

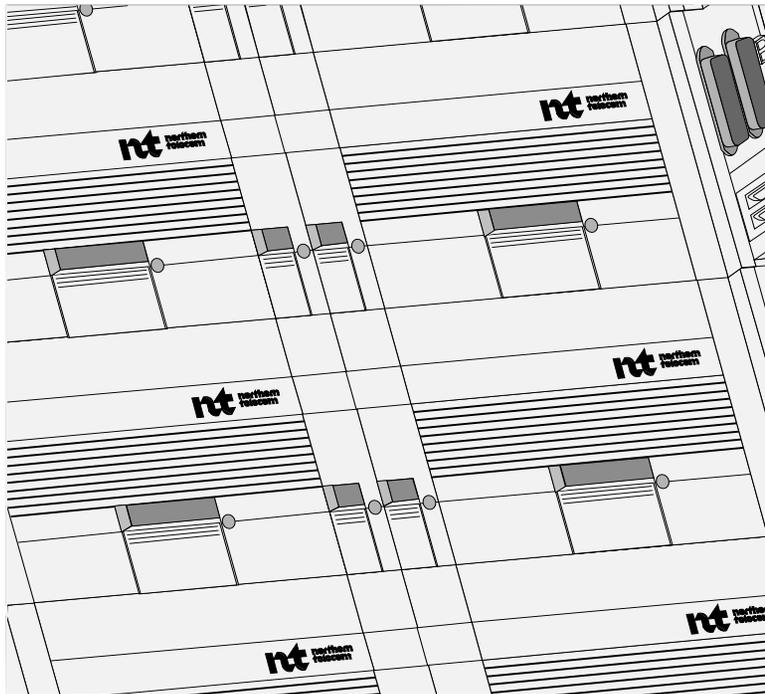
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SONET Products

AccessNode

ABM Bay Cable Connection Quick Reference Guide

Issue 1.0 February 1999



Front cover

NORTEL
NETWORKS™

SONET Products

AccessNode

ABM Bay Cable Connection Quick Reference Guide

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Title page

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June 1998

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February 1998

AN14 Standard release of the document.

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About this document

This document presents the essential cabling and connection information for access bandwidth manager (ABM) bays in all configurations. It is a quick reference to help installers in planning the installation of an ABM bay.

Note: This document should be used to support the *Bay in Central Office Installation Manual - ABM*, 323-3001-201, in the AccessNode documentation suite (separately bound).

Audience

Users of this document should be familiar with the job specifications for the ABM bay application and configuration they are installing. Users should also know telecommunications industry installation practices and be familiar with the tools required to complete the tasks.

Related documentation

For additional information related to the ABM bay and its applications and configurations, see the following documents:

Engineering, Configuration, and Ordering Guide, Volume 1

- *Engineering and Ordering Information*, 323-3001-032
- *Mapper Layouts Planning Guide*, 323-3001-154
- *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

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AccessNode Express volume, separately bound

- *AccessNode Express Customer Ordering Guide*, 323-3051-032
- *AccessNode Express Configuration and Equipment Description*, 323-3051-100

ABM bay ac power requirements

This chapter describes the ac power requirements for the access bandwidth manager (ABM) bay.

Note: For complete information on the ac power requirements of the ABM bay, see *Site Installation Planning and Engineering*, 323-3001-200 in the *Engineering, Configuration, and Ordering Guide*, Volume 1.

AC power grounding environments

The ABM bay can be used in both isolated bonding network (IBN) and common bonding network (CBN) grounding environments. For CBN environments, Nortel Networks recommends that you use a dedicated ac panel for feeding communication equipment and utility receptacles. For IBN grounding environments, you must use a dedicated ac panel for feeding communication equipment and utility receptacles.

AC power feed requirements

The sizes of ac entrance and distribution feed cables must conform with information given in national electrical codes, as follows:

- For the United States: Table 250-94, of the National Electrical Code (NEC)
- For Canada: Table 17, of the Canadian Electrical Code (CEC)

Unless otherwise specified by the operating company or local electrical codes, the preferred wiring is metal-clad flexible cable.

The ac distribution panel and cabling must be installed by a licensed electrician in accordance with the national and local codes.

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Utility receptacles (ac)

Utility ac receptacles can be installed on the AccessNode bays or on the walls of the installation room, and can be of one of the two following types:

- standard receptacle for 3 conductors (Neutral, Line 1, and Line 2) and ac equipment ground (ACEG). Use insulated metal-clad cable with 4 conductors: L1, L2, N, and ACEG
- isolated-ground receptacle (orange) for 4 conductors (L1, L2, N, and dedicated ACEG). Use insulated metal-clad cable with 5 conductors: L1, L2, N, dedicated ACEG and ACEG.

Boxes for receptacles installed on the bays can either be bolted directly to the bays or can be mounted on insulators to isolate them from frame ground.

Unless otherwise specified by the operating company or by local codes, the preferred method is to use standard 3-conductor receptacles, and when the receptacles are mounted on the bays, to use receptacle boxes that are not isolated from frame ground.

Receptacles (ac) in a CBN

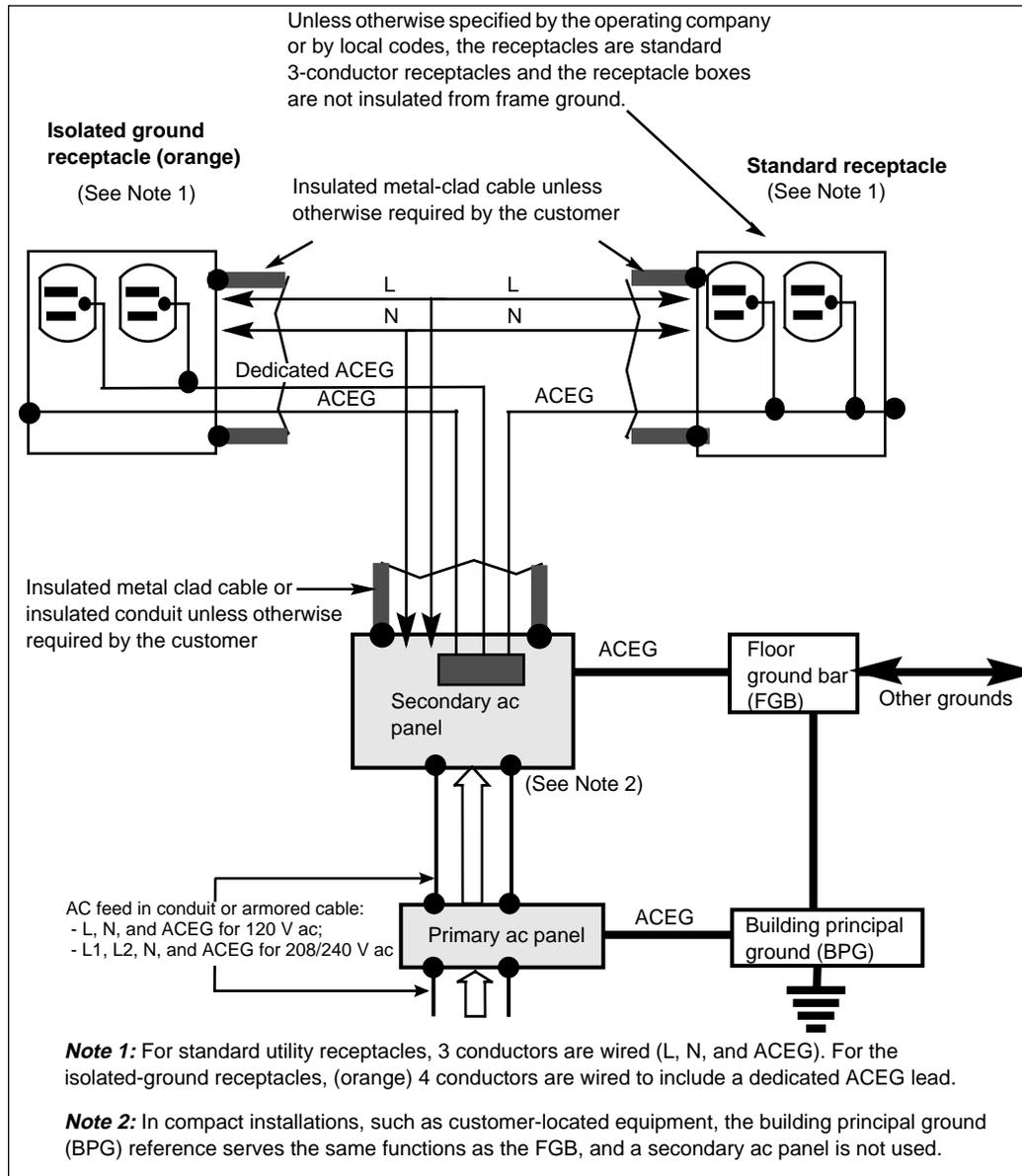
In a CBN, receptacles on the bays or on the walls of the installation room should be bonded to the same floor ground bar (FGB) as the AccessNode. For an illustration of the grounding scheme for ac receptacles in a CBN, see Figure 1-1 on page 1-3.

Receptacles (ac) in an IBN

In an IBN, Nortel Networks recommends that you bond the utility receptacles that are mounted on the bays to the single point ground (SPG). Also, you should bond receptacles that are mounted on the walls of the installation room within 2 m (7 ft) of the bays to the SPG. If they are not bonded to the SPG, the receptacles must be further than 2 m (7 ft) from the bays. For an illustration of the grounding scheme for ac receptacles in an IBN, see Figure 1-2 on page 1-4.

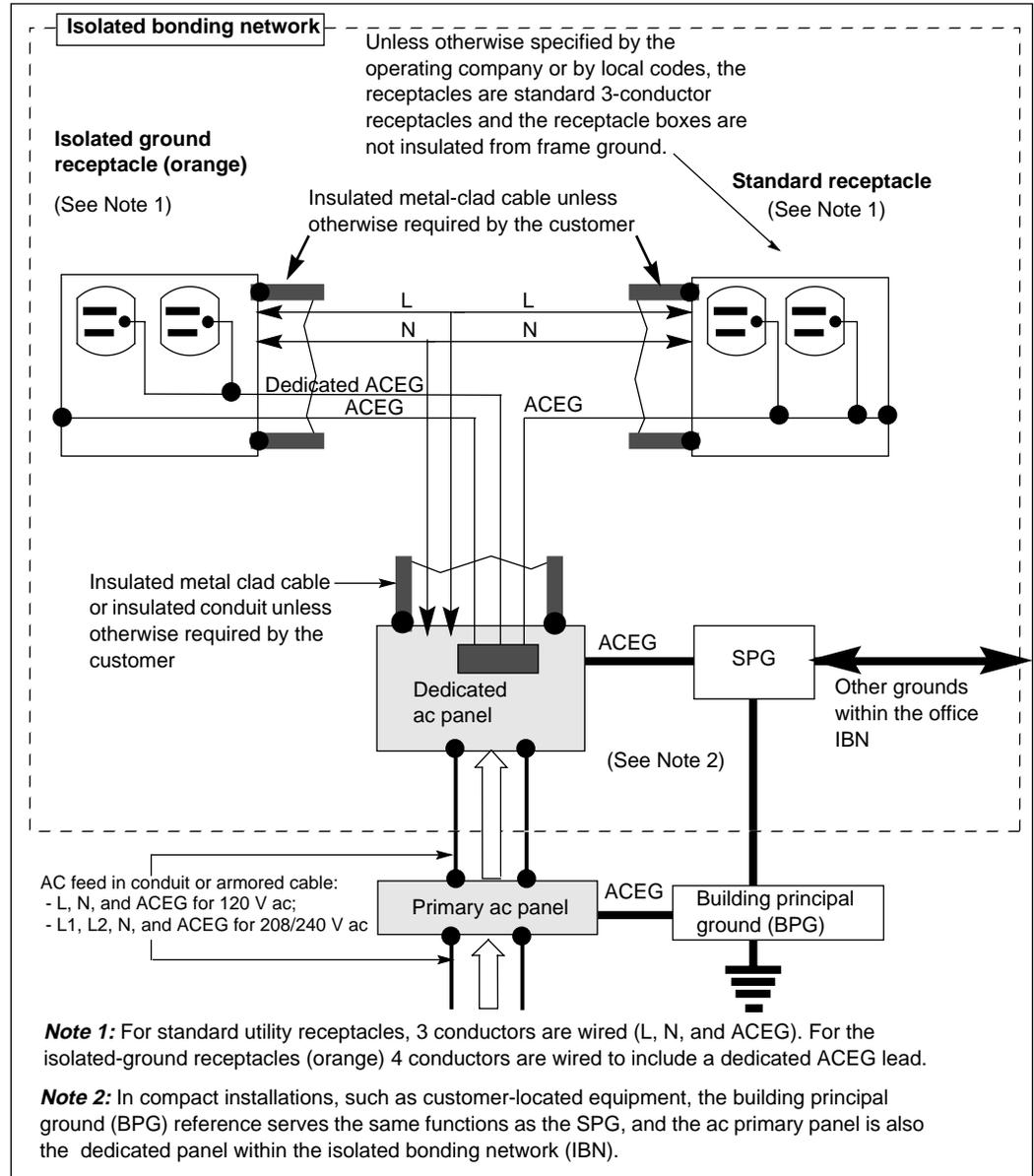
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Figure 1-1
CBN ac power distribution and utility receptacle ground wiring scheme



Left even

Figure 1-2
IBN ac power distribution and utility receptacle ground wiring scheme



ABM bay grounding schemes

This chapter describes grounding schemes for an access bandwidth manager (ABM) bay.

Note: For complete information about the grounding requirements of the ABM bay, see “Power and ground distribution” in *Site Installation Planning and Engineering*, 323-3001-200, in the *Engineering, Configuration, and Ordering Guide*, Volume 1.

Grounding schemes

AccessNode equipment can be installed in a common bonding network (CBN) or in an isolated bonding network (IBN). A CBN is the most common grounding network used with transmission equipment.

With the use of line interface cards and external copper access lines, large transient currents caused by certain events, such as lightning storms, and ac or dc power line faults, can be expected to flow through the shared system grounds. The resulting disturbances can affect AccessNode and any other interconnected systems. Therefore, it is important that the shared grounding scheme, involving battery leads, ac grounding, logic ground, and frame ground, be installed correctly.

Note 1: On all external lines, first-order protection is required, as provided by gas discharge tube or carbon block protection.

Note 2: Installation according to the NT Corporate Standard 4122.00, “Grounding of Communication Systems,” is mandatory.

The following grounding schemes are shown in this chapter:

- Figure 2-1 on page 2-3 shows the use of CBN in central office locations
- Figure 2-2 on page 2-5 shows the use of CBN in remote locations
- Figure 2-3 on page 2-7 shows the use of IBN in central office locations
- Figure 2-4 on page 2-9 shows the use of IBN in remote locations

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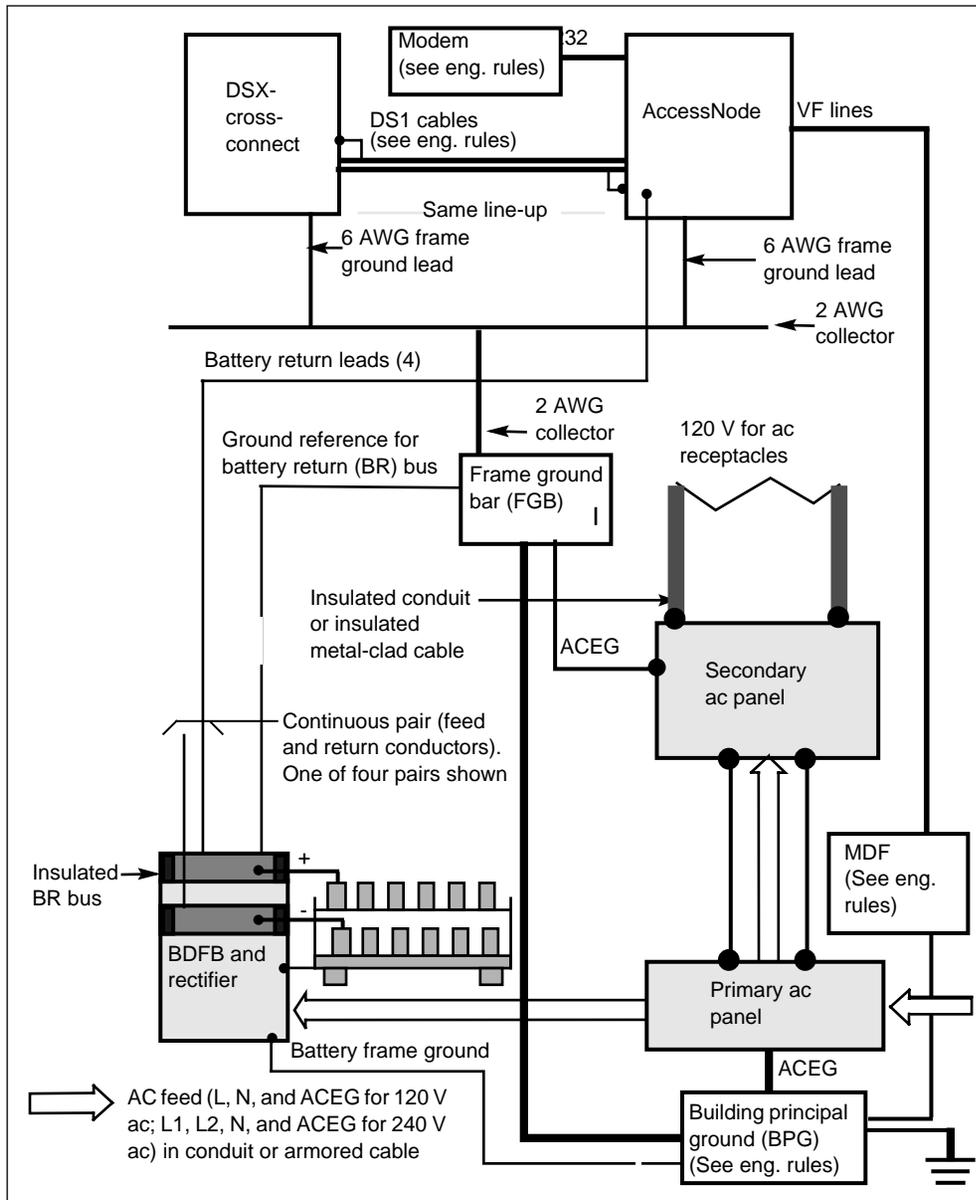
Central office CBN engineering rules

The following engineering rules and requirements apply to central office CBN grounding schemes as shown in Figure 2-1 on page 2-3:

- A modem is needed if the distance to the AccessNode terminal is more than 50 ft, if the AccessNode is located in an IBN, or if the AccessNode is in located in a different CBN.
- The transmit DS1 cable coming from the DSX-1 cross-connect is grounded at the DSX-1. The receive DS1 cable of the DSX-1 is grounded at the AccessNode.
- In small buildings, the secondary panel or the building point ground (BPG) may not exist. In such buildings, the BPG will serve as the FGB and the primary panel will serve as the secondary panel.
- In small buildings the main distribution frame (MDF) and battery rack are on the main floor and are connected to the floor ground bar (FGB). In large buildings, the MDF and battery rack are in the basement and are connected to the BPG. Any subscriber lines that exit the building must be protected by gas discharge protectors installed on the MDF and grounded to the FGB or the BPG.

Figure 2-1
Central office common bonding network grounding scheme

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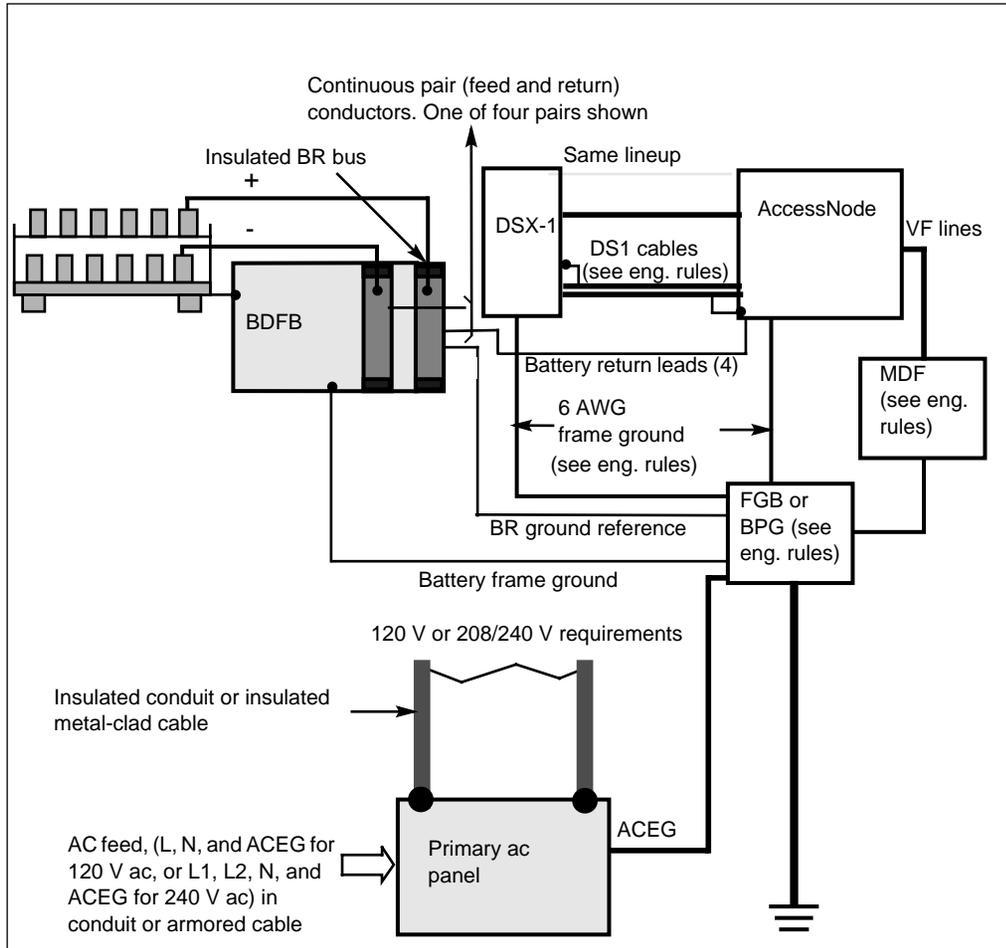
Remote CBN engineering rules

The following engineering rules and requirements apply to remote CBN grounding schemes as shown in Figure 2-2 on page 2-5:

- The transmit DS1 cable from the DSX-1 is grounded at the DSX-1. The DSX-1 receive DS1 cable is grounded at the AccessNode.
- In small buildings, the floor ground bar (FGB) does not exist. Instead, the building principle ground (BPG) serves the same function.
- In small installations, an interconnect panel can serve the same purpose as the main distribution frame (MDF). Any subscriber lines that exit the building must be protected by gas discharge protectors installed on the MDF and grounded to the FGB or the BPG.

Figure 2-2
Remote common bonding network grounding scheme

Right odd



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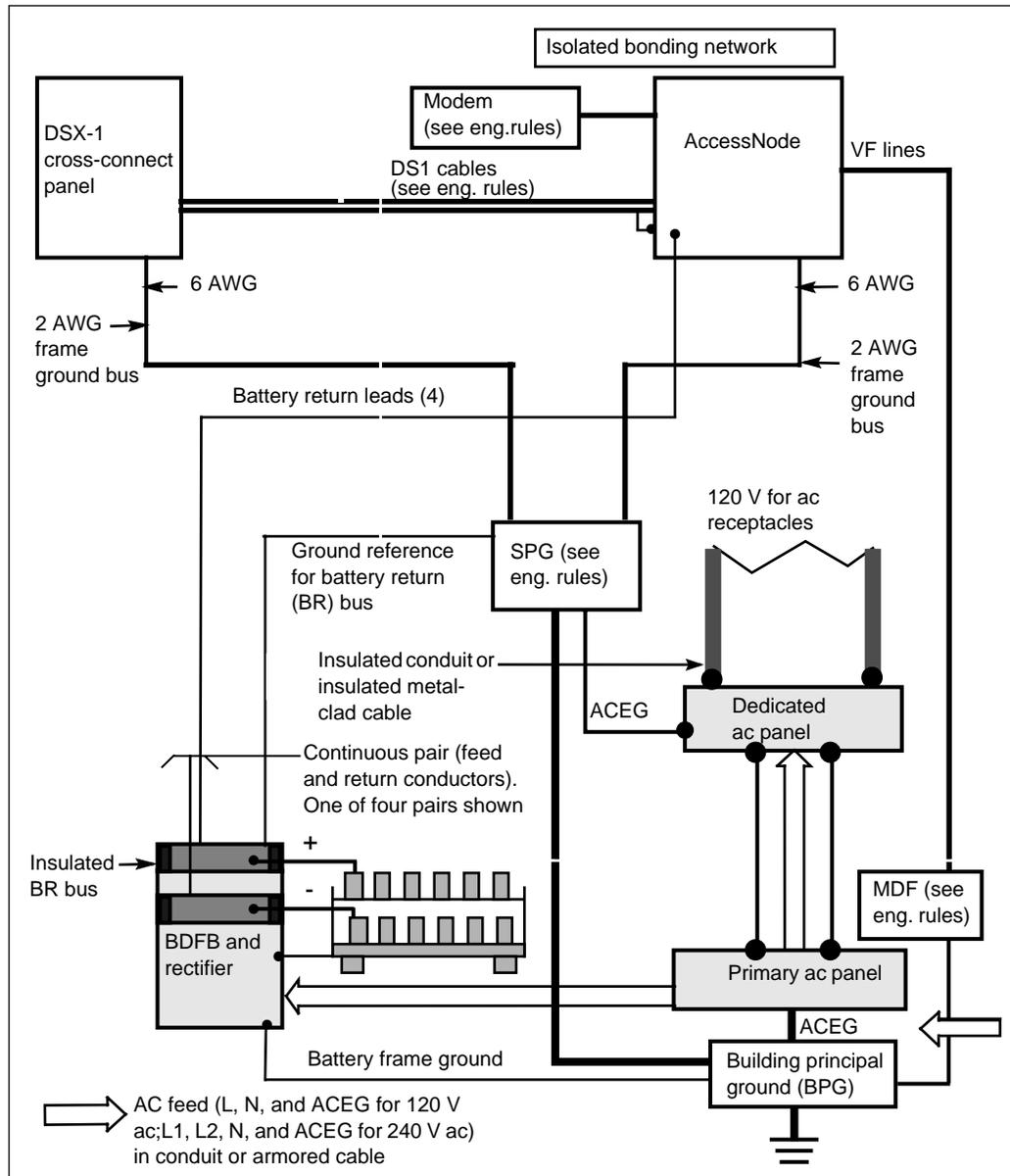
Central office IBN engineering rules

The following engineering rules and requirements apply to central office IBN grounding schemes as shown in Figure 2-3 on page 2-7:

- A modem is needed if the distance to the AccessNode terminal is more than 50 ft, if the AccessNode is located in a CBN, or if the AccessNode is in located in a different IBN.
- The transmit DS1 cable coming from the DSX-1 cross-connect is grounded at the DSX-1. The receive DS1 cable of the DSX-1 is grounded at the AccessNode.
- In small buildings the single point ground (SPG) may not exist. In such buildings, the building point ground (BPG) will serve as the SPG.
- In small buildings, the main distribution frame (MDF) and battery rack are on the main floor and are connected to the SPG. In large buildings, the MDF and battery rack are in the basement and are connected to the BPG. Any subscriber lines that exit the building must be protected by gas discharge protectors installed on the MDF and grounded to the SPG or the BPG.

Figure 2-3
Central office isolated bonding network grounding scheme

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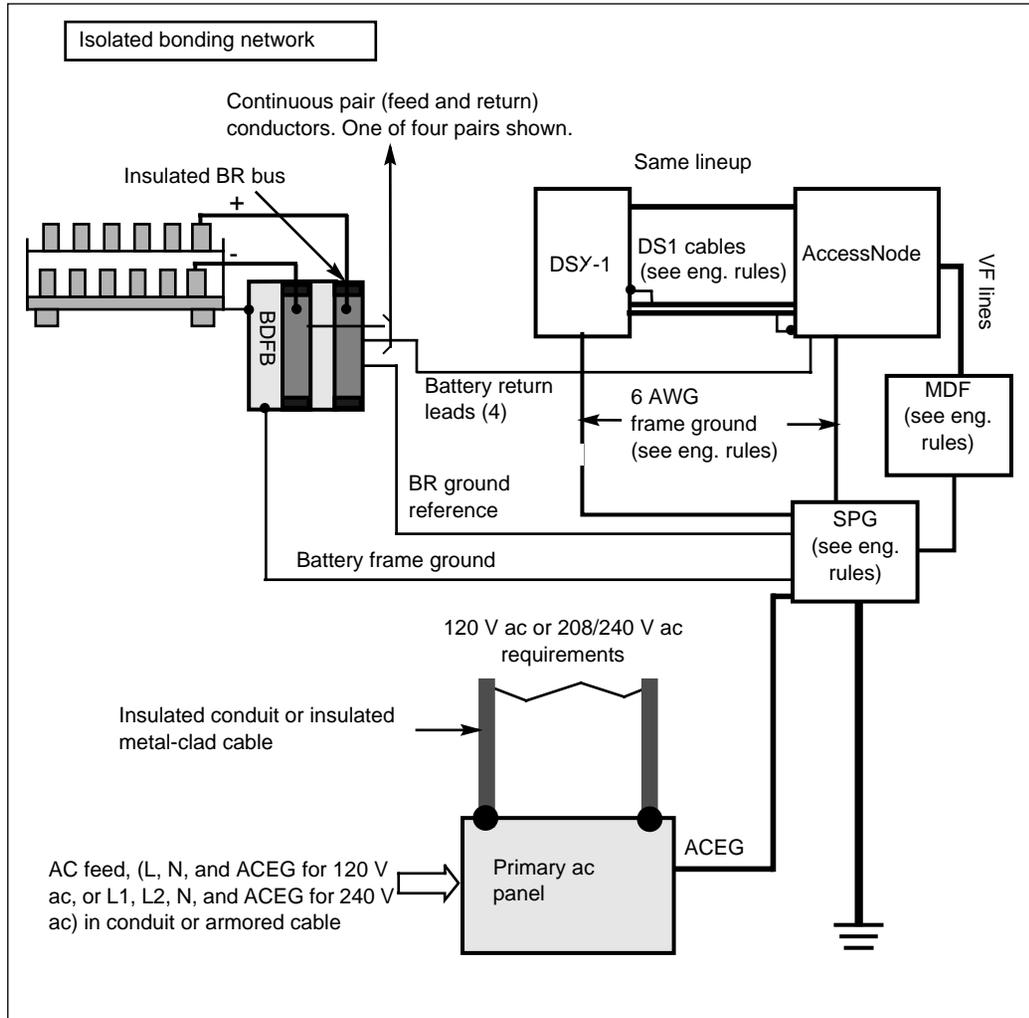
Remote IBN engineering rules

The following engineering rules and requirements apply to remote IBN grounding schemes as shown in Figure 2-4 on page 2-9:

- The transmit DS1 cable coming from the DSX-1 cross-connect is grounded at the DSX-1. The receive DS1 cable of the DSX-1 is grounded at the AccessNode.
- In small buildings the single point ground (SPG) may not exist. In such buildings, the building point ground (BPG) will serve as the SPG.
- When all the equipment bays (including battery distribution) are in the same lineup, as in most remote locations, or where the SPG is more than 16 meters (53 ft) away, the individual frame grounds of up to six frames can be connected to a single 2 AWG conductor ground bus, which is routed to the SPG.
- In small installations, an interconnect panel can serve the same purpose as the main distribution frame (MDF). Any subscriber lines that exit the building must be protected by gas discharge protectors installed on the MDF and grounded to the SPG or the BPG.

Right odd

Figure 2-4
Remote isolated bonding network grounding scheme



Left even

ABM bay frame ground

The ground wire used for the ABM bay frame ground must be a 6 AWG conductor with green colored insulation, connectorized at one end with a crimp-type two-hole lug as shown in Figure 2-5. The ABM bay frame ground attaches to the top of the ABM bay as shown in Figure 2-6.

Figure 2-5
Frame ground lug connection

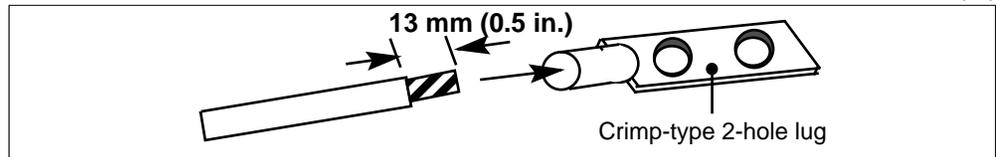
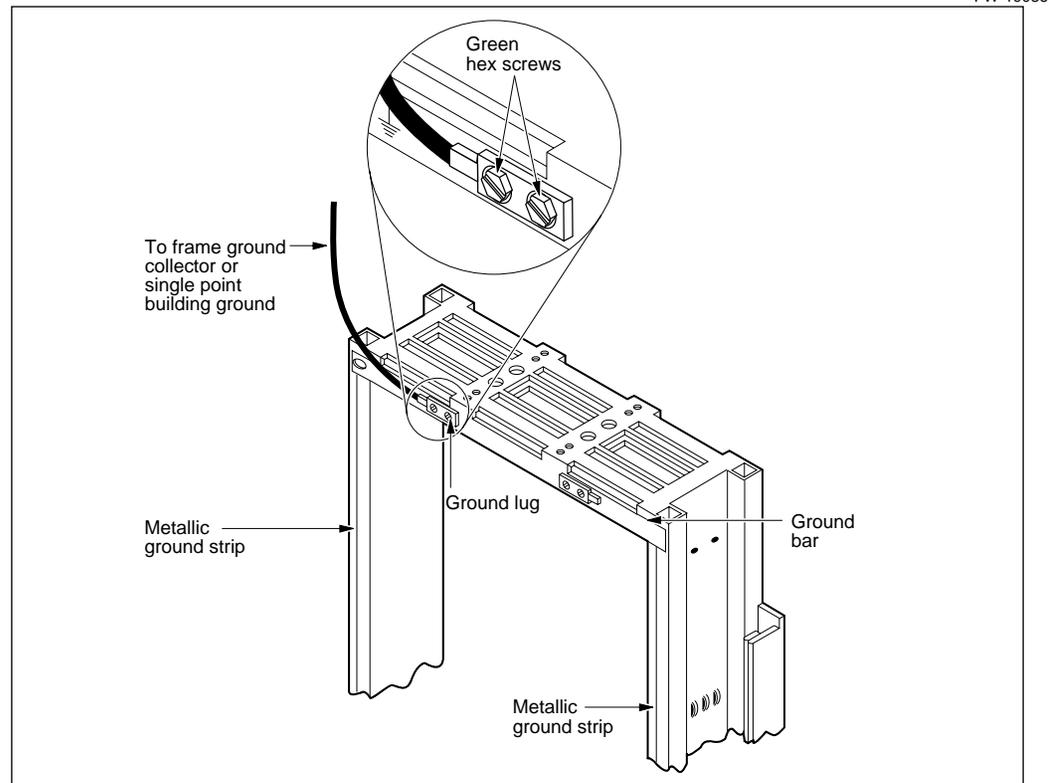


Figure 2-6
Connecting the frame ground



ABM bay dc power requirements and connection

This chapter describes the dc power requirements for the access bandwidth manager (ABM) bay.

Note: For complete information on the ac power requirements of the ABM bay, see *Site Installation Planning and Engineering*, 323-3001-200 in the *Engineering, Configuration, and Ordering Guide*, Volume 1.

Protection against transient voltages

Transient voltages that appear differentially between the -48 V dc battery and battery return must be less than 5 V/ms. Transients greater than this are likely to occur when lightning strikes more than 20 subscriber lines connected to an AccessNode system and the lines exit the building.

To protect against voltage transients caused by lightning strikes on up to 100 subscriber lines, extra filtering must be provided at the battery distribution fuse bay (BDFB).

This filtering consists of connecting capacitors across the talk battery and ground at the BDFB. For systems with subscriber lines that do not exit the building, installation of capacitors is not required.

Left even

Calculating capacitor values

When capacitors are required, two are normally used if the BDFB is fed with redundant power feeds. The value of the capacitors depends on the distance between the BDFB and the battery-rectifier system. Use the following procedure to determine the capacitor values.

- 1 Calculate the theoretical capacitor value using the following formula:

$$C=10d^2$$

Where: C = uF

d = distance in meters

- 2 Use the formula in step 1 or 33 000 uF as the capacitor value, whichever is the greater.

The BDFB must be equipped with a battery return ground bar that is insulated from the frame ground of the BDFB.

Main power cables for ABM bays

Nortel Networks manufactures main power cables with a length of 10.7 m (35 ft). The cables are preconnectorized at one end for connection to the breaker interface panel (BIP) of the AccessNode equipment. Longer cables are the responsibility of the customer.

Four battery and return circuits, 1, 2, 3, and 4, must be grouped together for a continuous connection between the external -48 V dc BDFB and the BIP or dc distribution panel in AccessNode. For the BIP input and output power distribution, see Figure 3-3 on page 3-5.

Battery return cables are referenced to ground through the BDFB battery return bar, which is referenced to the frame ground bar (FGB) in grounding environments consisting of a common bonding network (CBN), or to the single point ground (SPG) in grounding environments consisting of an isolated bonding network (IBN) (see grounding chapter).

NT4K84UA main power cable (4 cables for each bay)

Each cable consists of two 6 AWG stranded conductors (red battery and white return), in an overall jacket, 10.6 m (35 ft) in length, and connectorized at one end for connection to the BIP.

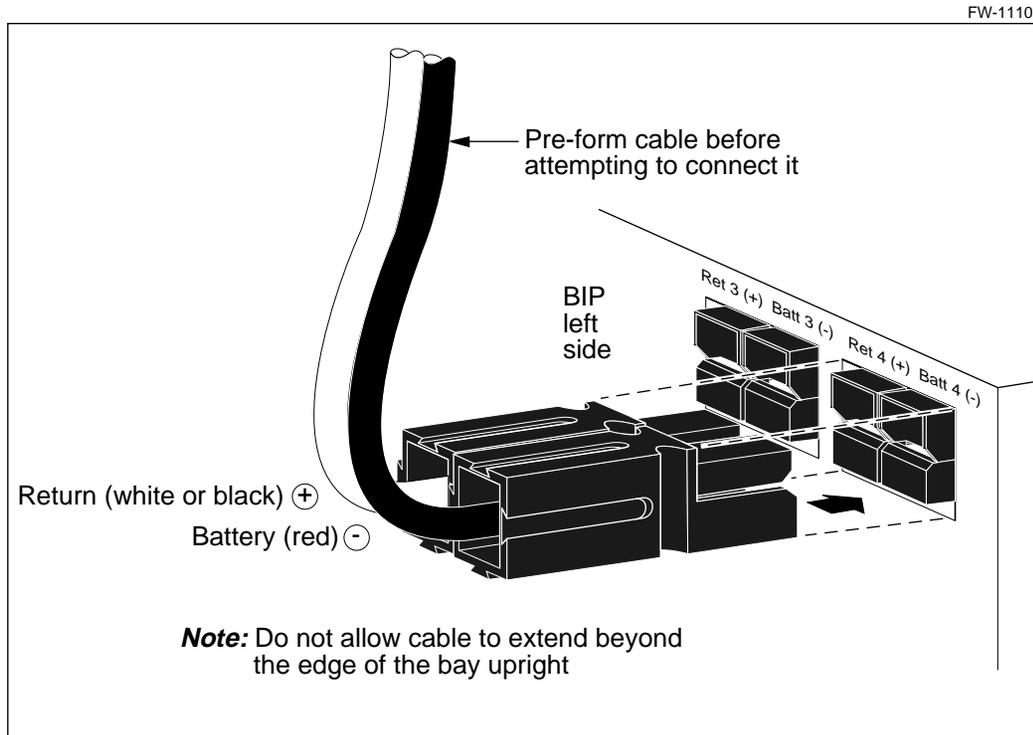
The conductor color codes for the battery and return cables are as follows:

- Battery (-): red
- Return (+): white or black

Cables should be designated at the point of origination and destination with sufficient details, indicating the system (bay location) and the battery and return circuit (1, 2, 3, and 4). See Figure 3-1 and Figure 3-2.

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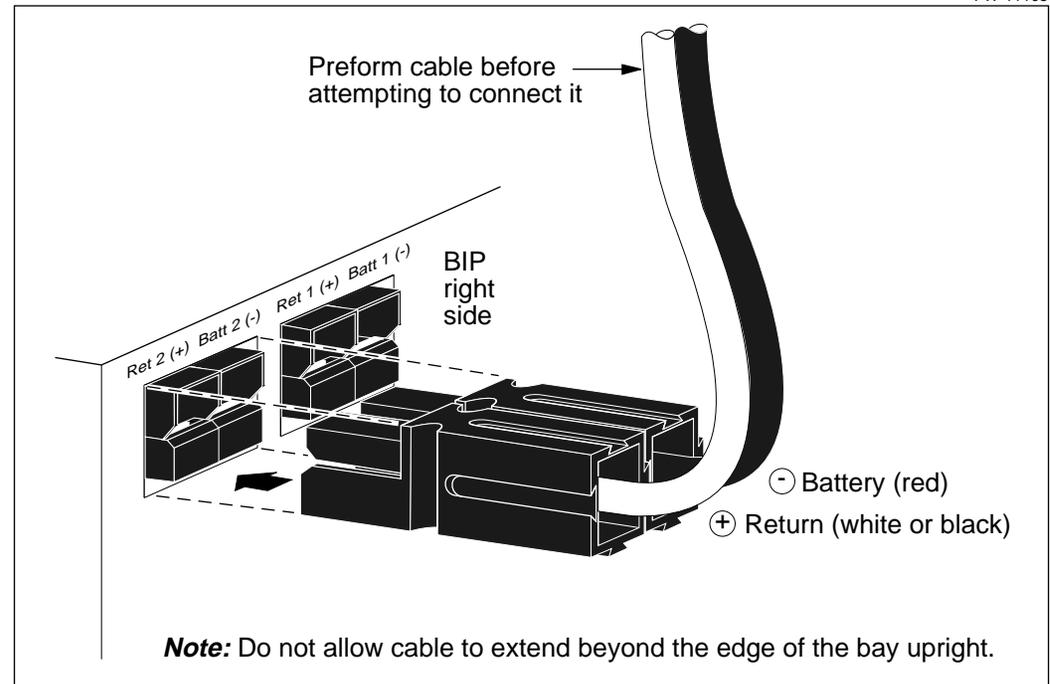
Figure 3-1
DC power connection to the left side of the BIP



Left even

Figure 3-2
DC power connection to the right side of the BIP

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Power redundancy in bays equipped with ABM shelves

As shown in Figure 3-3, feeds 1 and 2 serve the common-equipment shelf with redundancy, and feeds 3 and 4 serve the cooling unit with redundancy. The logic and talk battery for the copper-distribution shelves, and the talk battery for the access test card are not fed with redundant power feeds.

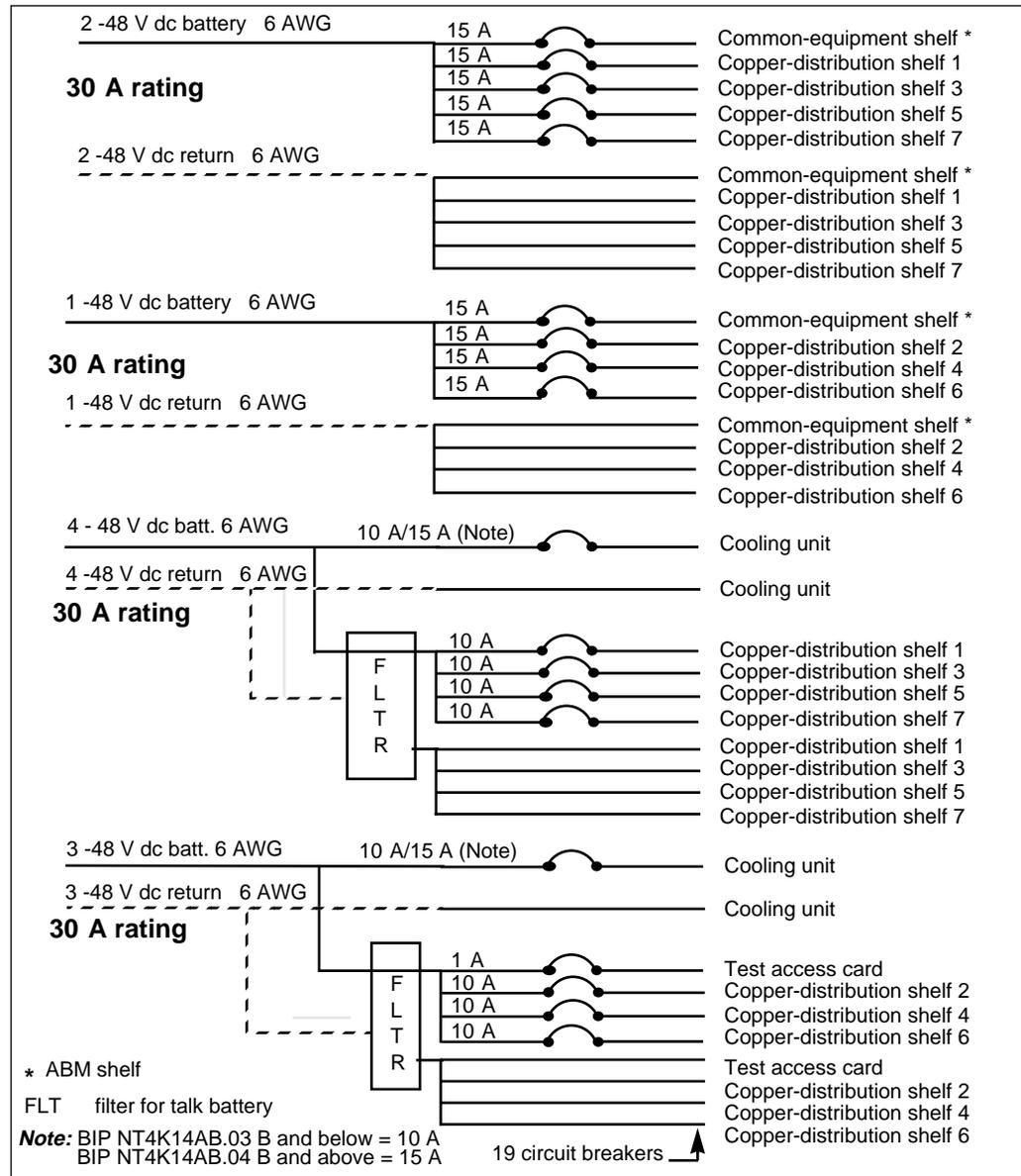
Note: To ensure uninterrupted service, bays must be equipped with dual power feeds to the common-equipment shelf and the cooling unit.

Feeder voltage drop in bays equipped with ABM shelves

A minimum size of 6 AWG for the battery and return cables is required to ensure that the voltage drop from BDFB to BIP does not exceed 1.0 V dc, and to accommodate the maximum worst-case current limits.

Right odd

Figure 3-3
BIP power input and distribution schematic for bays equipped with ABM shelves



Left even

ABM bay connections

This chapter describes the cabling connections for access bandwidth manager (ABM) bays in an AccessNode system.

ABM bay intershelf and external cabling connections

Nortel Networks classifies all cabling connections in the ABM bay as either intershelf or external. Intershelf cabling in the ABM bay is installed in the factory. You should only have to deal with intershelf cabling if you are replacing a component or doing maintenance troubleshooting. External cabling is connected to the ABM bay at the installation site.

Left even

ABM bay intershelf cabling connections

Table 4-1 describes the intershelf connections and cabling used in the ABM bay. Figure 4-1 on page 4-4 shows a schematic diagram of these connections.

Table 4-1
ABM bay intershelf connections

Connection/Cable	From	To
Breaker interface panel (BIP) control / NT4K85KA	BIP Ctl (J13) connector on ABM shelf side interconnect left (SIL)	BIP Ctl connector on left side of BIP
Cooling unit power / part of NT4K84JA power harness	CU Pwr A/B connectors on BIP	CU Pwr A/B connectors on cooling unit
Cooling unit interface / NT4K85JA	CU IF (J05) connector on the ABM shelf SIL	CU IF connector on the cooling unit
Local craft access / cable is part of local craft access panel (LCAP)	LCAP internal connector	LCAP 1 (J03) and LCAP 2 (J02) connectors on ABM SIL
Common equipment (CE) power for ABM shelf / cable is part of NT4K84JB power harness	CE Pwr A/B connectors on right side of BIP	CE Pwr A card and CE Pwr B card in ABM I/O slots 54 (CE Pwr A) and 55 (CE Pwr B)
Copper-distribution shelf (CDS) metallic test access / NT4K86FA and NT4K86FB Note: This connection used only in ABM bays containing CDSs.	CDS MTA (J01) connector on ABM shelf SIL (using NT4K86FA)	CDS MTA In connector on CDS #1 (using NT4K86FA) Note: NT4K86FB is used to "daisy-chain" from the MTA Out connector of CDS #1 to the MTA In/Out connectors of CDS #'s 2-7.
—continued—		

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Table 4-1 (continued)
ABM bay intershelf connections

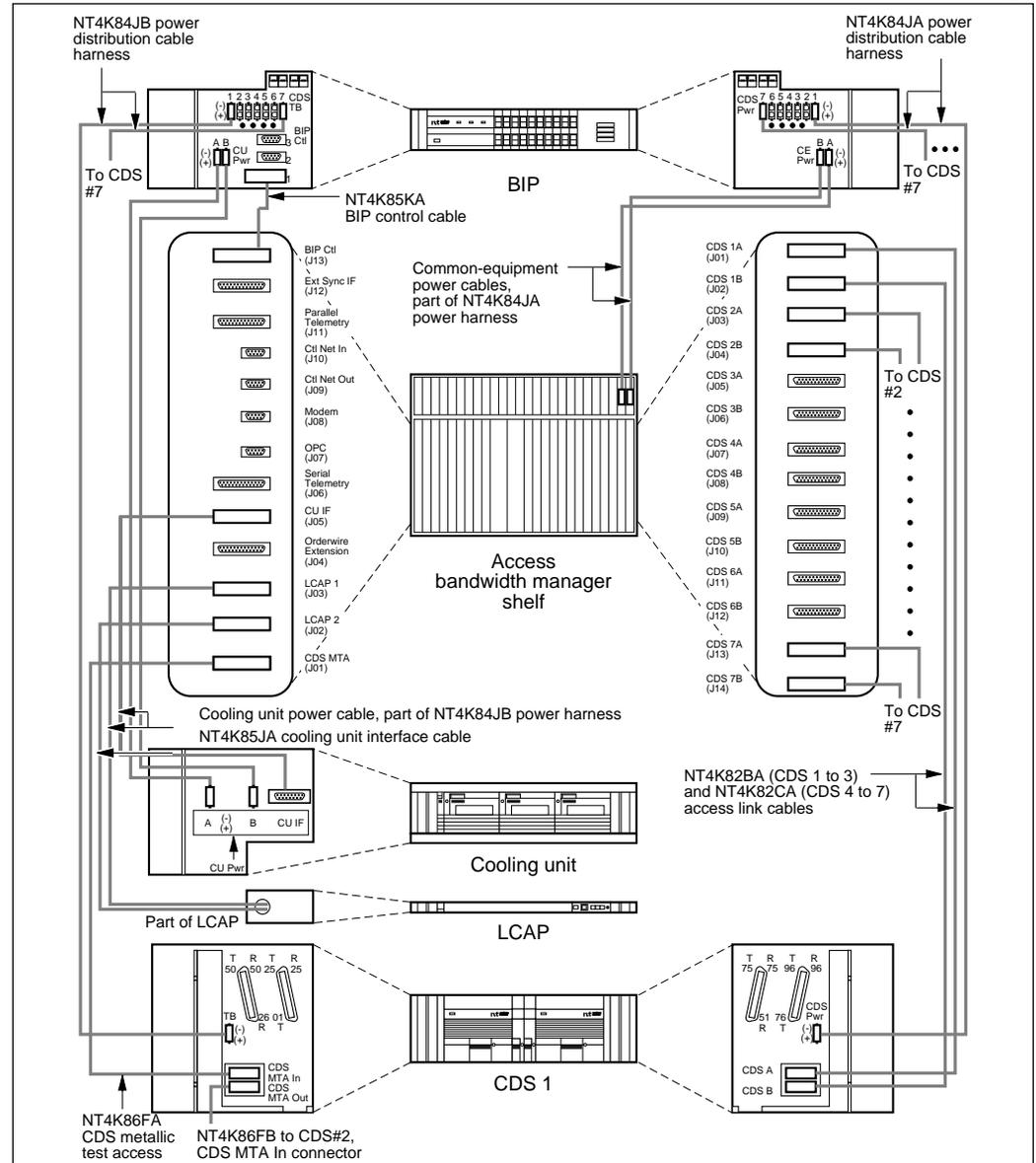
Connection/Cable	From	To
CDS VT & D links / NT4K82BA and NT4K82CA Note: These connections used only in ABM bays containing CDSs.	CDS 1A/B to CDS 7A/B (J01 to J14) on ABM shelf side interconnect right (SIR)	CDS A and CDS B connectors on CDS #1-7. Note: NT4K82BA is used for CDS #1-3, NT4K82CA is used for CDS #4-7.
CDS power distribution / NT4K84JB power harness Note: This connection used only in ABM bays containing CDSs.	CDS Pwr connectors 1-7 on right side of BIP	CDS Pwr connector on right side(s) of CDS(s) #1-7
CDS talk battery (TB) / NT4K84JA power harness Note: This connection used only in ABM bays containing CDSs.	CDS TB connectors 1-7 on left side of BIP	CDS TB connector on left side(s) of CDS(s) #1-7
—end—		

4-4 ABM bay connections

Left even

Figure 4-1
Intershelf cable connections for ABM bays

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ABM bay external cabling connections

Table 4-2 describes the external connections and cabling used in the ABM bay. Figure 4-2 on page 4-8 shows a schematic diagram of these connections.

Right odd

Table 4-2
ABM bay external connections

Connection/Cable	From	To
Main power / NT4K84UA	Battery distribution fuse bay	Breaker interface panel (BIP) Battery and Return connections 1-4
External synchronization interface / NT4K86EA-EE	Ext Sync IF (J12) connector on ABM shelf side interconnect left (SIL)	External synchronization equipment
Parallel telemetry / NT4K85GA/GB/GC/GF	Parallel Telemetry (J11) connector on the ABM shelf SIL	External parallel telemetry equipment
Control Network In/Out / NT7E44JB/JC/JK	Ctl Net In (J10) and Ctl Net Out (J09) connectors on the ABM shelf SIL	Ctl Net In/Out connector on another ABM bay
Modem / NT7E44EA/EB	Modem (J08) connector on the ABM shelf SIL	External modem
Operations Controller (OPC) on the SIL/ NT7E44EA/EB, NT7E44QA/QB, NT7E44RA/RB, and NT7E44SA/SB	OPC (J07) connector on the ABM shelf SIL	NT7E44EA/EB - Modem NT7E44QA/QB - X.25 interface NT7E44RA/RB - VT 100 terminal NT7E44SA/SB - PC laptop
Serial telemetry / NT4K86CA/CB/CC	Serial Telemetry (J06) connector on the ABM shelf SIL	External serial telemetry equipment.
—continued—		

Left even

Table 4-2 (continued)
ABM bay external connections

Connection/Cable	From	To
Orderwire extension / NT4K85CA-CF	Orderwire Extension (J04) connector on the ABM shelf SIL	Orderwire office equipment.
BIP wire-wrap external connections / Customer-provided wire-wrap cable consisting of twisted 22, 24, or 26 AWG solid wire cables. Maximum of 42 conductors.	BIP wire-wrap block Note: See Figure 4-3 on page 4-9 for the pin-out details of the BIP wire-wrap block.	Customer-selected external equipment for alarms, parallel telemetry, and orderwire
Test access path (TAP) / NT4K85EA-ED	TAP input/output (I/O) card in slot 53 of the ABM shelf I/O section	Distribution frame
Pair gain test control (PGTC) and metallic test access (MTA) / NT4K85BA	PGTC/MTA I/O card in slot 52 of the ABM shelf I/O section	External PGTC/MTA equipment or next bay
Test bypass pair (TBP) / NT4K85EA-ED	TBP I/O card in slot 51 of the ABM shelf I/O section	Master distribution frame
VT 100 terminal or remote printer / NT7E44VA/VB	I/O card in slot 40 of the ABM shelf I/O section	VT 100 terminal or remote printer
Graphic terminal or remote operating system / NT7E44TA/TB	I/O card in slot 38 of the ABM shelf I/O section	Graphic terminal or remote operating system
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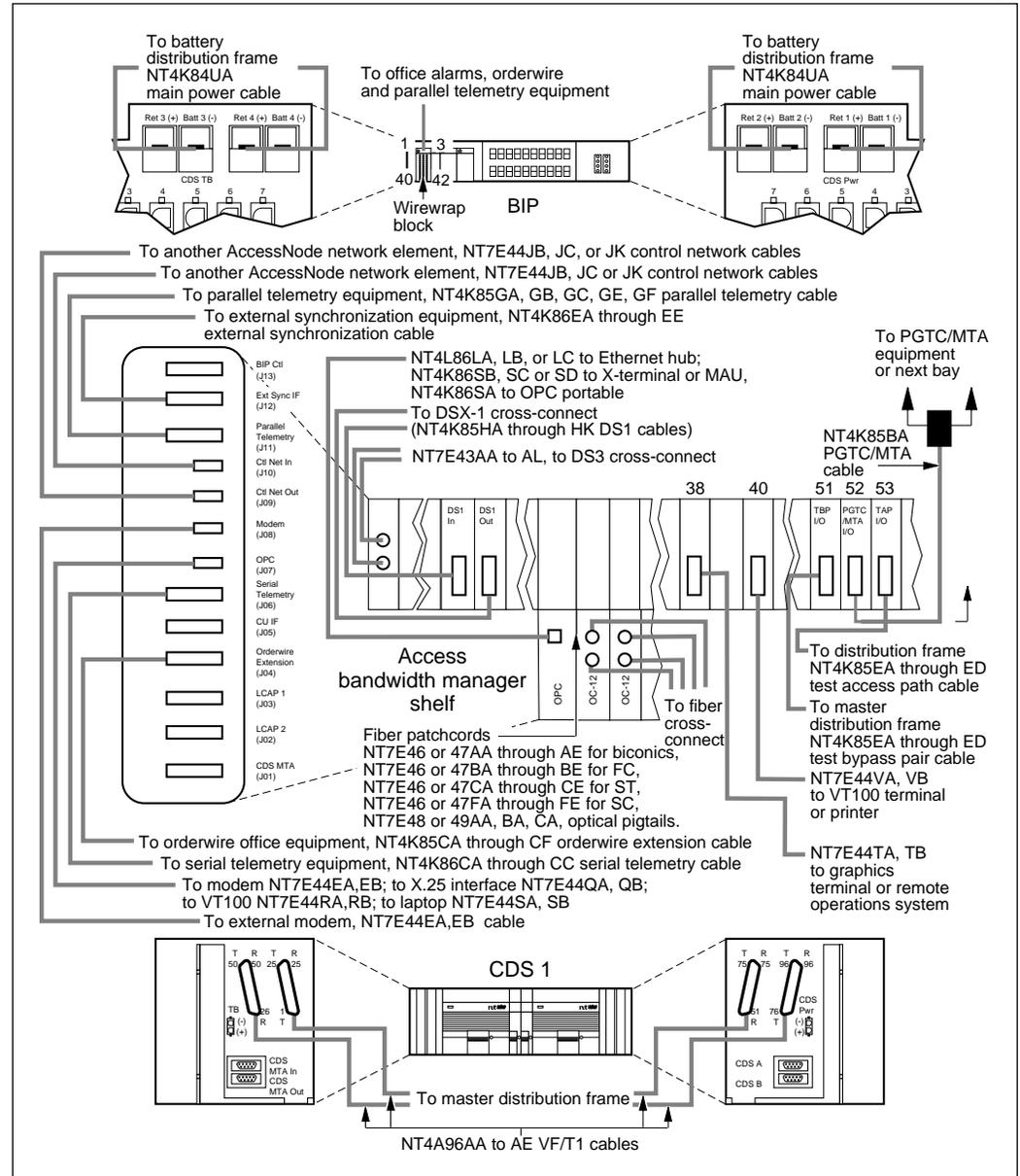
Table 4-2 (continued)
ABM bay external connections

Connection/Cable	From	To
OC-3 or OC-12 optic fiber / NT7E46/47AA-AE - biconic connectors NT7E46/47BA-BE - FC connectors NT7E46/47CA-CE - ST connectors NT7E46/47FA-FE - SC connectors NT7E48/49AA/BA/CA - optic pigtails	I/O connectors on the front faceplate of the OC-3 or OC-12 multiplexer	Fiber optic cross-connect
DS3 input and output / NT7E43AA-AL	BNC DS3 I/O cards in the ABM shelf I/O section	DS3 cross-connect
DS1 input and output / NT4K85HA-HK	DS1 I/O cards in the ABM shelf I/O section	DSX-1 cross-connect
Operations controller module faceplate/ NT4K86LA/LB/LC, NT4K86SB/SC/SD, NT4K86SA	RS-232 connector on front faceplate of the OPC module	--NT4K86LA/LB/LC - Ethernet hub --NT4K86SB/SC/SD - X-terminal or MAU --NT4K86SA - Portable OPC
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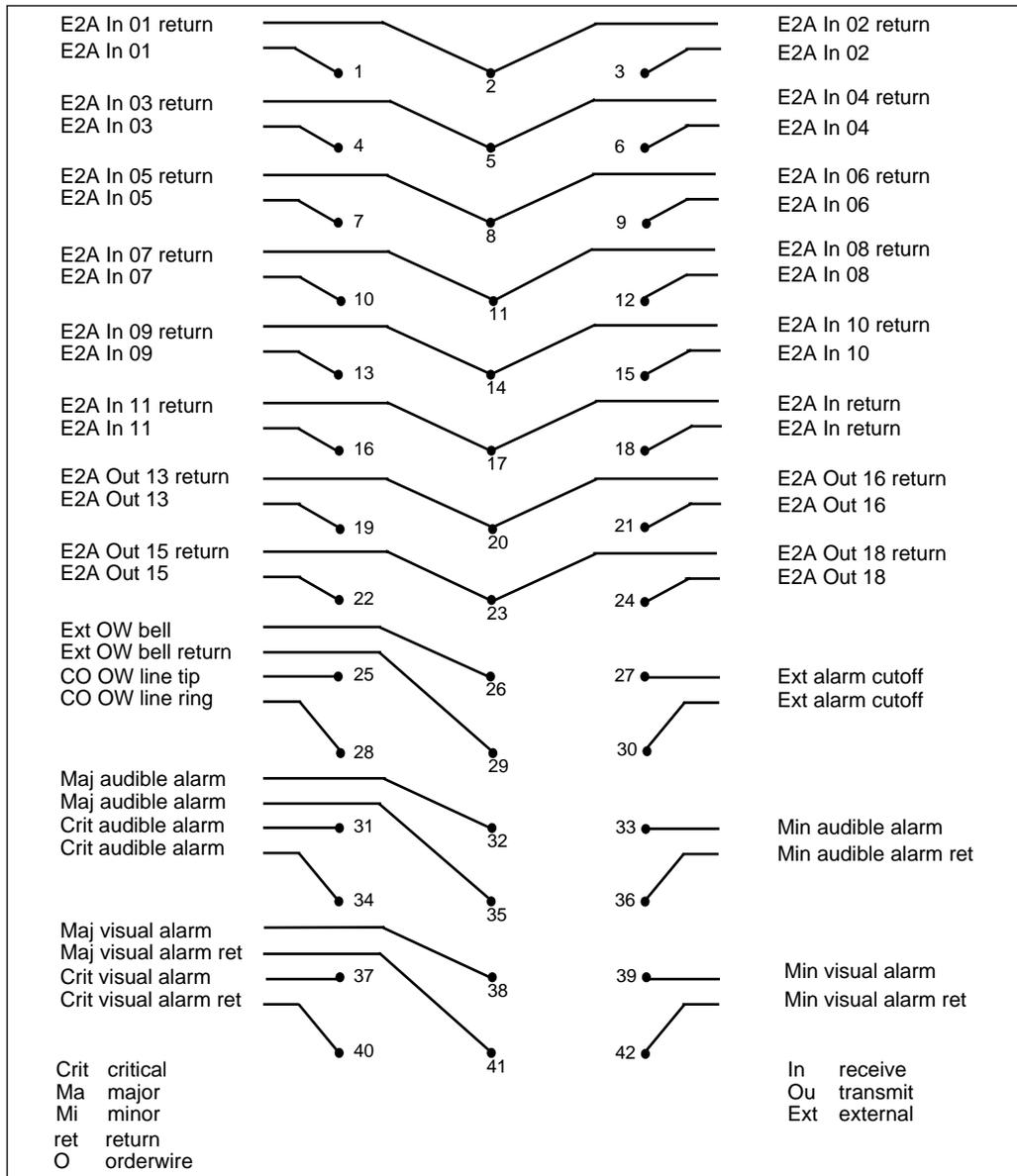
Figure 4-2
External cable connections for ABM bays

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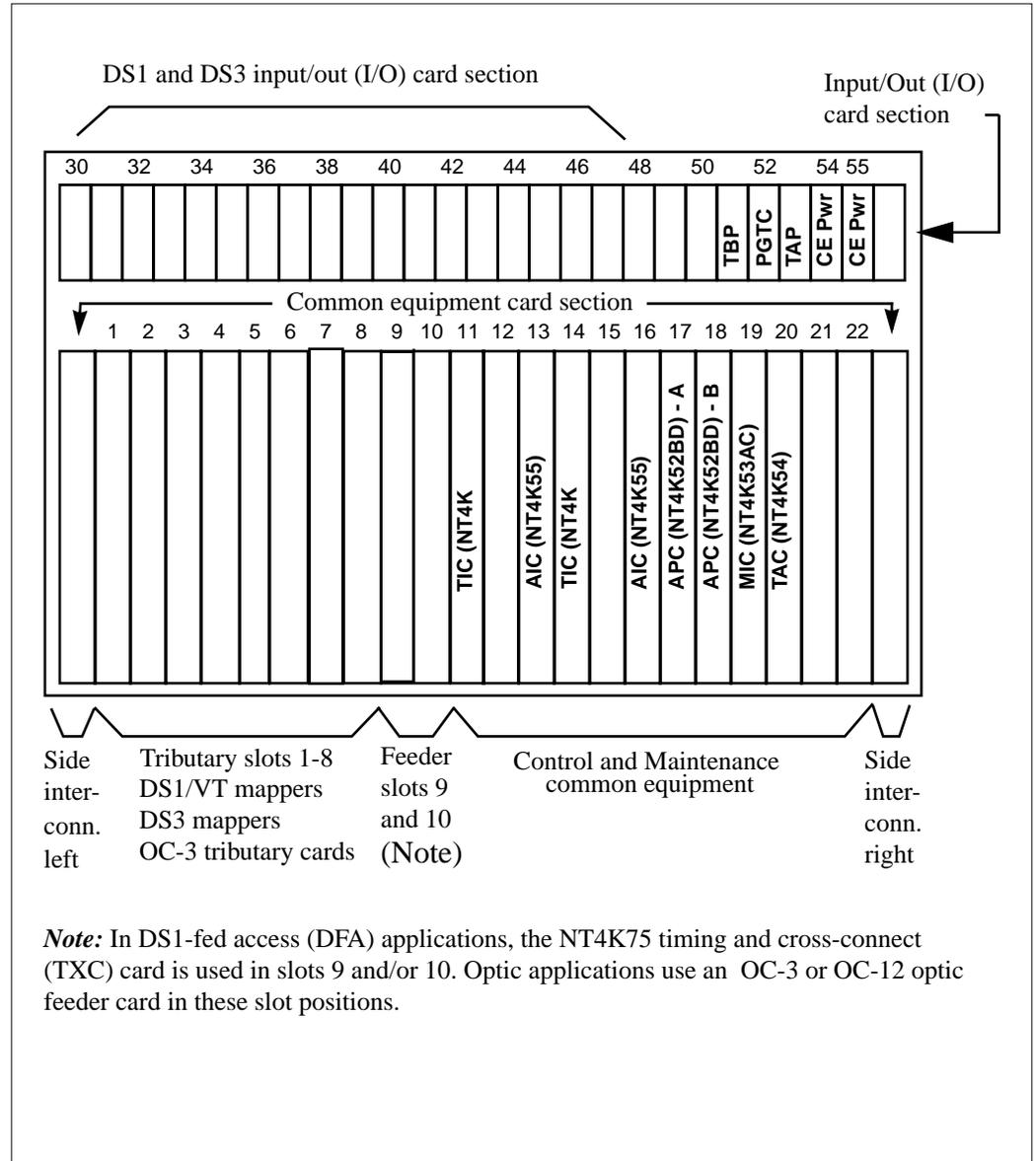
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Figure 4-3
Pinout details of wire-wrap pins on the BIP



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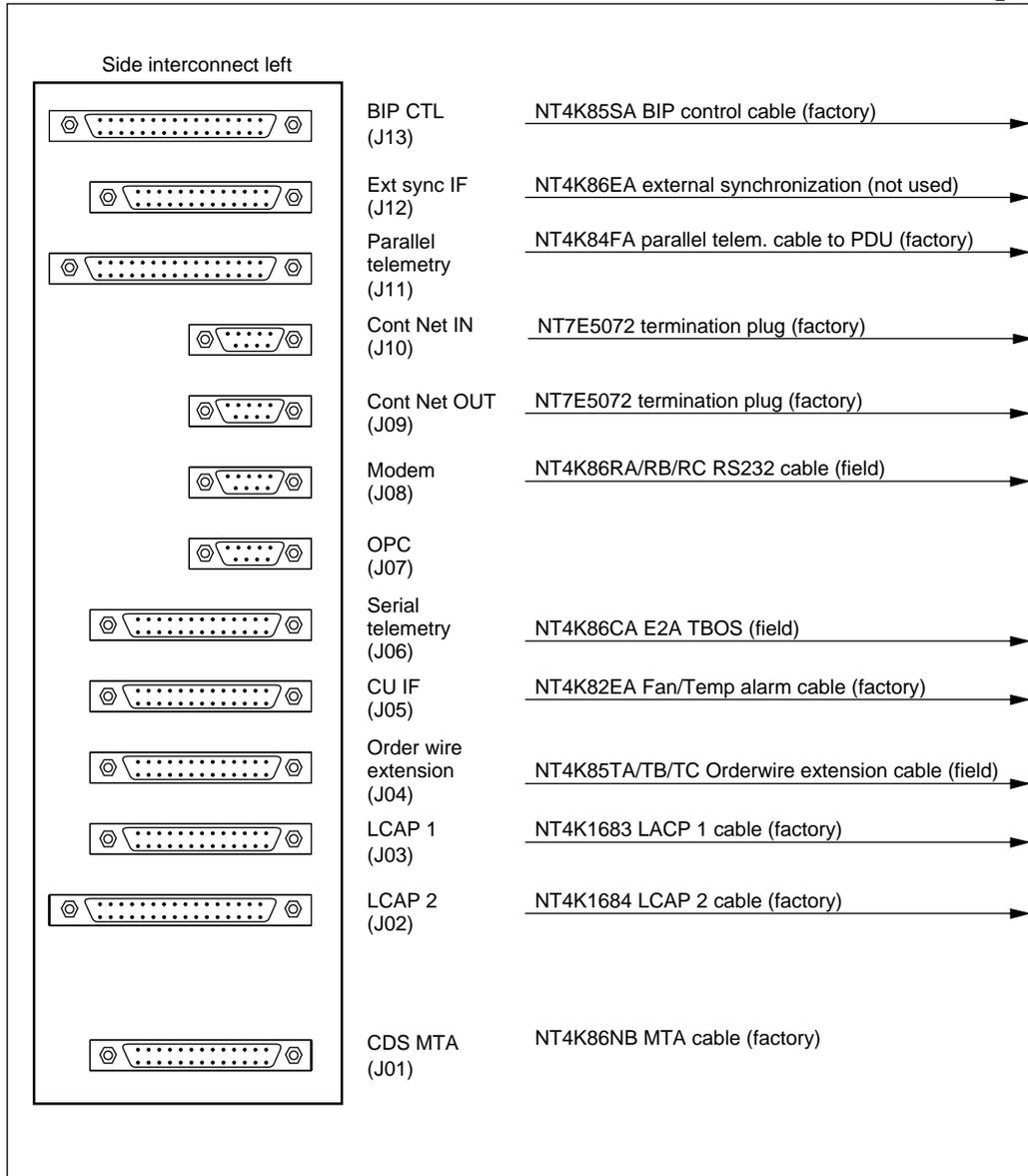
Figure 4-4
ABM shelf layout



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Figure 4-5
ABM side interconnect left connectors

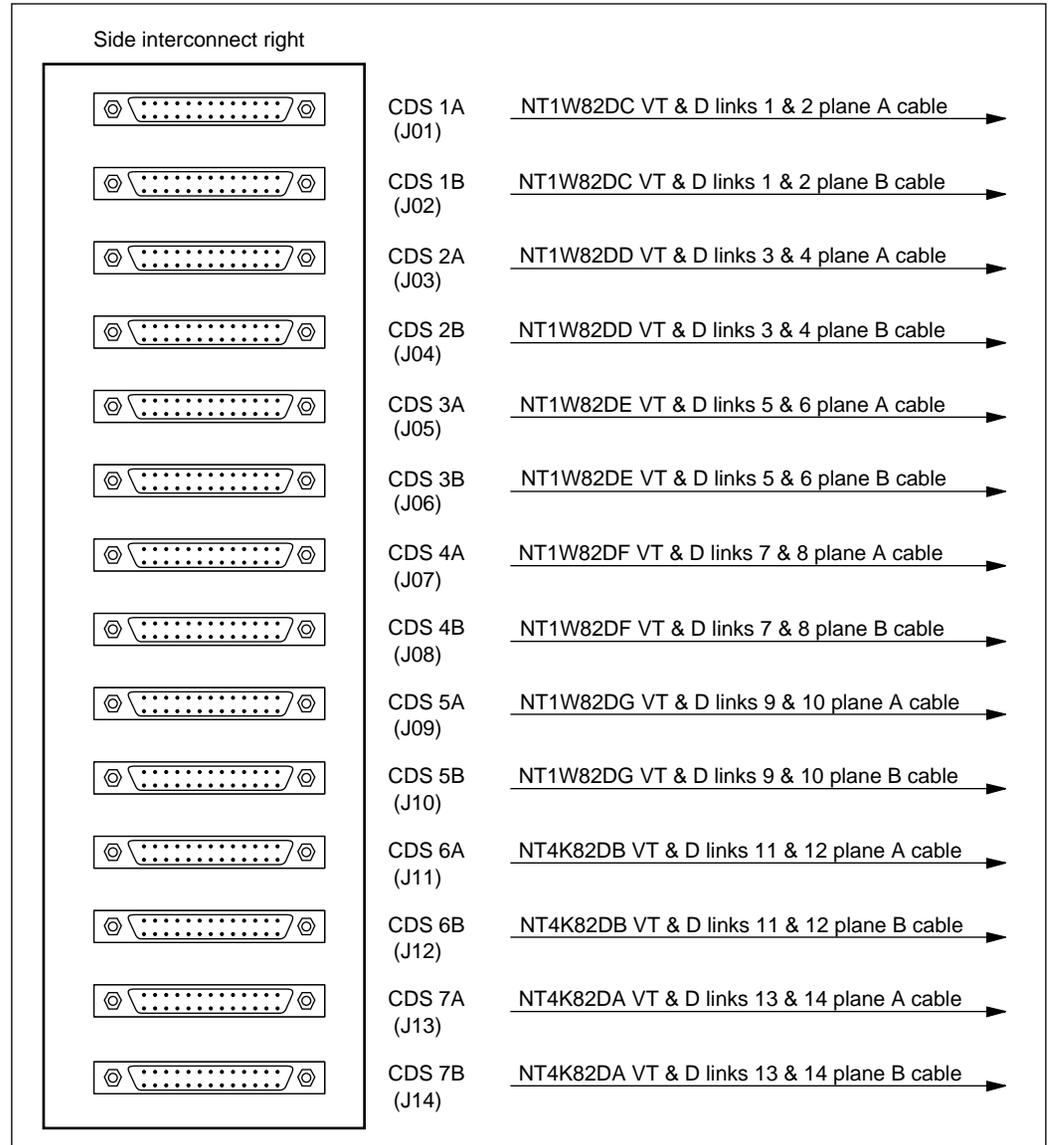
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Figure 4-6
ABM shelf side interconnect right connectors

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