

Sun™ StorEdge™ A3000 Controller Module Guide



THE NETWORK IS THE COMPUTER™

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Regulatory Compliance Statements

Your Sun product is marked to indicate its compliance class:

- Federal Communications Commission (FCC) — USA
- Department of Communications (DOC) — Canada
- Voluntary Control Council for Interference (VCCI) — Japan

Please read the appropriate section that corresponds to the marking on your Sun product before attempting to install the product.

FCC Class A Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, 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.

Shielded Cables: Connections between the workstation and peripherals must be made using shielded cables in order to maintain compliance with FCC radio frequency emission limits. Networking connections can be made using unshielded twisted-pair (UTP) cables.

Modifications: Any modifications made to this device that are not approved by Sun Microsystems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

FCC Class B Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Shielded Cables: Connections between the workstation and peripherals must be made using shielded cables in order to maintain compliance with FCC radio frequency emission limits. Networking connections can be made using unshielded twisted pair (UTP) cables.

Modifications: Any modifications made to this device that are not approved by Sun Microsystems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

DOC Class A Notice - Avis DOC, Classe A

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

DOC Class B Notice - Avis DOC, Classe B

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

VCCI 基準について

第一種VCCI基準について

第一種VCCIの表示があるワークステーションおよびオプション製品は、第一種情報装置です。これらの製品には、下記の項目が該当します。

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第二種VCCI基準について

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取り扱い説明書に従って正しくお取り扱いください。

Safety Agency Compliance Statements

Read this section before beginning any procedure. The following text provides safety precautions to follow when installing a Sun Microsystems product.

Safety Precautions

For your protection, observe the following safety precautions when setting up your equipment:

- Follow all cautions and instructions marked on the equipment.
- Ensure that the voltage and frequency of your power source match the voltage and frequency inscribed on the equipment's electrical rating label.
- Never push objects of any kind through openings in the equipment. Dangerous voltages may be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

Symbols

The following symbols may appear in this book:



Caution – There is risk of personal injury and equipment damage. Follow the instructions.



Caution – Hot surface. Avoid contact. Surfaces are hot and may cause personal injury if touched.



Caution – Hazardous voltages are present. To reduce the risk of electric shock and danger to personal health, follow the instructions.



On – Applies AC power to the system.

Depending on the type of power switch your device has, one of the following symbols may be used:



Off – Removes AC power from the system.



Standby – The On/Standby switch is in the *standby* position.

Modifications to Equipment

Do not make mechanical or electrical modifications to the equipment. Sun Microsystems is not responsible for regulatory compliance of a modified Sun product.

Placement of a Sun Product



Caution – Do not block or cover the openings of your Sun product. Never place a Sun product near a radiator or heat register. Failure to follow these guidelines can cause overheating and affect the reliability of your Sun product.



Caution – The workplace-dependent noise level defined in DIN 45 635 Part 1000 must be 70Db(A) or less.

SELV Compliance

Safety status of I/O connections comply to SELV requirements.

Power Cord Connection



Caution – Sun products are designed to work with single-phase power systems having a grounded neutral conductor. To reduce the risk of electric shock, do not plug Sun products into any other type of power system. Contact your facilities manager or a qualified electrician if you are not sure what type of power is supplied to your building.



Caution – Not all power cords have the same current ratings. Household extension cords do not have overload protection and are not meant for use with computer systems. Do not use household extension cords with your Sun product.



Caution – Your Sun product is shipped with a grounding type (three-wire) power cord. To reduce the risk of electric shock, always plug the cord into a grounded power outlet.

The following caution applies only to devices with a **Standby** power switch:



Caution – The power switch of this product functions as a standby type device only. The power cord serves as the primary disconnect device for the system. Be sure to plug the power cord into a grounded power outlet that is nearby the system and is readily accessible. Do not connect the power cord when the power supply has been removed from the system chassis.

Battery Pack



Caution - There is a sealed lead acid battery in StorEdge A3000 units: Eagle-Picher, model HE6V12.7. There is danger of explosion if the battery pack is mishandled or incorrectly replaced. Replace only with the same type of Sun Microsystems battery pack. Do not disassemble it or attempt to recharge it outside the system. Do not dispose of the battery in fire. Dispose of the battery properly in accordance with local regulations.

System Unit Cover

You must remove the cover of your Sun computer system unit in order to add cards, memory, or internal storage devices. Be sure to replace the top cover before powering up your computer system.



Caution – Do not operate Sun products without the top cover in place. Failure to take this precaution may result in personal injury and system damage..

Einhaltung sicherheitsbehördlicher Vorschriften

Auf dieser Seite werden Sicherheitsrichtlinien beschrieben, die bei der Installation von Sun-Produkten zu beachten sind.

Sicherheitsvorkehrungen

Treffen Sie zu Ihrem eigenen Schutz die folgenden Sicherheitsvorkehrungen, wenn Sie Ihr Gerät installieren:

- Beachten Sie alle auf den Geräten angebrachten Warnhinweise und Anweisungen.
- Vergewissern Sie sich, daß Spannung und Frequenz Ihrer Stromquelle mit der Spannung und Frequenz übereinstimmen, die auf dem Etikett mit den elektrischen Nennwerten des Geräts angegeben sind.
- Stecken Sie auf keinen Fall irgendwelche Gegenstände in Öffnungen in den Geräten. Leitfähige Gegenstände könnten aufgrund der möglicherweise vorliegenden gefährlichen Spannungen einen Kurzschluß verursachen, der einen Brand, Stromschlag oder Geräteschaden herbeiführen kann.

Symbole

Die Symbole in diesem Handbuch haben folgende Bedeutung:



Achtung – Gefahr von Verletzung und Geräteschaden. Befolgen Sie die Anweisungen.



Achtung – Hohe Temperatur. Nicht berühren, da Verletzungsgefahr durch heiße Oberfläche besteht.



Achtung – Gefährliche Spannungen. Anweisungen befolgen, um Stromschläge und Verletzungen zu vermeiden.



Ein – Setzt das System unter Wechselstrom.

Je nach Netzschaltertyp an Ihrem Gerät kann eines der folgenden Symbole benutzt werden:



Aus – Unterbricht die Wechselstromzufuhr zum Gerät.



Wartezustand (Stand-by-Position) - Der Ein-/Wartezustand-Schalter steht auf Wartezustand. Änderungen an Sun-Geräten.

Nehmen Sie keine mechanischen oder elektrischen Änderungen an den Geräten vor. Sun Microsystems, übernimmt bei einem Sun-Produkt, das geändert wurde, keine Verantwortung für die Einhaltung behördlicher Vorschriften

Aufstellung von Sun-Geräten



Achtung – Um den zuverlässigen Betrieb Ihres Sun-Geräts zu gewährleisten und es vor Überhitzung zu schützen, dürfen die Öffnungen im Gerät nicht blockiert oder verdeckt werden. Sun-Produkte sollten niemals in der Nähe von Heizkörpern oder Heizluftklappen aufgestellt werden.



Achtung – Der arbeitsplatzbezogene Schalldruckpegel nach DIN 45 635 Teil 1000 beträgt 70Db(A) oder weniger.

Einhaltung der SELV-Richtlinien

Die Sicherung der I/O-Verbindungen entspricht den Anforderungen der SELV-Spezifikation.

Anschluß des Netzkabels



Achtung – Sun-Produkte sind für den Betrieb an Einphasen-Stromnetzen mit geerdetem Nulleiter vorgesehen. Um die Stromschlaggefahr zu reduzieren, schließen Sie Sun-Produkte nicht an andere Stromquellen an. Ihr Betriebsleiter oder ein qualifizierter Elektriker kann Ihnen die Daten zur Stromversorgung in Ihrem Gebäude geben.



Achtung – Nicht alle Netzkabel haben die gleichen Nennwerte. Herkömmliche, im Haushalt verwendete Verlängerungskabel besitzen keinen Überlastungsschutz und sind daher für Computersysteme nicht geeignet.



Achtung – Ihr Sun-Gerät wird mit einem dreiadrigen Netzkabel für geerdete Netzsteckdosen geliefert. Um die Gefahr eines Stromschlags zu reduzieren, schließen Sie das Kabel nur an eine fachgerecht verlegte, geerdete Steckdose an.

Die folgende Warnung gilt nur für Geräte mit Wartezustand-Netzschalter:



Achtung – Der Ein / Aus-Schalter dieses Geräts schaltet nur auf Wartezustand (Stand-By-Modus). Um die Stromzufuhr zum Gerät vollständig zu unterbrechen, müssen Sie das Netzkabel von der Steckdose abziehen. Schließen Sie den Stecker des Netzkabels an eine in der Nähe befindliche, frei zugängliche, geerdete Netzsteckdose an. Schließen Sie das Netzkabel nicht an, wenn das Netzteil aus der Systemeinheit entfernt wurde.

Batterien



Achtung - Die Geräte StorEdge A3000 von Sun enthalten auslaufsichere Bleiakkumulatoren. Eagle-Picher, Produkt-Nr. HE6V12.7. Werden bei der Behandlung oder beim Austausch der Batterie Fehler gemacht, besteht Explosionsgefahr. Batterie nur gegen Batterien gleichen Typs von Sun Microsystems austauschen. Nicht demontieren und nicht versuchen, die Batterie außerhalb des Geräts zu laden. Batterie nicht ins Feuer werfen. Ordnungsgemäß entsprechend den vor Ort geltenden Vorschriften entsorgen.

Gehäuseabdeckung

Sie müssen die obere Abdeckung Ihres Sun-Systems entfernen, um interne Komponenten wie Karten, Speicherchips oder Massenspeicher hinzuzufügen. Bringen Sie die obere Gehäuseabdeckung wieder an, bevor Sie Ihr System einschalten.



Achtung – Bei Betrieb des Systems ohne obere Abdeckung besteht die Gefahr von Stromschlag und Systemschäden.

Conformité aux normes de sécurité

Ce texte traite des mesures de sécurité qu'il convient de prendre pour l'installation d'un produit Sun Microsystems.

Mesures de sécurité

Pour votre protection, veuillez prendre les précautions suivantes pendant l'installation du matériel :

- Suivre tous les avertissements et toutes les instructions inscrites sur le matériel.
- Vérifier que la tension et la fréquence de la source d'alimentation électrique correspondent à la tension et à la fréquence indiquées sur l'étiquette de classification de l'appareil.
- Ne jamais introduire d'objets quels qu'ils soient dans une des ouvertures de l'appareil. Vous pourriez vous trouver en présence de hautes tensions dangereuses. Tout objet conducteur introduit de la sorte pourrait produire un court-circuit qui entraînerait des flammes, des risques d'électrocution ou des dégâts matériels.

Symboles

Vous trouverez ci-dessous la signification des différents symboles utilisés :



Attention : risques de blessures corporelles et de dégâts matériels. Veuillez suivre les instructions.



Attention : surface à température élevée. Evitez le contact. La température des surfaces est élevée et leur contact peut provoquer des blessures corporelles.



Attention : présence de tensions dangereuses. Pour éviter les risques d'électrocution et de danger pour la santé physique, veuillez suivre les instructions.

MARCHE – Votre système est sous tension (courant alternatif).

Un des symboles suivants sera peut-être utilisé en fonction du type d'interrupteur de votre système:

 **ARRET** – Votre système est hors tension (courant alternatif).

 **VEILLEUSE** – L'interrupteur Marche/Veilleuse est en position « Veilleuse ».

Modification du matériel

Ne pas apporter de modification mécanique ou électrique au matériel. Sun Microsystems n'est pas responsable de la conformité réglementaire d'un produit Sun qui a été modifié.

Positionnement d'un produit Sun

 **Attention** : pour assurer le bon fonctionnement de votre produit Sun et pour l'empêcher de surchauffer, il convient de ne pas obstruer ni recouvrir les ouvertures prévues dans l'appareil. Un produit Sun ne doit jamais être placé à proximité d'un radiateur ou d'une source de chaleur.

 **Attention** : Le niveau de pression acoustique au poste de travail s'élève selon la norme DIN 45 635 section 1000, à 70 dB (A) ou moins.

Conformité SELV

Sécurité : les raccordements E/S sont conformes aux normes SELV.

Connexion du cordon d'alimentation

 **Attention** : les produits Sun sont conçus pour fonctionner avec des alimentations monophasées munies d'un conducteur neutre mis à la terre. Pour écarter les risques d'électrocution, ne pas brancher de produit Sun dans un autre type d'alimentation secteur. En cas de doute quant au type d'alimentation électrique du local, veuillez vous adresser au directeur de l'exploitation ou à un électricien qualifié.



Attention : tous les cordons d'alimentation n'ont pas forcément la même puissance nominale en matière de courant. Les rallonges d'usage domestique n'offrent pas de protection contre les surcharges et ne sont pas prévues pour les systèmes d'ordinateurs. Ne pas utiliser de rallonge d'usage domestique avec votre produit Sun.



Attention : votre produit Sun a été livré équipé d'un cordon d'alimentation à trois fils (avec prise de terre). Pour écarter tout risque d'électrocution, branchez toujours ce cordon dans une prise mise à la terre.

L'avertissement suivant s'applique uniquement aux systèmes équipés d'un interrupteur VEILLEUSE:



Attention : le commutateur d'alimentation de ce produit fonctionne comme un dispositif de mise en veille uniquement. C'est la prise d'alimentation qui sert à mettre le produit hors tension. Veuillez donc à installer le produit à proximité d'une prise murale facilement accessible. Ne connectez pas la prise d'alimentation lorsque le châssis du système n'est plus alimenté.

Bloc-batterie



Attention -Les unités Sun StorEdge A3000 contiennent une batterie étanche au plomb (Eagle-Picher n°HE6V12.7). Il existe un risque d'explosion si ce bloc-batterie est manipulé de façon erronée ou mal mis en place. Ne remplacez ce bloc que par un bloc-batterie Sun Microsystems du même type. Ne le démontez pas et n'essayez pas de le recharger hors du système. Ne faites pas brûler la batterie mais mettez-la au rebut conformément aux réglementations locales en vigueur.

Couvercle

Pour ajouter des cartes, de la mémoire, ou des unités de stockage internes, vous devrez démonter le couvercle de l'unité système Sun. Ne pas oublier de remettre ce couvercle en place avant de mettre le système sous tension.



Attention : il est dangereux de faire fonctionner un produit Sun sans le couvercle en place. Si l'on néglige cette précaution, on encourt des risques de blessures corporelles et de dégâts matériels.

Normativas de seguridad

El siguiente texto incluye las medidas de seguridad que se deben seguir cuando se instale algún producto de Sun Microsystems.

Precauciones de seguridad

Para su protección observe las siguientes medidas de seguridad cuando manipule su equipo:

- Siga todas las avisos e instrucciones marcados en el equipo.
- Asegúrese de que el voltaje y la frecuencia de la red eléctrica concuerdan con las descritas en las etiquetas de especificaciones eléctricas del equipo.
- No introduzca nunca objetos de ningún tipo a través de los orificios del equipo. Pueden haber voltajes peligrosos. Los objetos extraños conductores de la electricidad pueden producir cortocircuitos que provoquen un incendio, descargas eléctricas o daños en el equipo.

Símbolos

En este libro aparecen los siguientes símbolos:



Precaución – Existe el riesgo de lesiones personales y daños al equipo. Siga las instrucciones.



Precaución – Superficie caliente. Evite el contacto. Las superficies están calientes y pueden causar daños personales si se tocan.



Precaución – Voltaje peligroso presente. Para reducir el riesgo de descarga y daños para la salud siga las instrucciones.

Encendido – Aplica la alimentación de CA al sistema.

Según el tipo de interruptor de encendido que su equipo tenga, es posible que se utilice uno de los siguientes símbolos:



Apagado – Elimina la alimentación de CA del sistema.



En espera – El interruptor de Encendido/En espera se ha colocado en la posición de *En espera*.

Modificaciones en el equipo

No realice modificaciones de tipo mecánico o eléctrico en el equipo. Sun Microsystems no se hace responsable del cumplimiento de las normativas de seguridad en los equipos Sun modificados.

Ubicación de un producto Sun



Precaución – Para asegurar la fiabilidad de funcionamiento de su producto Sun y para protegerlo de sobrecalentamientos no deben obstruirse o taparse las rejillas del equipo. Los productos Sun nunca deben situarse cerca de radiadores o de fuentes de calor.



Precaución – De acuerdo con la norma DIN 45 635, Parte 1000, se admite un nivel de presión acústica para puestos de trabajo máximo de 70Db(A).

Cumplimiento de la normativa SELV

El estado de la seguridad de las conexiones de entrada/salida cumple los requisitos de la normativa SELV.

Conexión del cable de alimentación eléctrica



Precaución – Los productos Sun están diseñados para trabajar en una red eléctrica monofásica con toma de tierra. Para reducir el riesgo de descarga eléctrica, no conecte los productos Sun a otro tipo de sistema de alimentación eléctrica. Póngase en contacto con el responsable de mantenimiento o con un electricista cualificado si no está seguro del sistema de alimentación eléctrica del que se dispone en su edificio.



Precaución – No todos los cables de alimentación eléctrica tienen la misma capacidad. Los cables de tipo doméstico no están provistos de protecciones contra sobrecargas y por tanto no son apropiados para su uso con computadores. No utilice alargadores de tipo doméstico para conectar sus productos Sun.



Precaución – Con el producto Sun se proporciona un cable de alimentación con toma de tierra. Para reducir el riesgo de descargas eléctricas conéctelo siempre a un enchufe con toma de tierra.

La siguiente advertencia se aplica solamente a equipos con un interruptor de encendido que tenga una posición "En espera":



Precaución – El interruptor de encendido de este producto funciona exclusivamente como un dispositivo de puesta en espera. El enchufe de la fuente de alimentación está diseñado para ser el elemento primario de desconexión del equipo. El equipo debe instalarse cerca del enchufe de forma que este último pueda ser fácil y rápidamente accesible. No conecte el cable de alimentación cuando se ha retirado la fuente de alimentación del chasis del sistema.

Paquete de pilas



Precaución – Las unidades StorEdge A3000 contienen una pila de plomo sellada, Eagle-Picher n° HE6V12.7. Existe riesgo de estallido si el paquete de pilas se maneja sin cuidado o se sustituye de manera indebida. Las pilas sólo deben sustituirse por el mismo tipo de paquete de pilas de Sun Microsystems. No las desmonte ni intente recargarlas fuera del sistema. No arroje las pilas al fuego. Deséchelas siguiendo el método indicado por las disposiciones vigentes.

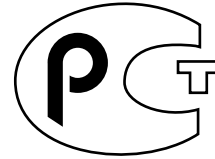
Tapa de la unidad del sistema

Debe quitar la tapa del sistema cuando sea necesario añadir tarjetas, memoria o dispositivos de almacenamiento internos. Asegúrese de cerrar la tapa superior antes de volver a encender el equipo.



Precaución – Es peligroso hacer funcionar los productos Sun sin la tapa superior colocada. El hecho de no tener en cuenta esta precaución puede ocasionar daños personales o perjudicar el funcionamiento del equipo.

GOST-R Certification Mark



Declaration of Conformity

Compliance ID: Class 1000

Product Name: RSM Array 2000
Sun StorEdge A3000

This product has been tested and complies with:

EMC

European Union—EC

This equipment complies with the following requirements of the EMC Directive 89/336/EEC:

EN55022 / CISPR22 (1985)	Class A
EN50082-1 IEC801-2 (1991)	4 kV (Direct), 8 kV (Air)
IEC801-3 (1984)	3 V / m
IEC801-4 (1988)	1.0 kV Power Lines, 0.5 kV Signal Lines
EN61000-3-2 / IEC1000-3-2(1994)	Pass

Safety

This equipment complies with the following requirements of the Low Voltage Directive 73/23/EEC:

EC Type Examination Certificates:

EN60950 / IEC950 (1993)	TUV Rheinland Certificate # S9677494.1
EN60950 w / Nordic Deviations	CB Scheme Certificate # UL1195-142277 / USA

Supplementary Information

This product was tested and complies with all the requirements for the CE Mark when connected to a Sun workstation or server.

/ S /
Dennis P. Symanski DATE
Manager, Product Compliance

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Contents

Preface xxiii

1. Product Overview 1-1

- 1.1 Description 1-2
 - 1.1.1 Front Components 1-3
 - 1.1.2 Rear Components 1-4
- 1.2 SCSI Components 1-5
 - 1.2.1 SCSI Array Controllers 1-5
 - 1.2.2 SCSI Interfaces 1-6
- 1.3 Power System 1-7
 - 1.3.1 Battery Unit 1-7
 - 1.3.2 Power Supplies 1-8
- 1.4 Cooling System 1-10
 - 1.4.1 Controller Fan 1-10
 - 1.4.2 Power Supply Fan 1-11
- 1.5 Other Features 1-11

2. Installation 2-1

- 2.1 Before You Begin 2-2
 - 2.1.1 Rackmount Placement 2-2
 - 2.1.2 Installation Worksheet 2-3

- 2.2 Installing the Mounting Rails 2-4
- 2.3 Verifying the Host SCSI IDs 2-6
- 2.4 Installing the Controller Module 2-7
- 2.5 Connecting the SCSI Cables 2-9
- 2.6 Connecting the Power Cords 2-10
- 2.7 Completing the Installation 2-10
- 3. Operating the Controller Module 3-1**
 - 3.1 Powering On the Controller Module and System 3-2
 - 3.2 Powering Off the Controller Module and System 3-3
- 4. Diagnostics and Troubleshooting 4-1**
 - 4.1 Checking the Controller Module LEDs 4-2
 - 4.1.1 Checking the Front Panel LEDs 4-2
 - 4.1.2 Checking the Controller LEDs 4-3
 - 4.1.3 Checking the Battery Canister LEDs 4-5
 - 4.1.4 Checking the LEDs on the Rear of the Controller Module 4-7
 - 4.2 Checking the Battery Label 4-8
 - 4.3 Troubleshooting 4-9
 - 4.3.1 No Power to Controller Module 4-9
 - 4.3.2 No Power to Part of Controller Module 4-10
 - 4.3.3 Controller Module Fault LEDs are On 4-11
 - 4.3.4 Battery Is Weak or Dead 4-13
 - 4.3.5 Write Cache Function Is Not Working Properly 4-13
 - 4.3.6 Cannot Access Controllers or Drives 4-14
 - 4.3.7 Disk Drive Problem 4-14
- 5. Preparing for Service 5-1**
 - 5.1 Front Panel 5-2
 - 5.1.1 Removing the Front Panel 5-2

5.1.2	Replacing the Front Panel	5-2
5.2	Controller Module	5-3
5.2.1	Removing the Controller Module	5-3
5.2.2	Replacing the Controller Module	5-6
5.3	Mounting Rails	5-7
5.3.1	Removing the Mounting Rails	5-7
5.3.2	Replacing the Mounting Rails	5-8
6.	SCSI Components	6-1
6.1	Replacing SCSI Cables	6-2
6.2	Determining a Controller Failure	6-2
6.2.1	Removing and Replacing a Controller	6-4
6.2.2	Removing and Replacing a SIMM Module	6-5
6.2.3	Replacing a Controller Card Cage (Service Technician Only)	6-8
7.	Power Subassemblies	7-1
7.1	Recovering From a Power Supply Shutdown	7-2
7.2	Checking and Replacing Power Cords	7-3
7.3	Replacing a Power Supply	7-4
7.4	Replacing the Battery Unit	7-6
7.5	Replacing a DC Power Harness (Service Technician Only)	7-8
7.6	Replacing the Power Supply Housing (Service Technician Only)	7-11
7.7	Replacing the Battery Harness (Service Technician Only)	7-14
8.	Cooling System Subassemblies	8-1
8.1	Determining a Fan Failure	8-2
8.2	Replacing the Controller Fan	8-3
8.3	Replacing the Power Supply Fan	8-5

A. Illustrated Parts Breakdown A-1

A.1 List of Replacement Parts A-2

A.2 Illustrations of Replacement Parts A-3

B. Specifications B-1

B.1 Physical Specifications B-2

B.2 Electrical Specifications B-2

B.3 Environmental Specifications B-3

Index Index-1

Figures

FIGURE 1-1	Controller Module (Front View)	1-2
FIGURE 1-2	Controller Module Front Components	1-3
FIGURE 1-3	Controller Module Rear Components	1-4
FIGURE 1-4	Controller Canister	1-5
FIGURE 1-5	Controller Card Cage (Front View)	1-6
FIGURE 1-6	Battery Unit	1-7
FIGURE 1-7	Power Supply Canister	1-8
FIGURE 1-8	Power Supply Housing	1-9
FIGURE 1-9	Controller Fan	1-10
FIGURE 1-10	Power Supply Fan Canister	1-11
FIGURE 2-1	Installation Worksheet	2-3
FIGURE 2-2	Attaching the Mounting Rails to the Rear of the Cabinet	2-5
FIGURE 2-3	Attaching the Mounting Rail to the Front of Cabinet	2-5
FIGURE 2-4	Setting the Host SCSI ID for the Controllers	2-6
FIGURE 2-5	Installing the Controller Module Chassis	2-8
FIGURE 2-6	Tightening the Securing Screws	2-8
FIGURE 2-7	Differential SCSI connectors	2-9
FIGURE 3-1	Controller Module Power Switches	3-2
FIGURE 4-1	LEDs on the Front Panel	4-2

FIGURE 4-2	Controller LEDs (Front View)	4-4
FIGURE 4-3	Battery Canister LEDs	4-6
FIGURE 4-4	Controller Module LEDs (Rear View)	4-7
FIGURE 4-5	Battery Unit Service Label	4-8
FIGURE 5-1	Removing the Front Panel	5-2
FIGURE 5-2	SCSI Cables and Power Cords on Back of Controller Module	5-4
FIGURE 5-3	Removing Chassis Mounting Screws (Front of Cabinet)	5-5
FIGURE 5-4	Loosening the Securing Screws (Back of Cabinet)	5-5
FIGURE 5-5	Removing the Mounting Screws at the Front of Cabinet	5-7
FIGURE 5-6	Removing the Mounting Screws at the Rear of the Cabinet	5-8
FIGURE 6-1	Removing a Controller Canister	6-4
FIGURE 6-2	Opening the Controller Canister	6-6
FIGURE 6-3	Removing a SIMM Module on a Controller	6-7
FIGURE 6-4	Removing Controller Card Cage Screws	6-8
FIGURE 6-5	Battery and Power Harnesses	6-9
FIGURE 6-6	Removing the Controller Card Cage	6-10
FIGURE 6-7	Controller Card Cage Side Vent	6-11
FIGURE 7-1	Power Switch and Power Cord Location	7-4
FIGURE 7-2	Removing a Power Supply Canister	7-5
FIGURE 7-3	Removing the Battery Unit	7-7
FIGURE 7-4	Removing the Power Harnesses From the Back Panel	7-9
FIGURE 7-5	Removing the Power Harnesses From the Power Supply Housing	7-9
FIGURE 7-6	Removing the Power Supply Housing Screws	7-11
FIGURE 7-7	Removing the Power Supply Housing	7-12
FIGURE 7-8	Power Supply Housing Connectors	7-13
FIGURE 7-9	Removing Controller Card Cage Screws	7-14
FIGURE 7-10	Battery and Power Harnesses	7-15
FIGURE 7-11	Removing the Controller Card Cage	7-16

FIGURE 8-1	Removing the Controller Fan Canister	8-3
FIGURE 8-2	Power Supply Fan Canister Lever and Pull Ring	8-5
FIGURE 8-3	Removing the Power Supply Fan	8-5
FIGURE A-1	Controller Module Replaceable Canisters	A-3
FIGURE A-2	Controller Card Cage	A-3
FIGURE A-3	Power Supply Housing	A-4
FIGURE A-4	68-to-68 Pin Cable	A-4
FIGURE A-5	Differential SCSI Terminator	A-4
FIGURE A-6	DC Power and Battery Harnesses	A-5

Tables

TABLE 4-1	Front Panel LEDs Under Normal Operating Conditions	4-3
TABLE 4-2	Controller LEDs Under Normal Operating Conditions	4-4
TABLE 4-3	Status LED Interpretation	4-5
TABLE 4-4	Battery Canister LEDs Under Normal Operating Conditions	4-6
TABLE 4-5	Power Supply and Power Supply Fan LEDs Under Normal Operating Conditions	4-7
TABLE 4-6	No Power to Controller Module	4-9
TABLE 4-7	No Power to Part of Controller Module	4-10
TABLE 4-8	Controller Module Fault LEDs are On	4-11
TABLE 4-9	Battery Is Weak or Dead	4-13
TABLE 4-10	Write Cache Function Is Not Working Properly	4-13
TABLE 4-11	Cannot Access Ccontrollers or Drives	4-14
TABLE 4-12	Disk Drive Problem	4-14
TABLE A-1	Customer and Field Replaceable Units	A-2
TABLE B-1	Physical Specifications	B-2
TABLE B-2	AC Power Requirements	B-2
TABLE B-3	Environmental Requirements	B-3

Preface

The *Sun StorEdge A3000 Controller Module Guide* provides installation, operation, and service instructions for the Sun™ StorEdge A3000™ controller module. These instructions are designed for an experienced system administrator.

Using UNIX Commands

This document does not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris 2.x Handbook for SMCC Peripherals*
- AnswerBook™ online documentation for the Solaris™ 2.x software environment
- Other software documentation that you received with your system

Typographic Conventions

TABLE P-1 Typographic Conventions

Typeface or Symbol	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output.	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output.	% su Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized. Command-line variable; replace with a real name or value.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be root to do this. To delete a file, type <code>rm filename</code> .

Shell Prompts

TABLE P-2 Shell Prompts

Shell	Prompt
C shell	<i>machine_name%</i>
C shell superuser	<i>machine_name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

Related Documentation

TABLE P-3 Related Documentation

Title	Part Number
<i>Sun StorEdge A3500 Hardware Configuration Guide</i>	805-4981
<i>Sun StorEdge A3500 Task Map</i>	805-4982

Ordering Sun Documents

SunDocsSM is a distribution program for Sun Microsystems technical documentation. Contact SunExpress for easy ordering and quick delivery. You can find a listing of available Sun documentation on the World Wide Web.

TABLE P-4 SunExpress Contact Information

Country	Telephone	Fax
Belgium	02-720-09-09	02-725-88-50
Canada	1-800-873-7869	1-800-944-0661
France	0800-90-61-57	0800-90-61-58
Germany	01-30-81-61-91	01-30-81-61-92
Holland	06-022-34-45	06-022-34-46
Japan	0120-33-9096	0120-33-9097
Luxembourg	32-2-720-09-09	32-2-725-88-50
Sweden	020-79-57-26	020-79-57-27
Switzerland	0800-55-19-26	0800-55-19-27
United Kingdom	0800-89-88-88	0800-89-88-87
United States	1-800-873-7869	1-800-944-0661
World Wide Web: http://www.sun.com/sunexpress/		

Sun Documentation on the Web

The docs.sun.com web site enables you to access Sun technical documentation on the World Wide Web. You can browse the docs.sun.com archive or search for a specific book title or subject at <http://docs.sun.com>.

Sun Welcomes Your Comments

We are interested in improving our documentation and welcome your comments and suggestions. You can email your comments to us at smcc-docs@sun.com. Please include the part number of your document in the subject line of your email.

Product Overview

This chapter describes the controller module and its components. For information on the drive trays and expansion cabinet, refer to the documents that you received with that equipment.

- Description—page 1-2
- SCSI Components—page 1-5
- Power System—page 1-7
- Cooling System—page 1-10

1.1 Description

The StorEdge A3000 controller module (FIGURE 1-1) is a compact unit designed to provide high-performance disk array management services. Constructed for installation and integration into StorEdge A3500 systems, the controller module supports dual SCSI hosts on a 16-bit SCSI-2 bus. In addition, the unit provides the same SCSI-2 bus interface for drive trays in the expansion cabinet. There are two SCSI controllers inside the controller module that use five independent drive channels to manage data distribution and storage for up to 60 disk drives. The controllers perform system status and fault detection functions as well.

The controller module chassis houses several removable, portable canisters:

- SCSI array controllers
- Power supplies
- Batteries
- Cooling fans

You can access these components either from the front or rear of the controller module.

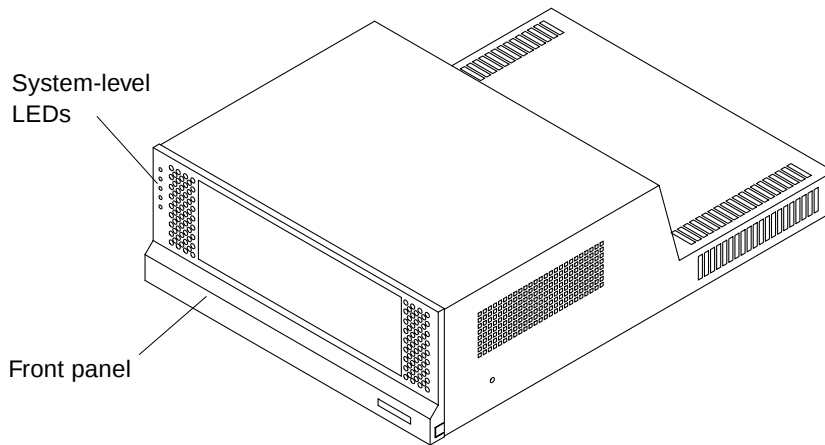


FIGURE 1-1 Controller Module (Front View)

1.1.1 Front Components

The removable front panel (FIGURE 1-1) contains openings for viewing the system-level light emitting diodes (LEDs) and for air circulation to the internal components. Behind the front panel are the two controllers, the battery unit, and the controller fan (FIGURE 1-2).

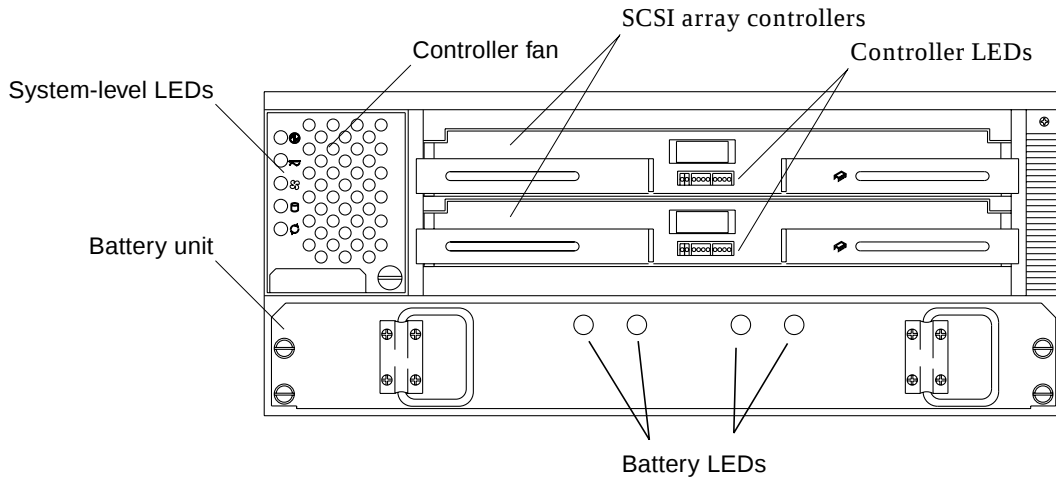


FIGURE 1-2 Controller Module Front Components

There are three sets of LEDs on the front of the controller module (FIGURE 1-2):

- **System-level LEDs**, which indicate the overall status of the controller module and its components. They are located on the left side of the front panel. See TABLE 4-1 on page 4-3 for a description of the system-level LEDs.
- **Controller LEDs**, which indicate the status of each controller. You must remove the front panel to view the controller LEDs. See TABLE 4-2 on page 4-4 for a description of the controller LEDs.
- **Battery LEDs**, which indicate the battery charge. See TABLE 4-4 on page 4-6 for a description of the battery LEDs.

1.1.2 Rear Components

At the rear of the controller module are two power supplies, a power supply fan canister, and connectors for both the host SCSI bus and drive tray cabling (FIGURE 1-3). These connectors extend through the back panel, or rear shield, of the controller module chassis.

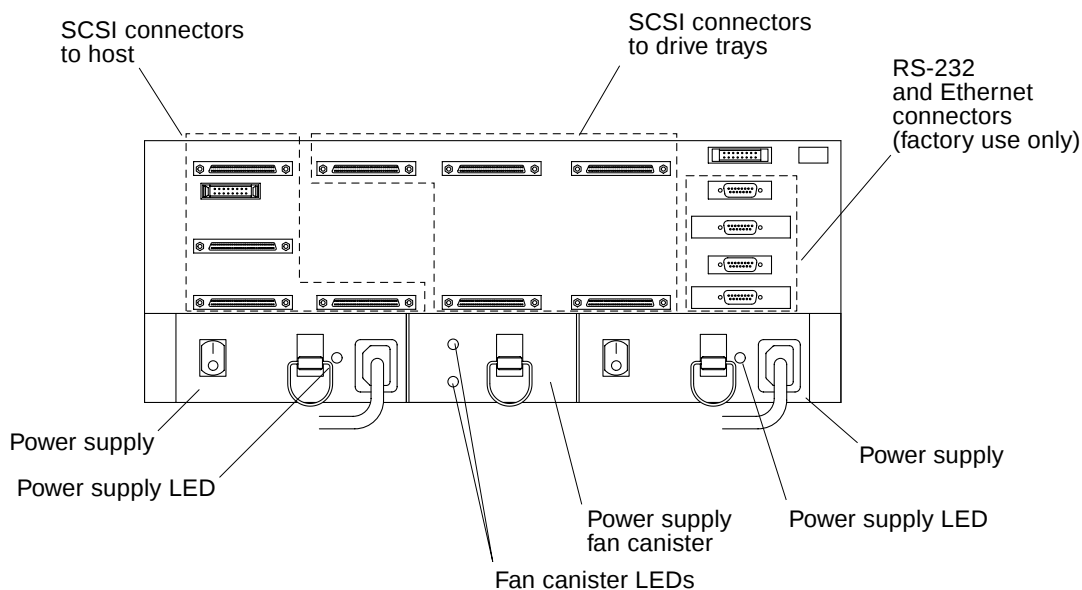


FIGURE 1-3 Controller Module Rear Components

The LEDs on the rear of the controller module indicate the status of the individual components within the unit. There are two LEDs on the power supply fan canister and one LED on each power supply canister. See TABLE 4-5 on page 4-7 for a description of these LEDs.

1.2 SCSI Components

The controller module contains or uses several SCSI components. These components include the following:

- Two host SCSI bus cables
- Five drive tray SCSI cables
- Two SCSI array controllers
- One controller card cage (includes controller back panel)

1.2.1 SCSI Array Controllers

The controller module contains two SCSI array controllers. Each controller comes in a removable, portable canister that goes into one of two slots on the front of the controller module. The canisters have two locking handles and an opening for viewing the controller LEDs (FIGURE 1-4). See TABLE 4-2 on page 4-4 for a description of the controller LEDs.

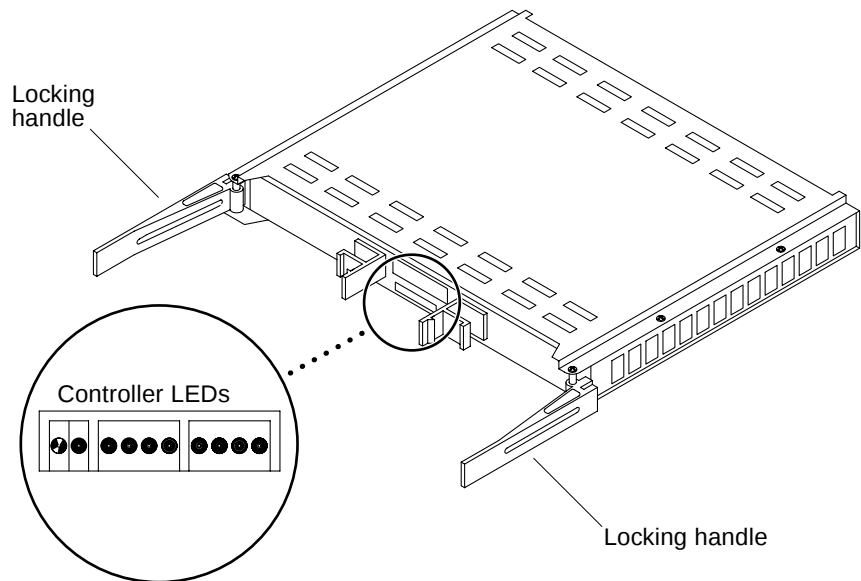


FIGURE 1-4 Controller Canister

Both array controllers come with 16-Mbyte processor memory and 64-Mbyte cache memory. Cache memory is a memory buffer on the controller used to support the Write Cache feature of RAID Manager, the disk array management software. The controllers require no maintenance. Refer to the *RAID Manager Installation Guide* and the *RAID Manager User's Guide* for controller configuration and other software-related information.

1.2.2 SCSI Interfaces

Both controllers connect into the back panel, the main circuit board that interconnects all the components in the controller module. The controller back panel is an integral part of the controller card cage assembly. The controller card cage is a modular structure inside the chassis consisting of controller shelves and the controller back panel (FIGURE 1-5).

Connectors for both the host SCSI bus and drive tray cabling are located on the other side of the back panel (FIGURE 1-3).

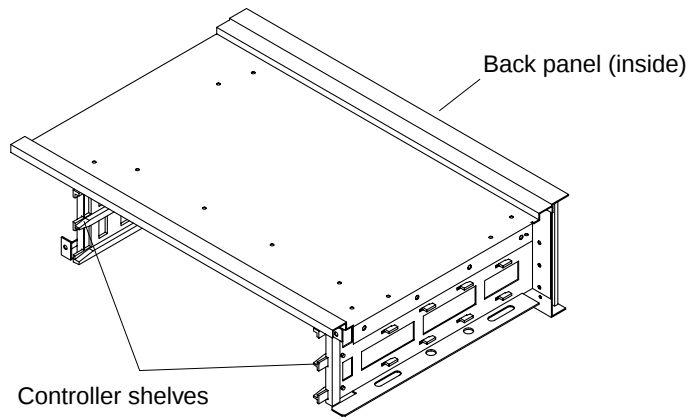


FIGURE 1-5 Controller Card Cage (Front View)

1.3 Power System

The power system for the controller module includes the following:

- Two external AC power cords
- Three internal DC power harnesses
- One DC battery unit
- Two DC power supplies
- Power supply housing (includes power interface board)

1.3.1 Battery Unit

The battery unit (FIGURE 1-6) is a portable, removable canister containing rechargeable batteries and a battery charging board. The battery canister goes into a slot on the front of the controller module, just below the controllers (FIGURE 1-2).

The battery canister has four labels:

- The “Caution” label contains weight and length information for safe removal and installation purposes.
- The “Battery Support Information” label contains three dates for maintenance purposes.
- The Battery replacement label provides information on when to replace the battery canister.
- The “Warning” label contains servicing and warranty information.

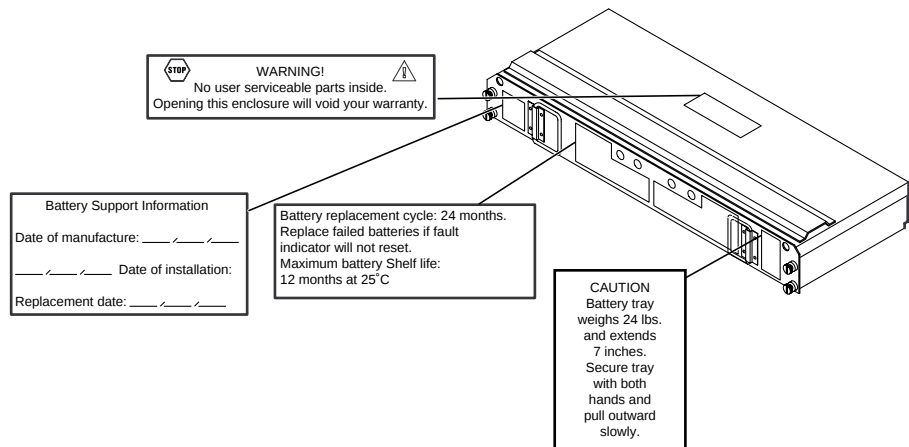


FIGURE 1-6 Battery Unit

The battery unit provides backup power to the cache memory in the controllers. During a power outage, a properly charged battery unit maintains electrical power to the controllers for up to three days. All data stored in memory is preserved as long as the batteries can sustain power to the cache memory.

Note – For newly installed systems, the battery charges and runs self-tests for up to 12 hours. During this time, write caching is not active.

Both batteries inside the battery canister have a two-year life expectancy. Because the battery unit is a sealed canister, you must replace the entire canister every two years.



Caution – The battery unit weighs approximately 24 lbs. Be prepared to support its weight if you remove it from the chassis.

1.3.2 Power Supplies

Two DC power supplies in the controller module provide power to the internal components, converting incoming AC voltage to DC voltage. These are redundant power supplies—one power supply maintains electrical power to the controller module if the other power supply fails. Both power supplies are removable canisters that slide into one of two slots on the back of the controller module. Each canister has a locking lever, a green power LED, a power switch, and an AC power cord connector (FIGURE 1-7).

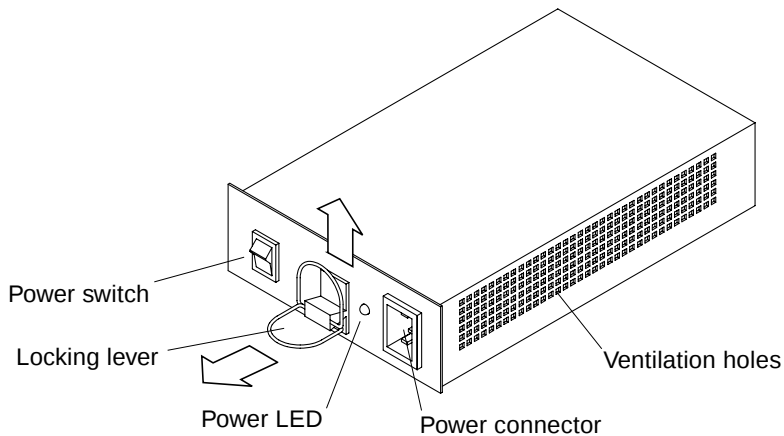


FIGURE 1-7 Power Supply Canister

The power supplies are interchangeable and connect to the power interface board, which provides electrical connections between the power supplies and the other components in the chassis. The interface board is part of the power supply housing, a modular structure inside the chassis (FIGURE 1-8).

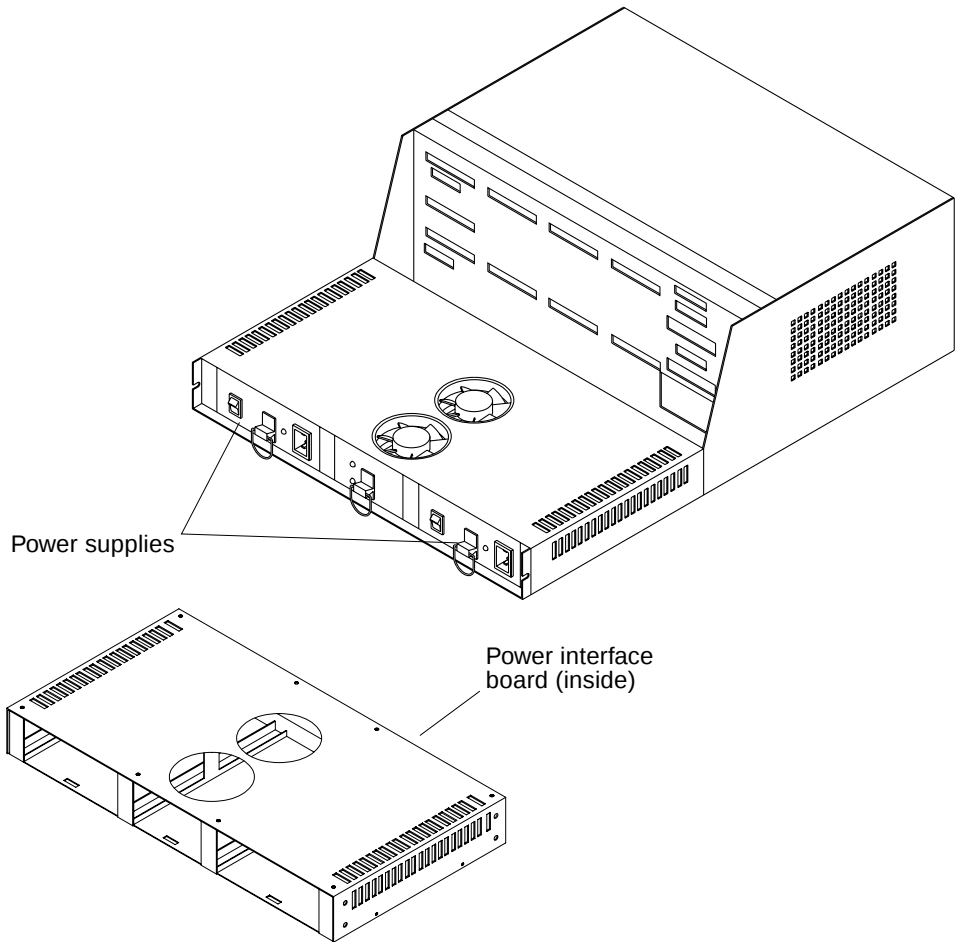


FIGURE 1-8 Power Supply Housing

1.4 Cooling System

The cooling system for the controller module includes the controller fan, power supply fan, and ventilation holes.

1.4.1 Controller Fan

The controller fan (FIGURE 1-9) is a single, removable canister that contains two cooling fans and the circuitry for the system-level LEDs. The dual fans provide a redundant cooling system to both controller canisters. If one fan fails, the other continues to operate, providing sufficient air circulation, until you can replace the unit.

The controller fan goes into a slot on the front of the controller module, to the left of the controllers (FIGURE 1-2). The canister has a handle and thumbscrew that enable you to service the unit. The five LEDs on the left side of the canister provide overall system status information. See TABLE 4-1 on page 4-3 for a description of the system-level LEDs.

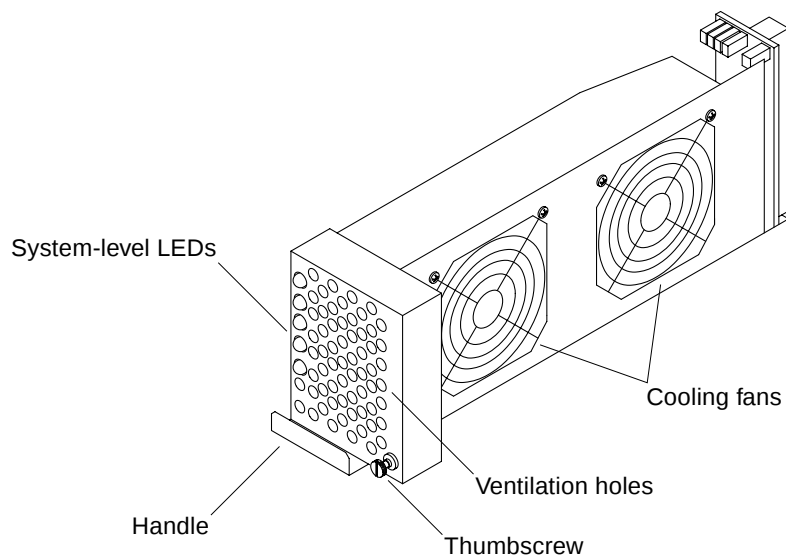


FIGURE 1-9 Controller Fan

1.4.2 Power Supply Fan

Like the controller fan, the power supply fan is a single, removable canister that contains two cooling fans. The dual fans provide a redundant cooling system to both power supply canisters. If one fan fails, the other continues to operate, providing sufficient air circulation to prevent the power supplies from overheating until you can replace the entire power supply fan canister.

The power supply fan canister goes into a slot on the rear of the controller module, between the power supplies. Each canister has a locking lever that enables you to unlatch and remove it from the chassis (FIGURE 1-10). There are two LEDs on the canister: a Power LED and a Fault LED. See TABLE 4-5 on page 4-7 for a description of these LEDs.

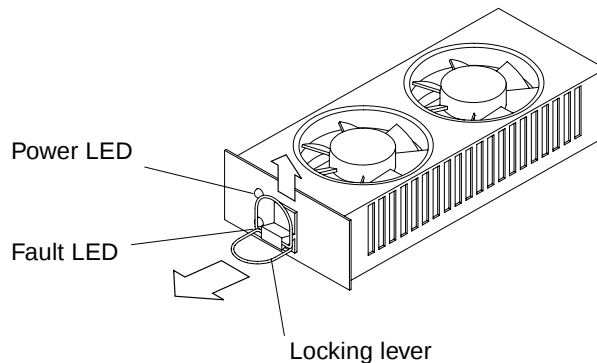


FIGURE 1-10 Power Supply Fan Canister

1.5 Other Features

The StorEdge A3000 controller module works with the RAID Manager software, a disk array management program for configuring, monitoring, and troubleshooting the disk array. As part of this overall disk management system, the controller module supports the following disk array elements and configurations:

- RAID levels 0, 1, 3, and 5
- Redundant, dual-active controller configurations
- Hot spare disk drives
- Hot-swappable components (controllers, fans, etc.)
- Fast Write cache

Installation

This chapter provides instructions for installing the A3000 controller module into an expansion cabinet. These step-by-step procedures will guide you through the entire installation process, beginning with cabinet preparation and ending with system record-keeping information.

- Before You Begin—page 2-2
- Installing the Mounting Rails—page 2-4
- Verifying the Host SCSI IDs—page 2-6
- Installing the Controller Module—page 2-7
- Connecting the SCSI Cables—page 2-9
- Connecting the Power Cords—page 2-10
- Completing the Installation—page 2-10

This chapter does not include instructions on installing and configuring RAID Manager software. Once the controller module, is operational, refer to the *RAID Manager Installation Guide* and the *RAID Manager User's Guide* for instructions on installing and using RAID Manager software.

Note – Some default software parameters (such as RAID level, drive groups, and caching) are set at the factory prior to shipment. Before you attempt to store data on your system, you should use RAID Manager to determine the current status and configuration of your system and reconfigure as required. Refer to your software documentation for further instructions.

2.1 Before You Begin

Before you begin the installation, make sure that:

- You are installing the controller module in a expansion cabinet containing drive trays. The drive tray mounting hardware, drive trays, and other hardware should already be set up, and the cabinet should be near its operating location.
- You have SCSI cables to connect each drive tray to the controller module. These cables were shipped with the drive trays.
- The cabinet and installation site meet all area, environmental, power, and site requirements for the controller module. See Appendix B for more information.
- The host is installed and contains two Wide Intelligent UltraSCSI (UDWIS) host adapters. You can use a DWIS host adapter in place of the UDWIS host adapter, but to achieve optimum SCSI performance use the UDWIS host adapter.
- The cabinet containing the controller module will be the only device on the SCSI bus connected to the host.

To prepare the cabinet, drive trays, and host system, refer to the documentation that came with that equipment.

2.1.1 Rackmount Placement

Rackmount placement information for the StorEdge A3000 controller module, as well as other devices that can be mounted in Sun system and expansion cabinets, is now available through the Web at:

<http://docs.sun.com>

Click on “Storage and Peripherals” in the Hardware section and open the *Rackmount Placement Matrix*.

If you do not have access to the Web, you can obtain this document through the SunDocs program (“Ordering Sun Documents” on page xxv) or from your Sun service provider.

Note – Retrieve the placement information for the controller module before beginning the installation.

2.1.2 Installation Worksheet

The Installation Worksheet (FIGURE 2-1) contains two sections:

- **Controller Installation**—lists the primary steps in the installation process. Use this section as a reference for each step and checklist for completing each task.
- **Controller and System Information**—provides space for recording information about the controller module and about changes you make to other devices in the cabinet during the installation.

Controller Installation

- Plan Your Configuration
 - ❑ Refer to the *Sun StorEdge A3500 Hardware Configuration Guide*
- Prepare Rails
 - ❑ Unpack rackmounting hardware
 - ❑ Install mounting rails
- Prepare Controller Module
 - ❑ Check host SCSI IDs on the controller module
 - ❑ Check battery manufacture date
 - ❑ Write down date of installation on battery label
- Install Controller Module
 - ❑ Slide controller module onto mounting rails
 - ❑ Install mounting screws
 - ❑ Install SCSI terminators
 - ❑ Connect drive tray SCSI cables to controller module
 - ❑ Connect host SCSI cables to controller module
 - ❑ Connect power cords to controller module
- Complete Installation
 - ❑ Turn on both main circuit breakers
 - ❑ Check for Fault LEDs
 - ❑ Replace panels on cabinet
 - ❑ Install necessary software and configure system
 - ❑ Test SCSI bus and devices

Controller and System Information

Controller Module Information	System Information
Model # _____	Cabinet ID (name or number) _____
Serial # _____	No. of devices installed (tape/drive trays, etc.) _____
Date Installed _____	Drive Tray SCSI ID Settings _____
Installer's Name _____	NOTES _____
Installation Location _____	_____
Controller SCSI ID Settings #1____ #2____	_____
Date on Battery Module _____	_____

FIGURE 2-1 Installation Worksheet

2.2 Installing the Mounting Rails

- **Tools:** #2 Phillips screwdriver
- **Equipment:**
 - Mounting rails (2 each)
 - #10 Phillips-head screws
 - #8 Phillips-head screws

1. Determine where you will install the controller module.

Look at the *Rackmount Placement Matrix* on the `docs.sun.com` website if you have not done so already (Section 2.1.1 “Rackmount Placement” on page 2-2).

2. Unpack the rackmounting hardware.

You should have two mounting rails and at least 12 screws in two sizes (#8 and #10).

3. Identify the left mounting rail from the right one.

The mounting rails are not interchangeable and must be installed in the correct orientation inside the cabinet. To determine which rail is which:

- a. **Hold one of the rails by its bracketed end (the end with all the screws) in your right hand.**
- b. **Aim the right-angled edges so that the long edge (solid) is down, the short edge (with many holes) is up, and the screws are facing left or right.**
 - If the screw heads are on the right, you are holding the right mounting rail.
 - If the screw heads are on the left, you are holding the left mounting rail.

4. Attach the left and right mounting rails.

You will install the rails at the hole positions listed in the *Rackmount Placement Matrix*.

- a. Face the rear of the cabinet and insert two #10 screws through the cabinet rail and into the mounting rail bracket (FIGURE 2-2).**

Do not tighten the screws yet.

If necessary, you can loosen the four screws that secure the mounting rail to the mounting rail bracket. Remember to tighten the screws after making any adjustments.

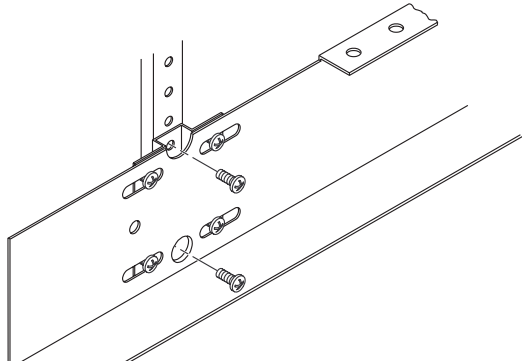


FIGURE 2-2 Attaching the Mounting Rails to the Rear of the Cabinet

- b. Move to the front of the cabinet and align the mounting rails horizontally behind the vertical rails of the cabinet (FIGURE 2-3).**

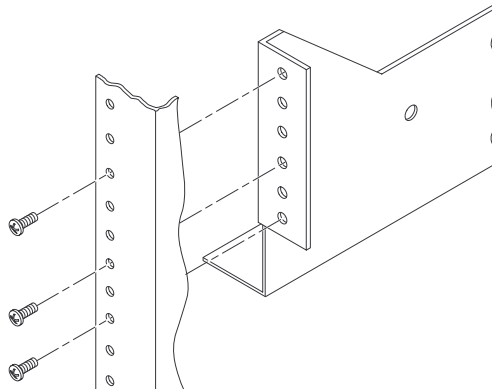


FIGURE 2-3 Attaching the Mounting Rail to the Front of Cabinet

- c. Attach the front of the mounting rails to the cabinet rails with two #8 screws.**
- 5. Tighten the front and back mounting screws in both mounting rails.**

Do not tighten the securing screws (FIGURE 2-6 on page 2-8).

2.3 Verifying the Host SCSI IDs

- **Tools:** Needlenose pliers
- **Equipment:** Jumpers (supplied with unit), antistatic wrist strap

Every device attached to a SCSI bus must have a unique ID number in order to communicate. The factory default SCSI ID settings for controller A and B are ID 5 and ID 4, respectively.

1. Locate the 16 pins on the rear of the controller module (FIGURE 2-4).

The eight pins on the right determine the host SCSI ID for controller 1(A); those on the left determine the SCSI ID for controller 2(B).

2. Wearing the antistatic wrist strap, install jumpers on the pins as shown in FIGURE 2-4.

Use needlenose pliers to remove the jumpers, if necessary.

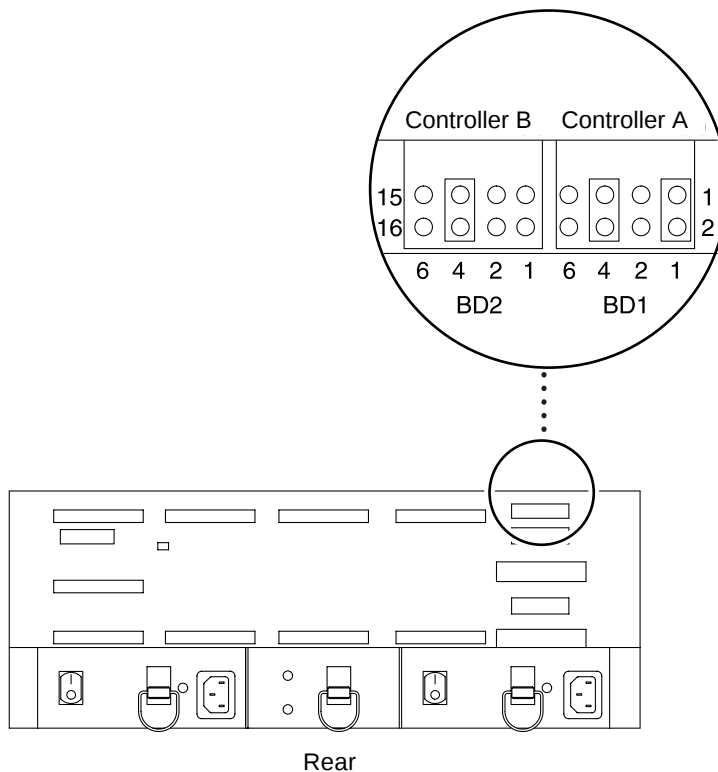


FIGURE 2-4 Setting the Host SCSI ID for the Controllers

2.4 Installing the Controller Module

When you set the chassis in the cabinet, make sure that:

- The canisters are locked in place.
- The air vents above the power supplies and fans are free of obstructions. This includes interface cabling that exits the back of the controller module.



Caution – This procedure requires two people to lift and move the controller module. Use care to avoid injury. A fully loaded controller module weighs approximately 82 pounds.

- **Tools needed:** #2 Phillips screwdriver
- **Equipment needed:** #10 Phillips screws

1. Remove the battery canister from the controller module.

See Section 7.4 “Replacing the Battery Unit” on page 7-6.



Caution – The battery unit weighs approximately 24 lbs. Be prepared to support its weight when you pull it out of the chassis.

2. With the aide of an assistant, lift the controller chassis, set it on the mounting rails, and slide it into the front of the cabinet.

Make sure the slots on the back of the chassis slide beneath the rear securing screws.

3. Install a #10 screw in each side of the battery canister opening (FIGURE 2-5).

These holes align with holes in the mounting rails.

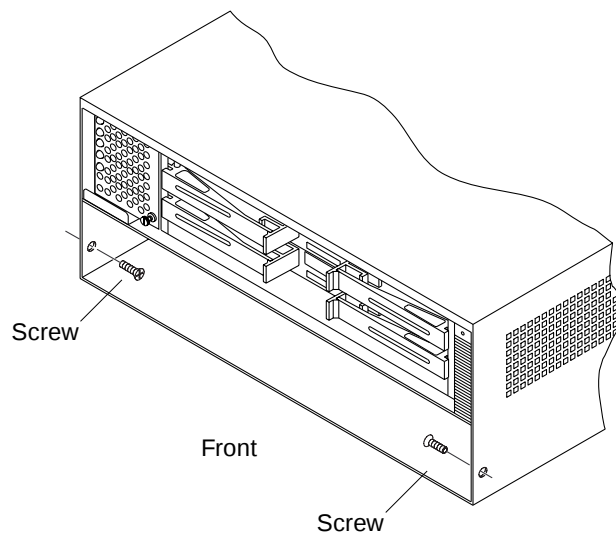


FIGURE 2-5 Installing the Controller Module Chassis

- 4. Tighten the two securing screws in each mounting rail. (FIGURE 2-6).**

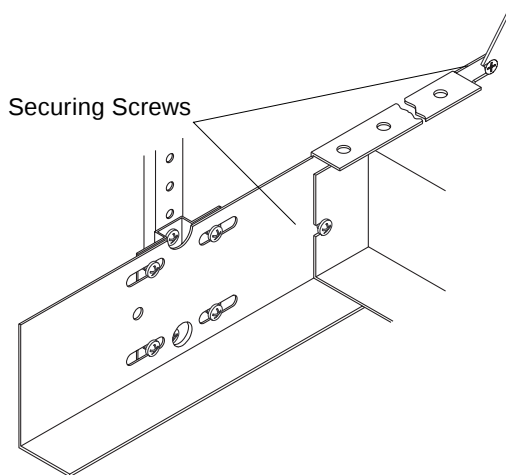


FIGURE 2-6 Tightening the Securing Screws

- 5. Reinstall the battery canister into the controller module.**

See Section 7.4 "Replacing the Battery Unit" on page 7-6.

2.5 Connecting the SCSI Cables

This section gives a generic instructions for attaching SCSI cables to the controller module. For more configuration options, refer to the *Sun StorEdge A3500 Hardware Configuration Guide*, part number 805-4981.

- **Tools:** None
- **Equipment:** SCSI bus cables, SCSI drive cables, terminators, and tie wraps

- 1. Install 16-bit, differential terminators to both HOST OUT connectors on the back of the controller module (FIGURE 2-7).**

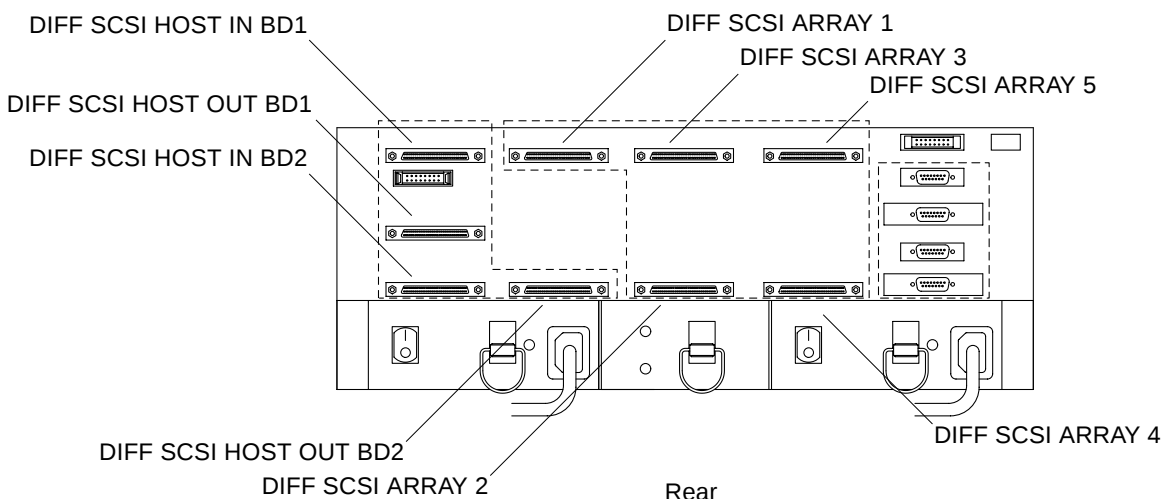


FIGURE 2-7 Differential SCSI connectors

- 2. Connect both host SCSI bus cables to the HOST IN connectors.**

Route both host SCSI bus cables from the bottom of the cabinet and attach them to the HOST IN connectors on the back panel.

- 3. Connect a SCSI cable from the controller module to each drive tray.**

Connect SCSI cables from the DIFF SCSI ARRAY connectors to the corresponding back panel connector. Make sure that you tighten the cable connector screws securely.

- 4. Secure the cables to the inside of the cabinet (left or right) with tie wraps.**

This will keep them from blocking the air flow to the rear of the controller module. Be careful not to route the cables across any sharp edges.

2.6 Connecting the Power Cords

- **Tools:** None
- **Equipment:** AC power cords (shipped with the controller module)

- 1. Make sure the power switches for both power supplies in the controller module are off (FIGURE 2-7).**
- 2. Determine how the power cords will be routed to the power sequencers.**

Refer to the *Sun StorEdge A3000 Hardware Configuration Guide*, part number 805-4981.

Skip to Step 6 if you are installing the controller module in a StorEdge Expansion Cabinet.
- 3. Retrieve the power cords from the controller module shipping container.**
- 4. Facing the rear of the cabinet, plug the power cords into AC power sequencer outlets in the cabinet.**

Note – The cords must be plugged into one or more of the four right outlets to ensure that the controller module is powered on after the disk drive trays.

- 5. Secure the cables to the inside of the cabinet (left or right) with tie wraps.**

This will keep them from blocking the air flow to the back of the controller module.
- 6. Connect the power cords to the controller module.**

2.7 Completing the Installation

Proceed to Chapter 3 “Operating the Controller Module” and follow the instructions in Section 3.1 “Powering On the Controller Module and System.”

Operating the Controller Module

This chapter how to power the StorEdge A3000 controller module on and off. For information on the drive trays or expansion cabinet, refer to the documents that you received with that equipment.

- Powering On the Controller Module and System—page 3-2
- Powering Off the Controller Module and System—page 3-3

3.1 Powering On the Controller Module and System

Note – The power cords from the controller module and drive trays should be connected into the expansion cabinet power sequencers so that the drive trays receive power first, and the controller module receives power last.

If you received a factory configured StorEdge A3500 system, the power cords are already set up for this power-on sequence. If you installed a new controller module into an existing cabinet, see Chapter 2 for power cabling instructions.

1. Prepare to power on the system as follows:

- a. **Make sure that all the controller module canisters are connected and locked into place properly.**
- b. **Make sure that all power and SCSI cables are attached securely.**

2. Turn all power switches on the drive trays to the On position.

Refer to your drive tray documentation for power switch location.

3. Turn both power switches at the rear of the controller module to the On position (FIGURE 3-1).

Both power switches must be on to take advantage of the redundant power supplies.

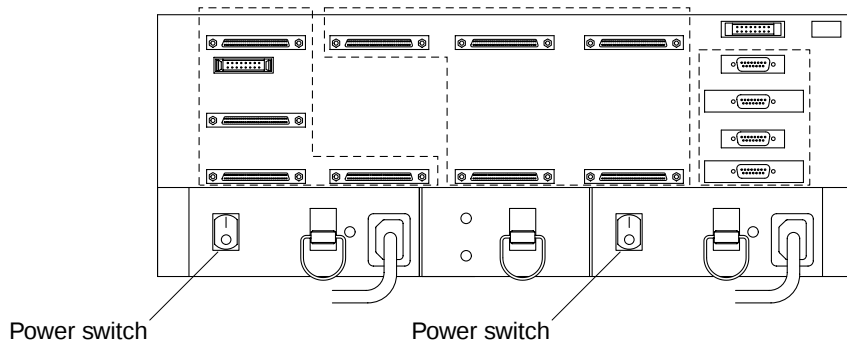


FIGURE 3-1 Controller Module Power Switches

4. Power on the expansion cabinet, if necessary

Refer to your expansion cabinet documentation. If the cabinet has two AC power sequencers, you must turn both circuit breakers to the On position.

5. Power on the host system, if necessary.

Refer to your system documentation for instructions.

6. Check the status of the controller module.

See Section 4.1 “Checking the Controller Module LEDs” on page 4-2.

3.2 Powering Off the Controller Module and System

The controller module is designed to run continuously. Once you turn on the power to the controller module, it should remain on. The only time you should turn off the power is when:

- An emergency situation arises (like fire or flood)
- Hardware or software procedures require that you turn the power off
- A factory representative or service technician tells you to turn off the power

1. Halt all activity to the controller module.

Refer to the *RAID Manager User's Guide* and your operating system documentation for instructions.

2. Check the LEDs on the front and rear of the controller module to make sure that:

a. All drive Active LEDs are turned off.

Drive activity is complete.

b. The Fast Write Cache LED is off.

Controller and SCSI Bus activity is complete.

c. Amber fault LEDs are off.

If a fault LED is lit, see Section 4.3 “Troubleshooting” on page 4-9 to correct the problem *before* you turn off the power.

See Section 4.1 “Checking the Controller Module LEDs” on page 4-2” for LED locations and interpretations.



Caution – Except in an emergency, never turn off the power if a fault LED is lit on any canister or on the front panel of the controller module.

3. To power off only the controller module, turn both power switches on the back of the controller module to the Off position (FIGURE 3-1).

To power off the StorEdge A3500 system, go to Step 4.

4. Power off the expansion cabinet.

Refer to your expansion cabinet documentation for instructions.

Powering off the expansion cabinet removes power from the controller module and drive trays.

Note – For an emergency shutdown, such as in a fire or flood conditions, you should also disconnect the power cords to help prevent circuit shorts if the system may be exposed to water.

Diagnostics and Troubleshooting

This chapter describes how to check the status of the controller module and diagnose problems using the LEDs. It also contains troubleshooting tables to resolve hardware problems.

- Checking the Controller Module LEDs—page 4-2
 - Checking the Front Panel LEDs—page 4-2
 - Checking the Controller LEDs—page 4-3
 - Checking the LEDs on the Rear of the Controller Module—page 4-7
- Checking the Battery Label—page 4-8
- Troubleshooting—page 4-9

4.1 Checking the Controller Module LEDs

The controller module LEDs indicate the status of the overall controller module and the components within the controller module. It is important that you check all LEDs on the controller module (front and rear) after you power on and before you power off the unit.

4.1.1 Checking the Front Panel LEDs

- **Check the LEDs on the front panel (FIGURE 4-1).**

See TABLE 4-1 for LED status under normal operating conditions.

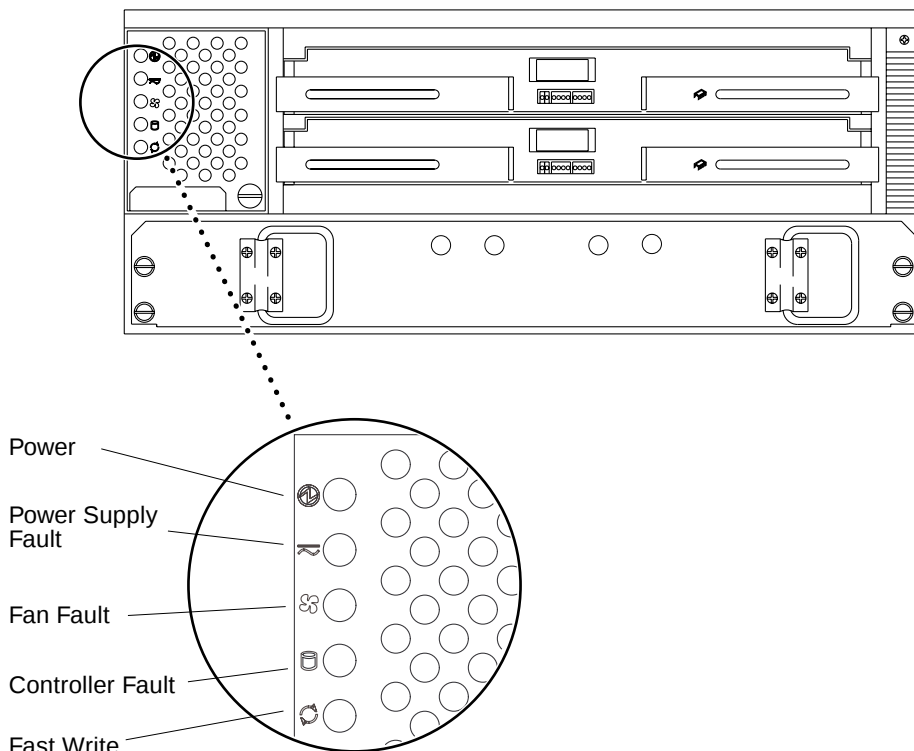


FIGURE 4-1 LEDs on the Front Panel

TABLE 4-1 Front Panel LEDs Under Normal Operating Conditions

LED Type	Color	State	Description
Power	Green	On	Power is being supplied to controller.
Power Supply Fault	Amber	Off	If lit, power supply requires troubleshooting. See TABLE 4-8.
Fan Fault	Amber	Off	If lit, controller fan requires troubleshooting. See TABLE 4-8.
Controller Fault	Amber	Off	If lit, one or both controllers require troubleshooting. See TABLE 4-8.
Fast Write	Green	Blinking	Fast Write operation in progress. (If not lit, Fast Write activity is complete.)

4.1.2 Checking the Controller LEDs

1. Remove the front panel from the controller module.

See Section 5.1.1 “Removing the Front Panel” on page 5-2.

2. Check the LEDs on both controllers (FIGURE 4-2).

See TABLE 4-2 for LED status under normal operating conditions.

Note – During normal operation, you will see green LEDs glowing or blinking on the controller module. The number and pattern of green status LEDs lit on the controllers depends on how your system is configured. An active controller does not have the same status LEDs lit as a passive controller. See TABLE 4-3 for an interpretation of the controller status LED activity.

3. Replace the front panel.

See the procedure Section 5.1.2 “Replacing the Front Panel” on page 5-2.

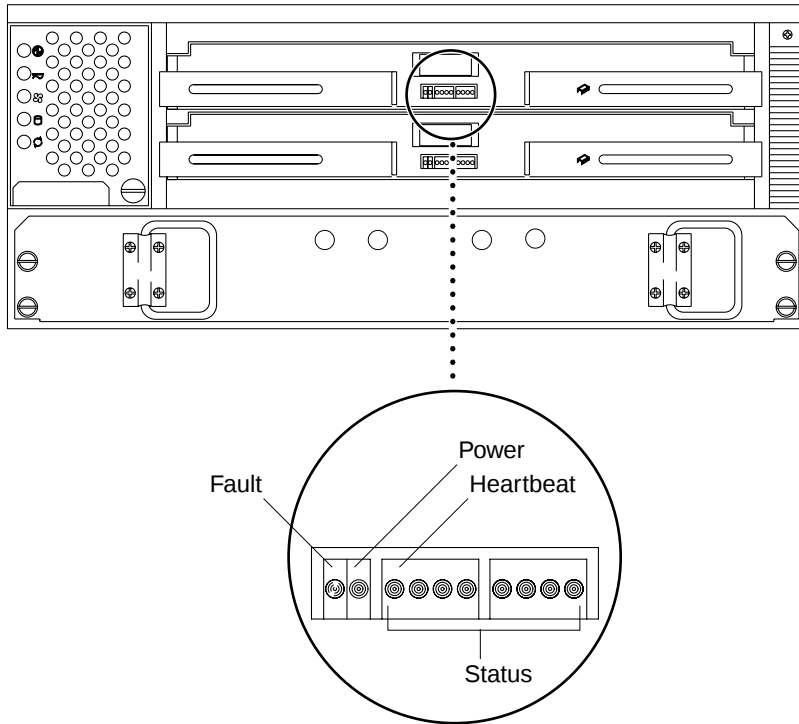


FIGURE 4-2 Controller LEDs (Front View)

TABLE 4-2 Controller LEDs Under Normal Operating Conditions

LED Type	Color	State	Description
Fault	Amber	Off	If lit, controller requires troubleshooting. See TABLE 4-8.
Power	Green	On	Power is being supplied.
Heartbeat	Green	Blinking	The controller is active.
Status	Green	On	The number and pattern of status LEDs lit depends on your system configuration. See TABLE 4-3 for a detailed interpretation of the status LEDs.

TABLE 4-3 shows the status LED patterns and related definitions. The flashing eight-light pattern in column one alternates with the eight-light pattern in the second column. If no pattern is shown in the second column, the LEDs remain lit as shown in the first column.

TABLE 4-3 Status LED Interpretation

Status LED Pattern	○=On ● = Off	Definition
○●●● ●●●●	●●●● ●●●●	Active - no fault
●○○● ○○○●	○○○● ○○○●	Passive - no fault
○○○○ ○○○○		Controller is held in reset
●●●● ●●●●	●●●● ●●●○	Cycling light pattern indicates controller held in boot menu
●●●● ●●○●	●●●● ●○●●	
●●●● ○●●●	●●●○ ●●●●	
●●○● ●●●●	●○●● ●●●●	
○●●● ●●●●	●●●● ●●●●	
●●●● ●●●●	●●●● ●●●○	Chasing light pattern indicates controller firmware upgrade
●●●● ●●○●	●●●● ●○●○	
●●●● ○○○○	●●●○ ○○○○	
●●○● ○○○○	●○●○ ○○○○	
○○○● ○○○○	●●●● ●●●●	
○○○● ○●○●		The controller is in the wrong slot
All other patterns		There is a controller failure

Note – Refer to the *RAID Manager User’s Guide* for additional information regarding controller statuses.

4.1.3 Checking the Battery Canister LEDs

- 1. Remove the front panel from the controller module.**
See Section 5.1.1 “Removing the Front Panel” on page 5-2.
- 2. Check the LEDs on the front of the battery (FIGURE 4-3).**
- 3. Replace the front panel.**
See Section 5.1.2 “Replacing the Front Panel” on page 5-2.

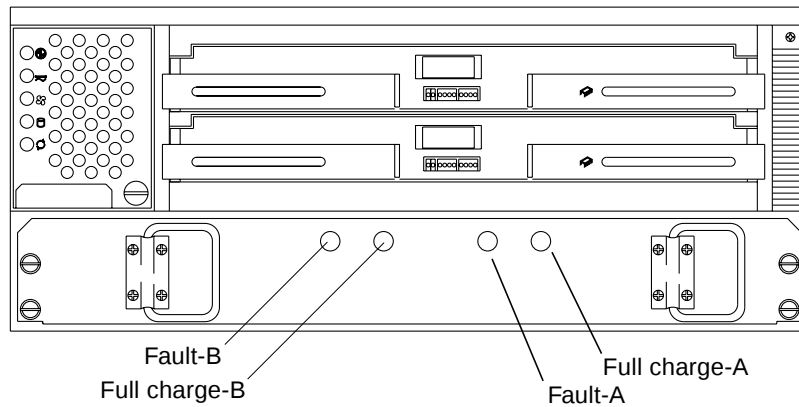


FIGURE 4-3 Battery Canister LEDs

TABLE 4-4 Battery Canister LEDs Under Normal Operating Conditions

LED Type	Color	State	Description
Full Charge - A/B	Green	On	The corresponding battery is fully charged and no fault condition exists.
		Off	The corresponding battery is not fully charged. The RAID controller is also restricted from caching.
Fault - A/B	Amber	Off	If lit, there is a Fault condition in the circuit and the battery canister must be replaced. The RAID controller is also restricted from caching.

4.1.4 Checking the LEDs on the Rear of the Controller Module

- **Check the LEDs on the rear of the controller module** (FIGURE 4-4).

See TABLE 4-5 for LED status under normal operating circumstances.

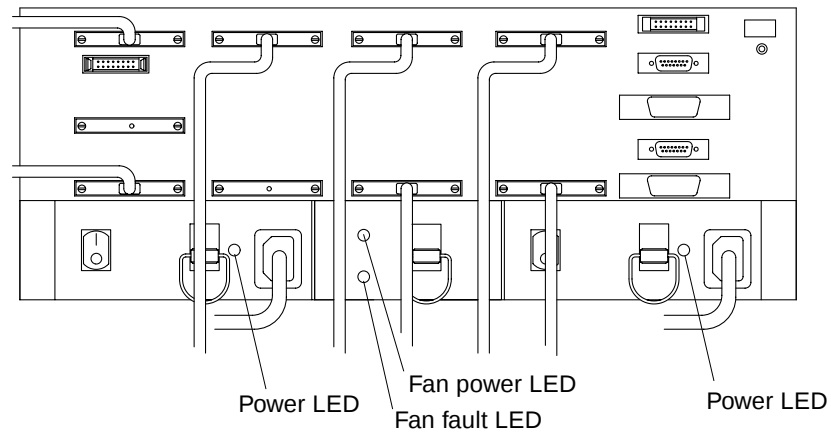


FIGURE 4-4 Controller Module LEDs (Rear View)

TABLE 4-5 Power Supply and Power Supply Fan LEDs Under Normal Operating Conditions

LED Type	Color	State	Description
Power	Green	On	Power supply is functional.
Fan Fault	Amber	Off	If lit, power supply fan requires troubleshooting. See TABLE 4-8.
Fan Power	Green	On	Fan power is being supplied.

4.2 Checking the Battery Label

You must check the expiration date on the battery unit label. If it is time to replace the battery, order a new battery unit and use the instructions in Section 7.4 “Replacing the Battery Unit” on page 7-6 to replace this unit. For more information about the battery, see Section 1.3.1 “Battery Unit” on page 1-7.

1. Remove the front panel from the controller module.

See Section 5.1 “Front Panel” on page 5-2.

2. Check the replacement date on the Battery Support Information label (FIGURE 4-5).

This is the date you should replace the battery unit. The date should have been entered during the system installation. (See Section 2.1.2 “Installation Worksheet” on page 2-3.)

Note – Operate the controller module in a moderate environment (between 5°C and 35°C). Operating the controller module in temperatures above 35°C lowers the life expectancy of the battery unit.

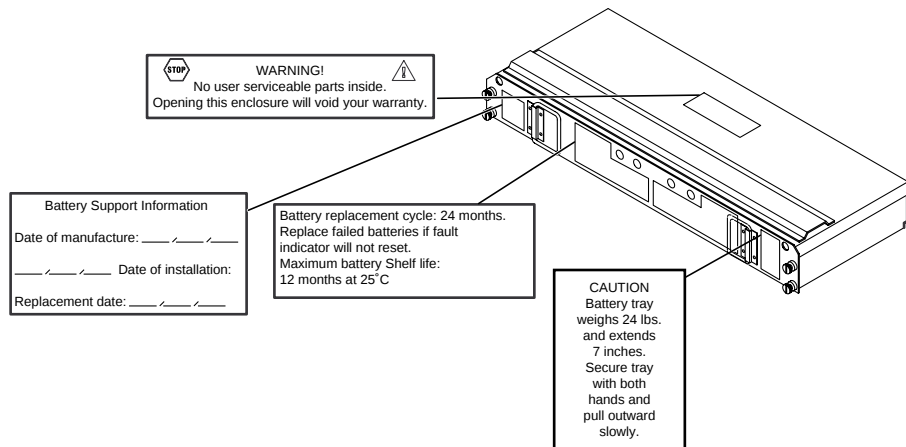


FIGURE 4-5 Battery Unit Service Label

3. Replace the front panel.

See Section 5.1.2 “Replacing the Front Panel” on page 5-2.

4.3 Troubleshooting

4.3.1 No Power to Controller Module

TABLE 4-6 No Power to Controller Module

Symptom	Possible Causes	Corrective Action	Reference
All Power LEDs for controller module are off	Power switches turned off	1. Turn on both controller module power switches.	page 3-2
		2. Turn on cabinet main circuit breakers.	
	Power cords unplugged or damaged	Make sure both power cords are connected and undamaged.	page 7-3
	Power supplies overheated or failed	1. Wait 10 minutes. If power supply turns on automatically, use recovery procedure. If not, go to Step 2.	page 7-2
		2. Replace power supplies.	page 7-4

4.3.2 No Power to Part of Controller Module

TABLE 4-7 No Power to Part of Controller Module

Symptom	Possible Causes	Corrective Action	Reference
Front panel Power LED off (all other canister power LEDs on)	Controller fan missing or not inserted all the way	Make sure controller fan is installed correctly. If LED still off, it may be burned out. Go to next cause.	
	Controller fan circuitry failure	Replace controller fan.	page 8-3
Both power supply Power LEDs on (all other Power LEDs off)	Canisters not inserted	Make sure all the controllers and fans are locked securely in place.	
	DC power harness failure	Replace the DC power harnesses (call service technician).	page 7-8
	Power interface board failure	Replace the power supply housing (call service technician).	page 7-11
	Controller back panel failure	Replace the controller card cage (call service technician).	page 6-8
One power supply Power LED is on, the other is off.	Power supply turned off or disconnected	Check power cord and turn on the power switch. If canister LED remains off, go to Cause next cause.	page 3-2
	Power supply overheated	Wait 10 minutes to see if power supply turns on again. If not, go to next cause.	page 7-2
	Power supply failure	Check for power supply Fault LED on front panel. If lit, replace failed power supply.	page 7-4

4.3.3 Controller Module Fault LEDs are On

TABLE 4-8 Controller Module Fault LEDs are On

Symptom	Possible Causes	Corrective Action	Reference
Power Supply Fault LED on (front panel and canister LEDs)	Power supply missing or not connected properly	1. Make sure power supply is locked in place.	page 7-3
		2. If LED still off, go to next cause.	
	Power supply overheated	Wait 10 minutes to see if power supply LED turns on again. If it does, go to recovery procedure. If not, go to next cause.	page 7-2
	Power supply failure (power supply canister Fault LED on)	Replace failed power supply.	page 7-4
	Key switch turned off on expansion cabinet	Turn key switch to On position. Refer to expansion cabinet manual.	
	Local/Remote switch on power sequencer set to the wrong state.	Change switch setting. Refer to expansion cabinet manual.	
Fan Fault LED on (front panel and canister LEDs)	Power supply fan missing or not connected properly	1. Check the LEDs on the power supply fan.	page 4-7
		2. If the Power LED is on and the Fault LED is off, the unit is probably okay. Go to next cause.	
		3. If the Power LED is off, make sure power supply fan is locked in place.	
		4. If a unit Power LED remains off or the Fault LED is on, go to next cause.	
	Power supply fan failure (canister Fault LED on)	Replace failed power supply fan.	page 8-5
	Controller fan failure	If the power supply fan looks normal, it probably means a controller fan failure. Replace the unit.	page 8-3

TABLE 4-8 Controller Module Fault LEDs are On *(Continued)*

Symptom	Possible Causes	Corrective Action	Reference
Controller Fault LED on (front panel and canister LEDs)	Controller missing or not connected properly	1. Check both controller canisters.	page 6-2
		2. If the Power LED on one of the controllers is off, make sure the canister is locked in place.	
		3. If the Power LED remains off or the Fault LED turns on, go to next cause.	
		4. If both controllers look normal, but the Fault LED on the front panel remains on, go to next cause.	
	Controller failure	Replace failed controller.	page 6-4
	Controller back panel failure	Replace the controller card cage (call service technician).	page 6-8
Both Controller and Fan Fault LEDs on (front panel and canister)	Fan failure caused controller to overheat	1. Check both controllers for a Fault LED.	page 4-3
		2. Turn off power to controller module and replace controller fan.	page 8-3
		3. Allow unit to cool down, then turn on power. If controller Fault LED turns on, go to next cause.	
	Failure of both controller and controller fan	Perform steps in Cause A, then replace controller module.	page 5-3

4.3.4 Battery Is Weak or Dead

TABLE 4-9 Battery Is Weak or Dead

Symptom	Possible Causes	Corrective Action	Reference
Write cache disabled by controller Error message in message log	Battery unit due for replacement	Check service date for battery unit.	page 4-8
		If near battery service date, replace battery unit.	page 7-6
	Power turned off for extended period and drained batteries	Turn on power to controller module and allow to run 24 hours to recharge batteries. If you still get battery low message, go to next symptom.	page 3-2
	Faulty battery harness	Replace the battery harness (call service technician).	page 7-14
	Battery is not fully charged	Check the battery status again after 12 hours; recharge may take that long.	

4.3.5 Write Cache Function Is Not Working Properly

TABLE 4-10 Write Cache Function Is Not Working Properly

Symptom	Possible Causes	Corrective Action	Reference
Fast Write LED not blinking (front panel)	Write Cache function disabled or data not being downloaded	Use RAID Manager to enable Write Cache function or download data. If still doesn't work, go to next possible cause.	
	SCSI cable or interface problem	1. Make sure there are no Fault LEDs on the controller module or drives. Use RAID Manager to check status of system.	page 4-3
		2. Check all SCSI cables and connectors.	page 6-2
	Fast Write LED burned out	Replace controller fan	page 8-3
	Battery dead	Check service date for battery unit.	page 4-8
		If near battery service date, replace battery unit.	page 7-6

4.3.6 Cannot Access Controllers or Drives

TABLE 4-11 Cannot Access Ccontrollers or Drives

Symptom	Possible Causes	Corrective Action	Reference
Host or RAID Manager errors when attempting to access controllers or drives	Software function or configuration problem	Check appropriate software and documentation to make sure system is set up correctly or proper command was executed.	RAID Manager or host manuals
	Controller module or expansion cabinet is turned off	Make sure all power switches are turned on.	page 3-2
	Loose or defective SCSI cables	Check cables and connectors between the host, controller module, and drive trays.	page 6-2
	Controller (or other hardware) failure	1. Check for a Fault LED on the front panel. If one is lit, go to Step 2. If not, go to next cause.	page 4-2
		2. Check the canisters for fault LEDs. Replace the failed controller (or other failed unit).	page 6-2
	Controller back panel failure	Replace the controller card cage (call service technician).	page 6-8
	Hhost adapter failure	Replace host adapter.	Host adapter manual

4.3.7 Disk Drive Problem

Table 4-12 Disk Drive Problem

Symptom	Possible Causes	Corrective Action	Reference
LUN in “Degraded” mode or LUN is “Dead” Disk drive red LED is on	Disk drive failure in one of the drive trays	Replace the failed disk drive.	RAID Manager or drive tray manuals

Preparing for Service

This chapter describes how to prepare the StorEdge A3000 controller module for service.

- Front Panel—page 5-2
 - Removing the Front Panel—page 5-2
 - Replacing the Front Panel—page 5-2
- Controller Module—page 5-3
 - Removing the Controller Module—page 5-3
 - Replacing the Controller Module—page 5-6
- Mounting Rails—page 5-7
 - Removing the Mounting Rails—page 5-7
 - Replacing the Mounting Rails—page 5-8

5.1 Front Panel

Remove the front panel of the controller module to access the following parts:

- SCSI array controllers—page 6-4
- SIMMs—page 6-5
- Controller card cage—page 6-8
- Battery unit—page 7-6
- Controller fan canister—page 8-3

5.1.1 Removing the Front Panel

1. Grasp the lower left and right edges of the front panel and pull out slightly until you feel it snap out of the mounting holes (FIGURE 5-1).
2. Slide the front panel down and out from under the lip on the top of the chassis.

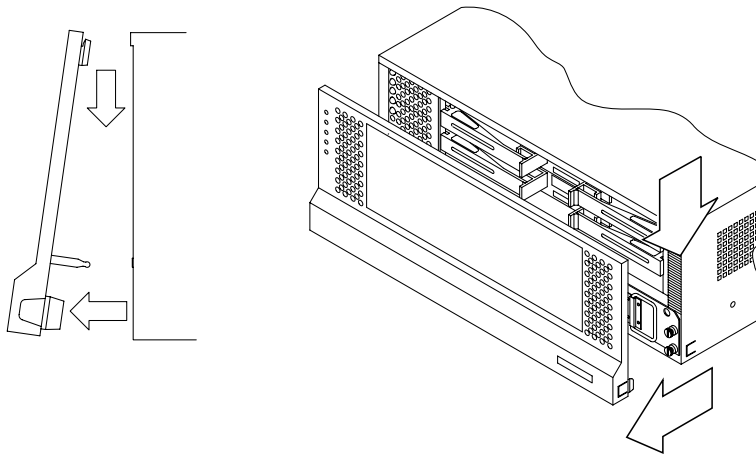


FIGURE 5-1 Removing the Front Panel

5.1.2 Replacing the Front Panel

1. Tilt and slide the top edge of the front panel under the upper lip on the chassis (reverse FIGURE 5-1).
2. Push on the lower edges of the front panel until the mounting pins (on the rear of the panel) snap into place.

5.2 Controller Module

Remove the controller module from the cabinet to replace the following parts:

- Controller card cage—page 6-8
- DC power harness—page 7-8
- Power supply housing—page 7-11
- Battery harness—page 7-14

5.2.1 Removing the Controller Module



Caution – This procedure requires two people to remove and lift the controller module. Use care to avoid injury. A fully loaded controller module weighs approximately 82 pounds.

1. Stop all controller module and SCSI bus activity.

The Fast Write LED on the front panel off the controller module and the Active LEDs on the drives should be off (not blinking).

Refer to the *RAID Manager User's Guide* for instructions on stopping SCSI bus activity.

2. Remove the controller module front panel.

See Section 5.1 “Front Panel” on page 5-2.

3. Check the LEDs before powering off the system to make sure conditions are safe.

See Section 4.1 “Checking the Controller Module LEDs” on page 4-2.

4. Disconnect both power cords from the controller module (FIGURE 5-2).

5. Disconnect all of the SCSI cables and SCSI terminators from the controller module (FIGURE 5-2).

Label each cable as you disconnect it (host #1, drive tray #5, and so forth) for reassembly later.

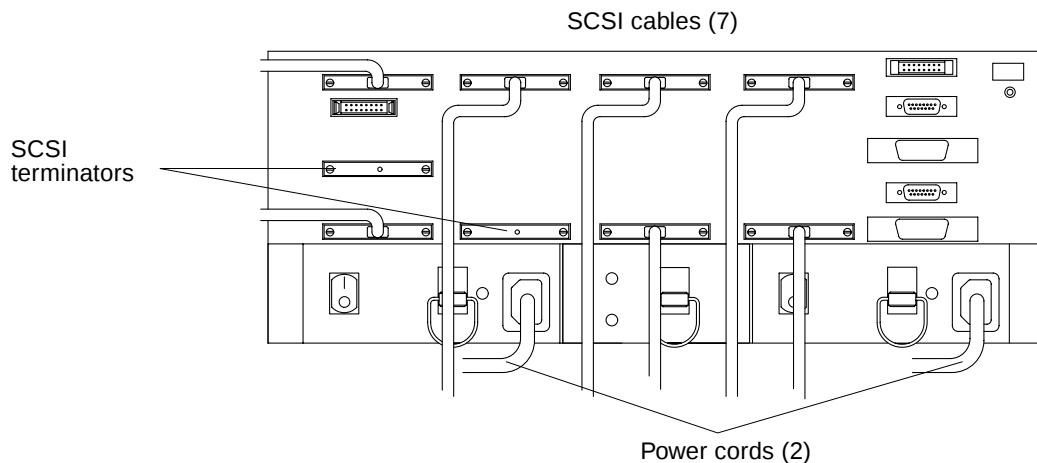


FIGURE 5-2 SCSI Cables and Power Cords on Back of Controller Module

6. Attach an antistatic wrist strap.



Caution – Electrostatic charges can damage sensitive components. Use antistatic precautions before removing or handling the controllers or other components in the controller module.

7. Remove the battery canister from the controller module.

See Section 7.4 “Replacing the Battery Unit” on page 7-6.



Caution – The battery unit weighs approximately 24 lbs. Be prepared to support its weight when you pull it out of the chassis.

- 8. Remove the mounting screws from each side of the battery canister opening in the chassis (FIGURE 5-3).**

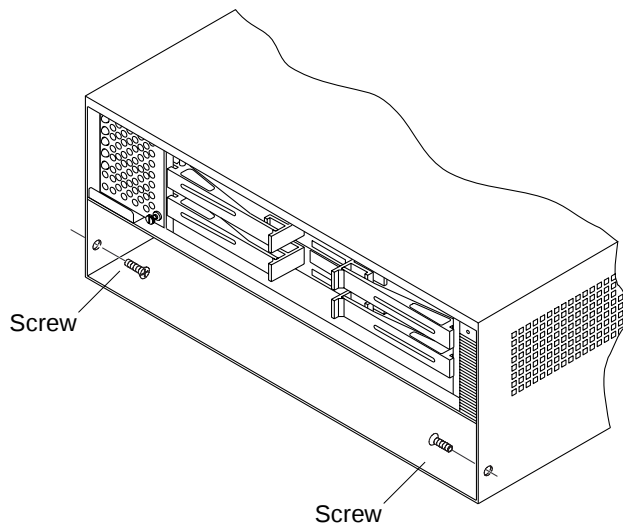


FIGURE 5-3 Removing Chassis Mounting Screws (Front of Cabinet)

- 9. Loosen the four screws that secure the chassis to the mounting rails, two screws on each side at the back of the chassis (FIGURE 5-4).**

Do *not* remove the screws.

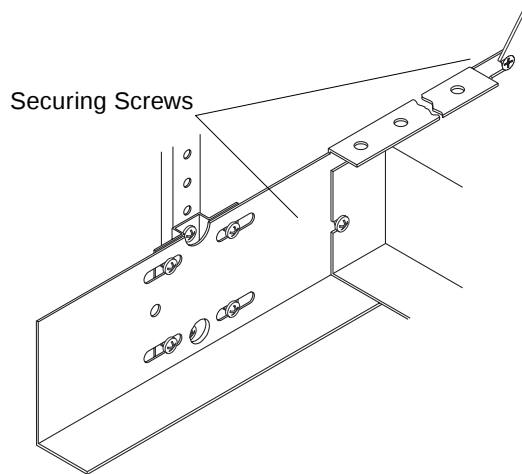


FIGURE 5-4 Loosening the Securing Screws (Back of Cabinet)

- 10. With the aid of an assistant, slide the controller module chassis out of the cabinet.**

Set it on a level, dry surface.

5.2.2 Replacing the Controller Module

When you replace a controller module or install it in a new expansion cabinet:

- 1. Replace the controller module into the cabinet.**

See Section 2.4 “Installing the Controller Module” on page 2-7.

- 2. Reconnect the SCSI cables to the controller module.**

See Section 2.5 “Connecting the SCSI Cables” on page 2-9.

- 3. Reconnect the power cables to the controller module.**

See Section 2.6 “Connecting the Power Cords” on page 2-10.

- 4. Power on the system.**

See Section 3.1 “Powering On the Controller Module and System” on page 3-2.

- 5. Check the LEDs for faults.**

See Section 3.1 “Powering On the Controller Module and System” on page 3-2

If a fault LED comes on, or the power LEDs remain off, see Section 4.3 “Troubleshooting” on page 4-9 for troubleshooting procedures.

- 6. Use RAID Manager to check the status of the controller module.**

Refer to the *RAID Manager User's Guide* for instructions.

5.3 Mounting Rails

5.3.1 Removing the Mounting Rails

Use this procedure only if you are installing the controller module into another cabinet. If not, skip this procedure.

1. **Remove the three mounting screws from the front of a mounting rail (FIGURE 5-5).**

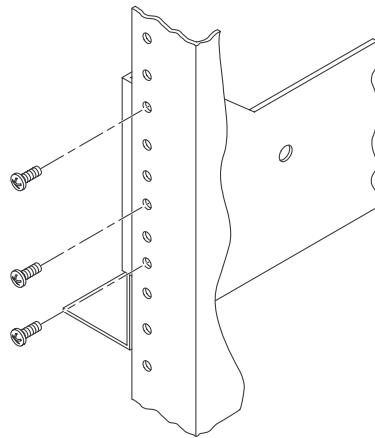


FIGURE 5-5 Removing the Mounting Screws at the Front of Cabinet

- 2. Remove the two mounting screws from the back of the mounting rail (FIGURE 5-6).**

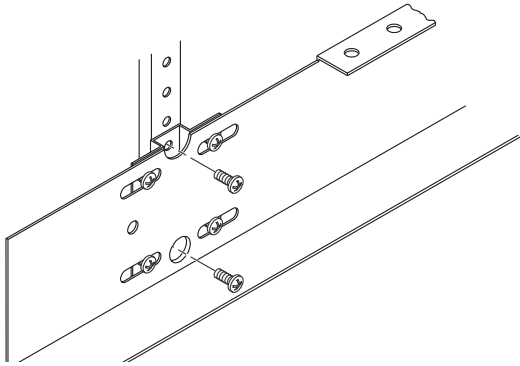


FIGURE 5-6 Removing the Mounting Screws at the Rear of the Cabinet

- 3. Remove the mounting rail.**
- 4. Remove the other mounting rail.**

5.3.2 Replacing the Mounting Rails

See Section 2.2 “Installing the Mounting Rails” on page 2-4 for installing the mounting rails in a new cabinet.

SCSI Components

This chapter contains procedures for servicing the SCSI cables, controllers, and controller card cage.

- Replacing SCSI Cables—page 6-2
- Determining a Controller Failure—page 6-2
- Removing and Replacing a Controller—page 6-4
- Removing and Replacing a SIMM Module—page 6-5
- Replacing a Controller Card Cage (Service Technician Only)—page 6-8

6.1 Replacing SCSI Cables

Before replacing SCSI cables, make sure that all the SCSI cables are securely fastened (with screws or latches) to the controller module, drive trays, and host system(s).

Check the entire length of the SCSI cables for cracks, splits, or other damage.

1. **Stop all I/O activity to the appropriate devices (host, controller, or drive tray).**
2. **Disconnect the defective cable and replace it with a new cable.**
3. **Restart I/O activity**
4. **Check the LEDs of both controllers for faults.**

See Section 4.1.2 “Checking the Controller LEDs” on page 4-3

5. **Use the RAID Manager software to check the overall system status.**

If you still cannot find the problem, it may indicate a failure of the controller back panel. You may have to replace the controller card cage, which includes the back panel. See Section 6.2.3 “Replacing a Controller Card Cage (Service Technician Only)” on page 6-8.

6.2 Determining a Controller Failure

If there is a problem with the controller, you will see two amber LEDs glowing on the controller module: the controller fault LED on the front panel and a fault LED on the failed controller canister. There are four circumstances that can cause a controller fault:

- Controller failure
- SIMMs module failure (processor or cache memory)
- Controller back panel failure
- Controller overheating

Before you replace a failed controller, be aware of the following:

- In the event of a controller failure, the other controller will take over and assume task processing functions. However, you will probably lose any data stored in the cache memory of the failed controller. You should stop all I/O activity to the failed controller to prevent more data loss or other communication problems on the bus.
- You can hot-swap a failed controller (replace it while the controller module is operating) as long as the failed controller:
 - Is one of a redundant pair, two controllers attached to the same host, and
 - Has a passive status in the RAID Manager software.
- To ensure the best results, make sure that the new controller is the same as the one you are replacing (same size memory, firmware version, and so forth).



Caution – Only remove a controller that has failed and has an amber Fault LED lit or that you have marked as Failed (off-line) through the RAID Manager software. Removing a controller that is operating normally (not failed) will result in data loss.

1. Read through this entire procedure before performing any tasks.

- a. **Compare this information with the controller replacement and recovery instructions in the *RAID Manager User's Guide*.**
- b. **Run “Recovery Guru” in the RAID Manager software.**
- c. **Determine if you need to modify the remaining steps to accommodate requirements unique to your software.**

2. Check the amber controller LED on the front panel to see if there is a fault.

See Section 4.1 “Checking the Controller Module LEDs” on page 4-2.

3. Remove the front panel.

See Section 5.1.1 “Removing the Front Panel” on page 5-2.

4. Check each controller for an amber Fault LED.

See Section 4.1.2 “Checking the Controller LEDs” on page 4-3.

- If a Fault LED is lit, proceed to the next section.
- If both controller Fault LEDs are off, it may indicate a problem with the controller back panel or another controller module component. See Section 4.3 “Troubleshooting” on page 4-9.

5. Replace the front panel.

See Section 5.1.2 “Replacing the Front Panel” on page 5-2.

6.2.1 Removing and Replacing a Controller



Caution – Electrostatic charges can damage sensitive components. Use a grounding wrist strap or other antistatic precautions before removing or handling the controllers.

- 1. Attach an antistatic wrist strap to yourself and to the cabinet.**
- 2. Remove the front panel.**
See Section 5.1.1 “Removing the Front Panel” on page 5-2.
- 3. Remove the failed controller canister (FIGURE 6-1).**
 - a. Unlock the controller canister handles by squeezing the center tabs.**
 - b. Open the handles and pull the canister out of the controller module.**
 - c. Close the handles.**

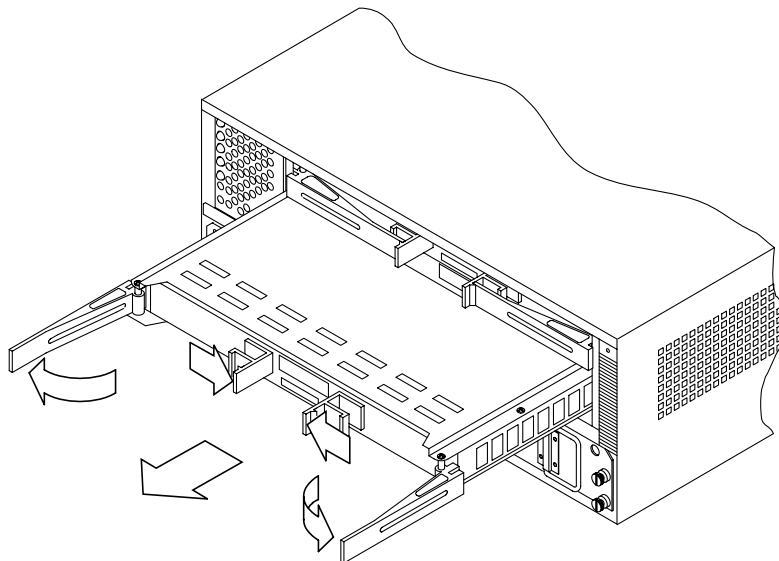


FIGURE 6-1 Removing a Controller Canister

- 4. Unpack the new controller canister and check it to make sure that it uses the same size cache SIMMs as the controller canister you are replacing.**

If the SIMMs are not installed in the replacement controller, install them now. See Section 6.2.2 “Removing and Replacing a SIMM Module” on page 6-5.

5. Install the new controller canister (reverse FIGURE 6-1).

- a. Unlock and open the handles on the new controller canister.**
- b. Set the canister into the empty slot.**
- c. Holding the handles, slide the canister slowly into the slot until the hooked edges (on the back of each handle) engage the sides of the inner frame.**
- d. Fold both handles to the center and lock them in place.**

6. Check the LEDs on the new controller (FIGURE 4-2 on page 4-4).

The green Power LED should be lit.

- If the Power LED remains off or the Fault LED comes on after a few seconds, check to make sure that the controller canister is locked into place.
- If the Fault LED remains on, it may indicate that the new controller has failed or that there is a problem with the controller back panel.

7. Replace the front panel.

See Section 5.1.2 “Replacing the Front Panel” on page 5-2.

8. Use the RAID Manager software to check the status of both controllers and perform any additional recovery procedures.

Refer to the *RAID Manager User's Guide* for instructions.

9. Check the controller module status to make sure it is operating without error.

Note – This is a good time to do a complete backup of the disk array.

6.2.2 Removing and Replacing a SIMM Module

This procedure is for either upgrading controller module memory or adding SIMM modules to an empty controller. FIGURE 6-2 shows processor SIMM and data cache SIMM locations.



Caution – Electrostatic charges can damage sensitive components. Use a grounding wrist strap or other antistatic precautions before removing or handling the controllers.

1. Attach an antistatic wrist strap to yourself and to the cabinet.

2. Remove the controller canister for the SIMM.

See Section 6.2.1 “Removing and Replacing a Controller” on page 6-4.

3. Unpack the new SIMM module.

4. Remove the six screws from the top of the controller canister (FIGURE 6-2).

Lift the top plate from the canister and set it aside.

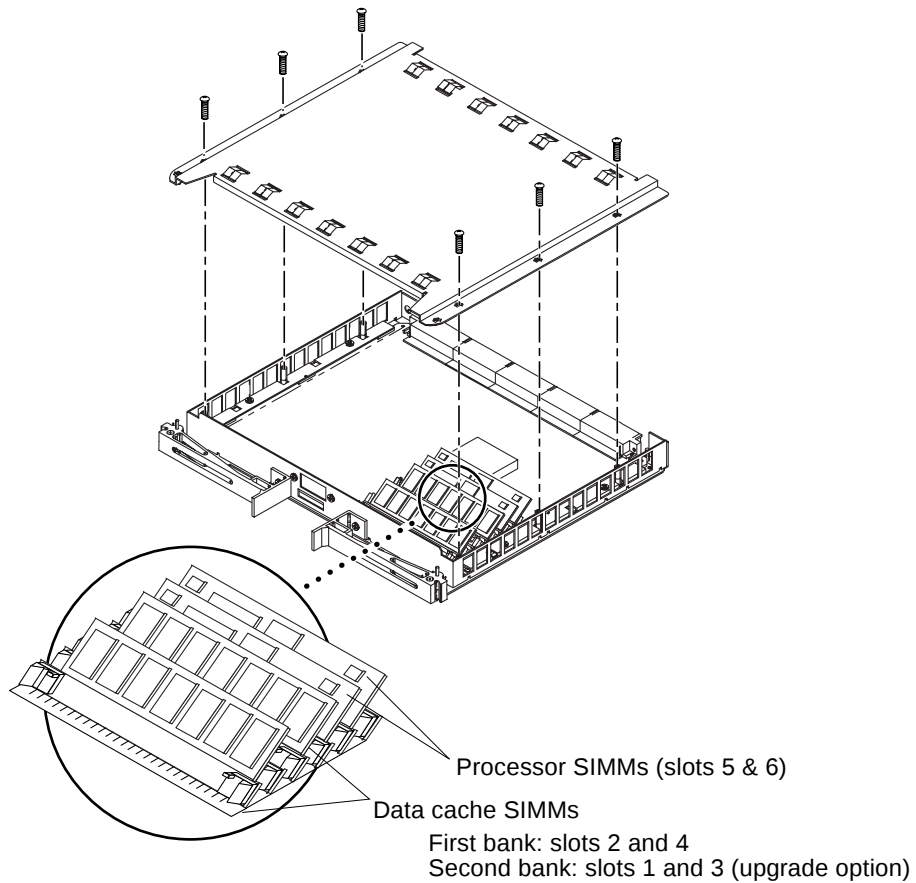


FIGURE 6-2 Opening the Controller Canister

5. To replace a failed SIMM, remove the failed SIMM module from the controller board by pressing out on the tabs until the SIMM module is released (FIGURE 6-3).

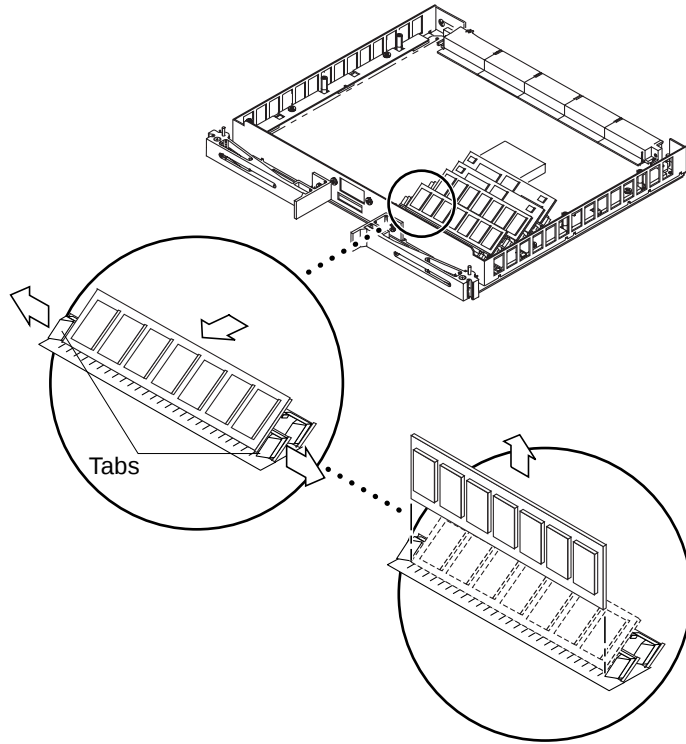


FIGURE 6-3 Removing a SIMM Module on a Controller

6. **Insert the new SIMM into the controller board.**

If you are replacing a failed SIMM, install the new SIMM into the same slot the failed one occupied.

Install new SIMMs according to the callouts in FIGURE 6-2.

The SIMM will snap into place when inserted correctly.

7. **Replace the top plate on the controller canister and secure it with the six screws (reverse FIGURE 6-2).**
8. **Replace the controller canister in the controller module.**

See Section 6.2.1 “Removing and Replacing a Controller” on page 6-4.

6.2.3 Replacing a Controller Card Cage (Service Technician Only)

The procedure in this section explains how to replace the entire controller card cage unit, which includes the controller back panel. If you need to replace the controller back panel, you will replace the entire controller card cage, not just the back panel.



Caution – This procedure involves disassembling the controller module. *Only qualified, trained service technicians* should perform this procedure.



Caution – Electrostatic charges can damage sensitive components. Use a grounding strap or other antistatic precautions before removing or handling the controllers or other components in the controller module.

Before you replace the controller card cage, make sure that you have already checked the SCSI cables (Section 6.1 “Replacing SCSI Cables” on page 6-2) and have verified that the controllers are working properly without a fault condition (Section 4.1 “Checking the Controller Module LEDs” on page 4-2).

1. Remove the controller module from the expansion cabinet.

See Section 5.2.1 “Removing the Controller Module” on page 5-3.

2. Remove the eight screws that hold the card cage to the chassis (FIGURE 6-4).

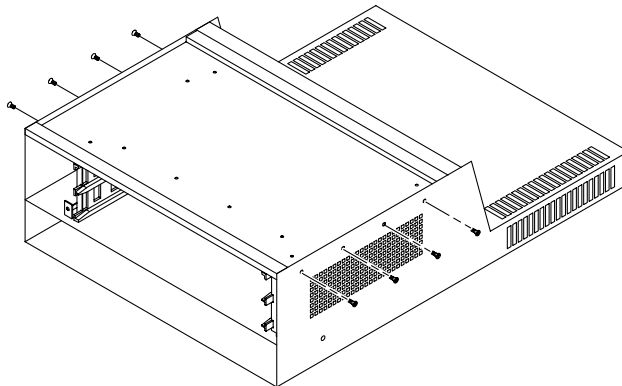


FIGURE 6-4 Removing Controller Card Cage Screws

3. Disconnect the battery and power harnesses on the rear of the controller module (FIGURE 6-5).

Disconnect all three harnesses by unlocking and opening the latches on each side of the connector. After you disconnect each harness, close the latches to keep them from breaking when you remove the controller card cage.

Note – Make sure that the connector end of the battery harness is outside the chassis and lying flat across the bottom of the access hole in the rear shield.

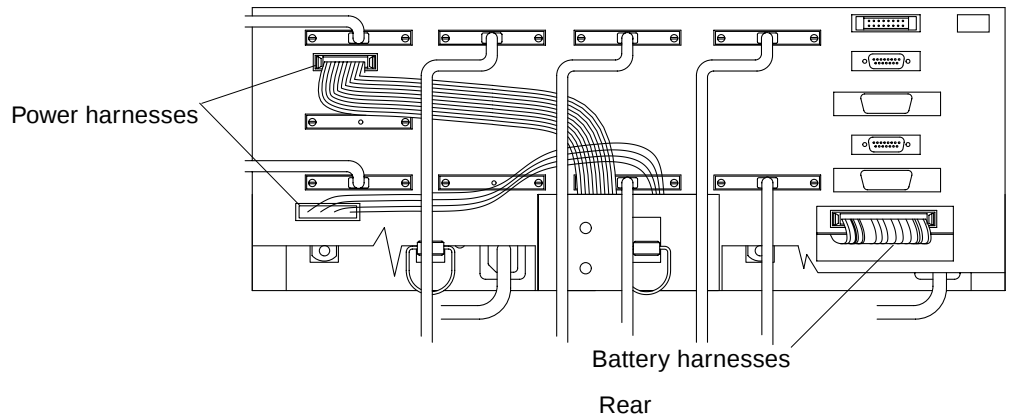


FIGURE 6-5 Battery and Power Harnesses

4. Grasp and lift the top, front edge of the controller card cage slightly (about one inch) and pull the card firmly toward the front until the connectors on the controller back panel exit the holes in the rear shield (FIGURE 6-6).

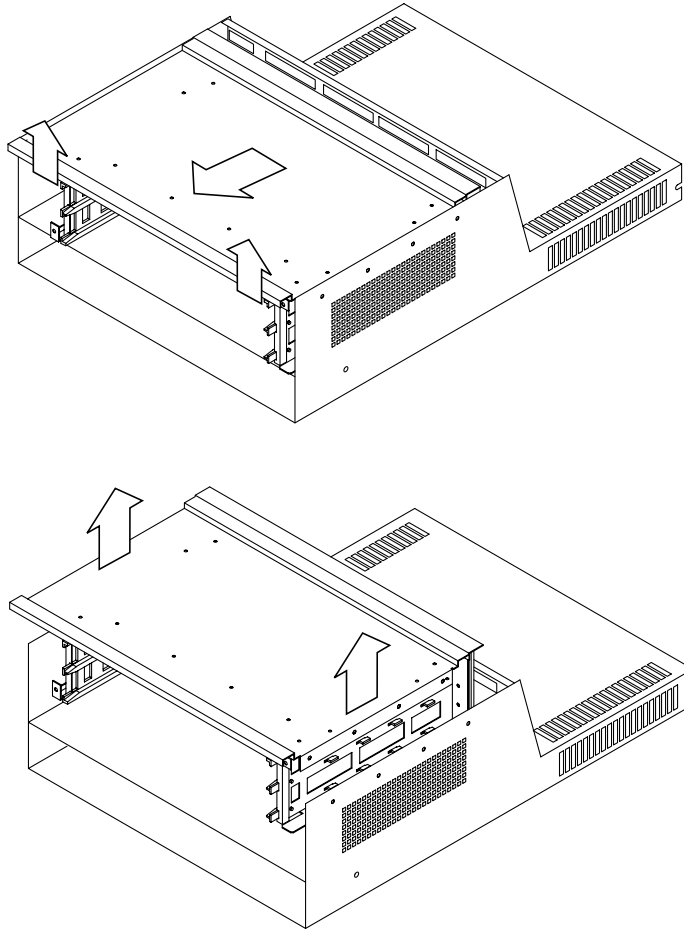


FIGURE 6-6 Removing the Controller Card Cage

5. Lift the controller card cage out of the chassis and set it aside.

6. Remove the side vent from the old controller card cage (FIGURE 6-7).

There is one screw securing the vent to the card cage structure. You will reuse this vent in Step 11.

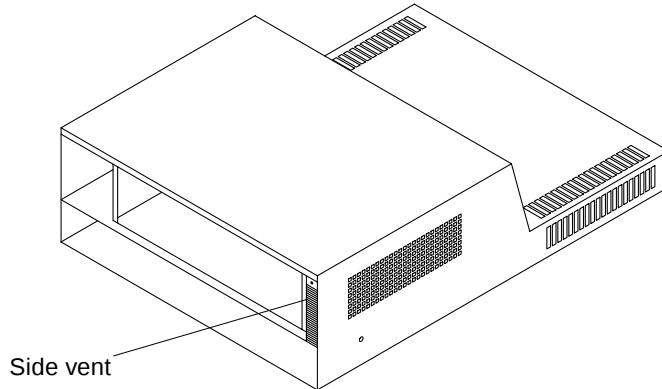


FIGURE 6-7 Controller Card Cage Side Vent

7. Unpack the new controller card cage.

8. With the back panel facing the rear shield, set the new controller card cage into the chassis (reverse the steps in FIGURE 6-6).

9. Grasp the top, front edge of the card cage and push the unit toward the back until the back panel rests firmly against the rear shield.

As you slide the card cage backward, keep the battery harness flat against the bottom of the chassis so it does not get pinched between the controller card cage and the rear shield.

Note – There are four holes in the bottom frame of the controller card cage that fit over four mounting pins in the top of the battery retainer shelf (FIGURE 6-6). When you slide the controller card cage into place, you will feel it drop down when the pins slip into these holes.

10. Secure the eight screws that hold the controller card cage in the chassis (FIGURE 6-4).

11. Insert and secure the side vent into the slot on the right side of the controller card cage with the mounting screw (FIGURE 6-7).

12. Connect the battery and power harnesses (FIGURE 6-5).

13. Reinstall the controller module chassis into the cabinet.

See Section 5.2.2 “Replacing the Controller Module” on page 5-6.

14. Use RAID Manager to check the status of the controller module.

Refer to the *RAID Manager User's Guide* for instructions. Perform a test I/O sequence to make sure the controller module is communicating with both the host and the drives.

Power Subassemblies

This chapter describes how to service the power components in the StorEdge A3000 controller.

- Recovering From a Power Supply Shutdown—page 7-2
- Checking and Replacing Power Cords—page 7-3
- Replacing a Power Supply—page 7-4
- Replacing the Battery Unit—page 7-6
- Replacing a DC Power Harness (Service Technician Only)—page 7-8
- Replacing the Power Supply Housing (Service Technician Only)—page 7-11
- Replacing the Battery Harness (Service Technician Only)—page 7-14

7.1 Recovering From a Power Supply Shutdown

The power supplies have temperature sensors designed to prevent the power supplies from overheating. If a temperature sensor detects an ambient air temperature of 70°C [158°F] or above, the power supply shuts down. The other power supply remains on as long as its temperature is below 70°C [158°F].



Caution – If the air temperature inside the expansion cabinet is hot enough to cause the power supplies to shutdown, there is a *serious* problem in the cabinet. Remove all panels from the cabinet immediately to help cool the controller module and drive trays. Then do whatever is necessary to alleviate the over-temperature problem (such as shutting down the power, using external fans to cool the area, and so forth).

Indications of an over-temperature condition are:

- **One power supply shuts down.** Its Power LED is off and the front-panel Power Supply Fault LED is off.
- **Both power supplies shut down.** All power to the controller module is off, but the drive trays keep running without fault.
- **Power supplies power cycle.** One or both power supplies shut down, then turn on again.
- **High temperature.** The air temperature at the back of the controller module is 70°C [158° F] or higher.

Once the air temperature cools to below 70°C [158°F], the power supplies will restart. The controllers will reset, attempt to spin up the disk drives (if needed), and return to a normal operating state.

You should not need to perform recovery procedures after a power supply shutdown and restart. However, you can lose data if there is an abrupt power loss to the controller module, especially if it occurs when data is being downloaded to cache memory or written to a disk drive.

1. Cool the area to a normal operating temperature, then check the power supplies.

- If the power LED on the power supply (or both power supplies) turns on again, go to Step 2.
- If the power supply (or both power supplies) remain off, it may indicate a faulty power cord (see Section 7.2 “Checking and Replacing Power Cords” on page 7-3) a failed power supply (see Section 7.3 “Replacing a Power Supply” on page 7-4), or a failed power interface board (see Section 7.6 “Replacing the Power Supply Housing (Service Technician Only)” on page 7-11).

2. **Once the power supplies turn on again, check all the LEDs on the controller module and on drive trays in the expansion cabinet for faults or damage.**

See Section 4.1 “Checking the Controller Module LEDs” on page 4-2.

7.2 Checking and Replacing Power Cords

1. **Make sure the cords are connected securely and have no evidence of damage.**

- If they are damaged, go to the next step.
- If they look normal, there might be a problem with a power supply, power harness, or the power interface board. See Chapter 4 for troubleshooting procedures.

2. **Stop all activity to the controller module.**

The Fast Write LED on the front panel off the controller module and the Active LEDs on the drives should be off (not blinking). Make sure that no Fault LEDs are lit.

3. **Power off the controller module.**

See Section 3.2 “Powering Off the Controller Module and System” on page 3-3.

4. **Power off the expansion cabinet, if necessary.**

Refer to your expansion cabinet documentation for instructions.



Caution – If the power cable is so damaged that there is a risk of electric shock, you should power down the expansion cabinet before proceeding.

5. **Disconnect the power cord from the controller module and the power sequencer in the cabinet.**
6. **Connect the new power cord, making sure that you connect the cord into the same outlet on the power sequencer from which you removed the old cord.**
7. **Power on the expansion cabinet, if necessary.**

See Section 3.1 “Powering On the Controller Module and System” on page 3-2.
8. **Check the LEDs for errors.**

7.3 Replacing a Power Supply

If a power supply has failed:

- The amber Power Supply Fault LED on the front panel will be turned on, *and*
- The green Power LED on the failed power supply will be turned off.

See Section 4.1 “Checking the Controller Module LEDs” on page 4-2 for LED indicators and locations.

Note – You can use RAID Manager to check the status of the power supplies.

1. **Check the LEDs on the front and back of the controller module to verify the power supply failure.**
2. **Turn the power switch on the failed power supply to the Off position.**
3. **Disconnect the power cord from the failed power supply (FIGURE 7-1).**



Caution – Removing a power supply canister that still has its power switch turned on and the power cord attached can cause electrical shock. *Always* turn off a power supply power switch and disconnect its power cord before you attempt to unlock or remove the canister from the controller module chassis.

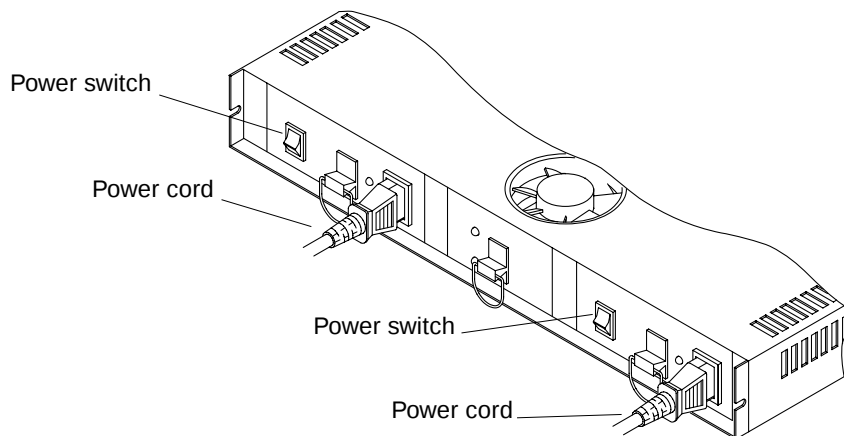


FIGURE 7-1 Power Switch and Power Cord Location

- 4. Remove the failed power supply (FIGURE 7-2).**
 - a. Lift the lever on the pull ring to unlock the power supply canister.**
 - b. Pull the failed power supply out of the controller module.**

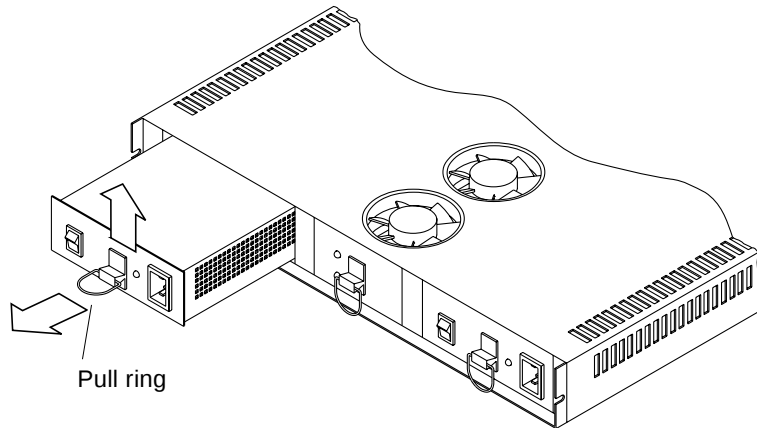


FIGURE 7-2 Removing a Power Supply Canister

- 5. Unpack the new power supply.**
- 6. Insert the new power supply into the empty slot, pushing it all the way in until the lever locks into place.**
- 7. Plug in the power cord and turn the power switch to the On position (FIGURE 7-1).**
- 8. Check the power supply canister and other controller module LEDs for faults.**

7.4 Replacing the Battery Unit



Caution – The battery unit is a sealed canister. When servicing the battery unit, you must replace the entire canister, not individual batteries or parts. Opening the battery canister will void your warranty.

The battery unit contains lead acid batteries that may be considered a hazardous material. You must handle this unit in accordance with all applicable regulations. After you install a new battery unit, you can use its shipping carton to return the old unit to the manufacturer for proper recycling. All battery units are shipped with a return label for this purpose.

1. Stop all activity to the controller module.

Make sure the Fast Write Cache LED on the controller and the Active LEDs on the drives are off.

2. Remove the controller module front panel.

See Section 5.1.1 “Removing the Front Panel” on page 5-2.

3. Loosen the four thumbscrews at the front of the battery (FIGURE 7-3).

Turn the thumbscrews counter-clockwise. If they are too tight, use a flat-blade screwdriver to loosen them.



Caution – The battery unit weighs approximately 24 lbs. Be prepared to support its weight when you pull it out of the chassis.

4. Using the handles, pull the battery unit out about two to three inches.

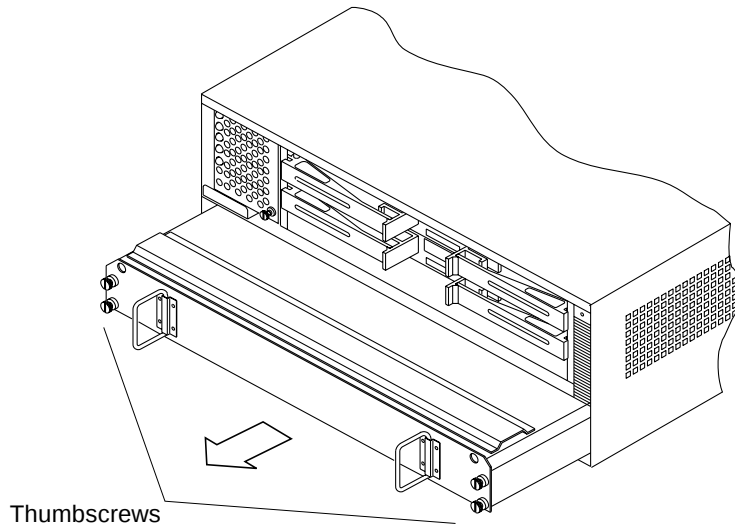


FIGURE 7-3 Removing the Battery Unit

5. Grasp both sides of the battery unit, remove it from the controller module, and set it aside.

6. Unpack and install the new battery.

Reverse Step 3 through Step 5. Save the shipping material so you can use it to return the used battery unit to the manufacturer for proper recycling.

7. Replace the controller module front panel.

See Section 5.1.2 “Replacing the Front Panel” on page 5-2.

8. Enable write caching activity to the module.

It takes up to 12 hours for caching activity to begin while the battery charges.

9. Reset the battery age by typing `raidutil -c cXtYdZs0 -R` for both controllers, where:

- X = HBA
- Y = controller SCSI ID number
- Z = LUN number

Refer to the *RAID Manager Installation and Support Guide* for more information on the `raidutil` utility.

10. Ship the used battery unit to the factory for recycling.

Use the shipping carton from the new battery unit and the enclosed return shipping label.



Caution – If the used battery is physically damaged and is leaking electrolyte gel, *do not* return it for recycling. Manage damaged batteries according to your local regulations, which may include management as a hazardous waste.

After installation, the battery charges and runs self-tests for up to 12 hours. During this time, write caching is not active.

7.5 Replacing a DC Power Harness (Service Technician Only)



Caution – This procedure involves disassembling the controller module to replace internal components. *Only qualified, trained service technicians* should perform this procedure.

This procedure describes how to replace two DC power harnesses (+5 volt and +12 volt harnesses). If replacing the harnesses does not fix the problem, you may need to replace the entire power supply housing.

1. Remove the controller module from the cabinet.

See Section 5.2.1 “Removing the Controller Module” on page 5-3.

2. Disconnect both power harnesses from the back of the controller module by unlocking and opening the latches on each side of the connectors (FIGURE 7-4).

The two power harnesses—one grey ribbon cable (+12 volt) and one white set of wires (+5 volt)—connect to the controller back panel and the power interface board, on the back of the power supply housing.

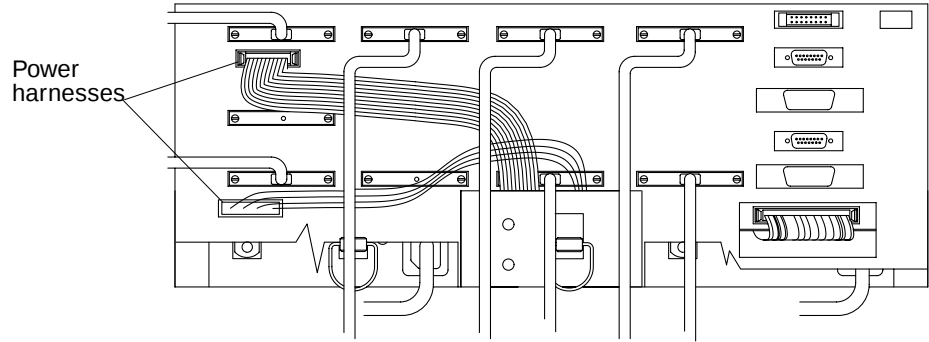


FIGURE 7-4 Removing the Power Harnesses From the Back Panel

3. Reach down between the power supply housing and rear shield to disconnect the other end of the power harnesses (FIGURE 7-5).

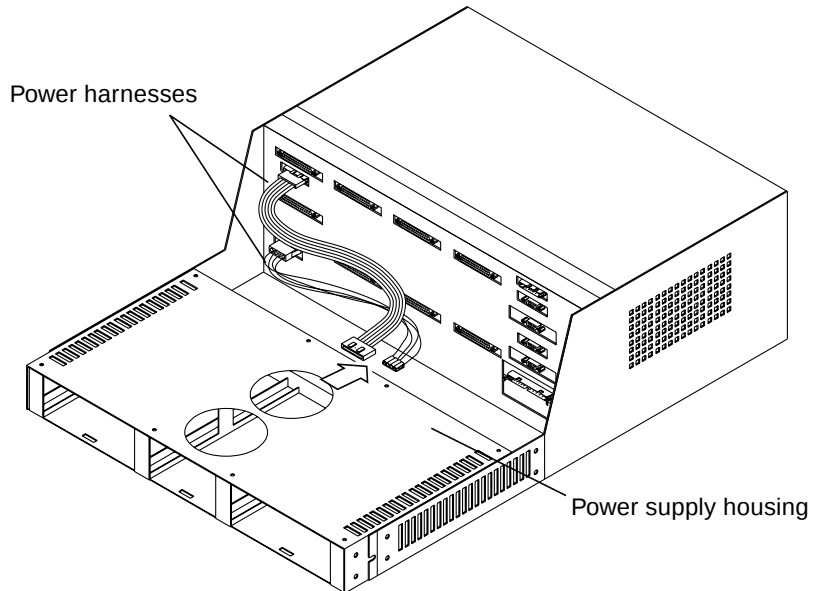


FIGURE 7-5 Removing the Power Harnesses From the Power Supply Housing

4. Unpack and connect the new harnesses (reverse Step 2 and Step 3).

5. Replace the controller module in the cabinet.

See Section 5.2.2 “Replacing the Controller Module” on page 5-6.

6. Reconnect the controller module power cords.

7. Reconnect the SCSI cables to the controller module.

8. Power on the system and check the LEDs.

See Section 3.1 “Powering On the Controller Module and System” on page 3-2. If a Fault LED is lit, or if the Power LEDs remain off, see Section 4.2 “Checking the Battery Label” on page 4-8 for troubleshooting procedures.

9. Use RAID Manager to check the status of the controller module.

Refer to the *RAID Manager User's Guide* for instructions.

7.6 Replacing the Power Supply Housing (Service Technician Only)



Caution – This procedure involves disassembling the controller module to replace internal components. *Only qualified, trained service technicians* should perform this procedure.

If there is an intermittent or complete power loss to the controllers, battery unit, or controller fan, it can be caused by either a defective power harness or power interface board. To replace the power interface board, you need to replace the entire power supply housing.

1. Remove the controller module from the cabinet.

See Section 5.2 “Controller Module” on page 5-3.

2. Remove the power supply housing from the chassis.

a. Remove the eight screws from the side of the chassis (FIGURE 7-6).

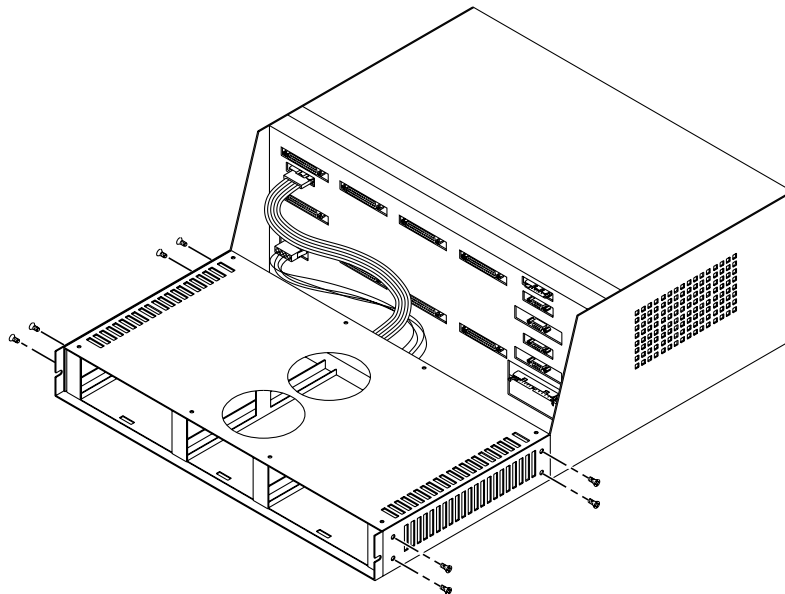


FIGURE 7-6 Removing the Power Supply Housing Screws

b. Disconnect the DC power harnesses from the back of the power supply housing (FIGURE 7-5).

Grasp the top, back edge of the power supply housing and pull until you have enough room to disconnect the DC harnesses from it.

c. Lift the power supply housing out of the chassis (FIGURE 7-7).

- i. Grasp the top, front edge of the power supply housing and lift it slightly (about one inch).**
- ii. Pull the housing firmly toward the front until the connectors on the controller back panel exit the holes in the rear shield.**
- iii. Lift the power supply housing out of the chassis and set it aside.**

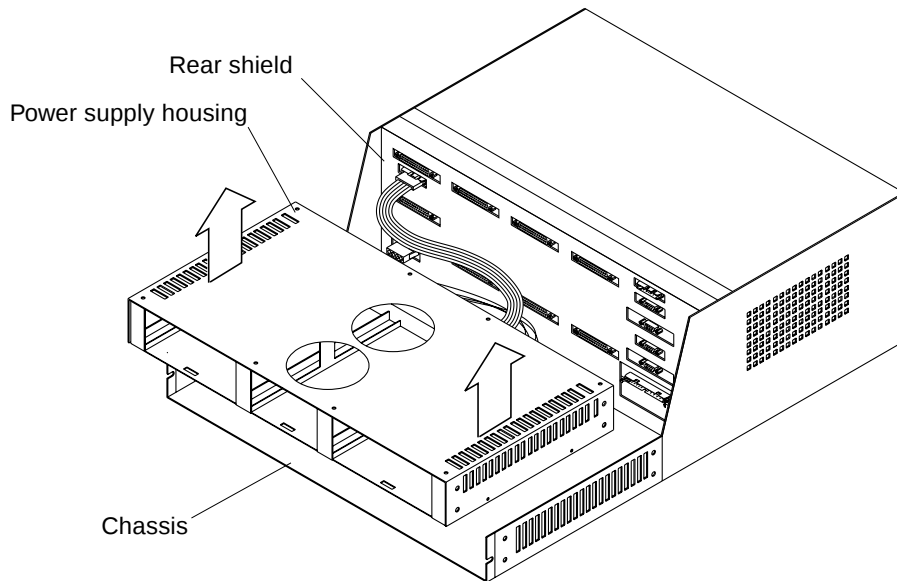


FIGURE 7-7 Removing the Power Supply Housing

3. Unpack and install the new power supply housing.

- a. With the connector side of the power supply facing the rear shield, set the housing into the chassis (FIGURE 7-8).**

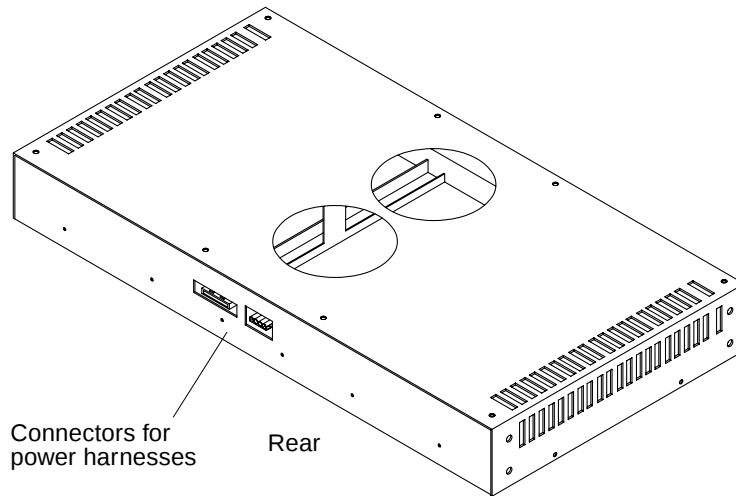


FIGURE 7-8 Power Supply Housing Connectors

- b. Slide the housing forward until you can reconnect the DC power harnesses.**

After you reconnect both harnesses, push the power supply housing in the rest of the way.

- c. Replace the eight mounting screws (FIGURE 7-6).**

4. Replace the controller module in the cabinet.

See Section 5.2.2 “Replacing the Controller Module” on page 5-6.

5. Reconnect the controller module power cords.

6. Reconnect the SCSI cables to the controller module.

7. Power on the system and check the LEDs.

See Section 3.1 “Powering On the Controller Module and System” on page 3-2. If a Fault LED is lit, or if the Power LEDs remain off, see Section 4.2 “Checking the Battery Label” on page 4-8 for troubleshooting procedures.

8. Use RAID Manager to check the status of the controller module.

Refer to the *RAID Manager User’s Guide* for instructions.

7.7 Replacing the Battery Harness (Service Technician Only)



Caution – This procedure involves disassembling the controller module to replace internal components. *Only qualified, trained service technicians* should perform this procedure.



Caution – Electrostatic charges can damage sensitive components. Use a grounding wrist strap or other antistatic precautions before removing or handling the controllers or other components in the controller module.

- 1. Remove the controller module from the expansion cabinet.**
See Section 5.2 “Controller Module” on page 5-3.
- 2. Remove the controller card cage from the chassis.**
 - a. Remove the eight screws that hold the card cage to the chassis (FIGURE 7-9).**

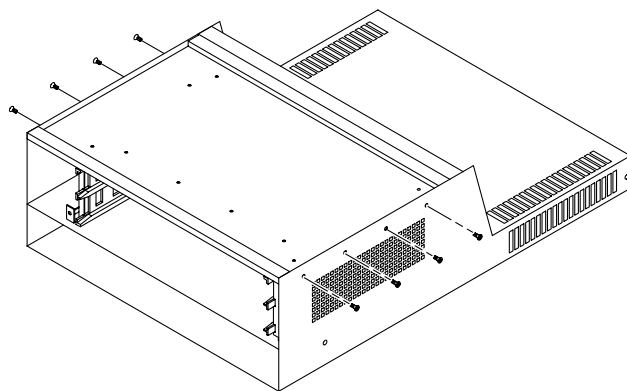


FIGURE 7-9 Removing Controller Card Cage Screws

b. Disconnect the battery and power harnesses on the rear of the controller module (FIGURE 7-10).

Disconnect all three harnesses by unlocking and opening the latches on each side of the connector. After you disconnect each harness, close the latches to keep them from breaking when you remove the controller card cage.

Make sure that the connector end of the battery harness is outside the chassis and lying flat across the bottom of the access hole in the rear shield.

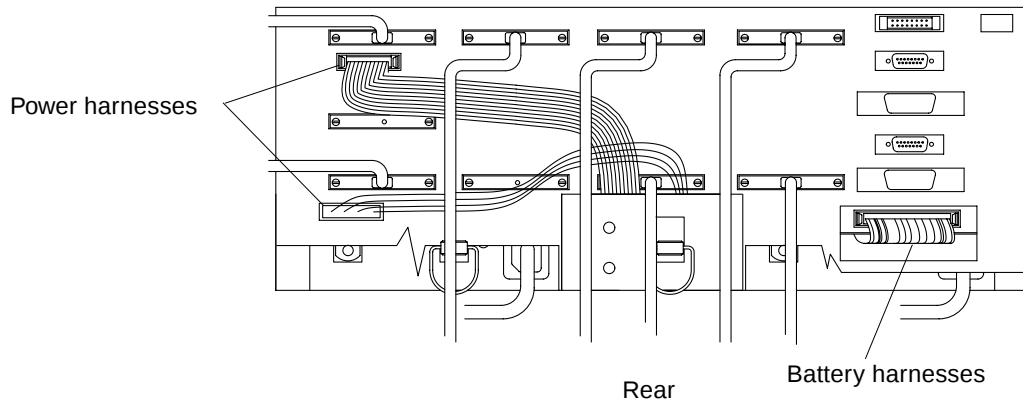


FIGURE 7-10 Battery and Power Harnesses

- c. Grasp and lift the top, front edge of the controller card cage slightly (about one inch) and pull the card firmly toward the front until the connectors on the controller back panel exit the holes in the rear shield (FIGURE 7-11).**
- d. Lift the controller card cage out of the chassis and set it aside.**

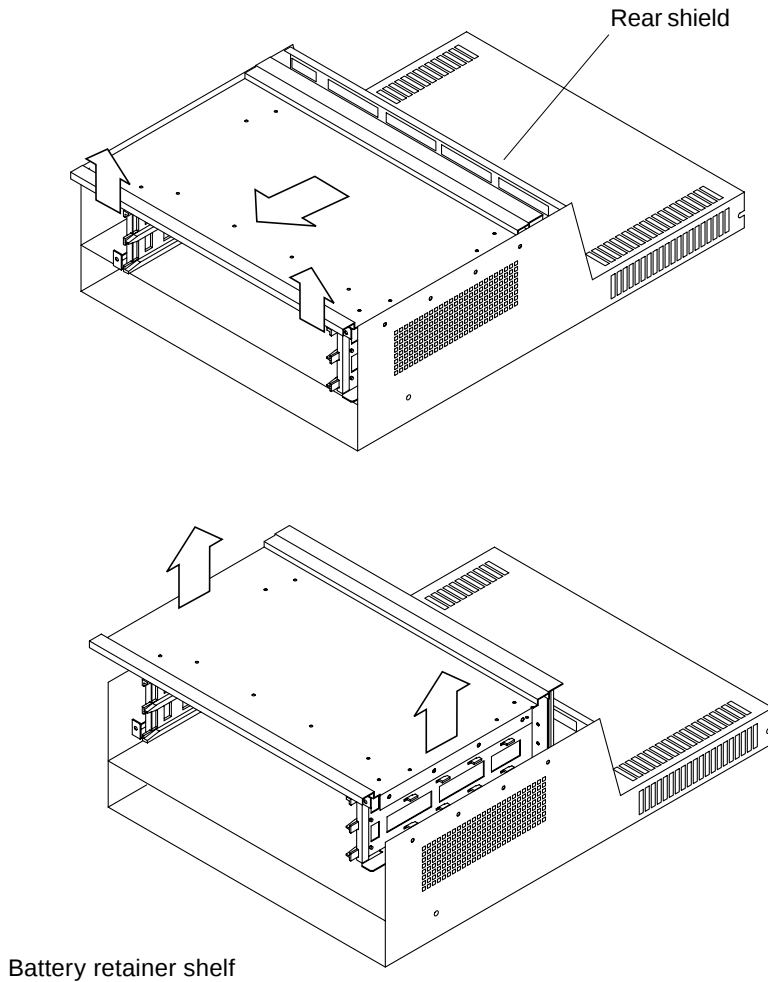


FIGURE 7-11 Removing the Controller Card Cage

3. Remove the battery harness.

- a. Look inside the chassis beneath the area from which you just removed the controller card cage.**

You will see one end of the battery harness (gray ribbon cable) mounted on a bracket at the back of the battery retainer shelf (FIGURE 7-11 shows the location of the battery retainer shelf).

- b. Loosen the two screws holding the harness in place.**

Remove the harness from the chassis.

4. Unpack and install the new battery harness.

a. Route the new battery harness from the mounting bracket to the access hole in the rear shield (where you removed the old harness).

b. Secure the other end on the mounting bracket and tighten the two screws.

5. Route the new harness out through the slot in the rear shield.

Make sure that the harness is flat against the bottom of the chassis.

6. Replace the controller card cage in the chassis.

a. With the back panel facing the rear shield, set the controller card cage into the chassis.

b. Grasp the top, front edge of the card cage and push the unit toward the back until the back panel rests firmly against the rear shield.

As you slide the card cage backward, keep the battery harness flat against the bottom of the chassis so it does not get pinched between the controller card cage and the rear shield.

Note – There are four holes in the bottom frame of the controller card cage that fit over four mounting pins in the top of the battery retainer shelf (FIGURE 7-11). When you slide the controller card cage into place, you will feel it drop down when the pins slip into these holes.

7. Secure the eight screws that hold the controller card cage in the chassis (FIGURE 7-9).

8. Connect the battery and power harnesses (FIGURE 7-10).

9. Replace the controller module in the cabinet.

See Section 5.2.2 “Replacing the Controller Module” on page 5-6.

10. Reconnect the controller module power cords.

11. Reconnect the SCSI cables to the controller module.

12. Power on the system and check the LEDs.

See Section 3.1 “Powering On the Controller Module and System” on page 3-2. If a Fault LED is lit, or if the Power LEDs remain off, see Section 4.2 “Checking the Battery Label” on page 4-8 for troubleshooting procedures.

13. Use RAID Manager to check the status of the controller module.

Refer to the *RAID Manager User's Guide* for instructions.

Cooling System Subassemblies

This chapter contains procedures for servicing the controller fan and the power supply fan.

- Determining a Fan Failure—page 8-2
- Replacing the Controller Fan—page 8-3
- Replacing the Power Supply Fan—page 8-5

8.1 Determining a Fan Failure

The controller module must have proper air circulation. There are several air vents along the top and sides for both air intake and exhaust. Make sure that these vents are clean and free of obstructions. Cooling problems occur when obstructions impede air flow and cause one or more components in the controller module to overheat.

Two fan canisters cool the controller module: the controller fan canister at the front of the unit and the power supply fan canister at the rear of the unit.

Note – In the unlikely event that both fans in the controller fan canister fail at the same time, it may cause one or both controllers to overheat. Under these circumstances, the amber controller LED on the front panel may turn on. Shut down the controller module immediately and allow the unit to cool to normal room temperature. Replace the controller fan using the instructions in the next section, then turn on the power and check the controller fault LED. It should remain off. If not, replace the controller.

1. Check the fan fault LED on the front of the controller module.

See Section 4.1 “Checking the Controller Module LEDs” on page 4-2 for LED location and indicators. If the fan fault LED is lit, the controller fan has failed. Go to Section 8.2 “Replacing the Controller Fan” on page 8-3.

2. Check the fault LED on the power supply fan at the back of the unit.

See Section 4.1 “Checking the Controller Module LEDs” on page 4-2 for LED location and indicators. If the fault LED is lit, go to Section 8.3 “Replacing the Power Supply Fan” on page 8-5.

3. If both fan fault LEDs are lit, replace both fan canisters.

8.2 Replacing the Controller Fan

You can hot-swap the controller fan canister (replace it while the controller module is running), as long as you complete the exchange within 15 minutes. This time limit applies to the total time that the fan canister is out of the chassis, beginning when you remove the failed unit and ending when you install the new one.



Caution – Do not run the controller module without adequate ventilation and cooling to the controllers. Leaving the unit running without proper cooling to the controllers may damage their circuitry. If there will be a delay of more than **15 minutes** from the time you remove the controller fan canister and insert a new one, shut down the controller module. This will prevent the controller from overheating.

1. Remove the controller module front panel.

See Section 5.1.1 “Removing the Front Panel” on page 5-2.

2. Loosen the thumbscrew (counter-clockwise) on the fan canister (FIGURE 8-1).

If the thumbscrew is too tight, use a flat blade screwdriver to loosen it.

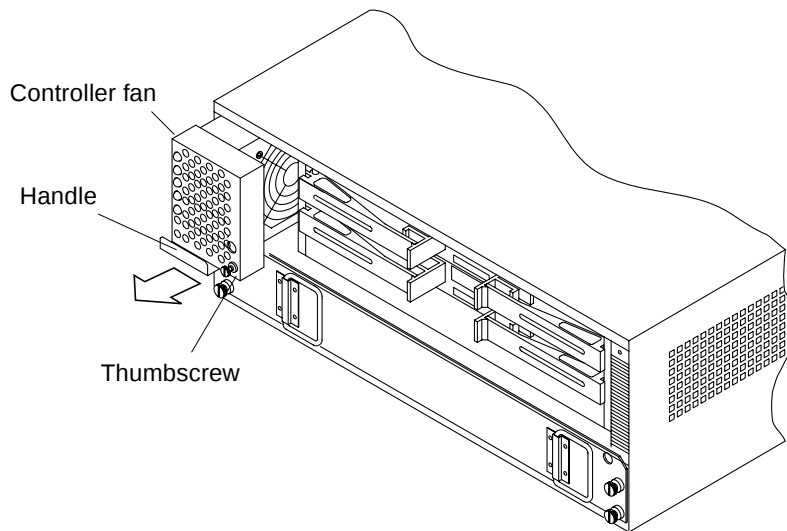


FIGURE 8-1 Removing the Controller Fan Canister

3. Pull on the fan canister handle to slide it out of the chassis.

The canister fits fairly snugly into the slot. You may need to pull firmly on the handle to get the canister started out of the slot.

4. Install the new controller fan canister, sliding the canister firmly into the slot (reverse of FIGURE 8-1).

5. Push in on the thumbscrew and tighten it (clockwise).

The thumbscrew is spring-loaded and will not tighten unless the fan canister is inserted all the way into the chassis. If the thumbscrew keeps spinning without tightening, push on the front of the fan canister until it snaps into place.

6. Make sure the green Power LED on the front panel is lit and the amber LEDs are off.

- If the amber fan LED turns on, make sure that the canister is inserted all the way into the chassis and the thumbscrew is tight.
- If the amber fan LED remains on, it may indicate that there is a problem with the new fan canister. Replace the controller fan canister with another one if it is available.
- If you do not have a spare controller fan, turn off the controller module to prevent it from overheating while you get a replacement fan.

1. Replace the front panel.

See Section 5.1.2 “Replacing the Front Panel” on page 5-2.

8.3 Replacing the Power Supply Fan

You can hot-swap the power supply fan canister (replace it while the controller module is running), as long as you complete the exchange within 15 minutes. This time limit applies to the total time that the fan canister is out of the chassis, beginning when you remove the failed unit and ending when you install the new one..

1. Use the pull ring to slide the black lever up to release the fan canister (FIGURE 8-2).

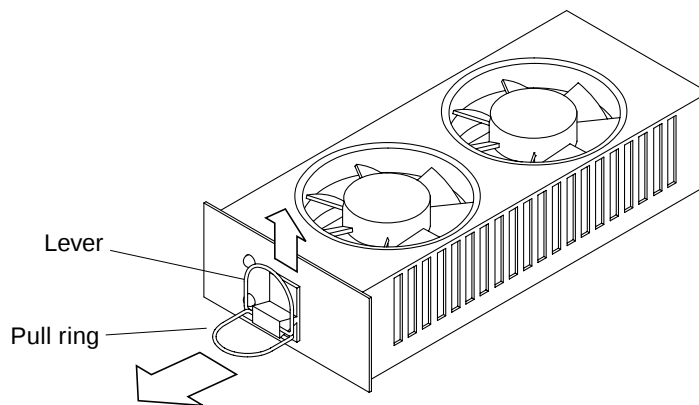


FIGURE 8-2 Power Supply Fan Canister Lever and Pull Ring

2. Pull the power supply fan out of the chassis (FIGURE 8-3).

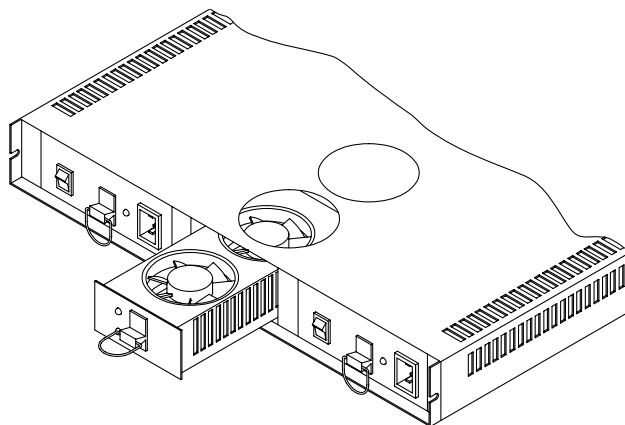


FIGURE 8-3 Removing the Power Supply Fan

3. Install the new power supply fan canister, sliding the canister firmly into the slot until it locks into place (reverse of FIGURE 8-3).

The lever will be down when the canister is seated properly in the chassis. If the lever remains up, push on the fan canister until it snaps into place.

4. Make sure that the green power LED is lit and the amber fault LED is off.

See Section 4.1 “Checking the Controller Module LEDs” on page 4-2 for LED locations and indicators.

- If the power LED remains off or the fault LED turns on, make sure that the canister is inserted all the way into the chassis and locked in place.
- If this does not correct the problem, it may indicate that the new fan canister is malfunctioning. Replace the power supply fan canister with another one if it is available.
- If you do not have a spare power supply fan, turn off the controller module to prevent the power supplies from overheating while you get a replacement fan.

Note – The power supply fan is redundant. You do not have to turn off the controller module if one of the fans in the replacement power supply fan canister is working.

Illustrated Parts Breakdown

This appendix includes a listing with part numbers of all customer and field replaceable units (CRUs and FRUs). It also includes illustrations of the replaceable units.

A.1 List of Replacement Parts

TABLE A-1 Customer and Field Replaceable Units

Replaceable Unit	Part Number	Figure Number
Power supply fan canister	370-2432	FIGURE A-1
Controller fan canister	370-2433	FIGURE A-1
Battery canister	370-2434	FIGURE A-1
Controller canister	540-3083	FIGURE A-1
Power supply canister	370-2436	FIGURE A-1
Controller card cage	370-2431	FIGURE A-2
Power supply housing	370-2869	FIGURE A-3
68-to-68 pin SCSI cable, 12 meters	530-1886	FIGURE A-4
Differential SCSI terminator	150-1890	FIGURE A-5
DC power and battery harness kit	565-1397	FIGURE A-6

A.2 Illustrations of Replacement Parts

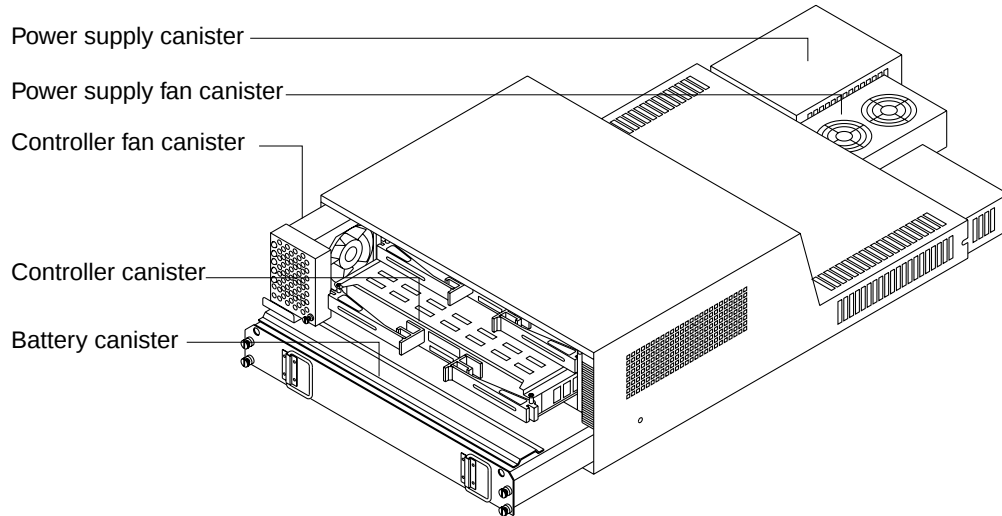


FIGURE A-1 Controller Module Replaceable Canisters

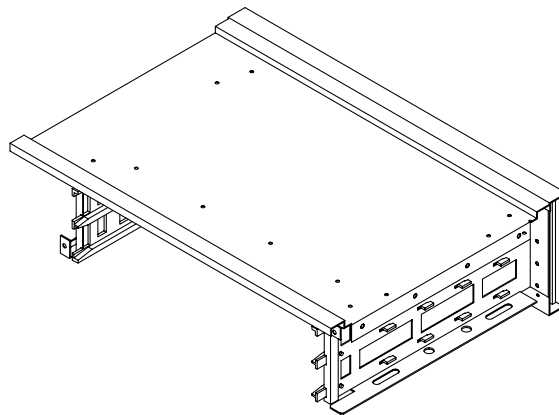


FIGURE A-2 Controller Card Cage

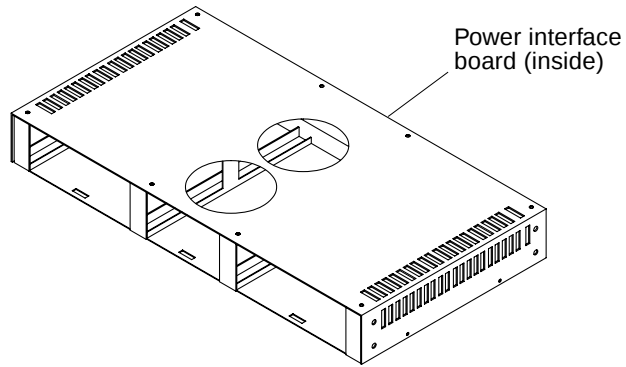


FIGURE A-3 Power Supply Housing

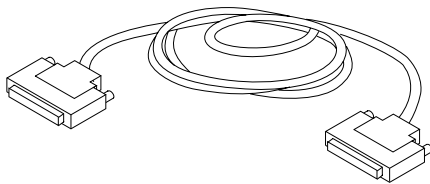


FIGURE A-4 68-to-68 Pin Cable

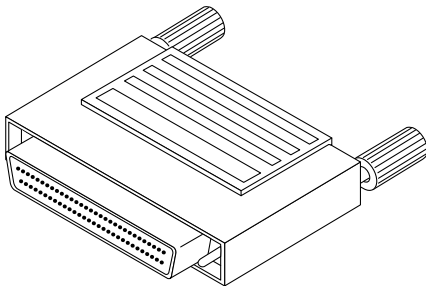


FIGURE A-5 Differential SCSI Terminator

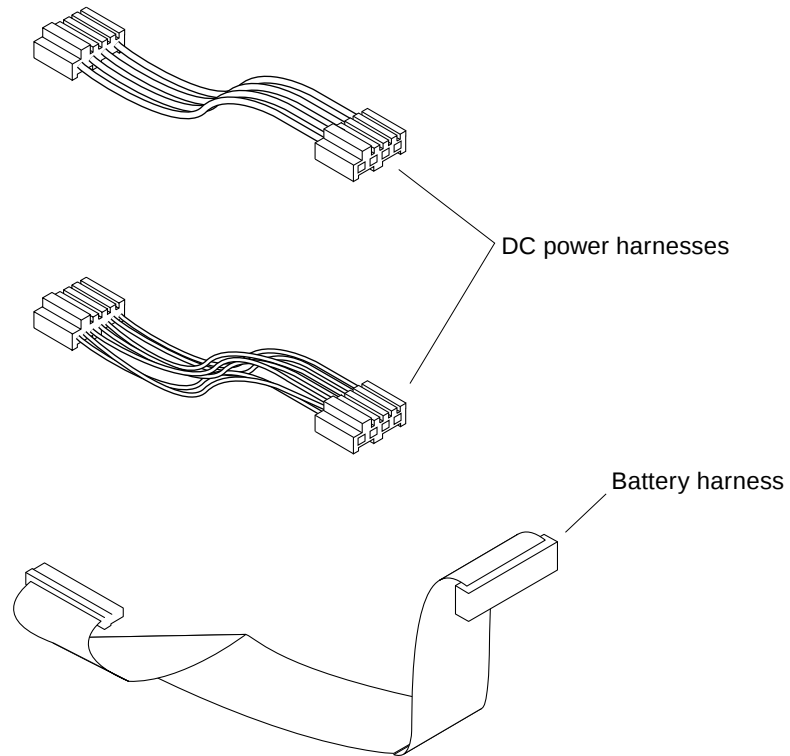


FIGURE A-6 DC Power and Battery Harnesses

Specifications

This section contains technical specifications for the controller module and its individual components.

- Physical Specifications—page B-2
- Electrical Specifications—page B-2
- Environmental Specifications—page B-3

B.1 Physical Specifications

TABLE B-1 Physical Specifications

Height	Width	Depth	Weight	
			With Canisters	Without Canisters
6.875 in	17.5 in	24 in	76 lbs	40 lbs
17.46 cm	44.45 cm	60.96 cm	34 kg	18 kg

B.2 Electrical Specifications

TABLE B-2 AC Power Requirements

Electrical Element	Requirement
Voltage	100–120 VAC (North America and Japan) 200–240 VAC (International)
Frequency	50 / 60 Hz
Currents ¹	
Idle	1 amp
Max. Operating	1 amp
Max. Surge	2 amps

1. Typical current ratings at 240 volts AC, 60 Hz. Assumes a 0.70 power efficiency, 0.99 power factor.

B.3 Environmental Specifications

TABLE B-3 Environmental Requirements

Climate Control	Minimum to Maximum Range
Temperature (dry bulb)	
Operating	5°C to 35°C (32°F to 104°F)
Storage	-10°C to 70°C (-40°F to 158°F)
Transit	-10°C to 70°C (-40°F to 158°F)
Temperature Change (max. per hour)	
Operating	10°C per hour (18°F per hour)
Storage	15°C per hour (27°F per hour)
Transit	20°C per hour (36°F per hour)
Temperature Derating (max.operating) ¹	3.3°C per 1000m (1.7°F per 1000 ft) above sea level
Relative Humidity (non-condensing)	
Operating	20% to 80%
Storage	10% to 93%
Transit	5% to 95%
Heat Dissipation (maximum operating)	0.329 KVA, 214 Watts, 731 BTU per hour
Air Flow (minimum operating)	10 CFM
Sound Power and Pressure (operating)	6.5 bels (power), 65 dBA (pressure)

1. If you plan to operate the controller module at altitudes between 1000m and 3000m (3280 ft and 9850 ft), you must lower the environmental temperature 3.3° C (1.7° F) for every 1000m (3280 ft) above sea level.

Index

A

active controller, LED pattern, 4-5

B

back panel
 controller
 troubleshooting, 4-14
battery
 backup system, 1-8
 checking service date, 4-8
 described, 1-7
 illustrated, 1-7
 leaking, 7-8
 location of, 1-3
 part number, A-2
 recycling, 7-6
 removing, 7-7
 replacing, 7-14
battery cable, *See* battery harness
battery harness
 illustrated, A-5
 location, 7-15
 part number, A-2
 removing, 7-15
 replacing, 7-14
 troubleshooting, 4-13
before you begin, 2-2

board
 power interface, 1-9
buffer, *See* memory

C

cable
 battery, *See* battery harness
 DC power, *See* DC power harness
 SCSI
 troubleshooting, 4-13
cache memory, 1-6, 1-8, 6-2
cache memory SIMM
 location, 6-6
canister, 1-2
checking
 and replacing power cords, 7-3
 battery service date, 4-8
circuit board
 power interface, 1-9
connecting
 SCSI cables, 2-9
controller
 back panel
 troubleshooting, 4-14
 description, 1-5
 failure and data loss, 6-3
 fault
 conditions, 6-2
 illustrated, 1-5
 LEDs, 1-3
 status LED interpretation, 4-5
 location of, 1-3

- marking as failed, 6-3
- part number, A-2
- passive, 6-3
- redundant pair, 6-3
- removing, 6-4
- replacing, 6-5
- troubleshooting, 4-12
- controller back panel, 6-8
 - See also* controller card cage
- controller card cage, 1-6
 - illustrated, A-3
 - part number, A-2
 - removing, 6-8
 - replacing, 6-8
- controller failure
 - determining, 6-2
 - LED indicator, 4-5
- controller fan
 - described, 1-10
 - illustrated, 1-10
 - location of, 1-3
 - part number, A-2
 - removing, 8-3
 - replacing, 8-3
 - troubleshooting, 4-11
- controller module
 - back panel, 6-8
 - battery, 1-7, 7-14
 - controller fan, 8-3
 - controllers
 - removing and replacing, 6-4
 - description, 1-2
 - electrical specifications, B-2
 - environmental specifications, B-3
 - features of, 1-11
 - front components, 1-3
 - front panel described, 1-3
 - illustrated, 1-2
 - illustrated blow out, A-3
 - installing into cabinet, 2-7
 - LEDs, 4-2 to 4-7
 - maintaining battery unit, 4-8
 - mounting clamp, 5-5
 - mounting screws, 5-5
 - physical specifications, B-2
 - power cord connector location, 1-8
 - power cord location, 7-4, 7-5
 - power cords, 5-4
 - checking, 7-3
 - power supply, 7-4
 - power supply fan, 8-5
 - power supply housing, 1-9, 7-11
 - power switch location, 7-4, 7-5
 - power switches, 3-2
 - power system described, 1-7 to 1-9
 - powering off, 3-3
 - powering on, 3-2
 - rear components, 1-4
 - SCSI cables, 5-4
 - SCSI ID location, 2-6
- controller state
 - active, 4-5
 - controller firmware upgrade, 4-5
 - failure, 4-5
 - held in boot menu, 4-5
 - held in reset, 4-5
 - passive, 4-5
 - wrong controller slot, 4-5
- cooling system, 1-10 to 1-11
- CRUs, A-1
- customer replaceable units, *See* CRUs

D

- data
 - loss during controller failure, 6-3
- data cache SIMM
 - location, 6-6
- date on battery unit, 4-8
- DC power harness
 - illustrated, A-5
 - part number, A-2
 - removing, 7-8
 - replacing, 7-8
- determining
 - controller failure, 6-2
 - fan failure, 8-2
- disk array software, 1-6
- drive channels, 1-2
- drives
 - number supported, 1-2

E

- electrical shock caution, 7-4
- electrical specifications, controller module, B-2
- emergency shutdown, 3-4
- environmental specifications, controller module, B-3
- error
 - write cache, 4-13

F

- fan failure
 - determining, 8-2
- fans
 - See also* controller fan or power supply fan
 - troubleshooting, 4-11
- fast write cache
 - troubleshooting, 4-13
- fast write cache LED
 - not blinking, 4-13
- field replaceable units, *See* FRUs
- front components, 1-3
- front panel
 - controller module, 1-3
 - removing, 5-2
 - replacing, 5-2
- front panel LEDs
 - controller fault, 4-2
 - fan fault, 4-2
 - fast write, 4-2
 - power, 4-2
 - power supply fault, 4-2
- FRUs, A-1

H

- host
 - number supported, 1-2
- host SCSI IDs
 - location on the controller module, 2-6
 - verifying, 2-6
- hot swap, 1-11, 6-3

I

- installation overview, 2-3
- installation worksheet, 2-3
- installing
 - controller module, 2-7
 - support rails in cabinet, 2-4

L

- leaking battery, 7-8
- LED patterns
 - controller status LEDs, 4-5
- LEDs, 4-2 to 4-7
 - controller, 1-3
 - front panel, 4-2
 - on back panel, 4-7
- list of replacement parts, A-2

M

- maintaining battery, 4-8
- memory
 - cache, 1-6, 1-8
 - failure of, 6-2
- memory buffer, *See* memory, cache
- mounting clamp, 5-5
- mounting clamp on support rail, 2-8
- mounting rails, 2-4
 - removing, 5-7

P

- passive controller
 - LED pattern, 4-5
- physical specifications, controller module, B-2
- power cord
 - checking and replacing, 7-3
 - location on controller module, 7-4, 7-5
- power cord connector location, 1-8
- power cords
 - routing, 2-10
- power interface board, 1-9
- power supply
 - described, 1-8
 - illustrated, 1-8
 - LED location, 4-7

- part number, A-2
- removing, 7-5
- replacing, 7-4
- troubleshooting, 4-9, 4-10
- power supply fan
 - described, 1-11
 - illustrated, 1-11
 - LED location, 4-7
 - part number, A-2
 - redundant pair, 8-6
 - removing, 8-5
 - replacing, 8-5
 - servicing, 8-5 to 8-6
- power supply housing, 1-9
 - connectors, 7-13
 - illustrated, 1-9, A-4
 - part number, A-2
 - removing, 7-11
 - replacing, 7-11
- power supply shutdowns, 7-1
 - recovering, 7-2
- power switch
 - location on controller module, 3-2, 7-5
- power system, 1-7 to 1-9
- powering off, 3-3
- powering on, 3-2
- pre-installation tasks, 2-2
- processor memory, 6-2
- processor memory SIMM
 - location, 6-6

Q

- quick-reference list for installation, 2-3

R

- RAID level, 1-11
- RAID Manager, 1-11
 - write cache, 1-6
- rear components
 - controller module, 1-4
- recovering from a power supply shutdown, 7-2
- recycling batteries, 7-6
- redundant pair
 - controllers, 6-3
 - power supplies, 1-8

- power supply fan, 8-6
- removing
 - battery, 7-7
 - battery harness, 7-15
 - controller, 6-4
 - controller card cage, 6-8
 - controller fan, 8-3
 - DC power harness, 7-8
 - front panel, 5-2
 - mounting rails, 5-7
 - power supply, 7-5
 - power supply fan, 8-5
 - power supply housing, 7-11
 - SIMM module, 6-5
- replacing
 - battery, 7-14
 - battery harness, 7-14
 - controller, 6-5
 - controller card cage, 6-8
 - controller fan, 8-3
 - controller module power cords, 7-3
 - DC power harness, 7-8
 - front panel, 5-2
 - power supply, 7-4
 - power supply fan, 8-5
 - power supply housing, 7-11
 - SCSI cables, 6-2
 - SIMM module, 6-5
- reset controller
 - LED pattern, 4-5
- routing the power cords, 2-10

S

- SCSI array controller, *See* controller
- SCSI cable
 - 68-to-68 pin, illustrated, A-4
 - troubleshooting, 4-13
- SCSI cables
 - 12 meter, part number, A-2
 - connected to controller back plane, 5-4
 - replacing, 6-2
- SCSI cables, connecting, 2-9
- SCSI components, 1-5 to 1-6
- SCSI IDs
 - controller module, 2-6
 - verifying the host IDs, 2-6
- SCSI interface, 1-6

- SCSI terminator
 - illustrated, A-4
 - part number, A-2
- SCSI-2 bus, 1-2
- servicing
 - power supply fan, 8-5 to 8-6
- SIMMs
 - location, 6-6
 - removing, 6-5
 - replacing, 6-5
- software
 - RAID Manager, 1-6, 1-11
- software configuration
 - troubleshooting, 4-14
- specifications
 - electrical, B-2
 - environmental, B-3
 - physical, B-2
- StorEdge A3000 controller module, *See* controller module
- Sun StorEdge A3000 controller module, *See* controller module
- support rails, 2-4
- system-level LEDs, 1-3, 4-2

T

- tools required for servicing, 5-1
- troubleshooting chart, 4-8 to 4-14
- turning off the power, 3-3
- turning on the power, 3-2

U

- unplugging
 - DC power harness, 7-8

V

- verifying the host SCSI IDs, 2-6

W

- write cache, 1-6
 - troubleshooting, 4-13

