

StorageWorks™ Solutions

5¼-Inch Storage Device Installation Guide

Order Number: EK-MC525-IG. A01

This guide describes the procedures for installing 5¼-inch fixed and removable media storage devices in a StorageWorks SWXBB-BB series modular carrier kit to create StorageWorks building blocks (SBBs).

April 1994

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This document was prepared using VAX DOCUMENT Version 2.1.

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Preface

This installation guide describes the procedures for installing either a Digital™ or another manufacturer's 5¼-inch form factor *fixed* or *removable* storage device in a 5¼-inch modular carrier to create a StorageWorks building block (SBB).

Intended Audience

This guide is for use by personnel responsible for installing storage devices in a modular carrier to create an SBB.

Structure

This guide is organized as follows:

- | | |
|-----------|---|
| Chapter 1 | Describes the procedures for determining device and modular carrier compatibility and selecting the appropriate mounting holes and hardware. |
| Chapter 2 | Describes the procedures for installing a full-height 5¼-inch storage device or a <i>lower</i> half-height 5¼-inch storage device in a modular carrier. |
| Chapter 3 | Describes the procedures for installing the <i>upper</i> half-height 5¼-inch storage device in a modular carrier. |

Preliminary Procedures

This chapter describes the procedures for determining device and modular carrier compatibility and selecting the appropriate mounting holes and hardware.

1.1 Device Qualification

The customer and the device manufacturer are responsible for performing the required tests and to take all actions required to make the assembled SBBs containing a non-Digital device fully comply with all country-specific standards (for example, FCC, CSA, TUV, and UL). The customer and the device manufacturer also are required to install the certification labels.

Note

Electronic devices emit radio frequencies that under certain conditions may interfere with other electronic equipment or radio frequency transmissions.

Should operation of this completed SBB cause unacceptable interference, the customer is responsible for taking whatever steps are necessary to correct the interference.

This modular carrier is intended for use only with storage devices that comply with the appropriate product safety requirements of UL1950, CSA950, or EN60 950.

For a list of qualified small computer system interface (SCSI) devices, contact your Digital account representative or the latest edition of the *StorageWorks Solutions Configuration Guide*.

CAUTION

All of the components (devices, cables, interfaces, and so forth) can be damaged by electrostatic discharge (ESD).

Do not implement the procedures in this document until you have taken proper precautions against ESD. As a *minimum*, you must wear an ESD grounding strap whenever you handle any component or storage device, or remove the SBB cover.

1.2 Compatibility

All Digital devices (for example, TZ™, RZ™, and EZ™ devices) can be installed in an SBB. Storage devices from other manufacturers may not be compatible. Compare the device specifications with those in Table 1–1 *before* assembling the SBB.

Note

Unless specifically stated otherwise, the storage device must comply with *all* the specifications listed in Table 1–1. *Any device that does not comply cannot be installed.*

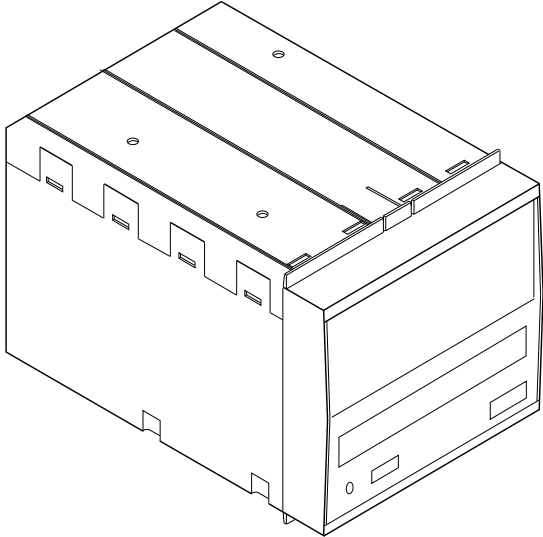
Table 1–1 Storage Device—SBB Compatibility Specifications

The 5¼-inch device . . .		MUST meet these specifications . . .			
Maximum Dimensions		Full-Height Device		Half-Height Device	
		mm	in	mm	in
	Height	82.50	3.25	43.00	1.70
	Width	146.00	5.75	146.00	5.75
	Depth	203.20	8.00	203.20	8.00
Power					
	Consumption	Full-Height: 55.5 Watts <i>total</i> power consumption (+5 V dc and +12 V dc) Half-Height: 27.75 Watts <i>total</i> power consumption (+5 V dc and +12 V dc)			
	Connector	The configuration of the <i>device power connector</i> must be as shown in Figure 1–4, and it must be wired as follows: Pin 4 +5 V dc Pin 3 +5 V dc Return Pin 2 +12 V dc Return Pin 1 +12 V dc			
Cooling					
		A minimum air flow of 3 CFM must be sufficient to cool the device.			
SCSI Bus					
		<ul style="list-style-type: none"> • Device SCSI connector must comply to ANSI standard X3.131-1986 SCSI–2 wiring. • SCSI connector must be located on the rear of the device. • Internal SCSI device bus termination can be disabled. • SCSI device address can be disabled (<i>optional</i>). 			
Mounting Hardware					
		<p>The lower device hole mounting pattern must match one of the patterns shown in Figure 1–5.</p> <p>To determine which SBB hole pattern to use, insert the device in the left SBB cover and move it around until all four SBB mounting holes match four device mounting holes. It is suggested that you mark the SBB holes for future reference.</p> <p>Only 6–32 and M3 mounting screws are provided with the SBB. Use the screws listed in the device specifications. If you are not sure which screw to use, the correct size can be inserted and finger-tightened.</p>			

CAUTION

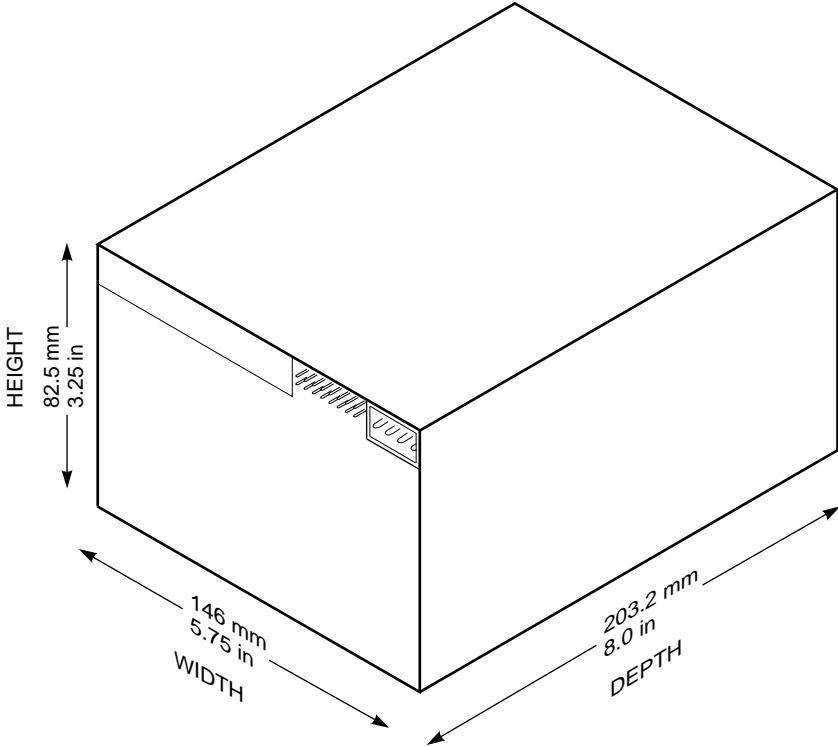
Installing the wrong size screw or cross-threading a screw can damage the threaded mounting hole.

Figure 1-1 Typical 5/4-Inch SBB



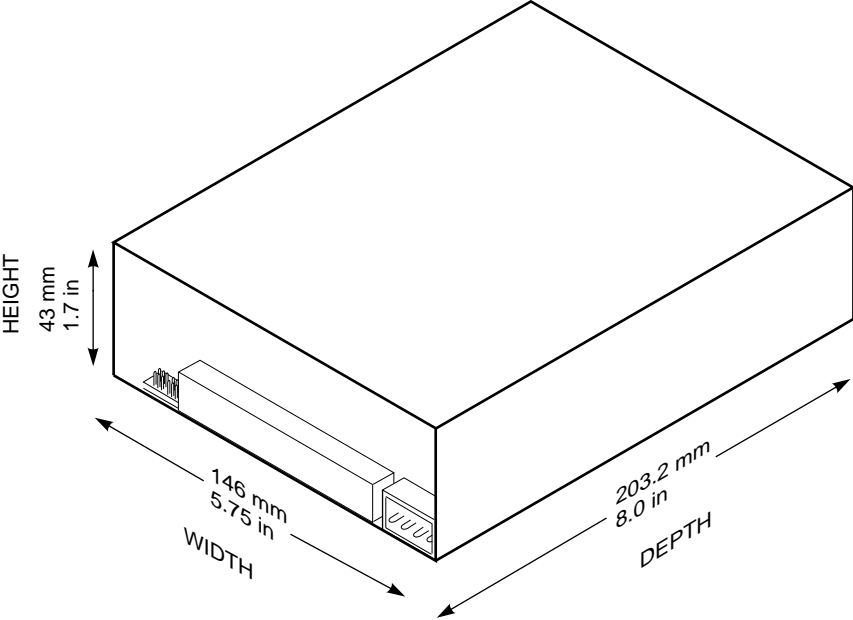
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Figure 1-2 Maximum Full-Height Device Measurements



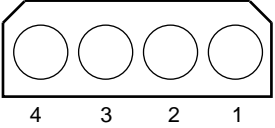
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Figure 1-3 Maximum Half-Height Device Measurements



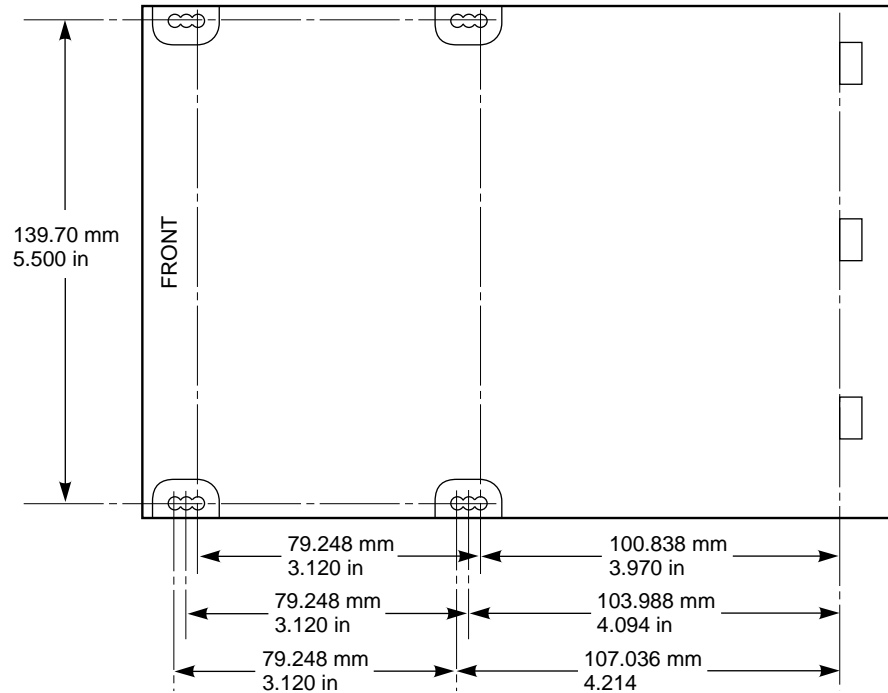
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Figure 1-4 Device Power Connector



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Figure 1–5 5/4-Inch SBB Lower Device Mounting Hole Pattern



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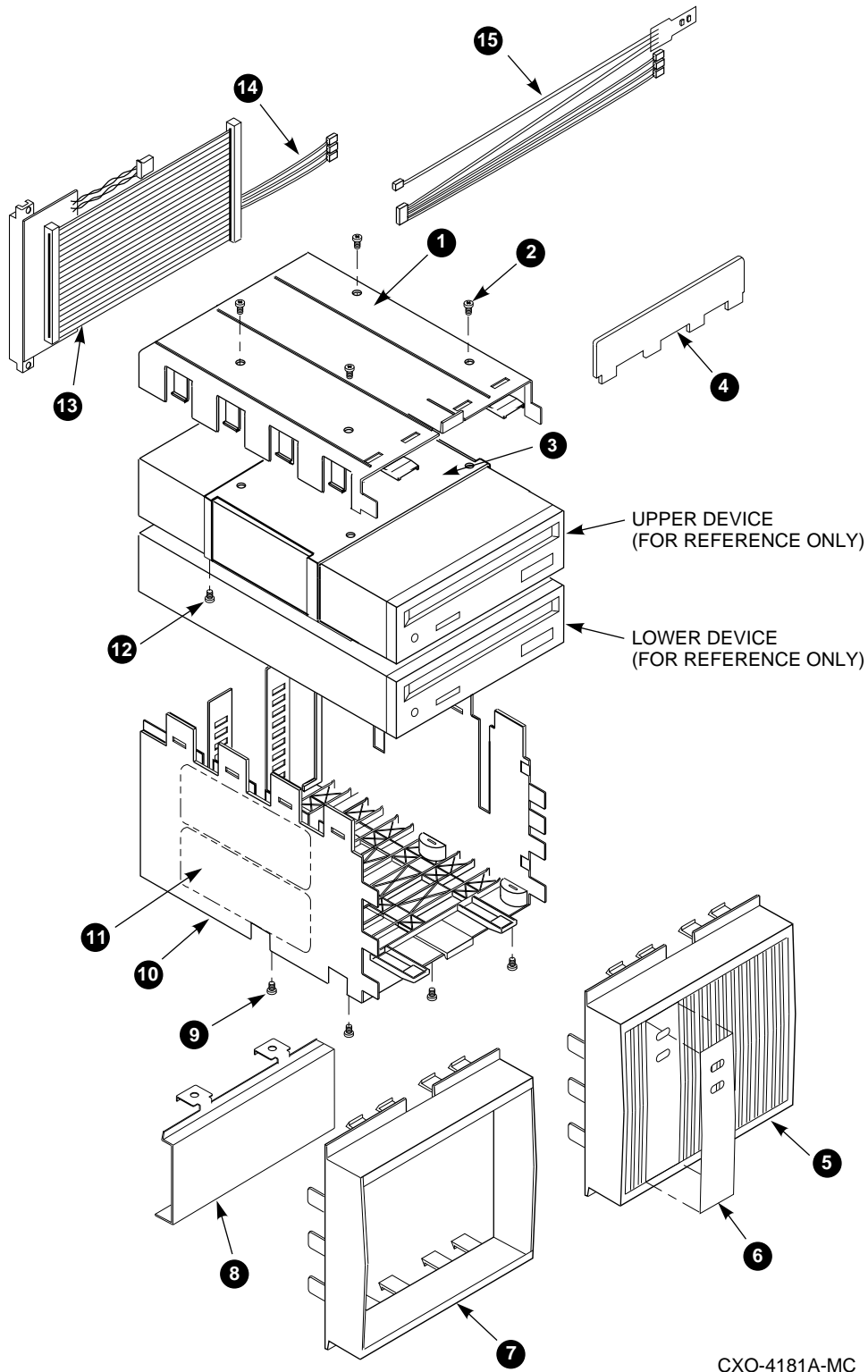
1.3 Fixed Media Device Installation Kit

Table 1–2 and Figure 1–6 describe the fixed media device SBB kit.

Table 1–2 SWXBB–BB Fixed Media Device SBB Kit Parts List

Description	Callout No.	Quantity
Bezel extraction tool	④	1
Bezel, fixed media device	⑤	1
Bezel, removable media device	⑦	1
Bezel half-height filler panel	⑧	1
Bezel label	⑥	1
ID cable harness (with LED flex circuit)	⑮	1
ID cable harness (without LED flex circuit)	⑭	1
Label, bottom cover	⑪	1
Mounting bracket, half-height	③	1
SBB cover, bottom	⑩	1
SBB cover, top	①	1
Screw, machine, 4–40 flat head	⑫	4
Screw, machine, 4–40 pan head	②	4
Screw, machine 6–32 pan head	⑨	4
Screw, machine M3, flat head	⑬	4
Screw, machine M3, pan head	⑧	4
Universal SCSI cable	⑬	2

Figure 1-6 Fixed and Removable Media Device Components



Installing a Full-Height or Lower Half-Height 5¼-Inch Device

This chapter describes the procedures for installing either a full-height (FH) or a *lower* 5¼-inch half-height (HH) *removable* media device in a 5¼-inch StorageWorks generic carrier to create a StorageWorks building block (SBB). The first HH media device is usually installed in the lower position.

Installing a FH fixed media device or a lower HH removable media device in a modular carrier requires that you complete the procedures in the following sequence:

- Connect the ID cable harness to the universal small computer system interface (SCSI) cable
- Fold the universal SCSI cable
- Connect the universal SCSI cable to the device
- Align the lower device
- Mount the fixed media device light emitting diodes (LEDs)
- Assemble the SBB
- Attach the bezel
- Set the device SCSI ID address

Note

Because there is no significant difference between installing a full-height device or a lower half-height device, there is only one set of procedures. Only half-height devices are shown in the illustrations.

CAUTION

All of the components (devices, cables, interfaces, and so forth) can be damaged by electrostatic discharge (ESD).

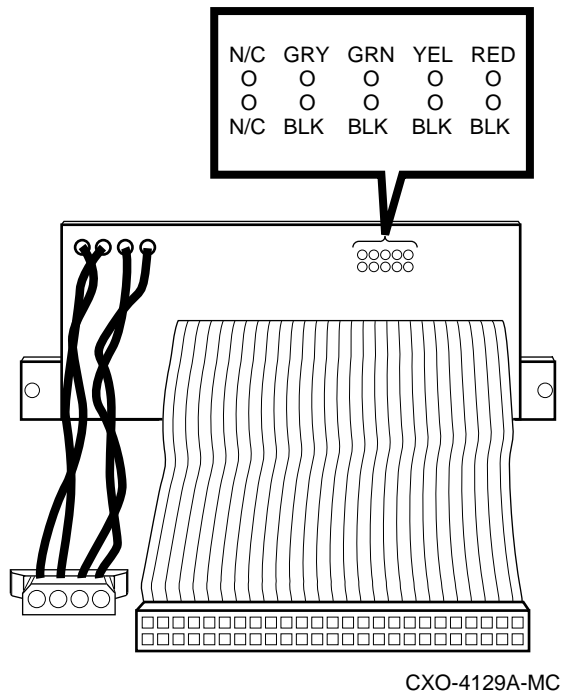
Do not implement the procedures in this document until you have taken proper precautions against ESD. As a *minimum*, you must wear an ESD grounding strap whenever you handle any component or storage device, or remove the SBB cover.

2.1 Connecting the ID Cable Harness

Complete the following procedure to connect the ID cable harness to the universal SCSI cable:

1. Orient the ID cable harness connector so that the colored signal wires are at the top and the BLACK signal return wires are at the bottom.
2. Connect the ID cable harness connector to the universal small computer system interface (SCSI) cable ID header as shown in Figure 2-1.

Figure 2-1 Connecting the ID Cable Harness

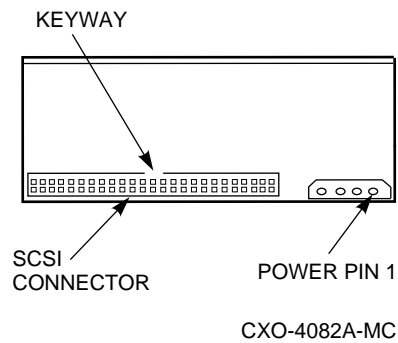


2.2 Folding the Universal SCSI Cable

The universal SCSI cable must be folded in a specific manner to make sure that the connector properly mates with the SCSI connector on the device. Complete the following procedure to make sure you have folded the cable correctly:

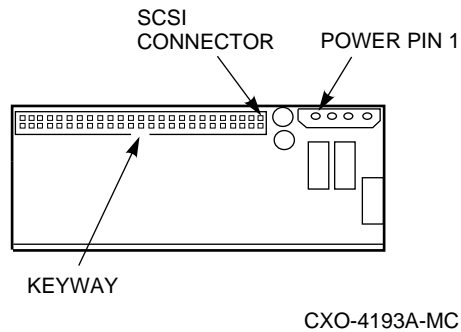
1. Position the device as it will be installed in the SBB and note the position of the keyway on the device SCSI connector.
2. When the device connector is positioned with the keyway at the top as shown in Figure 2-2, fold the cable as shown in the callouts in Figure 2-4.

Figure 2-2 Typical Device Connector Orientation



3. When the device connector is positioned with the keyway at the bottom as shown in Figure 2-3, fold the cable as shown in the callouts in Figure 2-5.

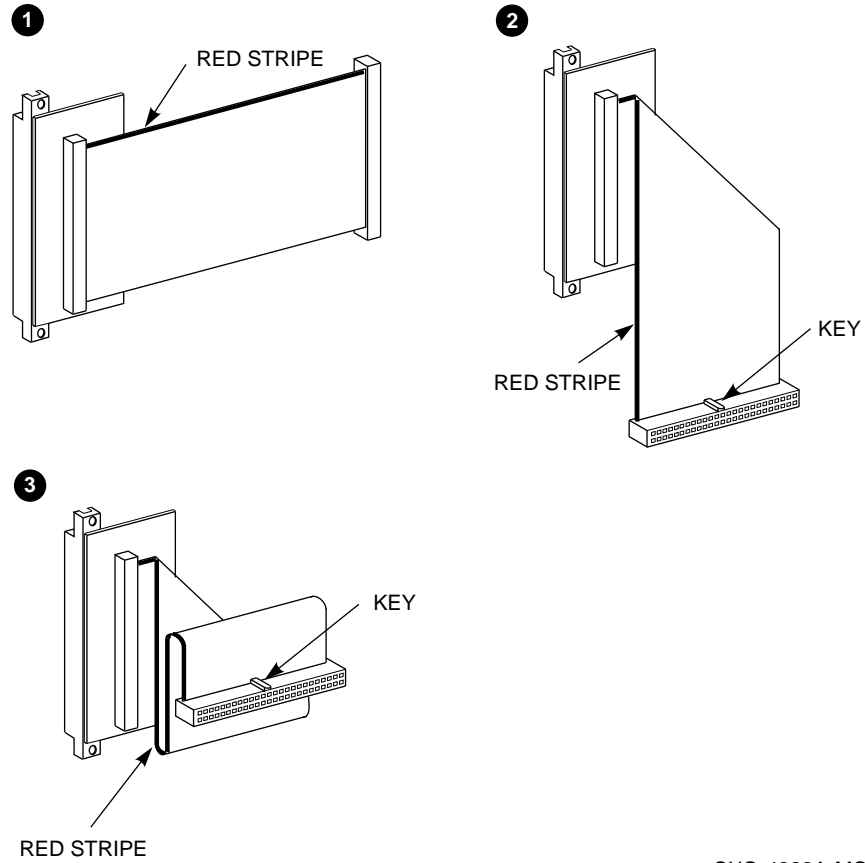
Figure 2-3 Inverted Device Connector Orientation



Note

Make sure the red stripe and the keyway are properly positioned.

Figure 2-4 Cable Folding—Key at the Top

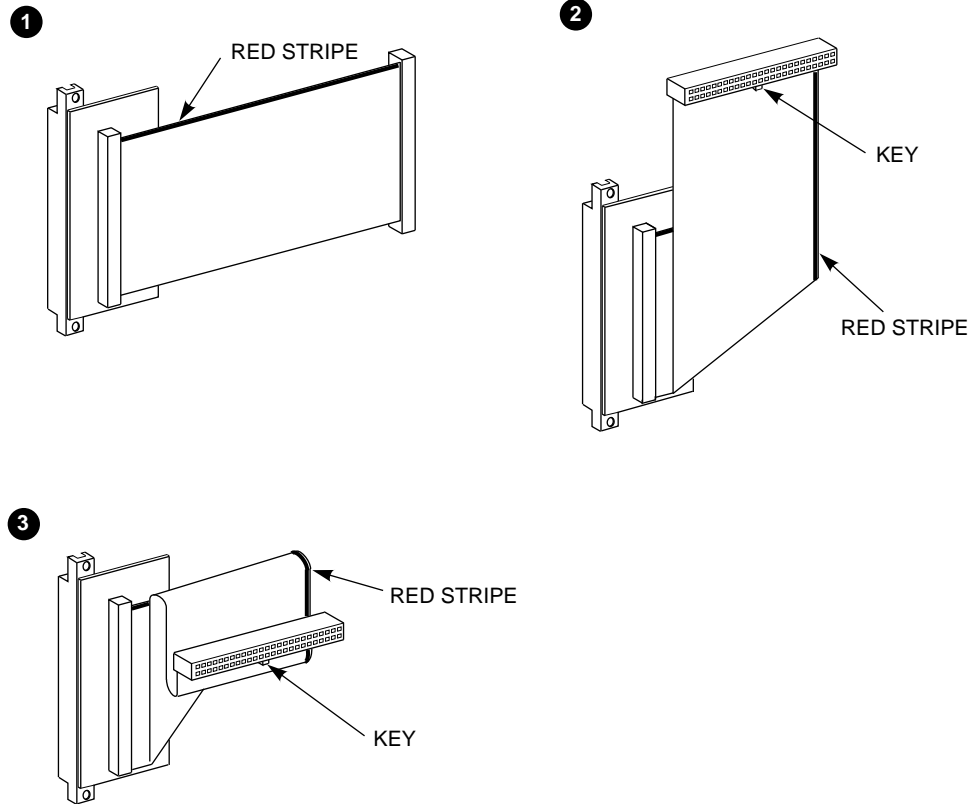


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Note

Make sure the red stripe and the keyway are properly positioned.

Figure 2-5 Cable Folding—Key at the Bottom



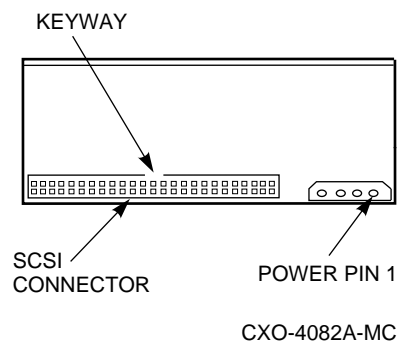
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2.3 Connecting the Universal SCSI Cable to the Device

Complete the following procedure to connect the universal SCSI cable to the device and to mount the device:

1. Make sure the ribbon cable is still folded while plugging in the connector.
2. Stand the device on end with the SCSI connector facing up.
3. Connect the universal SCSI cable 50-pin SCSI connector to the device as shown in Figure 2-6.
4. Connect the universal SCSI cable 4-pin power connector to the device.

Figure 2-6 Keyway Orientation

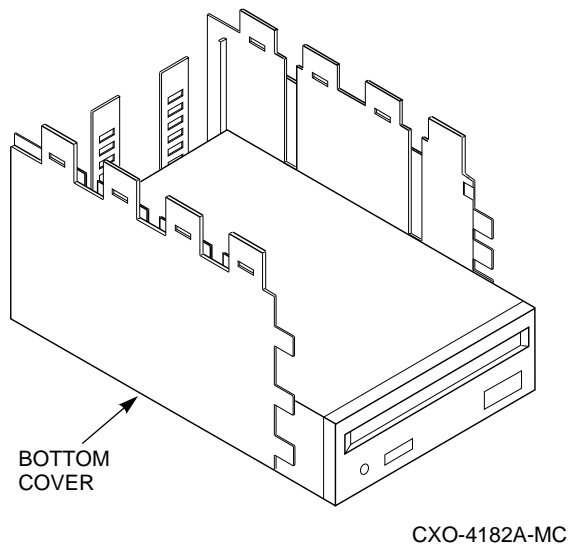


2.4 Aligning the Lower Device

Complete the following procedure to align the lower device in the SBB:

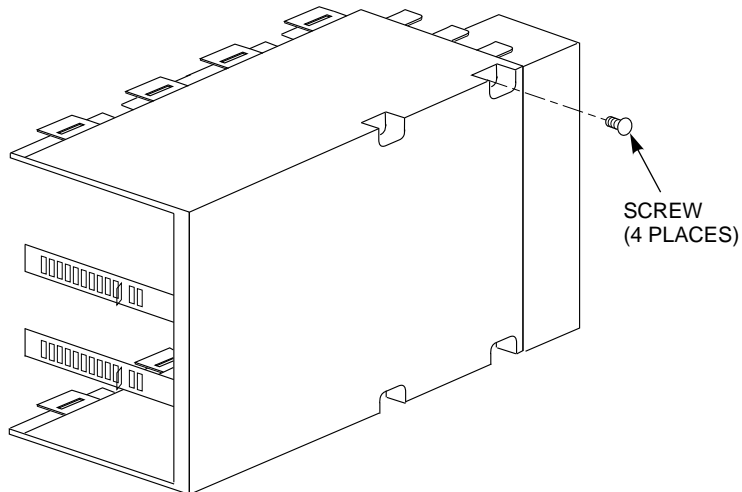
1. Slide the device into the bottom SBB cover as shown in Figure 2-7, but *do not* engage the top and bottom SBB covers.

Figure 2-7 Mounting the Lower Device



2. Place the bottom SBB cover on its side as shown in Figure 2–8.

Figure 2–8 Installing the Mounting Hardware



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Note

Refer to device documentation to determine whether 6–32 or M3 screws are used to mount the device.

3. Select the appropriate pan for mounting the device (that is, 6–32 or M3).
4. Align the device mounting holes with the appropriate bottom SBB cover mounting holes.

Note

If you are in doubt about which are the correct screws, insert and *finger-tighten* one of the mounting screws.

5. Install the screws and tighten securely.
6. Locate the device ID connector.

CAUTION

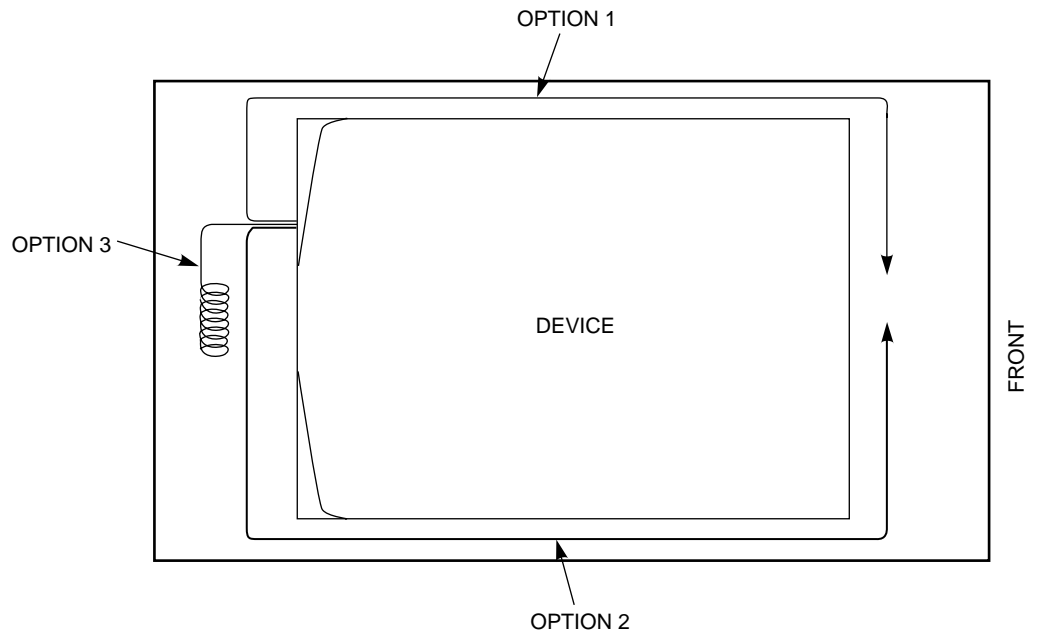
Do not route the ID cable harness between the top and bottom of the device. This restricts air flow and can impede the mechanical fit within the StorageWorks shelf.

7. Route the ID cable harness.

If these connectors are located at the front of the device, you must route the ID cable harness between the side of the device and the bottom SBB cover (Options 1 or 2, Figure 2–9).

If these are located at the rear of the device, coil the harness and store it at the rear of the device (Option 3, Figure 2–9).

Figure 2–9 Device ID Cable Harness Connection and Routing



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- Review the device specifications and identify the device ID signal pin assignments. Table 2–1 lists the ID cable harness wire pair colors.

Table 2–1 ID Cable Harness Color Assignments

Signal	Color
ID1 Signal	Red
ID1 Return	Black
ID2 Signal	Yellow
ID2 Return	Black
ID4 Signal	Green
ID4 Return	Black
Not Used†	Grey
Not Used†	Black
Activity LED Anode†	Blue
Activity LED Cathode†	Black

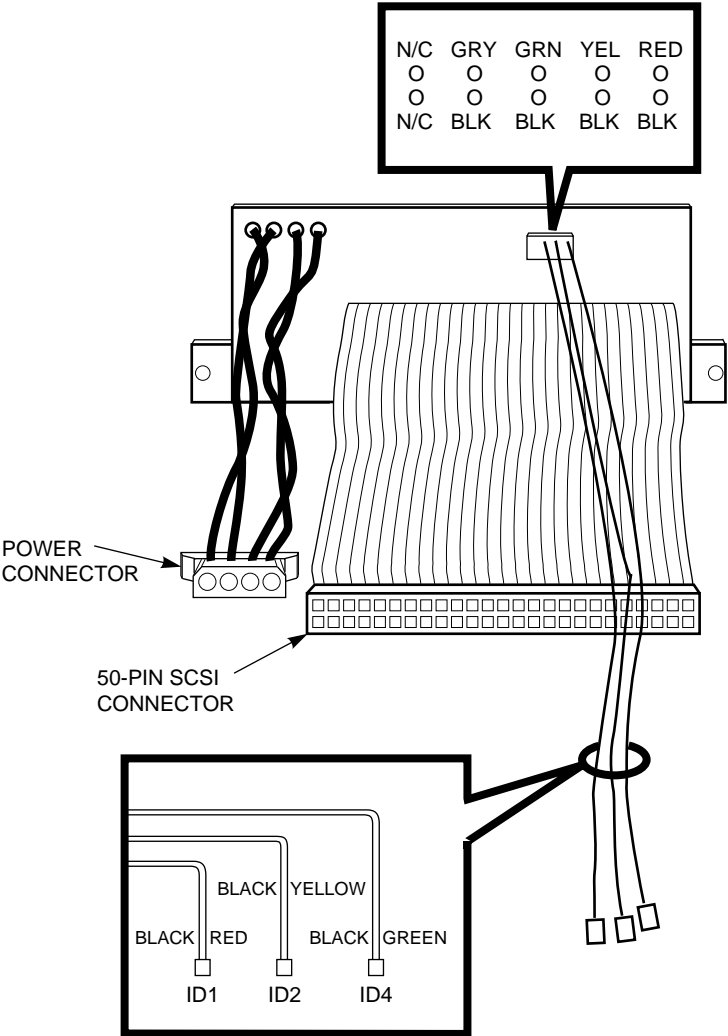
† Available only with fixed media devices.

- Refer to the device specification document, Table 2–1, Figure 2–10, and Figure 2–11 to connect the ID cable harness headers to the device ID connectors.

Note

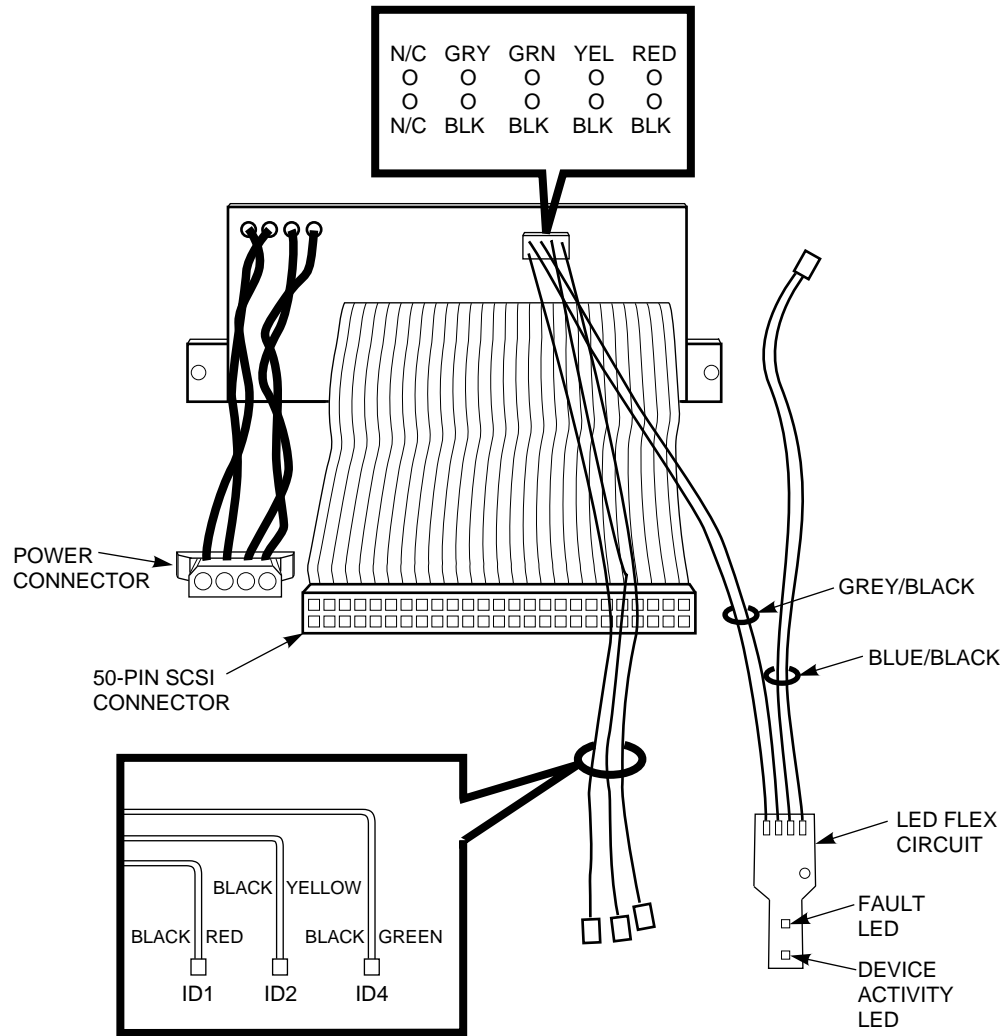
The BLACK wires **must** connect to the device signal RETURN pins.
The colored wires **must** connect to the device signal pins.

Figure 2-10 Removable Media ID Cable Harness



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Figure 2-11 Fixed Media ID Cable Harness



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2.5 Mounting the Fixed Media Device LEDs

The procedures in this section are applicable only to fixed media devices.

Note

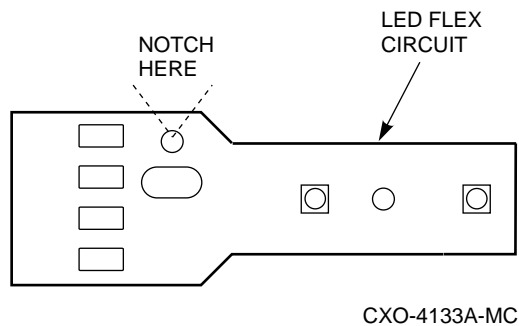
If the LED is already mounted on the bezel, proceed to Section 2.6.

CAUTION

To prevent damage to soldered cable connections and the LEDs, do not twist or apply excessive force to the LED flex circuit.

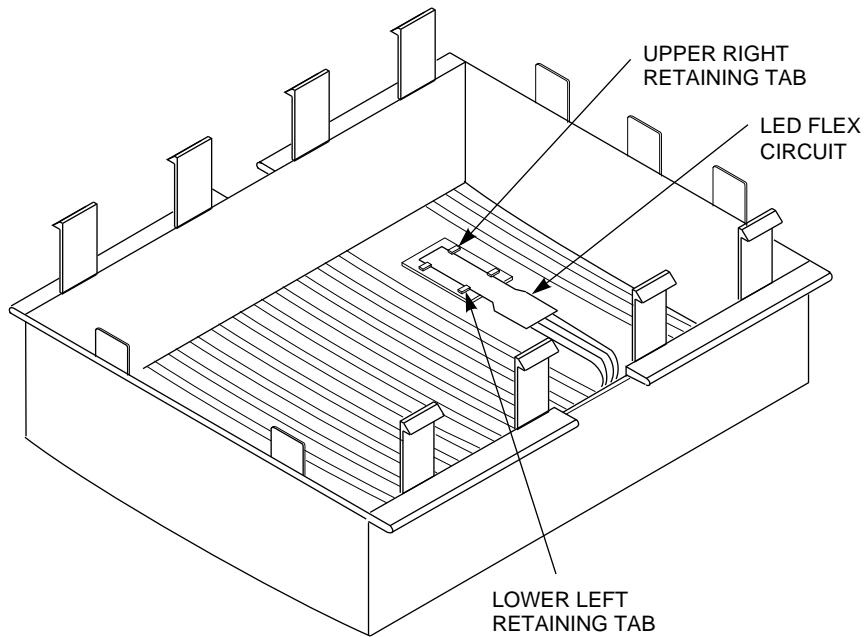
1. Check the device specifications to determine if the device activity LED drive requires a 330 ohm current limiting resistor.
2. If the resistor is required, cut and remove a piece of the current limiting resistor trace from the LED flex circuit as shown in Figure 2–12.

Figure 2–12 Enabling the LED Current Limiting Resistor



3. As shown in Figure 2–13, insert the upper right edge of the LED flex circuit under the upper right retaining tab on the back side of the fixed media device bezel.

Figure 2–13 Fixed Media Device Bezel—Rear View



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4. Twist the LED flex circuit slightly to fit the lower left edge of the lower left retaining tab.
5. When the LED flex circuit is in position, use a small screwdriver to gently push and secure the other corners under the remaining tabs.

2.6 Assembling the SBB

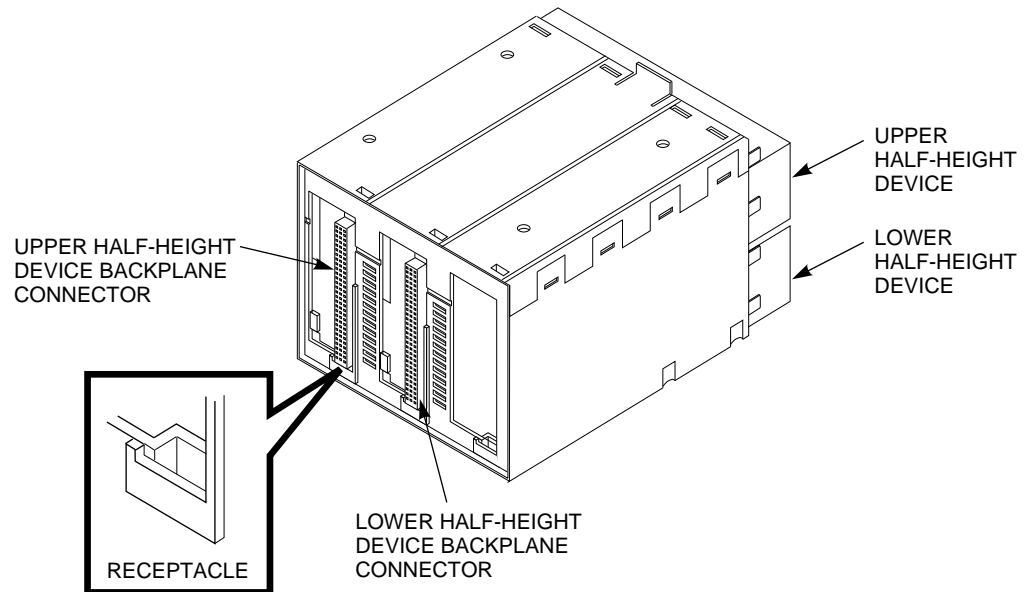
1. Position the bottom of the backplane connector into the receptacle in the bottom SBB cover as shown in Figure 2–14. The top SBB cover has a similar receptacle for the top of the backplane connector.

Note

The bottom device connector is the middle connector as shown in Figure 2–14.

2. As you align the top and bottom SBB covers, make sure that the backplane connector moves freely (up, down, and sideways).
3. Push the top SBB cover into the bottom SBB cover until the eight tabs on the sides of the covers engage and snap into place.
4. Affix the bottom cover label on the bottom SBB cover.

Figure 2–14 Mounted Lower Device



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2.7 Attaching the Bezel

Complete the following procedures to attach the bezel:

1. Position the SBB as shown in Figure 2–15.

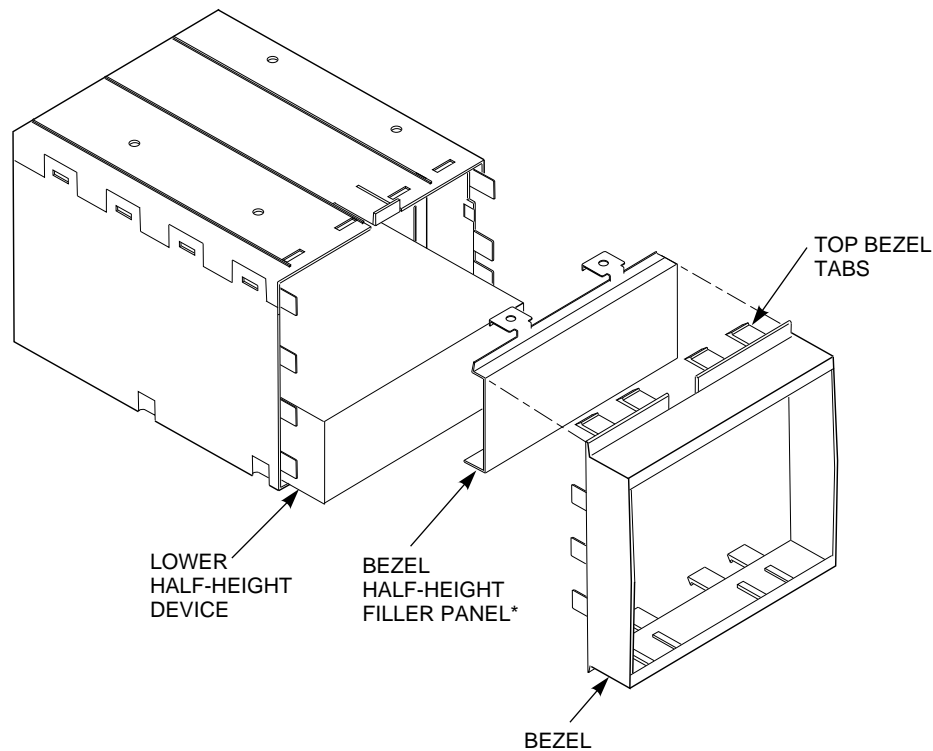
Note

The bezel half-height filler panel is not required when installing a full-height device.

Steps 2 and 3 are for installing the bezel half-height filler panel when installing a half-height device.

2. Place the bezel face down with the three side bezel tabs to the left.
3. Insert the bezel half-height filler panel into the bezel guide rails and push until it is flush with the front of the bezel.
4. Fit the top bezel tabs into the SBB. Make sure the tabs are aligned as shown, then gently push until the four top and four bottom bezel tabs are secure.

Figure 2–15 Bezel Attachment



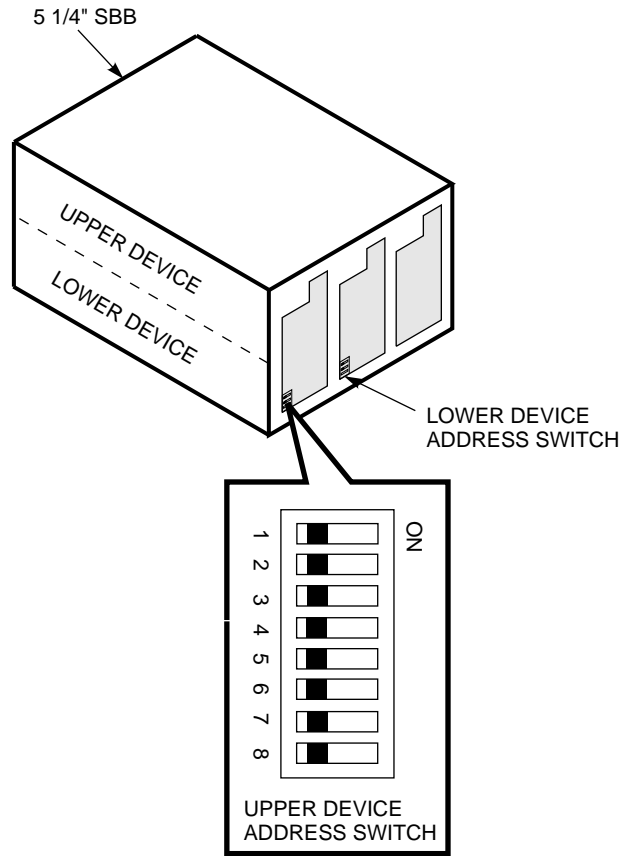
*USED IN PLACE OF A SECOND HALF-HEIGHT DEVICE.

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2.8 Setting the Device SCSI ID Address

The eight address switches on the rear of the SBB (see Figure 2–16) can override the SBB shelf connector device address.

Figure 2–16 Address Switches



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Usually, StorageWorks device addresses are user-defined. However, it is possible that your device requires a specific address. Check the device documentation and determine if a specific device address is required.

Before installing the SBB in the StorageWorks shelf, set the device address switches as described in Table 2–2 to any of the following:

- The device specific address
- The user-defined address
- The StorageWorks default address (automatic)

CAUTION

Each SCSI bus device address (0 through 7) can be used only *once*. Duplicate addresses cause the SCSI bus to malfunction.

Table 2–2 SCSI Device Address Switch Settings

Device Address	Switch Number							
	1	2	3	4	5	6	7	8
SCSI Address 0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SCSI Address 1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SCSI Address 2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
SCSI Address 3	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
SCSI Address 4	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
SCSI Address 5	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
SCSI Address 6	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
SCSI Address 7†	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
Default (Automatic)‡	OFF	OFF	OFF	ON	ON	ON	OFF	OFF

† Normally reserved for the host.

‡ Default setting; address is defined by the SBB shelf connector.

Installing the Upper Half–Height 5¼-Inch Device

This chapter describes the procedures for installing the *upper* 5¼-inch half-height (HH) removable media device in the 5¼-inch StorageWorks modular carrier. When two HH devices are installed in a 5¼-inch StorageWorks building block (SBB), the lower device is usually installed first. The second device is usually installed in the upper position.

Installing an upper HH device in a modular carrier requires that you complete the procedures in the following sequence:

- Remove the bezel
- Remove the top SBB cover
- Attach the mounting bracket to the top SBB cover
- Attach the device to the mounting bracket
- Align the mounted upper device
- Connect the ID cable harness to the universal small system computer interface (SCSI) cable
- Fold the universal SCSI cable
- Connect the universal SCSI cable connector to the device
- Assemble the SBB
- Attach the bezel
- Set the device SCSI ID address

CAUTION

All of the components (devices, cables, interfaces, and so forth) can be damaged by electrostatic discharge (ESD).

Do not implement the procedures in this document until you have taken proper precautions against ESD. As a *minimum*, you must wear an ESD grounding strap whenever you handle any component or storage device, or remove the SBB cover.

Note

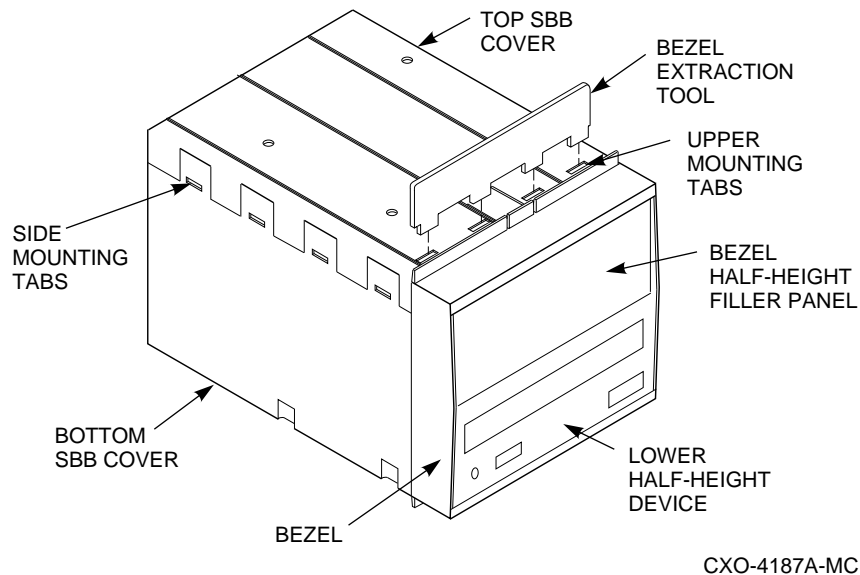
Digital recommends that the first half-height device be installed in the lower position as described in Chapter 2 before installing a device in the upper position.

3.1 Removing the Bezel

Position the SBB as shown in Figure 3–1 and complete the following procedure to remove the bezel:

1. Push down on the four upper mounting tabs with the bezel extraction tool while pulling the top of the bezel away from the SBB.
2. When the upper mounting tabs are free, pull the bezel forward slightly to release the bottom mounting tabs, and then remove the bezel.

Figure 3–1 5¼-Inch SBB



3.2 Removing the Top SBB Cover

Complete the following procedure to remove the top SBB cover:

CAUTION

To prevent damage to the SBB or the device, use a *screwdriver* and *apply minimal pressure* to release each mounting tab.

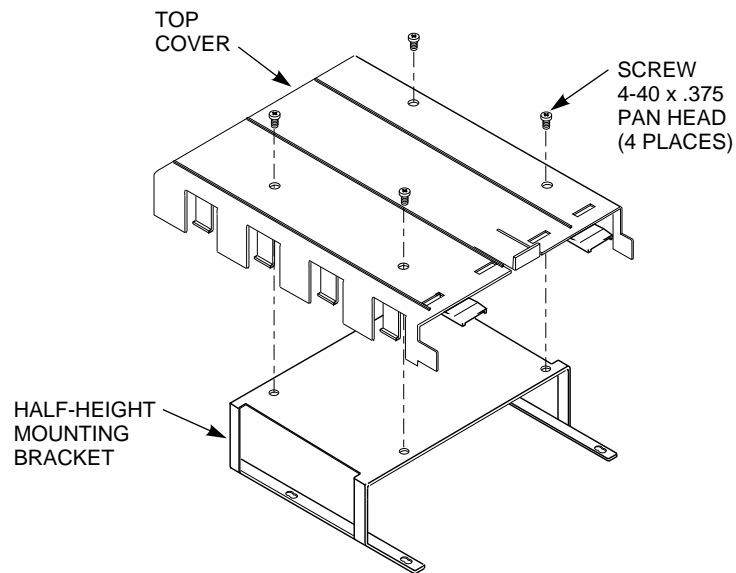
1. On the left side, use a flat tip screwdriver to push in each of the four top SBB cover side mounting tabs until they are released from the bottom SBB cover as shown in Figure 3–1.
2. Use the screwdriver to release the four mounting tabs on the right side and then remove the top SBB cover.

3.3 Attaching the Mounting Bracket to the Top SBB Cover

Complete the following procedure to attach the half-height mounting bracket to the top SBB cover:

1. Position the top cover over the half-height mounting bracket and align the cover mounting holes with the half-height mounting bracket screw holes as shown in Figure 3-2.
2. Insert and tighten the four 4-40 pan head screws.

Figure 3-2 Top Cover to the Mounting Bracket Installation



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3.4 Attaching the Device to the Mounting Bracket

Complete the following procedure to attach the device to the half-height mounting bracket:

1. Position the device as shown in Figure 3-3 ❶.

CAUTION

Use care when sliding the device into the half-height mounting bracket. Excessive force may damage the device or its protective covering.

2. Slide the device into the half-height mounting bracket ❷.

Note

Refer to device documentation to determine whether 4-40 or M3 screws are used to mount the device.

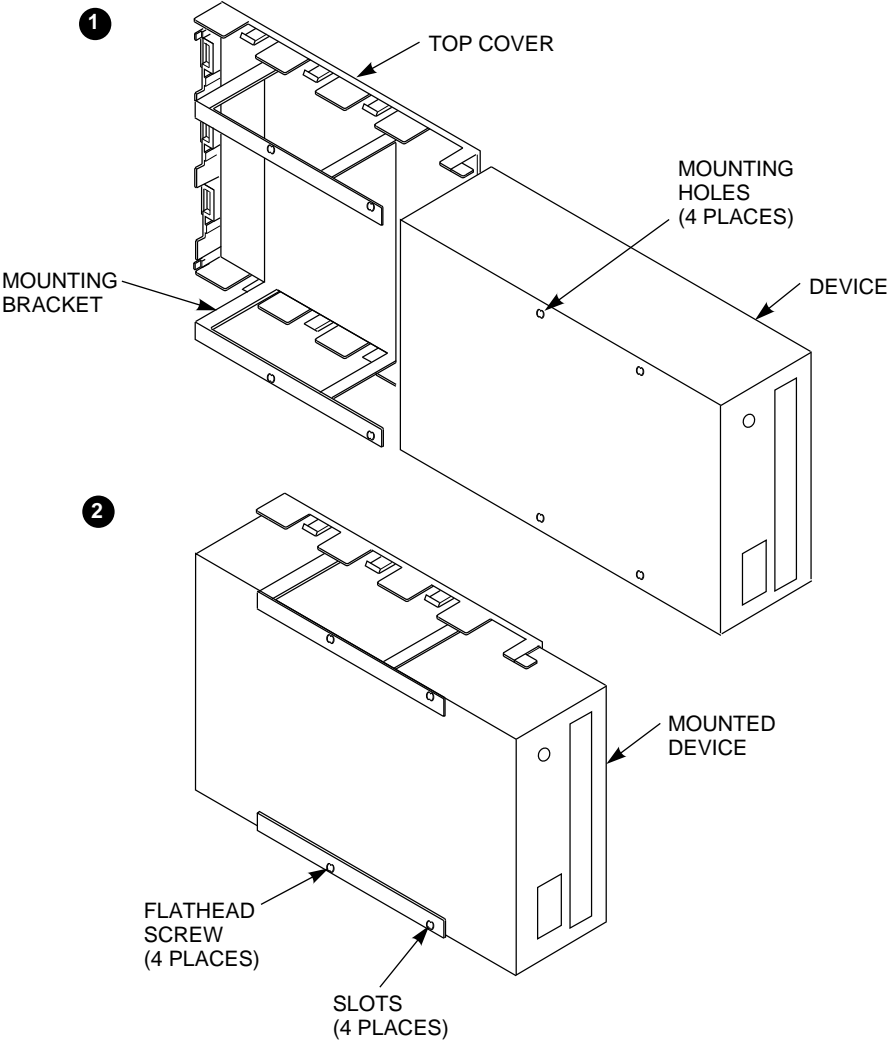
3. Select the appropriate flat head screws for mounting the device (that is, 4-40 or M3).
4. Align the four device mounting holes with slots in the half-height mounting bracket.

Note

If you are in doubt about which are the correct screws, insert and *finger-tighten* one of the mounting screws.

5. Insert the four flat head screws through the half-height mounting bracket slots and into the device. **Do not tighten the screws.**

Figure 3-3 Installing a Device in the Mounting Bracket



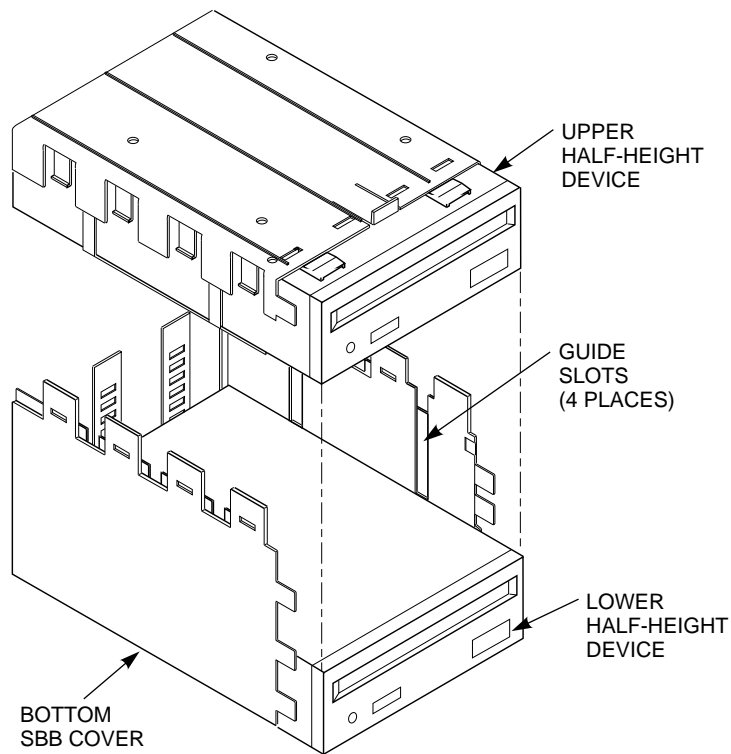
CXO-4190A-MC

3.5 Aligning the Mounted Upper Device

Complete the following procedure to align the mounted upper device in the SBB:

1. Slide the mounted upper device into the bottom SBB cover guide slots as shown in Figure 3-4.
2. Check the alignment of the mounted upper device with the front of the lower device.
3. Lift the mounted upper device from the bottom SBB cover and tighten the four flat head screws on the bottom of the half-height mounting bracket. If the alignment is incorrect, realign the four device mounting holes with the slots in the half-height mounting bracket.
4. Slide the mounted upper device into the bottom SBB cover guide slots.

Figure 3-4 Aligning the Mounted Upper Device



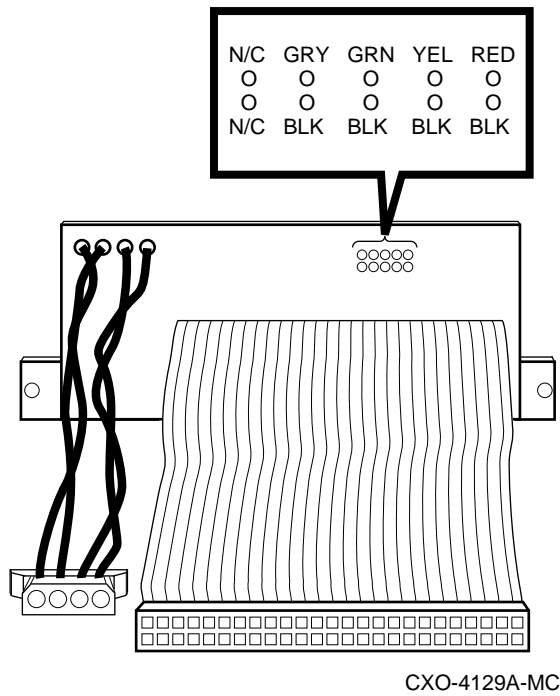
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3.6 Connecting the ID Cable Harness

Complete the following procedures to connect the ID cable harness to the universal SCSI cable:

1. Orient the ID cable harness connector so that the colored signal wires are at the top and the BLACK signal return wires are at the bottom.
2. Connect the ID cable harness connector to the universal small computer system interface (SCSI) cable ID header as shown in Figure 3-5.

Figure 3-5 Connecting the ID Cable Harness

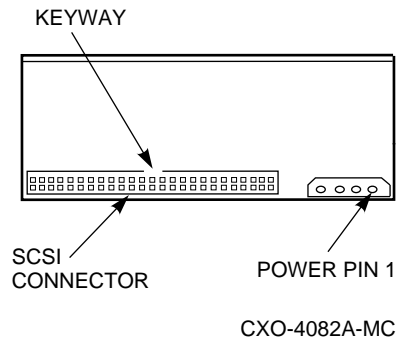


3.7 Folding the Universal SCSI Cable

The universal SCSI cable must be folded in a specific manner to make sure that the connector properly mates with the SCSI connector on the device. Complete the following procedure to make sure the cable is folded correctly:

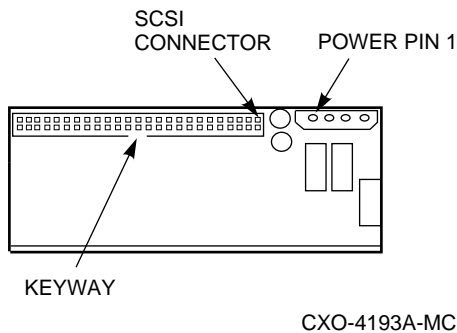
1. Position the device as it will be installed in the SBB and note the position of the keyway on the device SCSI connector.
2. When the device connector is positioned with the keyway at the top as shown in Figure 3-6, fold the cable as shown in the callouts in Figure 3-8.

Figure 3-6 Typical Device Connector Orientation



3. When the device connector is positioned with the keyway at the *bottom* as shown in Figure 3-7, fold the cable as shown in the callouts in Figure 3-9.

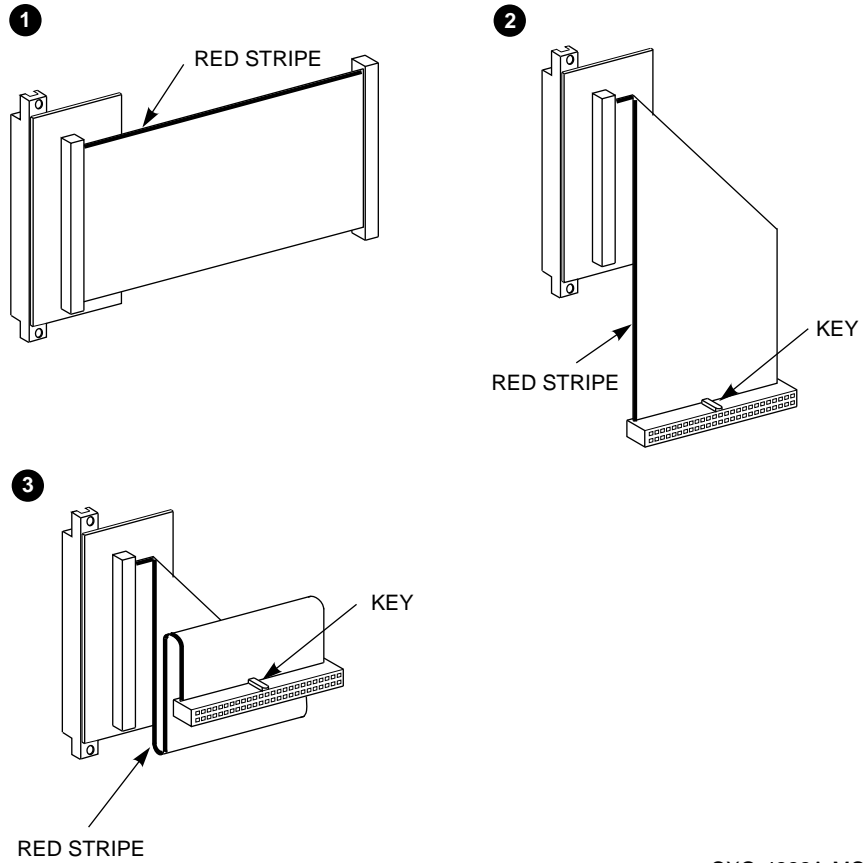
Figure 3-7 Inverted Device Connector Orientation



Note

Make sure the red stripe and the keyway are properly positioned.

Figure 3-8 Cable Folding—Key at the Top

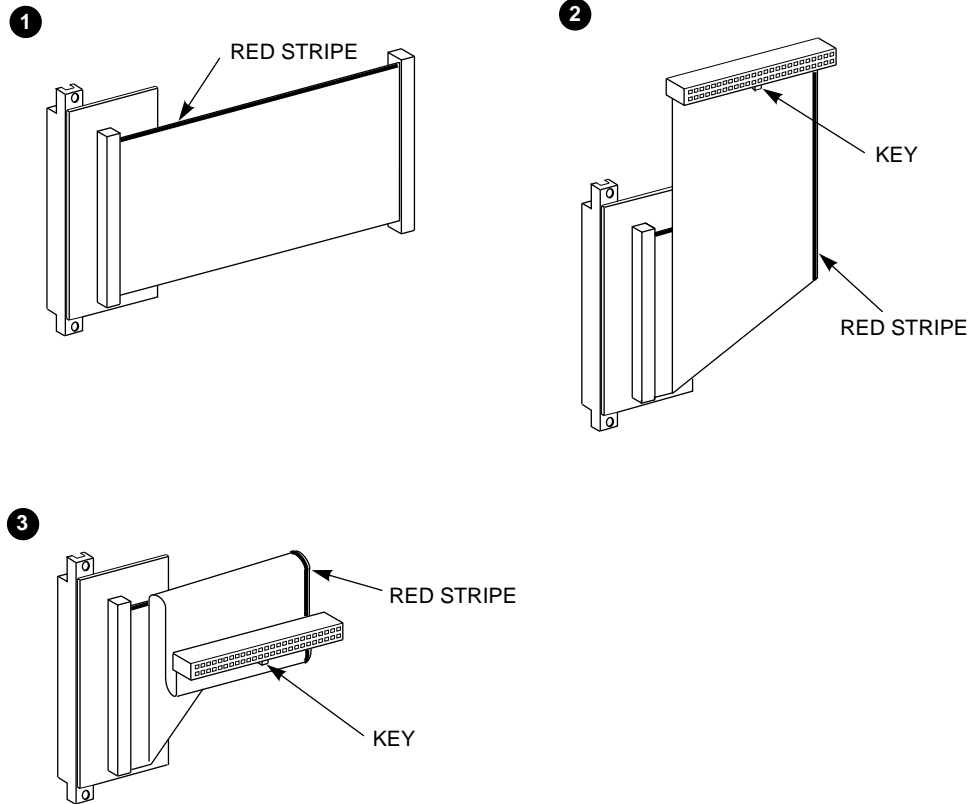


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Note

Make sure the red stripe and the keyway are properly positioned.

Figure 3–9 Inverted Device Connector Orientation



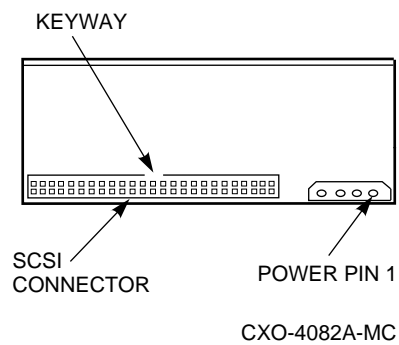
CXO-4223A-MC

3.8 Connecting the Universal SCSI Cable to the Device

Complete the following procedure to connect the universal SCSI cable to the device:

1. Keep the ribbon cable folded while plugging in the connector.
2. Stand the device on end with the SCSI connector facing up.
3. Connect the universal SCSI cable 50-pin SCSI connector to the device as shown in Figure 3–10.
4. Connect the universal SCSI cable 4-pin power connector to the device.

Figure 3–10 Keyway Orientation



3.9 Assembling the SBB

Complete the following procedure to mount the upper device in the bottom SBB cover:

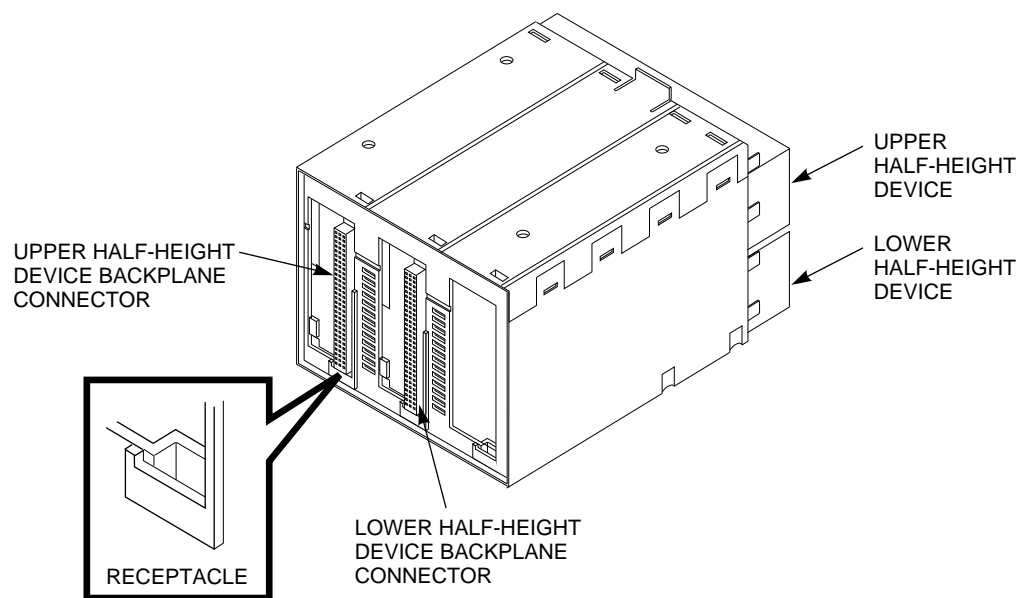
1. Insert the mounted upper device into the bottom SBB cover guide slots (refer to Figure 3-4).

Note

The upper device connector is the left rear modular carrier connector as shown in Figure 3-11.

2. Position the lower end of the backplane connector into the receptacle in the bottom SBB cover. The top SBB cover has a similar receptacle for the upper end of the backplane connector.
3. Align the top and bottom SBB covers so that the backplane connectors move freely (up, down, and sideways).
4. Push the top SBB cover into the bottom SBB cover until the eight tabs on the sides of the covers engage and snap into place.

Figure 3-11 Mounted Upper Device



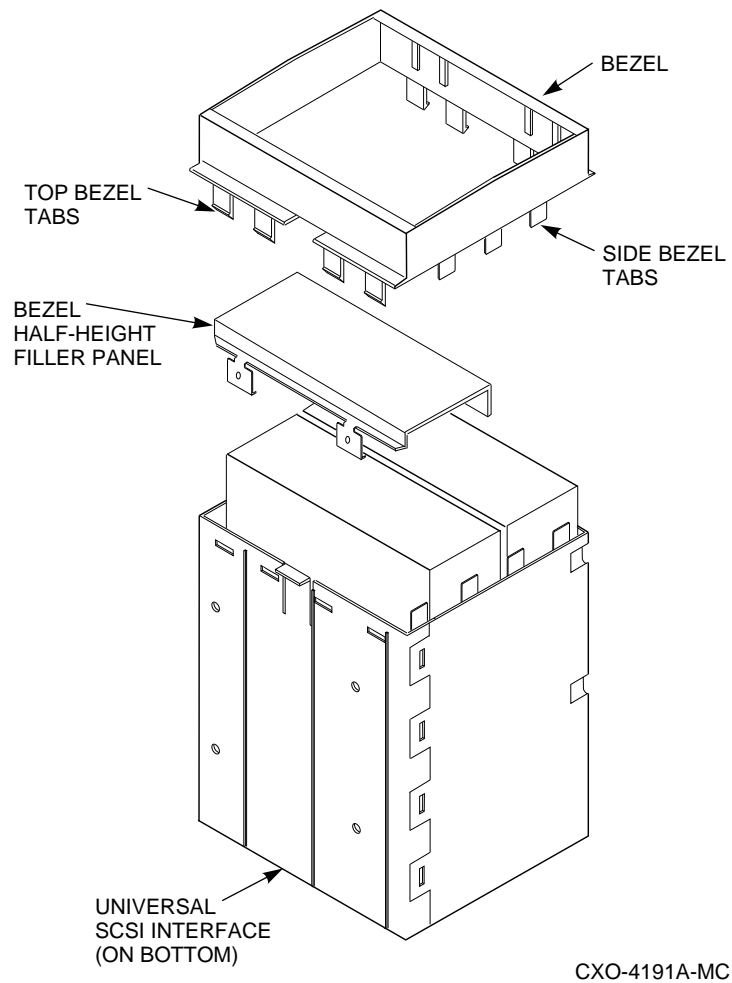
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3.10 Attaching the Bezel

Complete the following procedure to attach the bezel:

1. Stand the SBB on the universal SCSI cable end as shown in Figure 3–12.
2. Remove the blank bezel filler panel from the bezel.
3. Fit the top bezel tabs into the SBB. Make sure the tabs are aligned and the three evenly spaced side bezel tabs are on the right side. Gently push until the four top and four bottom bezel tabs are secure.

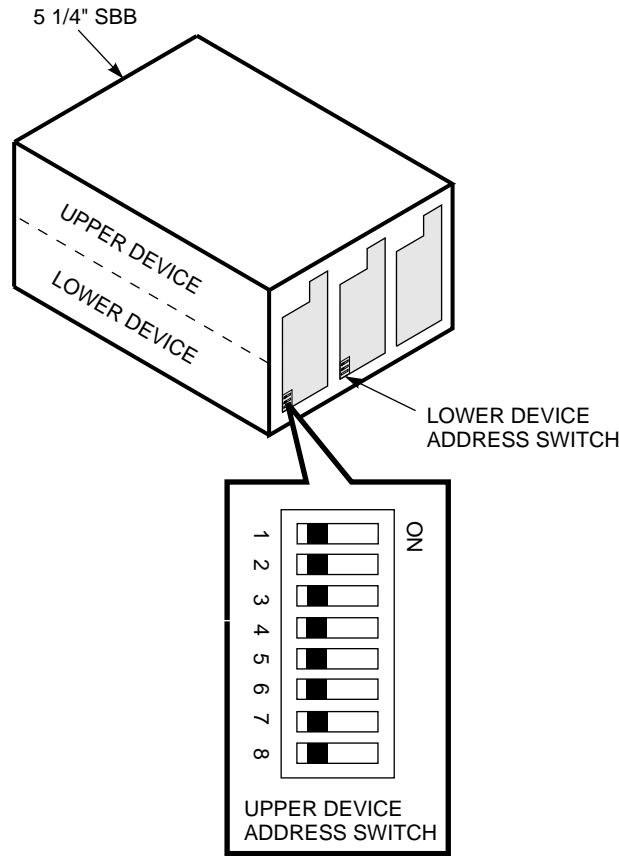
Figure 3–12 Bezel Attachment



3.11 Setting the Device SCSI ID Address

The eight address switches on the rear of the SBB (see Figure 3–13) can override the SBB shelf connector device address.

Figure 3–13 Address Switches



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Usually, StorageWorks device addresses are user-defined. However, it is possible that your device requires a specific address. Check the device documentation and determine if a specific device address is required.

Before installing the SBB in the StorageWorks shelf, set the device address switches as described in Table 3–1 to any of the following:

- The device specific address
- The user-defined address
- The StorageWorks default address (automatic)

CAUTION

Each SCSI bus device address (0 through 7) can be used only *once*. Duplicate addresses cause the SCSI bus to malfunction.

Table 3–1 SCSI Device Address Switch Settings

Device Address	Switch Number							
	1	2	3	4	5	6	7	8
SCSI Address 0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SCSI Address 1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SCSI Address 2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
SCSI Address 3	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
SCSI Address 4	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
SCSI Address 5	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
SCSI Address 6	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
SCSI Address 7†	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
Default (Automatic)‡	OFF	OFF	OFF	ON	ON	ON	OFF	OFF

† Normally reserved for the host.

‡ Default setting; address is defined by the SBB shelf connector.

