COMPAQ

# TA1000 Tape Drive Array

Reference Guide

First Edition (June 2000)
Part Number 189904-001
Compaq Computer Corporation

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# About This Guide

This guide is intended for use as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades for the Compaq TA1000 Tape Drive Array.

## Text Conventions

This document uses the following conventions to distinguish elements of text:

| | |
|---|---|
| **Keys** | Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously. |
| USER INPUT | User input appears in a different typeface and in uppercase. |
| *FILENAMES* | File names appear in uppercase italics. |
| Menu Options, Command Names, Dialog Box Names | These elements appear in initial capital letters. |
| COMMANDS, DIRECTORY NAMES, and DRIVE NAMES | These elements appear in uppercase. |
| Type | When you are instructed to *type* information, type the information **without** pressing the **Enter** key. |
| Enter | When you are instructed to *enter* information, type the information and then press the **Enter** key. |

## Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

**CAUTION:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

**IMPORTANT:** Text set off in this manner presents clarifying information or specific instructions.

**NOTE:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

## Symbols on Equipment

The following symbols may be placed on equipment to indicate the presence of potentially hazardous conditions:

This symbol in conjunction with any of the following symbols indicates the presence of a potential hazard. The potential for injury exists if warnings are not observed. Consult your documentation for specific details.

This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

**WARNING:** To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.

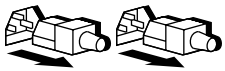
**WARNING:** To reduce the risk of injury from electric shock hazards, do not open this enclosure.

This symbol on an RJ-45 receptacle indicates a Network Interface Connection.

**WARNING:** To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

**WARNING:** To reduce the risk of injury from a hot component, allow the surface to cool before touching.



These symbols on power supplies or systems indicate the equipment is supplied by multiple sources of power.

**WARNING:** To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

Weight in kg
Weight in lb

**WARNING:** To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

## ⚠ Important Safety Information

Before installing this product, read the *Important Safety Information* document provided.

# Rack Stability

**WARNING:** To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single rack installation.
- The racks are coupled together in multiple rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

# Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

## Compaq Technical Support

In North America, call the Compaq Technical Phone Support Center at 1-800-OK-COMPAQ. This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed on the Compaq website. Access the Compaq website at http://www.compaq.com.

Be sure to have the following information available before you call Compaq:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

## Compaq Website

The Compaq website has information on this product as well as the latest drivers and Flash ROM images. You can access the Compaq website at http://www.compaq.com.

## Compaq Authorized Reseller

For the name of your nearest Compaq authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

*Chapter* **1**

# Tape Array Overview

## Introducing the Array

The *Compaq* TA1000 Tape Drive Array™ supports up to 10 Compaq hot-pluggable tape drives. It supports Wide-Ultra and Wide-Ultra2 SCSI protocols. The internal bus supports *only* low voltage differential (LVD) drives. The external bus (the array to the host controller bus) supports either Wide-Ultra2 (LVD) or Wide-Ultra single-ended (SE) SCSI protocols. The information in this guide is based on using the Wide Ultra2 LVD SCSI protocol, the most efficient means of transferring data.

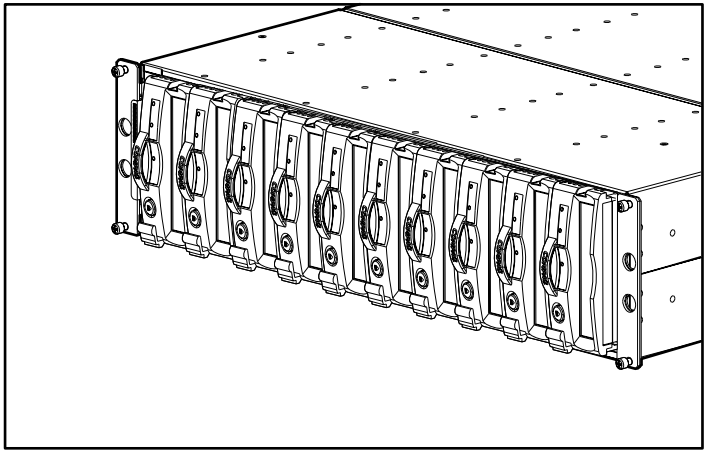


Figure 1-1. TA1000 Tape Drive Array

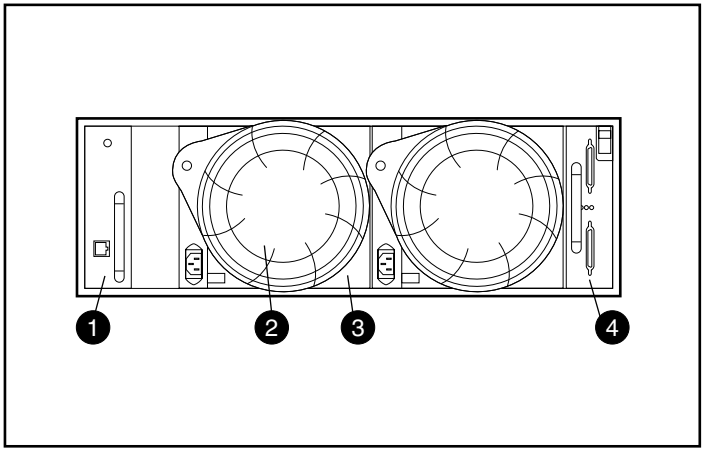



Figure 1-2. Tape Array rear view

❶ EMU

❷ Blower

❸ Power Supply

❹ Dual-Port I/O Module

**WARNING:** An assembled enclosure (all elements installed) weighs more than 60 lbs (27.2 kg).

Compaq requires a minimum of two individuals to install an empty enclosure into a rack.

## Tape Array Features

The major elements required for proper operation of the tape array include:

- A hot-pluggable environmental monitoring unit (EMU)
- Two hot-pluggable power supplies
- Two hot-pluggable blowers
- A dual-bus Ultra2 I/O module
- A hot-pluggable tape drive in each bay

The TA1000 Tape Drive Array supports up to ten 1.6-inch, Compaq hot-pluggable tape drives. The array is a rack-mountable device that requires a 3U vertical opening (5.25-inches) where a "U" is 1.75 inches.

**CAUTION:** Removing a drive significantly changes the airflow within the tape array and could cause overheating. Therefore, always replace it as soon as possible.

The hot-pluggable tape array elements are replaceable without stopping SCSI bus data transfers. The TA1000 Tape Drive Array is designed to support only Compaq hot-pluggable tape drives.

A full description of the individual elements and their functions can be found in the following chapters, including removal and replacement procedures.

# SCSI Buses

The tape array supports Wide-Ultra2 SCSI, wide (16-bit) *internal* LVD buses. Depending on the host interface, the external SCSI bus (the bus between the I/O module and the host) can be either Wide Ultra or Wide-Ultra2, LVD or SE. The SCSI bus type determines the bus length, speed, and maximum cable length. Each tape array has two internal SCSI buses with up to five devices on each bus. The I/O module has 68-pin very high density cable (VHDCI) connectors.

For detailed information about the SCSI buses, see Chapter 2 and Chapter 3.

# High-Availability

The high-availability features of the tape array allow the array to continue to function even if a variable speed blower or power supply fails.

## Variable Speed Blowers

All tape arrays have two variable speed blowers. In all configurations, the failure of one blower automatically causes the other blower to operate at a higher speed. This ensures that the failure of a single blower does not disable the tape array.

## Power Supplies

The redundant power supply configuration (two power supplies) prevents the failure of a single power supply from disabling the enclosure. A single power supply can support all enclosure operations.

**CAUTION:** Due to airflow considerations, if a power supply fails, do not remove it until a replacement power supply is available.

*Chapter* **2**

# Tape Array Installation

This chapter describes:

1. Installing a TA1000 Tape Drive Array into a rack.
2. Connecting the SCSI cables.
3. Applying power to the array.
4. Verifying proper operation.
5. Installing/Upgrading drivers.

## Rack Installation

Use the following procedures to install your tape array into the rack.

**WARNING:** To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single rack installation.
- The racks are coupled together in multiple rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

## Tools Required

- No. 2 Phillips screwdriver
- 3/8-inch nut driver

## Using the Template

Use the rack template to mark the rail attachment points on the front and rear of the rack.

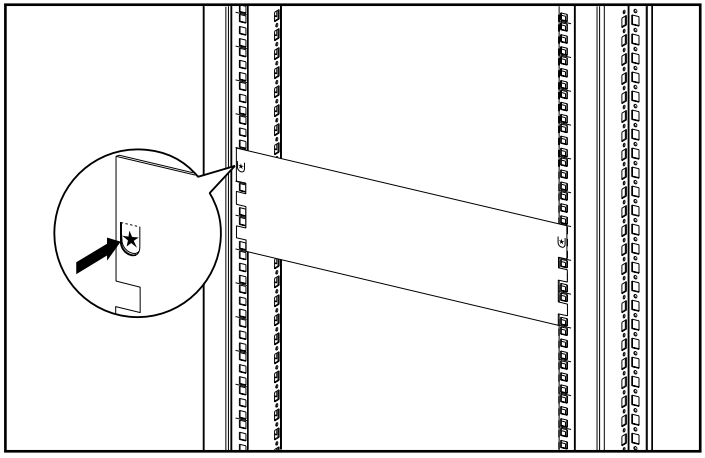


Figure 2-1. Using the rack template

## Attaching the Mounting Brackets

Attach the two mounting brackets.

**IMPORTANT:** Some Compaq racks use a square-hole rail design, while others use a round-hole rail design. Where indicated, follow the steps for each rack type.

1. For square-hole racks only: Install two alignment clips ❶ over the round tabs on the front of each mounting bracket.
2. For square-hole racks only: Install one alignment clip ❷ over the round tab on the rear of each mounting bracket.

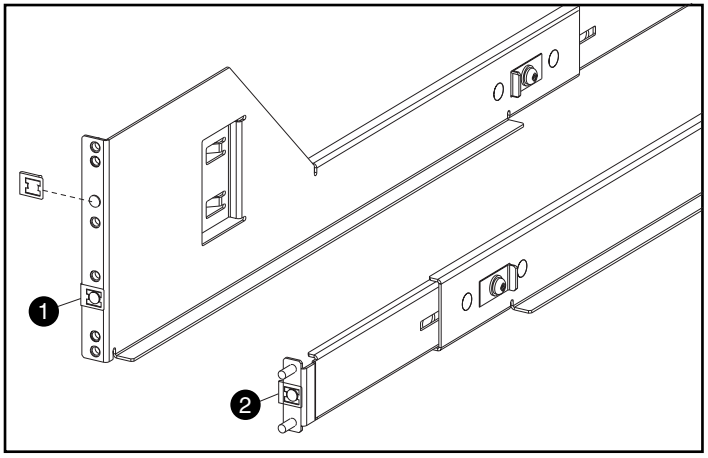



Figure 2-2. Attaching the alignment clips (for square-hole racks only)

3. If necessary, loosen the three screws in the middle of the mounting bracket to adjust the length of the bracket to fit your rack.
4. For square-hole racks only: Position the left mounting bracket ❶ just behind the front vertical rail, aligning the middle two mounting bracket holes with the rail holes previously marked using the template. Be sure the alignment clip flanges are positioned within the mounting rail square holes.

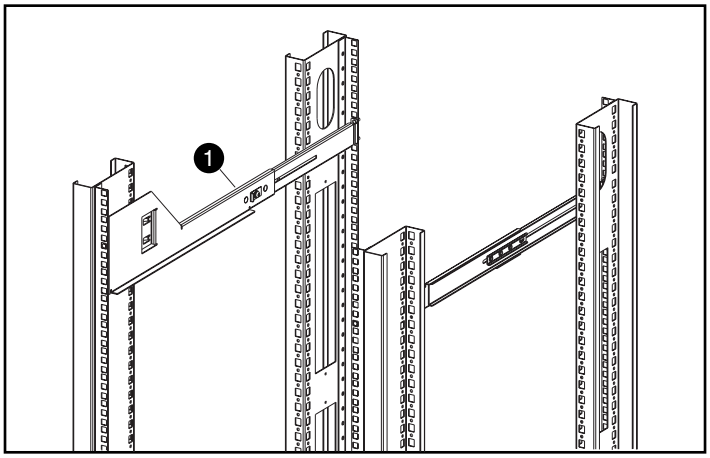



Figure 2-3. Square-hole rack bracket alignment

5. For round-hole racks only: Extend the mounting bracket through the rear vertical rail holes. Be sure that the mounting bracket fingers are inserted into the corresponding vertical inner rail holes.

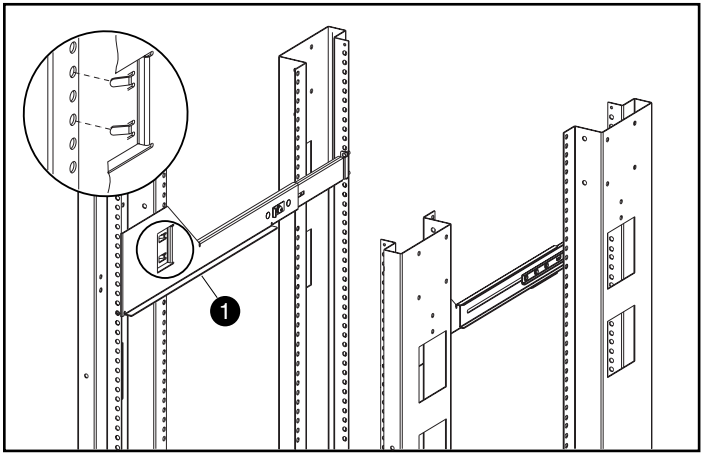



Figure 2-4. Round-hole rack bracket alignment

**IMPORTANT:** The mounting bracket must be parallel from front to rear before you secure it to the rack. The left and right mounting brackets must be parallel.

6. Secure the bracket to the rear vertical rail using two washers and two Kep nuts ❶.
7. Secure the mounting bracket to the front vertical rail using two pan head SEMS screws ❷ (10-32 x 5/8 in).
8. Tighten the three mounting bracket screws ❸.

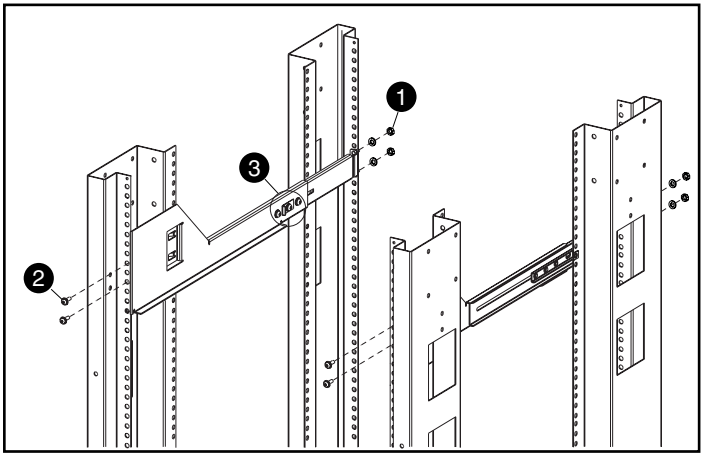



Figure 2-5. Inserting the screws

9. Repeat for the other mounting bracket.

## Installing the Tape Array Into the Rack

**CAUTION:** Enclosure weight, with all elements installed exceeds 60 lbs (27.2kg). To prevent personal injury, at least two people are required to install the tape array safely.

**WARNING:** To reduce the risk of personal injury or damage to the equipment:

- Observe local Occupational Safety guidelines for lifting heavy equipment.
- Obtain adequate assistance to lift and stabilize the chassis during installation or removal.
- Remove all pluggable power supplies and disk drives to reduce the weight of the chassis.
- The unit will be unstable when not mated with the rails.

**CAUTION:** Keep the tape array parallel to the floor while sliding it into the mounting brackets to prevent damaging the chassis and ease insertion.

1. Position the tape array on the mounting brackets with the Compaq logo in the upper left corner, and slide it in until the tape array flanges ❶ contact with the front vertical rails.
2. Once the tape array is fully inserted, verify that both tape array front flanges contact the rack vertical rail and the rear of the tape array is properly seated in the mounting brackets.
3. Secure the enclosure using the attached captive thumbscrews.

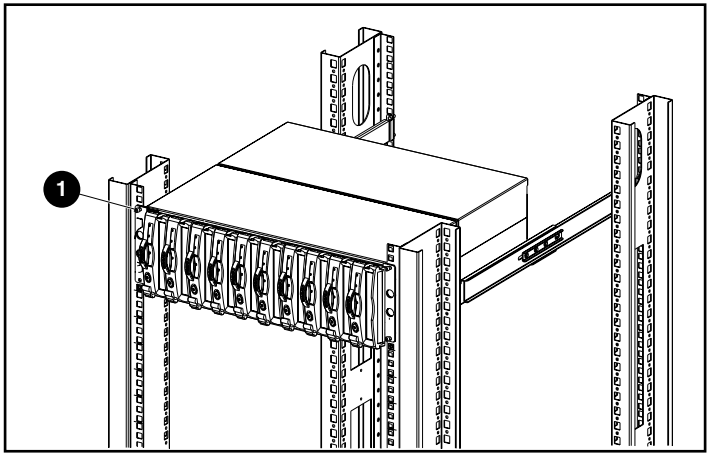



Figure 2-6. Installing the tape array into the rack

# Connecting the SCSI Cables

To connect the enclosure to a host adapter or SCSI controller, connect the cables to the I/O module. The I/O module has 68-pin, very high density cable interconnect (VHDCI) connectors.

## SCSI Bus Speeds and Lengths

The maximum bus and cable lengths are a function of the SCSI host controller or drives attached (LVD or SE). Table 2–1 defines the maximum bus speed, and bus and cable length based upon the SCSI bus type.

**Table 2-1**
**Bus Specifications**

| Termination Device | Bus Type Host Controller | Max. speed | Max Bus/cable length |
|---|---|---|---|
| LVD | Wide Ultra SCSI | 40 Mb/s | 12 m (39.4 ft) |
| LVD | Wide Ultra2 SCSI | 80 Mb/s | 12 m (39.4 ft) |
| Single-ended | Wide Ultra SCSI | 40 Mb/s | 3.7 m (12 ft) |

### I/O Module Connections

Figure 2-7 shows the connections for a dual-bus configuration using the dual-port I/O module.

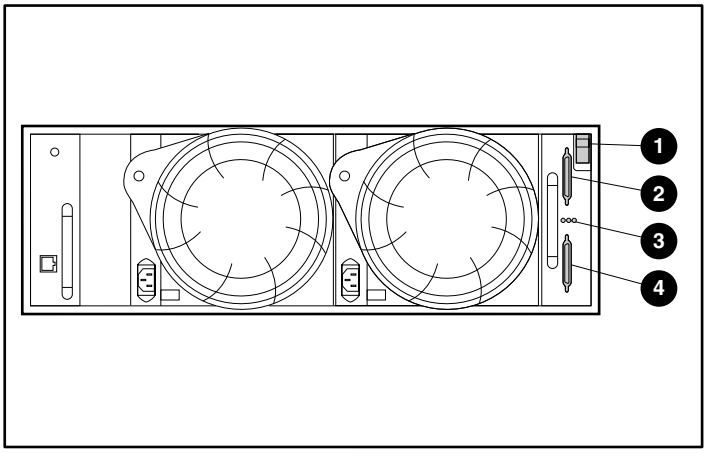



Figure 2-7. Dual-port I/O module SCSI cable connectors

❶ Latch
❷ SCSI Bus A connector
❸ Status LEDs
❹ SCSI Bus B connector

To attach the SCSI bus cable:

1. Align the D-shaped cable connector with the D-shaped I/O module connector and then firmly seat the cable connector on the module connector.
2. Tighten the thumbscrews to connect the cable.

**CAUTION:** To avoid damaging the cable connector do not use a screwdriver or any other tool to tighten the thumbscrews.

## Applying Power

There are no tape array power control switches. Connecting an AC power cord from a power source to the power supply is all that is required.

# Verifying Operation

All the devices in the tape array begin operating when power is applied. Check the tape array status LED indicators in the front, lower right corner. If the display is not exactly as shown there is an error condition. Check the drive status LEDs on the front, and the EMU, power supplies, blowers, and I/O module status LEDs on the rear to verify proper operation.

## Front Array Status LEDs

The array status LEDs, are located in the front, lower-right corner of the enclosure.

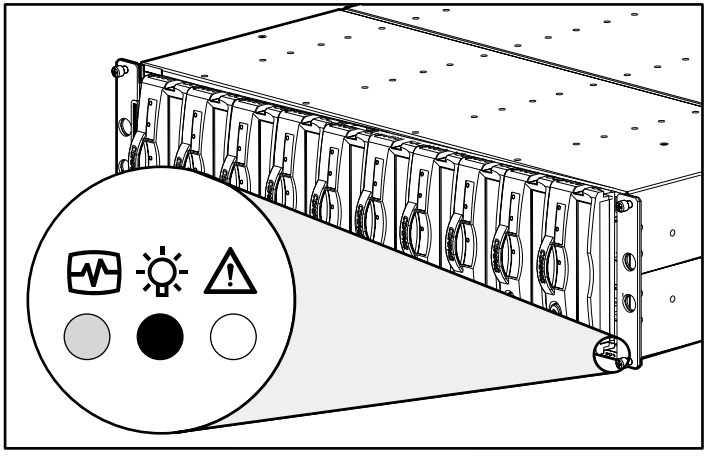


Figure 2-8. Location of LED indicator lights

Flashing  On  Off

**Table 2-2**
**Status LED symbols**

| Symbol | Meaning |
|---|---|
| | Tape array status (flashing – green LED) |
| | Tape array power (On – green LED) |
| | Tape array fault (Off – amber LED) |

## Rear Array Status LEDs

Figure 2-11 shows the location of the rear array status LEDs.

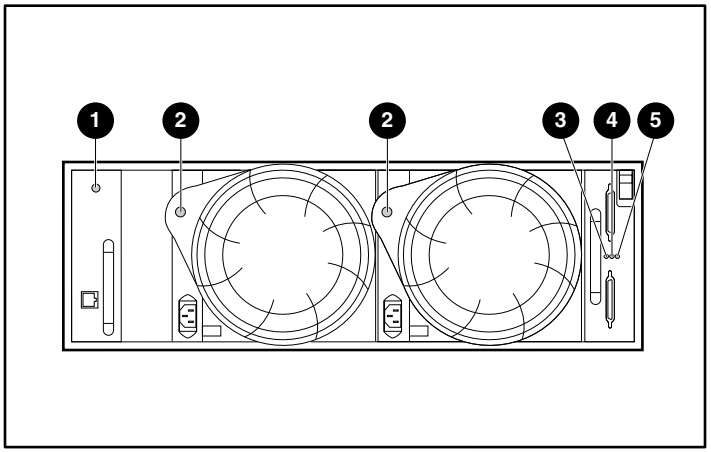



Figure 2-9. Typical rear status LED indicators

❶ EMU
❷ Power supply/blower
❸ I/O module power
❹ I/O Module SCSI bus A
❺ I/O Module SCSI bus B

## Driver Installation/Upgrade

The following drivers and utilities are required for proper operation of the TA1000 Tape Drive Array:

- Compaq System Management Drivers
- Compaq PCI Hot Plug Utility
- Compaq Integration Management Display Utility
- Compaq SCSI Controllers

To install or upgrade these software items:

1. Insert the Compaq SmartStart and Support Software CD, version 4.7 or greater (located in the Storage Utility Software kit that came with your unit).
2. Go to the CPQSUPSW (Compaq Supplement Software) directory.
3. Choose your operating system.
4. Proceed with appropriate operating system specific procedures.

## Storage Management Software Installation/Upgrade

For storage management software, refer to the third-party backup solution software that shipped with your unit.

*Chapter* **3**

# I/O Module

This chapter discusses the operation and function of the dual-bus tape array pluggable I/O module (commonly referred to as the “module”).

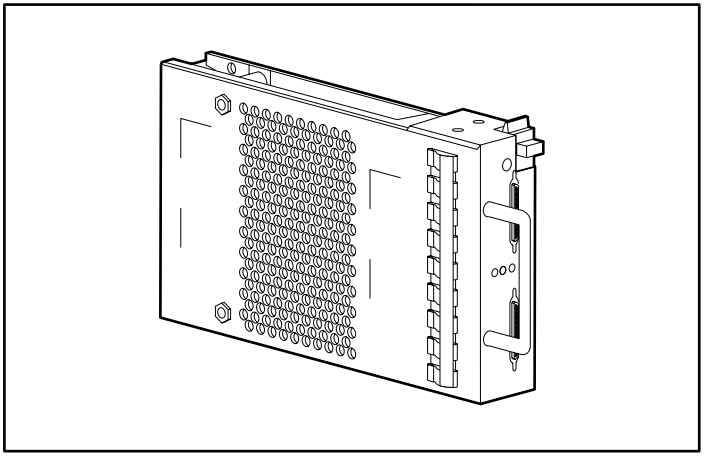


Figure 3-1. Dual-bus I/O module

## Features

The I/O modules are pluggable elements. Replacing either an I/O module or a cable requires stopping all data transfers to prevent the loss of data.

The I/O module connects the tape array to the host controller through a 68-pin, VHDCI connector and a SCSI cable. This I/O module can support a maximum of 10 drives in a single tape array.

The dual-port I/O module has two SCSI buses. Up to five devices are on SCSI bus A and up to five devices are on SCSI bus B. This configuration requires two controllers or host adapters.

## SCSI Bus Connectors

The I/O module label identifies each 68-pin, VHDCI SCSI bus connector with a label, as shown in Figure 3-2.

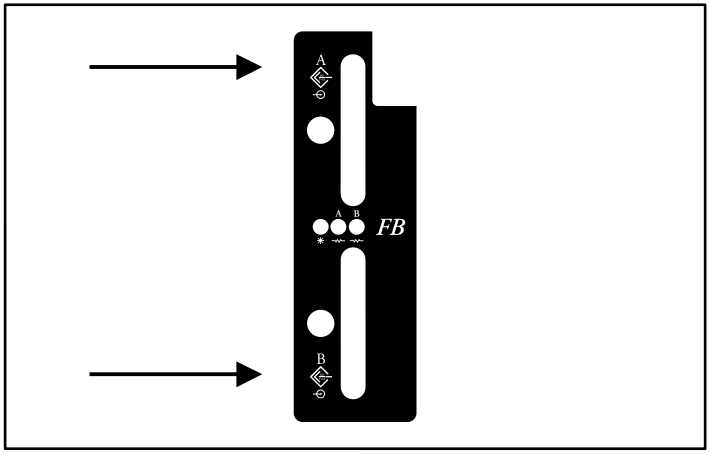



Figure 3-2. I/O module symbol label

# Dual-Bus SCSI Address Maps

The dual-port I/O module assigns a SCSI address to each drive bay in the enclosure (see Table 3-2).

**Table 3-1**
**Dual-Bus SCSI IDs**

| **Bay** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **SCSI ID** | **SCSI Bus A** | | | | | **SCSI Bus B** | | | | |
| | 00 | 01 | 02 | 03 | 04 | 00 | 01 | 02 | 03 | 04 |

# I/O Module Power Protection

A voltage sensor in the I/O module detects overcurrent conditions. Should this error occur, the sensor disconnects the voltage from the I/O module and the power LED goes Off. This disables the I/O module until one of the following conditions occurs:

- The overcurrent condition no longer exists.
- The defective I/O module is replaced.

# Dual-Port I/O Module Status Displays

Table 3-1 describes the dual-port I/O module status displays.

**Table 3-2**
**Dual-Port I/O Module Status Displays**

| ● LED is On | ○ LED is Off | ◌ LED is Flashing |
|---|---|---|
| **When the I/O module is operational and the external SCSI bus is functional:** | | |
| ◌●● | SCSI bus A is functional (LED On)<br>SCSI bus B is functional (LED On)<br>I/O module power present and I/O module locate function is active (LED Flashing) | |
| ●●● | I/O module power present (LED On)<br>SCSI bus A functional (LED On)<br>SCSI bus B functional (LED On) | |
| **When the I/O module is operational and the external SCSI bus is nonfunctional:** | | |
| ●○● | I/O module power present (LED On)<br>SCSI bus A nonfunctional (LED Off)<br>SCSI bus B functional (LED On) | |
| ●●○ | I/O module power present (LED On)<br>SCSI bus A nonfunctional (LED On)<br>SCSI bus B functional (LED Off) | |
| ●○○ | I/O module power present (LED On)<br>Backplane terminator A nonfunctional (LED Off)<br>Backplane terminator B nonfunctional (LED Off) | |
| **When the I/O module is nonoperational:** | | |
| ○○○ | No I/O module power (All LEDs Off)<br>I/O module nonoperational | |

**Recommended Corrective Action:**

1. Check power supplies for proper operation. Replace if defective.
2. Replace I/O module.

## Replacing an I/O module

To replace an I/O module, complete the procedures outlined in Chapter 7, “Customer Replaceable Units.”

*Chapter* **4**

# Environmental Monitoring Unit

This chapter discusses the Environmental Monitoring Unit (see Figure 4-1). The EMU is an integral part of every tape array enclosure. This element performs several functions, including monitoring the enclosure operation, detecting and indicating errors, and displaying the EMU and enclosure status.

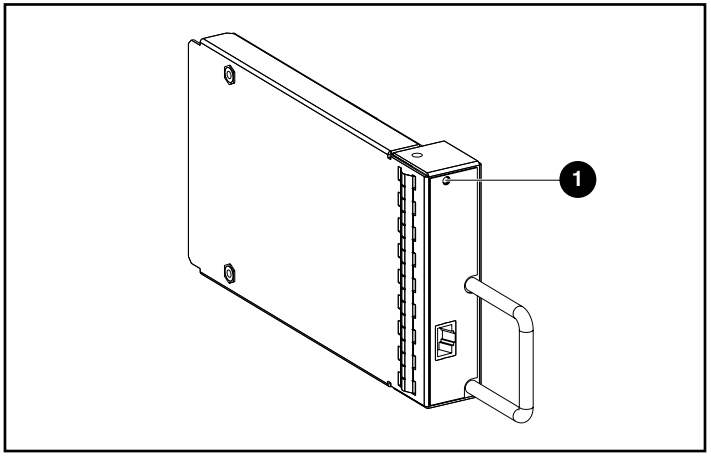



Figure 4-1. EMU

When the green LED ❶ is flashing slowly, the EMU is operational. If it is on or off, there is an internal problem. When flashing rapidly, the EMU is operational and there is a single-ended drive installed in the tape array (see Figure 4-4).

The EMU mounts in the bay at the left rear ❶ of the enclosure (see Figure 4-2).

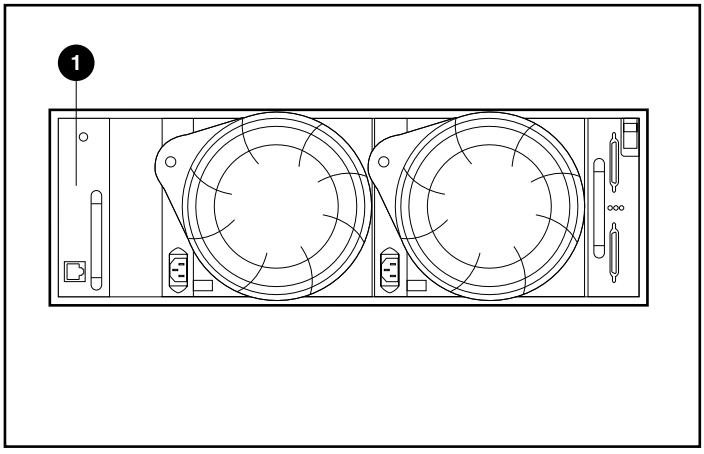



Figure 4-2. EMU location

## Functions

EMU functions include:

- Assigning device SCSI addresses (in conjunction with the I/O module)
- Monitoring the enclosure operation
- Detecting and reporting enclosure and element errors
- Displaying the EMU and enclosure status
- Controlling the LEDs

The enclosure functions and operations that the EMU monitors include:

- Temperature
- Power Supplies
- Blowers
- EMU internal functions

## Status LEDs

The EMU controls the three enclosure status LEDs (see Figure 4-3) that display the status of the EMU and the enclosure, the enclosure power, and an enclosure fault.

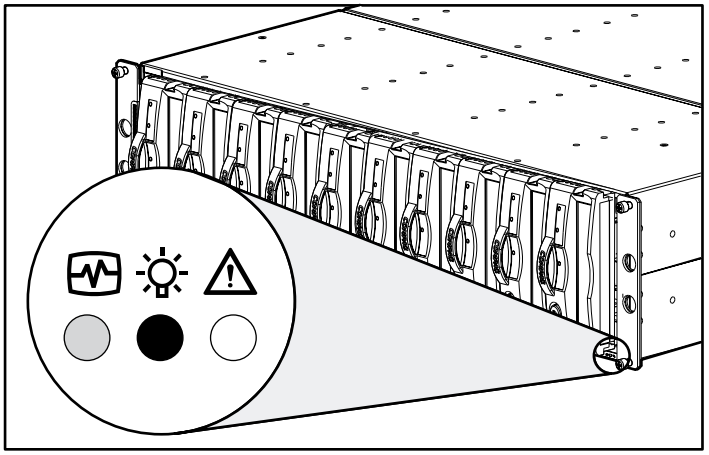


Figure 4-3. Front status LEDs

The EMU also monitors the power supply and blower LEDs, located on the rear of the enclosure. The operation of these LEDs is described in the chapters about each element.

## Temperature

The EMU monitors the internal temperature using sensors.

- When the tape array internal temperature is 45°C (113°F) or more, the EMU turns On the amber tape array Fault LED.
- A power supply automatically shuts down when the internal power supply temperature exceeds 85°C (180°F).
- When Compaq Insight Manager is installed, it can report an alarm condition when the internal temperature reaches 50°C (122°F).

## Power Supplies and Blowers

The green LED on the power supply assembly is On when both the power supply and the blower are operational. When there is either a power supply or blower fault, the EMU turns Off both the green power supply and the enclosure power LEDs. See Chapter 6, "Enclosure Power and Cooling," for a description of the operation of the power supply LED.

# Status Reporting

The green EMU status displays the EMU status and identifies the drive types, either LVD or single-ended. This LED flashes at two different rates (see Figure 4-4).

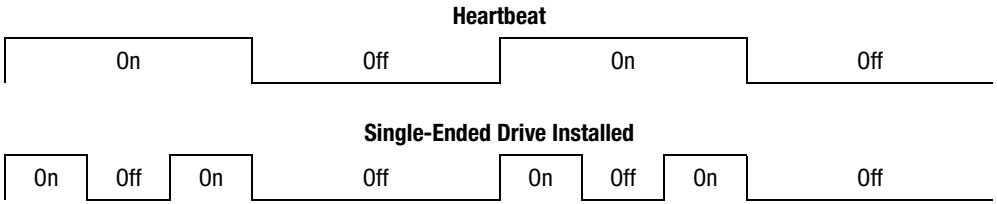



Figure 4-4. EMU LED display

- During normal operation it flashes at a rate of approximately once per second. This is the "heartbeat." The EMU and Enclosure LED on the front of the enclosure (see Figure 4-3) display is identical.
- When a single-ended drive is installed in the enclosure the LED is "on" twice per second.

**Table 4-1**
**EMU LED Status Displays**

| ● LED is On | ◯ LED is Off | ◯ LED is Flashing |
|---|---|---|
| **When the EMU and the tape array are operational:** | | |
| ◯ When flashing once per second (see heartbeat in Figure 4-4) both the EMU and the tape array are operational. | | |
| ◯ When flashing twice per second (see single-ended drive in Figure 4-4) both the EMU and the tape array are operational but there is a single-ended drive installed.. | | |
| **When there is an EMU or tape array error:** | | |
| ● There is an internal EMU problem. | | |
| ◯ Either there is no enclosure power or there is an internal EMU problem. | | |
| **Recommended Corrective Action:** | | |
| 1. Check power supplies for proper operation. Replace if defective. | | |
| 2. Replace EMU. | | |

# Replacing an EMU

To replace an EMU, complete the procedures outlined in Chapter 7, "Customer Replaceable Units."

*Chapter* **5**

# Tape Drives

The storage array supports Compaq hot-pluggable, Wide-Ultra2 SCSI, LVD tape drives. This chapter describes the tape drive features, functions, and characteristics. The 10-tape array supports 1.6-inch, hot-pluggable drives (see Figure 5-1).

**CAUTION:** Removing a drive significantly changes the airflow within the tape array and could cause overheating. Therefore, always replace it as soon as possible.

Never remove more than one drive from an operating enclosure at the same time.

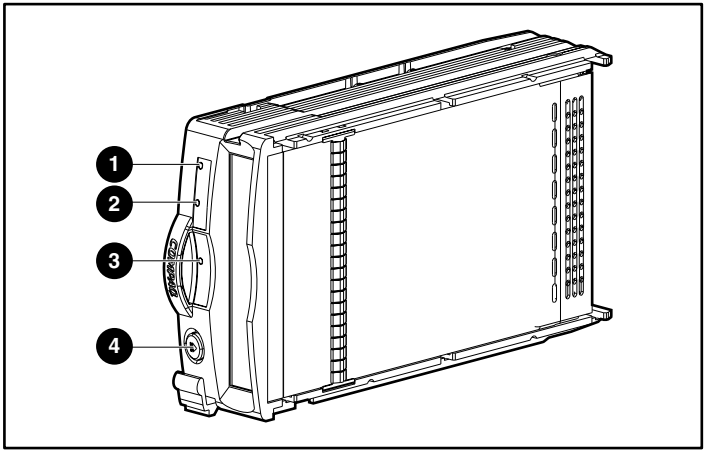



Figure 5-1. Tape Drive

## Status Reporting

All drives have three status LEDs (see Figure 5-1) to define the operational status of the drive. To determine the drive status you must observe all three LEDs (see Table 5-1).

**Table 5-1**
**Tape Drive LED Status**

| Callout | Icon | Description |
|---|---|---|
| ❶ | | Busy LED |
| ❷ | | Tape LED |
| ❸ | | Status LED |
| ❹ | | Eject Button |

Refer to your tape drive manual for additional information regarding the status LEDs.

## Drive Power

Backplane overcurrent sensors monitor the +5 VDC and +12VDC drive voltages. When there is a drive overcurrent condition the sensor disconnects the voltage from the drive. This disables the drive, ensuring that no data is written to it. The drive is disabled until one of the following conditions occurs:

- The defective drive is replaced.
- The overcurrent condition no longer exists.

## Replacing a Tape Drive

To replace a tape drive, see the procedures outlined in Chapter 7, "Customer Replaceable Units."

**CAUTION:** Removing a drive significantly changes the airflow within the tape array and could cause overheating. Therefore, always replace it as soon as possible.

*Chapter* **6**

# Power and Cooling

This chapter describes the functions and general operation of the tape array power supply and blowers. See Figure 6-1 for major component locations.

**NOTE:** Compaq provides country-specific power cords with each array.

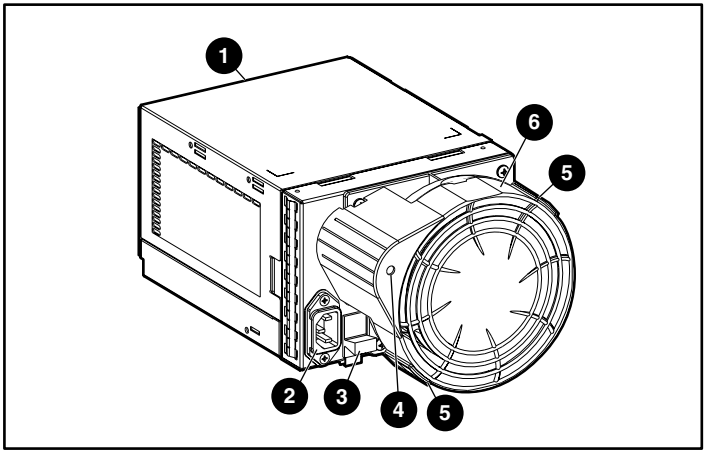



Figure 6-1. Power and blower elements

❶ Power supply element
❷ AC input connector
❸ Module latch
❹ Power supply and blower status LED
❺ Blower tabs
❻ Blower element

# Storage Array Power

The power supply and blower assembly mount in the rear of the enclosure. The power supply is auto-ranging and operates on an AC input voltage of 100 to 242 VAC ±10%, 50 to 60 Hz ± 5% (90 to 264 VAC, 47 to 63 Hz).

The DC outputs of this power supply are:

- +5.1 VDC for the EMU, I/O module, backplane, and drives.
- +12.1 VDC for the drives.
- +12.5 VDC for the blower.

The power supply circuitry provides protection against:

- Overloads
- Short circuits
- Thermal protection against overheating

Power supply status and diagnostic information is reported to the EMU with voltage, current, and temperature signals.

## Temperature Sensing

The power supply temperature sensor provides a temperature range signal to the EMU. The EMU can use this signal to set the blower speed. The power supply internal temperature can also set the speed of the blower. The higher the power supply temperature, the faster the speed of the blower. Should the power supply temperature exceed a preset value, the power supply is shut down.

# Blower Interface

The blower mounts on the rear of the power supply. A power supply connector is the interface between the blower and the enclosure. The interface signals include:

- Blower speed control to the blower
- Blower speed to the EMU through the power supply
- Power supply high speed enable
- Blower operating voltage

# Blowers

The power supply-mounted blowers cool the enclosure by circulating air through the enclosure and elements. The rate at which air moves (the airflow) determines the amount of cooling. This airflow is a function of blower speed (rpm). These blowers, under the control of the EMU or the associated power supply, can operate at multiple speeds. This ensures that when the enclosure temperature changes the blowers can automatically adjust the airflow.

If a blower operates too slowly or stops (a "blower failure") internal circuitry automatically causes the operational blower to operate at a higher speed.

**WARNING:** The blower blades rotate at a high speed and do not stop immediately when power is removed. Avoid touching the rotating blades when removing the blower.

# Status Reporting

The green status LED on the blower displays the status of both the power supply and the blower. See Table 6-1 for definitions of the LED displays.

**Table 6-1**
**Power Supply and Blower Status Displays**

| ● LED is On | ○ LED is Off | ◌ LED is Flashing |
|---|---|---|
| **When the blower and the power supply are operational**: | | |
| ● Both the power supply and the blower are operational. | | |
| ◌ Either the power supply or the blower locate function is active. | | |
| **When either the blower or the power supply is nonoperational:** | | |
| ○ Either the power supply or the blower is nonoperational. When there is a blower problem, the other blower runs at a higher speed. | | |
| **Recommended Corrective Action** | | |
| 1. Check the power supplies for proper operation. Replace if defective. | | |
| 2. Check the blower for proper operation. Replace if defective. | | |

## Replacing a Power Supply or Blower

To replace a power supply or blower use the procedure described in Chapter 7, "Customer Replaceable Units."

**NOTE:** As long as there is one operational power supply, you can replace a defective power supply without stopping data transfers. This is true whether the power supply has failed or is failing.

*Chapter* **7**

# Customer Replaceable Units

Each replacement CRU (Customer Replaceable Unit) contains detailed replacement instructions. This chapter describes the general replacement procedures.

**Table 7-1**
**CRU Replacement Methods**

| Device | Method |
|---|---|
| Drive | Hot-pluggable |
| EMU | Hot-pluggable |
| Blower | Hot-pluggable |
| I/O Module | Pluggable<br>Replacing an I/O module requires stopping all data transfers |
| Power Supply-Dual | Hot-pluggable<br>In a dual redundant power supply configuration, the array is not disabled when the power supply fails. |
| SCSI Bus Cables | Pluggable<br>Connecting or disconnecting a SCSI bus cable requires stopping all data transfers |

## Labeling

To order a CRU, you must use the Compaq spare part number that appears on the CRU product label (see Figure 7–1). The first six characters identify the CRU. The last three define the revision level.

Figure 7-1. Typical CRU product label

## Electrostatic Discharge Protection

When you replace a CRU, you must take precautions to prevent the possibility of electrostatic discharge (ESD) damaging sensitive electronic items.

- Always transport and store CRUs in a static-free container.
- Do not remove the CRU from the static-free container until you are ready to install it.
- Avoid touching the CRU connector pins, leads, or circuitry.

# Basic Replacement Procedures

The following procedures apply to all CRU replacement procedures.

**CAUTION:** The hot-pluggable power supplies, blowers, EMU, and drives DO NOT require halting all data transfers on the SCSI bus.

Replacing a pluggable I/O module or a SCSI cable always requires halting all data transfers on the SCSI bus.

Some controllers may require removing power when replacing an I/O module or SCSI cable.

**IMPORTANT:** Always transport and store CRUs in a static-free container.

**CAUTION:** To prevent ESD damage, never touch the CRU connector pins, leads, or circuitry.

1. Remove the defective CRU from the enclosure.
2. Remove the replacement CRU from the static-free container. Check the label to be sure that it is a compatible replacement (see Figure 7-1).
3. Align the CRU with the enclosure guide slots.
4. Slide the CRU into the enclosure until it is against the backplane connector.
5. Fully seat the CRU in the enclosure and verify that it is operating properly.
6. Place the defective CRU in the static-free container for shipment.

# Replacing a Drive

If a tape drive fails, replace it using the following procedures.

**CAUTION:** Never remove more than one tape drive at a time, as this can cause the enclosure to overheat.

To prevent overheating and ensure proper operation, Compaq recommends installing a tape drive of equal or greater capacity, or a drive blank, as soon as possible.

1. Eject media, if possible.
2. Push up and in on the ejector button ❶ and pull out on the handle ❷.

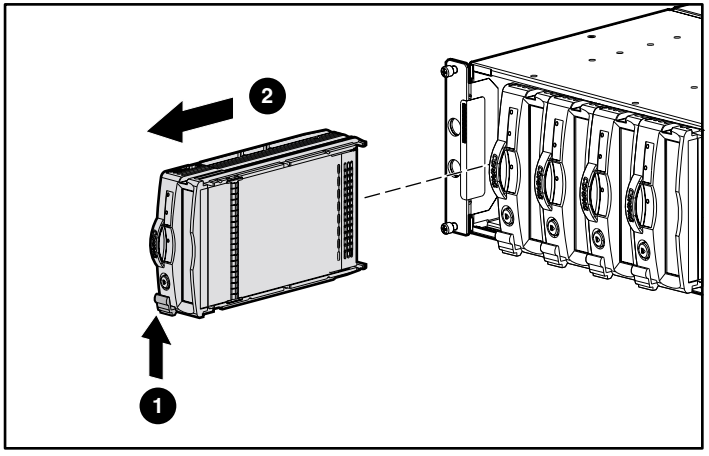



Figure 7-2. Removing a tape drive

3. Pull the drive out until it is disconnected from the backplane connector.
4. Insert the replacement drive into the tape array until it is seated firmly against the backplane connector.
5. Observe the drive status LEDs (see Chapter 6) to ensure the replacement drive is functioning properly.

# Replacing a Variable Speed Blower

**NOTE:** The power supply design ensures that removing a blower does not change the airflow within the enclosure. However, do not remove a blower until the replacement blower is available.

**WARNING:** The blower blades rotate at a high speed and do not stop immediately when power is removed. Avoid touching the rotating blades when removing the blower.

1. To remove the blower from the power supply, push in on the two blower tabs ❶ while pulling on the blower element.

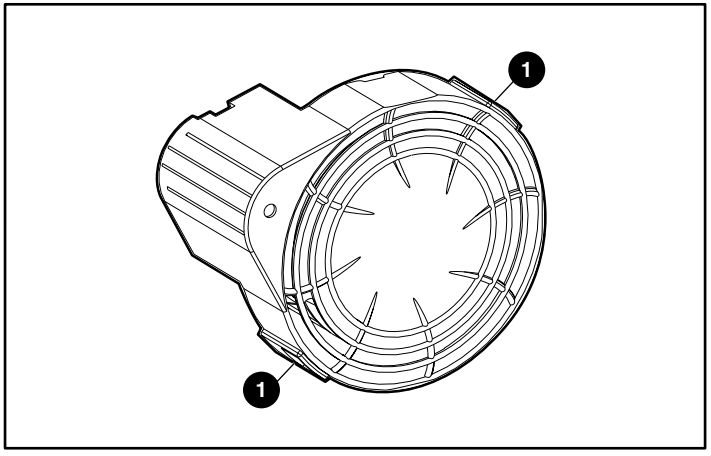



Figure 7-3. Location of blower tabs

**CAUTION:** Pressing on the center section of the blower can damage the blades. Only press on the outer edge of the blower when installing the blower.

2. Align the blower guide post ❷ with power supply connector ❶. Slide the replacement blower ❸ into blower base until the tabs ❹ snap into place.

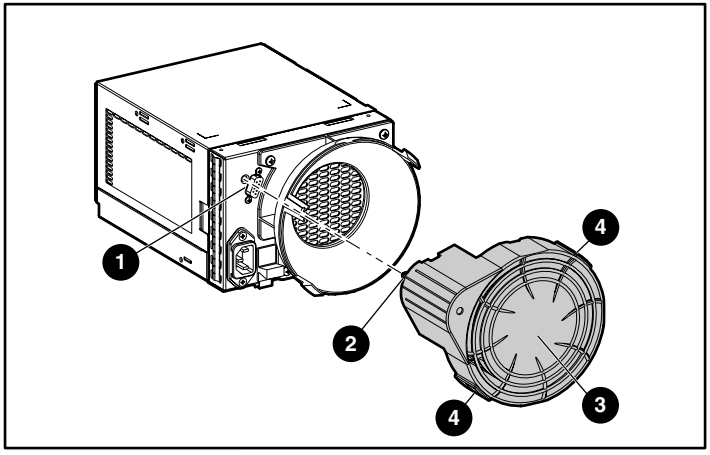



Figure 7-4. Blower replacement

3. Make sure that the blower starts operating immediately and the blower LED is On.

## Replacing a Power Supply

**CAUTION:** Removing a power supply significantly changes the airflow within the tape array. The system could shut down because of overheating unless the power supply is replaced within 5 minutes.

**NOTE:** Replacement power supply assemblies do not include a variable speed blower. Therefore you must remove the operational blower from the defective power supply and install it on the new supply.

To replace a power supply or a blower mounting assembly:

1. Disconnect the AC power cord from the defective supply.

2. While lifting the power supply port-colored module latch ❶ up, grasp the blower element ❷ and pull the defective power supply out of the enclosure.

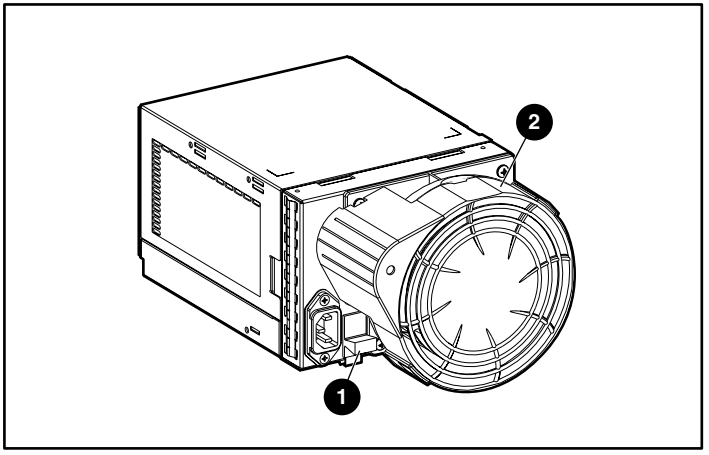



Figure 7-5. Removing a power supply

3. Install the replacement supply by lifting the power supply module latch ❶ up and pushing the blower base ❷ in until the assembly is fully seated in the enclosure.

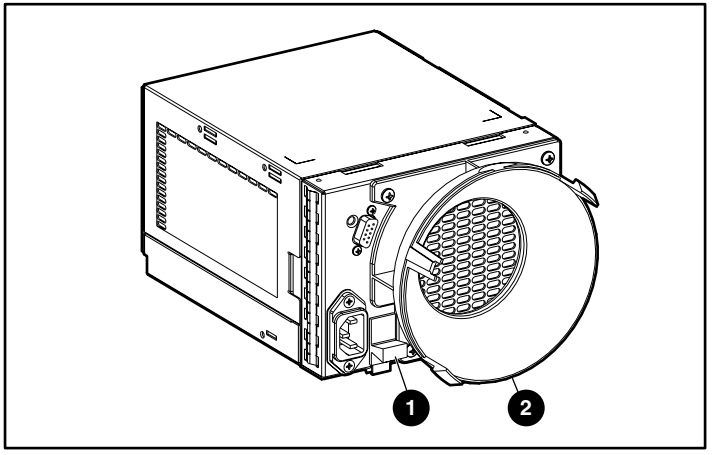



Figure 7-6. Inserting a new power supply

4. Remove the operational blower from the defective power supply by pushing the two blower tabs ❶ in and pulling the blower element to the rear.

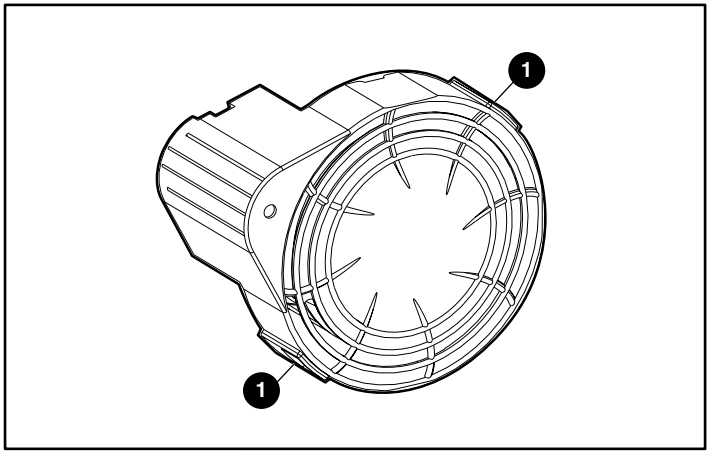



Figure 7-7. Removing the blower

**CAUTION:** Pressing on the center section of the blower can damage the blades. Only press on the outer edge of the blower when installing the blower.

5. Install the blower on the replacement supply by aligning the blower guide post ❷ with power supply connector ❶. Slide the blower ❸ into blower base until the tabs ❹ snap into place.

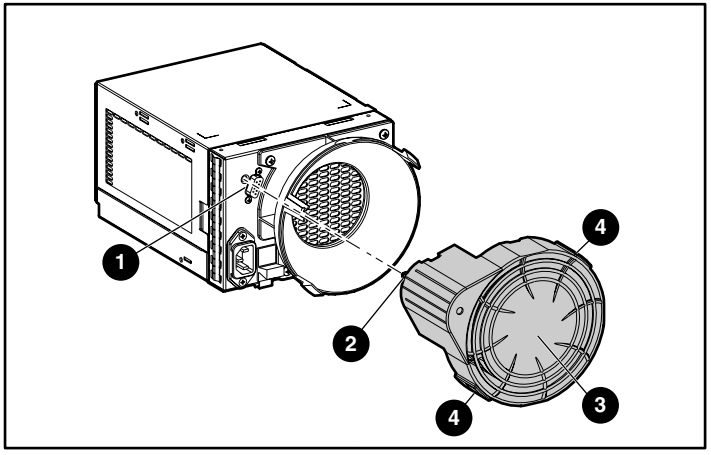



Figure 7-8. Installing the replacement blower

6. Connect the AC power cord and observe the power supply for proper operation.
   - ❑ The blower starts operating immediately.
   - ❑ The blower LED is ON.
   - ❑ The blower on the other supply no longer operates at high speed.

## Replacing the EMU

**NOTE:** Removing an EMU significantly changes the airflow within the tape array and could cause overheating. Therefore, always replace it as soon as possible.

1. Grasp the EMU handle and pull the EMU out of the tape array.

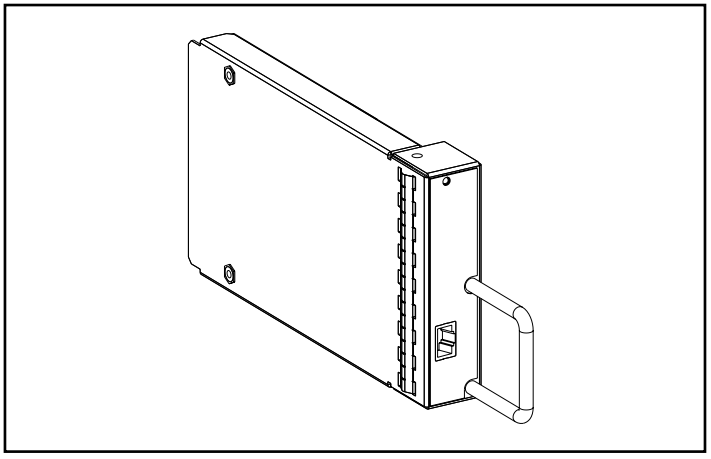


Figure 7-9. EMU

2. Insert the replacement EMU into the tape array.
3. Press the EMU firmly in to seat it in the connector. The EMU should start operating immediately.

# Replacing an I/O Module

**CAUTION:** Connecting or disconnecting an I/O module or SCSI cable while data is being transferred causes the loss of data. To prevent errors, always stop all data transfers on the SCSI bus before removing or installing an I/O module or SCSI cable.

Some controllers may require removing power when replacing an I/O module or SCSI cable.

**CAUTION:** Removing an I/O module significantly changes the airflow within the tape array, and could cause overheating. Therefore, always replace it as soon as possible.

To replace an I/O module:

1. Make sure that a current system back up is available.
2. When the controller does not support replacing an I/O module with power applied, remove power from the tape array.
3. Stop all data transfers.
4. Disconnect the SCSI cables from the I/O module connector ❸. Label the cables as you remove them.
5. While grasping the I/O module handle, press down on the I/O module latch ❶ and pull the I/O module out of the tape array.

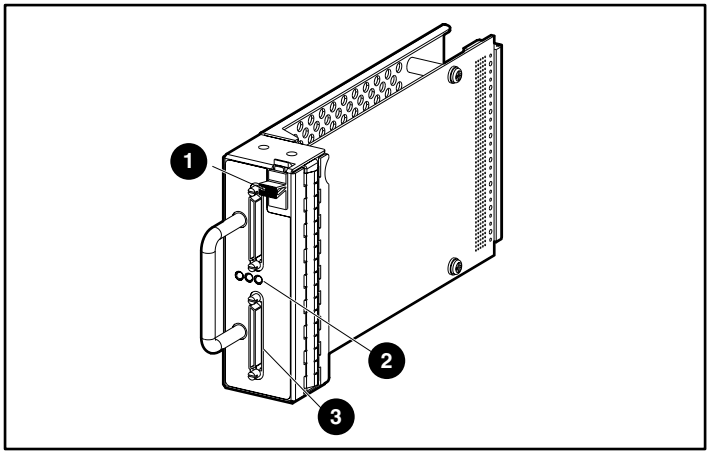



Figure 7-10. I/O module replacement

6. Slide the replacement I/O module into the enclosure.

7. While grasping the I/O module handle, press the I/O module latch ❶ down and push the I/O module into the enclosure until it is fully seated.
8. Connect the cable connector to the same connectors (see Step 4).
9. If power was removed in Step 2, apply it to the enclosure.
10. Activate the SCSI bus and observe the LEDs to verify that the I/O module is functioning properly.

*Appendix* ***A***

# Agency Notices

## Federal Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (personal computers, for example). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user. )

The rating label on the device shows which class (A or B) the equipment falls into. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have an FCC ID on the label. Once the class of the device is determined, refer to the following corresponding statement.

## Class A Equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

### Declaration of Conformity for Products Marked with the FCC logo – United States Only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding your product, contact:

Compaq Computer Corporation
P. O. Box 692000, Mail Stop 530113
Houston, Texas 77269-2000

or call 1-800- 652-6672 (1-800-OK COMPAQ). (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact:

Compaq Computer Corporation
P. O. Box 692000, Mail Stop 510101
Houston, Texas 77269-2000

or call (281) 514-3333.

To identify this product, refer to the Part, Series, or Model number found on the product.

## Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Compaq Computer Corporation may void the user's authority to operate the equipment.

### Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

## Canadian Notice (Avis Canadien)

### Class A Equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

## European Union Notice

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (in brackets are the equivalent international standards):

- EN55022 (CISPR 22) - Electromagnetic Interference
- EN50082-1 (IEC801-2, IEC801-3, IEC801-4) - Electromagnetic Immunity
- EN60950 (IEC950) - Product Safety

## Japanese Notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

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## Taiwanese Notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

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