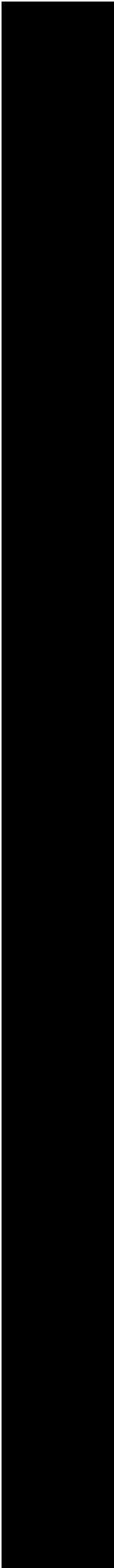


# StorageTek™ D173/9176 Disk Subsystem

Site Preparation Guide







# StorageTek<sup>TM</sup> D173/9176 Disk Subsystem

Site Preparation Guide

Information contained in this publication is subject to change. In the event of changes, the publication will be revised. Comments concerning its contents should be directed to:

Disk LPO Information Developer  
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USA

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# Summary of Changes

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The following is the history and summary of changes for this publication.

<b>Date</b>	<b>Edition</b>	<b>Description</b>
February 2000	A	Initial Release
April 2000	B	Added order information, cabinet information, modified sizes and weights, added color photographs of the 9176 and 9170, and feature codes.
August 2000	C	Changed solution name to StorageTek 9176 SAN Disk Array, and added more detail to various sections.
December 2000	D	Added 72 GB Drive Module and index information
June 2001	E	Changed product name and added D173, Object Manager 7.10, Heterogeneous information, and some value comparison pages
November 2001	F	Added new 180GB drive information as well as more information concerning performance vs. capacity.

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# Preface

This *Site Preparation Guide* is part of a four-book documentation set that supports installation, operation, troubleshooting, and servicing of the StorageTek 9176 and D173 Disk Subsystem. The *Site Preparation Guide* provides order information and some instructions for preparing your installation site. To plan for an installation, refer to the *Planning Guide*, part number MO9113Ae.

System operators and service technicians should use these books and follow all applicable site preparation requirements prior to installing the 9176 controller tray and drive tray, or the new D173 Disk Subsystem with its Disk Controller Array and drive tray extensions. Readers should understand Fiber Channel and network technology and have extensive knowledge of computer system operation, maintenance, and repair.

A portion of the product described in this book is a licensed product of our supplier, which due to contractual reasons **MUST** remain unnamed.

Design efforts will continue to improve products as new technology, components, software, and firmware become available. StorageTek, therefore, reserves the right to change specifications without prior notice.

All features, functions, and operations described herein may not be marketed by StorageTek in all parts of the world. In some instances, photographs and figures are of equipment prototypes. Therefore, before using this document, consult your StorageTek representative for information that is applicable and current.

StorageTek rebranding has taken place to use the latest Client Server Disk terminology, and convert acronyms such as SM7 to OST or OM. Please be aware of this difference when using the software and entering directory names or commands.

## Nomenclature

Disk storage subsystems (referred to in this book) are:

1. The StorageTek 9176 Disk Subsystem, which comes in three hardware models with formal names as follows.

9170 001	StorageTek 9170 Disk Array
9176 001	StorageTek 9176 001 Disk Controller
9176 002	StorageTek 9176 002 ENTPR Disk Controller

2. The StorageTek D173 Disk Subsystem, which comes in two hardware models with formal names as follows.

D173 001	StorageTek D173 Disk Controller Array
9170 001	StorageTek 9170-001 or 9170-002 Disk Array

The storage management software that enables one to assign LUNs, diagnose problems, and

configure and manage the subsystem is called: StorageTek Object Manager. It has various software components (for example: Client, Agent, RDAC, NVSRAM, and OMutil for the management station) that enable communications between hosts, controllers, drives, and the other network devices. All these components must work together for well-orchestrated data management and performance. StorageTek and its suppliers have worked hard to validate and certify their 9176 and D173 storage subsystem configurations.

As technical advances are made, the software becomes more sophisticated and capable of providing more value for the customer. These new features are described in the StorageTek Object Manager Concept Guide, P/N 96035. StorageTek Object Manager is currently at the 7.10 level, with the 8.0 level staged for release in Q4, 2001. The StorageTek Object Manager 8.0 Concept Guide is P/N 96067. As new software manuals are released, they will be available on the engineering web page at:

<http://gandalf.stortek.com/ctp/manager/>

Event monitoring, heterogeneous attach (with additional volumes and storage partitioning (aka LUN Mapping) capabilities), path failover, as well as new database features (point-in-time copy/snapshot) are explained in the documentation and are available in new software offerings from StorageTek.

This manual primarily covers hardware, and may be thought of as the hardware systems assurance guide. The equivalent software systems assurance guide is the StorageTek Object Manager Planning Guide, currently P/N MO9113Ae. This manual lists the system requirements as well as the patches necessary to host your StorageTek hardware and software.

## **Education and Training**

A class is available to teach installation and maintenance; and CD ROMs are available to update students on the latest Disk Subsystem product releases.

## Product Compliance

The StorageTek 9176 Disk Subsystem as well as all other product solutions undergo many regulatory agency tests. These tests help certify that our products meet various county and agency requirements. Product Compliance maintains a web site at: <http://pct.stortek.com> which defines the national, international, and corporate safety and environmental standards as well as the product compliance status for various product.

Once on the web page, click the agency approval status link on the left-hand side, and select the Disk Product Compliance Status link. In many cases the actual Declaration of Conformity may be viewed.

### Federal Communications Commission (FCC) Radio Frequency Interference Statement

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 in a commercial installation. 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 his own expense.

StorageTek and their suppliers are not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by Storage Technology Corporation. It is the user's responsibility to correct interference caused by such unauthorized modification, substitution, or attachment.

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

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

この装置は、第一種情報装置（商工業地域において使用されるべき情報装置）で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（VCCI）基準に適合しております。

従って、住宅地域またはその隣接した地域で使用すると、ラジオ、テレビジョン受信機等に受信障害を与えることがあります。

取扱説明書に従って正しい取り扱いをして下さい。

# About the Site Preparation Guide

This document provides information about ordering and site requirements for installation of the StorageTek™ 9176 and D173 Disk Subsystems.

## Introduction

The 9176 and D173 come in a 19 inch rackmount cabinet, already configured for the host(s). The 9176 always has at least one 9176 controller tray and one 9170 drive tray. Officially the controller is called the StorageTek 9176 Disk (or ENT-PR Disk) Controller and the drive tray is called the 9170 Disk Array, however, throughout the 9176's set of technical documentation, these devices may simply be referred to as a controller tray or drive tray.

The D173 Disk Subsystem is an entry level disk subsystem, which has two 2772 controller circuit boards installed into a drive tray. This combination is now called a D173 Disk Controller Array. One or two 9170 Disk Array "extensions" may be added for a maximum total of 30 drives (available in 72GB or 180GB drive module sizes). The D173 also uses the 7.10 level of Object Manager, which enables customers to activate the heterogeneous storage environment capabilities. Simply put, this allows one to network their storage with a variety of different kinds of operating systems, for example Solaris, Windows NT, Windows 2000, HP-UX, AIX, SGI, LINUX, and Netware.

When ordering Disk Subsystems it is important to be aware of performance vs. capacity. Customers may strive for low cost—buying based on cost per MB; or they may purchase a higher numbers of spindles and smaller drive sizes for higher performance. Or, they may select factors (such as cache) to improve performance, but yet keep costs down. Also bandwidth is primarily a factor of the number of controllers and paths from the host to the backend storage. Please be aware of all of these issues when helping customers, so that we place the best possible solution into the customer's business environment.

Various types of hardware and software components can be ordered depending on your business needs. The following section provides some information to facilitate your decision making, and help you select the right hardware (and software components) for your computing environment.

To fully understand this guide and all other technical documents, it is recommended that system operators and service technicians have extensive knowledge of Fibre Channel and network technology.

.....

Use this *Site Preparation Guide* to assist with your order (as well as the *Planning Guide*), and to make sure that your installation site meets all applicable environmental, power, and site requirements. The documentation necessary for installation, operation, and service of the controller and drive trays is shipped with your StorageTek Disk Subsystem solution, which arrives completely assembled and ready to plug-and-play in its associated Client Server Disk 19-inch rackmount cabinet.

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**NOTE** A deskside cabinet model is available in smaller configurations in the M02 cabinet. A new half-size cabinet that will be available Q1, 2002.

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### **Related Documentation**

- 9176 Product Configuration Document (PCD), P/N 3120609
- 9176 Disk Controller Configuration Control Document (CCD), P/N 3100207000
- 9170-001/002 Disk Array Configuration Control Document, P/N 3100208000
- D173 Disk Subsystem User's Guide, P/N 96032
- 9176/D173 Planning Guide, P/N MO9113Ae
- D173-001 Disk Controller Array CCD, P/N 3100227000
- D173/9170-00X PCD, P/N 3140417

Besides these documents, sales personnel should become familiar with the Object Manager software by reading the Object Manager 7.10 Concept Guide, P/N 96035.

For StorageTek employees, web based training pages (including photographs and screen captures) are also available (as well as documentation, drivers, scripts, and firmware). Go to the engineering web pages at:

<http://gandalf.storitek.com/ctp/9176/index.html>

<http://gandalf.storitek.com/ctp/D173/index.html>

<http://gandalf.storitek.com/ctp/manager/index.html>

Also, StorageTek D173 and 9176 Disk Subsystem value comparisons are on [page 38](#) of this document.



## Order Information

When ordering via the Siebel configurator or manually, you will need to make a decision on:

- what kind of rackmount cabinet you want
- the amount of storage needed
- the type of channel cable to use
- the amount of hosts you want to attach to your storage.

Assuming you want 720 Gigabytes of storage, and have 2 servers running a Solaris operating environment, you might decide to order:

- an M03 rackmount cabinet, which may be referred to as CBNT M03. The feature code (M03R) will need to be entered into the ordering system that you are using.

**NOTE** It would also be perfectly acceptable to order the CBNT M02 (M02R) with this example. In either case, if using the Siebel configurator, the system will automatically bring up the next selections for you.

- one 9176 controller (feature code 9176-002) with 512 MB cache, which enables you to connect to 4 host inputs and operate with higher bandwidth (greater performance). This configuration also enables you to grow your storage as your business grows.
- two 9170 disk arrays (feature code 9170-001) with ten 36 gigabyte drives each. The feature code for this selection will need to be ordered 4 times ( $10 \times 2 \times 36 = 720$  gigabytes).

**NOTE** One could also select one 9170 disk array with ten 72 gigabyte drives, or one drive tray only five 180 gigabyte drives. 180 GB drives can maximize your cost per MB; however, it puts more data on fewer spindles and may reduce the overall performance of your disk subsystem.

- three Host Kits with HBAs and drivers, as needed based on the type of servers you have. For example two HBAs for one server, and one HBA for the other could require that you choose a Sun PCI card for FC optical (shortwave) cables (feature code SPG3).
- three 50 meter Fibre Channel optical (shortwave) cables (feature code OA13) to attach the HBAs to your 9176 Disk Subsystem. Two FC cables will go to the redundant controllers and provide path failover (see page 4) capability for the entire path between the host and the back end RAID storage.

Refer to Appendix A, which has a portion of the information contained on the Product Configuration Document (PCD), or go to the StorageTek KnowledgeMap for the latest information on feature codes.

The following illustration depicts this particular example 9176 Disk Subsystem configuration.

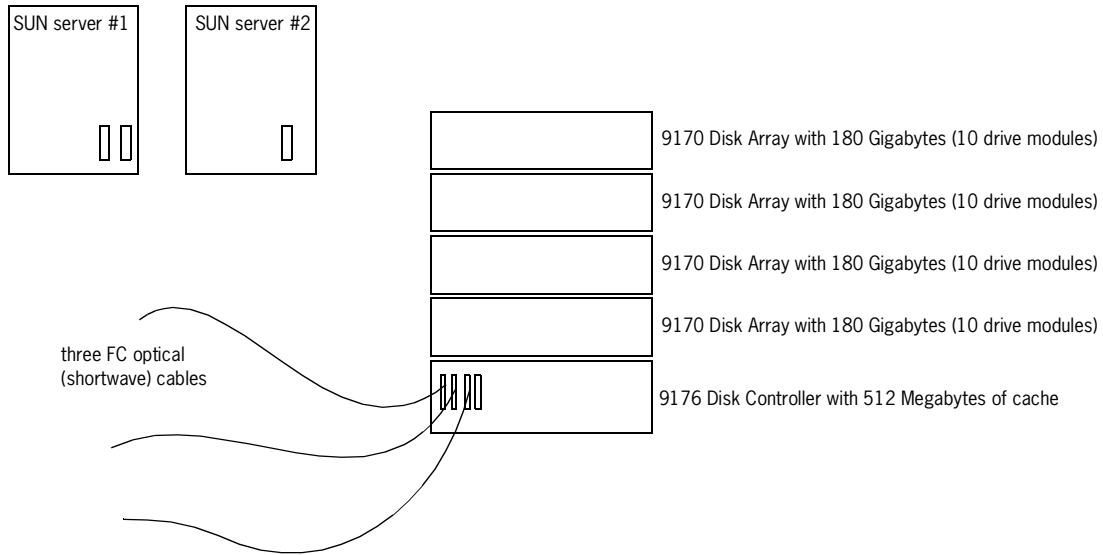
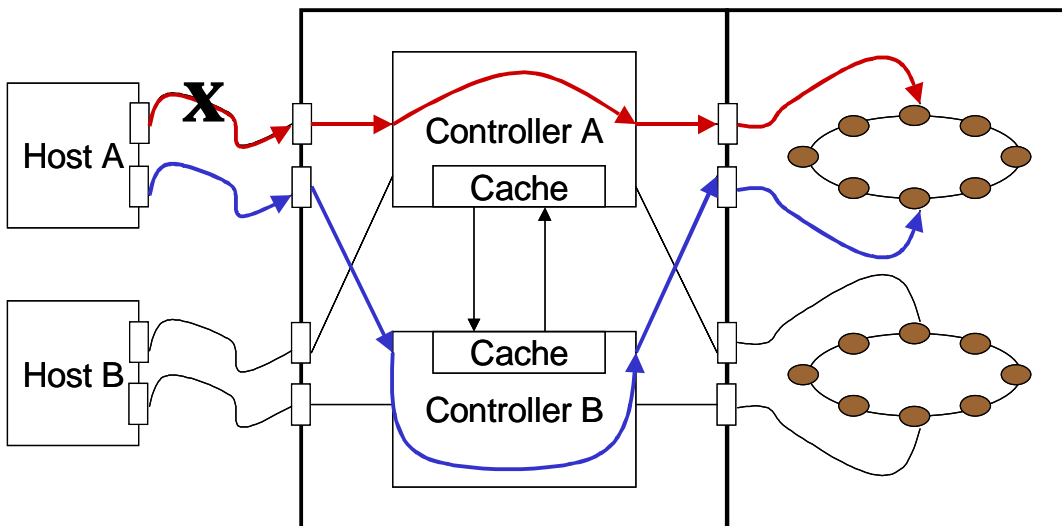


Figure 1 9176 Disk Subsystem - Order Example

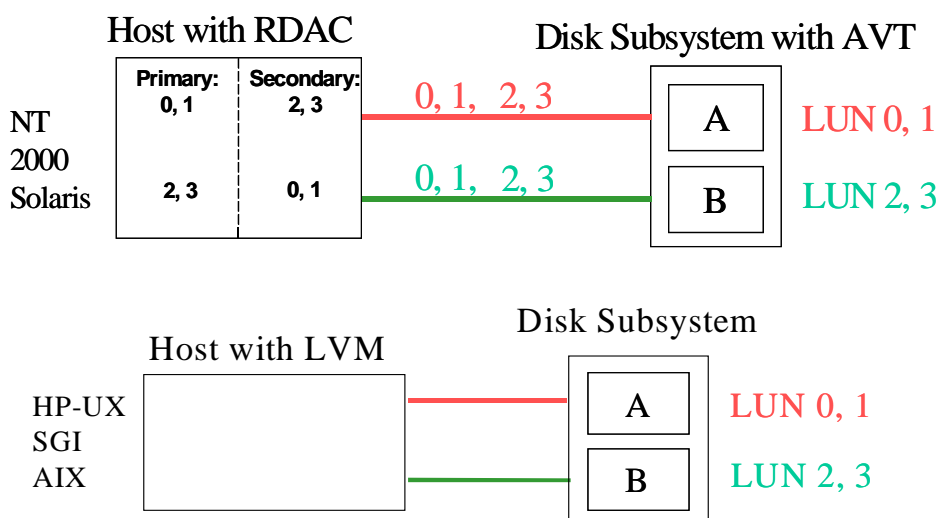
## Path Failover

StorageTek Disk Subsystem's use the storage management software package known as StorageTek Object Manager 7.10. It contains OMclient, OMagent, OMutil, and RDAC. The first three software applications handle the organization and monitoring of data; and RDAC is essentially the "path manager" working along with NVSRAM and AVT to route server-requested information over any path possible.



**NOTE** RDAC works on Windows NT, 2000, and on Solaris platforms. Other servers/operating systems have a similar host-specific software application.

In the event of a loss of a hardware device or cable-path along the way, alternate paths may be used. RDAC maintains a list machine names, and automatically inquires and links to them via alternate paths when the primary path is lost. The following illustration depicts how RDAC (and its companion software) works.



**NOTE** RDAC hides the secondary path, and automatically handles path failover and fail-back. LVM requires one to manually set-up primary and secondary paths. Novell Networkware and LINUX use the failover features of special Qlogic drivers.

## Model Description

The following tables describe the StorageTek Disk Subsystem models that are currently available.

Table 1 D173 "entry level" Model		
Model	Description	Storage Capacity
D173-001	A D173 Disk Controller Array with 128 Mbytes of cache, one host interface, and one drive interface per controller. It also has 10 drive module slots for 72 or 180 Gigabyte drives	The D173 disk subsystem has a performance maximum of 30 drive modules using either 72 or 180 Gigabyte drives. May be upgraded to enable up to 200 drives (14.4 TB current max.).

Table 2 9176 Models

Model	Description	Storage Capacity
9176-001	A 9176 Disk Controller with 256 Mbytes of cache, 2 host interface cards, and 2 drive interface cards.	One 9176 subsystem can handle up to 100 drives (or use 2 Disk Controllers with nine 9170s (90 drive modules)). Forty 180 GB drives maximum.
9176-002	A 9176 Disk Controller with 512 Mbytes of cache, 4 host interface cards, and 4 drive interface cards.	Same as above, except you can attach another cabinet to a 9176 Disk Controller with an additional 100 drives (1 by 200), or mix for better performance. Forty 180 GB drives maximum.

**NOTE** These models may be installed in an M02 or M03 rackmount cabinet or in your own 19-inch rack that conforms to the EIA-310-D standard. For information about StorageTek's Client Server Disk rackmount cabinets, see [page 11](#) or refer the CBNT M02 or M03 User's Guide. If installing into a non-StorageTek cabinet, be sure to read the Client Service Disk Device Installation and Mounting Supplement, P/N 95972.

## Battery Backup

The 9176 and the D173 ship with a battery to keep cache alive (active) in the event of a total power failure. Once power is restored, cache is dumped (write operations continue). Refer to your StorageTek 9176 Disk Controller User's Guide for more information about this feature.

## Feature Codes

Feature codes are used to facilitate a faster ordering process. They can be found in the Program Configuration Document (PCD).

**NOTE** Some feature codes have been listed in Appendix A. This information may not be current. Please refer to the web for the latest information.

The following feature codes are available with the M03 cabinet.

Feature Code	Description
9954	International Power Cord
9955	North America Nema L6-30P Power Cord
00DR	Cabinet without a door (filler panels may be installed)
01DR	Cabinet with door assembly
M3S1	One slide pair assembly
M3S2	Two slides pair assemblies
M3R1	One rail pair assembly
M3R2	Two rails pair assemblies
M3R3	Three rails pair assemblies

See Appendix A for more feature codes for the StorageTek 9176 Disk Subsystem. When ordering a storage subsystem, it is advised that you create a system floorplan and measure the cable-layout distances between your host servers, hubs, switches, and the storage subsystems. Also remember that there are network trade-offs that you may face depending on what you attach and how you attach it. Performance is limited by your bandwidth; and both network activity and storage capacity have an impact on your overall system performance. Consult you StorageTek representative for advice on how best to configure your computing network.

StorageTek's partitioning software can also help ensure that your network runs as efficiently as possible; and the right marriage between hardware and software is of paramount importance to StorageTek and your business operations.

A new heterogeneous level of Object Manager 7.10 software is now available. This software, in combination with the 4.01 level of firmware enables multiple hosts to be attached to a StorageTek Disk subsystem. Host attachments may now have up to 16 storage partitions with a maximum of 32 volumes per partition, and up to a maximum of 128 volumes overall. For more information, refer to the reference documents and to the power point 9176 configuration presentation, P/N 96034.

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**NOTE** This presentation, as well as the D173 configuration presentation, can be downloaded from the engineering web pages.

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## Installation Support

If you're planning an install, you will need to contact your StorageTek account team, who will help you configure the right solution for your business environment. They will also identify the StorageTek personnel who have been trained to install a StorageTek 9176 or D173 Disk Subsystem for a specific operating system or your entire heterogeneous storage environment. StorageTek's Service Representatives can also help ensure that your hardware and software components have been lab-validated and verified via the StorageTek connectivity web pages.

The following instructions tell how to identify the StorageTek 9176/D173 Disk Subsystem (course number OSY135) trained personnel.

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**NOTE** Access restrictions exist on the following web site. You must be a manager or request special access, and be registered into the system.

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- 1 Access the "skills inventory" web site at:  
<http://gandalf.stortek.com/skillsinv/>
- 2 Log in using your StorageTek User ID and password.

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**NOTE** If you have not registered, you will not see the Run Reports icon hyperlink or the Reports Menu hyperlink. Instead a Skills Inventory Template and Service Center Location form will appear. Click the appropriate button in both the Skills Inventory Template and the Service Center Location, and provide information as requested about yourself to complete your registration.

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- 3 At the Skills Inventory Main Menu screen, click "Run Reports" at the bottom (first-time users), or the "report menu" in the upper left corner of the screen.
- 4 Move down the page, and click on "Education Searches Across Skills Profiles."
- 5 Enter the course ID *OSY135*, choose appropriate options, and click GO.

This will provide you with a list of employees trained on the StorageTek 9176 Disk Subsystem and the StorageTek D173 Disk Subsystem (added 7/2001)\*. You can then print this out, or cut-and-paste it into an Excel spreadsheet to identify qualified employees to support your installation.

Also of importance is the information that the Customer Resource Center maintains. For example, to obtain connectivity information, StorageTek employees may go to the KnowledgeMap at <http://wwfokm.stortek.com/> and select Client Server Disk (OPENstorage Menu Button), to select the Connectivity Matrix under the Technical section.

\* CDROM training is also available to teach the D173 Disk Subsystem differences.

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**NOTE** You should also click the Other Resources button, and then go to the CRC (Customer Resource Center) where you can select the Disk Storage hyperlink. Information for both customers and employees is available here.

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## Site Preparation Form

The following should be used to plan your StorageTek 9176 Disk Subsystem installation.

What operating platforms (and levels) am I going to attach?

Windows NT	Solaris	HP-UX	AIX
Novell Netware	Red Hat Linux	Windows 2000	SGI IRIX

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**NOTE** Check the 917X/D17X Planning Guide, P/N MO9113Ae to verify minimum operating system requirements and patches are present or on order.

---

What type of Host Bus Adapter (HBA) am I going to use?

--	--	--	--

What drivers do I need to install?

--	--	--	--

What is the distance between the Host Bus Adaptor and the location of the next network device (hub, switch, 9176, or D173)? \_\_\_\_\_

May I use a special network devices in my configuration?

To help you answer these questions, refer to one of the connectivity web pages at:

- 1 Customer Resource Center (CRC) -- <http://www.support.storagetek.com>  
Select: Disk Subsystems >> 9176 Notices >> 9176/9170 Connectivity Information.

- 
- 2 Channel Site -- <http://www.storagetek.com/channels/index.html> where you select login here and then enter your username and password, and select Products >> 9176 (Client Server Disk Subsystem menu) >> Technical Info >> 9176/9170 Connectivity Information.
  - 3 KnowledgeMap -- <http://wwfokm.stortek.com/> where you select OPENstorage on the left menu, and then select Connectivity Matrix under the Technical section, and then select 9176 Connectivity Information.

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**IMPORTANT** In order to get the software that you need, you need to order at least one host attach kit, which includes the GBICs you need to match your order.

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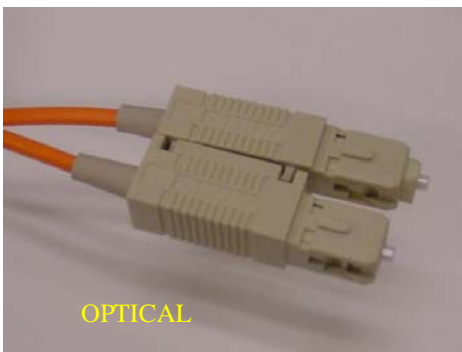
**NOTE** Installation into existing cabinets requires a 45cm (17.72 in.) width minimum!

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Refer also to the engineering web pages, especially for information about StorageTek's entry level D173 Disk Subsystem. The D173 uses Object Manager 7.10; and it has the same footprint as the 9176. It is also upgradeable to a 9176 as well as future products that StorageTek will announce in the months to come.

## Cable Connectors

StorageTek Disk Subsystems use Fibre Channel copper and optic cables. The following illustrations show the various types of connectors that are used to attach the server's HBAs to StorageTek's open system disk subsystems.





## Cabinet Description

StorageTek provides a 19 inch rackmount cabinet for the Disk Storage environment. The cabinet conform to the EIA-310-D standard using the modular unit U to indicate panel height. The unit U equals 44.45mm or 1.75 inches. The CBNT M03 is a fixed 39U size. It allow you to easily add more storage in the future. The Siebel configurator will not allow you to go beyond 39U of space without ordering an additional cabinet. Each 445 mm wide 9176 Disk Controller uses 4U of internal vertical space and each 449 mm wide 9170 Disk Array or D173 Disk Controller Array uses 3U of internal vertical space.

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**NOTE** StorageTek's earlier M01 and M02 cabinets are both being discontinued. Most of the same information applies, however, they will soon be replaced with new more cost-efficient cabinets once current stock has been depleted.


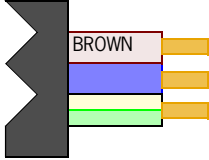
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### CBNT M03 Power Source

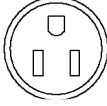
Each cabinet has redundant power distribution, and comes with two different types of AC power connections.

The CBNT M03 is connected to the AC power source by a NEMA power cord on all North American installations. The customer (or local StorageTek office) is to provide the power connector for all International installations.

The cabinet's power distribution unit (PDU) supplies AC power to the installed devices. The following lists the feature codes and part numbers for the cabinet's power cords.

Table 3 AC Power Cords		
Feature	Description	Attach-end Picture
9955	North American standard three-prong 220 VAC (NEMA L6-30P) to IEC-309-332P6 type	
9954	International (connector ready) type <b>Note:</b> Three ready-to-be-attached stranded-copper wires are available to connect via qualified personnel.	

**Deskside Power** The following lists the feature code and part number for the deskside (low-profile) cabinet's power cord, available with the D173 Disk Subsystem only.

Table 4 DC Power Cord			
Feature	Description	P/N	Picture
9930	North American standard three-prong 120 VAC (NEMA 5-15P) to IEC-320 type	310976001	

## Unique Situations

**Customer Cabinets** In the event that you are installing into existing customer cabinets, make sure that they are 19 in. (482.6 mm) rackmount cabinets that conform to EIA-310-D. Also ensure that mounting rails accommodate a minimum internal width of 45 cm (17.72 in.) and a depth of at least 51.5 cm (20.3 in.). At this minimum depth, you need unobstructed rear cabinet access for the removal of FRUs (otherwise you will have to remove the 9176 controller or 9170 disk array to allow room to remove FRUs from the back of the units). Ideally, it is more practical to have at least 66 cm (26 in.) of depth to allow adequate space to remove FRUs.

---

**NOTE** StorageTek's adjustable mounting rails require 450 mm (17.72 in.) width between front-facing vertical mounting flanges. Also the depth from the front to the back mounting flange must be between 660 mm (26 in) to 787 mm (31 in).

---

Most cabinets have their own custom mounting rails, which may be used, provided they have enough shelf support to accommodate weight, device widths from 445 mm to 450 mm (17.5 to 17.7 inches), and depths of at least 660 mm (26 in.) without obstructions.

**Floor and Ceiling Mounting** In some customer sites, the cabinet may be required to be secured to the floor. The M03 rackmount cabinets has a total of eight weld-nuts underneath the baseplate. You may use 1/2-13 bolts to secure a mounting bracket to the baseplate. At least four holes are available to secure the cabinet to the floor, and two holes are available to secure to the ceiling. Refer to the M03 Rackmount Cabinet User's Guide for hole locations and more information about this feature.

## Weight and Dimensions

### StorageTek™ 9176 Disk Controller Tray Weight

Make sure that the floor space at the installation site has sufficient stability to support the maximum weight of the controller tray and associated equipment. The controller tray's total weight depends on the number of canisters in the tray. [Table 5](#) lists the unit and shipping weight of the controller tray and the weight of individual canisters.

Table 5 Controller Tray Weights

Tray	Maximum Weight	Empty Weight	Maximum Shipping Weight	Empty Shipping Weight
Controller Tray	44.0 kg (97.0 lb)	18.1 kg (39.8 lb)	54.9 kg (121. lb)	29.0 kg (63.8 lb)
Canister	Weight		Shipping Weight	
Controller	3.0 kg (6.6 lb)		11.0 kg (24.2 lb)	
Battery	9.7 kg (21.4 lb)		11.8 kg (26.0 lb)	
Controller Fan	0.9 kg (1.9 lb)		2.3 kg (5.0 lb)	
Fan/ Communications	1.84 kg (4.1 lb)		2.5 kg (5.4 lb)	
Power Supply	1.5 kg (3.3 lb)		2.9 kg (6.5 lb)	
GBIC Minihub	0.6 kg (1.3 lb)		0.7 kg (1.6 lb)	
DB-9 Minihub	0.6 kg (1.3 lb)		0.7 kg (1.6 lb)	

---

## StorageTek™ 9176 Disk Controller Dimensions

Make sure that the installation site provides at least 610 mm (2 feet) of space around the cabinet to ensure adequate ventilation (and equipment cooling). [Figure 2](#) shows the dimensions for the deskside and rackmount controller tray and the front cover.

**Controller Tray**  
**Shipping Carton Dimensions**  
— Rackmount or Deskside Unit  
(Includes shipping pallet)  
**Height:** 430.6 cm (16.95 in.)  
**Width:** 605.8 cm (23.85 in.)  
**Depth:** 844.5 cm (33.25 in.)

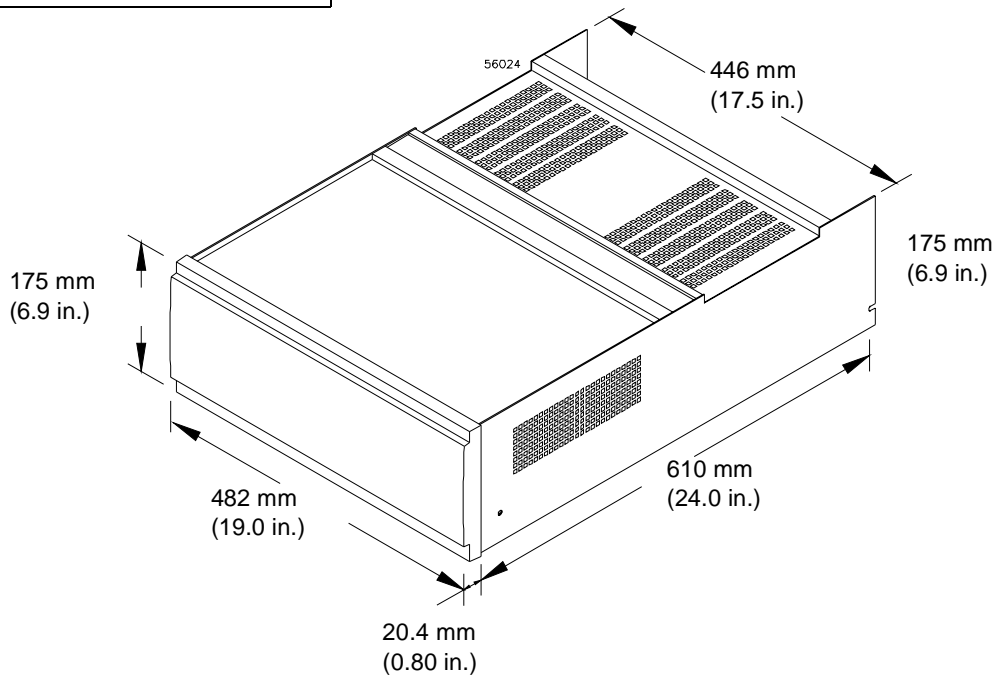


Figure 2 9176 Controller Tray Dimensions

## StorageTek™ 9170 Disk Array and D173 Disk Controller Array Weight

Ensure that the site's floor can support the total weight of all drive trays and associated equipment. The 9170/D173's weight depends on the number of drive modules installed in the tray. [Table 6](#) lists the unit and shipping weights for individual modules and for the following drive tray configurations:

Table 6 9170/D173 Drive Tray Weights with the new aluminum chassis

Unit	Minimum	Maximum	Chassis 1	Chassis 2	Shipping
Disk Array with 18 GB Drive Modules	16.8 kg (37.5 lb)	22.8 kg (51.3 lb)	14.1 kg (31.1 lb)	4.6 kg (10.1 lb)	32.7 kg (72.1 lb)
Disk Array with 36 GB Drive Modules	17.6 kg (38.7 lb)	24.8 kg (54.3 lb)	14.1 kg (31.1 lb)	4.6 kg (10.1 lb)	34.7 kg (76.5 lb)
Disk Array with 72 or 180 GB Drive Modules	17.7 kg (39.1 lb)	25 kg (55.3 lb)	14.1 kg (31.1 lb)	4.6 kg (10.1 lb)	34.9 kg (76.9 lb)
18 GB Drive Module 1.0 kg (2.3 lb)	36 GB Drive Module 1.2 kg (2.6 lb)	72 GB Drive Module 1.22 kg (2.7 lbs)			180 GB drives are 1.22 kg (2.7 lbs)
9170 Channel or D173 Controller Module	0.9 kg (1.9 lb)				
Power Supply Module	2.0 kg (4.5 lb)				
Fan Module	0.4 kg (0.9 lb)				
Address Card Module	0.7 kg (1.6 lb)				

**NOTE** A maximum configuration means the weight of a drive tray containing 10 drive modules, two channel/controller modules, two fan modules, and two power supply modules, and one address card module (9170 only). A minimum configuration only has four drive modules, and an empty chassis has all FRUs and motherboard removed.

If you have the original steel chassis, just add 9.5 kg (21 lbs) to the weights shown above. New orders will be shipped with the new aluminum chassis. The total weight of the Disk Subsystem depends on the number of 9176 Disk Controllers, D173 Disk Controller Arrays, and 9170 Disk Arrays in the cabinet. A typical StorageTek 9176 Disk Subsystem may weigh approximately 227 kg (500 lbs) or may weigh as much as 550 kg (1200 lbs). Refer to the M03 Rackmount Cabinet User's Guides for more information. These manuals are online at [gandalf.stortek.com/ctp/9176/index.html](http://gandalf.stortek.com/ctp/9176/index.html).

---

## 9170 Disk Array and D173 Disk Controller Array Dimensions

Again, make sure that there is adequate space available in the front and back of the cabinet to enable CSEs to service the drive trays. This space is also needed to ensure proper ventilation and cooling of the StorageTek 9176/D173 Disk Subsystem. [Figure 3](#) shows the dimensions of the rackmount and desktside drive tray.

### Approximate 9170 Drive Tray Shipping Carton Dimensions

(Includes shipping pallet)

**Height:** 38.1 cm (15.0 in.)

**Width:** 61.4 cm (24.0 in.)

**Depth:** 83.2 cm (32.7 in.)

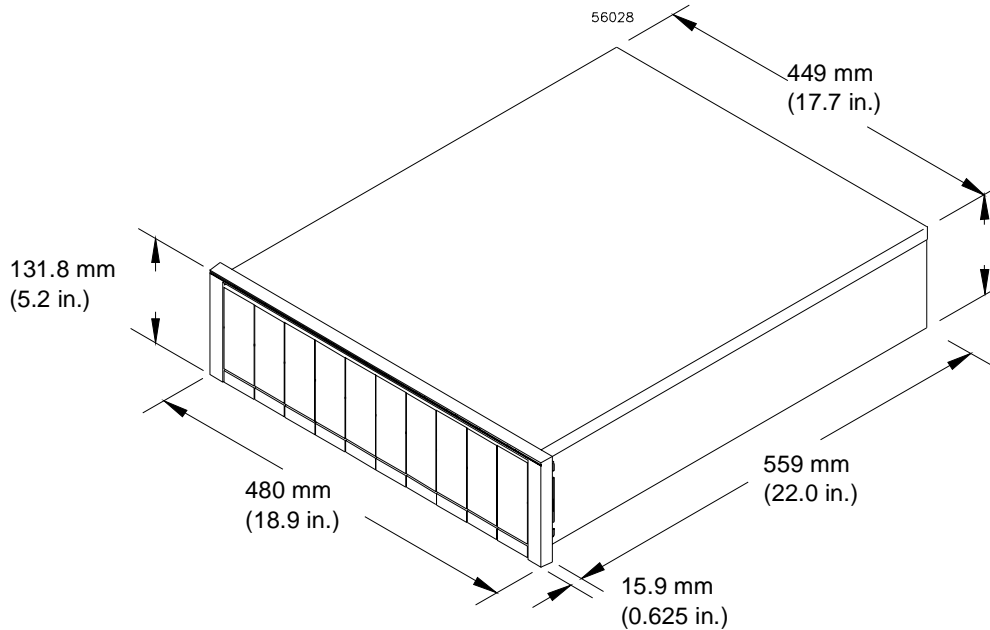


Figure 3 Drive Tray Dimensions

## Wiring and Power

The StorageTek 9176/D173 Disk Subsystem typically comes in its own rackmount cabinet with all internal power is supplied via the cabinet’s power distribution unit (PDU). StorageTek provides a rackmount cabinet user’s guides specific to the customer’s needs. StorageTek service representatives may obtain this manual (P/N 95932) from “Documents on CD”, or download it from the engineering web page. Specific power requirements are spelled out in this manual.

### StorageTek 9176 Disk Controller

The 9176 Disk Controller is a 120/220 VAC, 50/60 Hz unit that meets standard voltage requirements for both domestic (USA) and international operation. It uses standard industrial wiring with a line-to-neutral power connection. See [Table 7](#) for nonstandard installations.

- **Earth ground** - The unit must be properly grounded including an earth ground conductor on the AC power source.
- **Circuit overloading** - Make sure the power circuits and associated circuit breakers in the cabinet and building provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (for example, an air conditioning motor, elevator motor, factory equipment).
- **Power interruptions** - The unit will withstand the following voltage interruptions: Input transient (50% of nominal voltage), Duration (one half-cycle), Minimum frequency (once every 10 seconds).
- **Power failures** - Once power is restored after a complete power failure, the unit automatically performs a power-up recovery sequence without operator intervention.
- **Power Supply voltage range** - Wide-ranging, redundant 175 W power supplies operate on 90-264 VAC at 50 or 60 Hz. The DCPS meets international requirements, and can operate at any voltage with the specified range.

Table 7 Controller Tray Site Wiring Voltages

Input Power Connection	50 Hz			60 HZ		
	Nominal	Minimum	Maximum	Nominal	Minimum	Maximum
Single-Phase Line-to-Neutral	100	90	107	100	90	107
	127	114	136	120	104	127
	220	198	235	220	198	235
	240	216	264	240	216	264

---

## AC Power Requirements - 9176 Disk Controller

Assuming a 70% power supply efficiency and a 0.99 Power Factor, the following specifications apply to a fully configured 9176 Disk Controller.

Table 8 Additional Power Ratings/Specifications

Parameter	110 volt	220 volt
Min. Operating Current	2.0 A	1.0 A
Max. Operating Current	2.0 A	1.0 A
Max. Surge Current	3.0 A	2.0 A
Max. Operating Power	.1925 KVA, 192.5 Watts (AC), 657.5 BTU/HR	

---

**NOTE** When we take actual readings, we discover that the actual current is slightly less than the rating plate. This ensures that we never understate current and power consumption, especially with various unknowns. As shown above, the actual maximum operating power is slightly less than the maximum operating current multiplied by the current (220V times 1A=220VA), however, when calculating the maximum operating power, we recommend that you use the KVA figures shown in [Table 10](#) and [Table 11](#).

---

## StorageTek 9170 Disk Array and D173 Disk Controller Array

The 9170/D173 drive tray is a 120/220 VAC, 50/60 Hz unit that meets standard voltage requirements for domestic and international operation. It uses standard industrial wiring with a line-to-neutral power connection (see [Table 9](#)). When installing a 9170/D173 (drive tray), review the following specifications.

- **Earth ground** - The drive tray requires an earth ground conductor on the AC power source.
- **AC power source** - The AC power source must provide the correct voltage, current, and frequency specified by the manufacturer. If you plug the drive tray into an internal AC distribution unit, make sure the internal unit can handle the power requirements.
- **Redundant AC Power, nominal 100 volt** - In order to meet power requirements and maintain power redundancy, you should connect the drive tray to 90–136 volt, 15 Amp circuits with:
  - **three or fewer drive trays** - using two, 90–136 volt, 15 Amp circuits. On each 9170, connect one power supply to one circuit and the other power supply to a second circuit.



- **four or more drive trays** - using four, 90–136 volt, 15 Amp circuits. Connect half of the 9170 drive trays to two circuits and the remaining drive trays to the other two circuits. Make sure that each drive tray connects to two different circuits (one per power supply).
- **Redundant AC Power, nominal 240 volt** - Use two 200–264 volt, 15 Amp circuits. Connect one power supply from each drive tray to one circuit and the other power supplies to the second circuit.
- **Power supply voltage ranges** - The auto-ranging power supplies automatically match the voltage range (120 VAC or 220 VAC) to the AC power source. This means that you can switch the 9170 power supplies to alternative power source voltages (120 VAC to 220 VAC).

---

**CAUTION** Wait at least 10 seconds between each voltage change before powering up the drive tray to prevent damage to the power supplies.

---

Table 9 Drive Tray Site Wiring Voltages

Input Power Connection	50 Hz			60 Hz		
	Nominal	Minimum	Maximum	Nominal	Minimum	Maximum
Single-Phase Line-to- Neutral	100	90	107	100	90	107
	127	114	136	120	104	127
	220	198	235	220	198	235
	240	216	264	240	216	264

### 9170/D173 Current Rating

The 9170 and D173 are rated at 3.6 amperes at 120 volts and 1.8 amperes at 240 volts. Actual current drawn varies slightly depending on the number and type of drive modules you have installed. Drive modules rated at 1.2 amperes at 12 volts DC have little impact on the overall rating of the 9170 Disk Array operating on a 220 volt circuit.

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**NOTE** StorageTek’s 9170/D173 drive modules have been designed for a staggered start-up since this is the time of the greatest current demand. This helps ensure that current does not exceed design ratings during power up.

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## 9176/D173 Disk Subsystem Current Calculations

With the 9176 Disk Controller (at 220v) pulling one ampere and the 9170 or D173 each pulling 1.8 amperes, a rackmount cabinet with one controller and ten disk arrays would draw a total of 19 amperes. These amps are supplied by two grids of the power distribution unit (PDU), with each grid rated at 16 amps. The lower grid would supply one controller and five disk arrays (1 + 1.8 + 1.8 + 1.8 + 1.8 + 1.8) for a total of 10 amps, and the upper grid would supply the remaining five disk arrays (5 times 1.8) for a total of 9 amps. A 30 drive D173 Disk Subsystem (with its 20 amp PDU) pulls 5.4 amps (11 amps at 110v).

## 9176/D173 Disk Subsystem Maximum Operating Power Calculations

When calculating maximum operating power (the time just after the start-up power time zone), use 329 VA for the 9176 Disk Controller and 495 VA for the 9170 Disk Array and D173 Controller Disk Array as shown in [Table 10](#) and [Table 11](#).

For example, if calculating for a fully configured 9176 Disk Subsystem with two hundred 72 Gigabyte drive (i.e. twenty 9170 Disk Arrays), one would add the controller's 0.329 KVA to twenty times the disk array's 0.495 KVA. The formula becomes:

$$0.329 + 20 (0.495) = 0.329 + 9.90 = 10.23 \text{ KVA}$$

The maximum operating power consumption, therefore, for a fully configured 14.4 Terabyte 9176 Disk Subsystem (1 disk controller and 20 disk arrays) is 10.23 KVA.

Knowing that 10.23 KVA is the maximum operating power, we can figure the current for the two cabinets as follows.

- a 240 volt source would draw 42.6 amps
- a 220 volt source would draw 46.5 amps
- a 200 volt source would draw 51.1 amps.

---

**NOTE** The ratings of the individual drive modules (pulling 1.4 amps at 5 volts DC and 1.7 amps at 12 volts DC) mean that the 9170 power supplies provide this current (via the midplane) to all of the drive modules. The AC current drawn by the 9170 power supplies is essentially what is documented in [Table 10](#) and [Table 11](#). Basically, the "load" is the controller modules, fan modules, and all ten drive modules. Each of these 9170 components adds up to a combined maximum of 2.1 amps of AC current drawn at 240 volts. Note also that the relationship between AC and DC power requires one to use the .707 or 1.414 conversion factors. Use this to interpret such statements as: (0.495 kVA or 350.0 W).

---

## Power Cord Routing Notes

Review this power cord routing information before installing a StorageTek 9176 or D173 rackmount device (controller tray or drive tray).

### Rackmount Power

The D173 rackmount cabinet has two power grids in a caboose-mounted power distribution unit (PDU); and the 9176 (M03) rackmount cabinet has two AC power distribution units mounted vertically along the side members. Each separate grid (see photograph, [Figure 4](#)) or PDU enables power redundancy to the Disk Subsystem hardware components, ensuring ongoing data access in the event of a power failure to one of the customer-supplied circuits (assuming two separate power sources/circuits).



Figure 4 D173 PDU for distributing Power to Devices throughout the Cabinet

**NOTE** The following illustrations show various PDU power connectors available that attach to the customer-supplied power receptacles. The customer's power source should come from separate and isolated power circuits to maximize power redundancy and optimize the Disk Subsystem data availability.



9176 POWER CORDS



D173 POWER CORD

Figure 5 Power Connector types that attach to the customer-supplied power receptacle

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## Rackmount Considerations

The rackmount cabinet's PDU supplies power for the left or the right sides of each redundant device's DC power supply. The 9176 Disk Controller, 9170 Disk Array, and D173 Disk Controller Array have their own power cord. The StorageTek Disk Subsystems come fully intact, however, if additional storage devices are to be added to the cabinet, you will need to route power cords and FC cables to the controller tray or drive tray. Refer to the appropriate rackmount cabinet user's guide and to the StorageTek 9176 Installation Guide or D173 User's Guide for further information.

**NOTE** These documents are available online through StorageTek's Customer Resource Center (CRC), on StorageTek's *Documents on CD*, and comes on the CD that accompanies the product.

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**IMPORTANT** To ensure redundancy, connect the PDUs in the cabinet to two, independent power sources. Connect the power cords from each tray to separate PDUs or PDU grids in the cabinet.

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Illustrations are provided in the Installation Guide to facilitate non-StorageTek cabinet installations. Whenever possible, use the Fibre Channel cable routing shown to ensure that the StorageTek Object Manager diagnostics identify the hardware components properly. This will facilitate troubleshooting (properly identifying the faulty component) of your StorageTek Disk Subsystem, if it becomes necessary.

Component redundancy and path redundancy enable your StorageTek Disk Subsystem to be available to you 24 hours a day, seven days a week, and 365 days a year (366 days on leap years). For best results, ensure that your hardware components are monitored through Object Manager software or similar storage management application. Also make sure that your installation has adequate service and cooling clearances, and adheres to all power and environmental requirements.

Empty M03 cabinet used for the 9176 controller tray and drive trays



StorageTek D173 Disk Subsystem

# Environmental Requirements

## 9176 Disk Controller

Table 10 lists the environmental requirements for the 9176 controller tray.

Table 10 Controller Tray Environmental Requirements

Condition	Range	Requirement	
		Below Sea Level	Above Sea Level
Altitude	Operating	30.5 m (100 ft.)	3,048 m (10,000 ft.)
	Storage	30.5 m (100 ft.)	3,048 m (10,000 ft.)
	Transit	30.5 m (100 ft.)	12,000 m (40,000 ft.)
Temperature	Operating <sup>1</sup>	0° C to 43° C (32° F to 109° F)	
	Storage	-10° C to 65° C (14° F to 149° F)	
	Transit	-40° C to 65° C (-40° F to 149° F)	
Maximum Temperature Change Allowed	Operating	10° C (18° F) per hour	
	Storage	15° C (27° F) per hour	
	Transit	20° C (36° F) per hour	
Relative Humidity (no condensation)	Operating	20% to 80%	
	Storage	10% to 93%	
	Transit	5% to 95%	
	Maximum Dew Point	26° C (79° F)	
	Maximum Humidity Gradient	10% per hour	
Heat Dissipation	731.0 Btu/hr (based on 0.329 kVA or 214.0 W power consumption)		
Sound	Power	6.5 bels	
	Pressure	65 dBA	

<sup>1</sup> If you plan to operate the controller tray at altitudes between 1,000 m (3,280 ft.) and 3,000 m (9,850 ft.), lower the environmental temperature 1.7° C (3.3° F) for every 1,000 m (3,280 ft.) above sea level.

---

## Disk Controller Airflow

Figure 6 shows the controller tray airflow. Make sure your installation site will allow adequate ventilation of the rackmounted controller tray during operation.

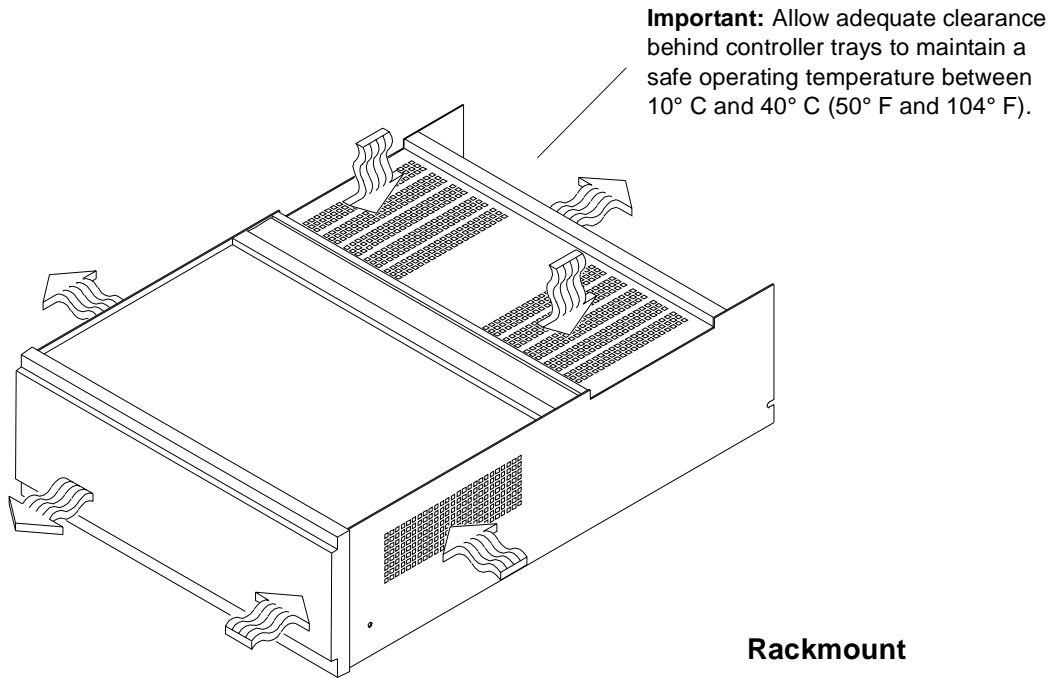


Figure 6 Controller Tray Airflow

## 9170 Disk Array and D173 Disk Controller Array

Table 11 lists the environmental requirements for the 9170/D173 drive trays.

Table 11 Drive Tray Environmental Requirements

Condition	Range	Requirement	
		Below Sea Level	Above Sea Level
Altitude	Operating	30.5 m (100 ft.)	3,000 m (9,840 ft.)
	Storage	30.5 m (100 ft.)	3,000 m (9,840 ft.)
	Transit	30.5 m (100 ft.)	12,000 m (40,000 ft.)
Temperature	Operating <sup>1</sup>	10° C to 40° C (50° F to 104° F)	
	Storage	-10° C to 50° C (14° F to 122° F)	
	Transit	-40° C to 60° C (-40° F to 140° F)	
Maximum Temperature Change Allowed	Operating	10° C (18° F) per hour	
	Storage	15° C (27° F) per hour	
	Transit	20° C (36° F) per hour	
Relative Humidity (no condensation)	Operating	20% to 80%	
	Storage	10% to 90%	
	Transit	5% to 95%	
	Maximum Dew Point	26° C (79° F)	
	Max. Humidity Gradient	10% per hour	
Heat Dissipation <sup>2</sup>	1200 Btu/hr (based on 0.495 kVA or 350.0 W power consumption)		
Sound	Power	6.5 bels	
	Pressure	65 dBA	

<sup>1</sup> If operating the 9176 at altitudes between 1,000 m and 3,000 m (3,280 ft. and 9,850 ft.), lower the environmental temperature by 1.7° C (3.3° F) for every 1,000 m (3,280 ft.) above sea level.

<sup>2</sup> kVA, W, and Btu calculations for typical tray configurations: 10 drive modules, two DCPSs, and two channel card modules.

---

## 9170/D173 Drive Tray Airflow

Figure 7 shows the StorageTek 9170 and D173 airflow. Make sure your installation site will allow adequate ventilation of the drive tray during operation. Refer to the StorageTek 9170 or D173 User's Guides, for specific requirements when placed inside of a rackmount cabinet.

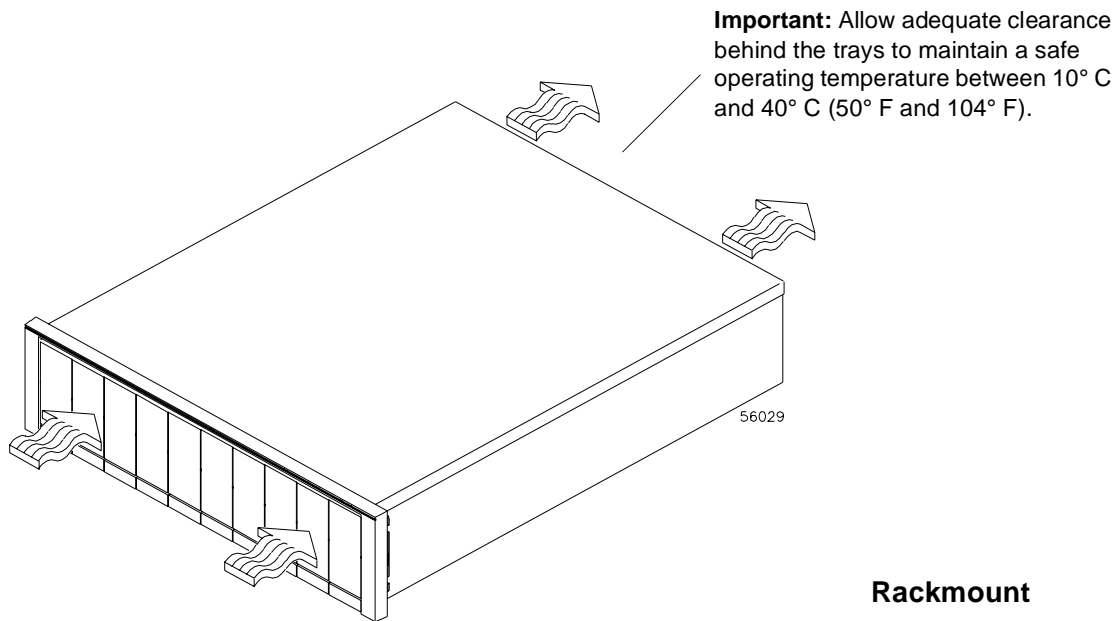


Figure 7 Drive Tray Airflow

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**NOTE** StorageTek's CBNT M03 has been enhanced — adding more top member venting, to dissipate even more heat and lengthen component life. Refer to the CBNT M03 Rackmount Cabinet User's Guide, P/N 95932; and the Client Server Device Installation and Mounting Supplement, P/N 95972 for more information.

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## Controller Tray and Drive Tray Connectors

This section provides an overview of the controller tray and drive tray connectors, which you will use to cable either type of tray to your storage subsystem.

The controller tray has three types of interface connectors (Figure 8).

- **Host interface connectors:** Fiber Channel (FC) (fiber optic or copper wire). The controller tray has four pairs of host interface connectors (two pairs per controller), which support host loop configurations requiring dual cables. Each pair of connectors is housed in its own host interface card canister.
- **Drive interface connectors:** FC (fiber optic or copper wire). The controller tray has four pairs of drive interface connectors for support of drive loop configurations requiring dual cables. Each pair of connectors is housed in its own drive interface card canister.
- **Secondary (diagnostic) interface connectors:** RS-232 (serial) or Ethernet. The controller tray interfaces provides RS-232 (serial) and Ethernet connections to each controller for use in diagnostics, troubleshooting, and special configurations.

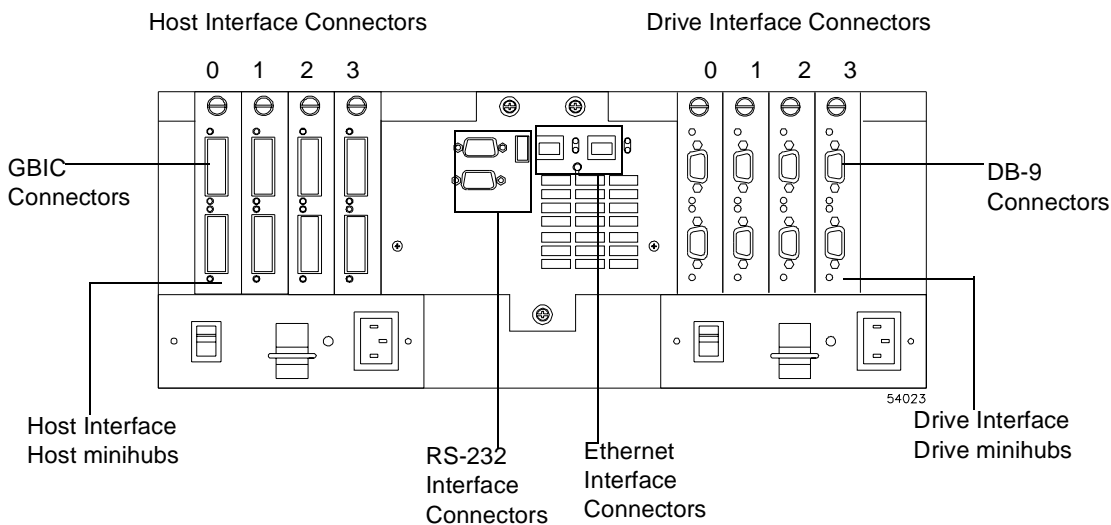


Figure 8 Controller Tray Interface Connectors

## Host Interface Connectors

The controller tray contains four host interface cards. The cards can be GBIC (gigabit interface card) or DB-9 cards. A GBIC card contains a pair of GBIC interface connectors, which interface the controller to fibre optic or copper fibre host cables. A DB-9 card contains a pair of DB-9 interface modules, which interface the controller to copper fibre host cables. [Figure 9](#) shows the host interface card slots populated with GBIC cards and the drive interface card slots populated with DB-9 cards

The interface cards connect to the controller in pairs. Cards 0 and 2 connect to the top controller (controller A) and Cards 1 and 3 connect to the bottom controller (controller B) ([Figure 9](#)). To ensure redundancy, you must connect each host to both controllers through the appropriate interface card.

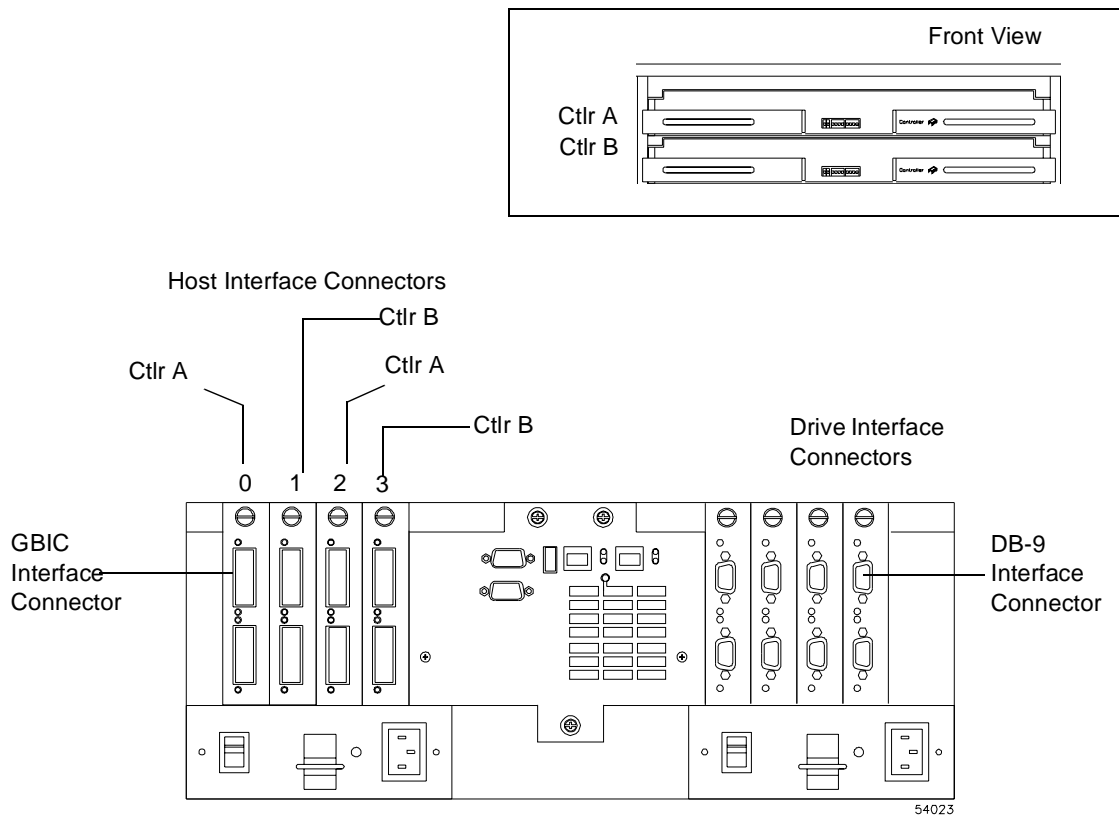


Figure 9 Controller Tray Host Interface Connectors

## Drive Interface Connectors

The controller tray contains four GBIC or DB-9 host interface cards aka drive minihub cards. [Figure 10](#) shows DB-9 cards in each drive interface card slot. Each card contains two GBIC or DB-9 connectors respectively and supports 8-bit and 16-bit interface protocol.

Each interface card represents a single drive channel. The drive channels are set up in pairs to support redundant drive loop configurations, or two data paths to each drive. Each pair of channels can support up to 10 drive trays, containing 10 drives apiece, or a maximum of 100 drives. Thus, a fully configured controller tray can support up to 20 drive trays (10 drive trays per channel pair), or a maximum of 200 drives.

---

**NOTE** 72 gigabyte drives would equal a total storage capacity of 14.4 terabytes. Note: Some of this storage capacity is used to format the drives. 180 gigabyte drives would equal 36 terabytes of 9176 storage capacity; however, StorageTek encourages individuals to be aware of the performance requirements as well as the time required to conduct a backup before maximizing storage capacity.

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You can connect the drive channel cables to either the upper or lower connectors on each card. Leave the remaining connector on each card unoccupied for future upgrades ([Figure 10](#)).

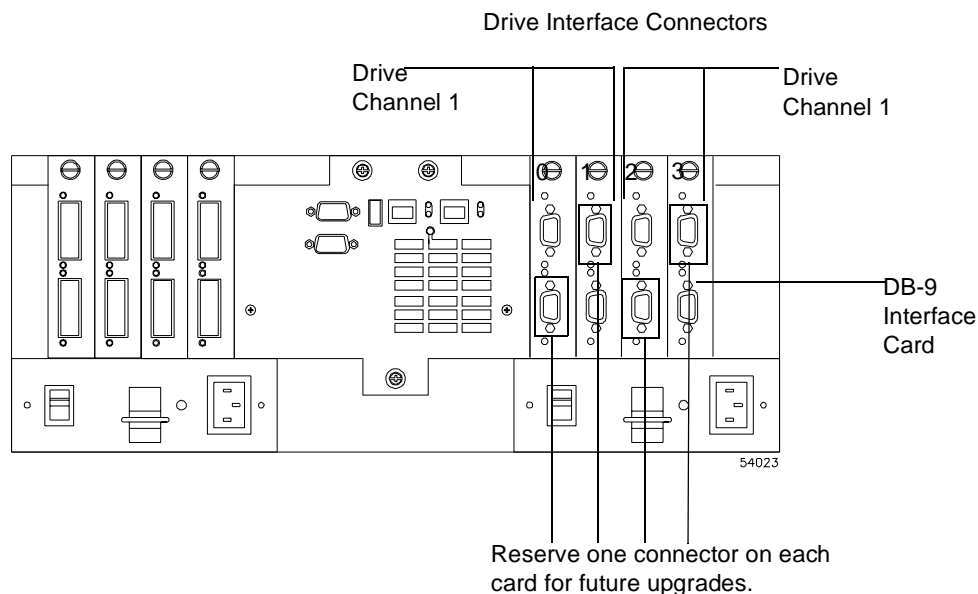


Figure 10 Controller Tray Drive Minihub Cards and Connectors

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**NOTE** The photograph below shows the D173's host (two per subsystem or one redundant connection) and drive interface connectors (which support up to 30 drive modules).

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## Secondary (Diagnostic) Interface Connectors

The controller tray provides an RS-232 (serial) and an Ethernet connection to each controller (Controller A and Controller B) for use in diagnostics, troubleshooting, and special configurations.

If you plan to manage the storage arrays directly from a remote management station, you must do so through direct Ethernet connections to Controller A and Controller B.

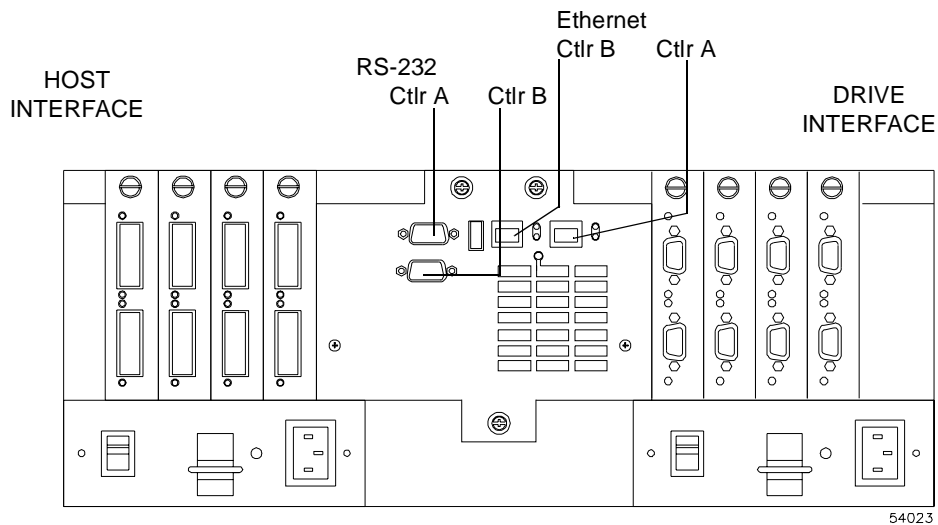
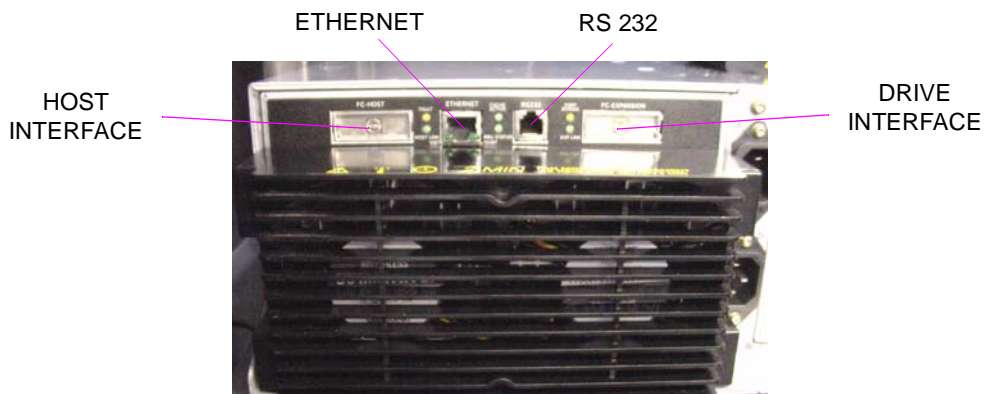


Figure 11 Controller Tray Diagnostic Interface Connectors

These same diagnostic connections are on the D173 Disk Controller Array, as shown in this back view photograph of one redundant side's controller module and fan module.



## 9170-001 Interface Components

The 9170-001 drive tray has four interface connectors— two on each Channel Card Module (see [Figure 12](#)). The 9170 FC cables use HSSDC to HSSDC connectors to route data, providing copper fibre cables' performance and reliability to the 9170 Disk Arrays.

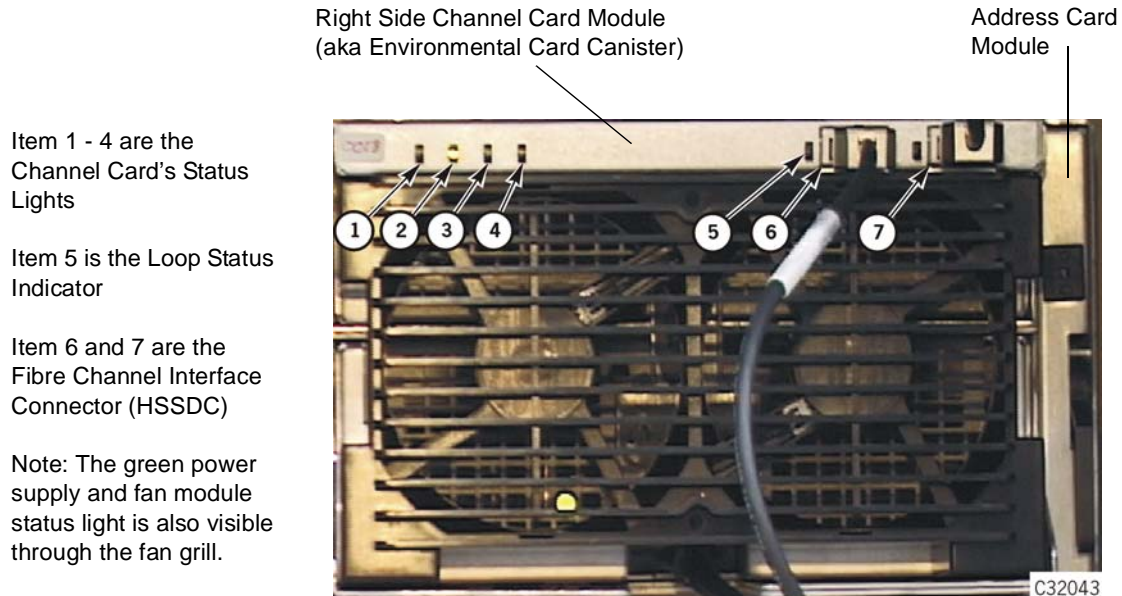


Figure 12 9170's Channel Card - Interface Connectors

Refer to the StorageTek™ 9170 Disk Array User's Guide (P/N 95960) for information about status lights, and cabling going from the 9176 Disk Controller to the 9170 Disk Array.

Briefly, the 9176 Fibre Channel cable used to attach from the controller to the 9170 array uses a FC cable with a DB-9 connector at the controller end and a HSSDC connector at the drive tray end. With ten drive trays in one cabinet, four DB-9 to HSSDC FC cables are used (two short and two long). This creates two sets of redundant FC loops, which attach to opposite ends of the 9170's drive trays. This enables data to be accessed in the event of a catastrophic failure that terminates the FC loop in midstream.

Unique installations using two cabinets and more than ten StorageTek 9170 Disk Arrays are possible. In this case it is important to balance your loads so that each Fibre Channel loop is driving equal amounts of storage. StorageTek Manufacturing will set up the cabinets for best performance, and this or a similar balanced configuration should be maintained.

Refer to the StorageTek D173 Disk Subsystem User's Guide (P/N 96032) for its connector and status light information.

## Controller and Array Cable Requirements

Table 12 lists the cable requirements for controller and drive cable connections. For performance sake of the interface card, you can use either fibre optic or twisted-pair copper cable for host connections, depending on your host to storage subsystem distances. Fibre Channel copper cables are used to make the 9170 drive connections.

To connect fibre optic host or drive cables to the controller tray, you must use GBIC host or drive interface cards. To connect twisted-pair copper cables, you use a copper GBIC with either a DB-9 or HSSDC cable connection port, and for fibre channel (glass) you use the fibre channel GBIC.

---

**NOTE** The appropriate style of GBIC is provided based on the type of HBA that you order. The configurator automatically select the cable and GBIC. If, however, you are installing a hub or switch you may have to modify your order.

---

It is possible to use both types of cables on the same controller tray for host or drive connections as long as you use the appropriate type of GBIC interface card (see illustrations below) for the respective type of cable.

Table 12 Host Interface Cable Requirements

Cable Descriptions					Order Information	
Item	Media Type	Data Size	Transfer Speed	Range	Part No.	Length
Fiber optic (multi-mode, 50 micrometer)	Shortwave laser	100 MB/sec	1062.5 Mbaud	Up to 0.5 kilometer	See Siebel or SAP clarify	3 meter
						10 meter
Copper wire (shielded, twisted pair)	Electrical signal	100 MB/sec	1062.5 Mbaud	Up to 30 meters	See Siebel or SAP clarify	3 meter
						10 meter



# Installing the Hardware

## Host Adapters

You can connect hosts to the controller tray using either a single-or dual-bus configuration (Figure 13). In a single-bus configuration, each host connects to only one controller. In a dual-bus configuration, each host connects to both controllers. The dual-bus configuration provides the greatest controller and path redundancy protection if a connection or hardware problem occurs.

To prepare for the StorageTek Disk Subsystem storage installation, always do the following as applicable to your network configuration:

- Refer to the documentation provided with your host adapters (HBA) for installation requirements and procedures.
- Use the correct host adapter driver. Refer to the particular software (operating system) installation guide and README file (or CD insert) on the StorageTek 9176 or D173 installation CD for information on supported host adapters and drivers. StorageTek's customer support organization maintains a configuration matrix, which lists all tested and approved HBAs and drivers.

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**NOTE** See appendix A, and refer to the KnowledgeMap, which has connectivity information. New platform host attachments are being added; and each has a specific and unique installation process. A host-specific CD is available from StorageTek for each platform you wish to attach to.

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## Single-Bus Configurations

For single-bus configurations, install a single- or dual-channel host adapter on each host.

## Dual-Bus Configurations (recommended)

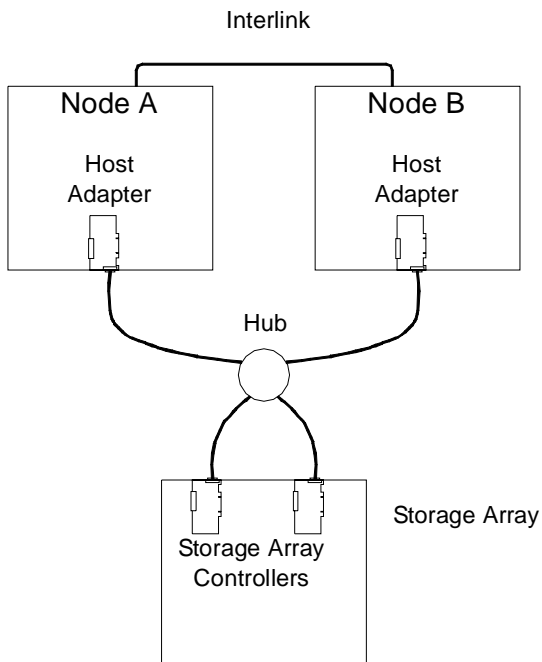
For dual-bus configurations, do either of the following:

- Install two, single-channel host adapters in each host, *or*
- Install one, two-channel host adapter in each host.

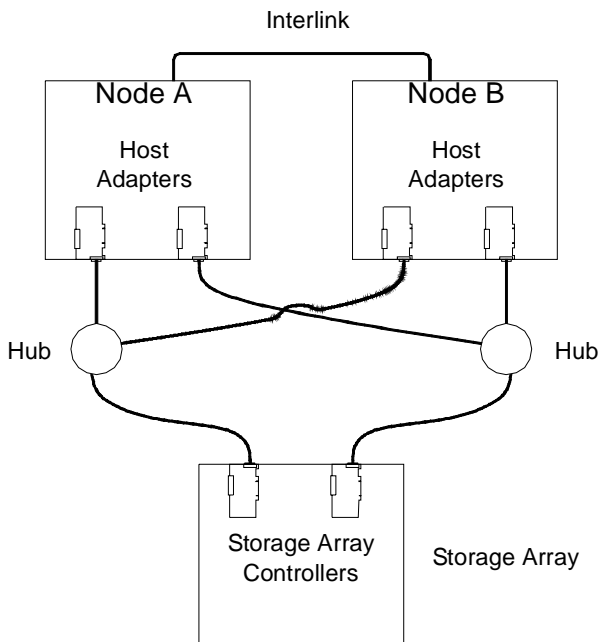
---

**IMPORTANT** Make sure each host adapter and controller has a unique ID. If installing two host adapters per host for a dual-bus configuration, select the same Host ID on each host to prevent conflicts.

---



Fibre Channel Connection  
(single bus)



Fibre Channel Connection  
(dual bus)

NOTE: Other Hub configurations are possible

Figure 13 Installing the Disk Subsystem on a Fibre Channel Network



## Other Hardware

Additional hardware you will need to install depends on whether you use the host-agent method (Figure 14 and Figure 16) or the direct-manage (Figure 15 and Figure 17) method to manage the Disk storage subsystem. Refer to the disk subsystem power point configuration presentation, P/N 96034; and to the concept guide, P/N 96035 for more information with information on heterogeneous configurations .

If using the host-agent attached (aka host-agent manage) method, do the following:

- Install one or more management stations (if not already installed).
- Install a software agent host.

If using the direct network attached (aka direct manage) method, do the following:

- Install one or more management stations (if not already installed).
- Attach Ethernet cables to each management station — one pair for each controller tray in the storage array. Leave the opposite end of these cables unconnected for now. You will connect each cable to each controller when you install the controller tray.

## StorageTek Disk Subsystem - Installation and Service

Refer to the *Documents on CD* or to the 9176 or D173 Product CD (inside the Docs folder) that shipped with your StorageTek Disk Subsystem for installation and service manuals.

There are also manuals available on StorageTek's rackmount cabinets and adjustable mounting rails. Refer to the KnowledgeMap, or go to engineering's web page at:

<http://gandalf.stortek.com/ctp/9176/index.html>

<http://gandalf.stortek.com/ctp/D173/index.html>

These documents can help you solve most any installation problem, and in the event of a component problem, there are User's Guides with service and replacement procedures.

StorageTek strives to provide the best StorageNet™ SAN solution for the customer and the customer's customer. Training web pages, photographs, screen captures, and videos will be made available at:

<http://gandalf.stortek.com/ctp/manager/index.html>

and at other web pages. Please feel free to notify us if there is any thing else that could help our sales or service organization.

Information Development, Mail Stop 2129, One StorageTek Drive, Louisville, CO 80028

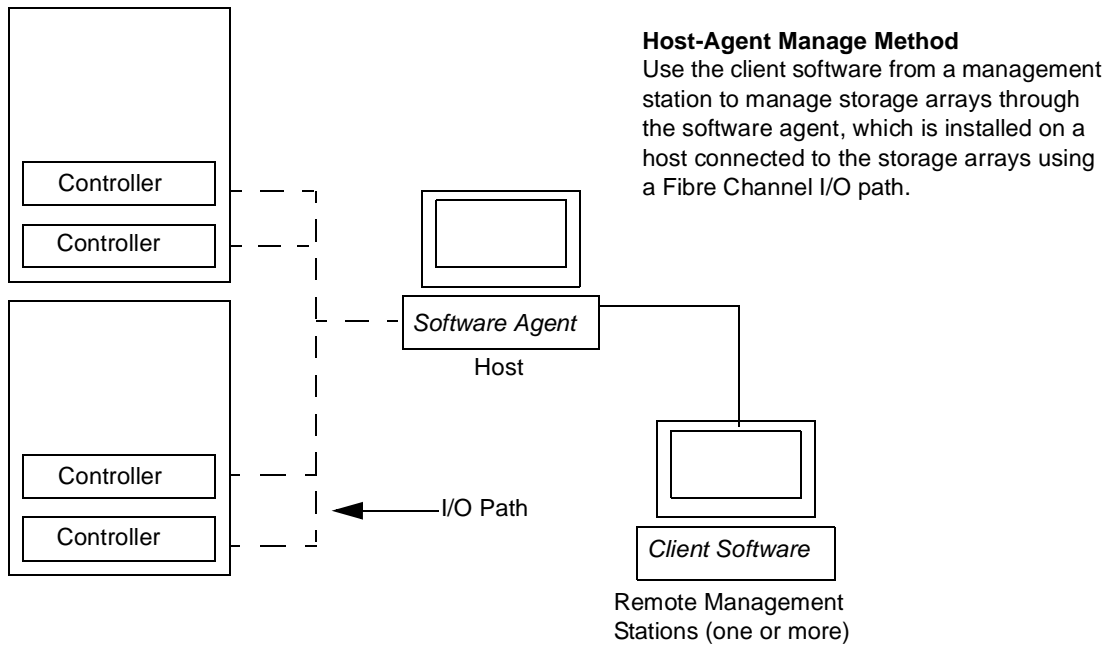


Figure 14 Host-Agent Manage Method

**Direct-Manage Method**

Use the client software from a management station to manage storage arrays through direct Ethernet connections to the controllers. The host machine is connected to the storage arrays using a Fibre Channel I/O path.

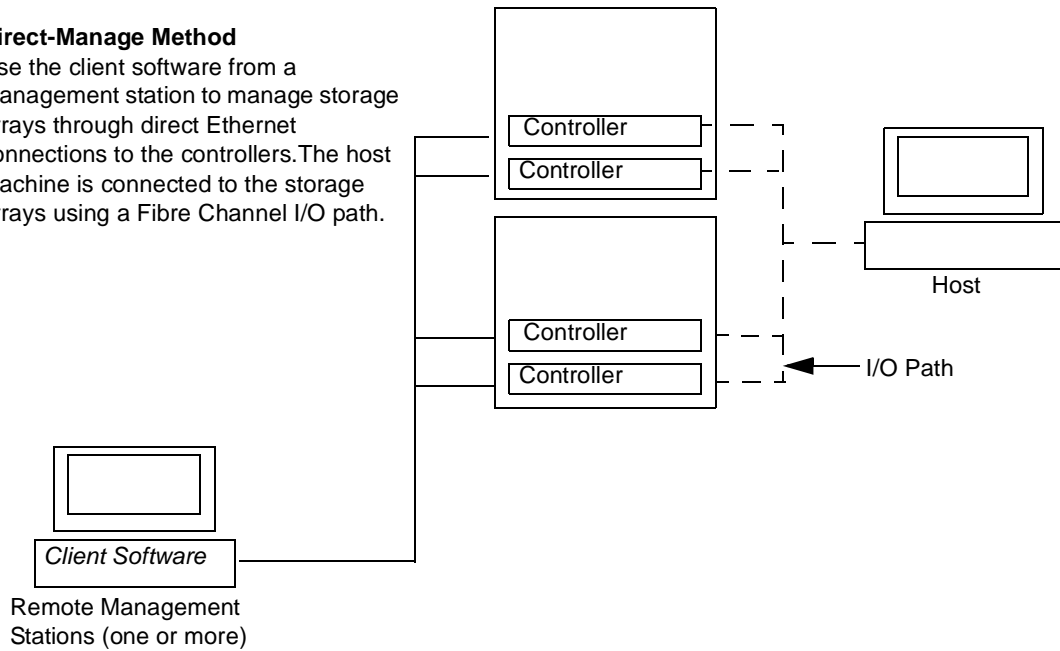


Figure 15 Direct-Manage Method

These same Host Agent attached and Direct Network attached configurations apply to the D173 Disk Subsystem. Refer to the Object Manager 7.10 Concept Guide and D173 User's Guide for more information.

## StorageTek Disk Subsystem comparisons

To assist with your purchasing decisions, use these parameters and consult with your local area sales team representatives to plan the solution that is best for your operating environment.

	D173-001	9176-001	9176-002
Server inputs	One Two (with HA02) for path redundancy	2 Host Minihubs (2 100MB/s redundant loops) or 4 shared ports	4 Host Minihubs (4 100MB/s redundant loops) or 8 shared ports
Cache	128MB per controller module	256MB upgradable to 512MB	512MB upgradeable to 1GB
Capacity	30 drives	100 drives	200 drives
Drive Tray ports	1 per controller module	2 Drive Interface Minihubs	4 Drive Interface Minihubs
Storage	5.4 Terabytes Max	18 Terabytes Max	18 Terabytes Max
Controller model #	2772	4774	4774
Bandwidth maximum	200 MB/s	200 MB/s	400 MB/s
Storage Manage Software	Object Manager 7.10	Object Manager 7.02 or 7.10	Object Manager 7.02 or 7.10
Preferred Cabinet	CBNT M02 for one 30 drive subsystem	CBNT M03	CBNT M03 (over 100 drives requires 2 M03 cabinets)

Note: If one is purchasing a D173 Disk Subsystem and plan to convert it (upgrade) to a 9176 or to a yet to be announced Disk Subsystem, one should consider ordering an M03 cabinet.

The above open systems Disk Subsystems use Fibre Channel with a 1 Gigabit processing capability. Also the following operating systems are supported.

Windows NT	HP-UX	Netware
Solaris	AIX	LINUX
Windows 2000	SGI	

## ■ Program Configuration

Engineering's Program Configuration Document (PCD) defines the applicable Configuration Control Documents (CCD) that are required to define the StorageTek 9176 and D173 Disk Subsystems, and provide the physical and logical integration rules of the multiple hardware and software models.

All of these documents can be found on the KnowledgeMap, which maintains the latest releases of these documents. Other documentation released by engineering include:

Document No.	Model No.	Description
3100207000	9176 001/002	CCD, 9176 Disk Controller
3100208000	9170 001	CCD, 9170 Disk Array
3100227000	D173 001	CCD, D173 Disk Controller Array
31200204000	CBNT M03	CCD, CBNT M03 (39U fixed-height rackmount cabinet)
4000546000	SNFC-H01	CCD, Fibre Channel Hardware (VIXEL 1000)
	FCBU500	CCD, Fibre Channel Hardware (ACCESS HUB)

## 9176-001 Disk Controller

This is modular, scalable storage for increasing capacity growth requirements. The 9176-001 is also referred to as Work Group.

### Logical Rules Summary:

#### *Dual controller subsystem*

- a. Two storage processor cards (controller cards with 256MB memory)
- b. Two Host I/O interface cards (one per storage processor)(two GBIC ports per interface card)
- c. Two DB9 Drive I/O interface cards (two DB9 ports per interface card)
- d. Different Host Interface Attachments are optional. Must order host attach to receive GBICs that are needed in the controller.
- e. Supports up to 4 host attach kits, (should be ordered in pairs)
- f. Both Homogeneous and Heterogeneous attaches are available.

- g. Copper or Shortwave (fibre optic) GBIC included in Host attach kits
- h. Cables for host attach kits are ordered separately
- i. Every controller must have at least one 9170-001 Disk Array
- j. Maximum of ten, 9170 Disk Arrays (up to 100 (36, 72 or 180 Gigabyte) drive modules)
- k. Battery Backup Unit (BBU) supplied
- l. 19 inch rackmount cabinet installation available
- m. Height = 4U
- n. One Storage partition is supplied. Ordered separately, feature code P1T4 is Storage Partition 1-4. If you increase the number of attaches using network hardware (hubs, switches, etc.), P5T8, Storage Partition 5-8 would be the additional feature code ordered. A form is available with more (up to 16 (PT16)).

**Note:** Storage Partitioning enables sharing of the disk capacity from a single 9176 controller among several hosts or host group. One storage partition is required for every host or host group. The partition represents a logical division of the disk that is only visible to the host or host group to which it is assigned.

## 9176-002 Disk Controller

This is modular, scalable storage for increasing capacity growth requirements, also known as enterprise storage.

### Logical Rules Summary:

#### *Dual controller subsystem*

- a. Two storage processor cards (controller cards with 512MB memory)
- b. Four Host I/O interface cards (two per storage processor) (two GBIC ports per interface card)
- c. Four DB9 Drive I/O interface cards (two DB9 ports per interface card)
- d. Different Host Interface Attachments are optional. Must order host attach to receive GBICs that are needed in the controller.
- e. Supports up to 8 host attach kits, (should be ordered in pairs)
- f. Both Homogeneous and Heterogeneous attaches are available
- g. Copper or Shortwave GBIC included in Host attach kits
- h. Cables for host attach kits ordered separately
- i. Every controller must have at least one 9170-001 Disk Array

- j. Maximum of twenty, 9170 Disk Arrays (up to 200 drives) - 36, 72 or 180 Gigabytes
- k. Battery Backup Unit (BBU) supplied
- l. 19 inch rackmount cabinet installation available
- m. Height = 4U
- n. One Storage partition is supplied. P1T4 (Storage Partition 1-4) and P5T8 (Storage Partition 5-8) must be ordered separately. A form is available with more (up to 16 (PT16))

**Note:** Storage Partitioning enables sharing of the disk capacity from a single 9176 controller among several hosts or host group. One storage partition is required for every host or host group. The partition represents a logical division of the disk that is only visible to the host or host group to which it is assigned.

## D173-001 Disk Controller Array

This is an entry-level storage subsystem, which is upgradeable to a 9176 Disk System. Refer to the StorageTek D173 User's Guide for specific information.

### Logical Rules Summary:

#### ***Dual controller subsystem with the High Availability (HA02) feature code selection***

- a. Two 2772 controller module cards (without HA02 equals single controller)
- b. Two Host I/O interface connectors (one each on each controller module)
- c. Two Drive I/O interface connectors (one each on each controller module)
- d. Different Host Interface Attachments are optional. Must order host attach to receive GBIC that are needed in the controller.
- e. Minimum of 2 host attach kits (order in pairs) recommended or (see f.)
- f. Heterogeneous attaches are available with hubs/switches
- g. Copper or Shortwave (fibre optic) GBIC included in Host attach kits
- h. Cables for host attach kits are ordered separately
- i. Maximum of two additional 9170 Disk Arrays (up to a total of 30 drive modules with a capacity of either 72 or 180 Gigabytes each)
- j. Battery Backup Unit (BBU) supplied (one per controller module)

- k. 19 inch rackmount cabinet installation available
- l. Height = 3U for the Disk Controller Array and each 9170 expansion unit
- m. One Storage partition is supplied. Ordered separately, feature code PT02 is for 1-2 storage partitions. P1T4 is for Storage Partition 1-4. If you increase the number of attaches using network hardware (hubs, switches, etc.), P5T8, Storage Partition 5-8 would be the additional feature code ordered. A form is available with more (up to 16 (PT16)).

**Note:** Storage Partitioning enables sharing of the disk capacity from a single D173 disk controller array among several hosts or host group. One storage partition is required for every host or host group. The partition represents a logical division of the disk that is only visible to the host or host group to which it is assigned.

## 9170-001 Disk Array

This is scalable disk (drive trays) for increasing capacity and meeting growing storage requirements.

### Logical Rules Summary:

- a. Maximum of 10 drives per drawer (9170 Disk Array)
- b. Minimum of 5 drives and 5 filler panels (FP05)
- c. Minimum of 1 storage array per 9176 Disk Controller
- d. Maximum of 20 9170s per controller
- e. Height = 3U

### Host Interface Kits for 9176-001/002

The host interface kits (depending on the host type) contain some or all of the following components:

- Host bus adapters (interface cards), software driver, and manuals (when applicable)
- CD-ROMs - contain Firmware, Software & Manuals (documentation is provided in Printed Document Format (PDF))
- Copper or Shortwave GBIC
- **Fibre channel** cables must be ordered **separately** with feature codes.

### CBNT M03 - 39U FIXED HEIGHT CABINET

- 39U Fixed cabinet
- Maximum number of U's is 39U
- 9176 Disk Controller: 4U
- 9170 Disk Array: 3U
- 9176/9170 models will have rackmount rails when ordered with M03R



- Slide assy feature codes are for Servers or other appliances that need to be pulled out.
- Rail assy feature codes are for appliances other than the 9176/9170.
- The CBNT M03 is connected to the AC power source by a NEMA L6 power cords on all North American installations.
- The CBNT M03 when shipped with an International power cords and will require the local StorageTek office to provide the power connection for all International installations.
- The CBNT M03 has dual power distribution units which includes dual power cords. The feature code for domestic or international must be selected.

## Placement

- A subsystem is any combination of one 9176 Disk Controller and (n) 9170 Disk Arrays within the same cabinet
- The subsystem (its devices) is always positioned at the bottom of the cabinet.
- If subsystems have the same number of drawers in the same cabinet, the subsystem with the largest number of drives goes on the bottom of the cabinet

**Note:** For additional information, refer to the CBNT M03 User's Guide (ONLINE)

The following features are for power connector options and supply rails or slide assemblies to add additional components. All of the feature codes can be used for various components including servers, monitors, etc.. The multiple feature codes are used for components that do not have a M03R feature code available.

Table 1. M03 Additional Features

FEATURE CODE	DESCRIPTION
9954	INTERNATIONAL PWR CORD
9955	N.A. NEMA L6-30P PWR CORD
00DR	WITHOUT DOOR (Filler panels in empty slots
01DR	WITH DOOR
M3S1	1 SLIDE ASSY
M3S2	2 SLIDE ASSY
M3R1	1 RAIL ASSY
M3R2	2 RAIL ASSY
M3R3	3 RAIL ASSY

## 9176 Hardware and Software Features

FeatureCodes	DESCRIPTION	Opt/ Pick one	9176 001	9176 002
SP02	ADDITIONAL STORAGE PROCESSOR CARD	P	X	NA
PIT4	STORAGE PARTITION 1 THRU 4	O	X	X
P5T8	STORAGE PARTITION 5 THRU 8	O	X	X
PT16	STORAGE PARTITION 9 THRU 16	O	X	X
M03R	CBNT M03 RACKMOUNT	P	X	X
AR01	ADJUSTABLE RACK RAILS	P	X	X

FeatureCodes	DESCRIPTION/HOST ATTACHMENT	Opt/ Req	9176 001	9176 002
SPC1	1 SUN PCI COPPER ATTACH W/CARD	O	X	X
SPC2	2 SUN PCI COPPER ATTACH W/CARD	O	X	X
SPC3	3 SUN PCI COPPER ATTACH W/CARD	O	X	X
SPC4	4 SUN PCI COPPER ATTACH W/CARD	O	X	X
SPC5	5 SUN PCI COPPER ATTACH W/CARD	O		X
SPC6	6 SUN PCI COPPER ATTACH W/CARD	O		X
SPC7	7 SUN PCI COPPER ATTACH W/CARD	O		X
SPC8	8 SUN PCI COPPER ATTACH W/CARD	O		X
SPCA	1 SUN PCI COPPER ATTACH WO/CARD	O	X	X
SPCB	2 SUN PCI COPPER ATTACH WO/CARD	O	X	X
SPCC	3 SUN PCI COPPER ATTACH WO/CARD	O	X	X
SPCD	4 SUN PCI COPPER ATTACH WO/CARD	O	X	X
SPCE	5 SUN PCI COPPER ATTACH WO/CARD	O		X
SPCF	6 SUN PCI COPPER ATTACH WO/CARD	O		X
SPCG	7 SUN PCI COPPER ATTACH WO/CARD	O		X
SPCH	8 SUN PCI COPPER ATTACH WO/CARD	O		X
SPG1	1 SUN PCI SHWV ATTACH W/CARD	O	X	X
SPG2	2 SUN PCI SHWV ATTACH W/CARD	O	X	X
SPG3	3 SUN PCI SHWV ATTACH W/CARD	O	X	X
SPG4	4 SUN PCI SHWV ATTACH W/CARD	O	X	X

FeatureCodes	DESCRIPTION/HOST ATTACHMENT	Opt/ Req	9176 001	9176 002
SPG5	5 SUN PCI SHWV ATTACH W/CARD	O		X
SPG6	6 SUN PCI SHWV ATTACH W/CARD	O		X
SPG7	7 SUN PCI SHWV ATTACH W/CARD	O		X
SPG8	8 SUN PCI SHWV ATTACH W/CARD	O		X
SPGA	1 SUN PCI SHWV ATTACH WO/CARD	O	X	X
SPGB	2 SUN PCI SHWV ATTACH WO/CARD	O	X	X
SPGC	3 SUN PCI SHWV ATTACH WO/CARD	O	X	X
SPGD	4 SUN PCI SHWV ATTACH WO/CARD	O	X	X
SPGE	5 SUN PCI SHWV ATTACH WO/CARD	O		X
SPGF	6 SUN PCI SHWV ATTACH WO/CARD	O		X
SPGG	7 SUN PCI SHWV ATTACH WO/CARD	O		X
SPGH	8 SUN PCI SHWV ATTACH WO/CARD	O		X
SSC1	1 SUNSBUS COPPER ATTACH W/CARD	O	X	X
SSC2	2 SUNSBUS COPPER ATTACH W/CARD	O	X	X
SSC3	3 SUNSBUS COPPER ATTACH W/CARD	O	X	X
SSC4	4 SUNSBUS COPPER ATTACH W/CARD	O	X	X
SSC5	5 SUNSBUS COPPER ATTACH W/CARD	O		X
SSC6	6 SUNSBUS COPPER ATTACH W/CARD	O		X
SSC7	7 SUNSBUS COPPER ATTACH W/CARD	O		X
SSC8	8 SUNSBUS COPPER ATTACH W/CARD	O		X
SSCA	1 SUNSBUS COPPER ATTACH WO/CARD	O	X	X
SSCB	2 SUNSBUS COPPER ATTACH WO/CARD	O	X	X
SSCC	3 SUNSBUS COPPER ATTACH WO/CARD	O	X	X
SSCD	4 SUNSBUS COPPER ATTACH WO/CARD	O	X	X
SSCE	5 SUNSBUS COPPER ATTACH WO/CARD	O		X
SSCF	6 SUNSBUS COPPER ATTACH WO/CARD	O		X
SSCG	7 SUNSBUS COPPER ATTACH WO/CARD	O		X
SSCH	8 SUNSBUS COPPER ATTACH WO/CARD	O		X
SSG1	1 SUNSBUS SHWV ATTACH W/CARD	O	X	X
SSG2	2 SUNSBUS SHWV ATTACH W/CARD	O	X	X

FeatureCodes	DESCRIPTION/HOST ATTACHMENT	Opt/ Req	9176 001	9176 002
SSG3	3 SUNSBUS SHWV ATTACH W/CARD	O	X	X
SSG4	4 SUNSBUS SHWV ATTACH W/CARD	O	X	X
SSG5	5 SUNSBUS SHWV ATTACH W/CARD	O		X
SSG6	6 SUNSBUS SHWV ATTACH W/CARD	O		X
SSG7	7 SUNSBUS SHWV ATTACH W/CARD	O		X
SSG8	8 SUNSBUS SHWV ATTACH W/CARD	O		X
SSGA	1 SUNSBUS SHWV ATTACH WO/CARD	O	X	X
SSGB	2 SUNSBUS SHWV ATTACH WO/CARD	O	X	X
SSGC	3 SUNSBUS SHWV ATTACH WO/CARD	O	X	X
SSGD	4 SUNSBUS SHWV ATTACH WO/CARD	O	X	X
SSGE	5 SUNSBUS SHWV ATTACH WO/CARD	O		X
SSGF	6 SUNSBUS SHWV ATTACH WO/CARD	O		X
SSGG	7 SUNSBUS SHWV ATTACH WO/CARD	O		X
SSGH	8 SUNSBUS SHWV ATTACH WO/CARD	O		X
NTC1	1 NT PCI COPPER ATTACH W/CARD	O	X	X
NTC2	2 NT PCI COPPER ATTACH W/CARD	O	X	X
NTC3	3 NT PCI COPPER ATTACH W/CARD	O	X	X
NTC4	4 NT PCI COPPER ATTACH W/CARD	O	X	X
NTC5	5 NT PCI COPPER ATTACH W/CARD	O		X
NTC6	6 NT PCI COPPER ATTACH W/CARD	O		X
NTC7	7 NT PCI COPPER ATTACH W/CARD	O		X
NTC8	8 NT PCI COPPER ATTACH W/CARD	O		X
NTCA	1 NT PCI COPPER ATTACH WO/CARD	O	X	X
NTCB	2 NT PCI COPPER ATTACH WO/CARD	O	X	X
NTCC	3 NT PCI COPPER ATTACH WO/CARD	O	X	X
NTCD	4 NT PCI COPPER ATTACH WO/CARD	O	X	X
NTCE	5 NT PCI COPPER ATTACH WO/CARD	O		X
NTCF	6 NT PCI COPPER ATTACH WO/CARD	O		X
NTCG	7 NT PCI COPPER ATTACH WO/CARD	O		X
NTCH	8 NT PCI COPPER ATTACH WO/CARD	O		X

FeatureCodes	DESCRIPTION/HOST ATTACHMENT	Opt/ Req	9176 001	9176 002
NTG1	1 NT PCI SHWV ATTACH W/CARD	O	X	X
NTG2	2 NT PCI SHWV ATTACH W/CARD	O	X	X
NTG3	3 NT PCI SHWV ATTACH W/CARD	O	X	X
NTG4	4 NT PCI SHWV ATTACH W/CARD	O	X	X
NTG5	5 NT PCI SHWV ATTACH W/CARD	O		X
NTG6	6 NT PCI SHWV ATTACH W/CARD	O		X
NTG7	7 NT PCI SHWV ATTACH W/CARD	O		X
NTG8	8 NT PCI SHWV ATTACH W/CARD	O		X
NTGA	1 NT PCI SHWV ATTACH WO/CARD	O	X	X
NTGB	2 NT PCI SHWV ATTACH WO/CARD	O	X	X
NTGC	3 NT PCI SHWV ATTACH WO/CARD	O	X	X
NTGD	4 NT PCI SHWV ATTACH WO/CARD	O	X	X
NTGE	5 NT PCI SHWV ATTACH WO/CARD	O		X
NTGF	6 NT PCI SHWV ATTACH WO/CARD	O		X
NTGG	7 NT PCI SHWV ATTACH WO/CARD	O		X
NTGH	8 NT PCI SHWV ATTACH WO/CARD	O		X
HPSA	1 HP SHWV ATTACH WO/CARD	O	X	X
HPSB	2 HP SHWV ATTACH WO/CARD	O	X	X
HPSC	3 HP SHWV ATTACH WO/CARD	O	X	X
HPSD	4 HP SHWV ATTACH WO/CARD	O	X	X
HPSE	5 HP SHWV ATTACH WO/CARD	O		X
HPSF	6 HP SHWV ATTACH WO/CARD	O		X
HPSG	7 HP SHWV ATTACH WO/CARD	O		X
HPSH	8 HP SHWV ATTACH WO/CARD	O		X

**Note:** Cables are ordered separately. Sun PCI and Sun SBUS Copper HBA are JNI and have a DB9 connector. NT Copper HBA is Qlogic with a HSSDC connector. All Optical HBAs have SC-SC Duplex connectors.

## DRIVE FEATURES CODES FOR 9170

Feature codes	DESCRIPTION	Opt/ Pick one	9170- 001
F185	5 18GB 10K FIBRE DRV	O	X
F18A	10 18GB 10K FIBRE DRV	O	X
F365	5 36GB 10K FIBRE DRV	O	X
F36A	10 36GB 10K FIBRE DRV	O	X
FP05	5 DRIVE FILLER PANEL	O	X
FP10	10 DRIVE FILLER PANEL	O	X
M02R	CBNT M02 MOUNTING KIT	P	X
M03R	CBNT M03 RACKMOUNT	P	X
AR01	ADJUSTABLE RACK RAILS	P	X

**Note:** FP05 or FP10 are always needed when 10 drives have **not** been ordered. The Configurator should default to the appropriate feature code.

## Fibre Optic Cable Features (SC Duplex to SC Duplex)

Application: 9176 SP (Controller) to Optical HBA and SNFC H01 Hub w/optical GBIC. The following tables describe the cables available.

FEATURE CODES	DESCRIPTION	PART NUMBER/QTY
OA01	1-5M SC/SC DUPLEX OPT CBL	10800133
OA02	1-10M SC/SC DUPLEX OPT CBL	10800134
OA03	1-50M SC/SC DUPLEX OPT CBL	10800137
OA04	1-100M SC/SC DUPLEX OPT CBL	10800138
OA05	1-250M SC/SC DUPLEX OPT CBL	10800139
OA06	1- 500M SC/SC DUPLEX OPT CBL	10800140
OA07	1- 30M SC/SC DUPLEX OPT CBL	10800136
OA08	1-20M SC/SC DUPLEX OPT CBL	10800135
O005	2-5M SC/SC DUPLEX OPT CBL	10800133 X2
O010	2-10M SC/SC DUPLEX OPT CBL	10800134 X2
O020	2-20M SC/SC DUPLEX OPT CBL	10800135 X2
O030	2-30M SC/SC DUPLEX OPT CBL	10800136 X2

FEATURE CODES	DESCRIPTION	PART NUMBER/QTY
O050	2-50M SC/SC DUPLEX OPT CBL	10800137 X2
O100	2-10M SC/SC DUPLEX OPT CBL	10800138 X2
O250	2-250M SC/SC DUPLEX OPT CBL	10800139 X2
O500	2-500 M SC/SC DUPLEX OPT CBL	10800140 X2
OA11	3-5M SC/SC DUPLEX OPT CBL	10800133 X3
OA12	3-10M SC/SC DUPLEX OPT CBL	10800134 X3
OA13	3-50M SC/SC DUPLEX OPT CBL	10800137 X3
OA14	3-100M SC/SC DUPLEX OPT CBL	10800138 X3
OA15	3-250M SC/SC DUPLEX OPT CBL	10800139 X3
OA16	3-500M SC/SC DUPLEX OPT CBL	10800140 X3
OA17	3-30M SC/SC DUPLEX OPT CBL)	10800136 X3
OA18	3-20M SC/SC DUPLEX OPT CBL	10800135 X3
OA21	4-5M SC/SC DUPLEX OPT CBL	10800133 X4
OA22	4-10M SC/SC DUPLEX OPT CBL	10800134 X4
OA23	4-50M SC/SC DUPLEX OPT CBL	10800137 X4
OA24	4-100M SC/SC DUPLEX OPT CBL	10800138 X4
OA25	4-250M SC/SC DUPLEX OPT CBL	10800139 X4
OA26	4-500M SC/SC DUPLEX OPT CBL	10800140 X4
OA27	4-30M SC/SC DUPLEX OPTCBL	10800136 X4
OA28	4-20M SC/SC DUPLEX OPTCBL	10800135 X4
OA31	5-5 M SC/SC DUPLEX OPT CBL	10800133 X5
OA32	5-10M SC/SC DUPLEX OPT CBL	10800134 X5
OA33	5-50M SC/SC DUPLEX OPT CBL	10800137 X5
OA34	5-100M SC/SC DUPLEX OPT CBL	10800138 X5
OA35	5-250M SC/SC DUPLEX OPT CBL	10800139 X5
OA36	5-500M SC/SC DUPLEX OPT CBL	10800140 X5
OA37	5-30M SC/SC DUPLEX OPT CBL	10800136 X5
OA38-	5-20M SC/SC DUPLEX OPT CBL	10800135 X5
OA41	6-5M SC/SC DUPLEX OPT CBL	10800133 X6
OA42	6-10M SC/SC DUPLEX OPT CBL	10800134 X6
OA43	6-50M SC/SC DUPLEX OPT CBL	10800137 X6
OA44	6-100M SC/SC DUPLEX OPT CBL	10800138 X6
OA45	6-250M SC/SC DUPLEX OPT CBL	10800139 X6
OA46	6-500M SC/SC DUPLEX OPT CBL	10800140 X6
OA47	6-30M SC/SC DUPLEX OPT CBL	10800136 X6

FEATURE CODES	DESCRIPTION	PART NUMBER/QTY
OA48	6-20M SC/SC DUPLEX OPT CBL	10800135 X6
OA51	7-5M SC/SC DUPLEX OPT CBL	10800133 X7
OA52	7-10M SC/SC DUPLEX OPT CBL	10800134 X7
OA53	7-50M SC/SC DUPLEX OPT CBL	10800137 X7
OA54	7-100M SC/SC DUPLEX OPT CBL	10800138 X7
OA55	7-250M SC/SC DUPLEX OPT CBL	10800139 X7
OA56	7-500M SC/SC DUPLEX OPT CBL	10800140 X7
OA57	7-30M SC/SC DUPLEX OPT CBL	10800136 X7
OA58	7-20M SC/SC DUPLEX OPT CBL	10800135 X7
OA61	8-5M SC/SC DUPLEX OPT CBL	10800133 X8
OA62	8-10M SC/SC DUPLEX OPT CBL	10800134 X8
OA63	8-50M SC/SC DUPLEX OPT CBL	10800137 X8
OA64	8-100M SC/SC DUPLEX OPT CBL	10800138 X8
OA65	8-250M SC/SC DUPLEX OPT CBL	10800139 X8
OA66	8-500M SC/SC DUPLEX OPT CBL	10800140 X8
OA67	8-30M SC/SC DUPLEX OPT CBL	10800136 X8
OA68	8-20M SC/SC DUPLEX OPT CBL	10800135 X8

### Copper Cables Features (HSSDC to HSSDC)

**Application: 9176 SP (Controller) Copper GBIC to Copper QLOGIC HBA**

FEATURE CODE	DESCRIPTION	PART NUMBER
HH01	1-3M HSSDC/HSSDC (COPPER)	10083586
HH02	1-5M HSSDC/HSSDC(COPPER)	10083569
HH03	1-10M HSSDC/HSSDC(COPPER)	10083570
HH11	2-3M HSSDC/HSSDC(COPPER)	10083586 X2
HH12	2-5M HSSDC/HSSDC(COPPER)	10083569 X2
HH13	2-10M HSSDC/HSSDC(COPPER)	10083570 X2
HH21	3-3M HSSDC/HSSDC (COPPER)	10083586 X3
HH22	3-5M HSSDC/HSSDC(COPPER)	10083569 X3
HH23	3-10M HSSDC/HSSDC(COPPER)	10083570 X3
HH31	4-3M HSSDC/HSSDC(COPPER)	10083586 X4
HH32	4-5M HSSDC/HSSDC(COPPER)	10083569 X4



FEATURE CODE	DESCRIPTION	PART NUMBER
HH33	4-10M HSSDC/HSSDC(COPPER)	10083570 X4
HH41	5-3M HSSDC/HSSDC (COPPER)	10083586 X5
HH42	5-5M HSSDC/HSSDC(COPPER)	10083569 X5
HH43	5-10M HSSDC/HSSDC(COPPER)	10083570 X5
HH51	6-3M HSSDC/HSSDC(COPPER)	10083586 X6
HH52	6-5M HSSDC/HSSDC(COPPER)	10083569 X6
HH53	6-10M HSSDC/HSSDC(COPPER)	10083570 X6
HH61	7-3M HSSDC/HSSDC (COPPER)	10083586 X7
HH62	7-5M HSSDC/HSSDC(COPPER)	10083569 X7
HH63	7-10M HSSDC/HSSDC(COPPER)	10083570 X7
HH71	8-3M HSSDC/HSSDC(COPPER)	10083586 X8
HH72	8-5M HSSDC/HSSDC(COPPER)	10083569 X8
HH73	8-10M HSSDC/HSSDC(COPPER)	10083570 X8

### **Cables Feature (DB9/HSSDC)Copper GBIC to Copper JMI HBAs**

FEATURE CODE	DESCRIPTION	PART NUMBER
DH01	1-3 METER DB9/HSSDC COPPER CBL	10083585
DH02	1-5 METER DB9/HSSDC COPPER CBL	10083561
DH03	1-10 METER DB9/HSSDC COPPER CBL	10083562
DH04	1-30 METER DB9/HSSDC COPPER CBL	10083565
DH11	2- 3 METER DB9/HSSDC COPPER CBL	10083585 X2
DH12	2-5 METER DB9/HSSDC COPPER CBL	10083561 X2
DH13	2-10 METER DB9/HSSDC COPPER CBL	10083562 X2
DH14	2-30 METER DB9/HSSDC COPPER CBL	10083565 X2
DH21	3-3 METER DB9/HSSDC COPPER CBL	10083585 X3
DH22	3-5 METER DB9/HSSDC COPPER CBL	10083561 X3
DH23	3-10 METER DB9/HSSDC COPPER CBL	10083562 X3
DH24	2-30 METER DB9/HSSDC COPPER CBL	10083565 X3
DH31	4-3 METER DB9/HSSDC COPPER CBL	10083585 X4

FEATURE CODE	DESCRIPTION	PART NUMBER
DH32	4-5 METER DB9/HSSDC COPPER CBL	10083561 X4
DH33	4-10 METER DB9/HSSDC COPPER CBL	10083562 X4
DH34	4-30 METER DB9/HSSDC COPPER CBL	10083565 X4
DH41	5-3 METER DB9/HSSDC COPPER CBL	10083585 X5
DH42	5-5 METER DB9/HSSDC COPPER CBL	10083561 X5
DH43	5-10 METER DB9/HSSDC COPPER CBL	10083562 X5
DH51	6-3 METER DB9/HSSDC COPPER CBL	10083585 X6
DH52	6-5 METER DB9/HSSDC COPPER CBL	10083561 X6
DH53	6-10 METER DB9/HSSDC COPPER CBL	10083562 X6
DH54	6-30 METER DB9/HSSDC COPPER CBL	10083565 X6
DH61	7-3 METER DB9/HSSDC COPPER CBL	10083585 X7
DH62	7-5 METER DB9/HSSDC COPPER CBL	10083561 X7
DH63	7-10 METER DB9/HSSDC COPPER CBL	10083562 X7
DH64	7-30 METER DB9/HSSDC COPPER CBL	10083565 X7
DH71	8-3 METER DB9/HSSDC COPPER CBL	10083585 X8
DH72	8-5 METER DB9/HSSDC COPPER CBL	10083561 X8
DH73	8-10 METER DB9/HSSDC COPPER CBL	10083562 X8
DH74	2-30 METER DB9/HSSDC COPPER CBL	10083565 X8

Refer to specific product CCD for the latest feature code information. The Siebel configurator will guide you to select the appropriate materials when ordering a StorageTek 9176 or D173 Disk Subsystem.

Again, refer to the Planning Guide, P/N MO9113Ae and the StorageTek Object Manager 7.10 Concept Guide to make sure that system and patch requirements are known ahead of time.

Also refer to the engineering web pages for up-to-date product terminology, a glossary of terms, photographs, Object Manager screen shots, web training, and downloads. Have your StorageTek sales representative go to:

<http://gandalf.stortek.com/ctp>

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