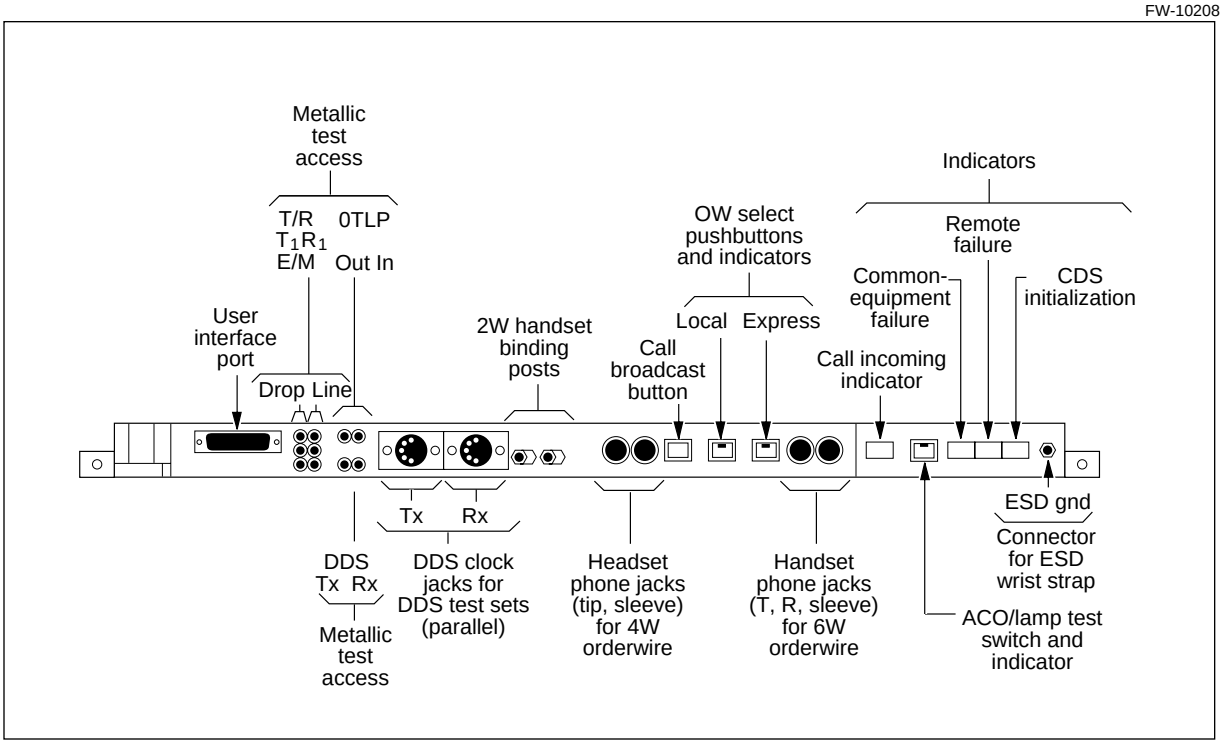


Local craft access panel NT4K16

The NT4K16 local craft access panel (LCAP), as shown in Figure 2-12, provides maintenance personnel with local access to the AccessNode equipment for testing and inter-office communications.

Figure 2-12
NT4K16 Local craft access panel

FW-10208



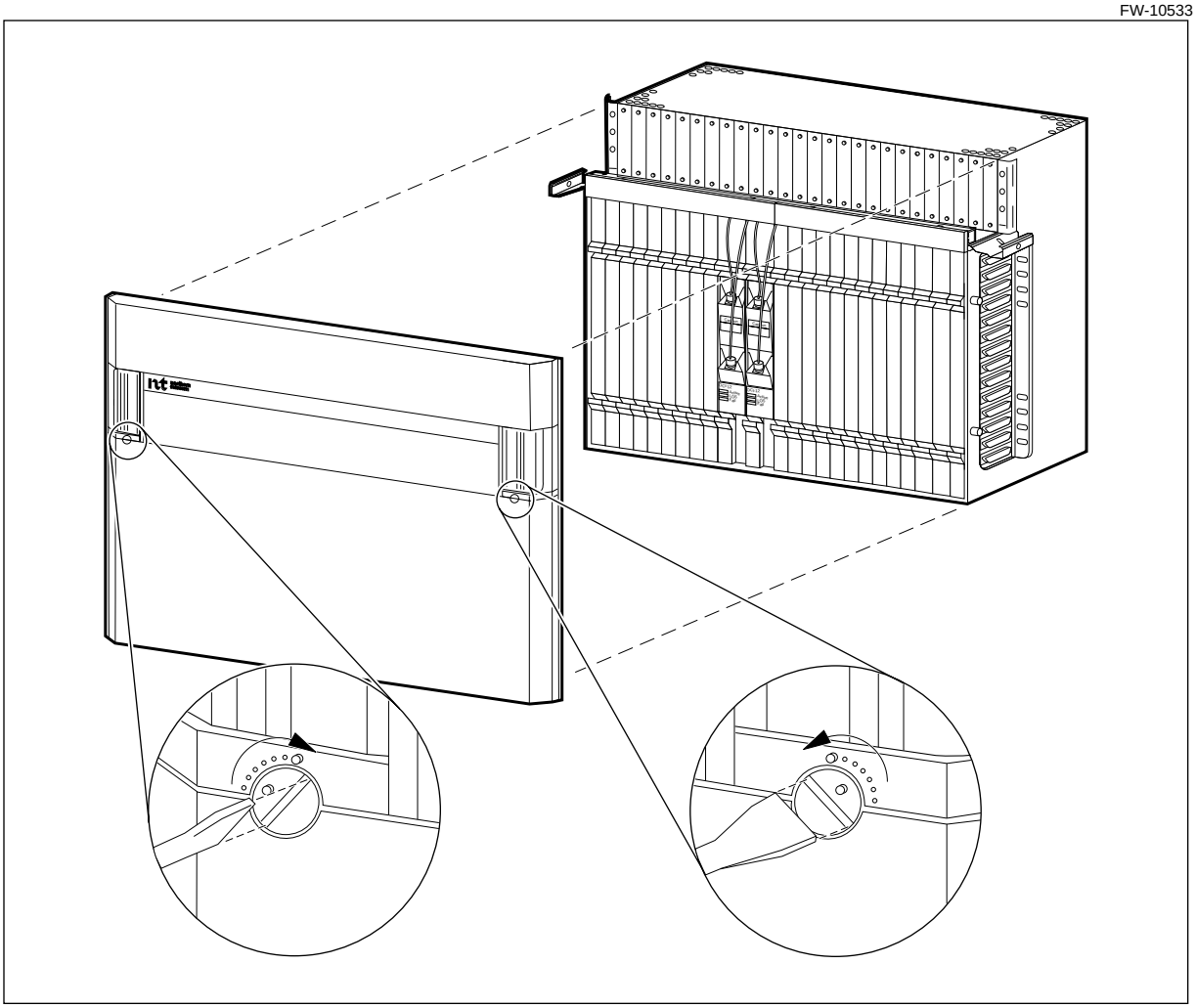
Transport bandwidth manager shelf NT4K19

The NT4K19 transport bandwidth manager (TBM) shelf, as shown in Figure 2-13, is used in the MBP STSBM configurations only and contains the AccessNode common equipment for:

- terminating the primary and secondary fiber optic feeders (STSBM MBP configurations)
- terminating the primary and secondary DS1 and DS3 feeders to the ABM (STSBM MBP configurations)
- signal flow control

Figure 2-13
NT4K19 transport bandwidth manager shelf, cover removed

FW-10533



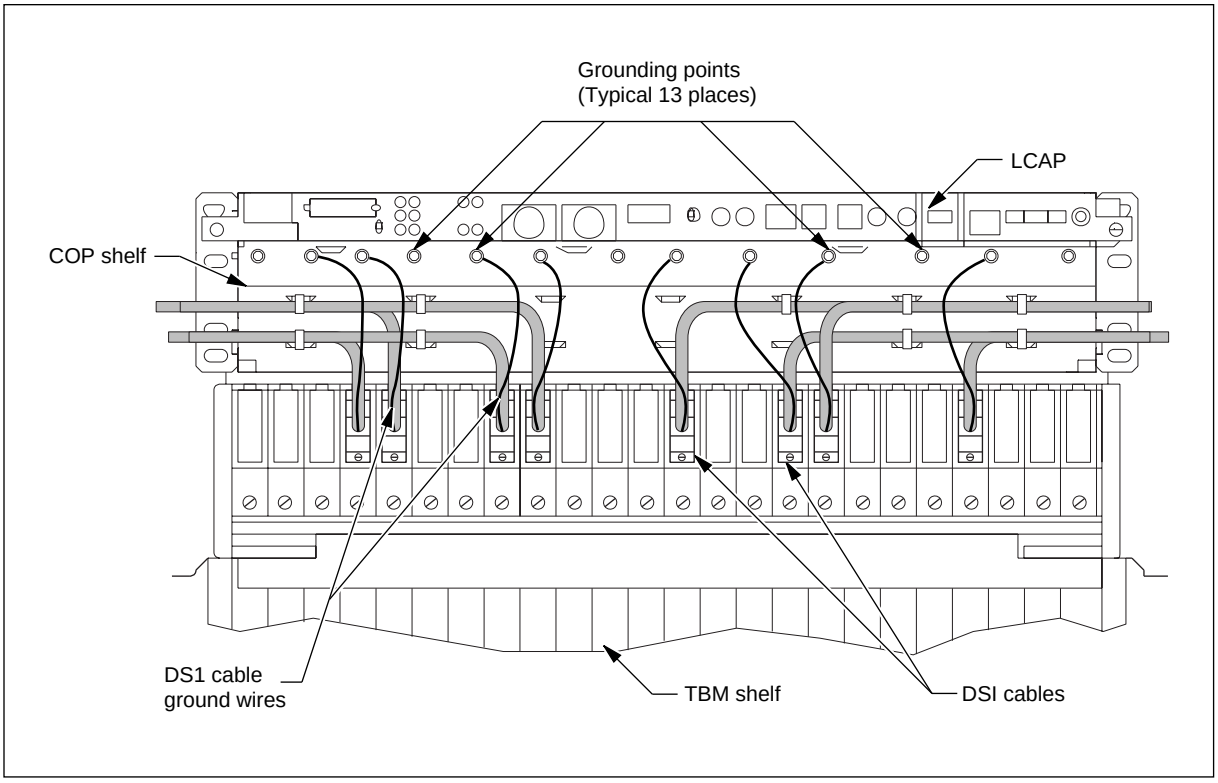
Cable organizer panel NT4K1930

An NT4K1930 cable organizer panel (COP), as shown in Figure 2-14, is used in the MBP STSBM configuration only. The COP provides the following:

- space for routing and securing the DS1 and DS3 cabling that routes into the cabinet to the TBM shelf I/O cards
- cable grounding positions

Figure 2-14
NT4K1930 Cable organizer panel

FW-15544

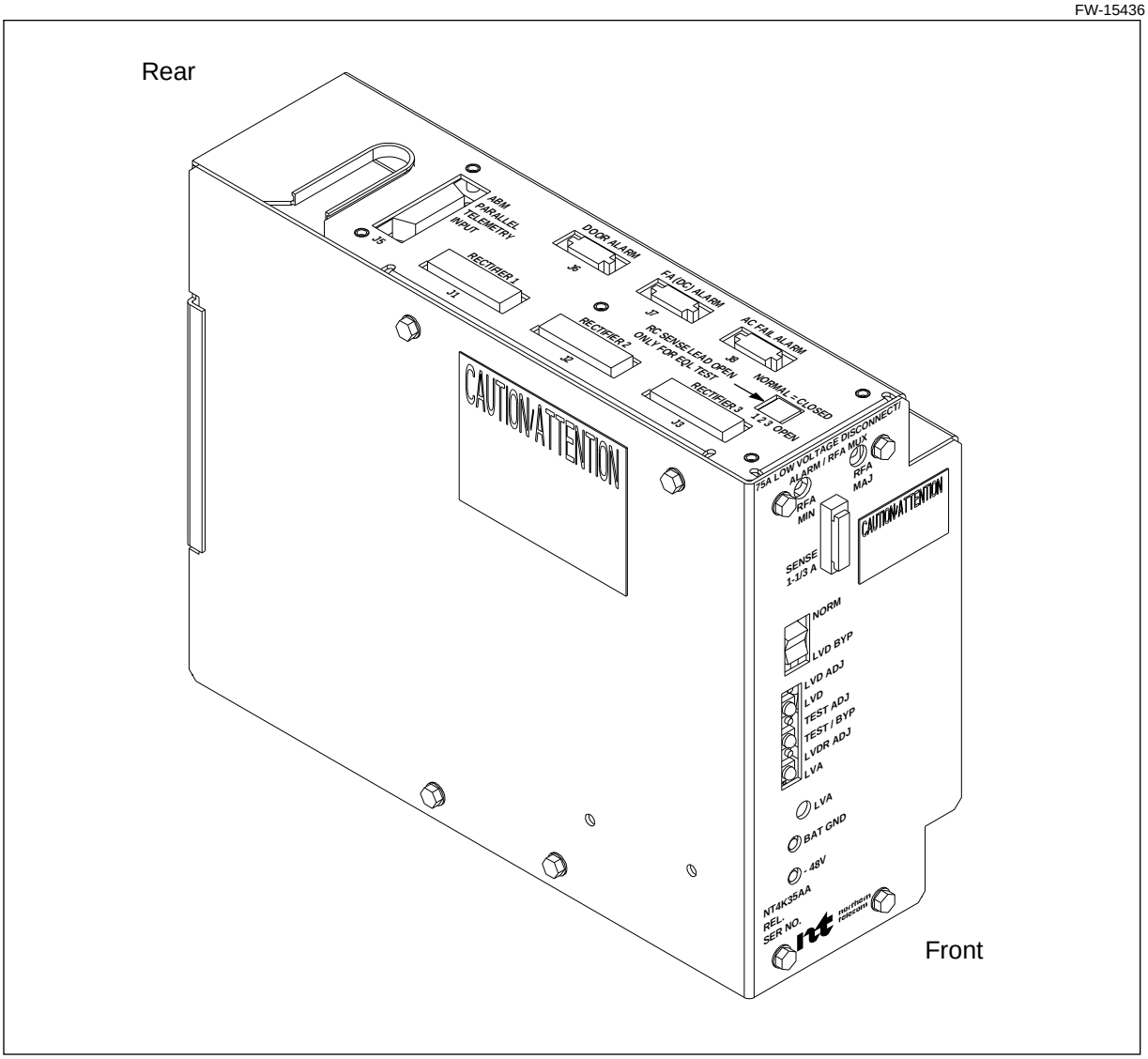


Low voltage disconnect unit NT4K35

The NT4K35 low voltage disconnect (LVD) unit, as shown in Figure 2-15, is mounted in the VTBM MBP master cabinet. The unit provides low voltage protection for the batteries and the AccessNode system.

Figure 2-15
NT4K35AA low voltage disconnect unit

FW-15436

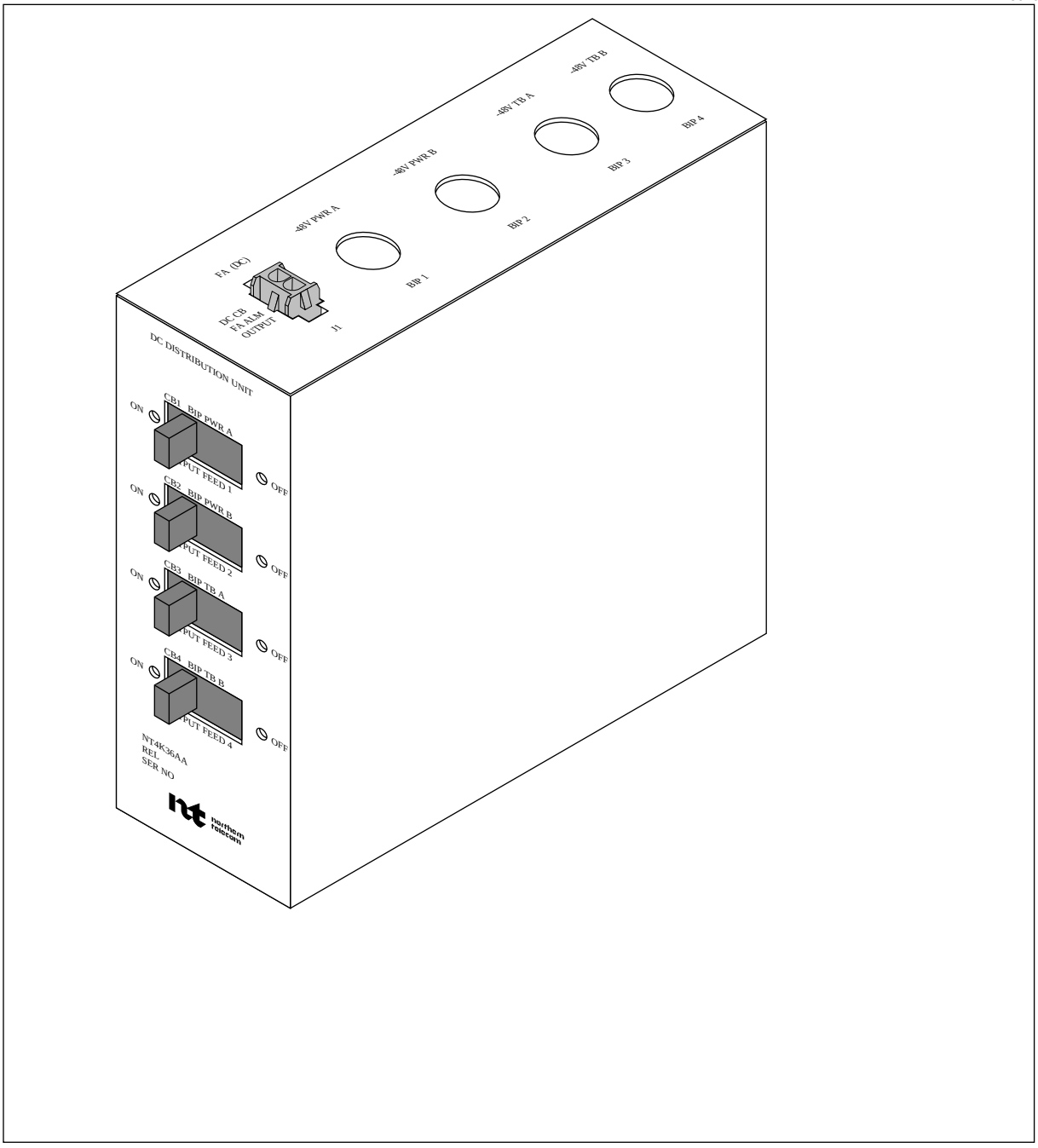


DC distribution shelf NT4K36

The NT4K36 dc distribution shelf, as shown in Figure 2-16, is used in the MBP VTBM configuration only. Mounted in the rear of the MBP VTBM master cabinet, the dc distribution unit provides circuit breaker protection for the dc input to the AccessNode BIP.

Figure 2-16
NT4K36 dc distribution shelf

FW-15670

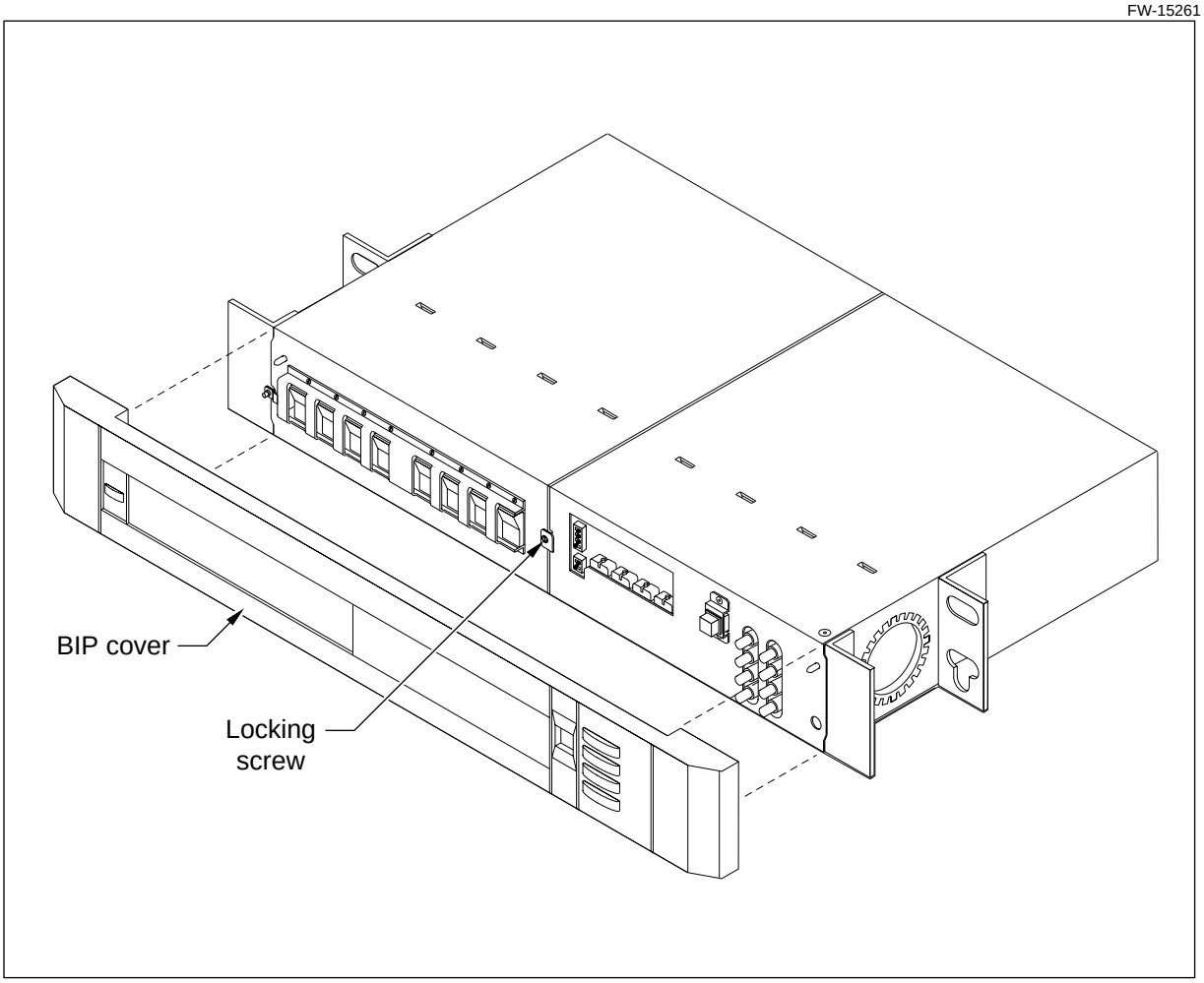


Breaker interface panel NT7E56

The NT7E56 breaker interface panel (BIP), as shown in Figure 2-17, is used in the MBP STSBM configuration only. The BIP contains circuit breakers to distribute the -48 V dc power feed from the rectifier shelf and the batteries to the transport bandwidth manager shelf in the STSBM MBP configuration.

Figure 2-17
NT7E56 breaker interface panel, cover removed

FW-15261



Rectifier shelf NT5C10CC

The NT5C10CC rectifier shelf provides mounting space for up to three MPR-25 rectifiers. It also provides the ac input connection points from the commercial ac source and the dc output connection points to the AccessNode equipment.

In OC-12 VTBM (NT4K06ED) MBP cabinet applications, the rectifier shelf is mounted in the MBP master cabinet. In all other applications, the rectifier shelf is mounted in an MPP cabinet.

Rectifier shelf numbering

Rectifier shelf position numbering is from top to bottom. That is, rectifier shelf 1 (standard) is the upper-most rectifier shelf and rectifier shelf 2 (optional) is the lower one.

MPR-25 rectifiers NT5C03CA

Mounted in a rectifier shelf, the NT5C03CA rectifiers, as shown in Figure 2-18 on page 2-24, convert a commercial 208-230 V ac source to dc power to power the AccessNode and the peripheral equipment. The rectifiers also provide battery charging current for back-up batteries.

In OC-12 VTBM (NT4K06ED) cabinet applications, the rectifiers are mounted in the MBP master cabinet. In all other applications, the rectifiers are is mounted in an MPP cabinet.

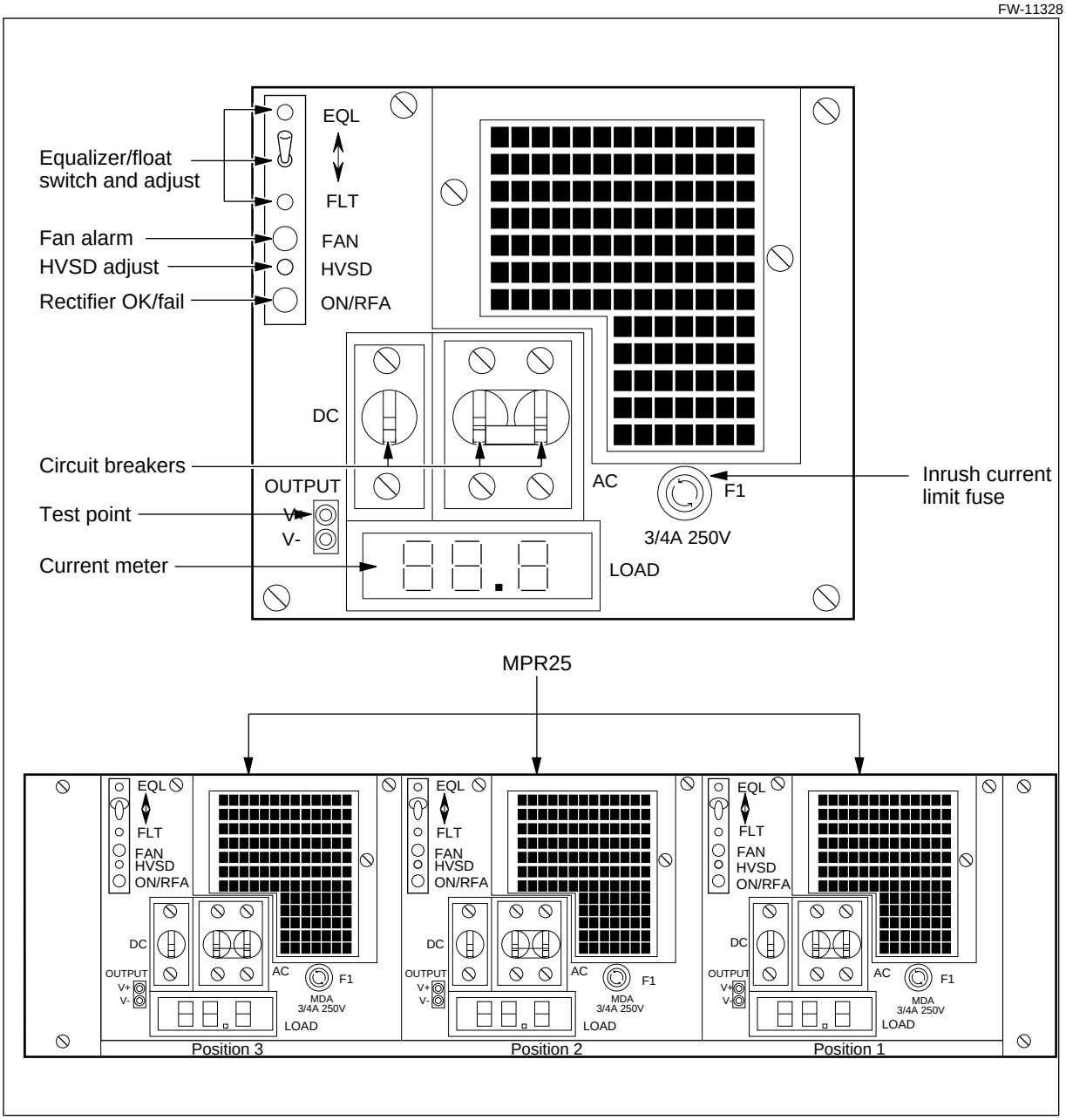
Modular in design, the rectifiers are used in a load sharing configuration. Up to three rectifiers can be installed in the first rectifier shelf. If two rectifier shelves are used, only one rectifier can be installed in position 3 of the second rectifier shelf.

Rectifier numbering

Rectifier position numbering, as shown in Figure 2-18, is from right-to-left as viewed from the front of the shelf.

Figure 2-18
NT5C10CC rectifier shelf with three NT5C03CA MPR-25 rectifiers

FW-11328

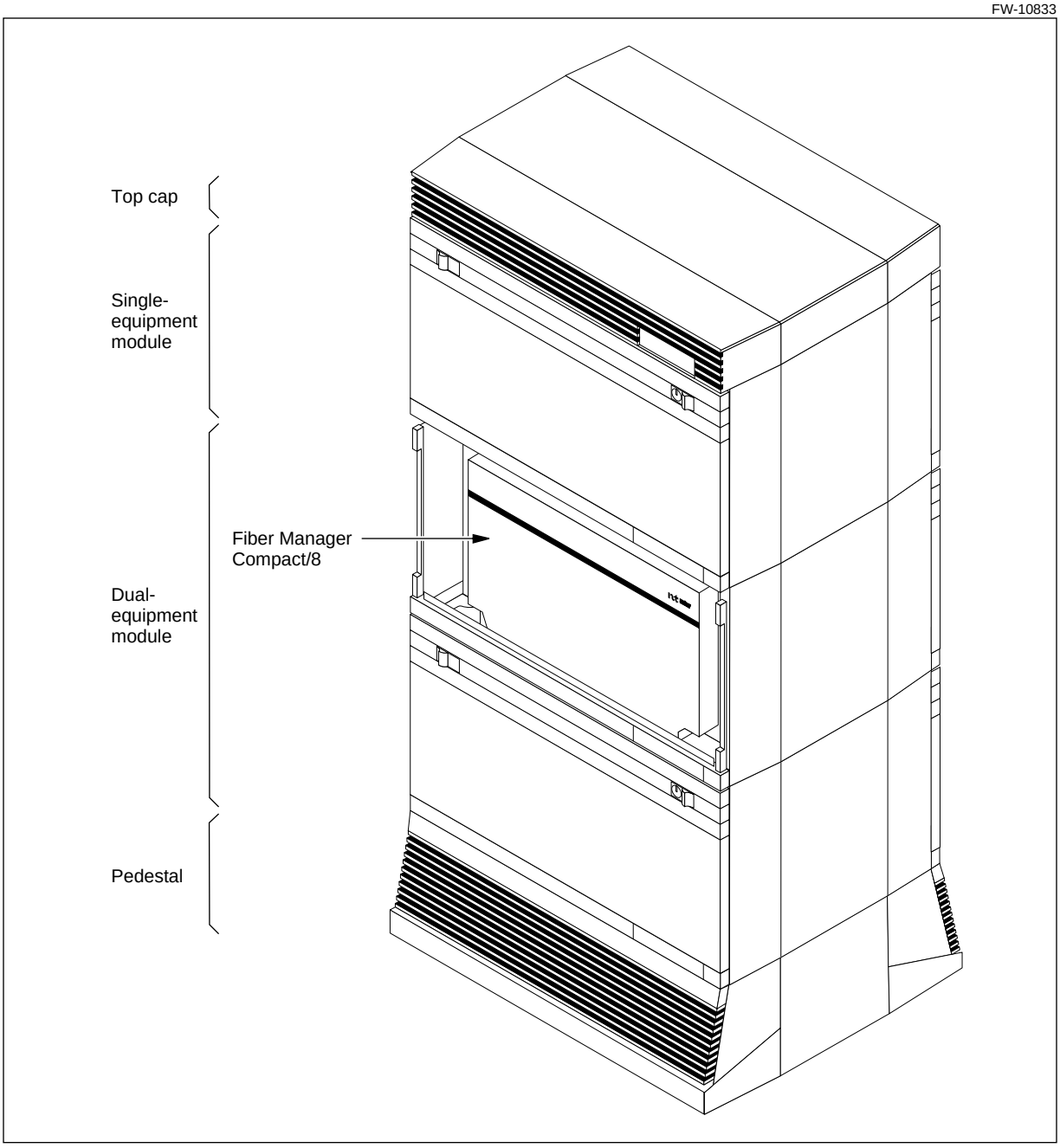


Fiber patch panel

The MBP cabinets can be purchased with an optional Fiber Manager Compact/8 fiber patch panel. This panel permits the storage of up to eight fiber splices and extra fiber for the fiber leads that connect to the access bandwidth manager shelf. When equipped, this panel is mounted inside the rear of the DEM in the master MBP cabinet as shown in Figure 2-19.

Figure 2-19
Rear view of the MBP master cabinet showing the location of the fiber patch panel

FW-10833



DSX-1 cross-connect shelf

A DSX-1 cross-connect facility can be installed in the MBP to provide termination and cross-connection of DS1 signals to and from the system. The DSX-1 cross-connect shelf is used for interfacing the external DS1 cables to the repeaters.

> ***Note:*** The DSX-1 cross-connect shelf and the DS1 repeater shelf are always packaged as a pair. It is not possible to order only a DSX-1 cross-connect shelf or only a DS1 repeater shelf.

When the system is shipped from the factory with an SEM that contains a DS1 repeater shelf and a DSX-1 cross-connect shelf, the SEM is installed at the top of the master cabinet in a single-cabinet configuration or at the top of the expansion cabinet in a two-cabinet configuration.

The LEDs on the DSX-1 cross connect shelf can be powered in any of the following ways:

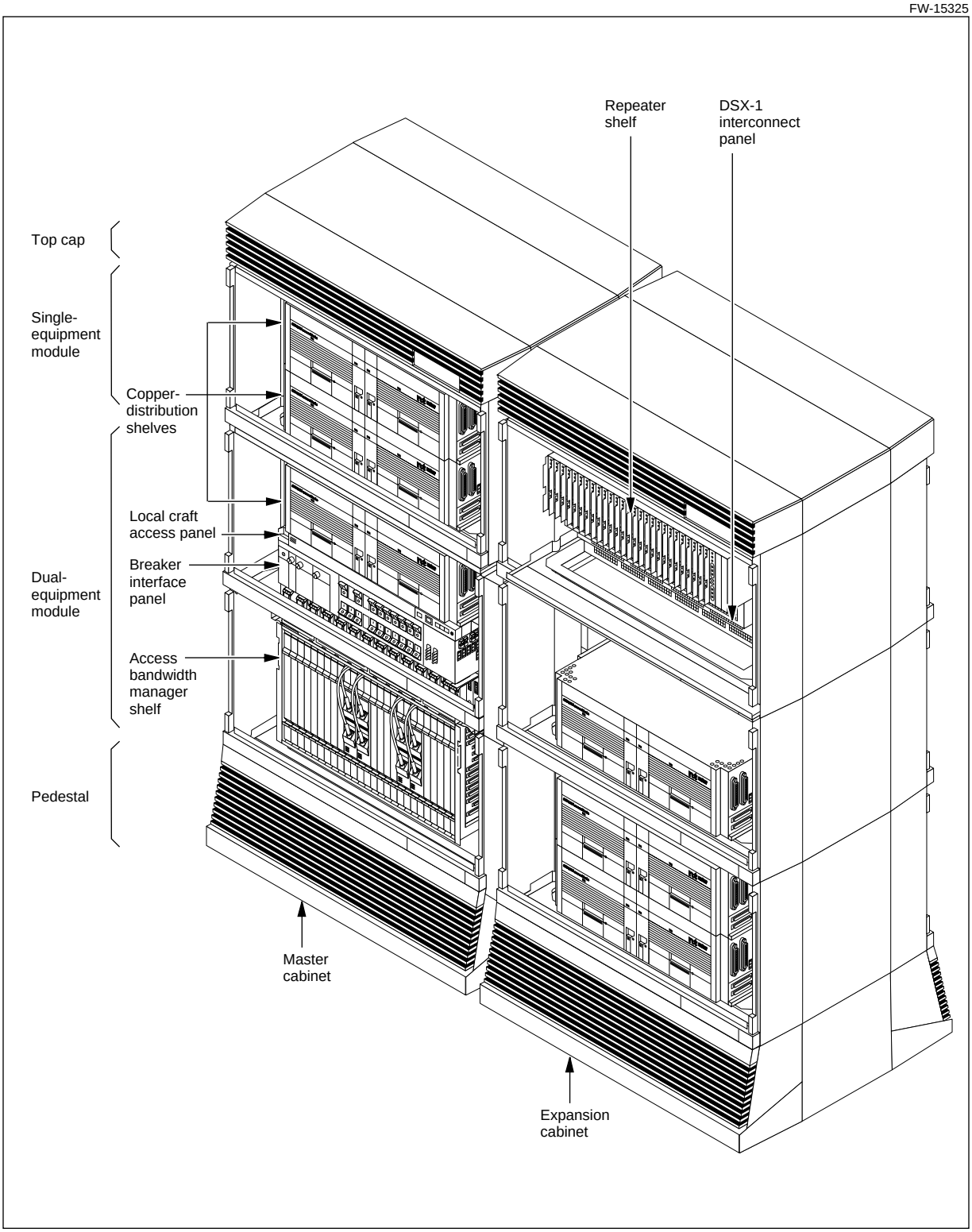
- from the dc power distribution cable, which carries power from the breaker interface panel (BIP) in the MBP master cabinet
- from an auxiliary power connector on the dc distribution shelf in an MPP cabinet, by way of the terminal blocks on that cabinet
- from an external customer supplied power source

> ***Note:*** If the power comes from the BIP, the system can support no more than six copper-distribution shelves.

Figure 2-20 shows a typical two-cabinet MBP system containing six copper-distribution shelves, a DSX-1 cross-connect shelf, and a DS1 repeater shelf. The DSX-1 cross-connect shelf and the DS1 repeater shelf are in the topmost SEM of the expansion cabinet.

Figure 2-20
Two-cabinet MBP configuration containing DSX-1 cross connect shelf and DS1 repeater shelf

FW-15325



DS1 repeater shelf

A DS1 repeater shelf can be installed to provide DS1 span line termination for transporting DS1 signals to remote locations. The repeaters are used to compensate for signal losses on the external DS1 cables.

> ***Note:*** The DSX-1 cross-connect shelf and the DS1 repeater shelf are always packaged as a pair. It is not possible to order only a DSX-1 cross-connect shelf or only a DS1 repeater shelf.

When the system is shipped from the factory with an SEM that contains a DS1 repeater shelf and a DSX-1 cross-connect shelf, the SEM is installed at the top of the master cabinet in a single-cabinet configuration or at the top of the expansion cabinet in a two-cabinet configuration.

Up to 14 repeaters, transmit and receive, can be provisioned in the repeater shelf to support a maximum of 14 DS1s. (Each repeater occupies two slots.)

The repeaters in the repeater shelf can be powered in any of the following ways:

- from the dc power distribution cable, which carries power from the breaker interface panel (BIP) in the MBP master cabinet
- from an auxiliary power connector on the dc distribution shelf in an MPP cabinet, by way of the terminal blocks on that cabinet
- from an external customer supplied power source

> ***Note:*** If the power comes from the BIP, the system can support no more than six copper-distribution shelves.

Figure 2-20 on page 2-27 shows a typical two-cabinet MBP system containing six copper-distribution shelves, a DSX-1 cross-connect shelf, and a DS1 repeater shelf. The DSX-1 cross-connect shelf and the DS1 repeater shelf are in the topmost SEM of the expansion cabinet.

MPP cabinets

The modular power package (MPP) cabinet is optional. The MPP cabinet configurations are modular in design to support various applications and contain shelf modules that convert a supply of alternating current to -48 V dc for powering the AccessNode equipment inside the MBP master and expansion cabinets.

For additional information, see *Configuration and Equipment Description*, 323-3001-100, in *Description*, Volume 2A.

MPP cabinet description

Using the (MPP) cabinet is one means of providing dc power to the MBP cabinets. Power can optionally be provided by means of customer-supplied equipment.

In the VTBM ring configuration, the MPP is not required. The ac-dc conversion and distribution equipment is self-contained in the master MBP cabinet. Refer to *Modular Business Package VTBM Ring Installation Guide* and *Modular Business Package VTBM Ring User Guide* for detailed information regarding the MBP VTBM ring configuration.

The power source for the MPP cabinet is 208/240 V single-phase ac. The ac power enters the MPP cabinet by way of armored cables, which are wired directly to the rectifier shelf or shelves.

The dc power feeds for the MBP cabinets go to the breaker interface panel, which is in the MBP master cabinet. The power feeds exit the MPP cabinet by way of a terminal block that is fastened to the rear of the inner panel of the dual equipment module. The power feeds enter the MBP master cabinet by way of a terminal block on the rear panel on the lower part of the dual equipment module in the master cabinet.

For more information, see *Site Installation Planning and Engineering*, 323-3001-200, in the *Engineering, Configuration, and Ordering Guide*, Volume 1.

The MPP cabinet must be attached to the master MBP cabinet if the system is installed in an unrestricted area. The MPP cabinet can be attached or remote if the system is located in a restricted area, that is, a locked area to which only authorized personnel can gain access.

Attached MPP

The MPP cabinet may be attached to the master cabinet by means of a cable duct called an expansion kit, and all power cables that run between the cabinets must pass through the expansion kit. If the MPP cabinet is attached, it is on the left-hand side of the master cabinet when the system is viewed from the front.

Remote MPP

Alternatively, the MPP cabinet may be remote from the MBP master cabinet, that is, it may be installed up to 7.6 m (25 ft) away from the master cabinet. If the MPP is in a remote location, the power cables between the MPP cabinet and the master MBP cabinet can run under a raised floor or in an overhead cable rack. In a raised floor installation, the local electrical code may require that the power cables under the floor be contained in conduit. The undersides of the MBP and MPP cabinets are equipped with knockouts for conduits.

MPP cabinet configurations

The standard MPP cabinet is identical in appearance to MBP cabinets. It uses the same types of equipment covers, the same seismic kit, and has an identical footprint (see Chapter 1, “Overview of the packaging option”).

The standard MPP cabinet configurations are:

- NT4K07AA standard MPP cabinet configuration (see Figure 3-1)
- NT4K07BA Zone 2 STSBM OC-12 fiber ring MPP cabinet configuration (see Figure 3-2 on page 3-5)
- NT4K07BB Zone 4 STSBM OC-12 fiber ring MPP cabinet configuration (see Figure 3-2)

The NT4K07BA and NT4K07BB MPP cabinets are expanded by ordering additional equipment modules such as a rectifier shelf and additional rectifiers.

Standard

When used in a subnetwork supporting a standard application, an MPP is packaged in a single cabinet, as shown in Figure 3-1. This cabinet consists of the following items:

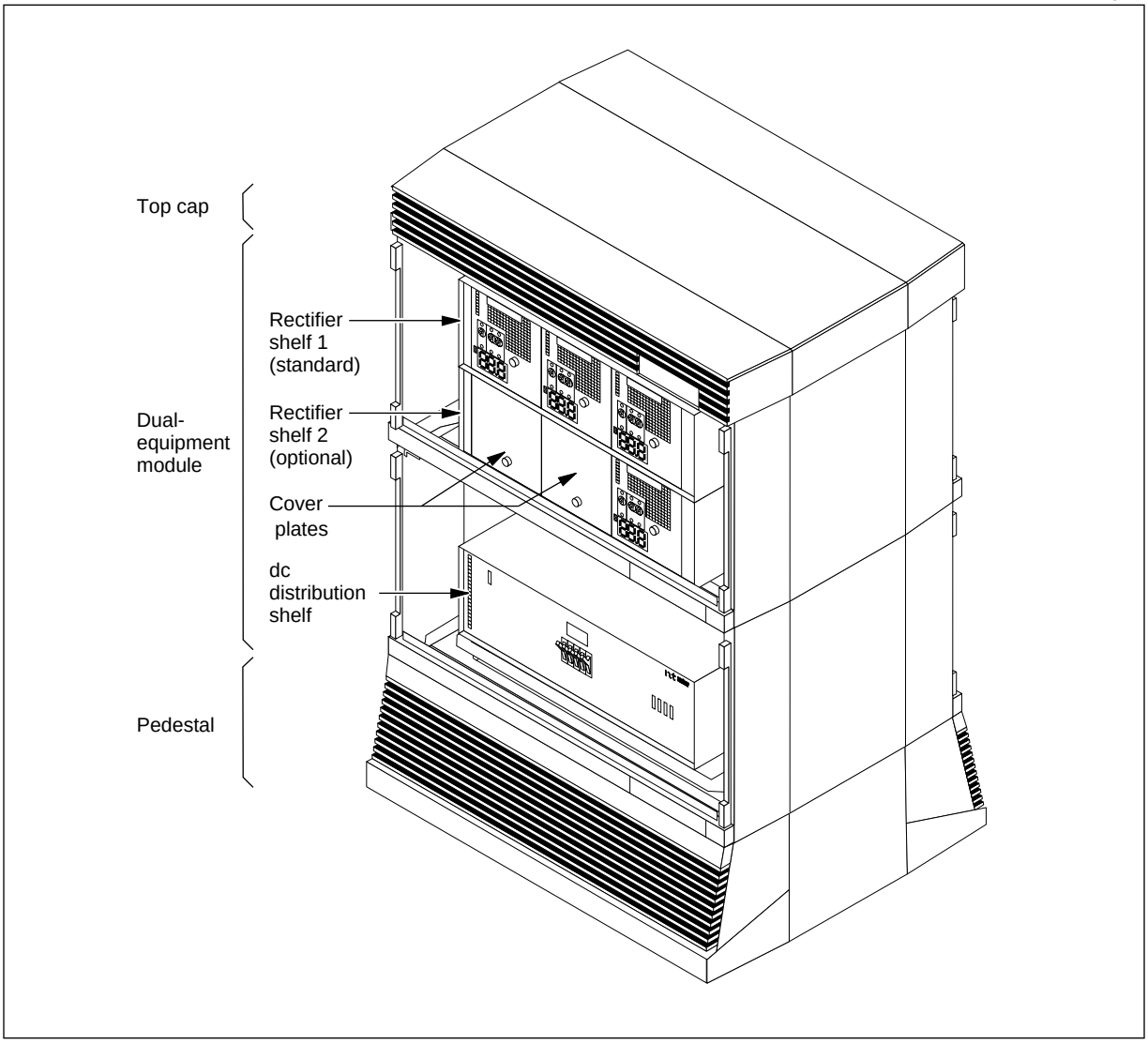
- a top cap
- a dual equipment module (DEM) that contains a dc distribution shelf and up to two rectifier shelves
- a pedestal that contains a power distribution unit (PDU), blowers, and a filter

NT4K07AA standard MPP cabinet configuration

The NT4K07AA standard power cabinet consists of a pedestal, a top cap assembly, internal cabling and a DEM containing up to two rectifier shelves and a dc distribution panel. Figure 3-1 shows the NT4K07AA standard MPP configuration.

Figure 3-1
NT4K07AA MPP cabinet standard configuration

FW-15242



STSBM configuration

The STSBM MPP cabinet is identical in appearance to MBP cabinets. It uses the same types of equipment covers, the same seismic kit, and has an identical footprint (see Chapter 1, “Overview of the packaging option”).

When used in a subnetwork supporting an STSBM fiber ring application, an MPP is packaged in a single cabinet, as shown in Figure 3-2. This cabinet consists of the following items:

- a top cap
- a dual equipment module (DEM) that contains a dc distribution shelf and up to two rectifier shelves
- a pedestal that contains a power distribution unit (PDU) and an air filter
- two battery equipment modules (BEMs) that each contain space for a string of back-up batteries. The string consists of four batteries connected in series

MPP cabinet for an VTBM configuration

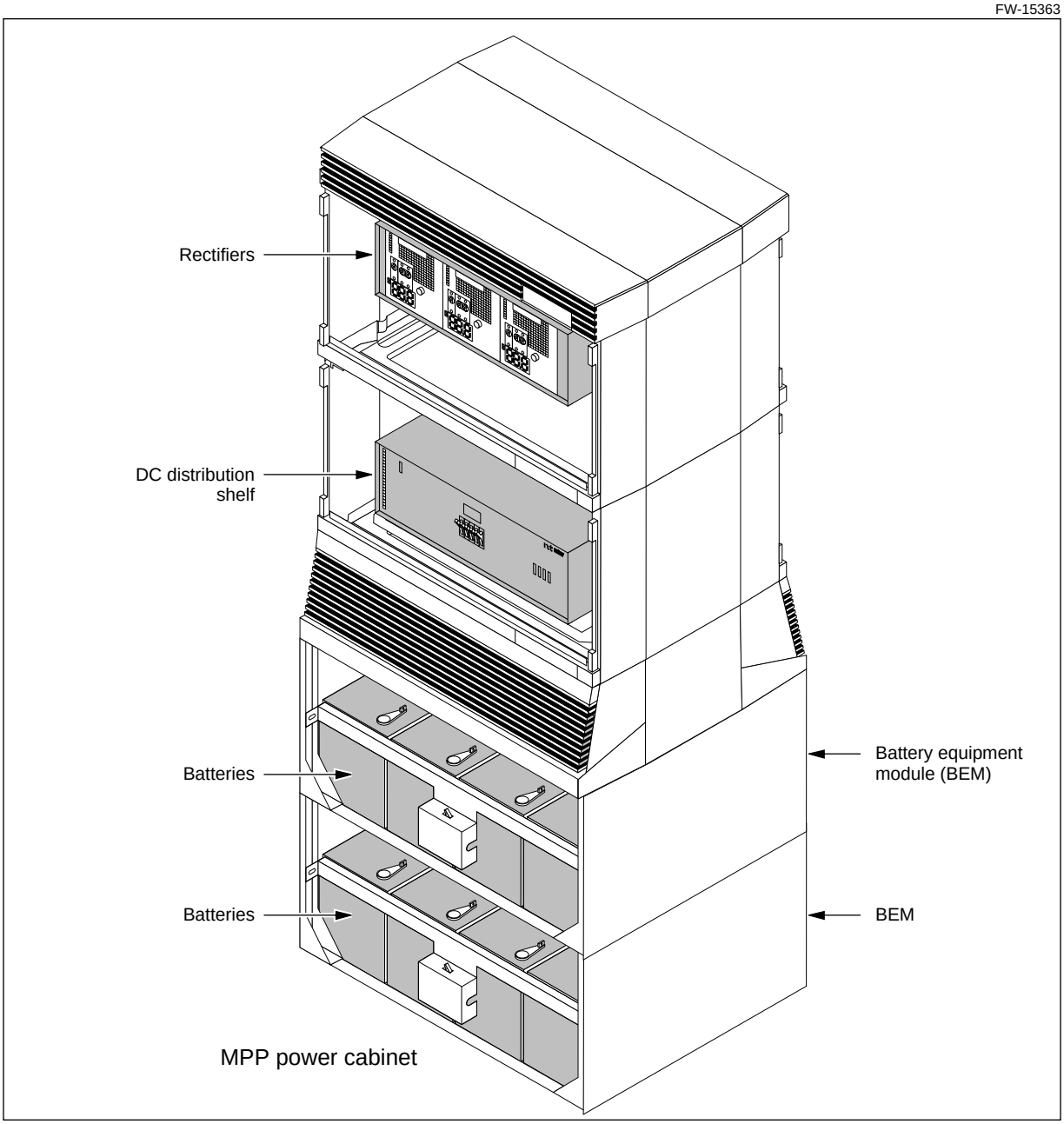
The MPP cabinet is not used in OC-12 VTBM fiber ring applications. Battery back-up and dc power is supplied internally by the master and expansion cabinets in these applications.

NT4K07BA/BB STSBM OC-12 fiber ring MPP cabinet configuration

The NT4K07BA Zone 2 MPP cabinet consists of two battery equipment modules, a pedestal, a top cap assembly, internal cabling and a DEM containing up to two rectifier shelves and a dc distribution panel. Figure 3-2 shows the NT4K07BA STSBM OC-12 fiber ring MPP configuration. The NT4K07BB Zone 4 MPP cabinet is identical to the NT4K07BA MPP except that it is Zone 4 compliant.

Figure 3-2
NT4K07BA/BB MPP cabinet STSBM configuration

FW-15363



Shelf modules for MPP cabinets

The shelf modules used in MPP cabinets are installed in the equipment modules. The following shelf modules can be installed in an MPP cabinet depending on the application and configuration ordered:

- NT5C10CC rectifier shelf
- NT5C06CA rectifier
- NT6C14JA dc distribution shelf
- Batteries for back-up dc power

Rectifier shelf

The NT5C10CC factory-installed rectifier shelf (rectifier shelf 1), located in the top of the MPP cabinet, provides mounting space for up to three NT5C06CA MPR-25A rectifiers (see Figure 3-3). The second rectifier shelf (rectifier shelf 2) used for n+1 redundancy, installed just underneath rectifier shelf 1, can only be equipped with one MPR-25 rectifier module installed in the right-most shelf position. The other two positions (middle and left-most) must be installed with blank cover plates.

The NT5C10CC rectifier shelf provides mounting space for up to three MPR-25 modular rectifiers. It provides the connection points for the commercial 208-230 V ac input to the system.

In most applications, the rectifier shelf is mounted in the MPP cabinet. In OC-12 VTBM (NT4K06ED) cabinet applications, the rectifier shelf is mounted in the MBP master cabinet.

> ***Note:*** Rectifier shelf position numbering is from top to bottom. That is, rectifier 1 shelf 1 (standard) is mounted in the upper-most position and rectifier shelf 2 (optional) is in the lower position.

MPR-25 rectifiers

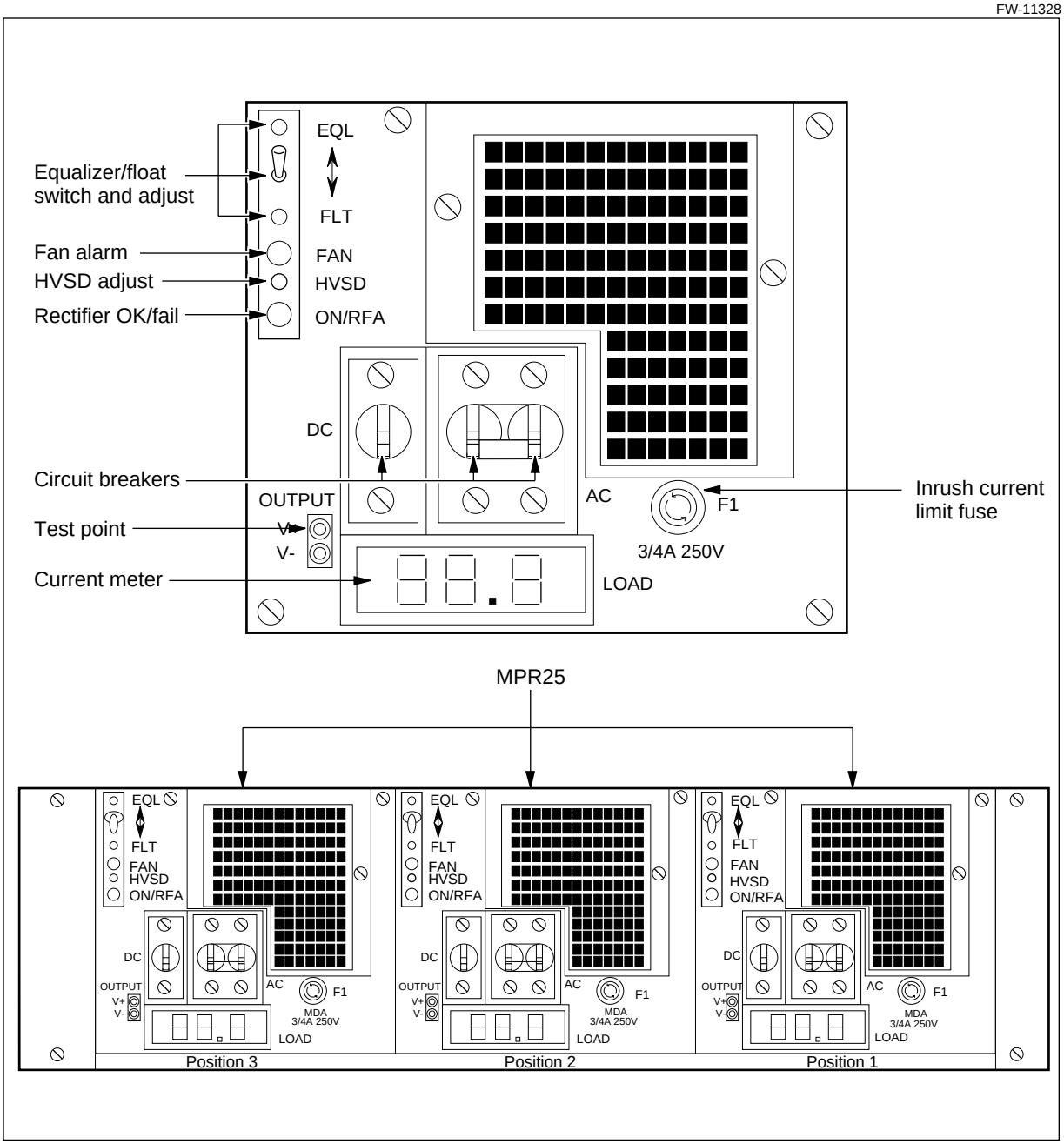
The NT5C06CA rectifiers (see Figure 3-3) convert a commercial source of 208-230 V ac to a nominal -48 V dc to power the AccessNode and peripheral equipment. The rectifiers also provide battery charging current for back-up batteries.

Modular in design, the rectifiers are used in a load sharing configuration. Up to three rectifiers can be installed in the first rectifier shelf. If two rectifier shelves are used, only one rectifier can be installed in position 3 of the second rectifier shelf.

> ***Note:*** Rectifier position numbering is from right-to-left as viewed from the front of the shelf. That is, rectifier 1 is in the right-most position of rectifier shelf 1.

Figure 3-3
NT5C10CC rectifier shelf with three MPR-25 rectifiers

FW-11328



DC distribution shelf NT6C14JA

The NT6C14JA dc distribution shelf (see Figure 3-4) is the location of the interconnection between the rectifiers and the system batteries.

In most applications, the dc distribution shelf is mounted in the MPP cabinet. In OC-12 VTBM (NT4K06ED) cabinet applications, the dc distribution shelf is not used.

The shelf is equipped with 12 pairs of Anderson Power pole connectors as follows:

- six pairs of connectors for connecting the load to the MPP 48 V dc power source
  - — four for supplying power to the master MBP cabinet
  - — one for powering the cooling unit in the pedestal of the MPP cabinet
  - — one for supplying power to external customer equipment
- six pairs of connectors rated at 120 A for connecting strings of backup storage batteries

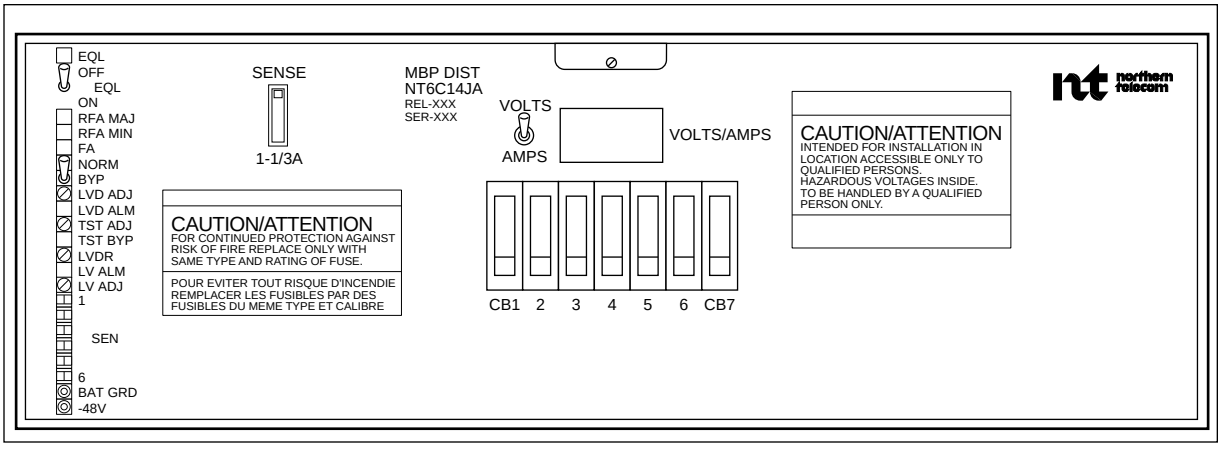
  Note: The Standard MPP system does not include a backup battery string, but allows connection to a customer-provided external battery string. The STSBM MBP includes back-up battery mounting space.one. For more information, see *Addendum 1 (MBP), Site Installation Planning and Engineering*, 323-3001-200.

The 12 pairs of Anderson Power pole connectors are pre-wired to a pair of terminal blocks located at the rear of the MPP cabinet.

The dc distribution shelf contains a monitor card that generates an alarm if a rectifier fails or if a circuit breaker opens and is available with a standard analog interface for alarms.

Figure 3-4
DC distribution shelf NT6C14JA

FW-11100



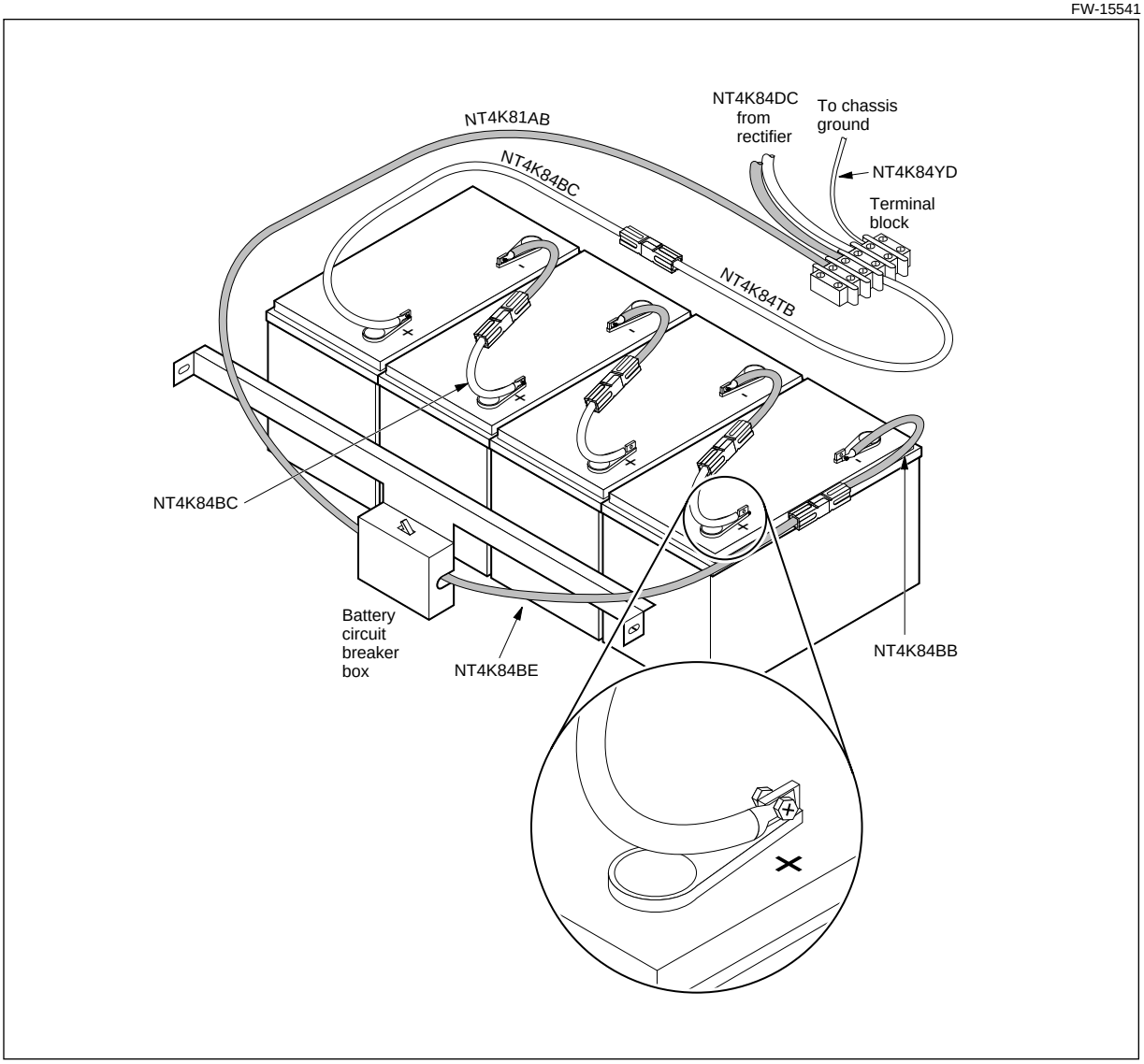
Batteries

Backup batteries (see Figure 3-5) can be installed in the MPP cabinets used in the STSBM OC-12 fiber ring application. Other applications provide different means of supplying back-up battery capability to the equipment.

- In standard MPP configurations, the battery back-up must be located external the MBP/MPP system.
- In STSBM OC-12 fiber ring configurations, back-up batteries can be installed in the MPP cabinet.
- In VTBM OC-12 fiber ring configurations, the MPP cabinet is not used because back-up batteries can be installed in both the MBP master and MBP expansion cabinets.

Figure 3-5
Batteries in the MPP STSBM cabinets

FW-15541



Cabinet line-ups

The AccessNode modular business package (MBP) remote fiber terminal (RFT) power, master and expansion cabinets can be lined up in different arrangements to meet the needs of many applications.

Cabinet arrangements

The cabinets are aligned and mounted from left to right (as viewed at the front of the cabinets) as follows:

- MPP cabinet (if installed)
  - — The MPP cabinet may be remote from the MBP master cabinet, that is, it may be installed up to 7.6 m (25 ft) away from the master cabinet. However, the MPP cabinet must be attached to the master MBP cabinet if the system is installed in an unrestricted area. The MPP cabinet can be attached or remote if the system is located in a restricted area, that is, a locked area to which only authorized personnel can gain access.
- MBP master cabinet
- MBP expansion cabinet
  - — The MBP master and expansion cabinets must be co-located, that is, they must be mounted side-by-side and joined with an expansion kit.

The different arrangements accommodate the following applications:

- multiplexer
- universal
- integrated
- synchronous transport signal bandwidth manager (STSBM)
  OC-12 fiber rings
- virtual tributary bandwidth manager (VTBM)
  OC-12 fiber rings

The following sections describe the typical cabinet line-ups for MBP applications. Due to the modularity and flexibility of the MBP system, all possible configurations and arrangements cannot be covered here. Your specific MBP system may vary according to the equipment ordered for your application.

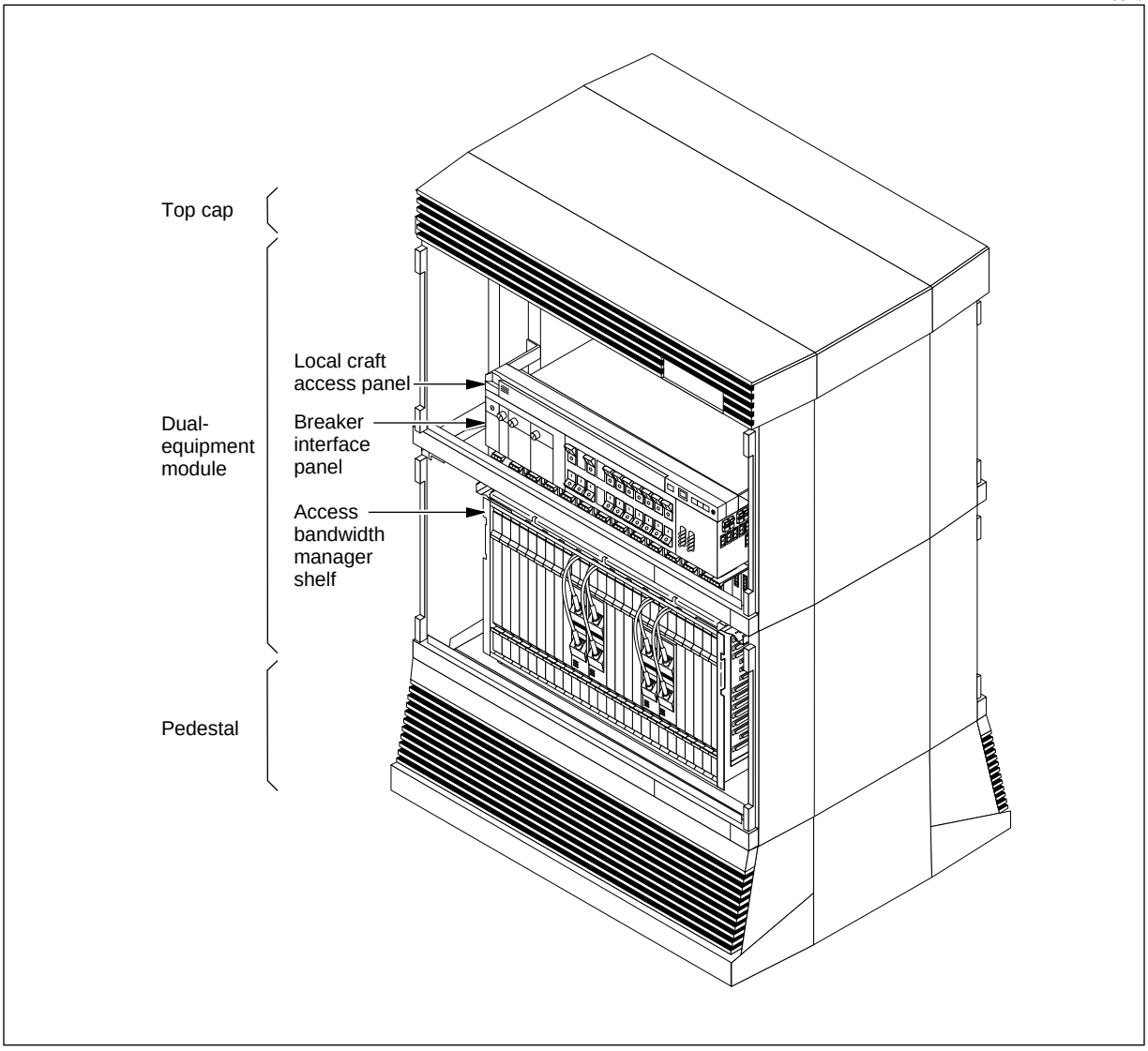
RFT for a multiplexer arrangement

When used in a subnetwork supporting a multiplexer application, an MBP-housed RFT is packaged in a single MBP master cabinet arrangement, as shown in Figure 4-1. This cabinet consists of the following items:

- a top cap
- a dual equipment module (DEM) that contains an NT4K16 local craft access panel (LCAP), an NT4K14 breaker interface panel (BIP), and an access bandwidth manager (ABM) shelf
- a pedestal that contains a power distribution unit (PDU), blowers, and a filter

Figure 4-1
MBP master cabinet configuration used as an RFT supporting a multiplexer application

FW-15320



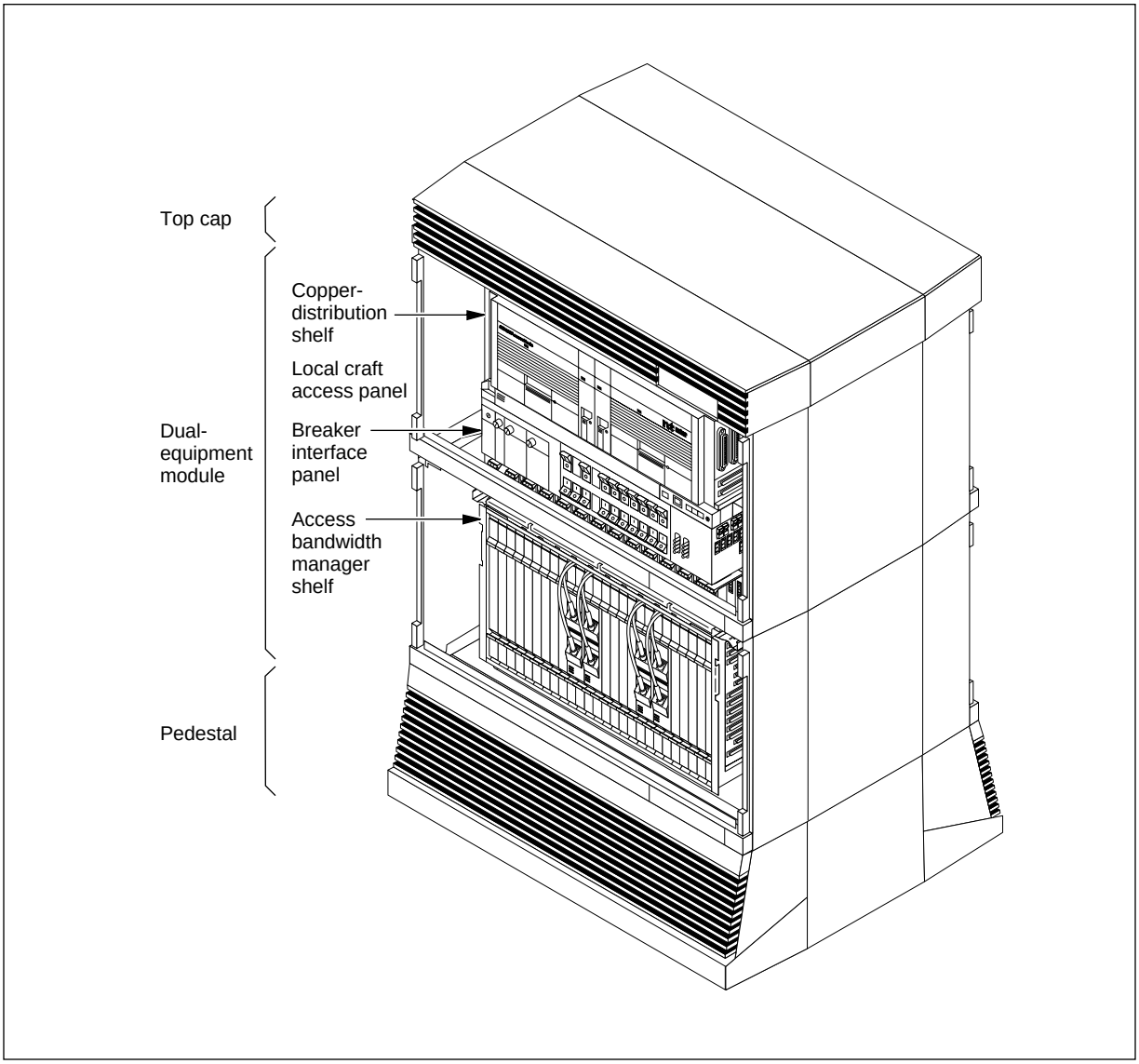
RFT handling 96 lines

An RFT capable of handling up to 96 2-wire subscriber lines can be contained in a single MBP master cabinet. This configuration is similar to the configuration used to support a multiplexer application, except for pack fill changes in the access bandwidth manager shelf, cabling changes, the addition of a single copper-distribution shelf, and the addition of a common-equipment plenum spacer. This copper-distribution shelf is installed in the DEM, above the LCAP, as shown in Figure 4-2.

The optional standard MPP cabinet can be added to provide -48 V dc power.

Figure 4-2
MBP standard master cabinet configuration supporting 96 lines

FW-15321



RFTs handling up to 672 lines

The modular construction of MBP cabinets allows flexibility in constructing configurations that support up to 672 2-wire (2W) subscriber lines (see Figure 4-3, Figure 4-4, and Figure 4-5). These configurations are constructed by adding single equipment modules (SEMs) to the system. Each SEM can contain one or two CDS shelves. Each CDS can support up to 96 2-wire lines.

Power cabinet for dc distribution

The MPP power cabinet or a customer-provided external -48 V dc source is required to power the STSBM master and expansion cabinets. The MPP cabinet may be attached or remote by up to 7.6 m (25 ft) away from the master cabinet.

Master cabinet for copper-distribution shelves

Up to two SEMs can be included in a single-cabinet configuration. This allows the MBP master cabinet to contain up to five CDS shelves (two CDS shelves in each of the two single equipment modules and one CDS shelf in the dual equipment module), and support up to 480 2-wire subscriber lines. Figure 4-3 shows a single-cabinet 480-line MBP configuration containing five CDS shelves.

Expansion cabinet for copper-distribution shelves

A third SEM containing up to two CDS shelves can be included in the system to bring the number of CDS shelves to seven and allow the system to support up to 672 2W lines. The third SEM is contained in an expansion cabinet. The expansion cabinet is attached to the master cabinet, and is on the right of the master cabinet when the system is viewed from the front.

Figure 4-4 on page 4-6 shows a two-cabinet MBP configuration in which the master cabinet has five CDS shelves and the expansion cabinet has two CDS shelves.

Other arrangements of the SEMs are possible. It is not necessary for the master cabinet to contain two SEMs with CDS shelves. In one alternative arrangement, the master cabinet contains only one SEM, and the expansion cabinet contains two SEMs. In this arrangement there would be three CDS shelves in the master cabinet and four in the expansion cabinet. Figure 4-5 on page 4-7 shows this configuration.

> ***Note:*** If seismic anchors are required for the MBP, then the arrangement with the three-tier master cabinet (Figure 4-5) should be chosen rather than the arrangement with the four-tier master cabinet (Figure 4-4). Seismic anchors are available for cabinets up to three tiers tall, but not for taller cabinets.

Figure 4-3
MBP standard master cabinet configuration supporting 480 lines

FW-15322

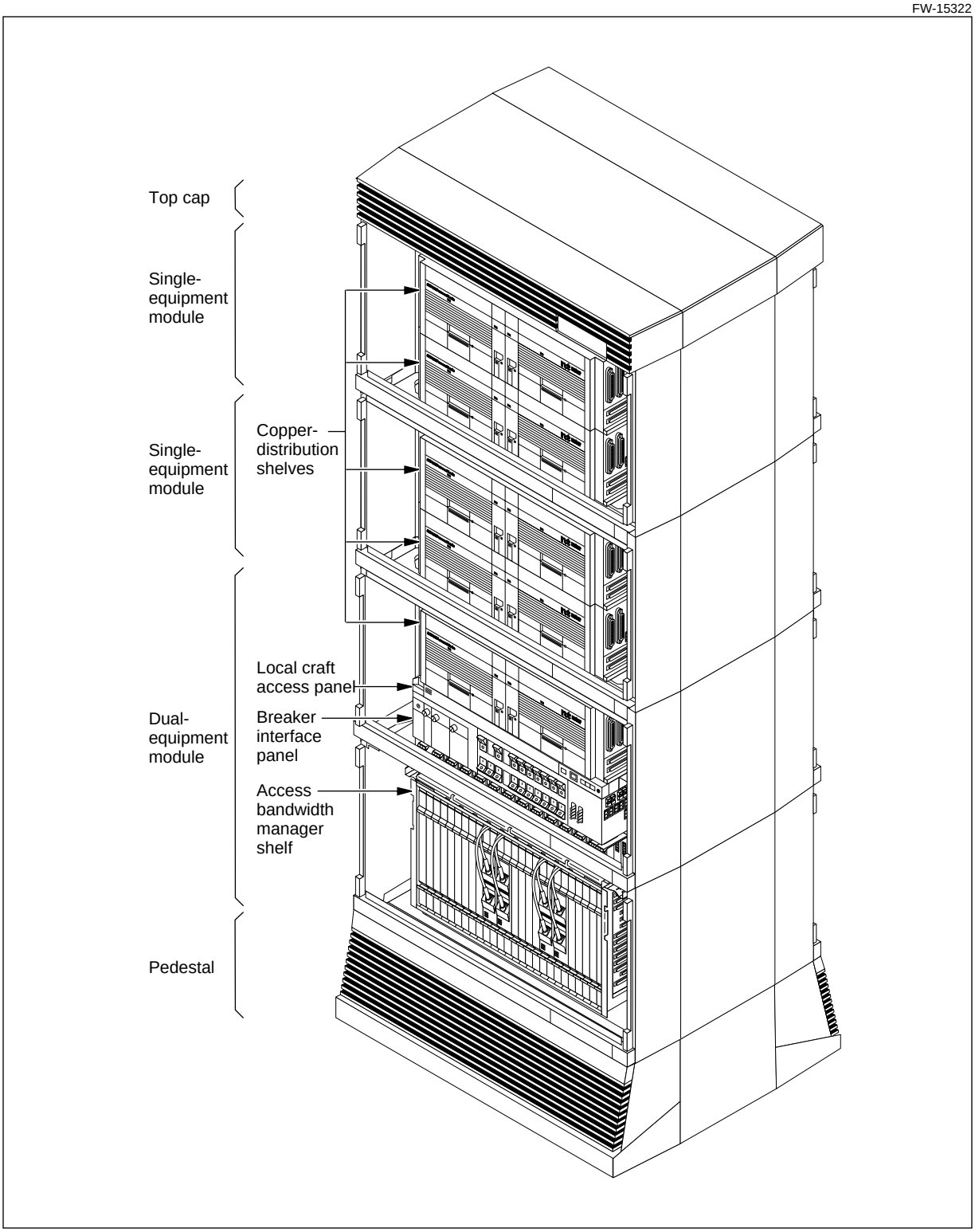


Figure 4-4
MBP standard two-cabinet configuration supporting 672 lines

FW-15323

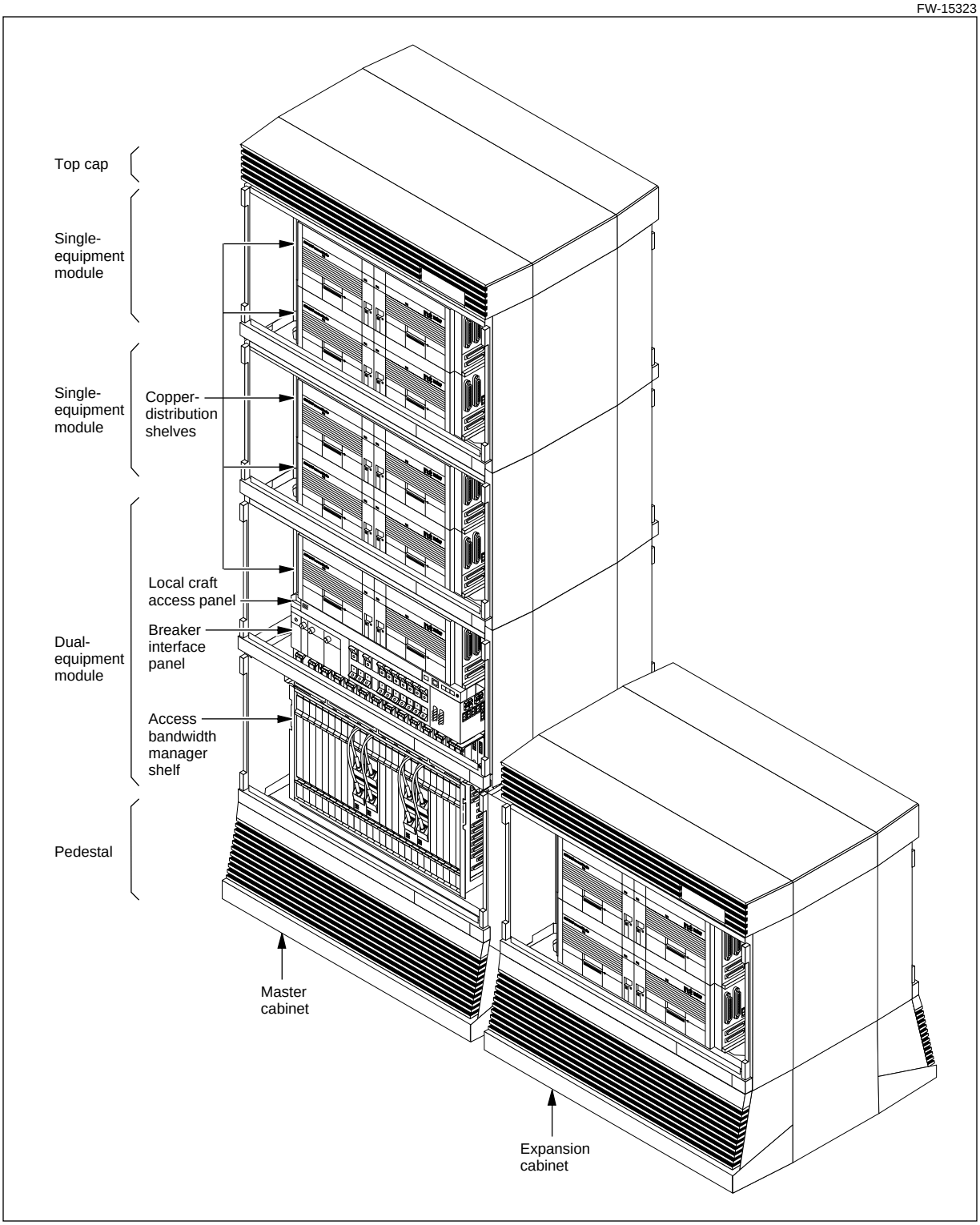
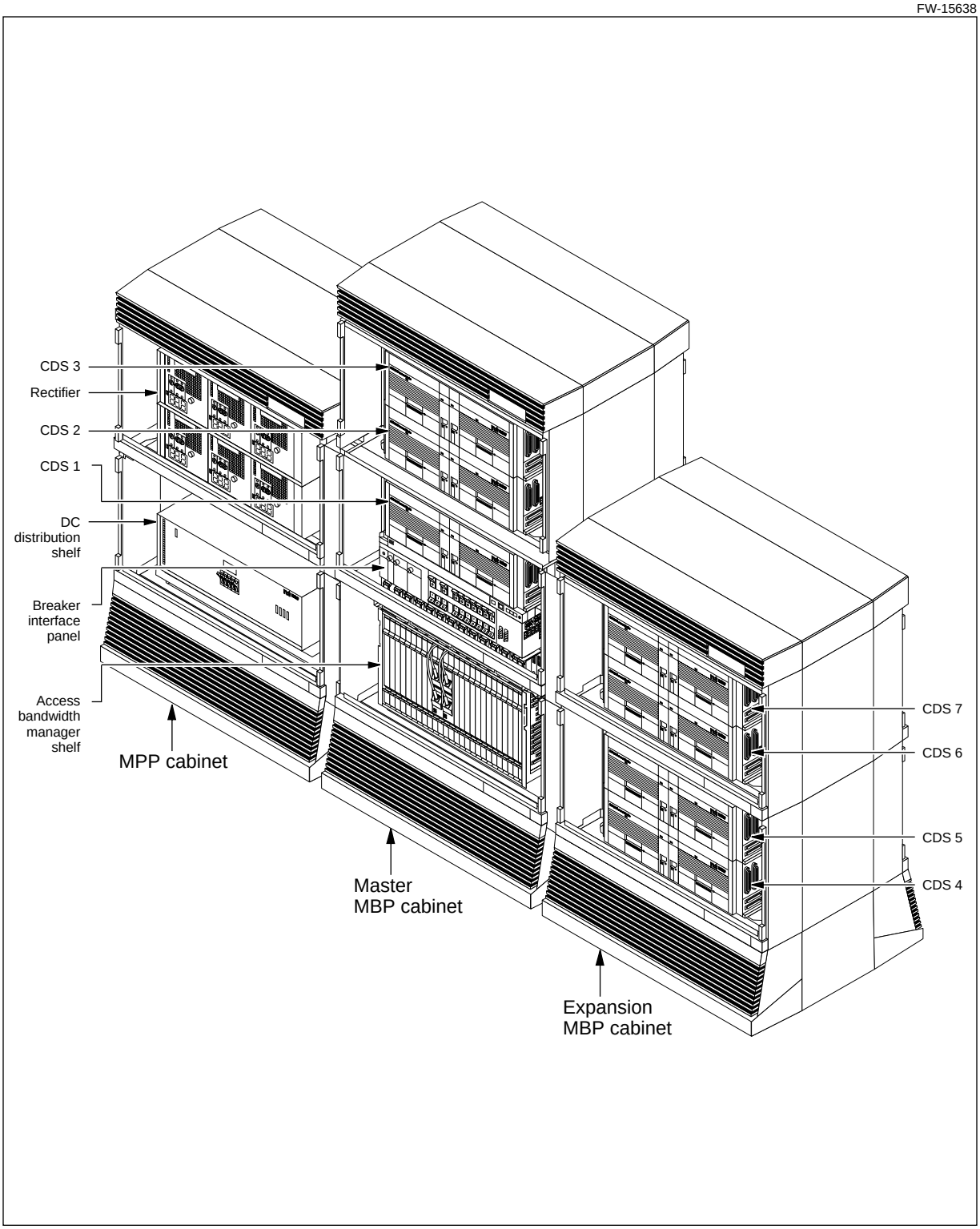


Figure 4-5
Alternate MBP standard cabinet configuration supporting 672 lines

FW-15638



STSBM OC-12 fiber ring RFTs handling up to 672 lines

The modular construction of the modular business package cabinets allows flexibility in constructing OC-12 Synchronous transport signal bandwidth manager (STSBM) configurations that support up to 672 2-wire (2W) subscriber lines (see Figure 4-6). These configurations are constructed by adding CDSs to the system. Each CDS can support up to 96 lines of DS0 services.

Power cabinet for dc distribution

The MPP power cabinet or a customer-provided external -48 V dc source is required to power the STSBM master and expansion cabinets. The MPP cabinet may be attached or remote by up to 7.6 m (25 ft) away from the master cabinet.

Master cabinet for copper-distribution shelves

Up to two CDSs can be included in a single STSBM OC-12 fiber ring configuration master cabinet. This allows 192 lines of DS0 services, in a single master cabinet.

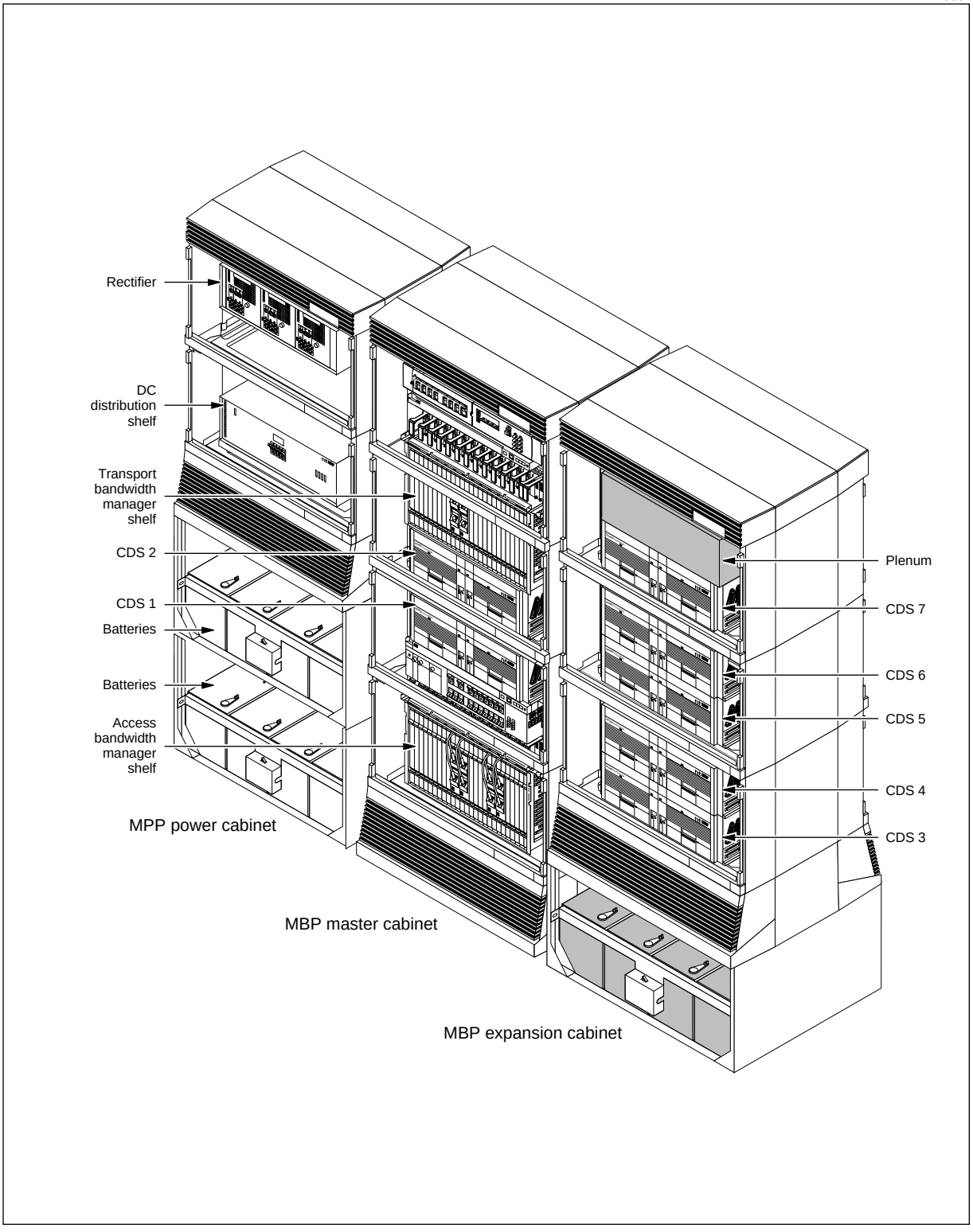
Expansion cabinet for copper-distribution shelves

An expansion cabinet containing up to five CDS shelves can be included in the MBP STSBM configuration to bring the maximum number of CDS shelves to seven and allow the system to support up to 672 2W lines. The expansion cabinet is the same one used in the VTBM MBP applications,

The expansion cabinet is attached to the master cabinet, and is mounted on the right of the master cabinet when the system is viewed from the front.

Figure 4-6
MBP STSBM ring configuration containing seven copper-distribution shelves

FW-15632



VTBM fiber ring RFTs handling up to 672 lines

The modular construction of MBP cabinets allows flexibility in constructing OC-12 virtual tributary bandwidth manager (VTBM) configurations that support up to 672 2-wire (2W) subscriber lines (see Figure 4-7). These configurations are constructed by adding single-equipment modules (SEMs) to the system. Each SEM can contain one or two CDS shelves. Each CDS shelf can support up to 96 2-wire lines.

> ***Note:*** The MPP power cabinet is not used in the VTBM fiber ring configuration. The master cabinet contains the rectifier, dc distribution and back-up battery equipment and the expansion cabinet can contain additional back-up batteries.

Master cabinet for copper-distribution shelves

Two BEMs are included in a single-cabinet VTBM configuration to provide battery back-up and dc power distribution to the AccessNode equipment. This allows the MBP master cabinet to contain up to two CDS shelves and support up to 192 2-wire subscriber lines in a self-contained unit.

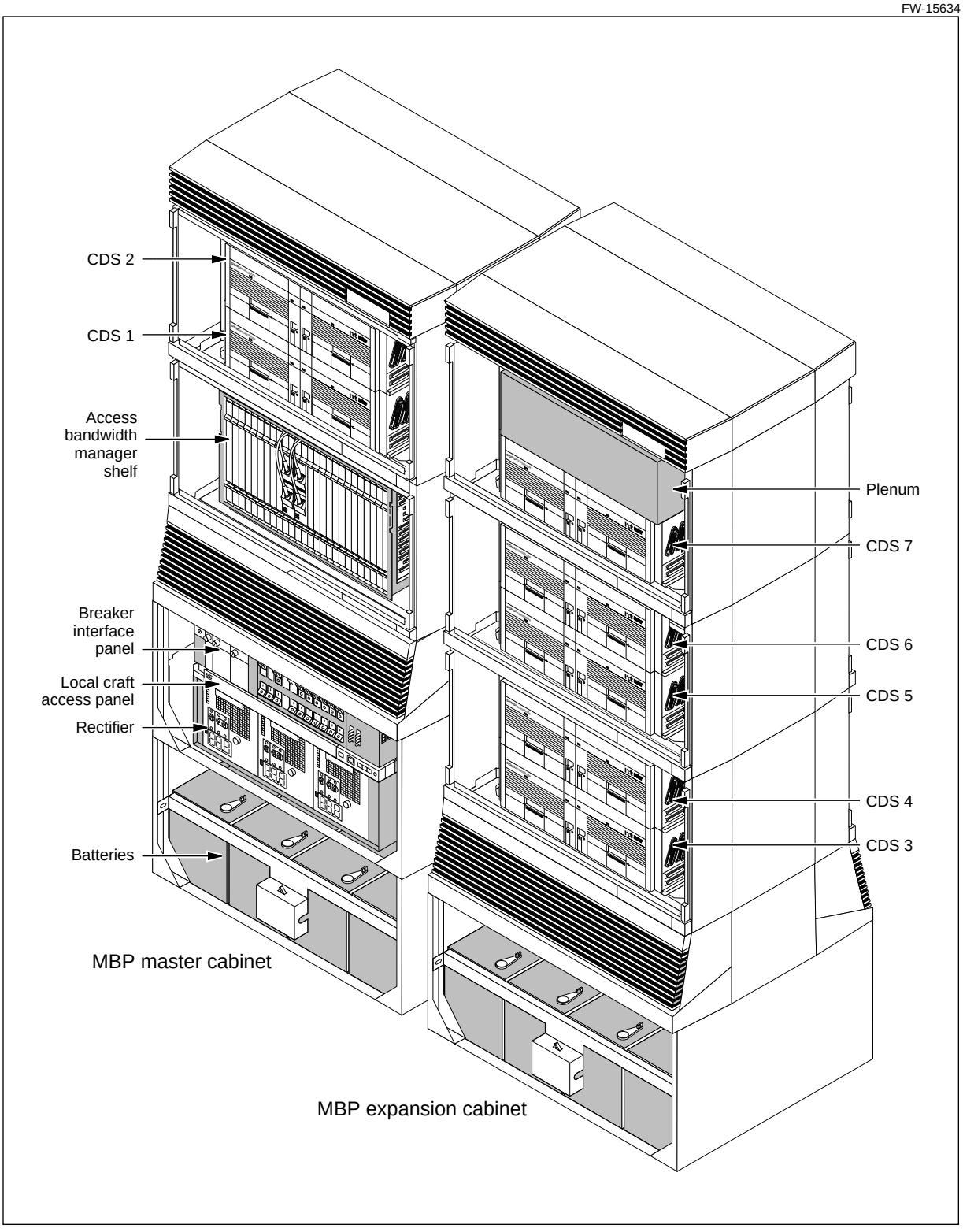
Expansion cabinet for copper-distribution shelves

An expansion cabinet containing up to five CDS shelves can be included in the MBP VTBM configuration to bring the maximum number of CDS shelves to seven and allow the system to support up to 672 2W lines. The expansion cabinet also includes a BEM for battery back-up to provide sufficient battery back-up power for the additional CDSs.

The expansion cabinet is attached to the master cabinet on the right-hand side of the master cabinet when the system is viewed from the front.

Figure 4-7
MBP VTBM ring configuration containing seven copper-distribution shelves

FW-15634



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AccessNode

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