BA350–EA
Modular Storage Shelf

User's Guide

Order Number: EK–350EA–UG. A01

This manual describes the BA350–SA modular storage shelf and the rules for configuring the shelf to include power, system building blocks (SBBs), device addressing, and SCSI buses. Procedures for determining shelf status and replacing blowers are also included.

Digital Equipment Corporation
Maynard, Massachusetts

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The postpaid READER'S COMMENTS card requests the user's critical evaluation to assist in preparing future documentation.

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Preface

The *BA350–EA Modular Storage Shelf User's Guide* describes how to configure the BA350–EA shelf, and install and replace DECstor/me components.

Note

Shelf installation procedures are cabinet specific and are not included in this manual.

Intended Audience

This manual is intended for use by personnel responsible for configuring, using, and installing BA350 DECstor/me modular storage shelf systems.

Structure

This manual is organized as follows:

Chapter 1	Provides a description of the BA350–EA modular storage shelf including components, status signals, and replacement procedures.
Chapter 2	Provides shelf-specific configuration rules for power, storage SBBs, shelves, and device addressing.
Chapter 3	Provides a detailed description of shelf-specific SCSI buses including terminators, jumpers, and devices by bus and location.
Chapter 4	Provides a description of the DWZZA–VA bus adapter used for compatibility between 8-bit differential SCSI buses and 8-bit single-ended SCSI buses.

Related Documents

The following table lists documents (alphabetically by title) that contain information related to this product:

Document Title	Order Number
BA350 Modular Storage Shelf SBB User's Guide	EK–SBB35–UG
BA350 Modular Storage Shelf Subsystem Configuration Guide	EK–BA350–CG
BA350 Modular Storage Shelf Subsystem User's Guide	EK–BA350–UG
BA350–LA Modular Storage Shelf User's Guide	EK–350LA–UG
BA350–SA Modular Storage Shelf User's Guide	EK–350SA–UG
BA35X–VA Vertical Mounting Kit User's Guide	EK–350SV–UG
BA655 SCSI Disk and Tape PIU Installation Guide	EK–BA655–IN
Installation Notice—RZ73 Bus Termination and Jumper Installation Guide	EK–RZ73X–IS
MicroVAX/VAXserver 3100 and DECsystem 5100 RZ25 Installation Guide Addendum	EK–RZ2MV–AD
RZ Series Disk Drive Reference Manual	EK–RZXXD–RM
RZ22, RZ23, RZ24 Disk Drive Subsystem Service Manual	EK–RZ234–SV
RZ24 Hard Disk Drive Installation Guide	EK–RZ24I–IS
RZ25–S Mounting Bolt/Bracket Installation Instructions	EK–RZ25S–IN
RZ2x Hard Disk Drive Upgrade Installation Instructions	EK–RZ2XH–UG
RZ2x Series Drive Bracket Installation Sheet	EK–RZ2XD–UG
TLZ06 Cassette Tape Drive Installation Guide	EK–STEXP–AD
TLZ06 Cassette Tape Drive Owner's Manual	EK–TLZ06–OM

Documentation Conventions

The following conventions are used in this manual:

boldface type Boldface type indicates the first instance of terms being defined in text, in the glossary, or both.

italic type Italic type indicates emphasis and complete manual titles. In the glossary, italic type is also used to indicate cross-references.

1

Introducing the BA350–EA Modular Storage Shelf

This manual describes the BA350–EA modular storage shelf including configuration rules, system building blocks (SBBs)†, shelf status, power, blowers, and SCSI buses.

1.1 BA350–EA Shelf Description

The BA350–EA shelf is a basic entry subsystem that can be expanded to accommodate two HSx-series controllers, six system building blocks (SBBs), and an adapter.

Note

The mounting brackets required and the procedures for installing this shelf are unique to each cabinet type and are described in the cabinet-specific user's guide.

The BA350–EA shelf is basically a double-height shelf with a common backplane and requires twice the vertical clearance of a standard, single-height shelf.

The BA350–EA shelf can be installed horizontally or vertically in a storage array, in a data center cabinet, or in a BA35X–VA vertical mounting kit (stand).

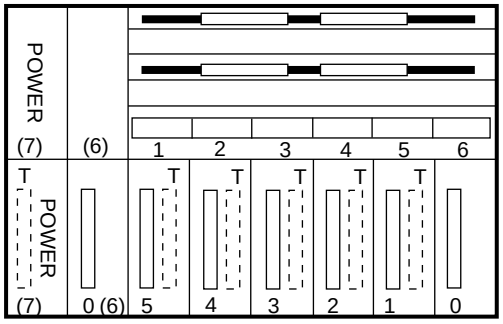
The dimensions of the BA350–EA shelf are as follows:

Height—300 millimeters (11.8 inches)
Width—445 millimeters (17.5 inches)
Depth—350 millimeters (13.8 inches)
Weight—22.7 kilograms (50.0 pounds)

† SBBs are devices installed in either a 3½-inch or 5¼-inch modular carrier, including disk drives, tape drives, CDROMs, static storage devices, power supplies, adapters, CPUs, and so on.

As shown in Figure 1–1, the upper half of the BA350–EA shelf is for controller devices and the lower half is for storage devices.

Figure 1–1 BA350–EA Shelf



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The BA350–EA modular storage shelf differs from other DECstor/me storage shelves in that:

- The SCSI address and the slot number are not always the same.

  The slot numbers are shown in parentheses when:

  – The slot number and the SCSI address are not the same.

  – The slot does not have a SCSI address.

- Both slot 0 and slot 6 of the storage device section of the BA350–EA have a SCSI address of 0.
- The BA350–EA shelf requires a power supply in each section (controller and storage).
- The controller section of the BA350–EA shelf can accommodate two power supplies and two HSx-series controllers. The positions for the HSx-series controllers are software dependent.

  The storage device section of the BA350–EA shelf can contain a maximum of one adapter, one power supply, and six 3½-inch SBBs.
- The primary power supplies are always installed in slot 7 in both the controller and the storage sections of the BA350–EA shelf. The primary power supply type is determined by the cabinet power distribution unit.
- An optional, redundant power supply or a battery backup unit (BBU) can be installed in slot 6 when fewer than six SBBs are already installed.

  Note

  Installing a redundant power supply or BBU in the storage device section of the BA350–EA shelf reduces the number of 3½-inch storage devices that can be installed to five.

- There are six single-ended SCSI bus connectors located at the bottom of the controller section of the shelf.

Table 1–1 lists the DECstor/me products required for different configurations, based on the number of 3½-inch devices on each of the five SCSI buses. The rules used for developing this table are as follows:

- The BA350–EA modular storage shelf can support a maximum of one device per bus. To increase the number of devices per bus requires adding BA350–SA storage shelves.
- The primary power supply can be either of the following, based on the type of cabinet power system:
  - BA350–HA universal ac input power supply
  - BA350–HB universal dc input power supply

Table 1–1 BA350 DECstor/me Products

	Devices per SCSI Bus					
Item	**1**	**2**	**3**	**4**	**5**	**6**
BA350–SA shelf	0	1	2	4	4	4
Primary power supply	2	3	4	6	6	6
3½-inch SBB	5	10	15	20	25	30
BA35X-MB SCSI terminator board†	6	5	4	6	6	6
BA35X–MC SCSI jumper board†	0	2	2	7	8	8
Mounting bracket kit‡	1	2	3	5	5	5

†One terminator per bus; one jumper per unterminated, extended bus.
‡Not required for BA35X–VA vertical mounting kit. See cabinet user's guide for option number.

Note

The configuration rules in the following sections have precedence over those listed in *BA350 Modular Storage Shelf Subsystem User's Guide.*

1.2 HSx-Series Controllers

HSx-series controllers can be installed in either the first or third slot. The actual location is software dependent. Refer to the specific controller documentation to determine if the controller can be removed and replaced without removing power from the shelf (hot swap method). See Section 1.5 for more information on hot, cold, and warm swap methods.

Whenever the controller is changed, it must be reconfigured, and the software reloaded and retested as described in the specific controller user's guide.

1.3 Adapters

A 16-bit differential SCSI system cannot be connected directly to a single-ended, 8-bit SCSI system. However, with the proper adapter, a differential SCSI system operating in the 8-bit mode is compatible with a single-ended SCSI bus. The BA350 modular storage shelf subsystem uses the DWZZA–VA bus adapter for compatibility between these two SCSI bus types.

See Chapter 4 for a complete description of and the specifications for the DWZZA adapter.

1.4 Shelf Status

Two conditions are monitored for the shelf: cooling and power. The cabinet provides the cooling and the shelf power supply provides the +5 Vdc and +12 Vdc of power to operate the SBBs. When there is an overtemperature condition or a power supply failure, the status is reported to the host or controller and is indicated to the user by the illumination of one or both of the power supply LEDs.

1.4.1 Power Supply LEDs

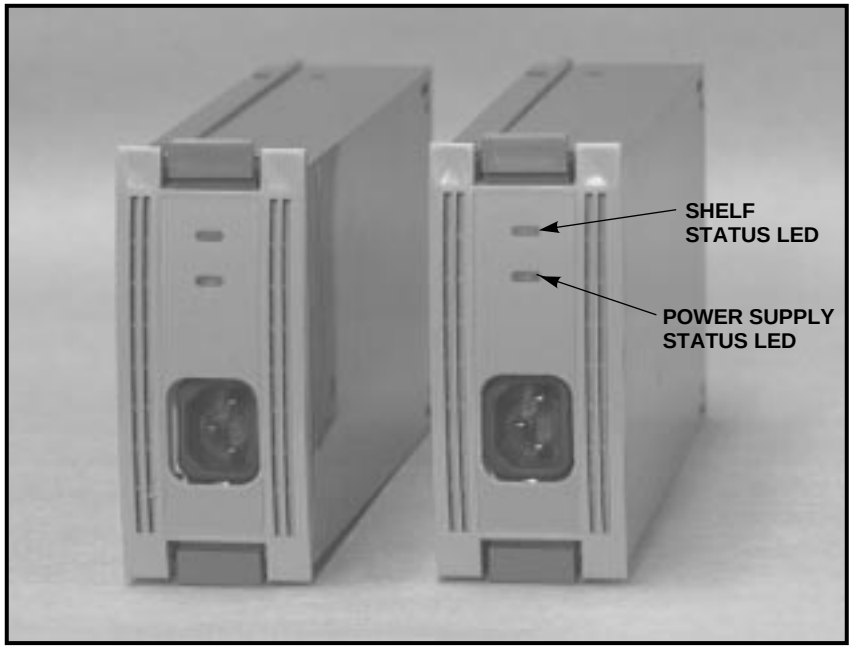
The power supply is shown in Figure 1–2. There are two status LEDs on the front of the power supply:

- The upper LED indicates the shelf status.
- The lower LED indicates the power supply status.

Depending on whether or not either or both of the LEDs are lit indicates one of the following conditions:

- When the shelf status (upper) LED is on and the power supply status (lower) LED is on, the temperature is within the proper operating range and the power supplies are functioning properly.
- When the shelf status (upper) LED is off and the power supply status (lower) LED is on, there is an overtemperature condition.
- When both the shelf status (upper) LED and the power supply status (lower) LED are off, either the power supply has failed or the input voltage is incorrect.

Figure 1–2 Power Supply LEDs



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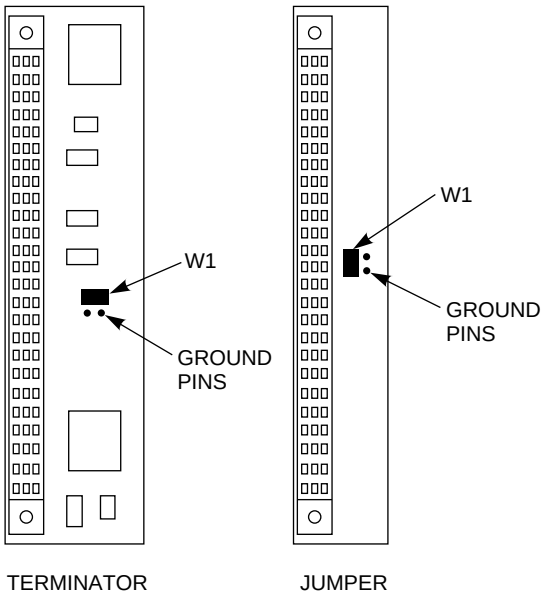
1.4.2 SHELF_OK Signal

The shelf status (SHELF_OK) is reported to the host or controller that can process this information. However, since not all hosts and controllers can process this signal, this signal is sent to a compatible host or controller by installing jumper W1 on both the terminator board (BA35X–MB) and the jumper board (BA35X–MC) on each shelf, as shown in Figure 1–3. The terminator board, the jumper board, and jumper W1 are installed prior to shipment.

When the SHELF_OK signal is not used, install jumper W1 on the two ground pins shown in Figure 1–3.

Figure 1–3 SHELF_OK Signal Jumper W1



1.5 Replacing SBBs

There are three methods for replacing SBBs, including power supplies—hot swap, warm swap, and cold swap. A full description of these methods is contained in the *BA350 Modular Storage Shelf Subsystem User's Guide.*

CAUTION

To prevent electrostatic discharge (ESD) damage to an SBB, do not touch the SBB connector.

You use the LEDs on the front of the SBB to determine which SBBs are operational and which have failed.

- For power supplies, use the hot swap method *only* when there are two power supplies in a shelf. You can remove the failed power supply while the other furnishes the power.

CAUTION

When removing or replacing an SBB, always use both hands to support the weight of the SBB.

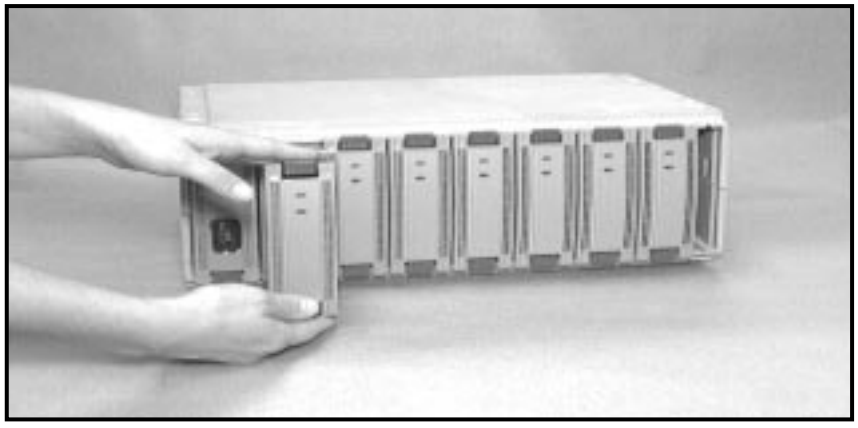
For storage SBBs, you can use the hot swap method provided that the green status LED is off, indicating the unit is not being accessed.

- Use the warm swap method when there are multiple shelves in a cabinet and it is necessary to remove power from a particular shelf because the power supply has failed. When this is the case, none of the devices on that shelf are operational until the replacement supply is installed.
- Use the cold swap method when input power is removed from all shelves in a cabinet by turning off the power at the power controller. This normally only occurs during initial installation. None of the shelves are operational until the input power is restored.

To remove or replace an SBB, use the following procedure:

Step	Procedure
1.	Press the two mounting tabs (as shown in Figure 1–4) to release the SBB and pull the SBB out of the shelf.
2.	Insert the replacement SBB into the guide slots and push it in until the tabs lock in place.

Figure 1–4 Removing an SBB from the Shelf



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1.6 Replacing Blowers

Each BA350–SA shelf has two blowers mounted on the rear of the shelf. Connectors on the backplane provide the +12 Vdc of power to operate the blowers. As long as one blower is operational on each shelf, there is sufficient air flow to prevent an overtemperature condition. When either blower fails, the shelf status (upper) LED on the power SBB lights and an error message is passed to the controller or host.

WARNING

Service procedures described in this manual that involve blower removal or access to the rear of the shelf must be performed only by qualified service personnel.

To reduce the risk of electrical energy hazard, disconnect the power cables from the shelf power SBBs before removing shelf blower assemblies or performing service in the backplane area, such as modifying the SCSI bus.

When a blower is removed, the change in the air flow pattern reduces the cooling to the point that the shelf can overheat within 60 seconds.

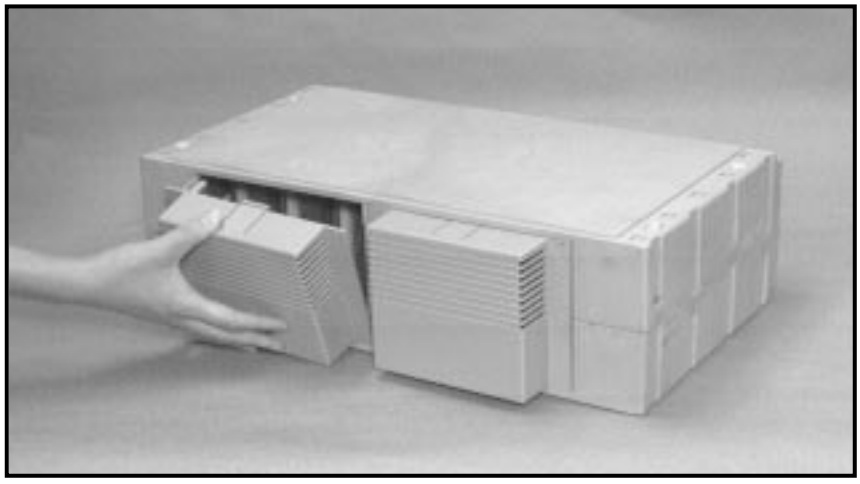
To replace a blower, use the following procedure:

Note

Replacing a blower requires access to the rear of the shelf. If the rear of the shelf is not accessible, turn off the power, remove the shelf from the cabinet, and perform steps 1 through 6. Then replace the shelf in the cabinet and apply power.

Step	Procedure
1.	Disconnect all power cables to shelf power SBBs.
2.	Use a Phillips screwdriver to remove the safety screw in the upper right corner or lower left corner of the blower.
3.	As shown in Figure 1–5, press the upper and lower blower mounting tabs in to release the blower.
4.	Pull the blower straight out to disconnect it from the shelf power connector.
5.	Align the replacement blower connector and push the blower straight in, making sure that both mounting tabs lock in place.
6.	Replace the safety screw.
7.	Connect the shelf power cables and verify that the shelf and all SBBs are operating properly.

Figure 1–5 Replacing Blowers



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2

Configuring the BA350–EA Shelf

This chapter describes the rules for configuring a BA350–EA modular storage shelf including power, system building blocks (SBBs), and device addresses.

Note

The configuration rules in the following sections have precedence over those listed in the *BA350 Modular Storage Shelf Subsystem User's Guide.*

2.1 Power Configuration Rules

Use the following rules to configure the power for a BA350–EA modular storage shelf:

- Each BA350–EA shelf requires either an ac or dc primary power supply, based upon the cabinet power distribution unit.
- The primary power supply is installed in slot 7 (power slot).
- When slot 6 does not contain a storage SBB, either of the following can be installed:
  - An *optional* redundant power supply
  - An *optional* battery backup unit (BBU)

2.2 SBB Configuration Rules

Use the following rules to configure the SBBs (disk drives, tape drives, and so forth) in the BA350–EA shelf:

- The Digital storage devices available for use in the BA350–EA shelf are listed in *BA350 Modular Storage Shelf Subsystem Configuration Guide.*
- The maximum number of SBBs you can install in a BA350–EA modular storage shelf is determined by:
  - The SBB physical size (either 3½-inch or 5¼-inch)
  - The bus configuration
- Software control signals on the SCSI bus are required to ensure that the disk drives on each shelf spin up *sequentially*.

CAUTION

To prevent electrostatic discharge (ESD) damage to an SBB, do not touch the SBB connector.

2.3 SBB Device Addressing Rules

Use the following rules to assign device addresses to the SBBs (disk drives, tape drives, and so forth) in a DECstor/me shelf:

CAUTION

Each device address on a SCSI bus or DECstor/me storage shelf can only be used once.

- The maximum number of device addresses per SCSI bus or DECstor/me modular storage shelf is seven.
- The SBB device address is determined automatically by its physical location in the shelf unless the SBB has a device address switch.

Note

Unless specifically stated otherwise, DECstor/me modular storage shelf slot numbers and SCSI addresses are the same.

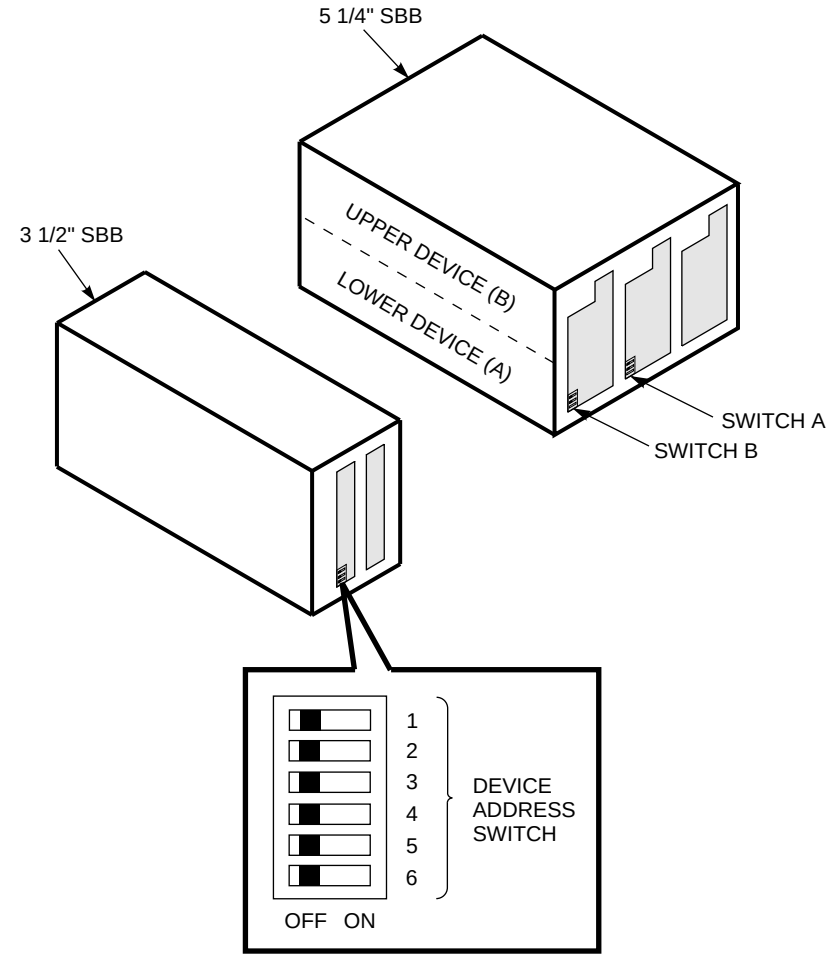
- The 3½-inch tape drive SBBs and all 5¼-inch SBBs have a six-bit address switch located on the rear of the SBB as shown in Figure 2–1. With this switch, you can select a SCSI address in the range 0 through 7. Table 2–1 lists the valid device address switch positions.
- Setting the switch to automatic, as described in Table 2–1, enables the automatic addressing mode, which uses the physical position of the SBB to determine the address.
- When there is no address switch or you set the switch to automatic, the SBB connector position determines the SCSI device address. For example:
  - If the SBB connector is in slot 5, the device address is 5.
  - If the SBB connector is in slot 3, the device address is 3.
- The address switch for a 5¼-inch, full-height (FH) SBB is installed adjacent to the center SBB connector.
- The address switch for the lower 5¼-inch, half-height (HH) SBB is installed adjacent to the center SBB connector.
- The address switch for the upper 5¼-inch, HH SBB is installed adjacent to the left SBB connector.

Table 2–1 DECstor/me SBB Address Switch Settings

	SCSI Switch Number					
	1	**2**	**3**	**4**	**5**	**6**
SCSI address 0	Off	Off	Off	Off	Off	Off
SCSI address 1	On	Off	Off	Off	Off	Off
SCSI address 2	Off	On	Off	Off	Off	Off
SCSI address 3	On	On	Off	Off	Off	Off
SCSI address 4	Off	Off	On	Off	Off	Off
SCSI address 5	On	Off	On	Off	Off	Off
SCSI address 6	Off	On	On	Off	Off	Off
SCSI address 7[1]	On	On	On	Off	Off	Off
Automatic	Off	Off	Off	On	On	On

[1]SCSI address 7 is generally reserved for the host.

Figure 2–1 SBB Device Address Switch



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2.4 Configuring a BA350–EA DECstor/me Modular Storage Shelf

The BA350–EA modular storage shelf shown in Figure 2–2 differs from other DECstor/me shelves in that:

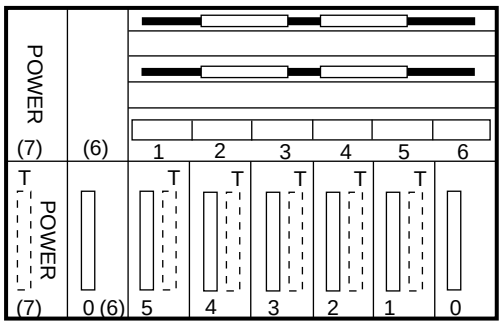
- The SBB slot number and the SCSI device address are not always the same.
- Two slots have SCSI device address 0: slot 0 and slot 6.

CAUTION

SCSI device address 0 is assigned to both slot 0 and slot 6. Do not install storage SBBs in slot 0 and slot 6 at the same time.

- The SCSI address and the slot number are not the same for all slots. When there is a difference between the slot number and the SCSI address, or there is no SCSI address, the slot number is shown in parentheses.

Figure 2–2 BA350–EA Shelf—Front View



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- Slot 0 is normally used for an adapter.
- There are six terminators or jumper connectors on the rear of the backplane behind storage shelf slots 1 through 5 and slot 7, the power slot, respectively.

Note

A terminator board (BA35X–MB) must be installed in the slot 1 connector on the rear backplane for all configurations.

- Each terminator and jumper board requires that jumper W1 be installed to pass the SHELF_OK signal to compatible hosts and controllers.

Note

Read the specific controller documentation to determine if the controller can process the SHELF_OK signal.

- The primary power supply is installed in slot 7 on both the controller and the storage shelf. Slot 6 on both shelves can be used for a redundant power supply or a battery backup unit (BBU).

3

BA350–EA Shelf SCSI Buses

This chapter describes the factory SCSI bus configurations of the BA350–EA and BA350–SA shelves when using an HSZ10–AX controller, including the terminators, jumpers, and SBBs. The SCSI bus components (that is, jumpers, terminators, and SBBs) and their physical locations are also defined.

Note

The SCSI bus factory configurations described in this chapter are only valid when using the HSZ10–AX controller.

The BA350–EA has six single-ended SCSI bus connectors mounted at the bottom of the controller shelf on the front of the backplane. The cables for these connectors exit through the front of the shelf.

Each bus requires a terminator at both ends. Jumpers are required for extending a bus. The terminator and jumper connectors are mounted on the rear of the backplane. You must remove the blowers to configure the SCSI buses. The use of the jumpers is determined by the number of drives installed. The basic HSZ10 5x1 bus does not require any jumpers. Jumpers are required for all the other bus configurations (that is, 5x2 through 5x6). See Section 3.1 for more information on SCSI bus configurations.

Note

Be sure to place unused jumpers where you can readily find them.

After you have configured and tested your buses, you can mount the extra jumpers on unused backplane connectors without affecting bus operation.

WARNING

Service procedures described in this manual involving blower removal or access to the rear of the shelf must be performed only by qualified service personnel.

To reduce the risk of electrical energy hazard, disconnect the power cables from the shelf power SBBs before removing shelf blower assemblies or performing service in the backplane area, such as modifying the SCSI bus.

To *initially* configure the buses, complete the following procedure:

Table 3–1 Configuring SCSI Buses

Step	Procedure
1.	Select the bus configuration from Sections 3.2 through 3.7.
2.	Turn off power to the shelves.
3.	If you cannot access the rear of the shelf, remove the shelf from the cabinet.
4.	Remove the blowers from the shelf as described in Section 1.6.
5.	Ground yourself by pressing a finger to an open space on the backplane.

CAUTION

To prevent ESD damage to devices on the SCSI bus, do not touch the SBB backplane connector pins.

6.	Install jumper W1 on all terminator boards (BA35X–MB) and jumper boards (BA35X–MC) to either enable or disable the SHELF_OK signal. (Refer to Section 1.4.2.)
7.	Position terminators and jumpers as shown in Figures 3–1 through 3–6.
8.	Position the storage devices as shown in Figures 3–1 through 3–6.
9.	Repeat Steps 2 through 8 for all shelves.
10.	Replace the shelves that were removed in step 3.
11.	Apply power to all shelves and verify proper operation.

Note

The following diagrams show the SCSI bus address for each BA350 modular shelf slot. Normally, the device address and the slot number are the same. When there is a difference or there is no device address, the slot number is shown in parentheses.

Sections 3.2 through 3.7 define the BA350–EA shelf factory configurations when using the HSZ10–AX controller. For each bus, there is a table that describes the components required (for example, buses, SBBs, terminators, and so forth), the buses for each shelf, and the location, by slot, of the terminators and jumpers. There is also a schematic diagram showing the same information.

3.1 SCSI Bus Configurations

SCSI bus configurations are identified by a three-character descriptor which defines:

- The number of SCSI buses
- The maximum number of SBBs (that is, devices or ranks allowable per bus)

This descriptor is also used to define the maximum number of SBBs per configuration. For example, a 5x3 SCSI bus configuration indicates that there are five SCSI buses and three SBBs per bus. This configuration can accommodate a maximum of 15 SBBs.

3.2 5x1 SCSI Bus—Factory Configuration

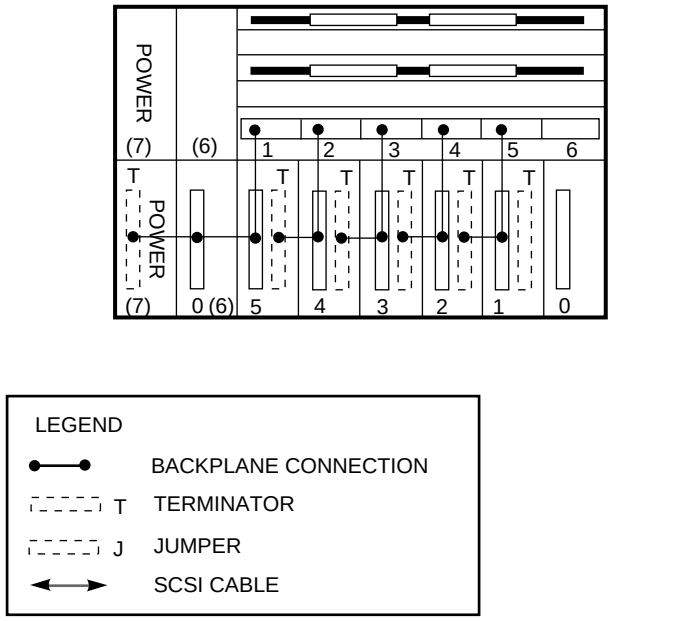
The 5x1 SCSI bus configuration does not require any jumpers or internal SCSI cables. Table 3–2 defines the 5x1 SCSI bus components and their physical locations. Figure 3–1 is a schematic of this configuration.

Table 3–2 5x1 SCSI Bus Components

Item	BA350–EA
SCSI Buses: 5	
	SCSI bus 1
	SCSI bus 2
	SCSI bus 3
	SCSI bus 4
	SCSI bus 5
Terminators (BA35X–MB): 6	
	Slot 1†
SCSI bus 1	Slot 7
SCSI bus 2	Slot 5
SCSI bus 3	Slot 4
SCSI bus 4	Slot 3
SCSI bus 5	Slot 2
Jumpers (BA35X–MC): None	
3½-Inch Storage SBBs: 5	
SCSI bus 1	Slot 5
SCSI bus 2	Slot 4
SCSI bus 3	Slot 3
SCSI bus 4	Slot 2
SCSI bus 5	Slot 1

†Install this terminator for all configurations.

Figure 3–1 5x1 Bus Schematic



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3.3 5x2 SCSI Bus—Factory Configuration

Table 3–3 defines the 5x2 SCSI bus components and their physical locations. Figure 3–2 is a schematic of this configuration.

CAUTION

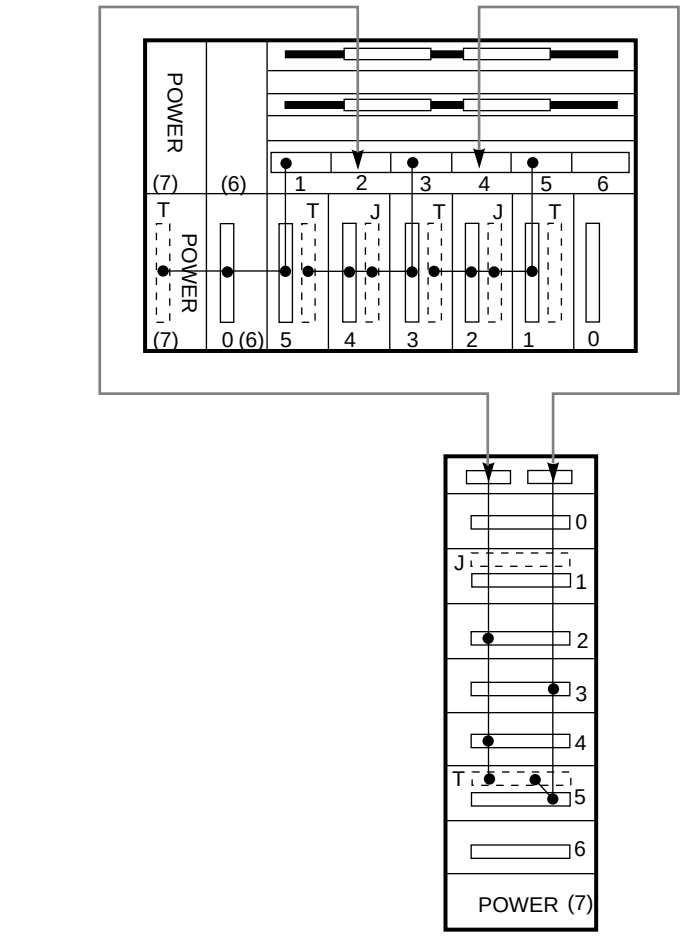
Do not use the following configuration when upgrading, as it can damage SCSI devices.

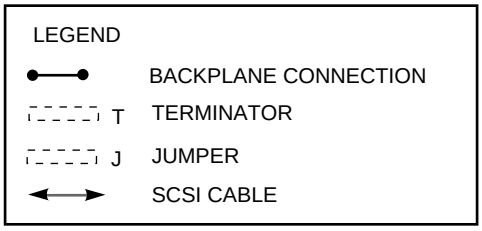
Table 3–3 5x2 SCSI Bus Components

Item	BA350–EA	First BA350–SA
SCSI Buses: 5		
	SCSI bus 1	SCSI bus 2
	SCSI bus 3	SCSI bus 4
	SCSI bus 5	
Terminators (BA35X–MB): 5		
	Slot 1†	
	SCSI bus 1	**SCSI bus 2**
	Slot 7	**SCSI bus 4**
	SCSI bus 3	Slot 5
	Slot 5	
	SCSI bus 5	
	Slot 3	
Jumpers (BA35X–MC): 2		
	SCSI bus 3	
	Slot 4	
	SCSI bus 5	
	Slot 2	
3½-Inch Storage SBBs: 10		
	SCSI bus 1	**SCSI bus 2**
	Slot 5	Slot 2
	Slot 6	Slot 4
	SCSI bus 3	**SCSI bus 4**
	Slot 3	Slot 3
	Slot 4	Slot 5
	SCSI bus 5	
	Slot 1	
	Slot 2	

†Install this terminator for all configurations.

Figure 3–2 5x2 Bus Schematic





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3.4 5x3 SCSI Bus—Factory Configuration

Table 3–4 defines the 5x3 SCSI bus components and their physical locations. Figure 3–3 is a schematic of this configuration.

CAUTION

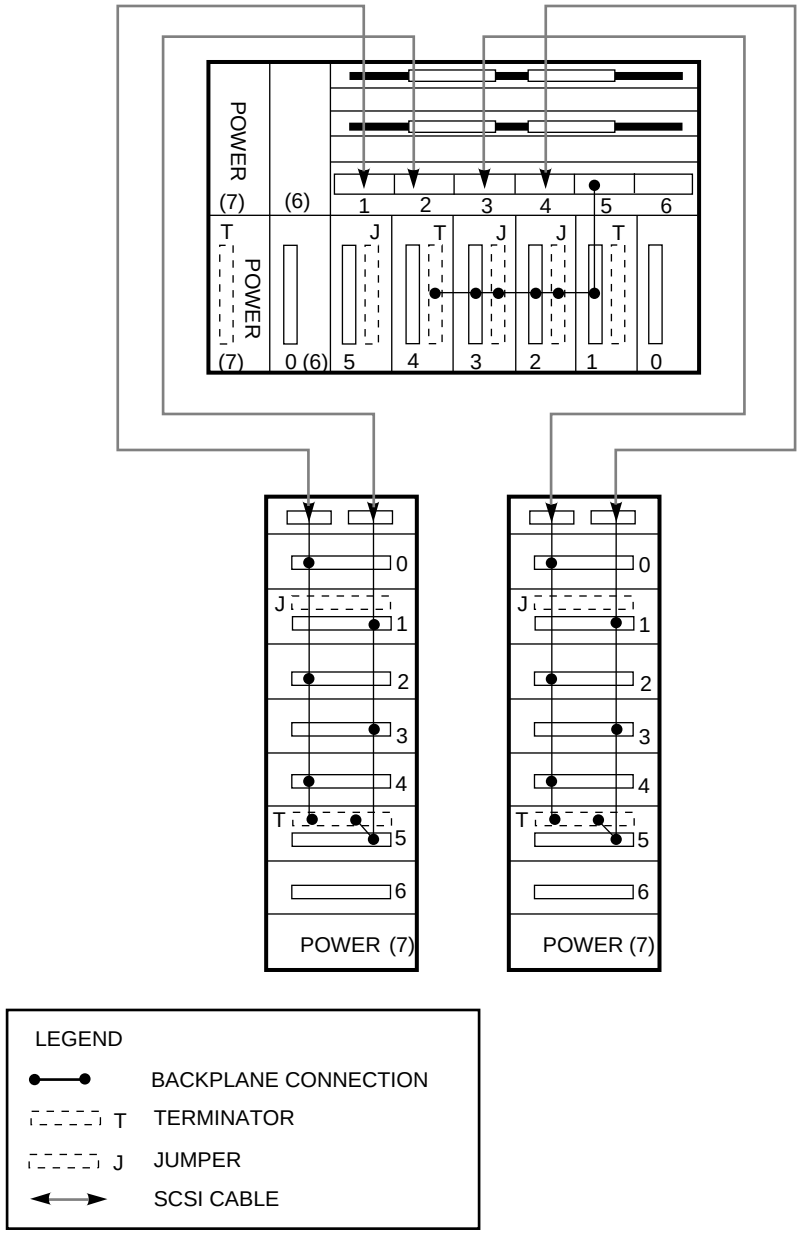
Do not use the following configuration when upgrading, as it can damage SCSI devices.

Table 3–4 5x3 SCSI Bus Components

Item	BA350–EA	First BA350–SA	Second BA350–SA
SCSI Buses: 5			
	SCSI bus 5	SCSI bus 1 SCSI bus 2	SCSI bus 3 SCSI bus 4
Terminators (BA35X–MB): 4			
	Slot 1† **SCSI bus 5** Slot 5	**SCSI bus 1** **SCSI bus 2** Slot 5	**SCSI bus 3** **SCSI bus 4** Slot 5
Jumpers (BA35X–MC): 2			
	SCSI bus 5 Slot 2 Slot 3		
3½-Inch Storage SBBs: 15			
	SCSI bus 5 Slot 1 Slot 2 Slot 3	**SCSI bus 1** Slot 0 Slot 2 Slot 4 **SCSI bus 2** Slot 1 Slot 3 Slot 5	**SCSI bus 3** Slot 0 Slot 2 Slot 4 **SCSI bus 4** Slot 1 Slot 3 Slot 5

†Install this terminator for all configurations.

Figure 3–3 5x3 Bus Schematic



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3.5 5x4 SCSI Bus—Factory Configuration

Table 3–5 defines the 5x4 SCSI bus components and their physical locations. Figure 3–4 is a schematic of this configuration.

CAUTION

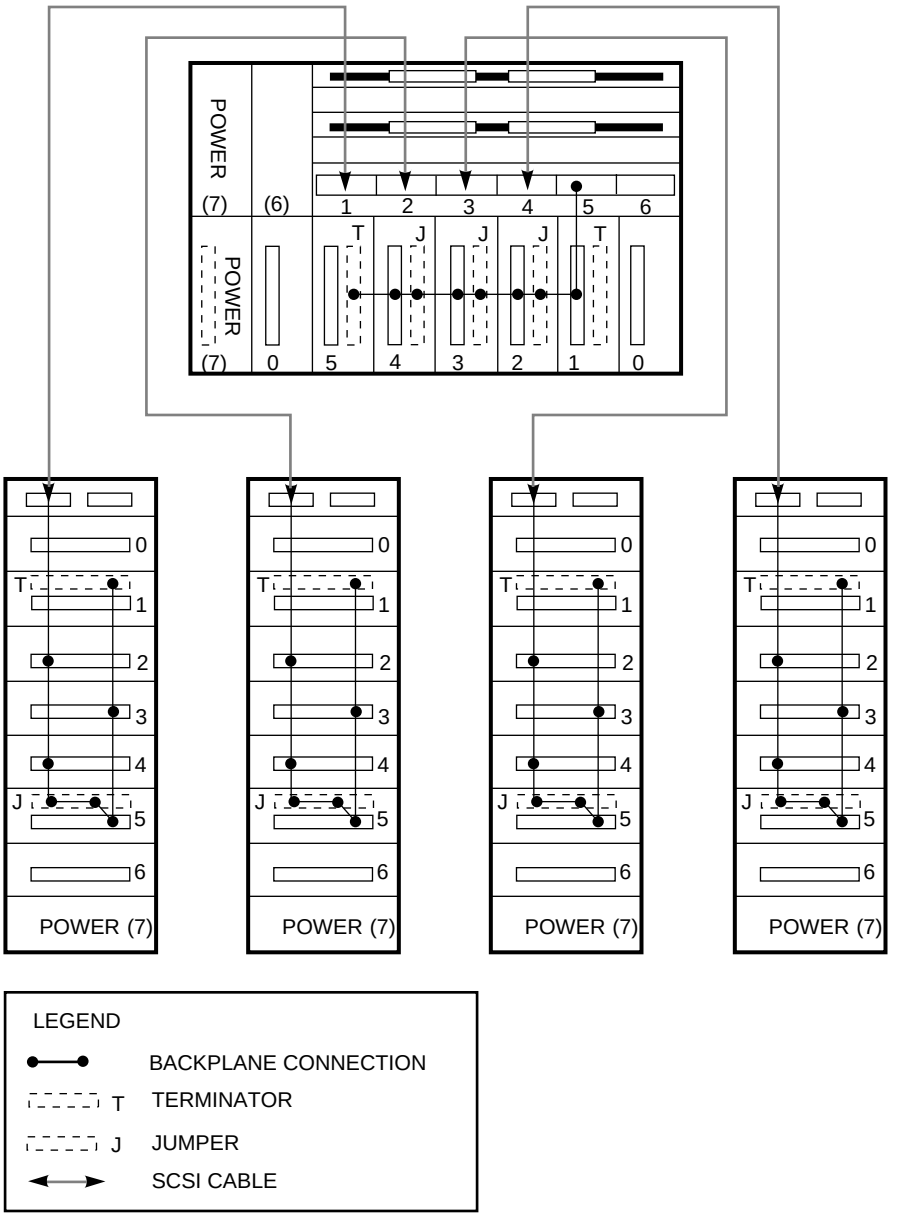
Do not use the following configuration when upgrading, as it can damage SCSI devices.

Table 3–5 5x4 SCSI Bus Components

Item	BA350–EA	First BA350–SA	Second BA350–SA	Third BA350–SA	Fourth BA350–SA
SCSI Buses: 5					
	SCSI bus 5	SCSI bus 1	SCSI bus 2	SCSI bus 3	SCSI bus 4
Terminators (BA35X–MB): 6					
	Slot 1† Slot 5	Slot 1	Slot 1	Slot 1	Slot 1
Jumpers (BA35X–MC): 7					
	Slot 2 Slot 3 Slot 4	Slot 5	Slot 5	Slot 5	Slot 5
3½-Inch Storage SBBs: 20					
	Slot 1 Slot 2 Slot 3 Slot 4	Slot 2 Slot 3 Slot 4 Slot 5	Slot 2 Slot 3 Slot 4 Slot 5	Slot 2 Slot 3 Slot 4 Slot 5	Slot 2 Slot 3 Slot 4 Slot 5

†Install this terminator for all configurations.

Figure 3–4 5x4 Bus Schematic



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3.6 5x5 SCSI Bus—Factory Configuration

Table 3–6 defines the 5x5 SCSI bus components and their physical locations. Figure 3–5 is a schematic of this configuration.

CAUTION

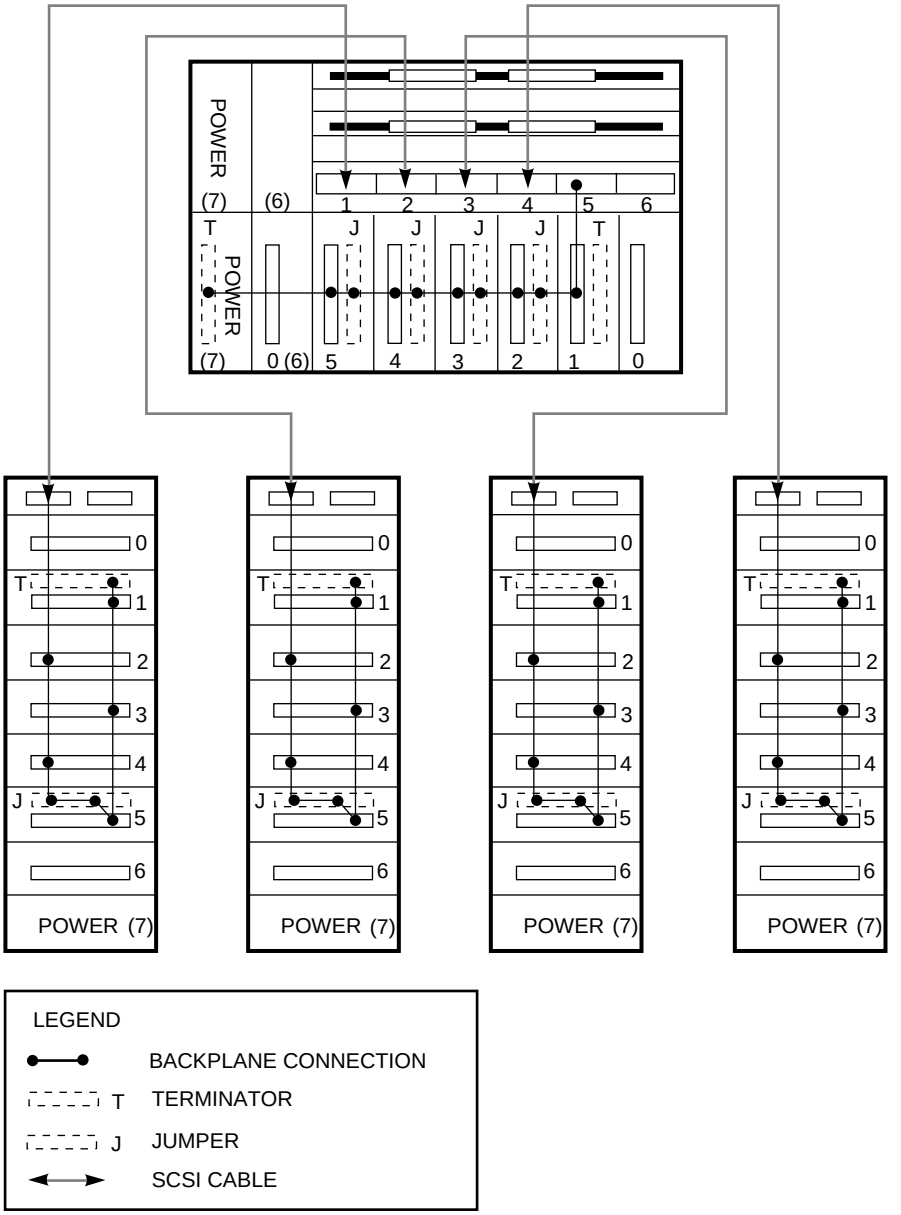
Do not use the following configuration when upgrading, as it can damage SCSI devices.

Table 3–6 5x5 SCSI Bus Components

Item	BA350–EA	First BA350–SA	Second BA350–SA	Third BA350–SA	Fourth BA350–SA
SCSI Buses: 5					
	SCSI bus 5	SCSI bus 1	SCSI bus 2	SCSI bus 3	SCSI bus 4
Terminators (BA35X–MB): 6					
	Slot 1† Slot 7	Slot 1	Slot 1	Slot 1	Slot 1
Jumpers (BA35X–MC): 8					
	Slot 2 Slot 3 Slot 4 Slot 5	Slot 5	Slot 5	Slot 5	Slot 5
3½-Inch Storage SBBs: 25					
	Slot 1 Slot 2 Slot 3 Slot 4 Slot 5	Slot 1 Slot 2 Slot 3 Slot 4 Slot 5	Slot 1 Slot 2 Slot 3 Slot 4 Slot 5	Slot 1 Slot 2 Slot 3 Slot 4 Slot 5	Slot 1 Slot 2 Slot 3 Slot 4 Slot 5

†Install this terminator for all configurations.

Figure 3–5 5x5 Bus Schematic



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3.7 5x6 SCSI Bus—Factory Configuration

Table 3–7 defines the 5x6 SCSI bus components and their physical locations. Figure 3–6 is a schematic of this configuration.

CAUTION

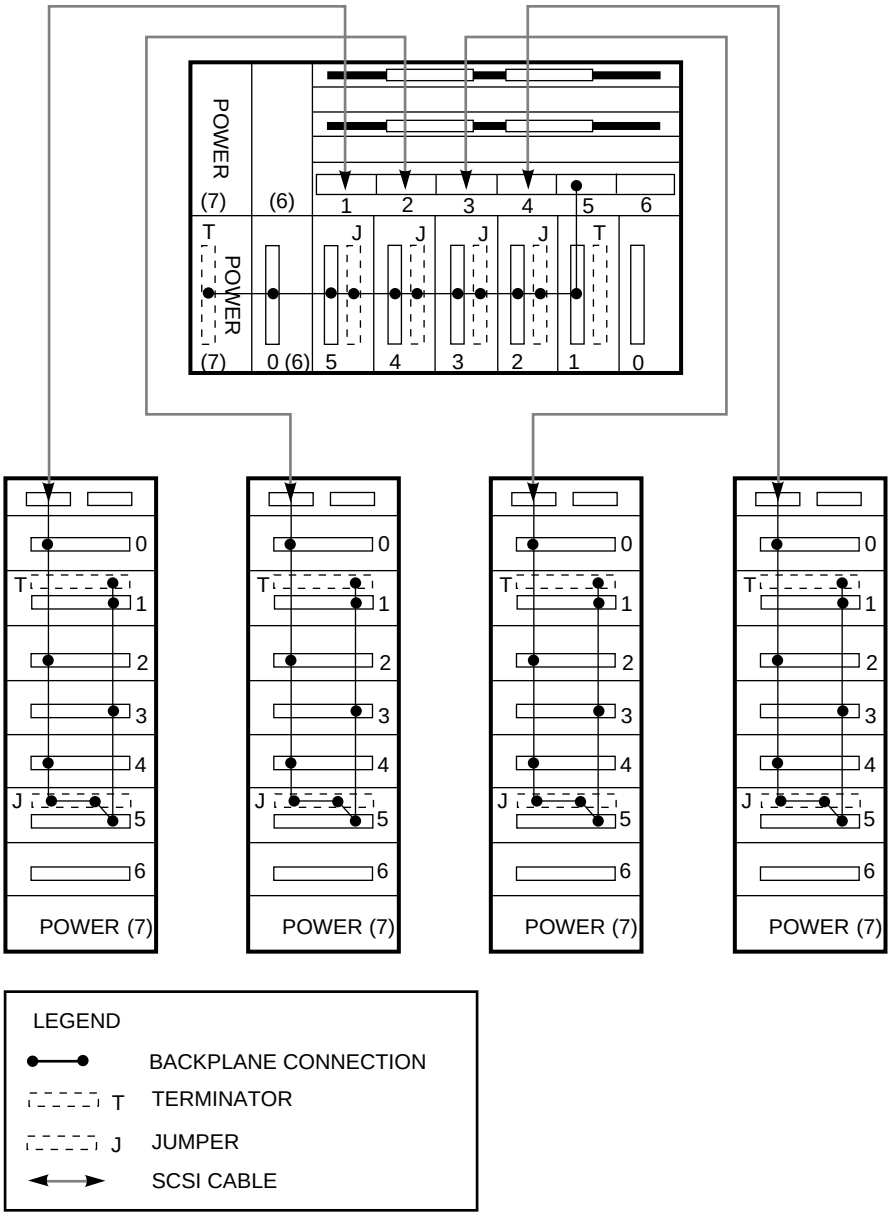
Do not use the following configuration when upgrading, as it can damage SCSI devices.

Table 3–7 5x6 SCSI Bus Components

Item	BA350–EA	First BA350–SA	Second BA350–SA	Third BA350–SA	Fourth BA350–SA
SCSI Buses: 5					
	SCSI bus 5	SCSI bus 1	SCSI bus 2	SCSI bus 3	SCSI bus 4
Terminators (BA35X–MB): 6					
	Slot 1† Slot 7	Slot 1	Slot 1	Slot 1	Slot 1
Jumpers (BA35X–MC): 8					
	Slot 2 Slot 3 Slot 4 Slot 5	Slot 5	Slot 5	Slot 5	Slot 5
3½-Inch Storage SBBs: 30					
	Slot 1 Slot 2 Slot 3 Slot 4 Slot 5 Slot 6	Slot 0 Slot 1 Slot 2 Slot 3 Slot 4 Slot 5	Slot 0 Slot 1 Slot 2 Slot 3 Slot 4 Slot 5	Slot 0 Slot 1 Slot 2 Slot 3 Slot 4 Slot 5	Slot 0 Slot 1 Slot 2 Slot 3 Slot 4 Slot 5

†Install this terminator for all configurations.

Figure 3–6 5x6 Bus Schematic



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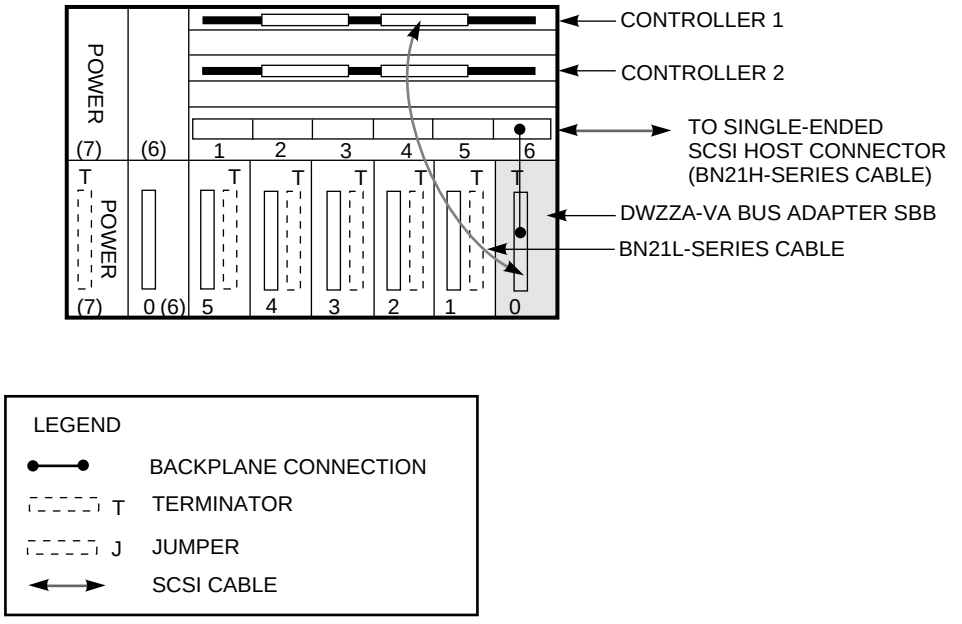
4

DWZZA–VA Bus Adapter

The DECstor/me modular storage shelf subsystem uses the DWZZA–VA bus adapter for compatibility between the two SCSI bus types. The DWZZA–VA bus adapter is mounted in a 3½-inch system building block (SBB). The DWZZA–VA bus adapter can only be installed in slot 0 of a storage shelf, as shown in Figure 4–1. The DWZZA–VA bus adapter is connected to the HSx controller with a cable and to the host by the SCSI cable connected to SCSI connector 6.

Figure 4–1 BA350–EA Shelf with DWZZA–VA Bus Adapter SBB Installed



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The DWZZA–VA bus adapter is mounted in a standard 3½-inch SBB and is always mounted in slot 0 of a DECstor/me shelf.

4.1 Major Features

The major features of the DWZZA–VA bus adapter are as follows:

- No SCSI device modification is required.
- The use of two DWZZA–VA bus adapters extends the effective length of a synchronous, single-ended SCSI bus to 31 meters (102 feet).
- Data transfers are supported at rates of up to 10 Megabytes/second.
- A SCSI device address is not used.

- Two physical buses are converted into one logical bus with a total of eight device addresses (0 through 7).
- Both buses are terminated in the end-bus configuration.
- Either bus can be terminated in the mid-bus configuration.
- DWZZA–VA bus adapter operation is transparent to both buses.
- SCSI–2 bus phases are supported.

4.1.1 Device ID

The DWZZA–VA bus adapter does not pass the SCSI shelf ID data to the differential SCSI device. Therefore, no device conflict exists with shelf slot 0 and SCSI hosts, which are manually set to SCSI ID 6 or 7.

4.1.2 SCSI Cables

The SCSI cables used with the DWZZA–VA bus adapter and the HSZ10–AX controller are shown in Table 4–1.

Table 4–1 SCSI Cable Types

Cable Number	Connectors
	Single-Ended Host to BA350-EA Shelf
BN21H	50-pin, high density, male, straight 50-pin, high density, male, right-angle, 2-56 jackscrews
BN21J	50-pin, high density, male, straight 50-pin, high density, male, straight
	DWZZA–VA Bus Adapter to HSx Series Controller
BN21L	68-pin, high density, male, right-angle, 2-56 jackscrews 68-pin, high density, male, right-angle, 2-56 jackscrews

4.1.3 Terminating the SCSI Buses

All SCSI buses are terminated at the physical ends of the bus or cable. The configuration shown in Figure 4-1 is terminated in the following manner:

- The single-ended host is connected to the adapter using SCSI connector 6 on the BA350–EA modular storage shelf. The procedures for terminating the single-ended bus are:
  - Install a single-ended bus terminator on the host.
  - Install jumper J2 on the DWZZA–VA bus adapter to enable the single-ended bus terminators.
- The DWZZA–VA bus adapter and the HSZ10–AX controller are connected by a 68-pin cable. Terminate the differential bus cables as follows:
  - Install differential bus terminators on the HSZ10–AX controller.
  - Install five SIP (single in-line package) resistors in the DWZZA–VA bus adapter at the adapter end of the differential bus cable.

Note

See the DWZZA–VA bus adapter documentation for jumper and SIP installation procedures.

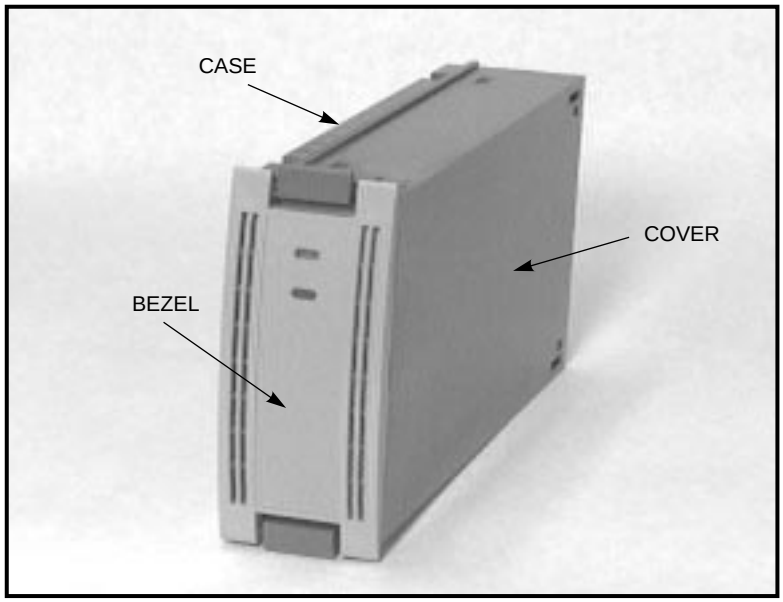
4.1.4 Terminator Power

The DWZZA–VA bus adapter supplies power to the SCSI terminators (TERMPOWER). TERMPOWER is current limited by self-resetting fuses.

4.2 Disassembly of the DWZZA–VA Bus Adapter

Remove the SBB bezel and the cover to install or remove bus terminators in the DWZZA–VA bus adapter as shown in Figure 4–2. Both the bezel and cover are secured with four mounting tabs. Use a small screwdriver to press in the **ends** of the mounting tabs.

Figure 4–2 Typical 3½-Inch SBB



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CAUTION

Removing the DWZZA–VA bus adapter or disconnecting the SCSI cable from the controller with power still active can cause the SCSI bus to malfunction.

Do not perform this procedure until you have removed power from the shelf.

To change the DWZZA–VA bus adapter terminators, use the following procedure:

Step	Procedure
1.	After removing power, disconnect the SCSI cable from the front of the DWZZA–VA bus adapter and remove the adapter from the shelf.
2.	Remove the bezel by pushing down on the end of the upper mounting tabs in the base and cover while pulling the top of the bezel away from the SBB.

CAUTION

Use minimal pressure when pushing down on the mounting tabs to prevent damage.

3.	Remove the cover by pushing down on the end of the upper mounting tabs while pulling the top of the cover away from the base.
4.	Configure the SCSI bus terminators by installing or removing the J2 jumper or the five SIP resistors.
5.	Replace the cover by inserting the bottom mounting tabs into the SBB base mounting holes. Align the top mounting tabs with the base and snap the cover into place.
6.	Replace the bezel by inserting the bottom mounting tabs into the bottom mounting holes in the base and cover. Align the top mounting tabs with mounting holes in the base and cover and snap the bezel into place.
7.	Install the SBB in the shelf, connect the SCSI cable, and apply power to the shelf.
8.	Verify that the SCSI bus and devices are functioning properly.

4.3 Functional Specifications

The DWZZA–VA bus adapter meets the environmental specifications defined in the *BA350 Storage Shelf Subsystem User's Guide* for a DECstor/me modular storage shelf subsystem. Table 4–2 lists the functional specifications of this device.

Table 4–2 DWZZA–VA Bus Adapter Functional Specifications

Power requirements	
Input voltage	+5 Vdc, +/-0.25 volts.
Input current:	
Electronics	1.5 amps.
Terminators	0 to 3 amps. TERMPOWER supplied to both buses.
Maximum Power	22.5 watts.
Electrical interface	Single-ended SCSI to differential SCSI. 8 bits plus parity. Fast SCSI on both buses.
Connectors	
Single ended	DECstor/me compatible 96-pin DIN Connector.

(continued on next page)

Table 4–2 (Cont.) DWZZA–VA Bus Adapter Functional Specifications

Differential	68-pin panel mounted SCSI "P" connector.
Termination	
End-bus use	Install or enable terminators.
Mid-bus use	Remove or disable terminators.
Single ended	User selected 8-bit active termination (J2 installed = enabled).
Differential	16-bit wide user removable resistors.
SCSI device address	No SCSI device addresses are used.
Overload protection	DTERMPOWER: 1.5 amp self-resetting thermal fuse. STERMPOWER: 1.5 amp self-resetting thermal fuse.
Diode protection	DTERMPOWER isolated from Vcc by Schottky diodes. STERMPOWER isolated from Vcc by Schottky diodes.
Shielding	SBB and differential connector shielded for ESD, EMI, and safety requirements.
Replacement	The DWZZA–VA bus adapter can be replaced using the hot swap method. The DWZZA–VA bus adapter can be turned on or off without inducing noise on either bus or causing electrical malfunction.
RESET	Power-up reset and SCSI bus reset automatically clear the initiator/target detection circuits and BSY noise filter.
DECstor/me status signals	The DECstor/me single-ended TTL logic signals are available on the following connector pins:

Single Ended Connector Pin		**Differential Connector Pin**
20	SWAP_L	40
22	SHELF_OK H	50
30	FAULT_CLK_H	55
34	FAULT_DATA_H	40

SCSI cable or bus length	
Single-ended	
Asynchronous	6 m (19.7 ft)
Synchronous	3 m (9.8 ft)
Differential	25 m (82 ft)
Cable fault signals	DEVIOUSNESS SCSI bus
Special features	BSY GLITCH TRAP† Eliminates cable length constraint due to wired OR noise on BSY line.

†Patent Pending

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