

# SPARC Enterprise T5140 and T5240 Servers

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## StorageTek SAS RAID Eight-Port Internal HBA Installation Guide

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# Installing the StorageTek SAS RAID Internal HBA Into the SPARC Enterprise T5140 and T5240 Servers

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This guide describes procedures for installing the StorageTek SAS RAID internal HBA into a SPARC Enterprise T5140 or T5240 server.

You need the following documents to install this card into these servers:

- *StorageTek SAS RAID HBA Installation Guide, Eight-Port, Internal HBA (820-1847)* – Provides the main installation instructions for this HBA.
- This document – Supplements the installation instructions by describing the cable routing instructions for the SPARC Enterprise T5140 and T5240 servers.
- *SPARC Enterprise T5140 and T5240 Servers Service Manual* – For server preparation and PCIe card installation procedures.

The following procedures are described in this guide:

- “Verifying the Current Devices on a SPARC System” on page 2
- “Preparing the StorageTek SAS RAID Internal HBA For Installation” on page 3
- “Preparing the Server” on page 9
- “Installing the StorageTek SAS RAID Internal HBA Into a SPARC Enterprise T5140 Server” on page 10
- “Installing the StorageTek SAS RAID Internal HBA Into a SPARC Enterprise T5240 Server” on page 18
- “Finishing Up” on page 23

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# Verifying the Current Devices on a SPARC System

## ▼ To Verify the Current Devices

1. Enter the OpenBoot Prompt (ok) and use the `show-disks` command to list the current devices.

```
{0} ok show-disks
> a) /pci@0/pci@0/pci@2/scsi@0/disk
> b) /pci@0/pci@0/pci@1/pci@0/pci@1/pci@0/usb@0,2/storage@2/disk
> q) NO SELECTION
> Enter Selection, q to quit: q
{0} ok
```

---

**Note** – Device paths might vary from this example, depending on the SPARC system you are using and into which PCIe slot the card is plugged.

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2. Take note of the devices.

This action helps you determine which device is the StorageTek SAS RAID Internal HBA after you install the card.



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# Preparing the StorageTek SAS RAID Internal HBA For Installation

## Observing ESD and Handling Precautions



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**Caution** – Damage to the StorageTek SAS RAID Internal HBA can occur as the result of careless handling or electrostatic discharge (ESD). Always handle the StorageTek SAS RAID Internal HBA with care to avoid damage to electrostatic sensitive components.

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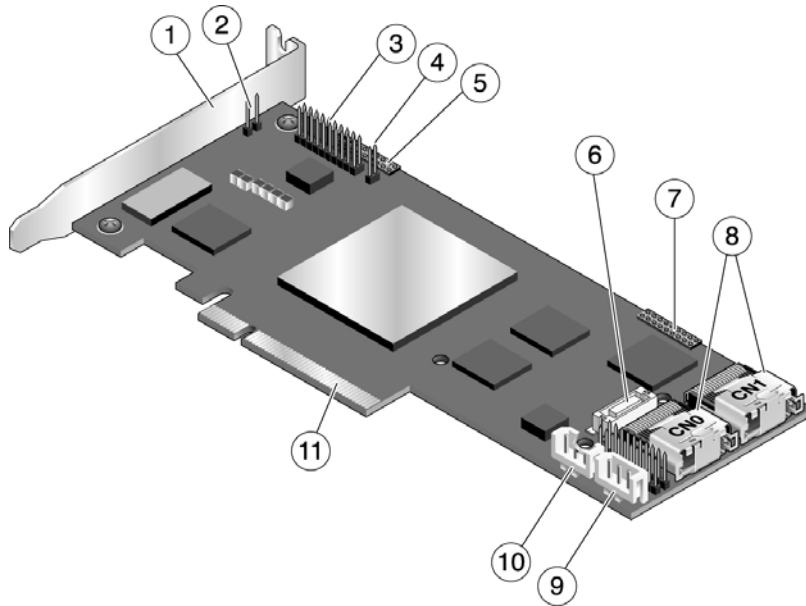
To minimize the possibility of ESD-related damage, use both a workstation antistatic mat and an ESD wrist strap. You can get an ESD wrist strap from any reputable electronics store. Observe the following precautions to avoid ESD-related problems:

- Leave the StorageTek SAS RAID Internal HBA in its antistatic bag until you are ready to install it in the system.
- Always use a properly fitted and grounded wrist strap or other suitable ESD protection when handling the StorageTek SAS RAID Internal HBA and observe proper ESD grounding techniques.
- Hold the StorageTek SAS RAID Internal HBA by the edge of the PCB, not the connectors.
- Place the StorageTek SAS RAID Internal HBA on a properly grounded antistatic work surface pad when it is out of its protective antistatic bag.

## Component Layout

FIGURE 1 shows the component layout for the StorageTek SAS RAID Internal HBA.

**FIGURE 1** StorageTek SAS RAID Internal HBA Component Layout



*Figure shows the component layout for the StorageTek SAS RAID Internal HBA.*

**Figure Legend**

- 
- 1 Mounting bracket
  - 2 Alarm connector
  - 3 Drive Activity LED connectors for CN0/CN1
  - 4 Mode 0 Flash connector
  - 5 Drive Activity LEDs for CN0/CN1
  - 6 Battery connector
  - 7 Diagnostic LEDs
  - 8 Internal SAS connectors
  - 9 I<sup>2</sup>C connector for CN1
  - 10 I<sup>2</sup>C connector for CN0
  - 11 PCIe x4 connector
-

The following table lists the features of the StorageTek SAS RAID Internal HBA.

**TABLE 1** StorageTek SAS RAID Internal HBA Features

<b>Feature</b>	<b>Specification</b>
Form factor	Low-profile MD2
Bus compatibility	PCIe
PCIe bus width	x8
PCIe bus speed	2.5 Gb/s
PHYs	8
Standard cache	256 MB DDR2
Connectors, internal	Two mini SAS x4 (SFF-8087)
RAID levels	0, 1, 1E, 10, 5, 5EE, 50,6, 60, JBOD
Simple volume	
Disk drives	SATA, SATA II, SAS
Maximum number of disk drives	8 (or up to 100 with expanders)
Hot-spares	
Enclosure support	I <sup>2</sup> C and SGPIO
Automatic failover	
Audible alarm	
Battery backup module	ABM-800

## ▼ To Prepare the StorageTek SAS RAID Internal HBA Card

1. Read “[Observing ESD and Handling Precautions](#)” on page 3.
2. Familiarize yourself with the physical features of the StorageTek SAS RAID Internal HBA and the RAID levels that it supports.  
See “[Component Layout](#)” on page 3.

3. Ensure that you have the right quantity of disk drives for the RAID level you want to use for the arrays.

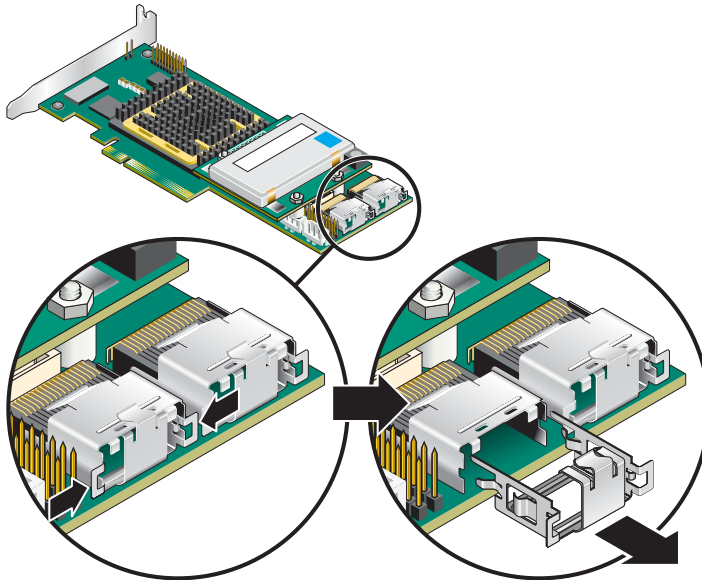
All the disk drives must have the same performance level. You can use different-sized disk drives in the array, but the array will be limited to the capacity of the smallest and slowest disk drive.

The StorageTek SAS RAID Internal HBA supports both SAS and SATA disk drives.

For more information, refer to the *StorageTek SAS RAID HBA Installation Guide, Eight-Port, Internal HBA* and the *StorageTek RAID Manager Software User's Guide* or online Help.

4. Remove the safety clip from each internal SAS connector by using your thumb and forefinger to gently press the tabs of the safety clip and pull the clip out (FIGURE 2).

**FIGURE 2** Removing the Safety Clips From the SAS Connectors



*Figure showing the safety clips being removed from the SAS connectors.*

# Installing the Battery Backup Module

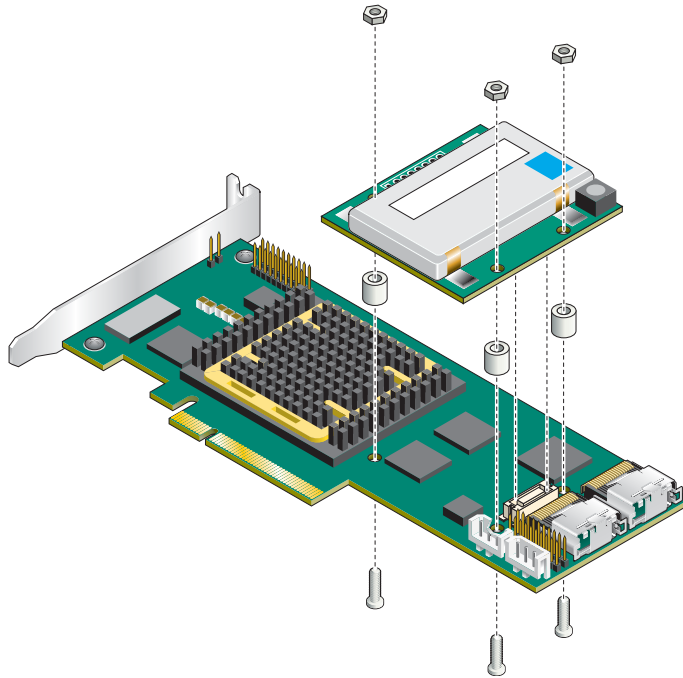
Tools required:

- Small Phillips screwdriver to tighten the screws
- (Suggested) Small needle nose pliers or tweezers
- ESD wrist strap

## ▼ To Install the Battery Backup Module

1. **Use a properly fitted and grounded wrist strap or other suitable ESD protection to avoid ESD-related problems during the battery backup module installation.**  
You can get an ESD wrist strap from any reputable electronics store.
2. **Lay the top square piece of packing foam from the StorageTek SAS RAID Internal HBA ship kit on your work surface, smooth side up.**
3. **Take the StorageTek SAS RAID Internal HBA out of the antistatic bag and set it on the packing foam with the heat sink facing up.**
4. **Slightly lift the StorageTek SAS RAID Internal HBA, and from underneath it, insert three plastic screws from the battery backup module kit through the following three mounting holes in the card (FIGURE 3):**
  - The bottom left hole, which is about 3 inches from the right edge of the StorageTek SAS RAID Internal HBA.
  - The bottom right hole, which is about 1 inch from the right edge of the StorageTek SAS RAID Internal HBA.
  - The top right hole, which is about 1 inch from the right edge of the StorageTek SAS RAID Internal HBA.

**FIGURE 3** Installing the Battery Backup Module



*Figure depicting how to install the battery.*

**5. Place a spacer over each screw.**

The battery backup module connector on the StorageTek SAS RAID Internal HBA is just below the screw closest to the right edge of the card.

**6. Line up the battery backup module connector on the module with the connector on the StorageTek SAS RAID Internal HBA.**

The screws you inserted will line up with matching holes in the battery backup module.

**7. Gently press down on the right edge of the battery backup module until the connectors click into place.**



---

**Caution** – *Do not* force the connection. If a gentle push does not mate the connectors, realign the components and try again.

---

8. Obtain the three nuts from the battery backup module kit, and for each nut, do the following:
  - a. Place the nut onto the screw and hold the nut in place.
  - b. With the Phillips screwdriver, reach underneath the StorageTek SAS RAID Internal HBA and, while holding the nut in place with your other hand, screw the plastic screw into the nut.
  - c. Repeat [Step a](#) and [Step b](#) for the remaining nuts.

---

**Note** – If you are unable to place a nut onto the screw that is close to the heat sink, use a small pair of needle nose pliers or tweezers.

---



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**Caution** – Do not over-tighten the screws.

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## Preparing the Server

Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for specific instructions for the following steps.

1. **Power off the server.**
2. **Disconnect all external cables.**
3. **Remove the server from the rack.**

Place the server on a hard, flat surface.
4. **Attach an antistatic wrist strap.**
5. **Remove the top cover.**
6. **Install the HBA and the cables in the server.**

The procedures for installing the StorageTek SAS RAID Internal HBA vary slightly, depending on the configuration and model of your server:

  - [“Installing the StorageTek SAS RAID Internal HBA Into a SPARC Enterprise T5140 Server”](#) on page 10
  - [“Installing the StorageTek SAS RAID Internal HBA Into a SPARC Enterprise T5240 Server”](#) on page 18

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# Installing the StorageTek SAS RAID Internal HBA Into a SPARC Enterprise T5140 Server

Use this procedure for 4-disk or 8-disk capable SPARC Enterprise T5140 servers.

**1. Remove the air duct.**

Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for those procedures, then return here.

**2. Remove all of the fan modules.**

Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for those procedures, then return here.

**3. Disconnect the hard drive data cables from the motherboard and the hard drive backplane as follows:**

There is one cable to remove on servers that are capable of holding 4 hard drives (see [FIGURE 4](#)).

There are two cables to remove on servers that are capable of holding 8 hard drives (see [FIGURE 5](#)).

**a. Locate the hard drive data cable connector on the motherboard.**

**b. Press the latching mechanism on the connector to release the cable plug.**

If you have difficulty releasing the cable plug, first push the plug slightly into the connector, then press the latching mechanism.

**c. Keeping the latching mechanism pressed, pull the plug from the connector on the motherboard.**

**d. Locate the hard drive cable connector on the hard drive backplane, and repeat [Step b](#) and [Step c](#) to remove the hard drive data cable from the hard drive backplane.**

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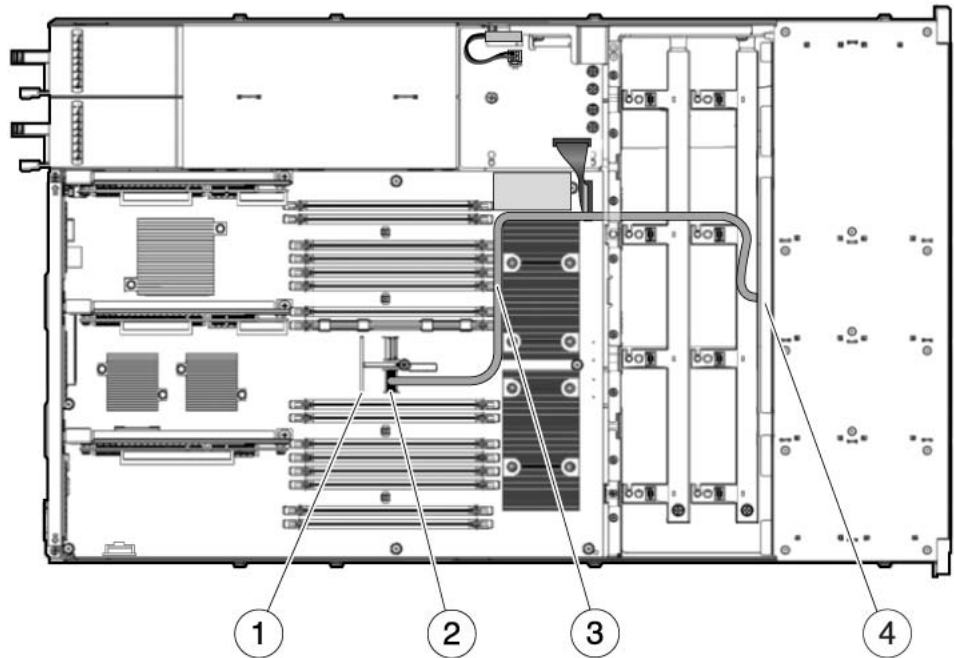
**Note** – If you can't easily remove the cable from the hard drive backplane, you might have to remove the hard drive cage to provide better access. Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for those procedures, then return here.

---

**4. (For 8-disk capable servers) Repeat [Step 3](#) to remove the other hard drive data cable.**



**FIGURE 4** Removing the Existing Hard Drive Cable From a Four-Disk Capable SPARC Enterprise T5140 Server

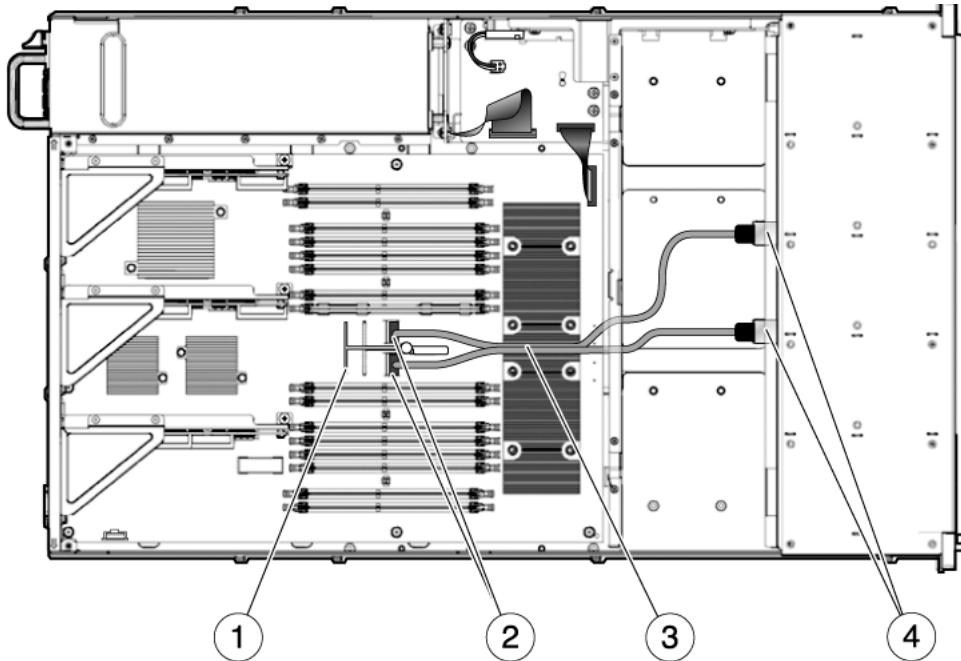


*Figure showing the existing cable routing for the T5140 server.*

**Figure Legend**

- 
- 1 Motherboard handle
  - 2 Connector on motherboard
  - 3 Hard drive data cable
  - 4 Connector on hard drive backplane
-

**FIGURE 5** Removing the Existing Hard Drive Cables From an Eight-Disk Capable SPARC Enterprise T5140 Server



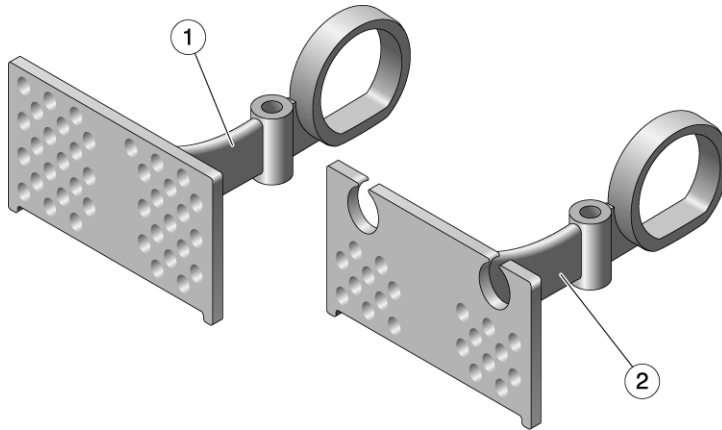
*Figure showing the existing cable routing for the T5140 server.*

**Figure Legend**

- 
- 1 Motherboard handle
  - 2 Connector on motherboard
  - 3 Hard drive data cables
  - 4 Connector on hard drive backplane
-

5. Verify that the motherboard in your system has the updated green motherboard handle (FIGURE 6).

**FIGURE 6** Motherboard Handles for the SPARC Enterprise T5140 Server



*Figure showing the old and updated motherboard handles.*

**Figure Legend**

- 
- |   |                            |
|---|----------------------------|
| 1 | Old motherboard handle     |
| 2 | Updated motherboard handle |
- 

- If the motherboard handle has two notches on top, then the motherboard has the updated handle. Go to [Step 6](#).
- If the motherboard handle does *not* have two notches on top, then you must replace the motherboard handle in your system as follows:
  - a. Remove the screw securing the old motherboard handle to the motherboard.**
  - b. Remove the old motherboard handle from the motherboard.**
  - c. Locate the updated motherboard handle in the StorageTek SAS RAID Internal HBA optional component box and install the handle in the system.**  
Verify that the two notches on the handle are facing up, away from the motherboard.
  - d. Secure the handle to the motherboard using the screw removed in [Step a](#).**

6. Use the following table to locate the correct cables, connectors, and figure references for your server model.

Server Model	Cable Length	Part Number (see label on cable)	Connections		Figure Reference
			HBA Connector	Hard Drive Backplane Connector	
4-disk capable	60 cm	530-3893	CN0	P1	<a href="#">FIGURE 7</a>
8-disk capable	45 cm	530-3891	CN0	P3	<a href="#">FIGURE 8</a>
	40 cm	530-4077	CN1	P2	

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**Note** – A number of cables are included in the StorageTek SAS RAID Internal HBA optional component box. You only need one or two of the cables. You will not use the additional cables.

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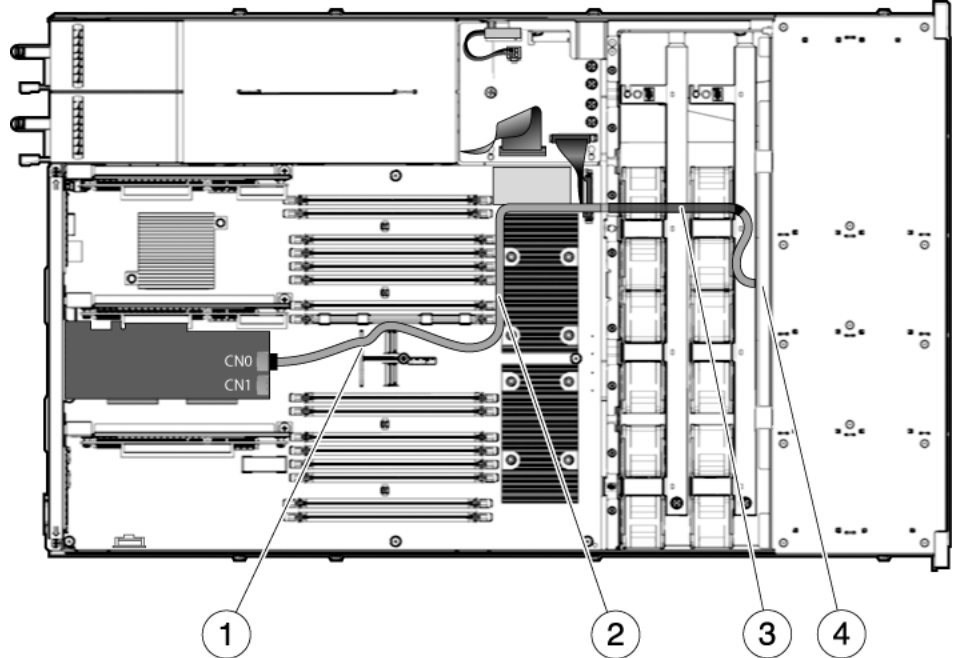
7. Lay the cables out in the system so that the end with the heat-shrink tubing is closer to the hard drive backplane ([FIGURE 7](#) or [FIGURE 8](#)).

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**Note** – Verify that the cable is oriented correctly, with the heat-shrink tubing closer to the hard drive backplane as shown in [FIGURE 7](#) or [FIGURE 8](#) before proceeding.

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**FIGURE 7** Routing the Hard Drive Data Cable in a Four-Disk Capable SPARC Enterprise T5140 Server

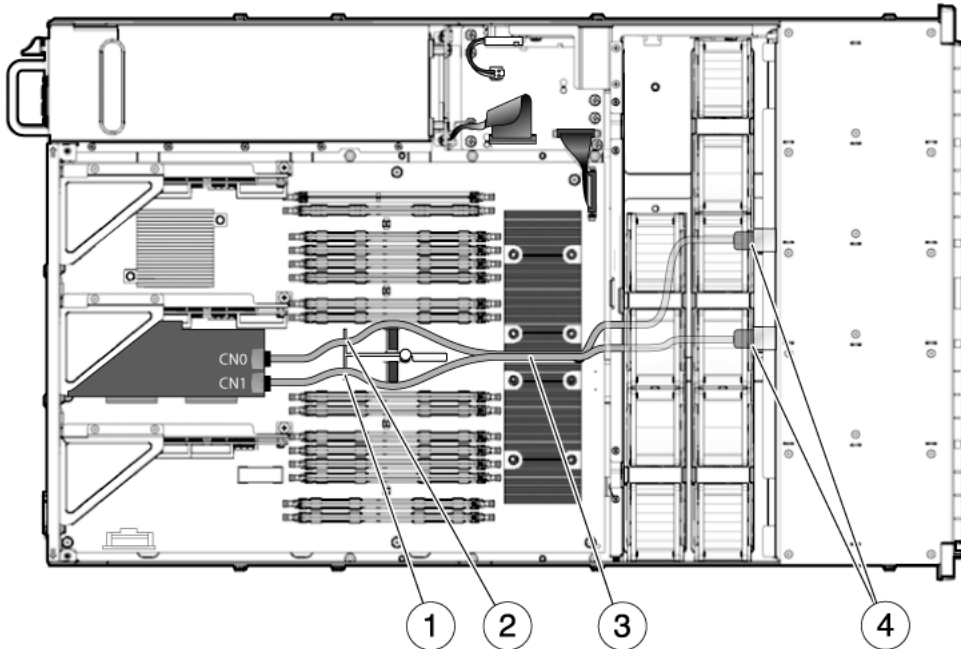


*Figure showing the new cable routing for the T5140 server.*

**Figure Legend**

- 
- 1 Routing the cable through the left notch on the motherboard handle
  - 2 Routing the cable between the FB-DIMMs and CMP1 processor
  - 3 Heat-shrink tubing
  - 4 Routing the cable through the fan midwall to the hard drive backplane
-

**FIGURE 8** Routing the Hard Drive Data Cable in an Eight-Disk Capable SPARC Enterprise T5140 Server



*Figure showing the new cable routing for the T5140 server.*

**Figure Legend**

- 
- 1 Routing the 40 cm cable through the notches on the motherboard handle
  - 2 Routing the 45 cm cable through the notches on the motherboard handle
  - 3 Heat-shrink tubing
  - 4 Routing the cable through the fan midwall to the hard drive backplane
- 
8. (For 4-disk capable) Connect one end of the 60 cm cable into connector CN0 on the StorageTek SAS RAID Internal HBA (FIGURE 7).
  9. (For 8-disk capable) Connect the 45 cm cable to CN0 and the 40 cm cable to CN1 on the StorageTek SAS RAID Internal HBA (FIGURE 8).
  10. Install the StorageTek SAS RAID Internal HBA into PCIe slot 1 (the middle slot).  
Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for the procedures for installing a PCIe card into the server, then return here.
  11. (For 4-disk capable) Connect the other end of the cable into connector P1 on the hard drive backplane (FIGURE 7).

**12. (For 8-disk capable) Connect the 45 cm cable into connector P3 and the 40 cm cable into connector P2 on the hard drive backplane (FIGURE 8).**

**13. Route the cable through the system as shown in FIGURE 7 or FIGURE 8.**

**14. Ensure that the heat-shrink is properly positioned, as shown in FIGURE 7 or FIGURE 8.**

**15. Reinstall the fan modules.**

Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for those procedures, then return here. Note that the heat-shrink tubing on the 530-3893 cable should be routed underneath the fan modules.

**16. Reinstall the air duct.**

Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for those procedures, then return here. Verify that the hard drive data cable is routed inside the air duct when you reinstall it.

**17. Go to “Finishing Up” on page 23 to reinstall your server and power it back on.**

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# Installing the StorageTek SAS RAID Internal HBA Into a SPARC Enterprise T5240 Server

Use this procedure for 8-disk or 16-disk capable SPARC Enterprise T5240 servers.

**1. Remove the following components from the SPARC Enterprise T5240 server:**

- All fans
- All fan boards

Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for those procedures, then return here.

**2. Determine if you have a memory mezzanine assembly installed in your system.**

- If you have a memory mezzanine assembly installed in your system, remove the assembly from the system.
- If you do not have a memory mezzanine assembly installed in your system, locate the air duct and rotate it forward, away from the motherboard.

Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for those procedures, then return here.

**3. Disconnect the hard drive data cables from the motherboard and the hard drive backplane (FIGURE 9).**

The eight-disk capable version of the SPARC Enterprise T5240 server has two cables. The sixteen-disk capable version of the SPARC Enterprise T5240 server has only one hard drive data cable rather than the two that are shown in FIGURE 9.

**a. Locate the hard drive data cable connectors on the motherboard.**

**b. Press the latching mechanism on the connector to release the cable plug.**

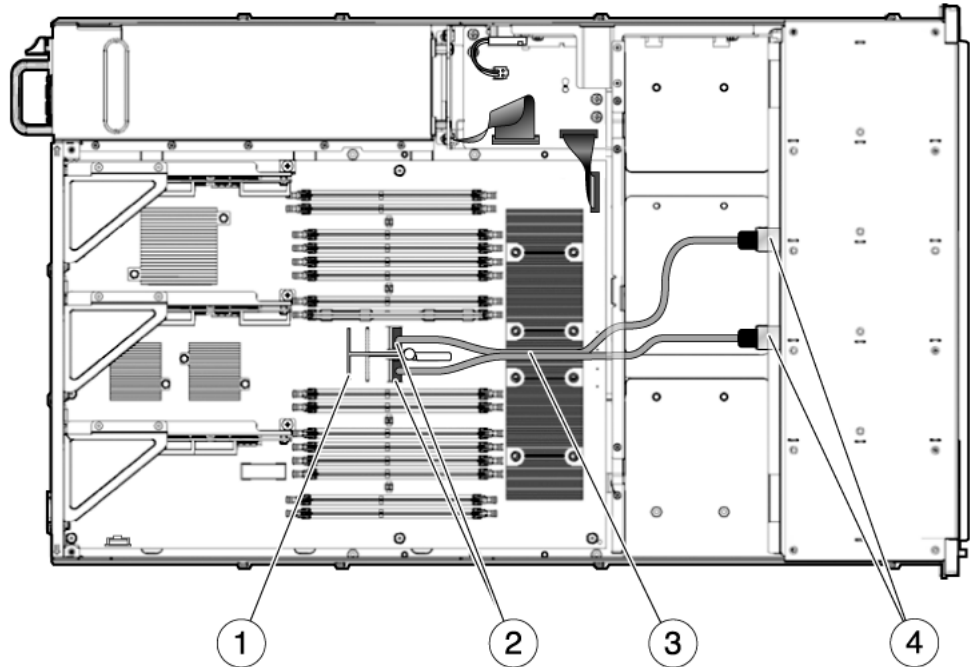
If you have difficulty releasing the cable plug, first push the plug slightly into the connector, then press the latching mechanism.

**c. Keeping the latching mechanism pressed, pull the plug from the connector on the motherboard.**

**d. Locate the hard drive cable connector on the hard drive backplane, and repeat Step b and Step c to remove the hard drive data cable from the hard drive backplane.**



**FIGURE 9** Removing the Existing Hard Drive Cables From a SPARC Enterprise T5240 Server



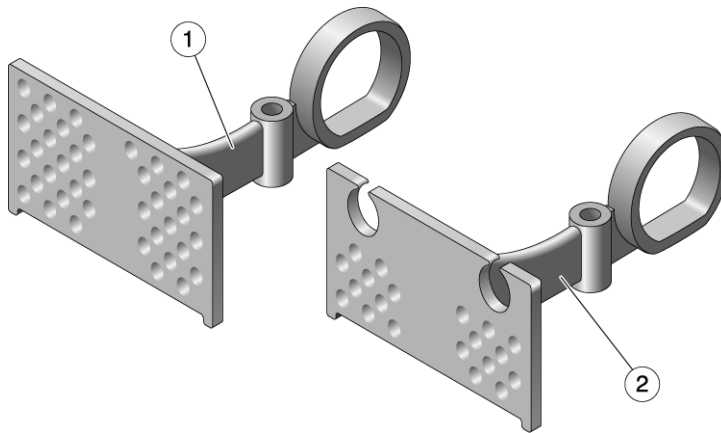
*Figure showing the existing cable routing for the T5240 server.*

**Figure Legend**

- 
- 1 Motherboard handle
  - 2 Connectors on motherboard
  - 3 Hard drive data cables
  - 4 Connectors on hard drive backplane
- 

4. Verify that the motherboard in your system has the updated green motherboard handle (FIGURE 10).

**FIGURE 10** Motherboard Handles for the SPARC Enterprise T5240 Server



*Figure showing the old and updated motherboard handles.*

**Figure Legend**

- 
- |   |                            |
|---|----------------------------|
| 1 | Old motherboard handle     |
| 2 | Updated motherboard handle |
- 

- If the motherboard handle has two notches on top, then the motherboard has the updated handle. Go to [Step 5](#).
- If the motherboard handle does *not* have two notches on top, then you must replace the motherboard handle in your system:
  - a. **Remove the screw securing the old motherboard handle to the motherboard.**
  - b. **Remove the old motherboard handle from the motherboard.**
  - c. **Locate the updated motherboard handle in the StorageTek SAS RAID Internal HBA optional component box and install the handle in the system.**  
Verify that the two notches on the handle are facing up, away from the motherboard.
  - d. **Secure the handle to the motherboard using the screw removed in [Step a](#).**

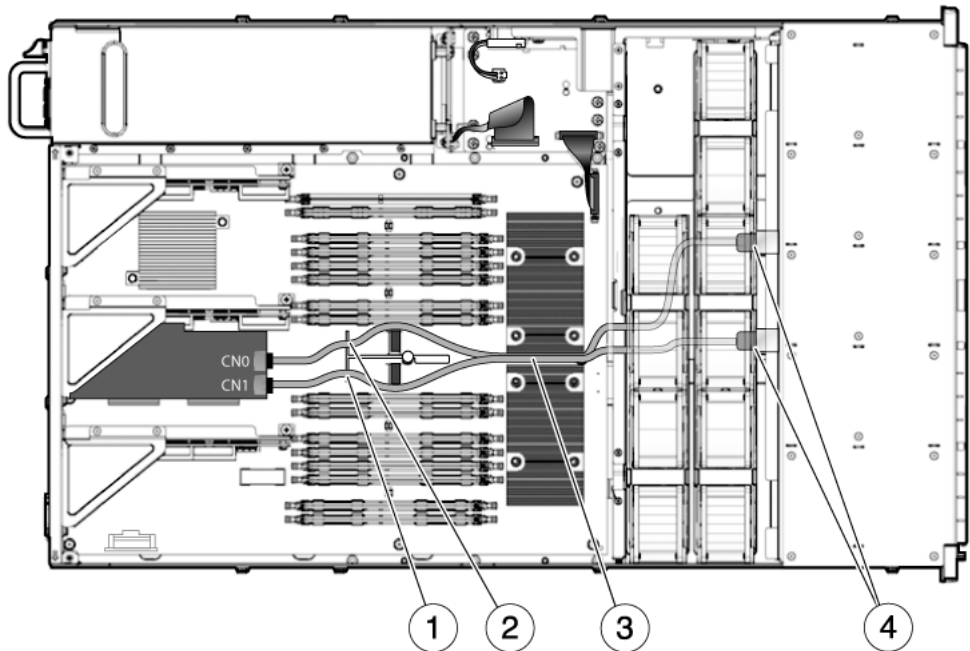
**5. Locate the two 40 cm hard drive data cables in the StorageTek SAS RAID Internal HBA optional component box.**

The part number for the 40 cm hard drive data cables is 530-4077. Note that you will be connecting both cables for the SPARC Enterprise T5240 server, regardless of whether the server is an eight- or a sixteen-disk capable version.

**6. Connect the hard drive cables to the StorageTek SAS RAID Internal HBA ([FIGURE 11](#)):**

- a. Connect one end of the first 530-4077 cable to connector CN0 on the StorageTek SAS RAID Internal HBA.
- b. Connect one end of the second 530-4077 cable to connector CN1 on the StorageTek SAS RAID Internal HBA.

**FIGURE 11** Routing Hard Drive Data Cables in an Eight- or Sixteen-Disk Capable SPARC Enterprise T5240 Server



*Figure showing the new cable routing for the T5240 server.*

**Figure Legend**

- 
- 1 Routing the second 530-4077 cable through the right notch on the motherboard handle
  - 2 Routing the first 530-4077 cable through the left notch on the motherboard handle
  - 3 Routing both 530-4077 cables between the two processors
  - 4 Routing both 530-4077 cables under the fan midwall to the hard drive backplane
- 

**7. Install the StorageTek SAS RAID Internal HBA into PCIe slot 1 (the lower middle slot when viewed from rear).**

Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for the procedures for installing a PCIe card into the server, then return here.

**8. Connect the hard drive cables to the hard drive backplane (FIGURE 11):**

- a. Slide the first 530-4077 cable under the fan midwall and connect the other end of the cable to connector P3 on the hard drive backplane.
  - b. Slide the second 530-4077 cable under the fan midwall and connect the other end of the cable to connector P2 on the hard drive backplane.
9. Route both 530-4077 cables through the system (FIGURE 11):
- a. Route the first 530-4077 cable through the left notch in the motherboard handle.
  - b. Route the second 530-4077 cable through the right notch in the motherboard handle.
  - c. Route both 530-4077 cables between the two processors.
10. Reinstall the memory mezzanine assembly into your system, if necessary.
- If you have a memory mezzanine assembly, reinstall the assembly into the system.
  - If you do not have a memory mezzanine assembly, locate the air duct and rotate it down until it is seated on the motherboard.
- Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for those procedures, then return here.
11. Reinstall the following components into the SPARC Enterprise T5240 server:
- Fan boards, with both cables routed underneath the fan boards
  - Fans
- Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for those procedures, then return here.
12. Go to “Finishing Up” on page 23 to reinstall your server and power it back on.

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# Finishing Up

Refer to the *SPARC Enterprise T5140 and T5240 Servers Service Manual* for specific instructions for each of the procedures in this section.

- 1. Install the top cover.**
- 2. Install the server into the rack.**
- 3. Connect all external cables.**
- 4. Power on the server.**

Refer to the *StorageTek SAS RAID HBA Installation Guide* for more information on the StorageTek SAS RAID Internal HBA, such as installing device drivers and selecting the best RAID level for your system.

