Sun StorEdge™ Fast Write Cache 2.0 SBus NVRAM Card Installation Guide

Send comments about this document to: docfeedback@sun.com

Please
Recycle

Adobe PostScript

Sun StorEdge™ Fast Write Cache 2.0 SBus NVRAM Card Installation Guide

This document replaces Chapter 2 of the *Sun StorEdge Fast Write Cache 2.0 System Administrator's Guide*. It is intended to communicate the SBus NVRAM board installation procedure to Sun™ customers and support personnel. Here is a brief summary of the installation procedure, with pointers to the detailed information in this document:

▼ Board Installation Procedure Summary

1. **Perform a system shutdown:**

   `/etc/shutdown.`

2. **Following the instructions in your system manual, remove your I/O boards from the slots into which you will insert the SBus NVRAM cards.**

3. **Follow the "Electrostatic Discharge Precautions" on page 3.**

4. **Proceed to "Enabling the NVRAM Card Batteries" on page 4.**

5. **Install the card ("Installing the NVRAM Cards" on page 8).**

SBus NVRAM Board Features

The SBus NVRAM card is a single-wide memory board with the following features:

- Solaris™ system software kernel driver
- Host-based fast write cache

- Battery backed-up data retention minimum of 75 hours, during power loss
- ECC for single-bit error detection and correction, and double-bit error detection
- SDRAM memory modules for fast access to persistent storage
- Maximum power dissipation of less than 13 watts
- Data mirroring between NVRAM cards
- Sustained write performance of 114 MBytes per second

A maximum of one pair of cards is supported per system or domain.

This document covers the following topics:

Qualified Platforms

The following platforms are qualified for the SBus NVRAM card.

Sun Enterprise™ 3000 and 3500
Sun Enterprise 4000 and 4500
Sun Enterprise 5000 and 5500
Sun Enterprise 6000 and 6500
Sun Enterprise 10000

Electromagnetic Compatibility Compliance (EMC)

The NVRAM card has been tested for EMC (USA FCC, Canada DOC, Japan VCCI, and EU CE Mark). When installed and operated in accordance with this guide, the EMC class marked on your Sun server label remains the same.

Error Detection and Correction Capability

Data is stored in 64-bit double long words, with 8 check bits for each double long word. This gives the NVRAM card the capability to detect all double-bit errors and correct all single-bit errors in a single 64-bit double long word. The NVRAM card cannot detect errors of 3 or more bits within the same nibble.

Because the check bits are generated and checked for the entire 64-bit word, all writes to memory that are less than 8 bytes wide require a read-modify-write cycle to memory. The following occurs in the read-modify-write cycle:

1. Existing 64 data bits and 8 check bits are read.

2. The bytes to be written are merged into the data.

3. New check bits are generated.

4. The resulting 64 data and 8 check bits are written back to memory.

Electrostatic Discharge Precautions

Circuit board components are vulnerable to damage by electrostatic discharge (ESD). An electrostatic charge can build up on the human body and discharge when you touch a board. Such discharge can be produced by walking across a carpet and touching a board, or by other similar causes. Touch a conductive surface of the chassis or other element connected to common earth ground to discharge the static electricity present in your body.

To minimize the risk of ESD damage:

- Handle the card by the edges only
- Store the card in the antistatic bag provided
- Use a grounding strap whenever you work on a circuit board

Enabling the NVRAM Card Batteries

The NVRAM card is shipped with the batteries disabled to prevent battery drainage during shipment.

Caution – Handle the NVRAM card with care to avoid damage. Wear an antistatic wrist strap when handling the card. Hold the card by its edges only, and do not touch any of the components on the card.

Do not place the NVRAM card on a metal surface, as it may discharge the batteries regardless of the battery jumper settings. If you must put the card down, place it in its antistatic bag.

Note – You must enable the batteries using the following procedure before you install the hardware.
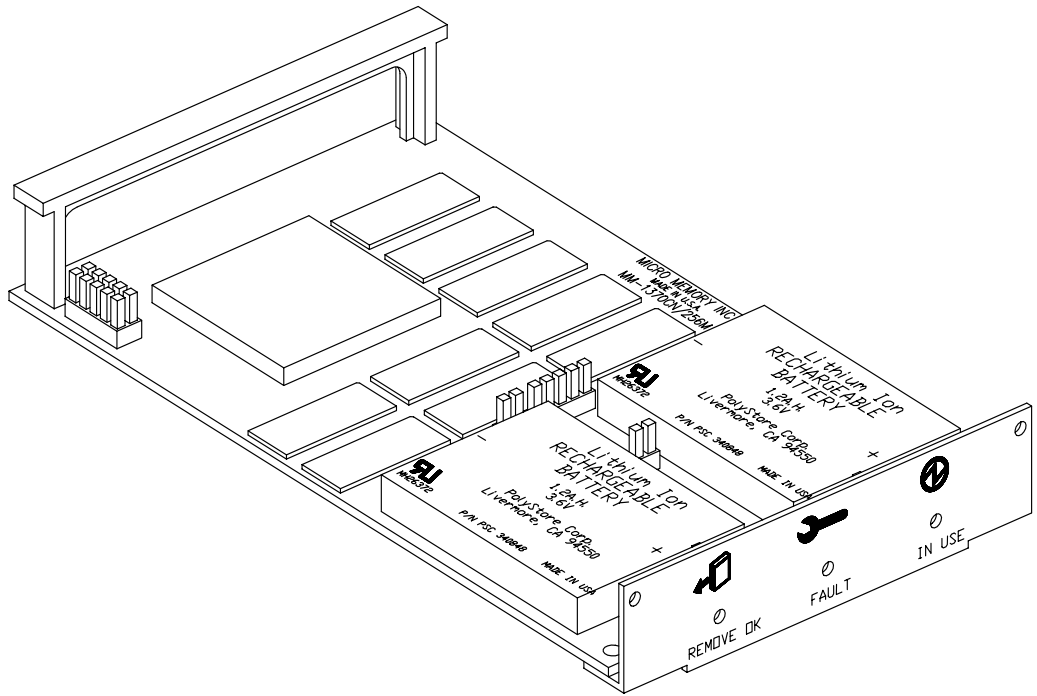
FIGURE 1 SBus NVRAM Card

▼ To Enable the SBus NVRAM Card Batteries

1. **Attach the antistatic wrist strap's adhesive copper strip to the metal casing of the power supply. Wrap the other end twice around your wrist, with the adhesive side against your skin.**

2. **Remove the card from the antistatic bag. Hold the card by its edges and place it, component side up, on the bag.**

   Use antistatic bags as a protective cushion for the SBus NVRAM card.

3. **Look for the battery jumpers.**

   The SBus NVRAM card holds two batteries. Each has its own jumper, and both batteries must be activated.
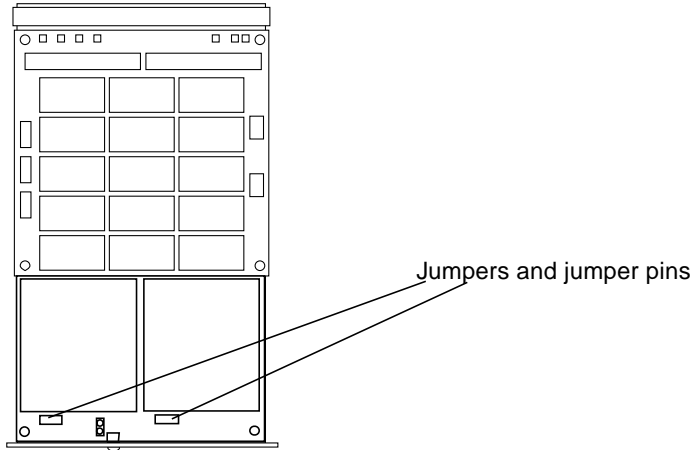
FIGURE 2 NVRAM Card Showing Location of Jumpers and Jumper Pins

4. Put the jumpers on the jumper pins.

When you unpack the card, the jumpers are inserted on only one pin of each pair, leaving the battery disabled.

FIGURE 3 Detail of Jumpers and Jumper Pins With Batteries Disabled

a. Use tweezers or needle-nosed pliers to lift each jumper off the single pin and align it with both pins.

b. Press the jumper in place on top of the pair of jumper pins.

FIGURE 4 Detail of Jumpers and Jumper Pins With Batteries Enabled

SBus NVRAM Card

The SBus NVRAM card has 256 MBytes of non-volatile memory. Due to SBus addressing limitations, only 254.5 MBytes of memory is available to the computer system. The Fast Write Cache 2.0 software is currently qualified with a maximum cache size of 64 MBytes. Therefore, the cache size reported by the software is 64

MBytes. Fast Write Cache may eventually be released in a version that uses all of the NVRAM card memory. The command that reports NVRAM hardware status shows the NVRAM card size as 254 MBytes:

```
% fwcadm nvram -s
```

The resulting display will be similar to this:

Device	Size	Inst	Parent	Status	Dirty	Battery	UCE	CE	Mirror
nvram0	254 MB	#0	sbus #0	Active	1	Good	0	0	nvram1
nvram1	254 MB	#1	sbus #1	Active	1	Good	0	0	nvram0

Note – You must install two NVRAM cards of the same memory size in a system or domain. For example, if you put a 32 MByte and a 254.5 MByte NVRAM card into the same system or domain, the Fast Write Cache software would not enable the cache.

The memory array on the 254.5 MByte, MM-1370 NVRAM is backed up by rechargeable batteries. The calculated backup time at an operating temperature of 25 degrees Centigrade and worst-case RAM power requirement is 75 hours minimum.

Caution – The batteries on the SBus NVRAM card are not customer-replaceable parts. They may explode if mishandled. Do not dispose of a battery in fire. Do not disassemble it. If a battery fails, call your authorized Sun service provider.

The batteries on the card will be fully charged or charging when you turn the system power on. The batteries will discharge when the system power is turned off and the battery jumpers are in the enabled position. If the system is off for extended periods of time then the batteries will become low. When the system is turned on and the batteries are low, the Fast Write Cache software will not enable the cache. Wait until the batteries are fully charged, (5 hours or less) then manually enable the cache by using this procedure:

▼ To Manually Enable the Cache

1. **Become superuser (root).**

2. **Enter the CLI shell by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
```

3. **Enable the cache:**

```
[1] sx> cd cache
[2] sx> control -e
```

Use the following command to check the status of the batteries:

```
% fwcadm nvram -s
```

Fully-discharged batteries take 5 hours to charge. If your system has been powered on for longer than 5 hours and the batteries are still low, then they have failed. You must then replace the NVRAM card.

Note – The 3-battery SBus NVRAM cards do not have rechargeable batteries. Refer to the installation and battery information in the *Sun StorEdge Fast Write Cache 2.0 System Administrator's Guide* for details.

Installing the NVRAM Cards

You must enable the NVRAM card batteries before installing the cards. Make sure you have performed the procedure in the previous section before continuing.

Note – To use Fast Write Cache, a pair of SBus NVRAM cards must be installed on your system.

Each SBus supports only 256 MBytes of address space. This address space is shared between all SBus slots on the same SBus. As a result of this limitation, it is very important that you install the NVRAM cards on different SBusses. The best way to ensure this is to install the NVRAM cards on different I/O cards.

This also improves the availability of the Fast Write Cache product in the event that one I/O card fails.

If your server contains more than one I/O card, install each NVRAM card on a different I/O card or bus to prevent the failure of a single I/O card from rendering the cache unavailable during a system recovery.

▼ To Install the SBus NVRAM Cards

Note – Refer to your system installation or service manual for detailed instructions for the following tasks.

1. **Power off your system.**

2. **Open the system unit.**

3. **Attach the antistatic wrist strap's adhesive copper strip to the metal casing of the power supply. Wrap the other end twice around your wrist, with the adhesive side against your skin.**

4. **Identify the slot in which you want to insert the NVRAM card.**

5. **Disconnect the SBus filler panel from the slot that you selected.**

6. **Position the NVRAM card on the system board over the SBus socket.**

7. **Carefully insert the NVRAM card into the SBus socket.**

   The carrier is keyed so the NVRAM can be installed only one way.

8. **Push the NVRAM into the socket until it is properly seated.**

9. **Detach the wrist strap, replace the unit cover, and power on the system.**

10. **Install the Fast Write Cache software. Refer to the** *Sun StorEdge Fast Write Cache 2.0 Installation Guide* **for installation instructions.**

▼ To Verify the Installation

Note – The Fast Write Cache software must be installed before verifying the installation of the NVRAM cards. See the *Sun StorEdge Fast Write Cache 2.0 Installation Guide* for the Fast Write Cache installation instructions.

● **As superuser, type the following command to verify that the NVRAM cards are properly installed.**

```
# /usr/opt/SUNWesm/sbin/fwcadm nvram -s
Device     Size  Inst    Parent   Status  Dirty  Battery   UCE    CE   Mirror
-----------------------------------------------------------------------------
nvram0    254MB    #0  SBus #0  Active      0     Good      0     0   nvram1
nvram1    254MB    #1  SBus #0  Active      0     Good      0     0   nvram0
```

The system returns the status of all cards installed including the total amount of memory in Mbytes, the dirty bit status, the battery status, the ECC errors, and the mirror configuration.

Once the cards are installed it is transparent to you unless problems arise or the batteries become low.

See the *Sun StorEdge Fast Write Cache 2.0 System Administrator's Guide.* for a detailed description of the fwcadm nvram -s display.

Configuration Data

The operating system keeps configuration data on the NVRAM card to keep track of information such as the host ID, mirror pairs (primary and secondary), and the number of NVRAM cards in the machine. During boot time, the operating system uses this information to verify the NVRAM configuration.