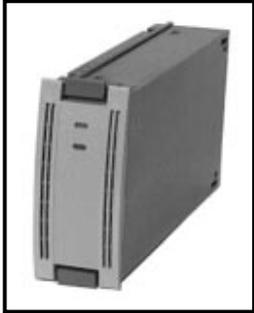# StorageWorks™ Solutions
3 ½-Inch Storage Device Installation Guide

What to Do

Fixed Media SBB

CXO-4196A-PH

Installing a storage device in a StorageWorks building block (SBB) is accomplished easily using only a screwdriver, either a Phillips (cross-head) or a flat-tip, installation kit parts, and electrostatic discharge (ESD) protection (either an ESD mat or an ESD wrist strap).

The installation procedures are listed in the *exact order* they are to be completed. Performing the procedures in a different order or skipping a step can result in the storage device malfunctioning, or even worse, disabling the SCSI (Small Computer System Interface) bus.

Complete the installation procedure in the following order:

1. Read the storage device publications to make sure that you have all the parts. Pay particular attention to the device mounting screws. Digital supplies only 6–32, M3, and M4 screws.

2. Review this installation guide to become familiar with the responsibilities, requirements, and procedures.

3. Read and comply with the requirements listed "Certification Testing an Assembled SBB."

4. Complete the procedures described in "Inventorying the Installation Kit." If you are not sure how to use an ESD strap, see "Using an ESD Strap."

5. Complete the procedures described in "Checking for Compatibility."

6. Complete the procedures described in "How to Install a Device."

7. Complete the procedures described in "Assembling the Covers."

8. Complete the procedures described in "Setting the Device SCSI Address."

Certification Testing an Assembled SBB

Removable Media SBB

CXO-4225A-PH

Customers assembling SBBs for resale are responsible for performing the certification tests required to make the assembled SBBs fully comply with all country-specific standards.

All customers are responsible for correctly installing devices as described in this installation guide.

Note

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

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

Note

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

Inventorying the Installation Kit

The installation kit for a fixed media device (such as a disk drive) and a removable media device (such as a cartridge tape drive) have different parts. Make sure that you have the correct installation kit and that you have all the parts.

- If your device is a *fixed* media device, such as a disk drive then the kit to use is either the BA35X–CE or the SWXBA–BA Device Carrier Kit.

- If your device is a *removable* media device, such as a tape drive then the kit to use is the BA35X–CF or the SWXBA–BB Device Carrier Kit.

Caution

Some of the electronic components (such as the storage device, the universal SCSI interface, the ID cable harness) can be damaged by electrostatic discharge (ESD). To prevent this you must take one of the following precautions:

- Place the components on an ESD mat on the work surface before starting the procedures.

- Wear an ESD wrist strap whenever you handle any of the electronic components (see "Using an ESD Strap," on page 12).

Fixed Media Device Installation Kit

Part		Qty
Bezel—fixed media		1
Cover label		1
ID cable harness (with LED[1] flexible circuit)		1
SBB left cover		1
SBB right cover		1
Screw, flat head, 6–32 x 0.250 in (The drawing shows the relative, *not the actual*, size of the screw.)	0.25 in	4
Screw, flat head, M4 x 8 mm (The drawing shows the relative, *not the actual*, size of the screw.)	8 mm	4
Standoff, male-female, 6–32 x 0.375 in		4
Universal SCSI interface		1

CXO-4287A-MC

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[1] Light emitting diode
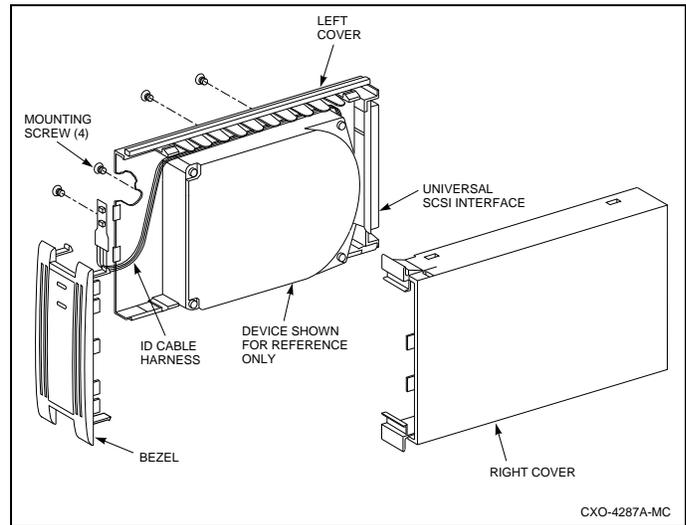
Removable Media Device Installation Kit

Part		Qty
Bezel—removable media		1
Cover label		1
ID cable harness		1
SBB left cover		1
SBB right cover		1
Screw, flat head, 6–32 x 0.250 in (The drawing shows the relative, *not the actual*, size of the screw.)	0.25 in	4
Screw, flat head, M3 x 5 mm (The drawing shows the relative, *not the actual*, size of the screw.)	5 mm	4
Screw, flat head, M4 x 8 mm (The drawing shows the relative, *not the actual*, size of the screw.)	8 mm	4
Universal SCSI interface		1

CXO-4227A-MC
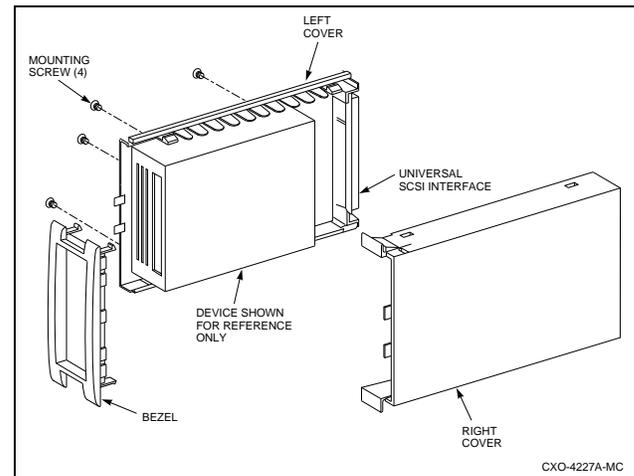
Checking for Compatibility

This section contains only procedures for determining compatibility of a storage device and the SBB kit. This section *does not* contain any assembly instructions. Compare the device specifications with the StorageWorks specifications listed in this section *before* assembling the SBB.
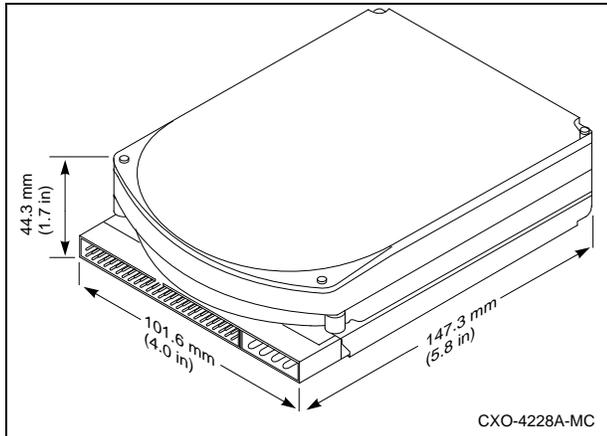
Physical Dimensions

The maximum dimensions of a storage device cannot exceed those shown.

Fixed Media Device

CXO-4228A-MC

Removable Media Device
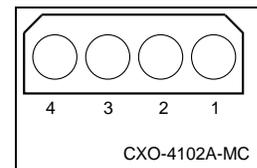

CXO-4229A-MC
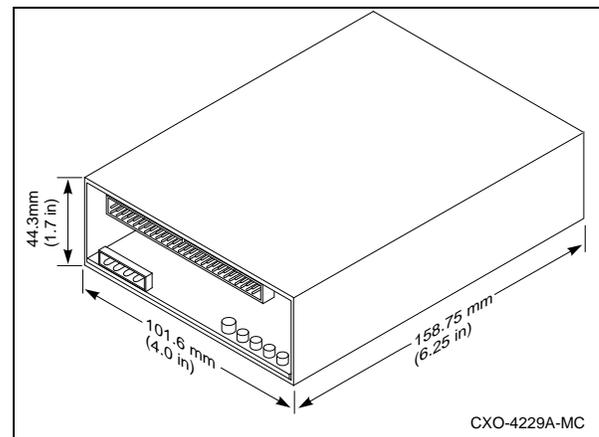
Cooling

The air flow through the SBB is approximately 3 CFM depending upon the location of the SBB in the shelf.

Power

The *total* power consumption (+5 V dc *and* +12 V dc) cannot exceed 18.5 Watts. Make sure the configuration and wiring of the *device power connector* are as shown.

| **Pin 4**	**Pin 3**	**Pin 2**	**Pin 1**
+5 V dc	+5 V dc Rtn	+12 V dc Rtn	+12 V dc

CXO-4102A-MC

SCSI Bus

The device must meet the following standards:

- The device 50-pin SCSI connector complies to industry standard SCSI–2 wiring.

- The SCSI connector keyway slot is at the top center.

- The internal SCSI device bus termination must be disabled.

As shown in the following figure, the SCSI connector can be mounted either at the top or the bottom.

CXO-4292A-MC
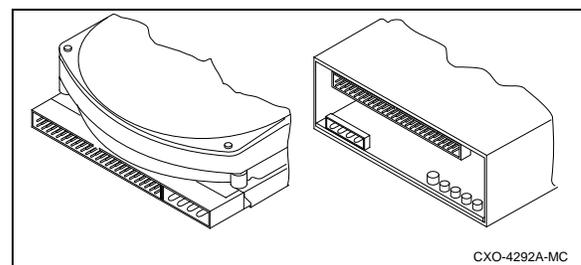
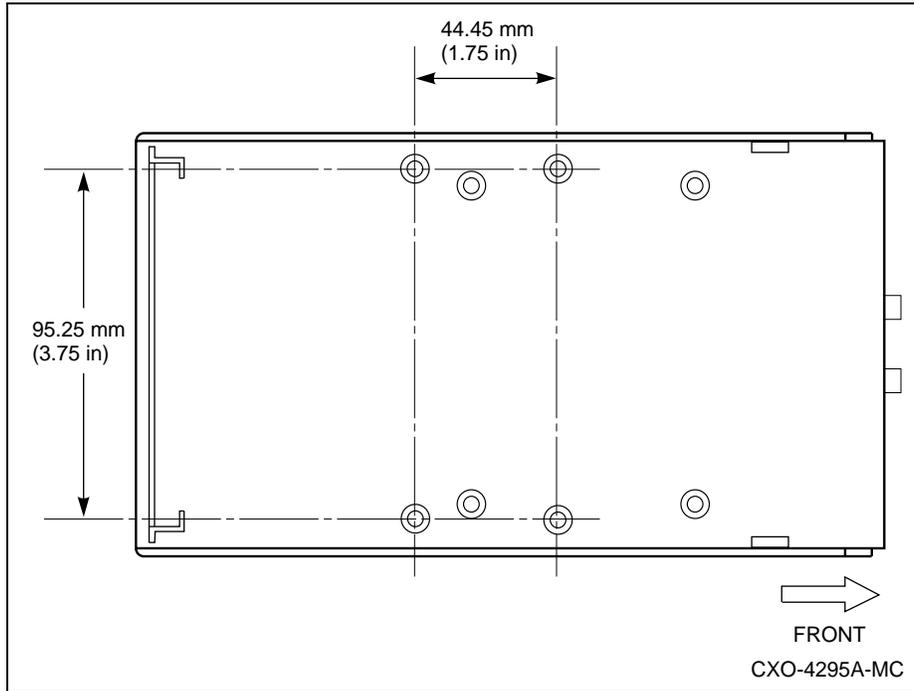# Checking for Compatibility

Mounting Hole Pattern

The device mounting hole pattern must match one of the patterns shown.
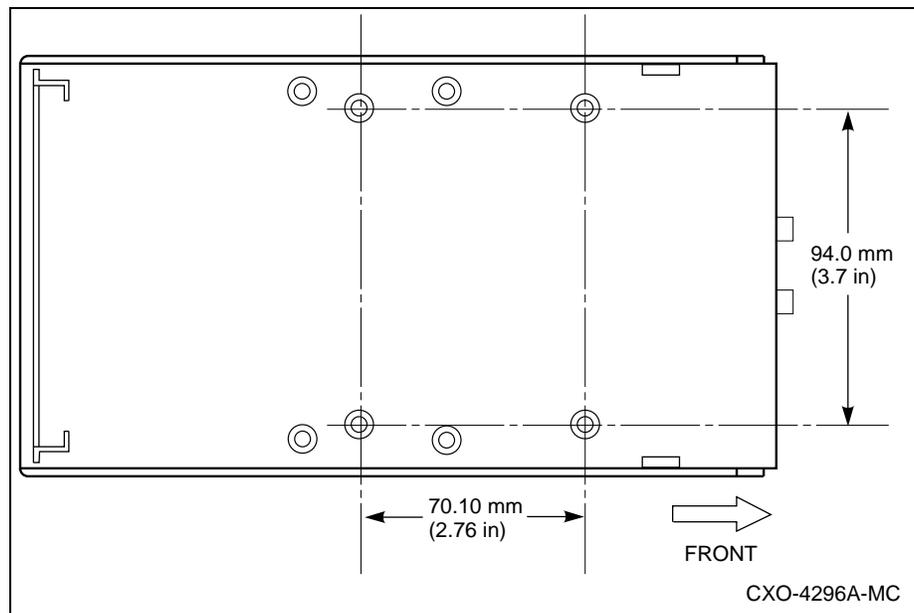
To determine the SBB hole pattern to use, orient the device as it will be mounted and insert it in the left SBB cover.

Slide the device around until four SBB mounting holes match the four device mounting holes. Digital suggests marking the SBB mounting holes for future reference.

SBB Mounting Hole Pattern 1

44.45 mm
(1.75 in)

95.25 mm
(3.75 in)

FRONT

CXO-4295A-MC

SBB Mounting Hole Pattern 2

94.0 mm
(3.7 in)

70.10 mm
(2.76 in)

FRONT

CXO-4296A-MC

How to Install a Device

Installing a fixed media device or a removable media device in a 3 ½–inch SBB requires that you complete the procedures in the following sequence:

1. Connect the universal SCSI interface.

2. Mount standoffs on a low profile device (optional).

3. Mount the device in the left cover.

4. Assemble the covers.

5. Mount the fixed media device LED on the bezel (optional).

6. Install the bezel.

This installation guide *does not* address the following subjects:

• Integrating the assembled SBB into a system

• The SCSI command set, the SCSI controller, or the host computer system

• Setting the device jumpers or switches

• Formatting the device

For detailed information on these subjects, please read the manufacturer's and system documentation.

Caution

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

Do not begin the installation procedures until you have taken the proper precautions against ESD. As a *minimum*, you must wear an ESD grounding strap (see "Using an ESD Strap," on page 12) whenever you handle any component, storage device, or remove the SBB cover.

Connecting the Universal SCSI Interface

Complete the following procedure to connect the ID cable harness connector to the universal SCSI interface.

1. Disable all SCSI bus addressing on the device per the manufacturer's documentation.

2. Orient the ID cable harness connector so that the colored signal wires are at the top and the black (BLK) signal return wires are at the bottom.

3. Connect the ID cable harness connector to the universal SCSI ID connector.

4. Carefully stand the device on end with the SCSI connector facing up, and support the device while completing the following steps. The 50–pin device SCSI connector keyway **must be** located at the top of the connector as shown.

5. Connect the universal SCSI interface 50–pin SCSI connector to the device.

6. Connect the universal SCSI interface 4–pin power connector to the device.
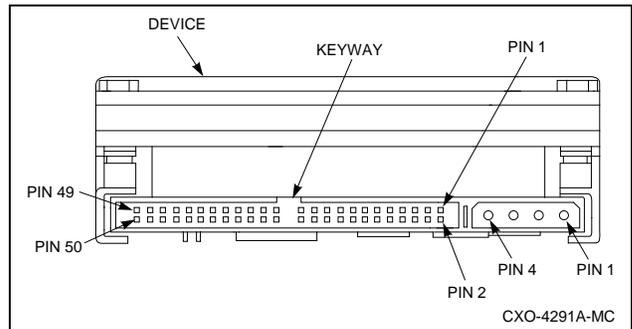
How to Install a Device

Using Standoffs with a Low–Profile Device

Devices less than 25 mm (1 in) high are referred to as low profile devices. Digital recommends that you use the 6–32 standoffs to mount low profile devices to improve the air flow through the SBB. The following conditions can prevent using standoffs:

- The device *does not* use 6–32 screws.

- The smallest device dimension is more than 25.4 mm (1-inch).

To prepare a low–profile device for installation, mount the four 6–32 standoffs on the bottom of the device as shown.

Caution

There is very little clearance between the device and the SBB cover. Make sure that all the wires are positioned between the device and the SBB cover and that they are neither pinched nor strained.
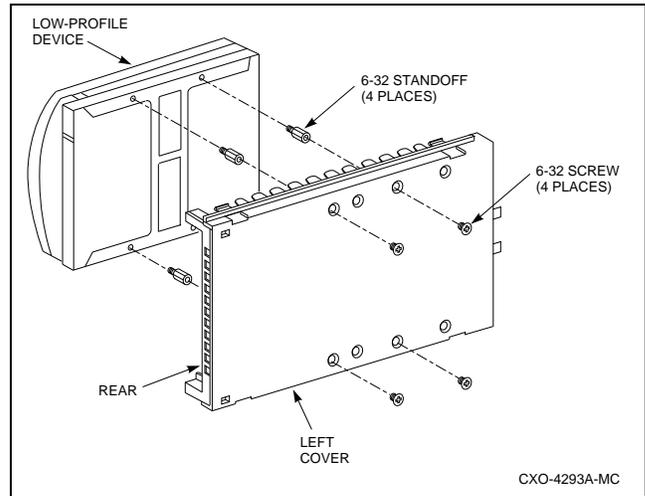
Mounting a Device

Complete the following procedures to install a device in an SBB.

1. Position the left SBB cover over the device and align the cover and device mounting holes.

Note

Refer to device documentation to determine the correct mounting screws.

2. Install and tighten the device mounting screws.

    When you are not sure which screw to use, carefully insert a screw in a mounting hole on the device, and use your fingers to tighten it. Only the correct size screws can be finger-tightened.

Caution

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

3. Locate the device ID option connectors and select a route for ID cable harness.

Typical ID Option Connectors
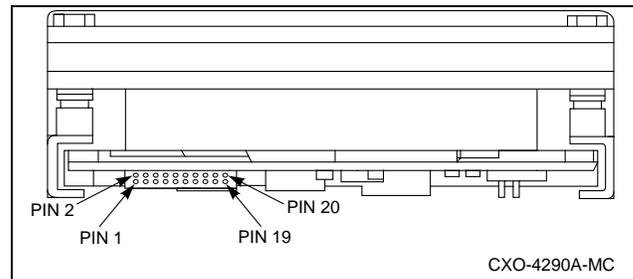
4. When the ID option connectors are located at the front of the device, you must route the ID cable harness between the side of the device and the SBB cover (Option 1 or 2).
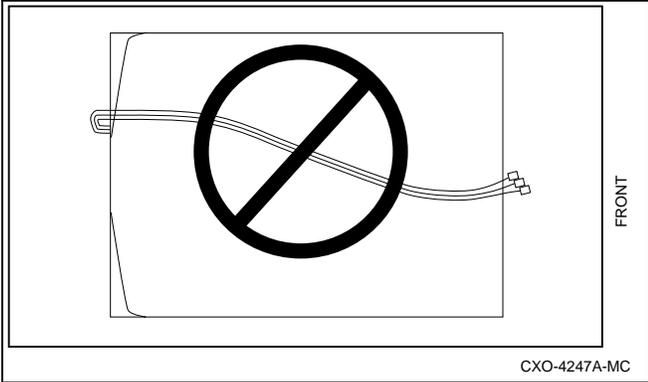
Caution

Do not route the ID cable harness on top of or under the device. These routes can restrict air flow through the device or deform the SBB so that it will not fit properly in the shelf.
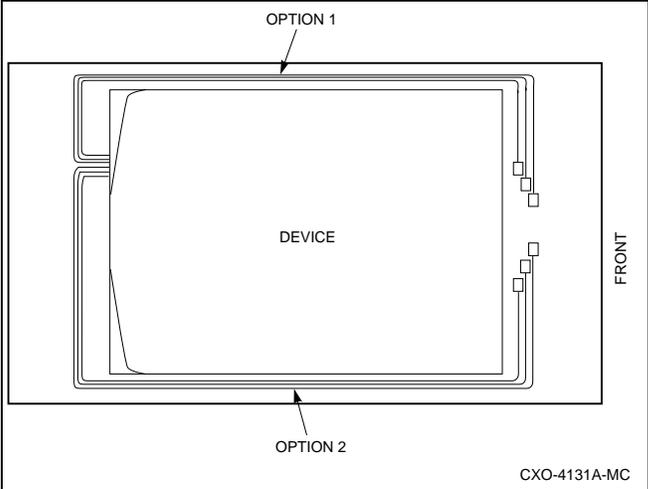
Go to Step 6.

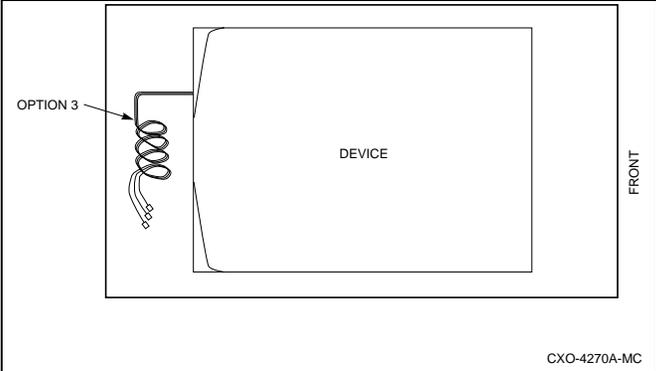**INCORRECT ID Cable Harness Routing**

CXO-4247A-MC

CORRECT ID Cable Harness Routing

CXO-4131A-MC

5. When the ID option connectors are located at the rear of device, coil the harness and store it at the rear of the device (Option 3).

Routing the ID Cable Harness to the Rear Connectors

CXO-4270A-MC

How to Install a Device
Connecting the Cables — Removable Media Device

6. To connect the **removable media device** ID cable harness, review the device documentation and identify the device ID signal pin assignments. The three ID cable harness wire pair colors are as shown.
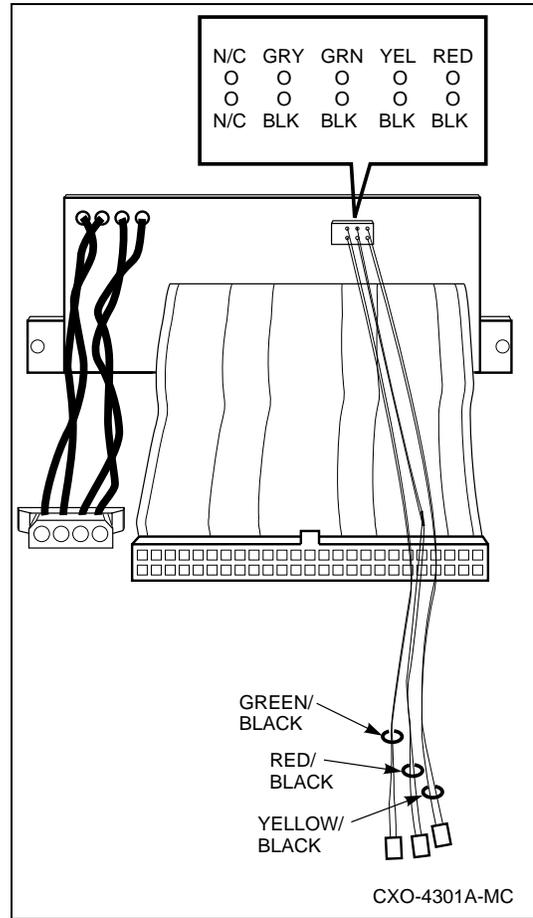
Caution

The black wires **must** connect to the device ID signal RETURN pins.

The colored wires **must** connect to the device ID signal pins

Pair	Wire Color	Signal
1	RED	ID1 Signal[2]
	BLACK	ID1 Return
2	YELLOW	ID2 Signal[3]
	BLACK	ID2 Return
3	GREEN	ID4 Signal[4]
	BLACK	ID4 Return

---

[2] Sometimes referred to as ID0, the least significant bit (LSB), or the least significant digit (LSD).

[3] Sometimes referred to as ID1.

[4] Sometimes referred to as ID2, the most significant bit (MSB), or the most significant digit (MSD).

CXO-4301A-MC

7. To connect the **fixed media device** ID cable harness, review the device documentation and identify the device ID signal pin assignments. The five ID cable harness wire pair colors are as shown.

Caution

The black wires **must** connect to the device ID signal RETURN pins.

The colored wires **must** connect to the device ID signal pins

Pair	Wire Color	Signal
1	RED	ID1 Signal[5]
	BLACK	ID1 Return
2	YELLOW	ID2 Signal[6]
	BLACK	ID2 Return
3	GREEN	ID4 Signal[7]
	BLACK	ID4 Return
4	GRAY	Amber LED +
	BLACK	Amber LED –
5	BLUE	Green LED +
	BLACK	Green LED –

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[5] Sometimes referred to as ID0, the least significant bit (LSB), or the least significant digit (LSD).

[6] Sometimes referred to as ID1.

[7] Sometimes referred to as ID2, the most significant bit (MSB), or the most significant digit (MSD).


CXO-4302A-MC
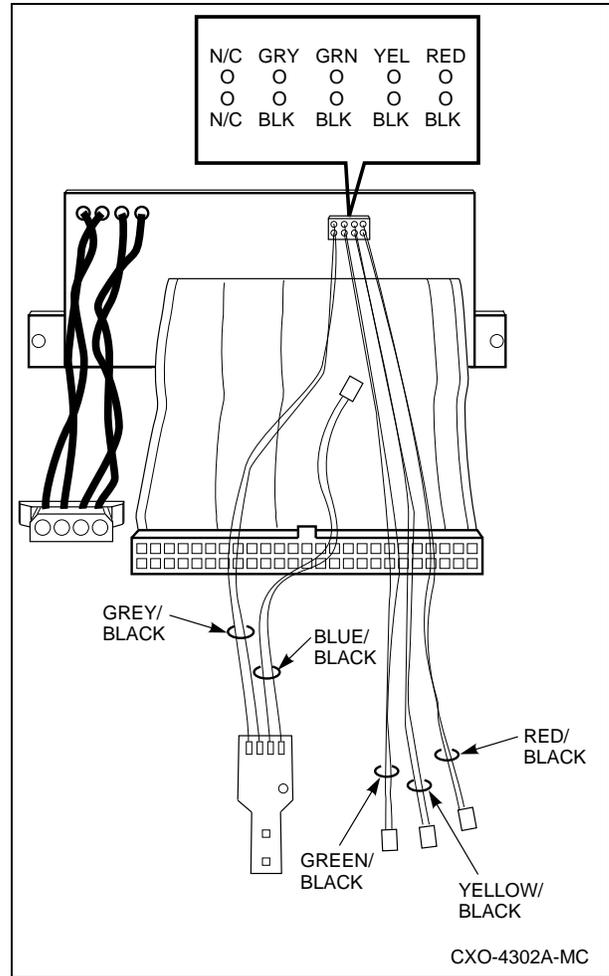
Assembling the Covers

Complete the following procedure to attach the right SBB cover to the left SBB cover:

1. Position the covers as shown.

2. Place the backplane connector over the mounting pins and align the cover alignment posts with the connector alignment post slots.

3. Holding the backplane connector in place, align the right SBB cover alignment posts and the left SBB cover alignment fingers.

4. Make sure that all the SCSI ID harness wires are between the cover and the device and that all the alignment fingers are positioned inside of the right cover.

5. Push down on the right cover until all the locking tabs snap into place.

6. To fully seat the front locking tabs, press in on the side of the right cover at the front while pushing down on the right cover. Visually inspect the four locking tab slots to make sure that all four locking tabs are fully seated.

Typical SBB Assembly

CXO-4297A-MC
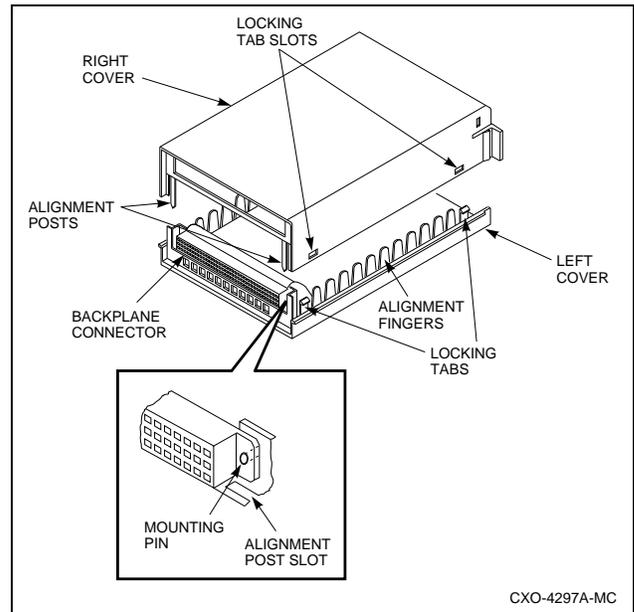
**Seating the Front Locking Tabs**

CXO-4285A-MC
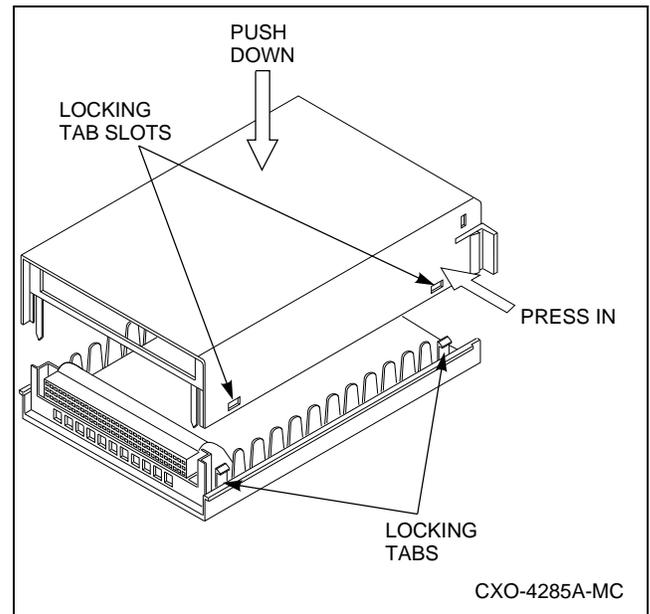
Mounting the Fixed Media Device LEDs on the Bezel

Only fixed media device installation kits have the LED flexible circuit. Complete the following procedures to install the LEDs on the bezel.

Caution

The LED cable connections are soldered to the LEDs. Be careful not to stress these connections either by flexing the wires or pulling on them.

1. Check the storage device documentation to determine if the device activity LED (green) driver requires a 330 ohm current limiting resistor.

2. When a current limiting resistor is required, cut and remove a piece of the LED flexible circuit as shown.

CXO-4133A-MC
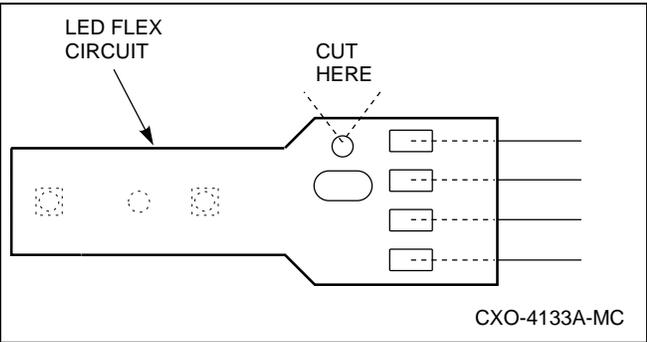
Note

To use the amber device activity LED, the SCSI controller must be modified to use the StorageWorks fault bus. To implement this feature, contact your Digital account representative and request a copy of *Engineering Specification—High Availability Storage Subsystem Fault Bus*, order number EK–FAULT–ES.

3. Insert the upper right edge of the LED flexible circuit under the upper right retaining tab.

4. *Gently* twist the LED flexible circuit slightly to fit the lower left edge of the lower left retaining tab.

5. When the LED flexible circuit is in position, *gently* twist and secure the other edges under the tabs.

CXO-4134A-MC
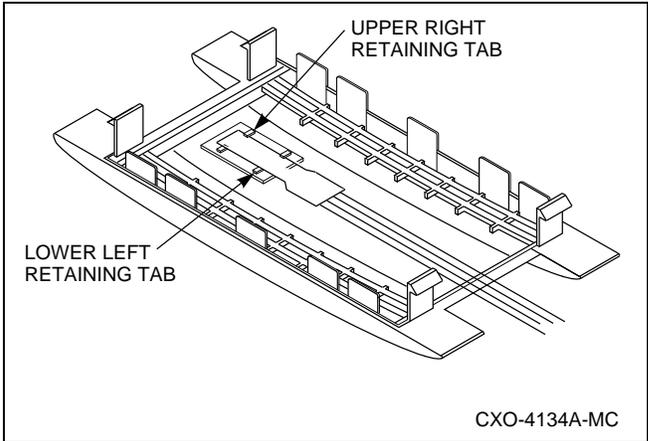
Installing the Bezel

Complete the following procedure to install the bezel:

1. Position the device as shown.

2. Align the four bezel mounting tabs inside of the covers.

3. *Gently* rock the bezel while pushing it in, until all four tabs snap into place.

4. Install the cover label on the left cover.

CXO-4136A-MC
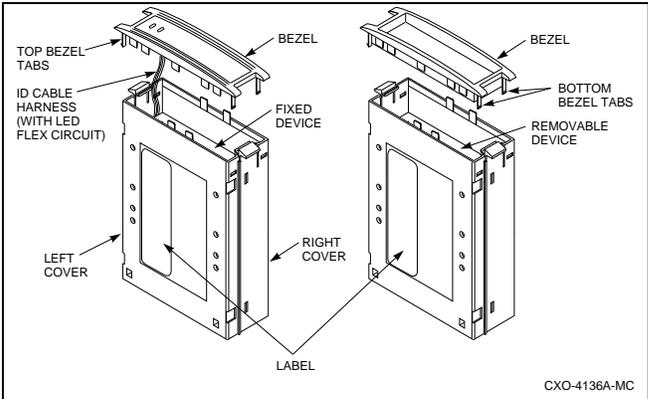
Setting the Device SCSI Address

The eight address switches on the rear of the SBB can override the SBB shelf connector device address. Usually, StorageWorks device addresses are user-defined. Check the device documentation to determine if a specific device address is required.

Before installing the SBB in the StorageWorks SBB shelf remove the protective film covering the device address switches.

When required, set the device address switches to one of the following:

- The device specific address

- The user-defined address

- The StorageWorks SBB shelf address

Caution

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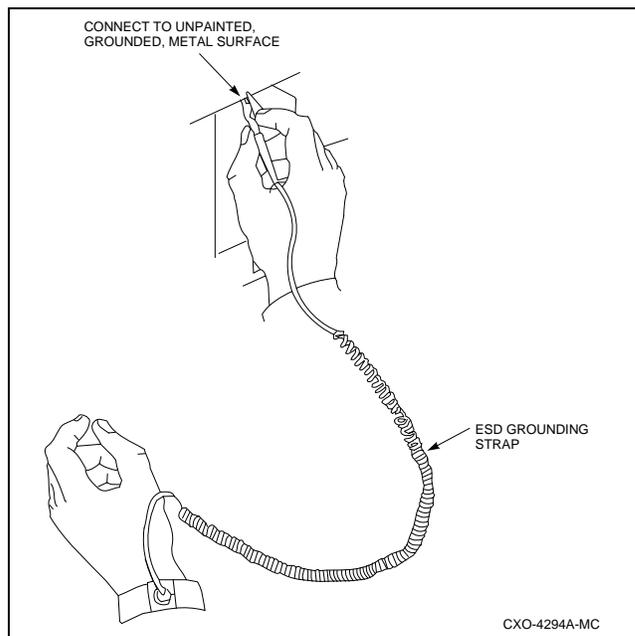

CXO-4246A-MC
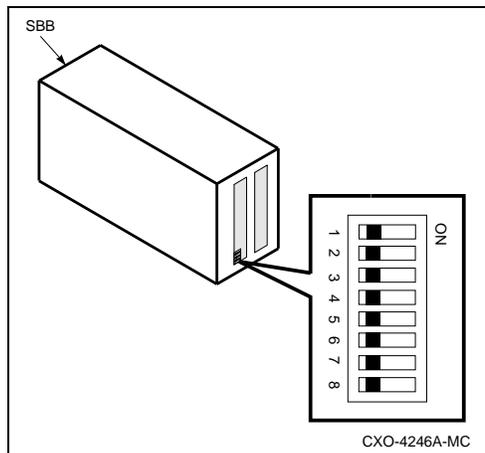
SCSI Device Address	Switch Number							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0	Off	Off	Off	Off	Off	Off	Off	Off
1	On	Off	Off	Off	Off	Off	Off	Off
2	Off	On	Off	Off	Off	Off	Off	Off
3	On	On	Off	Off	Off	Off	Off	Off
4	Off	Off	On	Off	Off	Off	Off	Off
5	On	Off	On	Off	Off	Off	Off	Off
6	Off	On	On	Off	Off	Off	Off	Off
7[8]	On	On	On	Off	Off	Off	Off	Off
Shelf Address[9]	Off	Off	Off	On	On	On	Off	Off

[8] Normally reserved for host.

[9] Address is defined by the SBB shelf connector.

Using an ESD Strap

When you do not have an ESD mat or other ESD protection, you must use an ESD wrist strap as shown when assembling the SBB.

CONNECT TO UNPAINTED, GROUNDED, METAL SURFACE

ESD GROUNDING STRAP

CXO-4294A-MC

November 1994