

# KZMSA Adapter Installation Guide

Order Number EK-KXMSX-IN.001

This guide tells how to install the KZMSA adapter (a SCSI I/O adapter) in a DEC 7000 AXP or DEC 10000 AXP system.

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**First Printing, May 1993**

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# Preface

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## Intended Audience

This manual is written for someone who needs to install a KZMSA adapter in the XMI card cage of a DEC 7000 or DEC 10000 system.

## Document Structure

This manual has four chapters and an appendix, as follows:

- **Chapter 1, Getting Started: Check the Kits**, describes the contents of the kits needed to install the adapter, and lists the other kits needed to do SCSI tape and disk I/O. The chapter also gives information needed for those who wish to connect to non-Digital devices.
- **Chapter 2, Installing the Adapter**, tells how to install the KZMSA adapter in the XMI card cage of a DEC 7000 or DEC 10000 system and connect the bulkhead cable assembly to the bulkhead of the XMI plug-in unit (PIU).
- **Chapter 3, Verifying That the Adapter Works**, describes the power-up self-test for the KZMSA, which tests the basic functionality of the board.
- **Chapter 4, Selecting the "Fast Synchronous Transfer" Option**, tells how to modify one of the KZMSA firmware parameters to allow for what is sometimes called simply "fast SCSI" operation. This option widens the range of possible peak transfer rates where cabling restrictions allow.
- **Appendix A, Grounding Rules for Cabinets and Enclosures**, gives the rules to follow to ensure proper grounding in multiple-cabinet or -enclosure SCSI configurations. Improper grounding can be a safety hazard and can also cause performance degradation and/or data corruption.

## Documentation Titles

Table 1 lists books related to the installation of the KZMSA adapter and general troubleshooting and service information.

**Table 1 Related Documentation**

| <b>Title</b>   | <b>Order Number</b> |
|--|---------------------|
| <b>Installation Kit</b>                                | EK-7000B-DK         |
| <i>Site Preparation Guide</i>                          | EK-7000B-SP         |
| <i>Installation Guide</i>                              | EK-700EB-IN         |
| <b>Hardware User Information Kit</b>                   | EK-7001B-DK         |
| <i>Operations Manual</i>                               | EK-7000B-OP         |
| <i>Basic Troubleshooting</i>                           | EK-7000B-TS         |
| <b>Service Information Kit—DEC 7000</b>                | EK-7002B-DK         |
| <i>Platform Service Manual</i>                         | EK-7000A-SV         |
| <i>System Service Manual</i>                           | EK-7002B-SV         |
| <i>Pocket Service Guide</i>                            | EK-7700A-PG         |
| <i>Advanced Troubleshooting</i>                        | EK-7701A-TS         |
| <b>Related Manuals</b>                                 |                     |
| <i>BA655 SCSI Disk and Tape PIU Installation Guide</i> | EK-BA655-IN         |
| <i>StorageWorks Family Configuration Guide</i>         | EK-BA350-CG         |
| <i>StorageWorks Family User's Guide</i>                | EK-BA350-UG         |
| <i>DWLMA XMI PIU Installation Guide</i>                | EK-DWLMA-IN         |

# Chapter 1

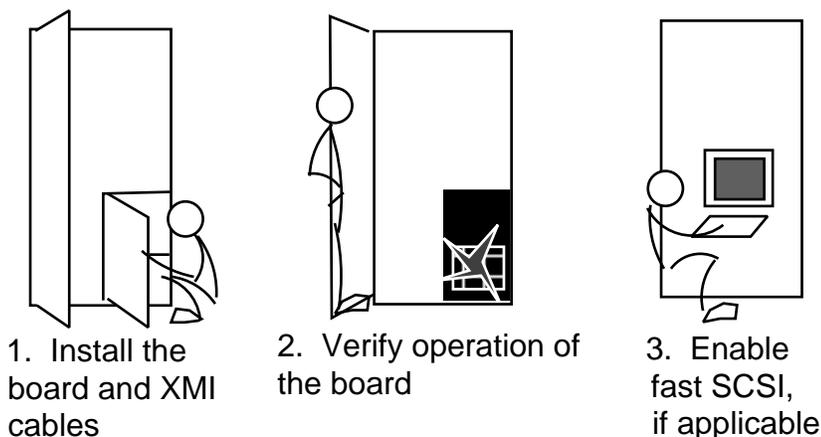
## Getting Started: Check the Kits

The KZMSA I/O adapter is used in the XMI plug-in unit (PIU) of a DEC 7000 AXP or DEC 10000 AXP system. The KZMSA allows I/O to tapes and disks using the SCSI (Small Computer Systems Interface) protocol. Figure 1- 1 shows the steps involved in installing the adapter alone.

For I/O, however, you need to connect the KZMSA to SCSI disks and/or tapes. Digital supplies the BA655 SCSI disk and tape PIU for SCSI I/O devices in the system and expander cabinets of the DEC 7000 and DEC 10000 systems. Digital also supplies separate SCSI storage cabinets and devices that allow the longer cable lengths needed for extensive storage arrays. Or, the site may be connecting to non- Digital devices.

Thus, the installation you are working on may involve more than simply installing the adapter. You need to check to see what other equipment exists or will be used with the KZMSA adapter. This manual tells what is currently available and what to look for in the way of other equipment that affects the adapter's installation. See the *BA655 SCSI Disk and Tape PIU Installation Guide* for information on installing devices in the SCSI PIU.

**Figure 1-1 Steps in Installing the KZMSA Adapter**

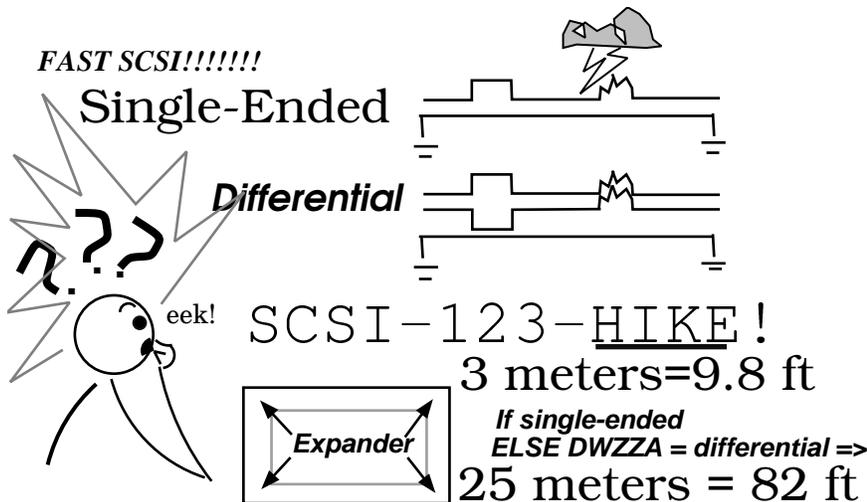


## 1.1 Some SCSI Background

You may be installing only the KZMSA adapter at this point. Or, you may also be installing attendant I/O devices and cabling. Either way, it will help to know a little about the Small Computer Systems Interface (SCSI).

The characteristics of the interface are regulated by the American National Standards Institute (ANSI), which produces documents describing the hardware and software interface. You may find the terms used to describe SCSI features confusing. The terms you need to know for installation of the KZMSA revolve around a feature called the "fast synchronous transfer option," or "fast SCSI" (see Figure 1-2).

Figure 1-2 SCSI Terminology



### 1.1.1 Fast Synchronous Transfer Option

The SCSI "fast synchronous transfer option" makes it possible for I/O devices that can run fast SCSI to achieve from 5- to 10- Mbytes/second peak rate transfers in synchronous mode. The SCSI-1 specification defines the peak transfer rate in synchronous mode as 1 to 5 Mbytes/second or 1.5 Mbytes/second in asynchronous mode.

Running fast SCSI, then, can double the transfer rate. However, many cable configurations do not handle fast SCSI, so the KZMSA offers a choice. Version 4.3 and upward of the KZMSA firmware offer the option of select-

ing fast SCSI. The default is unselected, for the factor affecting whether fast SCSI can be used is cable length, which varies according to the type of transmission: single- ended or differential. You can select fast SCSI without jeopardizing transfers to devices that do not support fast SCSI, because each transfer is negotiated; both device and controller must agree to do fast, or operation reverts to 1- to 5- Mbytes/second peak transfer rate.

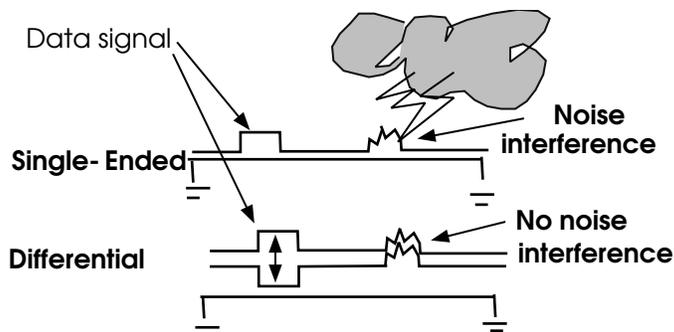
### 1.1.2 Single- Ended and Differential SCSI Implementations

The ANSI SCSI- 2 specification defines two types of SCSI transmission: single- ended and differential. The choice affects cable length. The shorter- length single- ended option is intended primarily for connecting to devices within a cabinet. The longer cable possible with the differential option allows for connection to expander cabinets farther from the system. One reason that the cable can be longer with differential is that the transmission method provides better protection from noise interference.

The *KZMSA* is a *single-ended adapter*; current is passed onto the cable to form a data signal (the rectangular bump in the signal wire in Figure 1.3). Noise can occur when an electrical disturbance (such as might be caused by lightning) causes a spike in the current on the signal wire that can be misinterpreted as a data signal (the jagged bump in the signal wire).

The *DWZZA bus converters*, available from Digital, *convert single-ended transmissions to differential*. Differential transmission decreases noise interference by using *two* signal wires and measuring a signal as the *difference* between the voltages in the two signal wires. A spike from a disturbance is identical in both data wires, hence the difference between the voltages remains the same and is not interpreted as a data signal.

Figure 1- 3 Single- Ended and Differential Transmission



### 1.1.3 Cable Length Restrictions

As discussed, the ANSI SCSI specification defines limits for the length of cable for connecting to SCSI I/O devices. The length varies according to two factors:

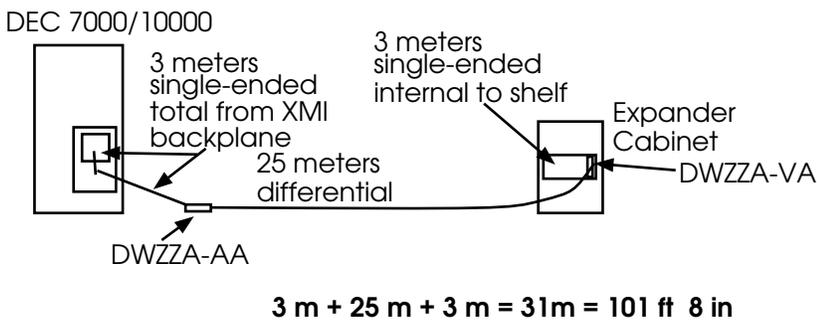
- Whether single- ended or differential transmission is used, and
- Whether the fast SCSI option is used.

Table 1- 1 shows the length of cable allowed for these variations specified by the ANSI SCSI standard. The DWZZA bus adapters can be used on the DEC 7000/10000 systems to convert from single- ended to differential and back to single- ended cable connected to Digital expander cabinets. The limits apply to each segment, as shown in Figure 1- 4, and allow a combined fast SCSI total cable length of 101 ft 8 in.

**Table 1- 1 Maximum Cable Length Defined by ANSI SCSI Standard**

|                      | Fast SCSI Option         | No Fast SCSI Option     |
|----------------------|--------------------------|-------------------------|
| <b>Single- Ended</b> | 3 meters ( 9 ft 10.8 in) | 6 meters (19 ft 7.2 in) |
| <b>Differential</b>  | 25 meters (82 ft)        | 25 meters (82 ft)       |

**Figure 1- 4 DWZZA Bus Adapters Allow Extended Cable Length**



## 1.1.4 Finding Out When You Can Use Fast SCSI

The KZMSA is a single-ended adapter; thus, whether or not you can use fast SCSI (a parameter you can define when you install the KZMSA) depends on the type and length of the cable you use to connect the KZMSA to the I/O devices.

If you have DWZZA bus adapters to install, and the length of single-ended cable you use to attach to the DWZZAs at each end is less than 3 meters, you can use fast SCSI. See Chapter 4 to learn how to calculate the length of single-ended cable used in installing from the XMI bulkhead and within a shelf in the SCSI PIU or expander cabinets.

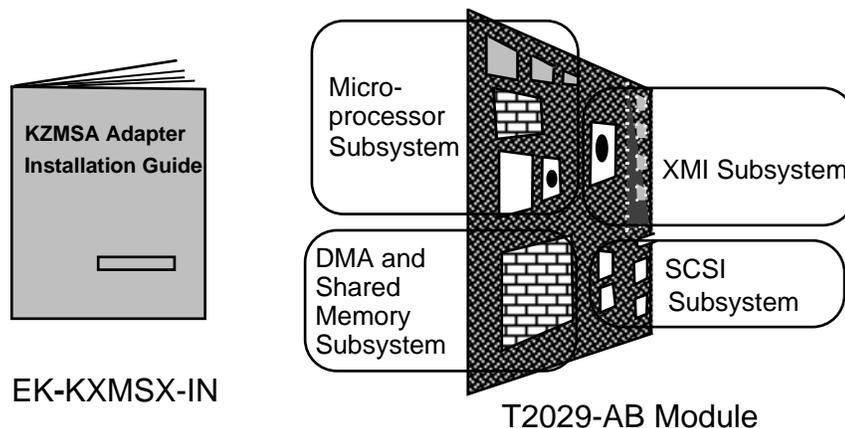
If you do not have DWZZA bus adapters, whether or not you can use fast SCSI depends on the length of single-ended cable needed to complete the bus connection to the I/O devices in a SCSI PIU. See Chapter 4 for rules on calculating the length of single-ended cable.

## 1.2 Kits Needed to Install KZMSA Adapter

### 1.2.1 KZMSA- AB Kit

The KZMSA- AB kit contains this book; the other component is the T2029- AB module, otherwise known as the KZMSA adapter, and its case.

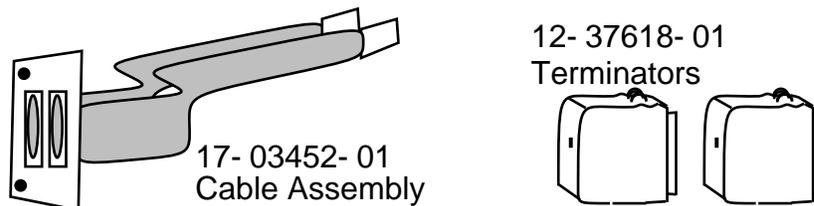
Figure 1-5 Contents of the KZMSA- AB Kit



## 1.2.2 CK-KZMSA-LA Kit

This kit contains the cable assembly needed to connect the adapter to the XMI PIU bulkhead. It also contains two SCSI bus terminators.

Figure 1-6 Contents of the CK-KZMSA-LA Kit



## 1.3 Other Digital Items That May Be Needed

### 1.3.1 XMI PIU — DWLMA-AA or -BA Kit

The KZMSA adapter functions on the XMI bus, so the system you are working with must have an XMI PIU. Two XMI PIU kits are available, one for installation in the system cabinet and one for installation in an expander cabinet. The difference is in the length of the "hose," the cable connecting the IOP module on the LSB bus, where the CPU and memory reside, to the XMI bulkhead connector to the DWLMA module on the XMI bus, where the I/O adapters reside:

- DWLMA-AA Kit—for installing in the system cabinet
- DWLMA-BA Kit—for installing in an expander cabinet

The directions for installing an XMI PIU are given in the *DWLMA XMI PIU Installation Guide*, part of the DWLMA kits.

### 1.3.2 SCSI PIU — BA655 Kit

To perform I/O, the KZMSA adapter must be connected to a SCSI tape or disk unit. Digital provides the SCSI PIU for holding Digital's tapes and disks in a DEC 7000 or 10000 system or expander cabinet. The SCSI PIU kit, BA655, contains the SCSI PIU that fits into the cabinet and plugs into the power supply, two shelves within the PIU assembly, a power unit for each shelf, and various cover plates, screws, internal cabling, and gaskets.

The directions for installing a SCSI PIU are given in the *BA655 SCSI Disk and Tape PIU Installation Guide*, also a part of the BA655 kit.

### 1.3.3 Cabling from XMI PIU to SCSI PIU

The single-ended cabling to connect the KZMSA connectors in the XMI PIU bulkhead to the SCSI PIU or to the DWZZA are, at this printing, available in 2-, 3-, 4-, 5-, 6-, 9-, and 12-foot lengths. (See Table 1-2.) Check the *Digital Systems and Options Catalog* for the cabling available.

**Table 1-2 Digital's Single- Ended Cable for SCSI PIU Connections**

| Type   | Length | Part Number |
|--|--------|-------------|
| SCSI- 2 to SCSI- 2<br>(50- pin, high- density) | 2 ft   | BC10U- 02   |
|  | 3 ft   | BC10U- 03   |
|  | 4 ft   | BC10U- 04   |
|  | 5 ft   | BC10U- 05   |
|  | 6 ft   | BC10U- 06   |
|  | 9 ft   | BC10U- 09   |
|  | 12 ft  | BC10U- 12   |

### 1.3.4 DWZZA and Expander Cabinet Kits

As described in Section 1.1.3, the DWZZA devices extend the allowable cable length for fast SCSI to 31 meters, or 101 feet, 8 inches, allowing connection to special expander cabinets with their own power supply. See the *Digital Systems and Options Catalog* if you need information on what expander cabinets and kits related to installation with the DEC 7000/10000 systems are available (including related installation documentation).

### 1.3.5 SCSI CD- ROM, Disk, and Tape Units

The CD- ROM, disk, and tape units available at this printing for the SCSI PIU and supported by the KZMSA are listed in Table 1- 3.

**Table 1- 3 SCSI Disk and Tape Units**

| <b>Disks</b> | <b>Tapes</b> |
|--------------|--------------|
| RRD42        | TKZ60        |
| RWZ01        | TLZ06        |
| RZ26         | TSZ07        |
| RZ73         | TZ85         |
| RZ74         | TZ857        |
|              | TZ86         |
|              | TZ867        |

Again, check the *Digital Systems and Options Catalog* for current information on what disks and tapes are supported by the KZMSA.

### 1.3.6 Console Disk for Enabling the Fast Synchronous Transfer Option

Versions 4.3 and upward of the KZMSA adapter firmware make available the SCSI "fast synchronous transfer option," which makes it possible for I/O devices that can run fast SCSI to achieve from 5- to 10- Mbytes/second peak rate transfers in synchronous mode. The SCSI- 1 specification defined the peak transfer rate in synchronous mode as 1 to 5 Mbytes/second or 1.5 Mbytes/second in asynchronous mode.

One aspect of fast transfer rates is the length of cable that can be used. The total length of a fast, single- ended SCSI bus cannot be more than 3 meters (9.8 feet). Buses without the fast option can extend to 6 meters (19.6 feet). This includes the length of the cabling from the XMI backplane to the XMI bulkhead, which is 30 inches (+/- 1/2 inch) in length, and the cabling in the shelf of the SCSI PIU. This length depends on how the shelves are cabled, as described in the *SCSI Disk and Tape PIU Installation Guide*.

The default setting for the KZMSA is to have "fast" transfers disabled, since your configuration may make it necessary to use cables longer than 9.8 feet. However, you can set a firmware parameter to enable "fast" transfers for any particular channel, using the Loadable Firmware Update (LFU) Utility, provided on the Alpha AXP Systems Firmware Update CD (Part Number AG- PTMW\*- BE, where \* is the letter that denotes the disk revision). Chapter 4 describes how to boot and run LFU to modify this parameter.

## 1.4 Connecting to Non-Digital Disks

The following information is provided for those interested in connecting the KZMSA adapter to non-Digital devices. The KZMSA is an 8-bit, single-ended adapter providing two channels of I/O, each channel supporting up to seven SCSI targets. The KZMSA default has the "fast" option disabled for both channels, as described in Section 1.3.6, but either or both channels can be set to "fast" with the LFU utility, as described in Chapter 4.

The two connectors in the bulkhead are 50-pin, high-density, pin and socket female connectors.

The protocol used in the implementation of the KZMSA firmware is revision 10d of the ANSI draft proposed for the SCSI-2 interface; document X3.131-199X, dated May 1, 1991. This document is available from Global Engineering Documents, 2805 McGaw, Irvine, CA 92714. The KZMSA firmware implements a subset of the features described in this document. Specifically, the KZMSA does *not* support the following optional features:

- Wide transfers
- Tagged queuing
- Linked commands (a SCSI-1 feature also)
- Asynchronous event notification
- Extended contingent allegiance condition handling

You can connect the KZMSA to a device with a SCSI-1 connector, but devices with SCSI-2 high-density connectors are preferred so that you can use the active terminators supplied with the CK-KZMSA-LA kit. Other recommendations include:

- Dedicate one port to one external device.
- Limit the cable length from the I/O bulkhead to 12 feet maximum, the shorter the better.
- Use external device grounding common to the system to avoid ground currents (see Appendix A).

See Tables 1- 4 and 1- 5 for SCSI cables and terminators available from Digital.

**Table 1- 4 SCSI Single- Ended Cables Available from Digital**

| Type  | Length | Part Number |
|---|--------|-------------|
| SCSI- 2 to SCSI- 2<br>(50- pin, high- density)                            | 2 ft   | BC10U- 02   |
|   | 3 ft   | BC10U- 03   |
|   | 4 ft   | BC10U- 04   |
|   | 5 ft   | BC10U- 05   |
|   | 6 ft   | BC10U- 06   |
|   | 9 ft   | BC10U- 09   |
|   | 12 ft  | BC10U- 12   |
| SCSI- 2 (50- pin, high- density)<br>to SCSI- 1 (50- pin, low-<br>density) | 6 ft   | BC09D- 06   |
|   | 12 ft  | BC09D- 12   |

**Table 1- 5 SCSI Terminators Available from Digital**

| Type                       | Part Number   |
|----------------------------|---------------|
| SCSI- 2 active terminator  | 12- 37618- 01 |
| SCSI- 1 passive terminator | 12- 30552- 01 |

## Chapter 2

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# Installing the Adapter

This chapter tells how to install the KZMSA adapter into an XMI plug-in unit (PIU) in DEC 7000 and DEC 10000 systems.

Observe the following before you start any installation procedure:

**WARNING:** *Turn off the system power by turning the keyswitch on the control panel to Disable before working with the XMI PIU.*

**CAUTION:** *Wear an ESD wrist strap when installing modules in the XMI PIU.*

The following sections are in this chapter:

- Opening the Front of the XMI PIU
- Installing the Adapter in the XMI Card Cage
- Attaching the SCSI Cable Connector Assembly to the XMI Bulkhead
- Connecting the Cables to the XMI Backplane

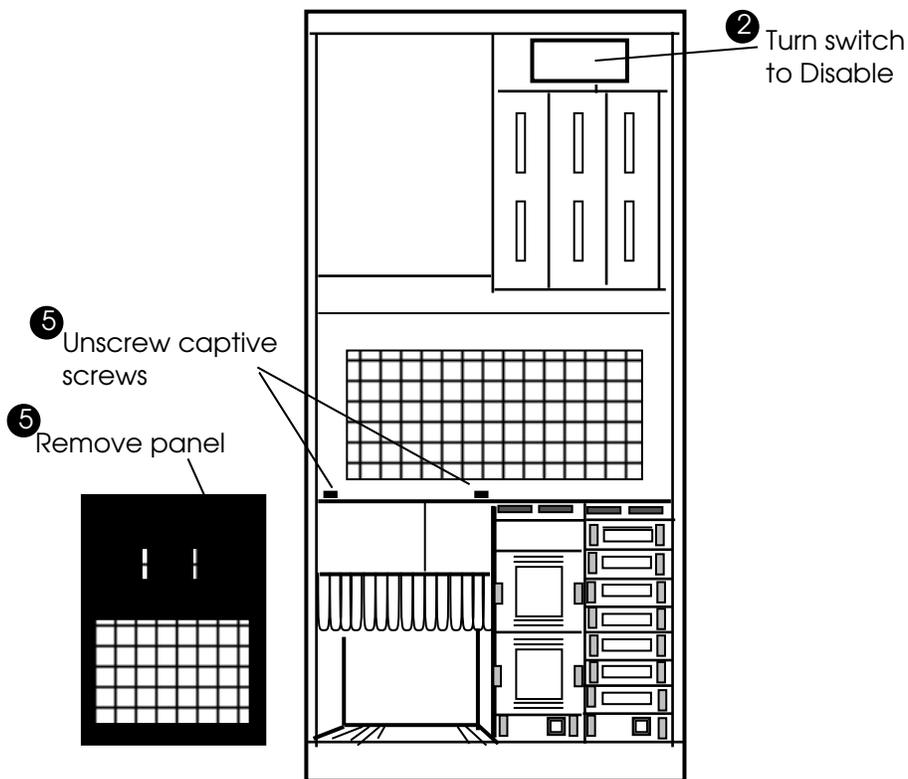
## 2.1 Opening the Front of the XMI PIU

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**Turn off the system power and open the front of the XMI PIU to access the XMI slot where the KZMSA adapter is to be installed.**

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Figure 2-1 Opening the Front of the XMI PIU



To access the XMI PIU so that you can install the KZMSA adapter:

1. Shut down the operating system in an orderly fashion.
2. Power down the system by turning the control panel keyswitch to the Disable position.
3. Open the front door of the cabinet. The front of an XMI PIU faces the front on both the system and expander cabinets, as shown in Figure 2- 1.
4. Ground yourself and the container for the adapter with the two grounding wires at the left side of the cabinet. Attach the ESD wrist strap to your wrist and connect the other wire to the adapter container using the snap. This grounds you and the container and prevents damage to the electronic components on the adapter.
5. Remove the panel on the front of the XMI PIU (see Figure 2- 1). Release the captive screws at the top of the panel covering the XMI PIU and remove the front panel.

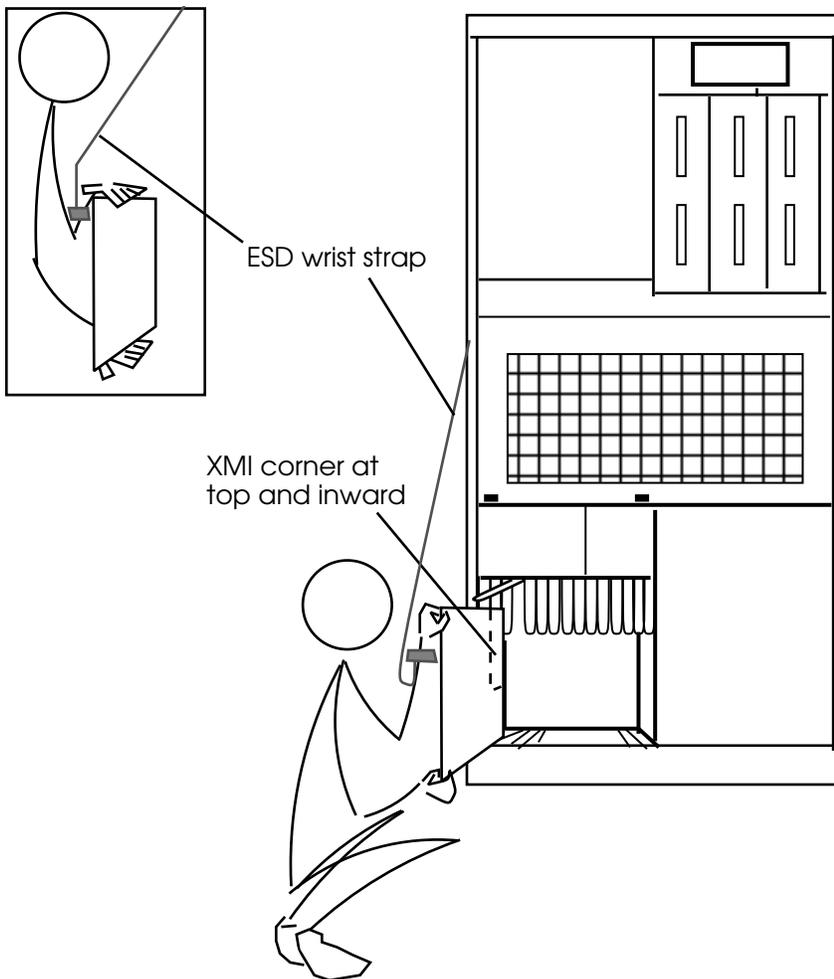
## 2.2 Installing the Adapter in the XMI Card Cage

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Choose the slot for the KZMSA adapter and install the adapter in the XMI card cage.

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Figure 2-2 Placing the KZMSA Adapter in an XMI Slot



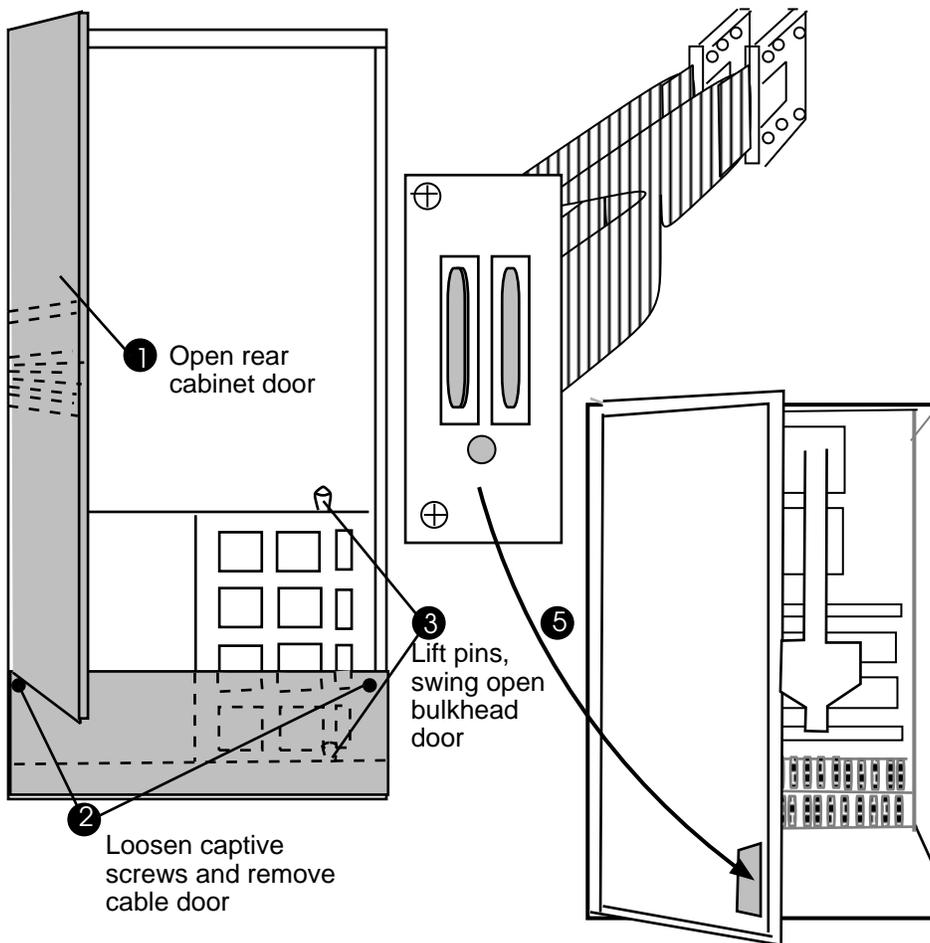
To install the KZMSA adapter in the XMI card cage:

1. Select the slot where you want the KZMSA to go, and lift the lever to open the chosen slot. Make sure the lever is firmly in the up position.
2. Remove the adapter from the ESD box. Hold the adapter by using the flats of your hands, keeping your thumbs and fingers off the sides of the adapter, so that you do not touch the components on the sides of the module. (See inset in Figure 2- 2.)
3. Place the adapter in the chosen slot, grasping it by the back corners (away from the XMI corner), and slide it—XMI corner at the top and inward (see Figure 2- 2)—into the slot until it stops.
4. Lower the lever to lock the module in the slot.
5. Replace the front panel of the XMI card cage.

## 2.3 Attaching the SCSI Cable Connector Assembly to the XMI Bulkhead

Install the SCSI bulkhead assembly in the bulkhead of the XMI PIU.

Figure 2-3 Attaching the Cable Assembly to the XMI Bulkhead



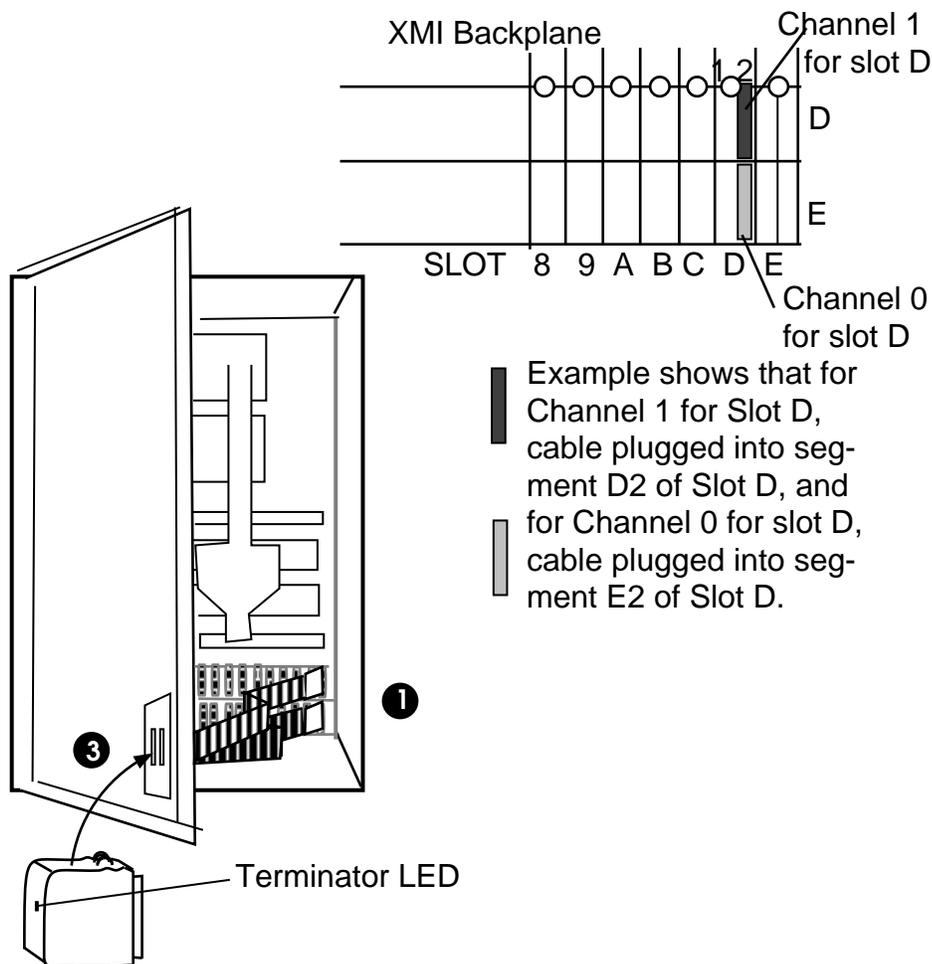
To install the SCSI cable assembly to the XMI bulkhead door:

1. Open the rear cabinet door to access the bulkhead of the XMI PIU.
2. Remove the cable door (a panel at the bottom of the cabinet) by releasing the two captive screws at the top of the panel and lifting it off.
3. Lift the two spring- loaded pins on the bulkhead door and swing it open on its hinges.
4. Remove the flat plate over one of the openings in the I/O bulkhead.
5. Install the SCSI bulkhead assembly (part number 17- 03452- 01) using a Phillips screwdriver to fasten the two small screws that hold the plate to the bulkhead door.

## 2.4 Connecting the Cables to the XMI Backplane

Plug the connector cables into the appropriate segments of the XMI backplane. Install terminators.

Figure 2-4 Installing the Cables in the XMI Backplane



To install the connector cables in the XMI backplane:

1. It is easiest if you first take the leftmost cable connector (from the viewpoint of the outside of the bulkhead door) in the bulkhead assembly and plug the loose end into the XMI backplane. To make the left connector channel 0, plug the end into segment E2 of the slot where the KZMSA adapter is installed. Note that the small raised "notch" on one side of the cable connector goes to the right.
2. Take the right cable connector and plug it into segment D2 (for channel 1) of the same slot. Again, the notch in the cable connector goes to the right.
3. Plug both terminators into the connectors for those channels at the bulkhead. (You can proceed with cabling to SCSI devices after verifying that the adapter is working properly, as described in Chapter 3.) When the power is turned back on, the LED on the terminator will light, showing that the terminator is properly connected. (Termination is *required* for proper operation of the KZMSA.)

The next step is to verify that the KZMSA is working. It is a good idea to do this before cabling any I/O devices to the KZMSA adapter at the XMI bulkhead. Proceed to Chapter 3.

1. Refasten the I/O panel door at the bottom of the cabinet and close the rear and front doors.
2. Power up the system by turning the keyswitch to Enable.



## Chapter 3

---

# Verifying That the Adapter Works

Before cabling to SCSI devices, check that the adapter is operating properly. This chapter tells how to tell whether the power-up self-test passes or fails, and some simple procedures to try if it fails.

The procedure for installing the SCSI disk and tape PIU is given in the *BA655 SCSI Disk and Tape PIU Installation Guide*. A disk exerciser is also described in that manual which further tests the adapter, cabling, and devices.

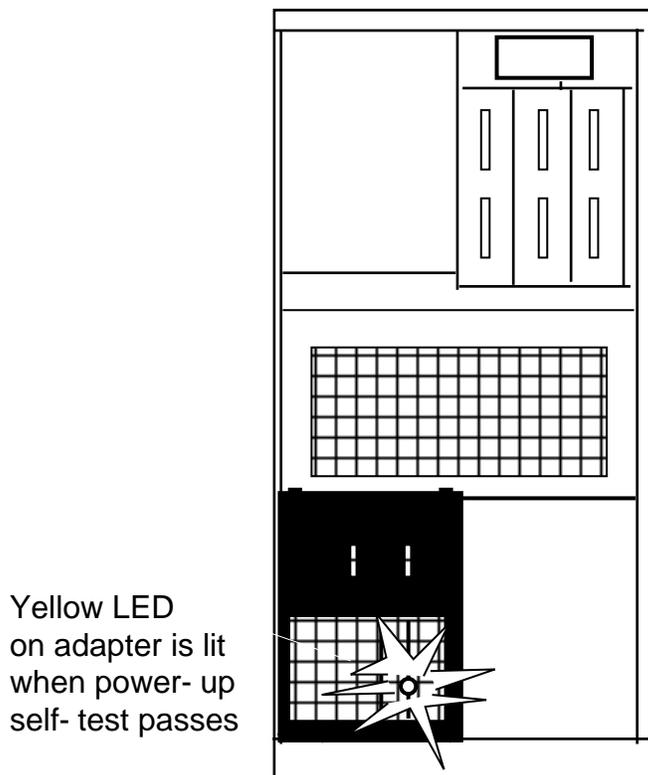
### 3.1 KZMSA Power- Up Self- Test

---

**On power-up, the adapter executes a series of ROM-based routines that test the basic functionality of the components of the adapter. The yellow LED on the adapter lights when power-up self-test passes.**

---

**Figure 3- 1 Yellow LED Indicates Power- Up Self- Test Passed**



1. Power up the system by turning the control panel switch to Enable. Wait 30 to 40 seconds for the cooling and power subsystems to begin operation, and for the KZMSA power-up self-test to complete. Then check the yellow LED on the KZMSA adapter. Proceed to step 2 or step 3.
2. **Adapter LED Lights.** If the adapter LED lights, the adapter has passed self-test, and you can proceed with step 4, connecting the adapter to whatever SCSI I/O devices you are using.
3. **Adapter LED Does Not Light.** If the KZMSA adapter LED does not light on power-up, and the LEDs on the other modules indicate that they are all operable, make the following checks:
  - a. Check that the KZMSA bulkhead cables are properly connected to the XMI backplane. Power the system down and check to ensure that the cables are in the proper backplane segments (see Section 2.4) and are firmly connected to the backplane.
  - b. Check that the KZMSA module is seated properly in the XMI card cage. Power down the system and reposition the module, making sure that it is in the right track, engaged with the XMI backplane, and that the lever is down, holding the module firmly in place.
  - c. Power up the system. If the adapter LED still does not light after you have adjusted and checked the cables and module seating, and no other problems appear on the system, try replacing the adapter. Proceed to step 4 when power-up self-test passes on an installed KZMSA adapter.
4. Once the KZMSA adapter is installed and passes self-test, you can begin to cable the KZMSA to the I/O devices it is to serve. Or, if you are simply installing the adapter and waiting for other equipment to arrive, you can proceed with powering up the system and booting the operating system.
5. One final step before proceeding with cabling or booting is determining whether or not you wish to enable the "fast synchronous transfer option" for either of the two I/O channels (ports). See Chapter 4.



## Chapter 4

# Selecting the "Fast Synchronous Transfer" Option

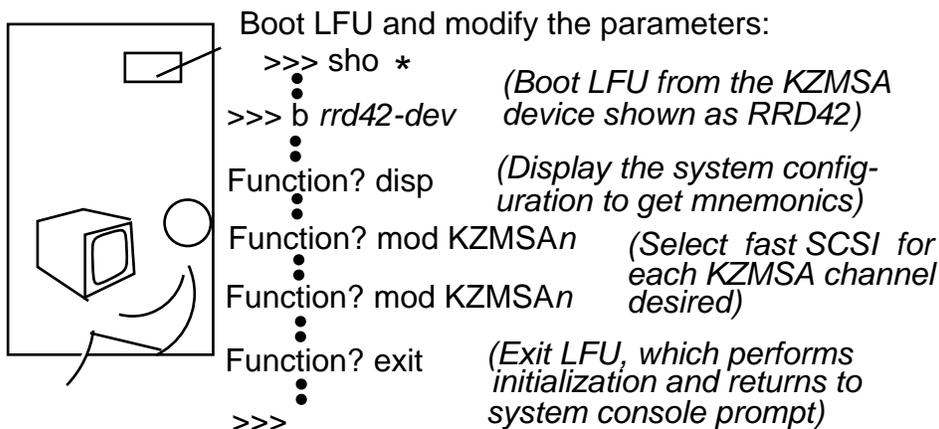
You may improve transfer speeds for some configurations by selecting the "fast synchronous transfer" option for some KZMSA channels.

*NOTE: Only firmware Revisions 4.3 and up allow fast SCSI. And, hardware revisions E01 and lower will not work with LFU. You must return those adapters to the factory for modification to run LFU.*

The sections in this chapter include:

- Check the Total Length of Cabling
- Determine Which XMI PIUs Hold Each KZMSA
- Boot LFU
- Use the Display Command to Check Configuration
- Use Modify to Enable the Fast SCSI Setting

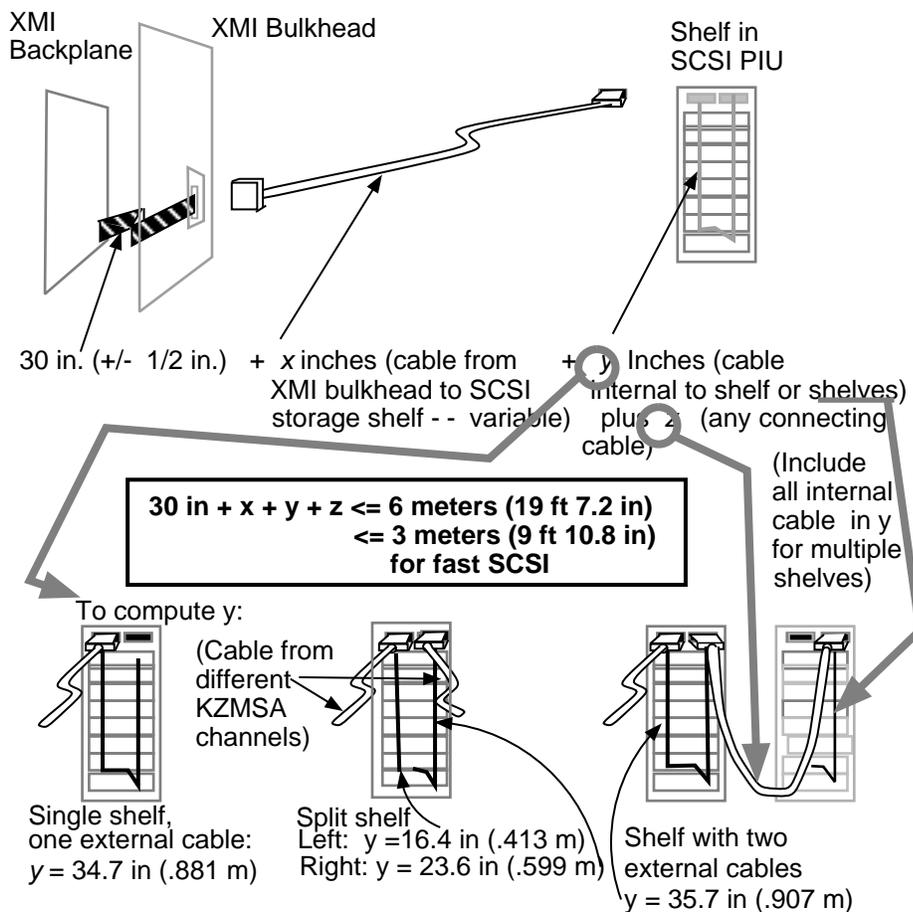
**Figure 4-1** Setting the "Fast Synchronous Transfer" Option



## 4.1 Check the Total Length of Cabling

**KZMSA ports cabled to SCSI devices with single-ended cabling whose total length (from the XMI backplane to the device) is less than 3 meters (9 ft 10.8 in) can be enabled for fast SCSI. Configurations that require the use of longer single-ended cabling cannot use fast SCSI. KZMSA ports connected to DWZZA bus adapters can be enabled for fast SCSI as long as the single-ended cabling at each end is less than 3 meters. By default, fast SCSI is disabled.**

**Figure 4-2 Computing Single-Ended Cable Length**

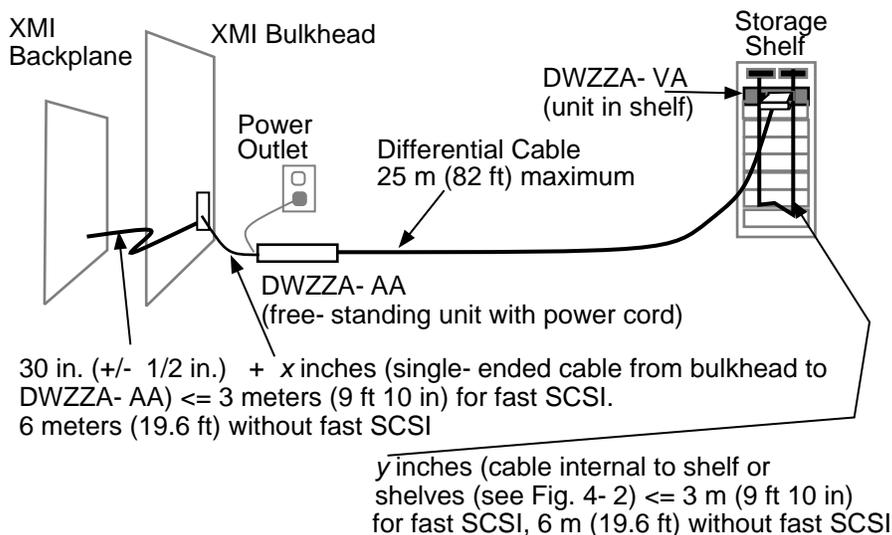


After you install and test the KZMSA, cable must be run from the XMI bulkhead to the SCSI I/O devices. Digital makes the SCSI disk and tape PIU to hold SCSI devices for the system and expander cabinets of the DEC 7000 and 10000 systems. The *SCSI Disk and Tape PIU Installation Guide* tells how to install that PIU and cable to its shelves within it for various configurations. DEC 7000 and 10000 systems can also use the DWZZA bus adapters, differential cabling, and storage expander cabinets to hold SCSI devices at distances farther than allowed by single-ended cabling alone.

**For single-ended connections** (SCSI PIU within DEC 7000 and 10000 system and expander cabinets), the total length of the SCSI bus, from the XMI backplane to the bus terminator, must be less than 6 meters (19.6 feet) for SCSI operation. The fast SCSI option can be enabled if the total length of the bus is 3 meters or less. Figure 4- 2 shows how to determine the total length of the bus.

**For differential connections** (using the DWZZA bus adapters), the total length of the SCSI bus can be 101 ft 8 in, as described in Section 1.1.3. This includes a maximum of 3 meters (9 ft 10.8 in) of single-ended cable at either end of the differential cable, and a maximum of 25 meters (82 ft) of differential cable. Figure 4- 3 shows how to determine the length of single-ended cable at either end of the differential cable.

**Figure 4- 3 How to Compute Cable Length When Using DWZZAs**



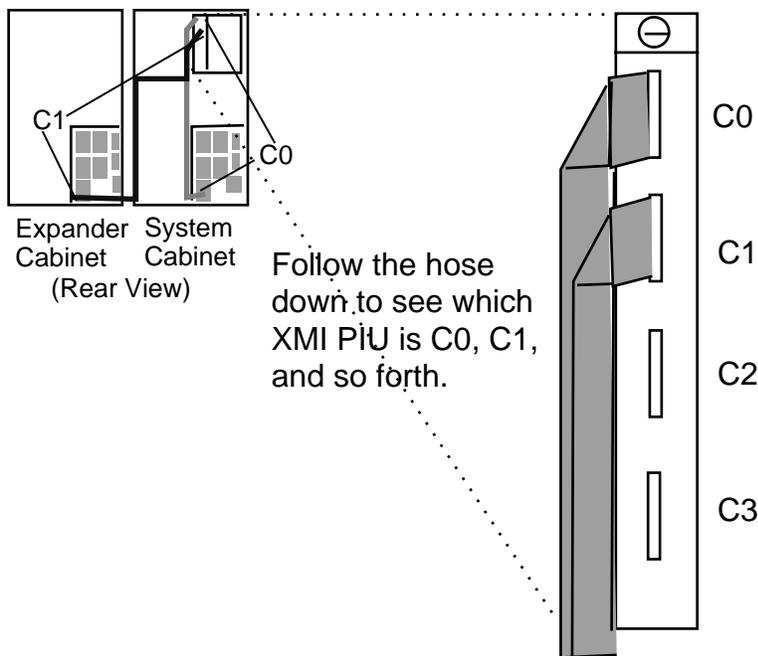
## 4.2 Determine Which XMI PIUs Hold Each KZMSA

---

To find out which KZMSA channels can be enabled for fast SCSI, you will need to determine the "name" of the XMI PIUs that hold each KZMSA. These names appear on console and LFU displays.

---

Figure 4-4 "Hose" Cabling the IOP Module to the XMI PIU



To enable "fast SCSI," you run the LFU utility. First, though, you must determine which KZMSA channels can be enabled for fast SCSI.

The KZMSAs are labeled on the console and LFU configuration displays according to the XMI PIU they are installed in. XMI PIUs are labeled C0, C1, C2, or C3, depending on which connector in the IOP module is used to plug in the large cable, or "hose" to the XMI PIU and DWLMA module (see Figure 4- 4).

## 4.3 Boot LFU

To modify parameters on the KZMSA, you run the Loadable Firmware Update (LFU) Utility, which you boot from the RRD42 or an InfoServer, if you have one.

### Example 4-1 Booting LFU from the RRD42

```
P00>>> sho dev kz*
polling for units on kzmsa0, slot 3, xmi0...
dka300.3.0.3.0 DKA300 RZ73
dka400.4.0.3.0 DKA400 RZ73
dkb400.4.1.3.0 KB400 RRD42
```

(Boot the RRD42 device on a KZMSA)

```
P00>>> b dkb400.4.1.3.0 -flag 0,80
Bootfile: [DEC7000]AXP7000_Vnn.APB
Booting...
```

### Example 4-2 Booting LFU from an InfoServer

```
P00>>> sho net
polling for units on demna0, slot 13, xmi0...
exa0.0.13.0: 01-00-2B-24-3F-E1
polling for units on demna1, slot 14, xmi0
exb0.0.14.0 01-00-2B-24-3F-E1
P00>>> boot exa0 -file APB_015 -flag 0,80
Booting...
Connecting to boot device exa0
Requesting MOP Assistance Volunteer.....
Bootfile: [DEC7000]AXP7000_Vnn.APB
```

| FUNCTION ID | FUNCTION         |
|-------------|------------------|
| 1           | - Display Menu   |
| 2           | - Help           |
| 3           | - Choose Service |
| 4           | - Select Options |
| 5           | - Stop           |

```
Enter a Function ID value: 3
```

(exa0 is the first DEMNA encountered: if more than one DEMNA is on your system, and file APB\_015 cannot be found on exa0, the console will keep searching indefinitely, printing out periods here as the search continues. Type CTRL/C to halt the search and boot from the next DEMNA (exb0) until the boot continues past the MOP line and the Bootfile: prompt appears).

```

OPTION          OPTION
ID
1 - Find Services
2 - Enter known Service Name
Enter an Option ID value: 1 ③

Working
Servers found : 2

#1
INFO4$RZ57
INFO4
01-00-28-26-A6-98
#2
UPDATE
OPUS_BSS
08-00-2B-18-A9-75
Enter a Service Number or <CR> for more: 2 ③

```

③ → Choose number of UPDATE service

### Booting from the RRD42

1. Place the Alpha firmware CD- ROM in the system load device.
2. Type **sho dev kz\*** at the console terminal to display KZMSA devices on the system. KZMSA adapters handle SCSI I/O.
3. The load device is identified by the name RRD42. The unit number for this device is shown as dkb400.4.1.3.0; use whatever number shows up on your display for the RRD42 in the boot command in step 4.
4. Using the unit number obtained in step 3, boot the system load device. Use the **- flag 0,80** option to get the prompt for the bootfile.
5. For a DEC 7000 system, type the bootfile name as shown. The *nn* is the version number of the Alpha firmware CD- ROM. For a DEC 10000 system, use the name [DEC10000]AXP7000\_Vnn.APB. Information describing the progress of the boot operation is displayed, LFU is loaded and run, and displays a header and a brief description of the commands available.

### Booting from an InfoServer

1. Type **sho net** at the console to see if there is more than one DEMNA.
2. Boot from the first DEMNA (exa0), using the **- file** option with the file-name APB\_015. *If the console code does not find that file, it will keep printing periods (...) indefinitely.* Do a CTRL/C in this case and boot from the next DEMNA (exb0) until you see the **Bootfile:** prompt.
3. See step (5) above for the bootfile name. The Network Initial System Load Program displays several menus from which you select the UPDATE service, as shown in the example. LFU is loaded and run.

## 4.4 Use Display Command to Check Configuration

---

The LFU display command shows the system configuration, providing the device mnemonic you will use to modify the fast SCSI parameter for the appropriate KZMSAs.

---

### Example 4-3 LFU Display Command

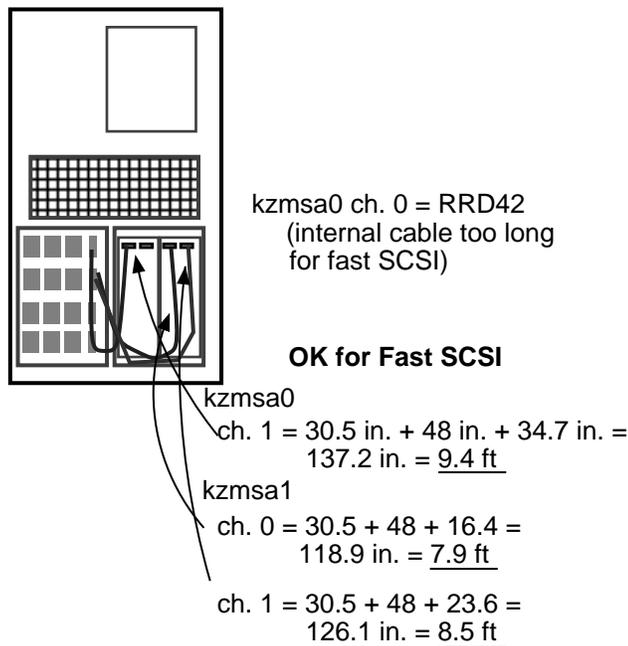
```
Function? display ①
      Name      Type      Rev      Mnemonic  FW Rev  HW Rev
LSB
0+   KN7AA      (8001)  0000    kn7aa0    1.0     E04
5+   MS7AA      (4000)  0000    ms7aa0    N/A     A01
7+   MS7AA      (4000)  0000    ms7aa1    N/A     A01
8+   IOP        (2000)  0001    iop0      N/A     A
C0 XMI          ②                xmi0
8+   DWLMA      (102A)  A5A6    dwlma0    N/A     A
B+   KZMSA      (0C36)  5143    kzmsa0    4.3     F01
C+   KZMSA      (0C36)  5143    kzmsa1    4.3     F01
E+   DEMNA      (0C03)  060B    demna0    6.8
C1 XMI          ②                xmi1
1+   KZMSA      (0C36)  5143    kzmsa2    4.3     F01
2+   KZMSA      (0C36)  5143    kzmsa3    4.3     F01
3+   KZMSA      (0C36)  5143    kzmsa4    4.3     F01
4+   KZMSA      (0C36)  5143    kzmsa5    4.3     F01
8+   DWLMA      (102A)  A5A6    dwlma1    N/A     A
```

To display the current configuration of the system:

1. Use the LFU **display** command to find the device mnemonics for the KZMSA adapters that you want to enable for fast SCSI operations.
2. The **display** command in Example 4- 3 shows two XMI PIUs (C0 and C1). Check the hose cabling as described in Section 4.1 As an example, assume that the C0 hose connects to the XMI PIU in the system cabinet, and the C1 hose connects to the XMI PIU in the expander cabinet shown in Figure 4- 5.
3. Check the cabling length, using the technique described in Section 4.1.

Figure 4- 5 shows some examples using the 4- foot BC10U- 04 cables.

**Figure 4- 5 DEC 7000 System Showing Fast SCSI Possibilities**



## 4.5 Use Modify to Enable the Fast SCSI Setting

---

The LFU modify command allows you to enable the fast SCSI parameter for the KZMSA.

---

### Example 4-4 LFU Modify Command

```
Function? modify kzmsa0 ❶
kzmsa0
  Local Console:                ENABLED
  Log Selftest Errors:         ENABLED
  Log NRC 53C710 RBD Errors:   ENABLED
  Log XMI RBD Errors:          ENABLED
  Log XZA RBD Errors:          ENABLED
  RBD Error Logging:           DISABLED
  RBD Error Frame Overflow:    DISABLED      Read Only
  Hard Error Frame Overflow:   DISABLED      Read Only
  Soft Error Frame Overflow:   DISABLED      Read Only
  FW Update Error Frame Overflow: DISABLED      Read Only
  Chnl 0 Fast SCSI:            DISABLED ❷
  Chnl 1 Fast SCSI:            DISABLED

  Channel_0 ID:                07
  Channel_1 ID:                07

  Module Serial Number:        *SG909T1455*

Do you wish to modify any of these parameters? [y/(n)] y ❸

  Local Console:                ENABLED      Change? [y/(n)]
  Log Selftest Errors:         ENABLED      Change? [y/(n)]
  .
  .
  .
  Chnl 0 Fast SCSI:            DISABLED      Change? [y/(n)]
  Chnl 1 Fast SCSI:            DISABLED      Change? [y/(n)] y ❹

  Channel_0 ID:                07           Change? [y/(n)]
  Channel_1 ID:                07           Change? [y/(n)]

  Module Serial Number:        *SG909T1455* Change? [y/(n)]
```

```

Local Console:                ENABLED      5
Log Selftest Errors:         ENABLED

.

Chnl 0 Fast SCSI:            DISABLED
Chnl 1 Fast SCSI:            ENABLED

Channel_0 ID:                 07
Channel_1 ID:                 07

Module Serial Number:         *SG909T1455*

Modify kzmsa0 with these parameter values? [y/(n)] y
Function? modify kzmsa1      6
.
.
Function? exit                7
Initializing...

```

To enable the fast synchronous transfer option for specific KZMSA ports:

- ❶ Use the **modify** command for the KZMSAs that you identified as suitable for fast SCSI operation. The example shows one such sequence.
- ❷ The **modify** command displays the current settings for the parameters. The Chnl x Fast SCSI: lines identify the current settings for the two channels on the kzmsa0. Both are disabled in the example.
- ❸ After displaying the current settings, LFU asks if you wish to modify any. Type **y** to indicate that you wish to change a particular setting.
- ❹ LFU then displays each parameter and asks if you want to modify that parameter. Simply press RETURN to accept the current setting; type **y** and RETURN to change the current setting.
- ❺ After completing all the parameters, LFU then displays the new settings and asks if you want to modify the KZMSA with the settings you just provided. Type **y** and RETURN to modify the EEPROM in the KZMSA with the new values. (Note: installing firmware updates with LFU will not affect the parameters you change here; they will stay changed through the update.)
- ❻ LFU prompts for another command, and you proceed with the next KZMSA that you wish to set for fast SCSI, if any.
- ❼ Exit LFU when you are done modifying parameters.



## Appendix A

---

# Grounding Rules for Cabinets and Enclosures

If the configuration you are working with consists of two or more cabinets (the system cabinet and an expander cabinet, for example) or enclosures (such as an I/O enclosure that holds Digital or non-Digital SCSI disks), and these cabinets or enclosures are connected by a common SCSI bus, proper grounding between these enclosures is required.

There are two reasons for this:

**WARNING:** *When two cabinets or enclosures are not connected to a common ground, there is the potential for a personal safety hazard. This is the same type of electrical shock hazard that exists when household appliances are not properly grounded.*

**CAUTION:** *If the ground offset voltages generated in the power distribution system are excessive, data transmission across the SCSI bus can be seriously disturbed. For example, the systems could experience significant performance degradation or possible data corruption.*

Single-ended SCSI does not have any allowance for ground offset voltages. Therefore, any ground voltage above 0 is reducing noise margin. It is therefore critical to keep these voltages as low as possible. If the offset is above a few millivolts DC, it should be treated by increasing the ground strapping and/or the power distribution system.

### A.1 Checking Ground Offset Voltages

In a properly wired power distribution system(s) with properly functioning (no ground faults) equipment connected to the power distribution system(s) there is generally no need for any further attention to grounding. The power distribution system provides a satisfactory cab-to-cab path.

To ensure the above, a power system survey should be performed by asking these questions:

1. Do any outlets being used not have power ground connections?
2. Is the grounding prong missing on any of the computer equipment power cords?
3. Are any of the power outlet neutral connections actually ground connections?
4. Are the grounds for any of the power distribution circuits (outlets) not connected to the same power distribution panel?
5. Are any devices that are not UL or IEC approved connected to the same breaker as any of the SCSI computer equipment?

If the answers are all "no," the grounding should be adequate for SCSI operation. For final verification, the ground offset should be checked by direct measurement with a simple hand-held multimeter.

If the answers to any of these questions is "yes," the problem must be corrected.

If you are not sure of any of the answers to any of the above questions, you can measure the actual grounding offset voltage between any two cabinets with a multimeter. This will only provide data for that particular moment in time, however. The ground offset values may change over time as additional devices are either plugged into the same power source or activated.

## **A.2 Correcting Ground Offset Problems**

If a multiple-cabinet or enclosure configuration exhibits ground offset voltages between interconnected cabinets which exceed the allowable limits, there are two solutions:

1. Have an electrician correct any deficiencies found during the power system survey. This solution is recommended.
2. Install grounding cables between enclosures in a SCSI multi-cab or enclosure system. Installing more grounding cables will normally reduce the ground voltage offset sufficiently to meet the requirements. In severe cases, however, the #6 cables may not be large enough. The ground voltage offset measurements will still be too large. If the additional grounding cables are not enough, the source of the ground offset voltage must be traced and either reduced or eliminated.

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