



Sun StorEdge™ T3 Array Controller Upgrade Manual

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Sun StorEdge T3 Array Controller Upgrade Procedure

This manual contains instructions for upgrading the Sun StorEdge™ T3 array to a Sun StorEdge T3+ array. It includes the upgrade instructions for both supported Sun StorEdge T3 array controller configurations, as explained in “Overview of Sun StorEdge T3 Array Configurations.”

To perform this upgrade, you must have a working knowledge of the array as well as the command-line interface (CLI) for administering the array.

This chapter contains the following sections:

- “Related Documentation” on page 4
- “Overview of Sun StorEdge T3 Array Configurations” on page 5
- “Upgrade Requirements” on page 6
- “Preparing to Upgrade” on page 9
- “Replacing the Controller Card” on page 12
- “Verifying the Upgrade” on page 17

Related Documentation

For more information on the Sun StorEdge T3 array product line, refer to the documents listed in TABLE 1.

These documents are available in PDF format on the Sun documentation web site:
http://www.sun.com/products-network-storage/hardware/docs/Network_Storage_Solutions.

TABLE 1 Sun StorEdge T3 and T3+ Array Documentation

Application	Title	Part Number
Latest array updates	<i>Sun StorEdge T3 Array Release Notes</i>	816-0781
Installation overview	<i>Sun StorEdge T3 Array Start Here</i>	816-0772
Safety procedures	<i>Sun StorEdge T3 Array Regulatory and Safety Compliance Manual</i>	816-0774
Site preparation	<i>Sun StorEdge T3 Array Site Preparation Guide</i>	816-0778
Configuration	<i>Sun StorEdge T3 Array Configuration Guide</i>	816-0777
Installation and service	<i>Sun StorEdge T3 Array Installation, Operation, and Service Manual</i>	816-0773
Administration	<i>Sun StorEdge T3 Array Administrator's Guide</i>	816-0776
Cabinet installation	<i>Sun StorEdge T3 Array Cabinet Installation Guide</i>	806-7979
Component Manager installation	<i>Sun StorEdge Component Manager Installation Guide - Solaris</i>	806-6645
	<i>Sun StorEdge Component Manager Installation Guide - Windows NT</i>	806-6646
Using Component Manager	<i>Sun StorEdge Component Manager User's Guide</i>	806-6647
Latest Component Manager updates	<i>Sun StorEdge Component Manager Release Notes</i>	806-6648

Overview of Sun StorEdge T3 Array Configurations

The Sun StorEdge T3 array supports two types of configurations: *workgroup* (single-tray) and *enterprise* (dual-tray partner group).

Workgroup Configuration

The workgroup array configuration forms a standalone array configuration, which is a high-performance, high-RAS (Reliability, Availability, and Serviceability) configuration with a single hardware RAID (Redundant Array of Independent Disks) cached controller. The standalone unit in the workgroup configuration is referred to as a *controller unit*, as shown in FIGURE 1-2.

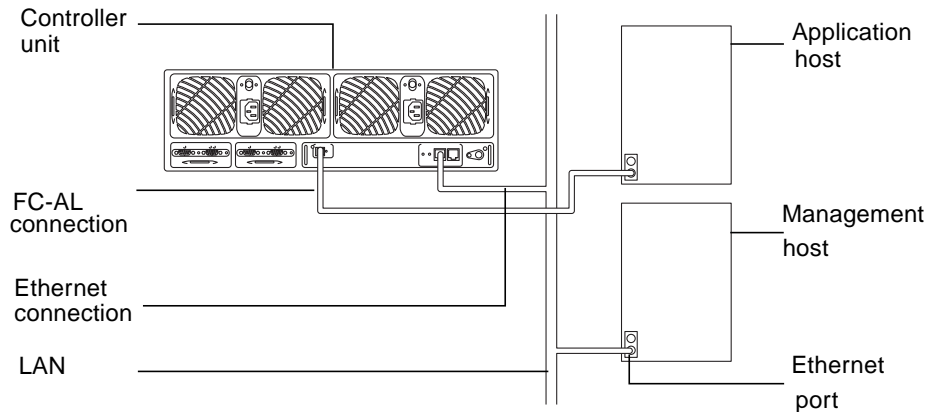


FIGURE 1-2 Sun StorEdge T3 Array Workgroup Configuration

Enterprise Configuration

This type of array configuration pairs two controller units by using interconnect cables for back-end data and administrative connections. The enterprise configuration encompasses all the RAS of single controller units in addition to redundant hardware RAID controllers with mirrored caches, plus the redundant channels for continuous data availability for host connections.

The Sun StorEdge T3 array enterprise configuration incorporates an additional controller unit. The top unit in an enterprise configuration is referred to as a the *alternate master controller unit*, as shown in FIGURE 1-3.

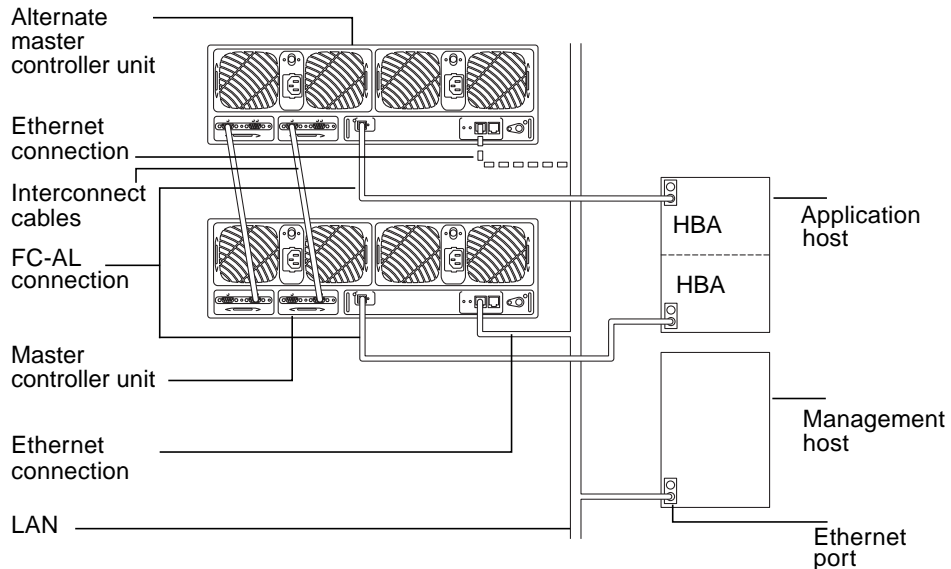


FIGURE 1-3 Sun StorEdge T3 Array Enterprise Configuration

Upgrade Requirements

Before you perform the upgrade procedure:

- Make sure you have all necessary parts and equipment contained in the Sun StorEdge T3 array kit:
 - One array controller card
 - One 0.4 meter fiber-optic cable
 - One fiber-optic cable connector
 - This manual
 - One antistatic wrist strap
 - One latch release tool
- Make sure your system meets the requirements in this section, which is divided into the following topics:
 - “Enterprise Upgrade Requirements” on page 7
 - “Workgroup Upgrade Requirements” on page 9

Enterprise Upgrade Requirements

To perform a hot-swap upgrade while the arrays are online, the Sun StorEdge T3 arrays must be set up in an enterprise configuration to provide failover capability. The enterprise configuration requires that the master controller unit (u1) is the bottom of the two arrays and the alternate master controller unit (u2) is stacked on the top, as shown in FIGURE 1-4.

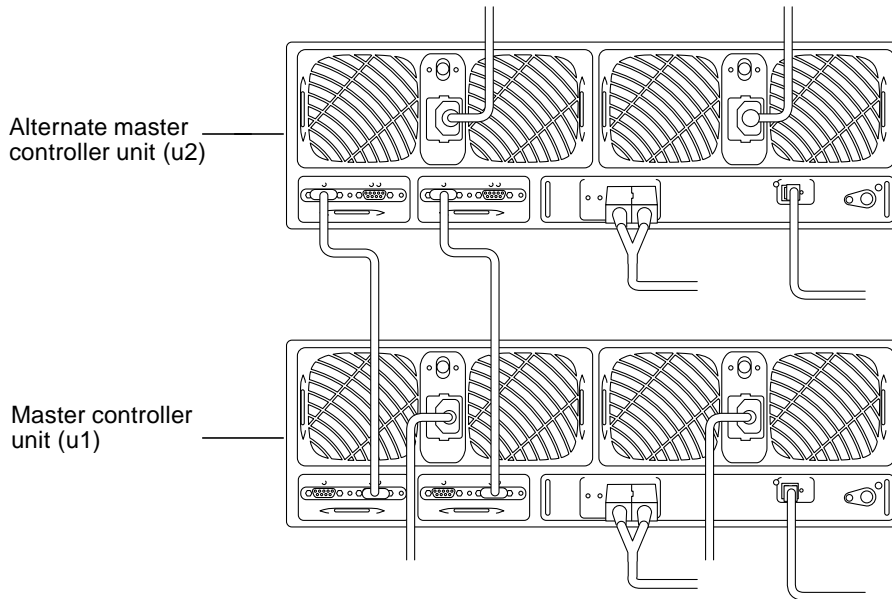


FIGURE 1-4 Alternate and Master Controller Units

- Use the `sys stat` command to determine the master (bottom) and alternate master (top) units.

The following is an example of a default enterprise configuration:

```
:/: sys stat

Unit   State      Role   Partner
-----
1      ONLINE    Master 2
2      ONLINE    AlterM 1
```

Software Requirements

Multipathing software such as VERITAS DMP or the Alternate Pathing software in the Solaris™ operating environment must be running on the attached host system.

Use the Solaris `iostat (1m)` command to ensure that data paths from both controller units within the Sun StorEdge T3 array for the enterprise configuration are operational.

System Requirements

Before upgrading, the arrays must have the following conditions:

- The data paths from the enterprise configuration on the host must be fully operational; that is, there should be no failover conditions.
- Both arrays and their associated back-end loops must be in an optimal system state. For example, no volume reconstructions or battery refresh cycles should occur.
- **Use the `vol mode` and `port listmap` commands to verify an optimal system state.**

The following command output example displays an optimal system state:

```
#!/: vol mode

volume      mounted   cache      mirror
v0          yes       writebehind on
v1          yes       writebehind on

#!/: port listmap

port  targetid  addr_type  lun    volume  owner  access
u1p1  1         hard      0     v0      u1     primary
u1p1  1         hard      1     v1      u2     failover
u2p1  2         hard      0     v0      u1     failover
u2p1  2         hard      1     v1      u2     primary
```

Note – This upgrade is not firmware-level dependent and can be done on any Sun StorEdge T3 array running 1.x level firmware.

If you have met all requirements in this section, proceed to “Preparing to Upgrade” on page 9.

Workgroup Upgrade Requirements

To upgrade a workgroup configuration, the unit must be offline: the unit should not be receiving any input/output (I/O) activity. Because there is no controller failover capability in a workgroup configuration, it is not possible to perform a hot swap of the controller card.

Note – This upgrade is not firmware-level dependent and can be done on any Sun StorEdge T3 array running 1.x level firmware.

Preparing to Upgrade

Follow the instructions for your enterprise or workgroup configuration before replacing the controller card. This section is divided into the following topics:

- “Prepare the Array Enterprise Configuration” on page 9
- “Prepare the Array Workgroup Configuration” on page 11
- “Observe Static Electricity Precautions” on page 11

▼ Prepare the Array Enterprise Configuration

1. **Start a telnet session with the master controller unit.**

```
# telnet array-name
```

Where *array-name* is the name of the master controller unit.

2. **Disable cache mirroring on the arrays.**

```
::: sys mirror off
```

3. **Use the `vol mode` command to verify that cache mirroring is off.**

```
::: vol mode
```

4. Disable the master controller unit (u1).

```
:/: disable u1
```

When this operation is completed, the controller status LED turns amber and begins blinking.

Note – This command will disconnect the current telnet session.

Caution – After disabling and removing the controller, you must complete the controller card replacement within 30 minutes or the Sun StorEdge T3 array and all attached arrays will automatically shut down and power off.

5. Start a new telnet session to the alternate master controller unit.

```
# telnet array-name
```

Where *array-name* is the name of the alternate master controller unit.

6. Use the `sys stat` command to verify that the master controller unit (u1) has been disabled.

```
:/: sys stat
Unit  State      Role  Partner
-----  -
  1    DISABLED   Master  2
  2    ONLINE     AlterM  1
```

7. Verify that all syslog messages from the master controller unit (u1) have been stopped.

```
:/: tail syslog
```

Once the syslog messages have completed logging, proceed to the section “Observe Static Electricity Precautions” on page 11.

▼ Prepare the Array Workgroup Configuration

1. Ensure that the array is in an optimal state:

- a. Use the `proc list` command to verify that there are no volume reconstruction activities in process.

```
#!/: proc list
```

- b. Use the `refresh -s` command to verify that there is no battery refresh operation in process.

```
#!/: refresh -s
```

2. Suspend all I/O activity on the data path between the array and data host.

Note – If the array is operating in the Solaris environment and there are array volumes mounted on the data host, unmount the volumes before powering off.

3. In a telnet session with the array, use the `shutdown` command to remove power.

```
#!/: shutdown  
Shutdown the system, are you sure? [N]:y
```

4. Press the power button once on each power and cooling unit to switch off power.

After you shutdown the array, proceed to the next section, “Observe Static Electricity Precautions.”

▼ Observe Static Electricity Precautions

Consider the following discretions before replacing the controller card:

- Wear a grounding wrist strip.
- Before handling a controller card, discharge any static electric charge by touching a ground surface.
- Do not remove a controller card from its antistatic protective bag until it is ready for installation.
- When removing a controller card from the array, immediately place it in an antistatic bag and packaging.

- Handle a controller card only by its edges and avoid touching the circuitry.
- Do not slide a controller card over any surface.
- Avoid having plastic, vinyl, and foam in the work area.
- Limit body movement (which builds up static electricity) during the installation.

After disconnecting the software and units and observing the static electricity precautions, proceed to the next section, “Replacing the Controller Card.”

Replacing the Controller Card

Before replacing the controller card(s) with the upgraded version, make sure that your system meets all the requirements listed in “Upgrade Requirements” on page 6 and that you have completed the steps listed in “Preparing to Upgrade” on page 9.

This section is divided into the following topics:

- “Replacing the Controller Cards in an Enterprise Configuration” on page 12
- “Replacing the Controller Card in a Workgroup Configuration” on page 16

Replacing the Controller Cards in an Enterprise Configuration

This section explains how to first remove the existing controller cards from the arrays and then replace them with the upgraded controller cards while the arrays are online. The procedure is divided into two parts:

- “To Replace the Controller Card in the Master Controller Unit” on page 12
- “To Replace the Controller Card in the Alternate Master Controller Unit” on page 15

▼ To Replace the Controller Card in the Master Controller Unit

1. **Remove the Ethernet cable from the 10BASE-T connector on the controller card.**
2. **Remove the fiber-optic cable and MIA (media interface adapter) from the FC-AL connector on the controller card.**
3. **Unlock the controller card by pushing in on the latch handles shown in FIGURE 1-5 with the latch release tool.**

The latch release tool can be found in the upgrade kit.

4. Pull the controller card out by using the latch handles.

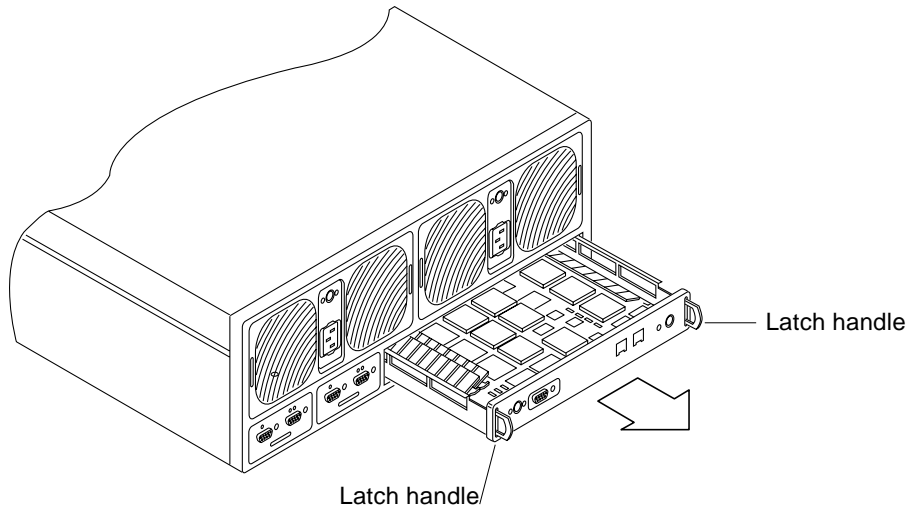


FIGURE 1-5 Removing the Controller Card From the Array

5. Insert the new controller card.

6. Lock the new controller card by pushing in the latch handles.

7. Insert the new 0.4 meter fiber-optic cable in the FC-AL connector on the new controller card, as shown in FIGURE 1-6.

The MIA is not used with the new controller card.

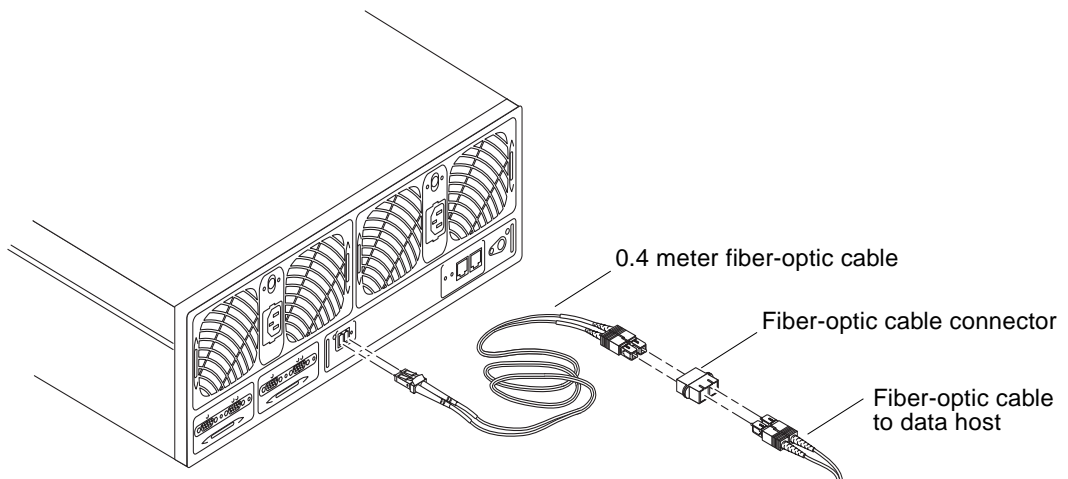


FIGURE 1-6 Fiber-Optic Cable Connection to Array Controller Card Upgrade

8. Connect the fiber-optic cable from the data host to the 0.4 meter fiber-optic cable using the cable connector from the upgrade kit (FIGURE 1-6).
9. Insert the Ethernet cable into the 10/100BASE-T connector of the new controller card.
10. Check the controller status LED to determine when the controller is operational.
The new controller starts booting automatically after it is installed. When the controller is operational, the LED is green.
11. Verify that the master controller unit (u1) is online and is receiving host I/Os by examining the Alternate Pathing software on the host system.

If the failback operation to the data path of the u1 controller is successful, the host detects it. Many host-based multipathing applications provide the ability to manually force a failback operation. Refer to the documentation that was shipped with the host multi-pathing software that is currently running for details on initiating manual failback operations.

Note – The VERITAS Volume Manager Software Administrator (VMSA) interface may not accurately report the actual state of a recovered data path. It can take some time for a failback operation to complete. Until the failback operation completes, the VMSA software displays an offline state. To verify that the data path is online, use the `iostat (1M)` command in the Solaris environment. This command indicates if I/Os have been resumed on the data path.



Caution – Ensure that the failback operation to the master controller unit (u1) is successful before continuing the upgrade on the alternate master controller unit (u2). Failure to confirm a proper failback operation of I/Os to the master controller unit (u1) before proceeding can result in a double-path failure to the host system. If this happens, data on the array will be temporarily inaccessible.

After upgrading the master controller unit, follow the instructions in “To Replace the Controller Card in the Alternate Master Controller Unit” on page 15 to complete the the enterprise configuration upgrade.

▼ To Replace the Controller Card in the Alternate Master Controller Unit

1. Disable the alternate master controller unit (u2).

```
:/: disable u2
```

When this operation completes, the controller LED turns amber and begins blinking

Note – This command disconnects the current telnet session.



Caution – This step will cause a failover to the master controller. Make sure the master controller is online and is receiving host I/Os.

2. Start a new telnet session to the master controller unit.

```
# telnet array-name
```

Where *array-name* is the name of the master controller unit.

You may want to check the `syslog` file to verify that the controller failover process is complete before starting a `telnet` back into T3.

3. Use the `sys stat` command to verify that the alternate master controller unit (u2) is disabled.

The following example shows a disabled alternate master controller.

```
:/: sys stat
Unit   State      Role      Partner
-----
 1     ONLINE    Master
 2     DISABLED  Slave
```

4. Verify that all system log messages from the alternate master controller unit (u2) have stopped by viewing the contents of the `syslog` file.

```
:/: tail syslog
```

5. Replace the controller card on the alternate master controller unit.

Follow Step 1 through Step 10 of the procedure “To Replace the Controller Card in the Master Controller Unit” on page 12. The new controller card starts booting automatically after it is installed.

6. Verify that the alternate master controller unit (u2) is online by examining the Alternate Pathing software on the host system.

If the failback operation to the data path of the u2 controller is successful, the host detects it.

Note – The VERITAS Volume Manager Software Administrator (VMSA) interface may not report the actual state of a recovered data path. It can take some time for a failback operation to complete. Until the failback operation completes, the VMSA software displays an offline state. To verify that the data path is online, use the `iostat (1M)` command in the Solaris environment. This command indicates if I/Os have resumed on the data path.

7. Enable cache mirroring.

```
#!/bin/sh
#
# Enable cache mirroring
#
::: sys mirror auto
```

After completing the controller card replacement in both controller units, proceed to “Verifying the Upgrade” on page 17 to ensure the configuration is operating correctly.

Replacing the Controller Card in a Workgroup Configuration

To replace the controller card in a workgroup configuration:

- 1. Follow Step 1 through Step 9 in “To Replace the Controller Card in the Master Controller Unit” on page 12.**
- 2. Push the power button once on both power and cooling units to return power to the controller unit.**
- 3. Check the controller status LED to determine when the controller is operational.**

The new controller starts booting automatically after it is installed. When the controller is operational, the LED is green.

After the unit is back online with the new controller, proceed to “Verifying the Upgrade” on page 17 to ensure the array is operating correctly.

Verifying the Upgrade

You can verify that the Sun StorEdge T3 array upgrade is operating correctly by examining the output of several array commands.

Note – For more information on these commands, refer to the *Sun StorEdge T3 Array Administrator's Guide*.

1. Use the `vol mode` command to verify the volumes have been mounted and that cache mirroring has been turned on.

The following is an example of the `vol mode` command output that shows volumes are mounted properly and cache mirroring is enabled in an enterprise configuration.

```
:/: vol mode

volume      mounted    cache      mirror
v0          yes       writebehind on
v1          yes       writebehind on
```

Note – For a workgroup configuration, cache mirroring can be turned off.

2. Use the `port listmap` command to confirm that the volumes assigned to each array are correct.

3. Use the `fru stat` command to verify that the state of all components in the arrays is enabled.

The following is an example of `fru stat` command output from an enterprise configuration that indicates all components are operating properly:

```

:/: fru stat
CTLR      STATUS  STATE    ROLE      PARTNER    TEMP
-----
ulctr     ready   enabled  master    u2ctr      32.0
u2ctr     ready   enabled  alt master ulctr      29.0

DISK      STATUS  STATE    ROLE      PORT1      PORT2      TEMP  VOLUME
-----
uld1      ready   enabled  data disk ready      ready      34    v0
uld2      ready   enabled  data disk ready      ready      34    v0
uld3      ready   enabled  data disk ready      ready      31    v0
uld4      ready   enabled  data disk ready      ready      34    v0
uld5      ready   enabled  data disk ready      ready      32    v0
uld6      ready   enabled  data disk ready      ready      38    v0
uld7      ready   enabled  data disk ready      ready      33    v0
uld8      ready   enabled  data disk ready      ready      34    v0
uld9      ready   enabled  data disk ready      ready      36    v0
u2d1      ready   enabled  data disk ready      ready      30    v1
u2d2      ready   enabled  data disk ready      ready      31    v1
u2d3      ready   enabled  data disk ready      ready      34    v1
u2d4      ready   enabled  data disk ready      ready      34    v1
u2d5      ready   enabled  data disk ready      ready      32    v1
u2d6      ready   enabled  data disk ready      ready      37    v1
u2d7      ready   enabled  data disk ready      ready      38    v1
u2d8      ready   enabled  data disk ready      ready      42    v1
u2d9      ready   enabled  data disk ready      ready      34    v1

LOOP      STATUS  STATE    MODE      CABLE1     CABLE2     TEMP
-----
u2l1      ready   enabled  master    installed  -          30.0
u2l2      ready   enabled  slave     installed  -          30.5
u1l1      ready   enabled  master    -          installed  27.0
u1l2      ready   enabled  slave     -          installed  29.5

POWER     STATUS  STATE    SOURCE   OUTPUT   BATTERY   TEMP   FAN1   FAN2
-----
ulpcu1    ready   enabled  line     normal   normal    normal normal normal
ulpcu2    ready   enabled  line     normal   normal    normal normal normal
u2pcu1    ready   enabled  line     normal   normal    normal normal normal
u2pcu2    ready   enabled  line     normal   normal    normal normal normal

```

4. Use the fru list command to make sure that all components in both arrays are detected by the host.

The following is an example of fru list command output from an enterprise configuration that shows all components detected by the host:

```

:/: fru list
ID          TYPE          VENDOR      MODEL      REVISION    SERIAL
-----
---
ulctr      controller card  SUN         purple2    0200        101454
u2ctr      controller card  SUN         purple2    0200        101125
uld1       disk drive      SEAGATE     ST318304FSUN A42D      3EL075C8
uld2       disk drive      SEAGATE     ST318304FSUN A42D      3EL06BYF
uld3       disk drive      SEAGATE     ST318304FSUN A42D      3EL083A9
uld4       disk drive      SEAGATE     ST318304FSUN A42D      3EL07MYA
uld5       disk drive      SEAGATE     ST318304FSUN A42D      3EL075PN
uld6       disk drive      SEAGATE     ST318304FSUN A42D      3EL073TH
uld7       disk drive      SEAGATE     ST318304FSUN A42D      3EL06YQ9
uld8       disk drive      SEAGATE     ST318304FSUN A42D      3EL07P62
uld9       disk drive      SEAGATE     ST318304FSUN A42D      3EL073F1
u2d1       disk drive      SEAGATE     ST318304FSUN A42D      3EL06TRE
u2d2       disk drive      SEAGATE     ST318304FSUN A42D      3EL07R81
u2d3       disk drive      SEAGATE     ST318304FSUN A42D      3EL06X3F
u2d4       disk drive      SEAGATE     ST318304FSUN A42D      3EL07X5M
u2d5       disk drive      SEAGATE     ST318304FSUN A42D      3EL06HX8
u2d6       disk drive      SEAGATE     ST318304FSUN A42D      3EL06096
u2d7       disk drive      SEAGATE     ST318304FSUN A42D      3EL07NWV
u2d8       disk drive      SEAGATE     ST318304FSUN A42D      3EL07PSX
u2d9       disk drive      SEAGATE     ST318304FSUN A42D      3EL07NXE
u1l1       loop card       SLR-MI      375-0085-01- 5.02 Flash  028505
u1l2       loop card       SLR-MI      375-0085-01- 5.02 Flash  028610
u2l1       loop card       SLR-MI      375-0085-01- 5.02 Flash  029575
u2l2       loop card       SLR-MI      375-0085-01- 5.02 Flash  030734
ulpcu1     power/cooling unit TECTROL-CAN 300-1454-01( 0000      026519
ulpcu2     power/cooling unit TECTROL-CAN 300-1454-01( 0000      026528
u2pcu1     power/cooling unit TECTROL     300-1453-01 0001      01014
u2pcu2     power/cooling unit TECTROL-CAN 300-1454-01( 0000      039771
ulmpn      mid plane      SLR-MI      370-3990-01- 0000      019191
u2mpn      mid plane      SLR-MI      370-3990-01- 0000      022750

```

5. Use the `refresh -s` command to verify that there are no battery refresh operations running on the arrays.

The following is an example of the `refresh -s` command output that shows there is no battery refresh operation in progress.

```
:/: refresh -s

No battery refreshing Task is currently running.
                                     PCU1                                     PCU2
-----
U1                                     Normal
U2                                     Normal

Current Time                         Fri Apr 13 09:55:29 2001
Last Refresh                         Thu Apr 12 09:47:52 2001
Next Refresh                         Thu Apr 26 09:47:52 2001
```

6. Use the `proc list` command to verify that there are no `vol` command operations currently running.

The following is an example of `proc list` command output that shows a `vol init` operation in progress.

```
:/: proc list

VOLUME          CMD_REF PERCENT    TIME COMMAND
v1              9280    2      0:39 vol init
```

This completes the upgrade of the Sun StorEdge T3 array to a Sun StorEdge T3+ array.