



# RAID Array 230/Plus Subsystem

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## Installation Guide

AA-R07FA-TE

**Digital Equipment Corporation**  
Maynard, Massachusetts

## **First Edition, August 1996**

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## About This Guide

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*This section explains the purpose of the guide and describes the guide's contents and structure.*

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### **The StorageWorks RAID Array 230/Plus Subsystem Installation Guide**

This guide explains the operation of a StorageWorks RAID Array 230/Plus Subsystem and describes how to install it in a host computer system.

#### **Organization**

The guide is organized into two parts as follows:

##### **Part 1: Getting Started With The RAID Array 230/Plus Subsystem**

Part 1 gives an overview of the documentation set to help users determine which guides are needed to install and maintain the RAID Array 230/Plus Subsystem. For the experienced computer user, the getting started guide provides specific details and the minimum steps necessary to get the RAID Array 230/Plus controller installed and configured using the automatic configuration option.

##### **Part 2: RAID Array 230/Plus Hardware Installation**

Part 2 provides detailed instructions for installing a KZPAC-AA, 1-channel, or KZPAC-CA or -CB, 3-channel RAID controller in a host computer and connecting it to one or more internal shelves or external StorageWorks storage pedestals.

Part 1  
Getting Started With The  
RAID Array 230/Plus Subsystem

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## *Revision Record*

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*This Revision Record provides a concise publication history of Part 1. It lists the Part 1 revision levels, release dates, and reasons for the revisions.*

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The following revision history lists all revisions of this publication and their effective dates. The publication part number is included in the Revision Level column. Part 1 supports Getting Started With the RAID Array 230/Plus Subsystem.

<b>Revision Level</b>	<b>Date</b>	<b>Summary of Changes</b>
AA-R07FA-TE/Part 1	August 1996	This original release supports KZPAC-AA, 1-channel, and KZPAC-CA and -CB, 3-channel RAID controllers.





# About Part 1

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*This section identifies the audience of Part 1 and describes the Part-1 contents and structure. In addition, this section includes the conventions used in Part 1.*

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## **Part 1 — Getting Started With The RAID Array 230/Plus Subsystem**

Part 1 gives an overview of the documentation set to help users determine which guides are needed to install and maintain the RAID Array 230/Plus Subsystem. For the experienced computer user, part 1 provides specific details and the minimum steps necessary to get the RAID Array 230/Plus controller installed and configured using the automatic configuration option.

### **Intended Audience**

Part 1 is intended for use by experienced computer users with a RAID background.

### **Organization**

Part 1 contains the following:

#### **Section 1.1: Overview of RAID 230/Plus Documentation Set**

Use this section to determine what documents to read.

#### **Section 2.1: Before You Get Started**

This section explains the need to list your requirements, then plan the RAID subsystem to satisfy these requirements. To simplify planning, you are directed to information on cost-effective RAID level selection and appropriate controller options.

#### **Section 3.1: Installing the KZPAC controller**

Guidelines for installing the KZPAC controller.

**Section 4.1: Controller Setup — First Time**

Guidelines for using the *RAID Configuration Utility (RCU)*

**Section 5.1: Automatic Configuration of Your Array**

Guidelines for using the *Automatic Configuration* option

**Section 6.1: Initializing a Logical Drive**

Procedure for using the *Initialize Logical Drive* option

**Section 7.1: Saving the RAID Configuration to Diskette**

Procedure for saving the RAID configuration to diskette

**Conventions**

This guide uses the following conventions:

<b>Style</b>	<b>Meaning</b>
<b>boldface mono-space type</b>	To be input by the user
plain mono-space type	Screen text
<i>italic type</i>	For emphasis, manual titles, utilities, menus, screens, and filenames

## **Special Notices**

This guide uses the following to emphasize specific information.

### **WARNING**

WARNING indicates the presence of a hazard that can cause personal injury if the hazard is not avoided.

### **CAUTION**

CAUTION indicates the presence of a hazard that might damage hardware or corrupt software.

### **NOTE**

NOTE provides additional information.

## Getting Started

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*Part 1 gives an overview of the documentation set to help users determine which manuals are needed to install and maintain the RAID Array 230/Plus Subsystem. For the experienced computer user, it provides specific details and the minimum steps necessary to get the RAID Array 230/Plus controller installed and configured using the automatic configuration option.*

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### 1.1 Overview of the RAID 230/Plus Documentation Set

#### 1.1.1 Associated Manuals

Table 1, Related Documentation, lists selected document part numbers and titles along with a brief description of the StorageWorks RAID Array 200 Subsystems supporting user's and installation guides. Consult the Release Notes accompanying your software kit for the latest RAID Array Document titles and part numbers.

**Table 1 Related Documentation**

<b>Part Number</b>	<b>Title</b>	<b>Description</b>
AA-R07FA-TE	<i>StorageWorks RAID Array 230/Plus Subsystem Installation Guide</i>	Two-part guide including this Getting Started section and a detailed controller installation section
AA-R07GA-TE	<i>StorageWorks RAID Array 230/Plus Subsystem RAID Configuration Utility User's Guide</i>	Complete reference for the RAID Configuration Utility used for configuring and maintaining the RAID Array 230/Plus controller
AA-R07EA-TE	<i>Release Notes accompanying the StorageWorks RAID Array 230/Plus Subsystem Software kit</i>	Important information concerning the RAID Array 230/Plus subsystem not found elsewhere in the documentation set.

### **1.1.2 Which Documents Should I Use?**

Depending on the level of experience the user has with computer systems, it may not be necessary to use all of the documents listed in Table 1, above. A user who is comfortable with StorageWorks and hardware installation may be able to install the controller using this Getting Started guide, and then continue with the configuration using the StorageWorks RAID Array 230/Plus Subsystem RAID Configuration Utility User's Guide.

## **2.1 Before You Get Started**

This section explains the importance of the Release Notes and why you should read them before you get started. Next, you must identify your configuration requirements, and define your RAID subsystem to satisfy these requirements. To simplify planning, the Getting Started guide includes basic information on defining your storage subsystem.

### **2.1.1 Read the Release Notes First**

The Release Notes for the RAID Array 230/Plus contains late breaking information not found elsewhere in the documentation set. You will find informational updates, helpful hints, and important notices and restrictions documented in the Release Notes. Please consult the Release Notes prior to configuring RAID Array 230/Plus components.

### **2.1.2 Identify Your Requirements**

You must identify your data processing requirements before you can define your RAID subsystem needs. Here are just a few examples of questions which need to be answered:

- Will the data requests involve sequentially stored information or randomly distributed data?
- Is data availability important? Bank transactions are one example of data where this is important.
- Is cost saving a very high priority?
- What is the most important aspect of your environment: performance, fault tolerance, or cost?
- What is the total capacity requirement of the subsystem?

## **2.1.3 Defining Your Subsystem**

### **2.1.3.1 Choosing RAID Levels**

- RAID 0
  - Higher performance through disk striping
  - No redundancy, worst availability
  - Lower cost, 100% of total storage capacity is available for use
  - Allows relatively large logical drive sizes
- RAID 1
  - Very good performance during read operations
  - Available capacity equal to one half of total storage
  - Full redundancy through data mirroring, excellent availability
  - Most expensive option per unit of available storage
- RAID 0+1
  - Higher performance due to disk striping
  - Full redundancy, availability comparable to RAID 1
  - Most expensive option per unit of available storage
  - Allows larger logical drive sizes than RAID 1
- RAID 5
  - Good performance for applications whose I/O loads consist of small read requests
  - Redundancy obtained by using parity, very good availability
  - More cost effective than mirroring for large storage capacities
  - Allows relatively large logical drive sizes
- Just a Bunch of Disks (JBOD) — single, independent disks
  - No redundancy, poor availability
  - Low cost, 100% of total capacity is available for use

### 2.1.3.2 Fault Tolerance Considerations

- *Fault Management* Capability — Provides automatic failure detection and allows for automatic notification and correction of errors.
- Battery Backup Unit — When write back caching is used, this protects data in cache in the event of a power failure.
- Hot Spares — Allows for using spare disks in case of a disk failure.

### 2.1.3.3 Performance

- Write-Back Caching — Improves performance as compared with write-through caching, but should be used with a battery backup unit (BBU) on the controller to avoid the risk of data loss in case of a power failure.
- Write-Through Caching — Provides lower performance than is available with write-back caching, but does not require a BBU to avoid data loss in case of a power failure.
- Firmware Parameter Settings — These settings can be tuned for a particular application. See the RAID Configuration Utility (RCU) user's guide listed in Table 1.
- Connecting Disks — Whenever possible, create drive groups across all available channels. Refer to the RCU user's guide listed in Table 1 for an example of this technique.

## 3.1 Installing the KZPAC controller

Connect the external disk subsystem to the KZPAC controller. External cable length must not exceed 2 meters.

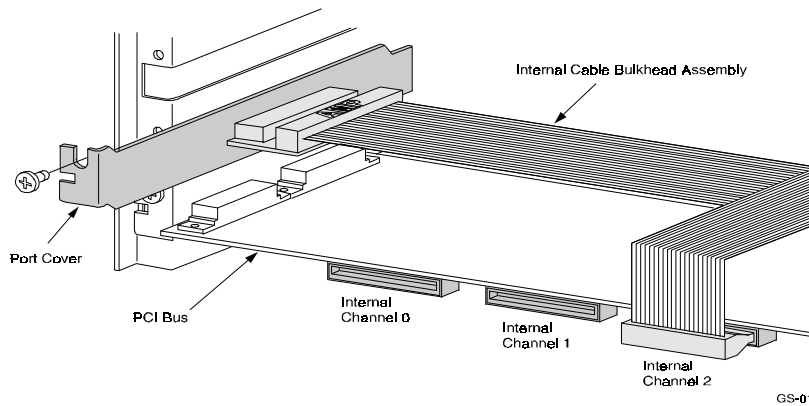
### CAUTION

When you install the KZPAC controller board, you should wear a grounded wrist strap to avoid damage to the controller caused by possible electrostatic discharge (ESD).

### 3.1.1 Internal Cabling

Orient the internal bus ribbon cable as shown in Figure 1. Insert the 90-degree connector of the internal ribbon cable into the internal channel 2 edge connector on the KZPAC controller. Fold the cable as shown. Attach the bulkhead panel with its 68-pin connector to the host system bulkhead and tighten the screw.

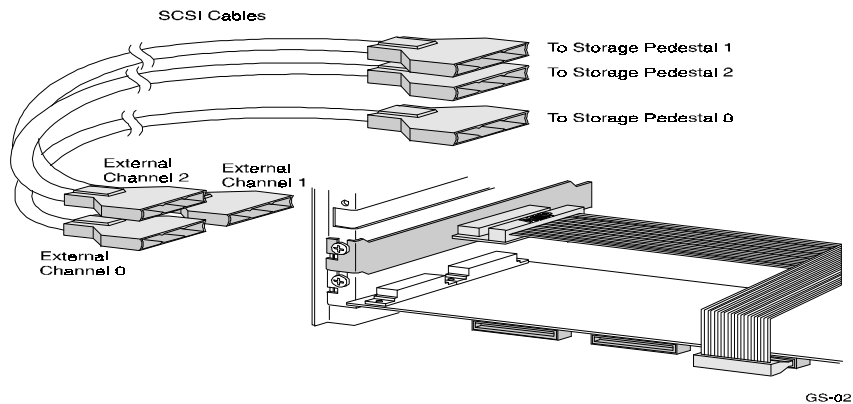
Figure 1 KZPAC Controller Internal Cabling



### 3.1.2 External Cabling

Figure 2 illustrates the cables and connections required to connect the 3-channel controller to an Expansion Storage Pedestal.

Figure 2 KZPAC Controller External Cabling



## 4.1 Controller Setup — First Time

1. From the Main Menu of the *RAID Configuration Utility (RCU)*, highlight *Controller Setup*.
2. Press the Enter key to select it. The *Edit/View Parameters* menu is displayed.

### NOTE

When in the *RCU*, the bottom line is a HELP line.



#### 4.1.1 Hardware Parameters

1. Highlight *Hardware Parameters*.
2. Press the Enter key to select it. The current status of the *Battery-Backup and Fault Management* options is displayed.

You can enable or disable the *Battery-Backup* or *Fault Management* at this time. Press the Esc key to return to the *Main Menu*.

#### 4.1.2 Suggested Physical Parameters

1. Highlight *Physical Parameters* (use arrow keys if necessary).
2. Press the Enter key to select it. The *Physical Parameters* are displayed as follows:

```
Rebuild rate (default rebuild rate = 50)
Stripe size (default size is 64K bytes)
Controller read ahead is disabled
```

When you finish viewing or changing any of the physical parameters, press the Esc key to return to the *Edit/View Parameters* menu.

#### 4.1.3 SCSI Xfr (Transfer) Parameters

1. Use the arrow keys to highlight the *SCSI Xfr Parameters* option.
2. Press the Enter key. An `Enter Channel #` box is displayed in the lower right-hand corner of the screen. Enter the channel number for which you wish to set parameters. Note that SCSI parameters are set on an individual channel basis; for a three channel controller you perform the following steps three times in sequence.
3. Press Enter.

The *SCSI Transfer Parameters* for a specified channel [Data transfer rate (MHz) and Command Tagging] options are displayed.

This option enables you to view or modify the controller's SCSI transfer rate or to enable or disable SCSI command queuing.

- *Data transfer rate* (default is 10 MHz)
- *Command tag queuing* (default is enabled)

When you are finished setting the *SCSI Transfer Parameters* for the specified channel, press the Esc key to return to the *Edit/View Parameters* menu.

#### 4.1.4 Startup Parameters

1. Highlight *Startup Parameters*. Press the Enter key to select it. The *Startup Parameters* menu is displayed with the *Spin up* option highlighted.
2. Spin up should be automatic. Specify whether the controller informs the drives to spin up or whether the drives spin up on power up (default).
3. Under the *Automatic* option, you can specify how many devices you want the controller to spin up at a time in the *Number of Devices per Spin* field.
4. Press the Esc key to return to the *Edit/View Parameters* menu. Press the Esc key again to return to the *Main Menu*.

### 5.1 Automatic Configuration of Your Array

You can configure automatically only if:

- You want to configure one RAID 5 logical RAID drive (requires between three and eight drives of same capacity) or to configure up to eight JBODs of any capacity.

To configure automatically, you must do the following:

- Select the *Automatic Configuration* option.
- Initialize the logical drives.
- Save your configuration to diskette.

#### 5.1.1 Automatic Configuration

- From the Main Menu, highlight Automatic Configuration.

##### NOTE

If a configuration currently exists, then the utility displays a warning message saying that a valid configuration exists and if you proceed, you will destroy it.

If no configuration currently exists, then the *Automatic Configuration* menu appears.

- Select *Yes* to delete the current configuration. Select *No* to quit without changing the configuration and to return to the *Main Menu*.

## 6.1 Initializing a Logical Drive

From the *Main Menu*, select the *Initialize Logical Drive* option. The utility displays the *Initialize Logical Drive* screen. Using the arrow keys, highlight logical RAID drive 0.

- Press the Enter key. A confirmation window appears displaying the following message:  
Do you want to proceed with initialization?
- Select *Yes*. to begin initialization. When initialization has been completed, the utility prompts you to press any key to continue.
- Press any key. The utility displays a message indicating that it is saving the configuration, then the *Main Menu* is displayed..

## 7.1 Saving the RAID Configuration to Diskette

You should save a copy of your configuration to a diskette.

To save the configuration, perform the following steps:

1. Insert a diskette in your system's floppy drive.
2. Press the Enter key to select the *Tools* option from *Main Menu*. The *Tools* menu is displayed.

Highlight the *Backup/Restore Conf* option to save your configuration information in a file.

3. Press any key to continue. The *Backup/Restore Conf* menu is displayed.
4. Enter a name for the file where your configuration will be saved.
5. Press the Y key to save the file. The utility saves the file.
6. The *Backup/Restore* menu is displayed.
7. Press the Esc key to exit. The *Main Menu* is displayed.
8. Press the Esc key twice. Highlight *Yes* and then press the Enter key to exit the utility.
9. Reboot your computer and start your operating system.

This completes the configuration of your array. If you are installing your subsystem for the first time, go to the *User's Guide* for the *StorageWorks RAID Array 200* management utility for your operating system. Follow the procedures there to load the online management utility onto your system.

Part 2  
RAID Array 230/Plus  
Hardware Installation

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## Revision Record

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*This Revision Record provides a concise publication history of Part 2. It lists the Part 2 revision levels, release dates, and reasons for the revisions.*

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The following revision history lists all revisions of this publication and their effective dates. The publication part number is included in the Revision Level column. Part 2 supports the RAID Array 230/Plus Hardware Installation.

<b>Revision Level</b>	<b>Date</b>	<b>Summary of Changes</b>
AA-R07FA-TE/Part 2	August 1996	This original release supports KZPAC-AA, 1-channel, and KZPAC-CA and -CB, 3-channel PCI RAID controllers.

## About Part 2

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*This section identifies the audience of Part 2 and describes the Part 2 contents and structure. In addition, this section includes the conventions used in the guide and a list of related documents.*

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### **Part 2 — RAID Array 230/Plus Hardware Installation**

Part 2 describes how to install RAID Array 230/Plus Subsystem hardware in a host computer system. Specific procedures cover installing a 1- or 3-channel KZPAC controller in a computer system and cabling the controller to an internal StorageWorks shelf or external StorageWorks storage pedestal.

#### **Intended Audience**

Part 2 provides detailed instructions for installing the RAID Array 230/Plus Subsystem.

If you are not experienced with installing hardware and software in computers, contact your service representative for assistance.

#### **Organization**

Part 2 contains the following:

##### **Chapter 1: Checklist**

The checklist provides an overview of requirements for installing a RAID Array 230/Plus Subsystem 1- or 3-channel controller and lists the user-supplied hardware and software needed. Chapter 1 also contains a tabular road map which serves as a sequential quick reference, directing users to the procedures needed for installing each type of controller.

##### **Chapter 2: Installing the KZPAC Controller**

This chapter describes how to install the 1- or 3-channel KZPAC controller in a computer.



### Chapter 3: Cabling Pedestal to Controller

Chapter 3 provides guidelines for installing one or more external storage pedestals and cabling them to a KZPAC one or three channel controller.

#### Conventions

This guide uses the following conventions:

Style	Meaning
<b>boldface mono-space type</b>	To be input by the user
plain mono-space type	Screen text
<i>italic type</i>	For emphasis, manual titles, utilities, menus, screens, and filenames

#### Special Notices

This guide uses the following to emphasize specific information.

**WARNING**

A WARNING indicates the presence of a hazard that can cause personal injury if the hazard is not avoided.

**CAUTION**

A CAUTION indicates the presence of a hazard that might damage hardware or corrupt software.

**NOTE**

A NOTE provides additional information

# 1

## *Checklist*

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*This chapter provides an overview of the work required to install a StorageWorks RAID Array 230/Plus Subsystem. Chapter 1 also details host computer system requirements and lists user supplied hardware and software. Finally, the chapter provides a tabular road map for installing the RAID Array 230/Plus Subsystem.*

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### **1.1 Installation Overview**

Thank you for purchasing a StorageWorks RAID Array 230/Plus Subsystem.

Part 2 provides detailed instructions for installing the StorageWorks RAID Array 230/Plus Subsystem. System administrators experienced with RAID equipment may wish to follow the summary procedures in Part 1 of this guide.

Installing StorageWorks RAID Array *230/Plus* hardware requires the user to:

- Prepare to install.
- Install options, if ordered, on the KZPAC controller.
- Install the KZPAC controller in the computer and connect it to one or more internal StorageWorks shelves, if applicable.
- Install one or more external StorageWorks storage pedestals, if applicable.
- Cable the KZPAC controller to one or more external StorageWorks storage pedestals, if applicable.

Refer to Related Documentation in About This Guide to identify documentation to configure the array, install the RAID Array Online Management Utility for the selected operating system, and, if necessary, upgrade controller firmware.

## **1.2 Prepare to Install**

### **1.2.1 User Supplied Hardware and Software**

Before installing, check that you have:

- An Intel or Alpha based computer system with:
  - 3.5-inch, 1.44 MB floppy drive
  - Available slots:
    - 1 PCI slot – 1 required for the KZPAC controller itself,  
An additional bulkhead slot is required for an external connection to the third channel of a three channel KZPAC controller
  - Associated computer system hardware manual
  - Phillips head screwdriver
  - 1 – 2 MB of disk space
- An operating system which supports a StorageWorks RAID Array *230/Plus* Subsystem. See release notes.
- A StorageWorks RAID Array *230/Plus* KZPAC controller kit containing:
  - 1- or 3-channel KZPAC controller
  - RAID Array *230/Plus* RAID Configuration Utility in one of two versions for Intel or Alpha systems, as appropriate
  - RAID Array *230/Plus* management utility diskette for selected operating system and computer type; for example, a Windows NT operating system running on an Intel based computer requires a different Online Management Utility than the same operating system running on an Alpha-based computer.
  - This installation guide
  - User's Guide for RAID Array *230/Plus* management utility for selected operating system and computer type.
- Any controller options which have been ordered.

- StorageWorks storage enclosure(s) (unless only internal storage shelf will be used), Storage Enclosure User's Guide, and disk drives — The number of storage enclosures and drives shipped depends on what was purchased for external storage capacity. Check the packing list for a record of components that come with the storage enclosure.
- Appropriate connecting cables for your 1- or 3-channel controller — Table 1-1 lists cables for KZPAC controllers. See the Release Notes for current part numbers.

**Table 1-1 Required Cables for KZPAC controllers**

KZPAC controller	Required Cables
1-channel controller	<ul style="list-style-type: none"> <li>• One 1.5-meter SCSI cable</li> </ul>
3-channel controller	<ul style="list-style-type: none"> <li>• Three 1.5-meter SCSI cables</li> <li>• One 0.5-meter cable bulkhead assembly</li> </ul>

### 1.2.2 Media Back Up

Make a backup copy of your RAID Array 230/Plus RAID Configuration Utility diskette.

This completes the preparation. Now install the subsystem as explained in Section 1.3.

## 1.3 Road Map for Installations

Table 1-2 directs the user to the specific procedures needed for installing each type of KZPAC controller.

**Table 1–2 Road Map for Installations**

<b>One Channel</b>	<b>Three Channel</b>
<p>Chapter 1</p> <ul style="list-style-type: none"><li>• Prepare to install.</li></ul> <p>Chapter 2</p> <ul style="list-style-type: none"><li>• Install options, if ordered, from Product Notes in option kit.</li><li>• Install KZPAC controller and connect it to internal shelf, if applicable.</li></ul> <p>Chapter 3</p> <ul style="list-style-type: none"><li>• Install storage pedestal(s), if applicable.</li><li>• Cable KZPAC controller to storage pedestal(s), if applicable.</li></ul>	<p>Chapter 1</p> <ul style="list-style-type: none"><li>• Prepare to install.</li></ul> <p>Chapter 2</p> <ul style="list-style-type: none"><li>• Install options (if ordered) from Product Notes in option kit.</li><li>• Install KZPAC controller and connect it to one or more internal shelves, if applicable.</li><li>• Cable KZPAC controller internally.</li></ul> <p>Chapter 3</p> <ul style="list-style-type: none"><li>• Install storage pedestal(s), if applicable.</li><li>• Cable KZPAC controller to storage pedestal(s), if applicable.</li></ul>

# 2

## *Installing the KZPAC Controller*

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*This chapter contains instructions for installing the 1- or 3-channel KZPAC controller board in a host computer.*

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The 1-channel KZPAC controller has two channel 0 connectors, one internally on the top of the printed circuit board and the second on the external connector.

The 3-channel KZPAC controller has five connectors: two channel 0 connectors, two channel 1 connectors, and one channel 2 connector. Channel 0 and channel 1 each have a connector on the edge of the KZPAC board and an external second connector. The edge connectors on the KZPAC board are the 68-pin high-density type. The bulkhead connectors are 0.8-mm, 68-pin connectors.

### 2.1 Installation

#### **CAUTION**

To avoid static damage, wear a grounded wrist strap while installing the KZPAC controller board.

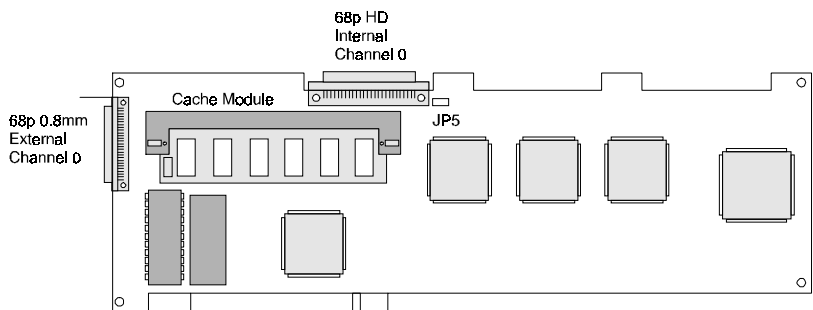
1. Turn off power to computer and disconnect power cord.
2. Remove cover from host computer. Refer to host computer manual for general instructions on removing cover and installing adapter boards.
3. Unpack KZPAC controller board.
4. If KZPAC controller board has options which need to be installed, refer to Product Notes packed with option kits for installation instructions. After installing options, continue with step 5.
5. If installing 1-channel controller, continue with Section 2.1.1. If installing 3-channel controller, go to Section 2.1.2.

### 2.1.1 1-Channel Controller

The controller supports either an external channel connection to an external storage pedestal or an internal channel connection to an internal shelf. Simultaneous external and internal connections are not supported.

1. Inspect controller board and confirm that jumper at JP5 is installed. (See Figure 2–1.) This jumper terminates SCSI bus on computer end of bus and must be in place.
2. Select any available PCI slot for controller board. When computer is powered on, computer locates and establishes communications with KZPAC controller.
3. Remove screw from outside slot cover and save screw.
4. Remove slot cover and install controller board in slot.
5. Secure controller board with screw previously used to secure slot cover. If you are connecting to external storage pedestal, go directly to step 7.
6. If you are connecting to internal shelf, refer to documentation that comes with shelf, then configure shelf, and cable controller to internal shelf before performing next step.
7. Install cover on host computer and reconnect power cord.

**Figure 2–1 Board Layout of 1-Channel KZPAC Controller**



200-02

### 2.1.2 3-Channel Controller

The controller supports either external channel connections to external storage pedestals, or internal channel connections to one or two internal shelves. Simultaneous external and internal connections on the same channel are not supported.

1. Inspect controller board and confirm that termination jumpers are properly installed. These jumpers terminate SCSI buses on computer end of bus and must be in place. (See Table 2–1 and Figure 2–2.)

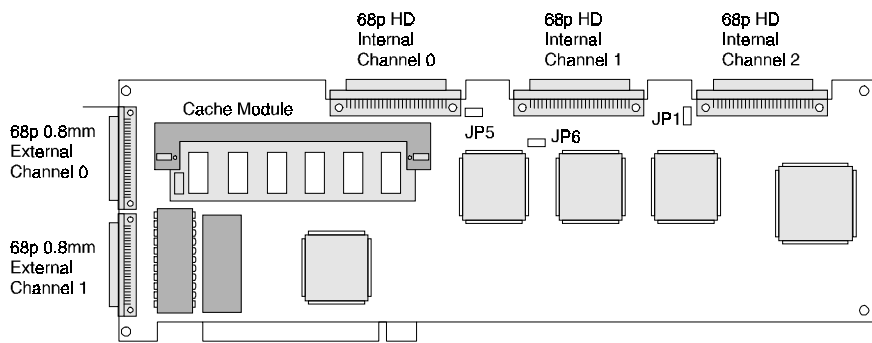
**Table 2–1 SCSI Bus Termination Jumpers**

Channel Number	Jumper Designation
0	JP6
1	JP5
2	JP1

2. Select available PCI slot for controller board. If bulkhead, or additional slot, must be used for external channel-2 connector, place board in PCI slot adjacent to vacant slot. Then use vacant slot for external connector. When computer system powers-on, computer locates and establishes communications with PCI board.
3. Remove screw from outside slot cover and save screw.
4. Remove slot cover and install controller board in slot.
5. Secure controller board with screw previously used to secure slot cover.
6. If channels will be connected to external storage pedestals, continue with Section 2.1.2.1. If channels will be connected to internal shelves, continue with Section 2.1.2.2.



Figure 2–2 Board Layout of 3-Channel KZPAC Controller



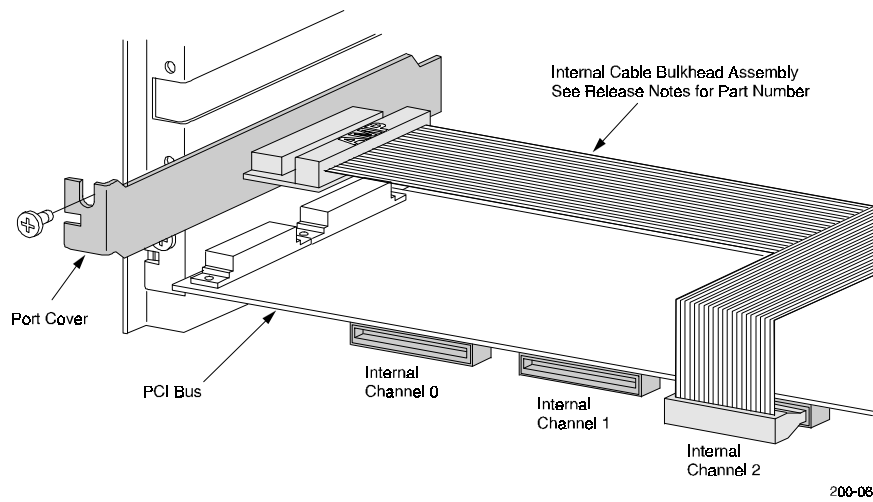
200-01

### 2.1.2.1 3-Channel KZPAC controller, Internal Cabling for External Connection

The internal cabling procedure below shows you how to connect the third channel of the 3-channel KZPAC controller to a bulkhead panel connector on the backplane of the computer so all three channels are accessible for connection to external storage pedestals. Chapter 3 contains a procedure for cabling the 3-channels to the external pedestals.

1. Orient internal bus ribbon cable as shown in Figure 2–3. Insert 90-degree connector of internal ribbon cable into internal channel-2 edge connector on KZPAC controller.
2. Fold cable as shown.
3. Attach bulkhead panel with its 68-pin connector to host computer system bulkhead and tighten screw.
4. Replace cover on host computer system and reconnect power cord.

**Figure 2–3 Internal Cable Connections for 3-Channel KZPAC Controller**



### 2.1.2.2 3-Channel KZPAC controller, Connection to Internal Shelf

1. If you are connecting to internal shelves, refer to documentation that comes with shelves, then configure shelves, and cable controller to internal shelves before performing next step.
2. Install cover on host computer and reconnect power cord.

## 2.2 Cabling

If you are connecting the KZPAC controller to one or more external storage pedestals, go to Chapter 3.

# 3

## *Cabling Pedestal to Controller*

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*Chapter 3 provides guidelines for installing one or more external storage pedestals and cabling them to a PCI 1-channel, or 3-channel, KZPAC controller.*

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### **3.1 Introduction**

Depending on your configuration, you can install and connect one, two, or three externally-mounted storage pedestals to a KZPAC controller. You must:

- Install the pedestal(s).
- Connect SCSI cable(s) between the KZPAC controller and the pedestal(s).

### **3.2 Install Pedestal(s)**

Refer to the user's guide supplied with your StorageWorks storage pedestal(s) for installation instructions. The titles and order numbers of these guides are listed under Related Documentation in About This Guide.

Label the first pedestal, Pedestal 0. Label the other pedestals Pedestal 1 and Pedestal 2, respectively. Pedestal 0 connects to Channel 0, Pedestal 1 connects to Channel 1, and Pedestal 2 connects to Channel 2.

Refer to the StorageWorks storage pedestal user's guide(s) to correctly configure terminators and jumpers on the backplane of the pedestal(s).

### 3.3 SCSI Cable Connection

**NOTE**

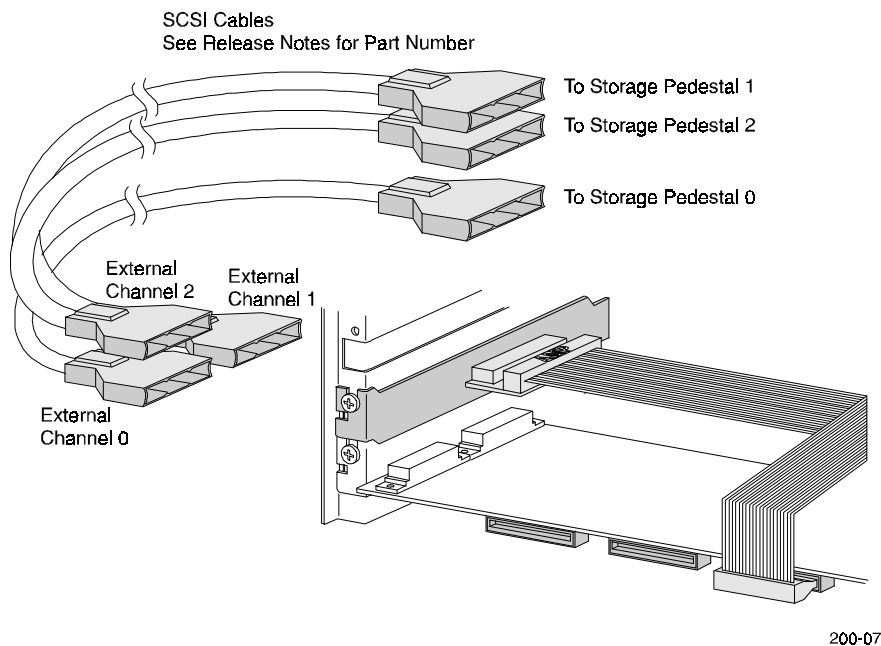
The total length of the cabling for a specific installation should be as short as possible.

The inter-device cabling of SCSI devices is critical to proper operation of the system. A fast, narrow, single-ended SCSI bus as used in PCI applications can have a maximum length of 3 meters, including internal wiring and external cabling.

#### 3.3.1 KZPAC controller connection

Figure 3–1 shows the cables and connections required to connect the 3-channel controller to the SCSI cables. The 1-channel controller requires only one SCSI cable and is not shown.

**Figure 3–1 External Cable Connections**



### **3.3.2 Storage Pedestal Connection**

Refer to the user's guide supplied with your StorageWorks storage pedestal for instructions on connecting the SCSI cable(s) from your 1-channel, or 3-channel KZPAC controller to the storage pedestal(s).

## *Reader's Comments*

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