Sun StorEdge™ T3 Disk Tray Field Service Manual

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Regulatory Compliance Statements

Your Sun product is marked to indicate its compliance class:

- Federal Communications Commission (FCC) — USA
- Industry Canada Equipment Standard for Digital Equipment (ICES-003) - Canada
- Voluntary Control Council for Interference (VCCI) — Japan
- Bureau of Standards Metrology and Inspection (BSMI) — Taiwan

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 it is not installed and used in accordance with the instruction manual, it 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 to comply 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.

ICES-003 Class A Notice - Avis NMB-003, Classe A

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

ICES-003 Class B Notice - Avis NMB-003, Classe B

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

VCCI 基準について

クラス A VCCI 基準について

クラス A 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、クラス A 情報技術装置です。これらの製品には、下記の項目が該当します。

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

クラス B VCCI 基準について

クラス B 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、クラス B 情報技術装置です。これらの製品には、下記の項目が該当します。

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス B 情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。取扱説明書に従って正しい取り扱いをしてください。

BSMI Class A Notice

The following statement is applicable to products shipped to Taiwan and marked as Class A on the product compliance
label.

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻 干擾，在這種情況下，使用者 會被要求採取某些適當的對策。

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 switches of this product function as standby type devices only. The power cords serve as the primary disconnect device for the system. ALL power cords must be disconnected to remove power from the product. Be sure to plug the power cords into a grounded power outlet that is nearby the system and is readily accessible.

Lithium Battery

Caution – On the system control board, there is a lithium battery molded into the real-time clock, SGS No. MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, M4T28 XXYYSHZ or MK48T08. Batteries are not customer replaceable parts. They may explode if mishandled. Do not dispose of the battery in fire. Do not disassemble it or attempt to recharge it.

Battery Pack

Caution - There is a Nickel Metal Hydride battery in the product power supply. Panasonic Model HHR200SCP. There is danger of explosion if the battery is mishandled or incorrectly replaced. Replace only with the same type of Sun Microsystems battery. Do not disassemble it or attempt to recharge it outside the system. Do not dispose of the battery in fire. Dispose of thebattery properly in accordance with local regulations.

System Unit Cover

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.

Laser Compliance Notice

Sun products that use laser technology comply with Class 1 laser requirements.

Caution – Use of controls, adjustments, or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

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 – Die Ein/Aus-Schalter dieses Geräts schalten nur auf Wartezustand (Stand-By-Modus). Um die Stromzufuhr zum Gerät vollständig zu unterbrechen, müssen Sie die Netzkabel aus der Steckdose ziehen. Alle Netzkabel müssen ausgesteckt sein, um die Stromverbindung zum Produkt zu unterbrechen. Schließen Sie die Stecker der Netzkabel an eine in der Nähe befindliche, frei zugängliche, geerdete Netzsteckdose an.

Lithiumbatterie

Achtung – Systemsteuerungskarten verfügen über eine Echtzeituhr mit integrierter Lithiumbatterie (Teile-Nr. MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, M4T28 XXYYSHZ oder MK48T08). Diese Batterie darf nur von einem qualifizierten Servicetechniker ausgewechselt werden, da sie bei falscher Handhabung explodieren kann. Werfen Sie die Batterie nicht ins Feuer. Versuchen Sie auf keinen Fall, die Batterie auszubauen oder wiederaufzuladen.

Batterien

Achtung – Das Netzteil des Panasonic-Modells HHR200SCP enthält eine Nickel-Metall-Hydridbatterie. Werden bei der Behandlung oder beim Austausch der Batterie Fehler gemacht, besteht Explosionsgefahr. Tauschen Sie Batterien nur gegen Batterien gleichen Typs von Sun Microsystems aus. Demontieren Sie die Batterie nicht, und versuchen Sie nicht, die Batterie außerhalb des Geräts zu laden. Werfen Sie die Batterie nicht ins Feuer. Entsorgen Sie die Batterie ordnungsgemäß entsprechend den vor Ort geltenden Vorschriften.

Gehäuseabdeckung

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

Einhaltung der Richtlinien für Laser

Sun-Produkte, die mit Laser-Technologie arbeiten, entsprechen den Anforderungen der Laser Klasse 1.

Warnung – Die Verwendung von anderen Steuerungen und Einstellungen oder die Durchfhrung von Prozeduren, die von den hier beschriebenen abweichen, knnen gefhrliche Strahlungen zur Folge haben.

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 : les commutateurs d'alimentation de ce produit fonctionnent comme des dispositifs de mise en veille uniquement. Ce sont les prises d'alimentation qui servent à mettre le produit hors tension. Vous devez débrancher TOUTES les prises d'alimentation afin de couper l'alimentation du produit. Veillez donc à installer le produit à proximité d'une prise murale facilement accessible.

Batterie au lithium

Attention : sur la carte de contrôle du système, une batterie au lithium (référence MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, M4T28-XXXYYSHZ ou MK48T08) a été moulée dans l'horloge temps réel SGS. Les batteries ne sont pas des pièces remplaçables par le client. Elles risquent d'exploser en cas de mauvais traitement. Ne pas jeter la batterie au feu. Ne pas la démonter ni tenter de la recharger.

Bloc-batterie

Attention : l'alimentation du produit contient une batterie nickel-hydrure métallique (Panasonic modèle HHR200SCP). Il existe un risque d'explosion si cette batterie est manipulée de façon erronée ou mal mise en place. Ne remplacez cette batterie que par une batterie Sun Microsystems du même type. Ne la démontez pas et n'essayez pas de la recharger hors du système. Ne faites pas brûler la batterie mais mettez-la au rebut conformément aux réglementations locales en vigueur.

Couvercle

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.

Conformité aux certifications Laser

Les produits Sun qui font appel aux technologies lasers sont conformes aux normes de la classe 1 en la matière.

Attention : l'utilisation de contrôles, de réglages ou de performances de procédures autre que celle spécifiée dans le présent document peut provoquer une exposition à des radiations dangereuses.

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 todos los avisos e instrucciones que se indican 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. El voltaje puede ser peligroso. 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, sección 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 que existe 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. Los enchufes de la fuente de alimentación están diseñados para ser el elemento primario de desconexión del equipo. Debe desconectar TODOS los enchufes de alimentación del equipo antes de desconectar la alimentación. El equipo debe instalarse cerca del enchufe de forma que este último pueda ser fácil y rápidamente accesible.

Batería de litio

Precaución – En las placas de control del sistema hay una batería de litio insertada en el reloj de tiempo real, tipo SGS Núm. MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, M4T28-XXYYSHZ o MK48T08. El usuario no debe reemplazar las baterías por sí mismo. Pueden explotar si se manipulan de forma errónea. No arroje las baterías al fuego. No las abra o intente recargarlas.

Paquete de pilas

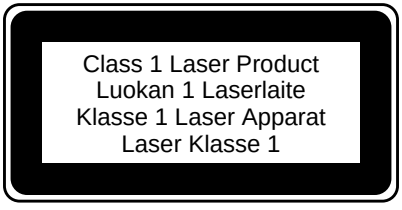
Precaución – Existe una pila de hidruro metálico de níquel en el sistema de alimentación de la unidad Panasonic modelo HHR200SCP. Existe riesgo de estallido si el paquete de pilas se maneja sin cuidado o se sustituye de manera indebida. Las pilas sólo deben sustituirse por el mismo tipo de pilas de Sun 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

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.

Aviso de cumplimiento con requisitos de láser

Los productos Sun que utilizan la tecnología de láser cumplen con los requisitos de láser de Clase 1.



Precaución – El manejo de los controles, los ajustes o la ejecución de procedimientos distintos a los aquí especificados pueden exponer al usuario a radiaciones peligrosas.

GOST-R Certification Mark

Nordic Lithium Battery Cautions

Norge

A D V A R S E L – Litiumbatteri — Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

Sverige

VARNING – Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

Danmark

ADVARSEL! – Litiumbatteri — Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

Suomi

VAROITUS – Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

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Preface

The *Sun StorEdge T3 Disk Tray Field Service Manual* is designed to provide the qualified service-trained maintenance provider with sufficient information to effectively troubleshoot and resolve any Sun StorEdge T3™ disk tray failure. The procedures in this manual describe how to isolate the failure, remove and replace component(s), effectively reconfigure the module and system, and place the product back into the customer's network.

Before You Read This Book

Make sure you have prepared by reviewing the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual; Sun StorEdge T3 Disk Tray Administrator's Guide;* and *Sun StorEdge T3 Disk Tray Release Notes*. Work with the site system administrator to determine if any external hardware or software products are required to repair this device.

How This Book Is Organized

This manual is organized as follows:

Chapter 1 provides an introduction to some of the tools available to troubleshoot the Sun StorEdge T3 disk tray.

Chapter 2 describes how to connect to and boot the Sun StorEdge T3 disk tray.

Chapter 3 provides the qualified service provider with troubleshooting techniques for the Sun StorEdge T3 disk tray.

Chapter 4 describes how to monitor and replace the controller card, and upgrade the firmware.

Chapter 5 describes how to monitor and replace the disk drives, and upgrade the firmware.

Chapter 6 describes how to monitor and replace the interconnect card, and upgrading firmware.

Chapter 7 describes how to replace the power and cooling unit and monitor the UPS.

Chapter 8 describes how to diagnose and correct back-end FC_AL drive loop problems with the Sun StorEdge T3.

Chapter 9 describes how to replace the chassis/backplane assembly.

Chapter 10 describes how to reconfigure the Sun StorEdge T3 disk tray into partner groups and single controller units.

Appendix A contains part numbers and illustrations of field-replacable units.

Appendix B lists the **Sun StorEdge T3 disk tray** defaults.

Appendix C contains a description of the messages that can be reported by the disk tray.

Appendix D contains descriptions of the commands supported by the **Sun StorEdge T3 disk tray**.

Appendix E lists the FC_AL loop identifies by AL_PA switch and setting values.

Appendix F contains blank worksheet for the qualified service provider to make notes at each customer site.

Using UNIX Commands

This document contains some information on basic UNIX® commands and procedures such as booting the devices. For more information outside of this document, see the following:

- AnswerBook2™ online documentation for the Solaris™ software environment
- Other software documentation that you received with your system

Typographic Conventions

TABLE P-1 Typographic Conventions

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

Shell Prompts

TABLE P-2 Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

TABLE P-3 Related Documentation

Application	Title	Part Number
Installation Road Map	*Sun StorEdge T3 Disk Tray Installation Task Map*	806-1061
Installation, Operation, and Service	*Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual*	806-1062
Configuring	*Sun StorEdge T3 Disk Tray Configuration Guide*	806-4210
Site Preparation	*Sun StorEdge T3 Disk Tray Site Preparation and Planning Guide*	806-4212
Administration	*Sun StorEdge T3 Disk Tray Administrator's Guide*	806-1063
Release Notes	*Sun StorEdge T3 Disk Tray Release Notes*	806-1497
Component Manager Installation	*Sun StorEdge Component Manager 2.0 Installation Guide*	806-4811
Component Manager User's Guide	*Sun StorEdge Component Manager 2.0 User's Guide*	806-4813
Component Manager Release Notes	*Sun StorEdge Component Manager 2.0 Release Notes*	806-4814
StorTools User's Guide	*Sun StorEdge StorTools User's Guide*	806-1946

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```
http://edist.corp
```

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CHAPTER 1

Introduction

This chapter provides an introduction to some of the tools available to troubleshoot the Sun Sun StorEdge T3 disk tray and describes the following topics:

- The Network Storage Overview
- Error Messages and Logs
- Host-Generated Message
- Sun StorEdge Component Manager
- Sun StorEdge StorTools
- Static Electricity Precautions

1.1 The Network Storage Overview

An understanding of a *network storage* environment is required before any troubleshooting can take place.

Each Sun StorEdge T3 disk tray can be structured to a maximum of two different RAID volumes, or logical unit numbers (LUNs). This means that each disk tray can be storing information from two completely different applications or sources, but both sources uniquely transmit their data delivery and retrieval through the same host adapter.

The Sun Sun StorEdge T3 disk tray partner group is two completely independent controller RAID units sharing only one of the controllers for system management. If one controller fails the system management facilities fail over to the other RAID controller. This gives the partner group redundancy.

Thus, when there is a Sun StorEdge T3 disk tray partner group, which consists of a minimum of two disk trays, there can be a maximum of four RAID volumes (LUNs) available to the server for data delivery and retrieval.

The interruption of data can happen anywhere on the storage network. This manual addresses data interruption problems from the output of the host to the T3 disk tray, and the individual components in the tray.

1.2 Error Messages and Logs

Both the Sun StorEdge T3 disk tray and the host server create log message files of system conditions and events, and both are the most useful *immediate* tools for troubleshooting.

1.2.1 Sun StorEdge T3 Generated Messages

A `syslog` daemon in the Sun StorEdge T3 disk tray writes system error message logs to a location determined by the site system administrator. Consult with the site system administrator to obtain access to this log. See Section 2.6 “Setting Up Remote Logging” on page 2-9 to set up this service.

1.2.2 Host-Generated Message

A `syslog` daemon in the host hardware writes system error message logs to `/var/adm/messages`.

The data host sees a disk tray as one or two logical volumes. A host-generated message indicates that the host cannot communicate with the disk tray through the Fibre Channel Arbitrated Loop (FC-AL) channel, or that an excessive number of channel errors are occurring. If the host loses access to the disk tray through the channel connection, then any host messages regarding the disk tray will refer only to the LUNs. To see details of problems internal to the Sun StorEdge T3 disk tray, use the `telnet` command to connect to the disk tray and run the `fru stat` command.

In a partner group configuration where alternate pathing fail over has been established, the failure of a channel path or disk tray controller causes the host to redirect I/O from the failed channel to the second FC-AL connection.

A variety of software logging tools monitor the various branches of the storage network. When an error is detected the error’s severity level is categorized and classified. Errors are reported or logged according to severity level.

The levels of message notification are:

Error	Indicates a critical system or storage network event or failure, requiring immediate intervention or attention
Warning	Indicates a possible system or storage network event or failure, requiring eventual intervention
Notice	Indicates a system event that could be a normal periodic notification, a system fault, operator keyboard commands, or a result of other events
Information	Indicates a system event that has no impact upon the system or storage networks ability to perform tasks.

The syntax of the error message uses a field-replaceable unit (FRU) identifier to refer to a particular FRU in a Sun StorEdge T3 disk tray. This identifier contains a unit constant (u), the unit number (*n*), the FRU constant (`ctr` for controller card, `pcu` for power and cooling unit, `l` for unit interconnect card, `d` for disk drive), and the FRU number (*n*).

TABLE 1-1 FRU Identifiers

FRU	Identifier	Unit number
Controller card	u*n*`ctr`	*n* = unit number (1, 2,...)
Power and cooling unit	u*n*`pcu`*n*	*n* = unit number (1, 2, ...) *n* = pcu number (1, 2)
Unit Interconnect card	u*n*`l`*n*	*n* = unit number (1, 2, ...) *n* = interconnect number (1, 2)
Disk drive	u*n*`d`*n*	*n* = unit number (1, 2, ...) *n* = disk drive number (1 to 9)

1.3 Sun StorEdge Component Manager

The Sun StorEdge T3 disk tray can be used with management software, such as Sun StorEdge Component Manager, to aid in its operation. Sun StorEdge Component Manager provides a graphical user interface (GUI) to monitor and manage one or more Sun StorEdge T3 disk trays that are connected to a host.

Sun StorEdge Component Manager software enables the administration of some of the components of the disk tray and constantly monitors system health. Alarm notification and remote reporting alert the system administrator of abnormal activities or conditions that require attention.

The *Sun StorEdge Component Manager Installation Guide* provides instructions for installing the software, and also covers the necessary steps to verify the installation, launch the software, and uninstall the software. The *Sun StorEdge Component Manager User's Guide* describes how to use the GUI to administer Sun StorEdge T3 disk trays.

The Sun StorEdge Component Manager software communicates with the disk tray unit via an Ethernet connection. It must be installed, configured, and initialized on the management host. The management host does not have to be the application host directly connected to the disk tray.

The software recognizes the unit through the Ethernet address and monitors it through a polling routine. The Sun StorEdge Component Manager GUI displays information on the unit, including the suspected problem area. The software can be configured to route error messages to a log file, generate an email, or page an on-call person. The log file contains information that can be used to determine the fault and what caused the message to be sent.

For more information about using the Component Manager, see the *Sun StorEdge Component Manager User's Guide*.

1.4 Sun StorEdge StorTools

Errors in the host data channel are outside of the scope of the Sun StorEdge T3 disk tray. To determine failures in the data path, use host-based application diagnostics, such as the StorEdge StorTools™ product for the Solaris operating environment.

Host-to-disk tray channel failures occur when the connection between the disk tray and the host is either severed or intermittent. The components that make up this data channel connection are:

- Host bus adapter (HBA), which resides on the host
- Gigabit interface converter (GBIC) adapter, used to connect the FC-AL cable to an SBus HBA
- Fibre-Channel cable that connects the disk tray to the host
- Media interface adapter (MIA), which converts the light source from the host to an electron source for use in the disk tray
- Channel interface port in the disk tray

Refer to Section 3.7.4 “Testing the Disk Tray With StorTools” and the *Sun StorEdge StorTools Users Guide* for information identifying data channel failures.

1.5 Static Electricity Precautions

Follow these procedures to prevent damaging the FRUs:

- Before handling a FRU, discharge any static electric charge by touching a ground surface.
- Wear a grounding wrist strip.
- Do not remove a FRU from its antistatic protective bag until it is ready for installation.
- When removing a FRU from the disk tray, immediately place it in an antistatic bag and packaging.
- Handle a FRU only by its edges and avoid touching the circuitry.
- Do not slide a FRU over any surface.
- Avoid having plastic, vinyl, and foam in the work area.
- Limit body movement (which builds up static electricity) during FRU installation.

CHAPTER 2

Connecting to the Sun StorEdge T3 Disk Tray

This chapter describes how to connect to the Sun StorEdge T3 disk tray and covers the following topics:

- Establishing a Serial Port Connection
- Establishing a Telnet Session
- Establishing an ftp Session
- tftpbooting a Disk Partner Group
- Configuring a Server For tftp Booting
- Setting Up Remote Logging

2.1 Establishing a Serial Port Connection

The serial port is a direct connection to the disk tray from any serial port on any host or system. Individual commands can be run to query and repair the unit from this interface using the command-line interface (CLI). The serial port connection provides the following advantages over the telnet connection:

- Boot messages are displayed when the disk tray boots.
- The `tftp boot` configuration is available.
- EPROM access is available.
- Useful for debugging RARP/IP address assignment issues.

The status of the disk tray unit can quickly be determined from the CLI. The `syslog` file of the disk tray file system contains a record of events that have occurred in the unit.

To start a serial connection and session with the disk tray:

1. **Connect a serial cable from the serial port on the disk tray master unit to any host system available serial port.**

   The serial port on the disk tray is on the controller card backplane.

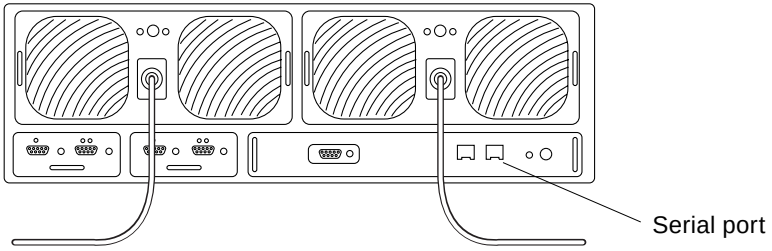

FIGURE 2-1 Serial Port Location

2. **On the host system, open a terminal window.**

3. **In the Solaris environment, open a terminal window, type** `tip`**, the baud rate and serial port designation.**

   For example:

```
mymachine# tip -9600 /dev/ttya
connected
Password:
Invalid name.
Login:root
Password:

T300 Release 1.13 2000/05/17 16:15:41 (129.150.47.104)
Copyright (C) 1997-2000 Sun Microsystems, Inc.
All Rights Reserved.

name:/:<1>
```

If the Sun StorEdge T3 disk tray is being booted, the following message is displayed:

```
auto boot is enabled
hit the RETURN key within 3 seconds to cancel...
```

In a boot situation, if the RETURN key is pressed within 3 seconds, the disk tray stops booting and the EPROM takes control of the disk tray. If the RETURN key is not pressed, the disk tray continues to boot. Note that in a partner group the

alternate unit will continue to boot and come up as the master if the boot sequence of the master is stopped. Screen messages are displayed (Section 3.6 “Checking Disk Tray Boot Status” on page 3-11 for an example.)

The following commands are available for use at the EPROM:

- boot
- `reset`
- `set`
- `id`

Once the disk tray has fully booted, all the commands available through the CLI are accessible.

For more information serial connections, see:

- Section 2.6 “Setting Up Remote Logging” on page 2-9,
- Section 3.6 “Checking Disk Tray Boot Status” on page 3-11.

2.2 Establishing a Telnet Session

The telnet session is a direct network link to the disk tray unit via the command-line interface (CLI). Individual commands can be run to query and repair the unit from this interface. The telnet session requires access to the unit’s IP address. The CLI can then be run from any host that is part of the same subnetwork.

The advantages that a telnet connection provides over a serial port connection are as follows:

- ftp images are displayed.
- You can have multiple windows open for each disk tray.
- The telnet connection provides a faster interface than the serial port connection, which can be useful for displaying `syslog` information.

The status of the disk tray unit can quickly be determined from the CLI. The `syslog` file of the disk tray file system contains a record of events that have occurred in the unit and can also be examined through the CLI.

To start a telnet connection and session with the disk tray:

1. **On the host, use the** `telnet` **command with the disk tray name (or IP address) to connect to the disk tray.**

   For example to telnet to a disk tray named T3-1:

```
mgmt-host# telnet T3-1
>   Trying 123.123.123.1...
>   Connected to T3-1.
>   Escape character is '^]'.
>   pSOSystem (123.123.123.1)
>   Login:
```

2. **Log in to the disk tray by typing** `root` **and the root password at the prompts.**

   The disk tray prompt is displayed.

   To view the available commands on the disk tray**, type** `help` **at the prompt.**

```
:/:<1>help
ftp     telnet
arp     cat     cd      cmp     cp      date    echo    head
help    ls      mkdir   mv      ping    pwd     rm      rmdir
tail    touch
boot    disable disk    enable  fru     id      logger  lpc
more    passwd  port    proc    reset   set     shutdown
sync    sys     tzset   ver     vol     ep      refresh route
```

   For more information on how to set up the `syslog` file and interpret it, see Section 2.6 “Setting Up Remote Logging” on page 2-9, and for information on how to use the CLI commands, see *Sun StorEdge T3 Administrator’s Guide*.

2.3 Establishing an ftp Session

To establish an `ftp` session:

1. **Start an `ftp` session from the management host to the disk tray.**

   For example:

```
mgmt-host:/:<15>ftp 123.123.123.2
Connected to 123.123.123.2.
Escape character is '^]'.

123.123.123.2 pSOSystem (NUPPC/2.0.0-G) ready

Name (123.123.123.2:root):
```

2. **Log in to the disk tray by typing `root` and the root password at the prompts.**

```
Name (123.123.123.2:root): root

331 Password required for root.
Password: password
230 User root logged in.
ftp>
```

Note – Be sure to set Binary mode if transferring firmware.

2.4 tftpbooting a Disk Partner Group

If you have a partner group that cannot boot on its own, you can use `tftp boot` to boot it remotely.

To tftp boot a Sun StorEdge T3 disk tray:

1. **Set up the `tftpboot` server.**

   See Section 2.5 “Configuring a Server For tftp Booting” on page 2-8.

2. **Unplug the ethernet cable connected to the alternate master.**

   Leave the ethernet cable on the master connected.

3. **Get to the disk tray EPROM as described in Section 2.1 “Establishing a Serial Port Connection” on page 2-1.**

4. **Set the disk tray boot mode to** `tftpboot`**.**

```
T3-1>set bootmode tftp
T3-1>set
bootmode  tftp
bootdelay 3
sn        000596
ip        123.123.123.4
netmask   255.255.255.0
gateway   0.0.0.0
tftphost  123.123.123.6
tftpfile  nb100.bin
hostname  mgmts-host
spindelay 0
revision  0210
mac       00:20:f2:00:02:ba
rarp      on
```

5. **Set** `tftphost` **IP address and** `tftp` **filename.**

```
T300-EP>set tftphost 123.123.123.6
T300-EP>set tftpfile nb113.bin
T300-EP>set
bootmode  tftp
bootdelay 3
sn        000596
ip        123.123.123.99
netmask   255.255.255.0
gateway   0.0.0.0
tftphost  129.150.47.37
tftpfile  nb113.bin
hostname  T3-1
spindelay 0
revision  0210
mac       00:20:f2:00:02:ba
rarp      on
```

6. **Reset the master to initiate the `tftp` boot cycle.**

```
T3-1>reset
Starting...

T3-1 Release 2.10 1999/11/24 13:05:57 (123.123.123.3)
Copyright (C) 1997-1999 Sun Microsystems, Inc.
All Rights Reserved.

Found units: [u1-ctr]
tftp boot is enabled
hit the RETURN key within 3 seconds to cancel...
Initializing TFTP...
Loading 123.123.123.6:nb113.bin
...
...
login:
```

7. **Copy the firmware from the `tftp` boot server to the Sun StorEdge T3 disk tray.**

   Note that `ftp` is initiated from the tftp server since at this point you are no longer on the disk tray.

```
mgmt_host# ftp 123.123.123.3
Connected to 123.123.123.3.
220 123.123.123.3 pSOSystem FTP server (NUPPC/2.0.0-G) ready.
Name (123.123.123.3:root): root
331 Password required for root.
Password:
230 User root logged in.
ftp> lcd /tftpboot
Local directory now /tftpboot
ftp> bin
200 Type set to I.
ftp> put filename.bin
200 PORT command successful.
150 Opening BINARY mode data connection for filename.bin.
226 Transfer complete.
local: filename.bin remote: filename.bin
2514468 bytes sent in 51 seconds (47.87 Kbytes/s)
ftp>
```

   Where *filename*`.bin` is the name of the current firmware file. For example, `nb113.bin`.

8. **Boot the newly transferred controller firmware image on the master.**

   This copies the firmware to the bootable reserved areas on the local disk.

```
:/:<3>boot -i filename.bin
file header: size 265e14, checksum be4ec46, start 20010, base 20000
```

9. **Set the bootmode back to auto**

   (If you forget this step, the system will continue doing tftpboots.)

```
:/:<4>set bootmode auto
```

10. **Reset the system.**

```
:/:<5>reset
Reset the system, are you sure? [N]: y
```

11. Reconnect the ethernet cable to the alternate master.

2.5 Configuring a Server For tftp Booting

If a Sun StorEdge T3 is unable to boot you can use `tftboot` to reload the firmware. This requires configuring a tftp boot server.

To configure a `tftpboot` server to `tftp` boot a Sun StorEdge T3, follow these steps:

1. **In a user filesystem, create a directory on the server called** `tftpboot`**.**

```
boothost# mkdir /tftpboot
```

2. **Set permissions to allow users read/write access.**

```
boothost# chmod 777 /tftpboot
```

3. **Copy the Sun StorEdge T3 disk tray boot code into the** `tftpboot` **directory.**

```
boothost# cp nbnnn.bin /tftpboot
```

Where `nb`*nnn*`.bin` is the current boot-code file identification number. For example, `nb101.bin`.

4. **Verify that** `/tftpboot/nb`*nnn*`.bin` **is readable by typing:**

```
boothost# chmod 755 /tftpboot/nbnnn.bin
```

5. **Edit the** `/etc/inetd.conf` **file and uncomment the** `tftp` **line.**

```
tftp dgram udp wait root /usr/sbin/in.tftpd in.tftpd -s /tftpboot
```

6. **Restart** `inetd`**.**

```
boothost# ps -eaf | grep inetd
root 140 1 0 Feb 08 ? 0:00 /usr/sbin/inetd -s
root 7715 7701 0 11:22:32 pts/18 0:00 grep inetd
# kill -HUP 140
```

2.6 Setting Up Remote Logging

The Sun StorEdge T3 disk tray can provide remote notification of disk tray events to designated hosts using Simple Network Management Protocol (SNMP) traps. To enable SNMP notification, edit the `/etc/syslog.conf` and the `/etc/hosts` files on the disk tray to configure system message logging. Because files cannot be edited on the disk tray, `ftp` the files to a host to make the edits and then `ftp` the files back to the disk tray.

Refer to the *Sun StorEdge T3 Disk Tray Administrator's Guide* for instructions on setting up remote logging.

CHAPTER 3

Diagnosing Problems

This chapter provides the qualified service provider with troubleshooting techniques for the Sun StorEdge T3 disk tray.

The chapter contains the following sections:

- Diagnostic Information Sources
- Troubleshooting Flow Charts
- Initial Troubleshooting Steps
- StorTools Connectivity Tests
- Checking Disk Tray Boot Status
- Telnet Connection Status Checks
- Testing the Disk Tray With StorTools
- Identifying Miscabled Partner Groups
- Identifying Data Channel Failures

3.1 Diagnostic Information Sources

The diagnostic tools available to you are summarized in TABLE 3-1 where:

- LED = Light emitting diodes on the disk tray.
- CM = Component Manager
- CLI(E) = Command line utilities run via ethernet connection as described in *Sun StorEdge T3 Disk Tray Administrator's Guide*
- CLI(S) = Command line utilities run via a serial connection as described in "Establishing a Serial Port Connection" on page 1.
- OFDG = Off-line Drive Diagnostic utility as described in Chapter 8 "Diagnosing and Correcting FC_AL Loop Problems.
- SNMP = Simple Network Monitoring Protocol as described in *Sun StorEdge T3 Disk Tray Administrator's Guide*

- SNMP(CA) = Simple Network Monitoring Protocol used with a customer-written application as described in *Sun StorEdge T3 Disk Tray Administrator's Guide*
- StorTools(A) = StorTools run on an application host as described in *Sun StorEdge StorTools Users Guide*
- StorTools(M) = StorTools run on a management host as described in *Sun StorEdge StorTools Users Guide*
- syslog = Sun StorEdge T3 disk tray `syslog` file
- syslog(CA) = Sun StorEdge T3 disk tray `syslog` with customer-written application
- SRS = Sun Remote Service

TABLE 3-1 Diagnostic Functions and Tools

Function	Tools That Can Be Used
Disk tray boot monitoring	LEDs, CLI(S),
Disk tray boot PROM commands	CLI(S)
Host data path diagnosis	StorTools(A)
Internal monitoring	LEDs, CM, CLI (E), CLI(S), SNMP, StorTools (M), syslog, SRS
Configuration	LEDs, CM, CLI (E), CLI(S)
System (admin domain) configuration	CM, CLI(E), CLI(S)
System (admin domain) monitoring	CM, CLI(E), CLI(S), SRS, SNMP(CA), syslog(CA)
Version level check	CM, CLI(E), CLI(S)
LUN configuration	CM, CLI(E), CLI(S)
FRU failure monitoring	LED, CM, CLI(E), CLI(S), SRS, SNMP(CA), syslog(CA)
Performance monitoring	CM, CLI(E), CLI(S), SNMP(CA), syslog(CA)
Firmware download	CLI(E)
Syslog access (mgmt host)	CLI(E), CLI(S), syslog(CA and StorTools(M) with 2nd copy of StorTools running on management host with ethernet connection to disk tray
Loop resiliency check (manual)	OFDG, CLI(E), CLI(S)
Manual loop resiliency check	OFDG, CLI(E), CLI(S)
Clear root password	CLI(S)
Host data path diagnosis	StorTools(A)

TABLE 3-1 Diagnostic Functions and Tools *(Continued)*

Function	Tools That Can Be Used
Statistics logging	syslog(CA) and StorTools(M) with 2nd copy of StorTools running on management host with ethernet connection to disk tray
Service commands	CLI(E), CLI(S)
Mfg / repair commands	CLI(E), CLI(S)

3.2 Troubleshooting Flow Charts

The following three charts illustrate typical diagnostic procedures.

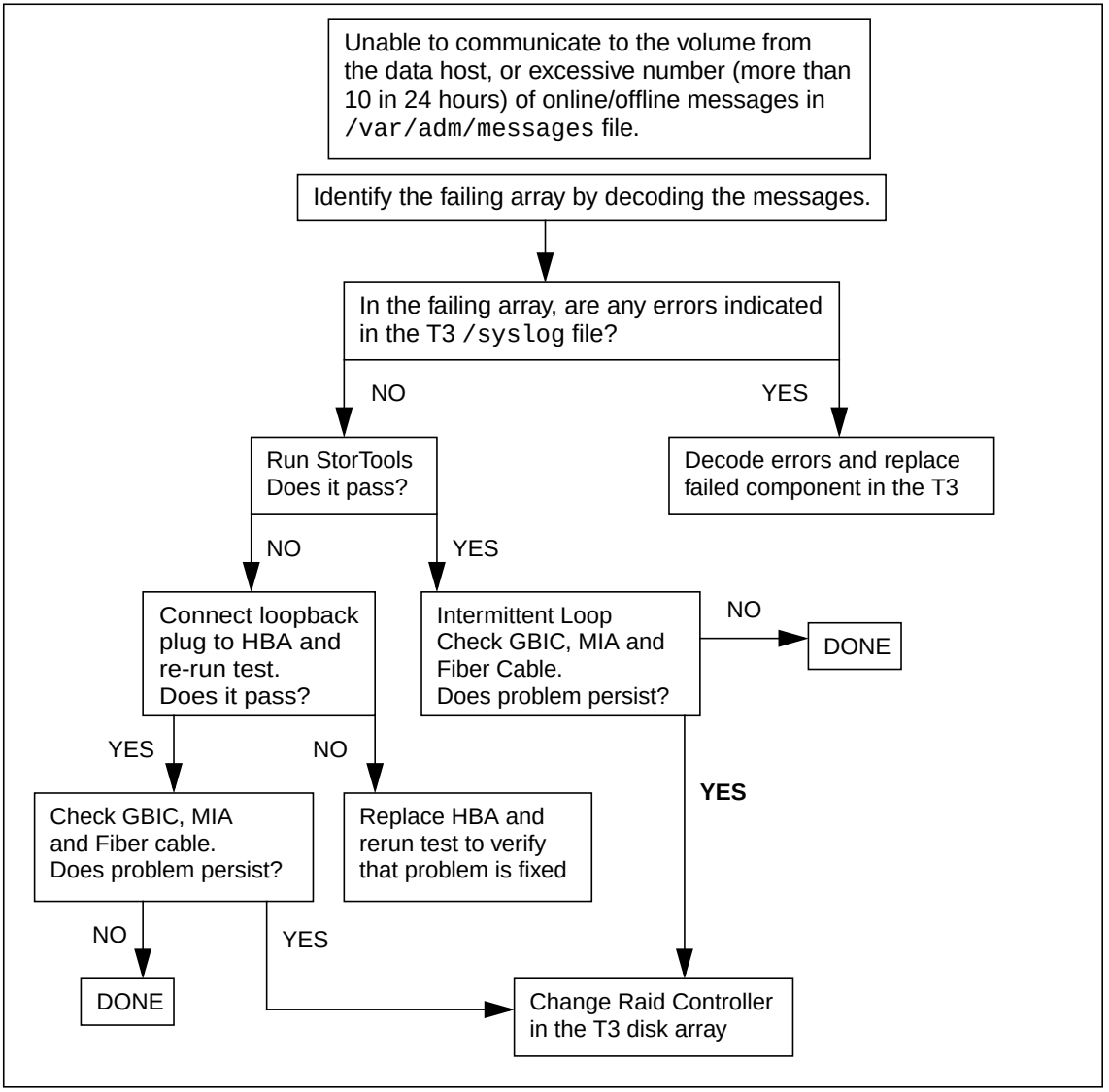

FIGURE 3-1 Data Connection Troubleshooting Flow Chart

Note that testing with a loopback plug can only be done on SBus systems. You cannot use a loopback cable with a PCI card.

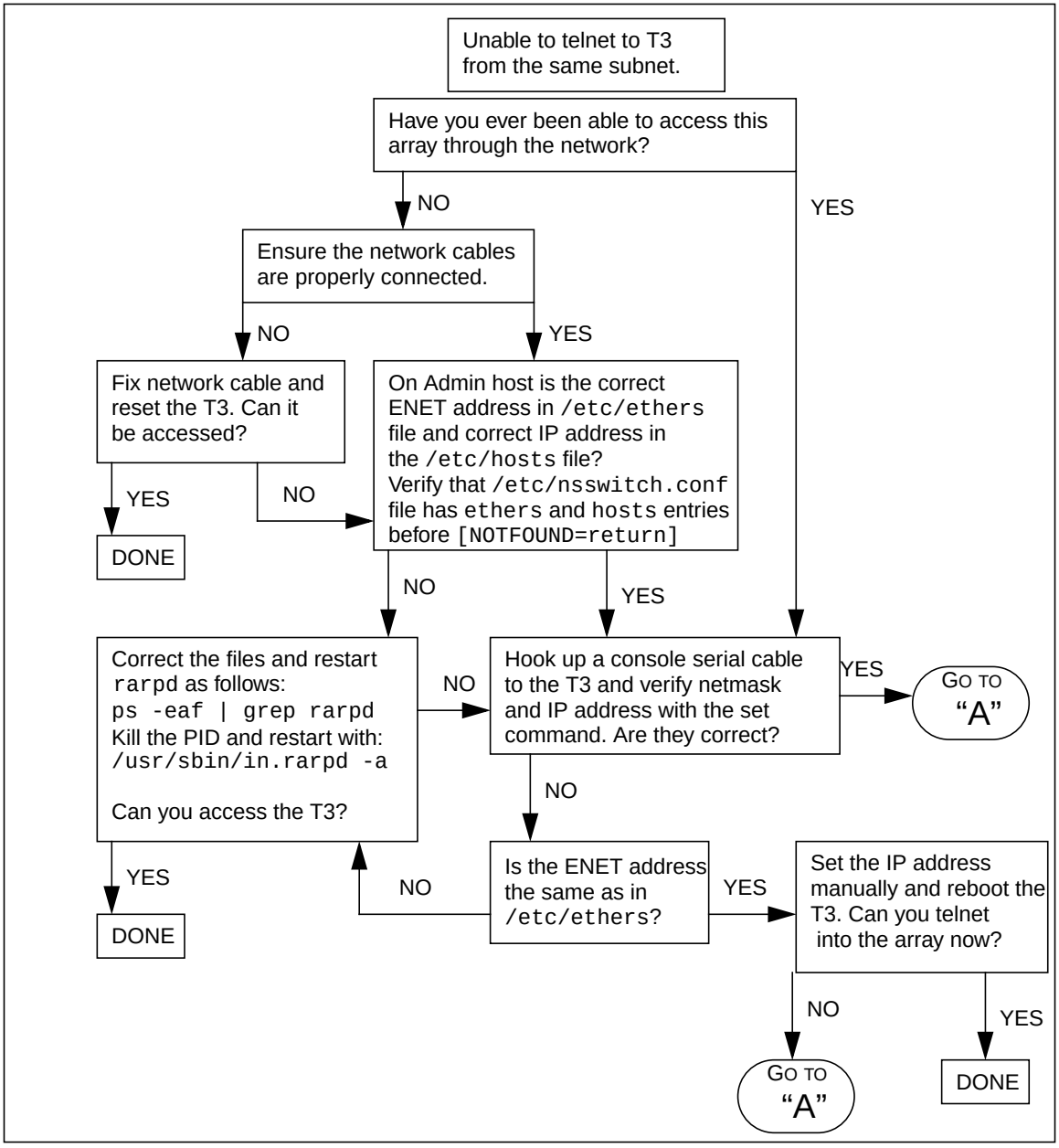

FIGURE 3-2 Ethernet Troubleshooting Flow Chart

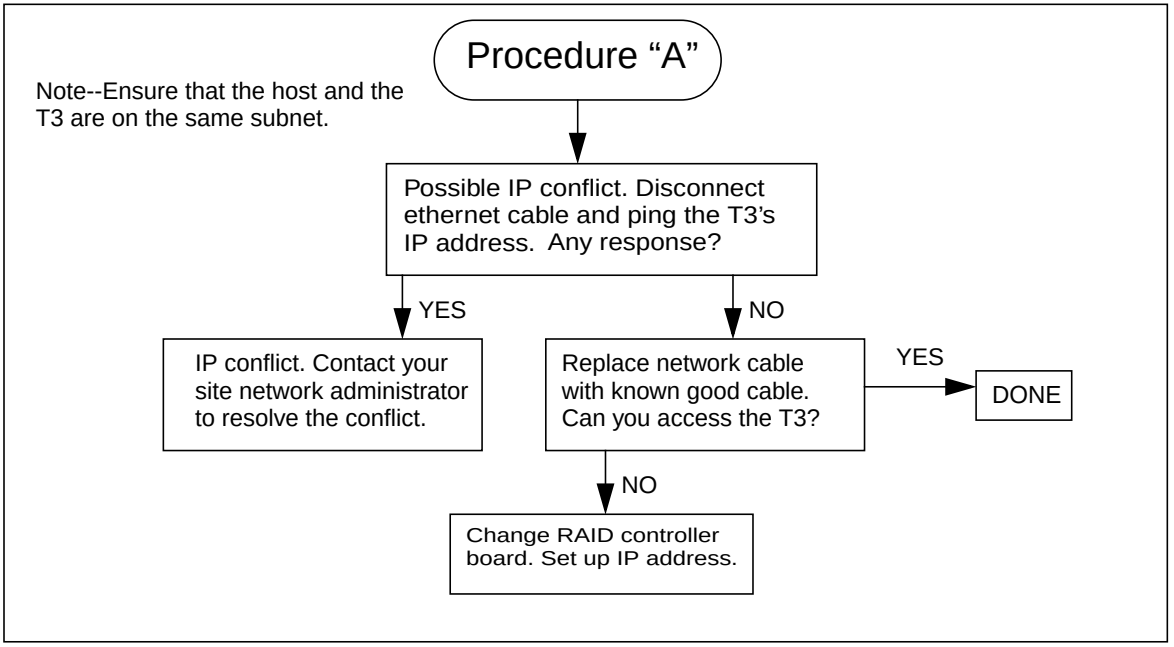

FIGURE 3-3 Procedure “A”

3.3 Initial Troubleshooting Steps

To begin a problem analysis, check one or more of the following information sources and / or perform one or more of the following checks:

- The disk tray LEDs, which provide a visual status as described in *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual*.
- Sun StorEdge T3 disk tray generated messages, found in a log file, indicating a problem or system status with the disk tray. See Section 1.2.1 “Sun StorEdge T3 Generated Messages” on page 1-2 for more information about disk tray generated messages.
- Host-generated message, found in the `/var/adm/messages` file, indicating a problem with the host channel connection to the disk tray unit. See Section 1.2.2 “Host-Generated Message” on page 1-2 for more information about host generated messages.
- Messages generated by the Sun StorEdge Component Manager software indicating a problem. See Section 1.3 “Sun StorEdge Component Manager” on page 1-3 for more information about Component Manager.

- Check the connection between the host and the Sun StorEdge T3 disk tray as described in Section 3.5 “StorTools Connectivity Tests” on page 3-8.
- Check the disk tray boot status as described in Section 3.6 “Checking Disk Tray Boot Status” on page 3-11.
- Check FRU status as described in the *Sun StorEdge T3 Disk Tray Administrator’s Guide*.
- Check disk tray status as described in Section 3.7 “Telnet Connection Status Checks” on page 3-14.
- Check disk tray operation as described in Section 3.7.4 “Testing the Disk Tray With StorTools” on page 3-19
- Check for miscabled partner groups as described in Section 3.8 “Identifying Miscabled Partner Groups” on page 3-19
- Check the data channel as described in Section 3.9 “Identifying Data Channel Failures” on page 3-23

3.4 Verifying the Data Host Connection

To verify the physical connection between the host and the disk tray use a utility, such as the `format` command in the Solaris environment, to confirm a volume on the disk tray. For example:

- **On the application host, enter** `format` **at the root prompt.**

```
# format
Searching for disks...done

c1t1d0: configured with capacity of 133.38GB

AVAILABLE DISK SELECTIONS:
       0. c0t2d0 <drive type unknown>
          /sbus@1f,0/SUNW,fas@e,8800000/sd@2,0
       1. c0t3d0 <SUN2.1G cyl 2733 alt 2 hd 19 sec 80>
          /sbus@1f,0/SUNW,fas@e,8800000/sd@3,0
       2. c1t1d0 <SUN-T3-0100 cyl 34145 alt 2 hd 64 sec 128>
         /sbus@1f,0/SUNW,socal@1,0/sf@0,0/ssd@w50020f2300000121,0
Specify disk (enter its number):
```

In this example, device number 2 is a volume on the disk tray, as identified by the `SUN-T3-0100` label.

3.5 StorTools Connectivity Tests

Use StorTools to verify the physical connection between the host and the disk tray and determine the primary and alternate paths.

3.5.1 Primary Path Verification by the Host

To determine a Sun StorEdge T3 disk tray's primary and alternate paths, from the host console, do the following:

1. **On the application host, enter** `format -e` **at the root prompt.**

   Specify the disk number when prompted.

```
# format -e
Searching for disks...done

AVAILABLE DISK SELECTIONS:
       0. c0t2d0 <drive type unknown>
          /sbus@1f,0/SUNW,fas@e,8800000/sd@2,0
       1. c0t3d0 <SUN2.1G cyl 2733 alt 2 hd 19 sec 80>
          /sbus@1f,0/SUNW,fas@e,8800000/sd@3,0
       2. c1t1d0 <SUN-T3-0100 cyl 34145 alt 2 hd 32 sec 128>
          /sbus@1f,0/SUNW,socal@1,0/sf@0,0/ssd@w50020f2300000172,0
       3. c1t1d1 <SUN-T3-0100 cyl 34145 alt 2 hd 32 sec 128>
          /sbus@1f,0/SUNW,socal@1,0/sf@0,0/ssd@w50020f230000015a,0
       4. c2t2d0 <SUN-T3-0100 cyl 34145 alt 2 hd 64 sec 128>
          /sbus@e,0/SUNW,socal@d,0/sf@0,0/ssd@w50020f2300000172,1
       5. c2t2d1 <SUN-T3-0100 cyl 34145 alt 2 hd 32 sec 128>
          /sbus@e,0/SUNW,socal@d,0/sf@0,0/ssd@w50020f230000015a,1
Specify disk (enter its number): 2
selecting c1t1d0
[disk formatted]
```

In this example, four Sun StorEdge T3 disk devices are shown as disk numbers 2 through 5. They can be identified by the `SUN-T3-0100` label.

Note – To view device paths using the `format` command, the `mp_support` setting on the disk tray must be set to `rw`. For more information on the `mp_support` setting, refer to the *Sun StorEdge T3 Disk Tray Administrator's Guide*.

It is presumed that selection 2 (`c1t1d0`) is the primary path, while selection 4 (`c2t2d0`) is the alternate path in the partner group. Since both these paths have the same number (`50020f2300000172`) they point to the same volume. The following procedure will determine whether selection 2 is the primary or alternate path to the logical volume.

2. **Enter** `scsi` **to select scsi menu.**

```
FORMAT MENU:
        disk       - select a disk
        type       - select (define) a disk type
        partition  - select (define) a partition table
        current    - describe the current disk
        format     - format and analyze the disk
        repair     - repair a defective sector
        label      - write label to the disk
        analyze    - surface analysis
        defect     - defect list management
        backup     - search for backup labels
        verify     - read and display labels
        save       - save new disk/partition definitions
        inquiry    - show vendor, product and revision
        scsi       - independent SCSI mode selects
        volname    - set 8-character volume name
        !<cmd>     - execute <cmd>, then return0
        quit
format> scsi
```

3. **Enter** `inquiry` **at the prompt.**

```
SCSI MENU:
        disk       - select a disk
        type       - select (define) a disk type
        partition  - select (define) a partition table
        current    - describe the current disk
        format     - format and analyze the disk
        repair     - repair a defective sector
        label      - write label to the disk
        analyze    - surface analysis
        defect     - defect list management
        backup     - search for backup labels
        verify     - read and display labels
        save       - save new disk/partition definitions
        inquiry    - show vendor, product and revision
        scsi       - independent SCSI mode selects
        volname    - set 8-character volume name
        !<cmd>     - execute <cmd>, then return0
        quit
scsi> inquiry
```

- The output of the `inquiry` command is as follows (the sample output below assumes that `mp_support` is set to `rw` (otherwise there will only be one path to each volume):

```
Inquiry:
  00 00 03 12 5b 00 10 02 53 55 4e 20 20 20 20 20    ....[...SUN
   54 33 30 30 20 20 20 20 20 20 20 20 20 20 20 20     T3
  30 30 39 36 30 30 30 30 30 32 35 38 31 30 00 00  01000000025810..
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ...............


           Vendor:                    SUN
           Product:                   T3
           Revision:                  0100
            Removable media:           no
            Device type:               0
```

The seventh byte in the inquiry screen (bold for this example) indicates whether the LUN is the primary or alternate path. ***10*** indicates primary path, ***30*** indicates alternate path.

In this example, c1t1d0 is the primary path.

3.5.2 Verifying Hub Connectivity

StorTools tests include testing any hubs in the data path.

If you suspect a hub-related problem, use the StorTools A5x00 FRU Isolation tool (`filtr`) in manual mode and the disk tray FRU Isolation tool (`sedr`) in verbose mode as described in the *Sun StorEdge StorTools User Guide*.

Note – Running StorTools will affect performance.

3.6 Checking Disk Tray Boot Status

1. **Establish a serial connection with the disk tray as described in Section 2.1 “Establishing a Serial Port Connection” on page 2-1.**

2. **Boot the disk tray.**

   There are several ways that a boot cycle can be initiated:

   - Power-off the Sun StorEdge T3 disk tray and power on again.
   - Log into a disk tray and issue a `reset` command.
   - Log into a disk tray and issue a `shutdown` command (this requires a power cycle to get the system to start booting).
   - If the disk tray is already running, you can reboot by issuing a `boot` command with options.

Screen messages similar to the following are displayed:

```
:/> tip -9600 /dev/ttyb

Connected.

T3-EP Release 2.10 1999/11/24 13:05:27 (IP Address of tray)
Copyright (c) 1997-1999 Sun Microsystems, Inc.
All Rights Reserved
Found units:   u1-ctr1  [u2-ctr]
auto boot is enabled
hit the RETURN key within 3 seconds to cancel...
Default master is 1
Default alternate master is 2
Initializing System Drives...
Initializing XPT Components...
Initializing QLCF Components
Initializing Loop 1 ISP2100...firmware status 3
Detecting 20 FC-AL ports on loop 1
Initializing Loop 2 ISP2100...firmware status 3
Detecting 20 FC-AL ports on loop 2
Initializing SVD Services...
Found (18) disks in the system
Found 9 disks in U1...
Found 9 disks in U2...
Trying to boot from encid 1...
Booting from U1D1...
Executing...
Starting...

Login: root
password: root-password
```

Once the disk tray starts a full boot, any system problems detected by the system are displayed. pSOSystem will also identify any controllers not responding, or if the master has failed over to the alternate master, in the boot messages.

Firmware status codes are good indicators of internally detected system and configuration problems. In the previous `boot` message example, a firmware status of 3 is displayed, which implies the disk tray is ready for operation. Other firmware status codes that can be reported through the serial-port console during a disk tray `boot` cycle are as follows:

TABLE 3-2 Firmware Status Indicators

Status	Definition
0	ISP is waiting for configuration process to complete
1	ISP is waiting for ALPA assignment
2	ISP is waiting for port login
3	ISP is ready and optimal
4	ISP has lost loop synchronization
5	ISP has experienced an unrecoverable error
6	Reserved
7	ISP is not participating on the loop

Once the disk tray has fully booted, all the commands available through the CLI are accessible.

Note – If you make configuration changes at the EPROM prompt, they can be overwritten when the disk tray boots completely. Check the disk tray settings after the disk tray has booted to ensure that they are correct.

If after you log in, a message such as the following is displayed:

```
6.1/: device not mounted
```

it is possible that the serial cable is connected to the alternate master unit instead of the master unit. To determine if this is true, enter `fru myuid`.

```
:/: fru myuid
u1
```

If you are connected the master, `u1` is returned. If you are connected to the alternate, `u2` is returned. If you are connected the alternate, stop the `tip` session, reconnect the serial cable to the master unit, and start the session again.

3.7 Telnet Connection Status Checks

Disk tray status can be checked by using a variety of CLI commands. This section contains the following topics:

- Checking Disk Tray Boot Status
- Determining Failover
- Verifying the Firmware Level and Configuration
- Checking FRU Status

3.7.1 Determining Failover

1. **On the host, use the** `telnet` **command with the disk tray name (or IP address) to connect to the disk tray.**

```
mngt_host# telnet disk-tray-name
Trying 123.123.123.3...
Connected to 123.123.123.3.
Escape character is '^]'.

pSOSystem (123.123.123.3)
```

2. **Log in to the disk tray by typing** `root` **and the root password at the prompts.**

3. **To determine which unit is the master or alternate master unit, enter** `sys stat`**.**

   The following example shows a partner group in a normal state:

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

   In a failover state, unit 2 assumes the role of master controller and unit 1 is disabled, as shown in the following example:

```
:/:<3>sys stat
Unit   State      Role    Partner
-----  ---------  ------  -------
  1    DISABLED   Slave
  2    ONLINE     Master
```

4. **Use the** `port list` **command to display how paths are mapped from the host ports to the volume.**

   This displays WWNs that can be compared to the WWns displayed by the Solaris command `format`(1M).

```
:/:<5>port list

port   targetid   addr_type   status   host   wwn
u1p1      1        hard       online   sun    50020f23000002ba

mgmt-host# format
       Searching for disks...done

AVAILABLE DISK SELECTIONS:
0. c0t0d0 <SUN4.2G cyl 3880 alt 2 hd 16 sec 135>
    /pci@1f,4000/scsi@3/sd@0,0
1. c2t1d0 <SUN-T300-0101 cyl 34145 alt 2 hd 64 sec 128>
    /pci@6,2000/SUNW,ifp@1/ssd@w50020f23000002ba,0
Specify disk (enter its number):
```

   In the example above, the WWN of 50020f23000002ba identifies the port and volume match.

3.7.2 Verifying the Firmware Level and Configuration

The Sun StorEdge T3 disk tray has four different types of firmware:

- Controller firmware. See Chapter 4 “Upgrading Controller Firmware”.
- Controller electrically erasable programmable read-only memory (EPROM) firmware. See Chapter 4 “Upgrading EPROM Firmware”.
- Disk drive firmware. See Chapter 5 “Upgrading Disk Drive Firmware”.
- Interconnect card firmware. See Chapter 6 “Upgrading Interconnect Card Firmware”.

The firmware upgrade procedures must be done through the Ethernet connection. The latest firmware versions are located on the SunSolve℠ web site:

```
http://sunsolve.sun.com
```

Firmware file naming restrictions are as follows:

- The name is a string that consists of 1 to 12 characters.
- The name must start with an alphabetic character and not a numeral. For example:
  - `file1.bin` is acceptable
  - `1file.bin` is not acceptable
- The characters can be a combination of alphabetic letters; digits (0 through 9); and special characters such as _ (underscore),. (period), $ (dollar symbol), or - (dash).
- Names are case-sensitive. (For example, `ABC` and `abc` are different files.)

Make sure the latest firmware versions are installed and that the disk tray configuration information indicates that the unit is ready for operation.

Check the firmware versions and disk tray information in a telnet session with the disk tray.

1. **On the host, use the `telnet` command with the disk tray name (or IP address) to connect to the disk tray.**

   For example:

```
# telnet disk-tray-name
Trying 23.123.123.3...
Connected to 123.123.123.3.
Escape character is '^]'.

pSOSystem (123.123.123.3)
```

2. **Log in to the disk tray by typing `root` and the root password at the prompts.**

   The disk tray prompt is displayed.

3. **Enter** `ver` **to identify the controller firmware.**

   For example:

```
:/:<5>ver

T3 Release 1.13 2000/05/17 16:15:41 (129.150.47.104)
Copyright (C) 1997-2000 Sun Microsystems, Inc.
All Rights Reserved.
```

   The `ver` command displays the header information. In the example above, the controller firmware is listed as `Release 1.13`.

4. **Enter** `fru list` **to display the firmware for the disk drives, interconnect card, and EPROM level:**

   In the event of a FRU failure, `fru list` output is helpful in verifying correct FRU replacement because it contains the serial numbers.

```
:/:<7>fru list
ID      TYPE               VENDOR       MODEL          REVISION       SERIAL
------  -----------------  -----------  -----------  -------------  --------
u1ctr   controller card    SUN          0082f-f0     0210           000596
u1d1    disk drive         SEAGATE      ST118202FSUN EA29           LKG88867
u1d2    disk drive         SEAGATE      ST118202FSUN EA29           LKG89225
u1d3    disk drive         SEAGATE      ST118202FSUN EA29           LKG88938
u1d4    disk drive         SEAGATE      ST118202FSUN EA29           LKG89528
u1d5    disk drive         SEAGATE      ST118202FSUN EA29           LKG89846
u1d6    disk drive         SEAGATE      ST118202FSUN EA29           LKG90455
u1d7    disk drive         SEAGATE      ST118202FSUN EA29           LKG89362
u1d8    disk drive         SEAGATE      ST118202FSUN EA29           LKG55303
u1d9    disk drive         SEAGATE      ST118202FSUN EA29           LKG78649
u1l1    loop card          SCI-SJ       375-0085-01-  5.01 Flash    000867
u1l2    loop card          SCI-SJ       375-0085-01-  5.01 Flash    001491
u1pcu1  power/cooling unit TECTROL-CAN  300-1454-01( 0000           002469
u1pcu2  power/cooling unit TECTROL-CAN  300-1454-01( 0000           003134
u1mpn   mid plane          SCI-SJ       370-3990-01- 0000           000698
```

   In this example:

   - EPROM firmware version is `Controller card, Revision 0210`
   - Disk drive firmware version is `Revision EA29`
   - Interconnect card (`loop card`) firmware version is `Revision 5.01 Flash`

3.7.3 Checking FRU Status

5. Use the `fru stat` **command to provide a status of each FRU, including temperatures.**

```
:/:<43>fru stat
CTLR    STATUS   STATE       ROLE        PARTNER    TEMP
------  -------  ----------  ----------  -------    ----
u1ctr   ready    enabled     master      u2ctr      34.5
u2ctr   ready    enabled     alt master  u1ctr      35.5

DISK    STATUS   STATE       ROLE        PORT1      PORT2      TEMP  VOLUME
------  -------  ----------  ----------  ---------  ---------  ----  ------
u1d1    ready    enabled     data disk   ready      ready      33    v0
u1d2    ready    enabled     data disk   ready      ready      30    v0
u1d3    ready    enabled     data disk   ready      ready      29    v0
u1d4    ready    enabled     data disk   ready      ready      27    v0
u1d5    ready    enabled     data disk   ready      ready      24    v0
u1d6    ready    enabled     data disk   ready      ready      26    v0
u1d7    ready    enabled     data disk   ready      ready      25    v0
u1d8    ready    enabled     data disk   ready      ready      31    v0
u1d9    ready    enabled     data disk   ready      ready      34    v0
u2d1    ready    enabled     data disk   ready      ready      31    v1
u2d2    ready    enabled     data disk   ready      ready      31    v1
u2d3    ready    enabled     data disk   ready      ready      30    v1
u2d4    ready    enabled     data disk   ready      ready      26    v1
u2d5    ready    enabled     data disk   ready      ready      34    v1
u2d6    ready    enabled     data disk   ready      ready      26    v1
u2d7    ready    enabled     data disk   ready      ready      28    v1
u2d8    ready    enabled     data disk   ready      ready      32    v1
u2d9    ready    enabled     data disk   ready      ready      27    v1

LOOP    STATUS   STATE       MODE        CABLE1     CABLE2     TEMP
------  -------  ----------  -------     ---------  ---------  ----
u2l1    ready    enabled     master      installed  -          31.5
u2l2    ready    enabled     slave       installed  -          35.0
u1l1    ready    enabled     master      -          installed  31.5
u1l2    ready    enabled     slave       -          installed  35.0
POWER   STATUS   STATE       SOURCE  OUTPUT  BATTERY  TEMP    FAN1    FAN2
------  -------  ---------   ------  ------  -------  ------  ------  ------
u1pcu1  ready    enabled     line    normal  normal   normal  normal  normal
u1pcu2  ready    enabled     line    normal  normal   normal  normal  normal
u2pcu1  ready    enabled     line    normal  normal   normal  normal  normal
u2pcu2  ready    enabled     line    normal  normal   normal  normal  normal
```

Note – The `fru stat` command reports temperature readings on the interconnect cards, controller board, disk drives, and PCUs. For the PCU, the `fru stat` output does not display a temperature value, but reports a normal value. For all other FRUs, `fru stat` reports a numerical temperature.

System firmware monitors only the temperature state reported by the PCUs. This means a high temperature reading on an interconnect card, for example, will not cause the firmware to take evasive action (such as powering off the disk tray).

3.7.4 Testing the Disk Tray With StorTools

Access the StorTools Main Menu through the `stormenu` command. Once executed, this command runs the `initcheck` program to identify any failing loops that could cause a program to hang. `initcheck` runs a quick loop back frame (`lbf`) test and performs disk inquiries.

Note – Since `lbf` is not supported on PCI FC100 host board adapters, `initcheck` performs disk inquiries only on those systems.

Consult your StorTools documentation for information on how to perform StorTools diagnostic tests.

Note – The StorTools diagnostic package expects the software and firmware files to be at certain minimum revision levels to run the tools. Always use the `Check Revisions` selection and ensure that the system is up to the minimum revision requirements before using any of the other Main Menu selections.

3.8 Identifying Miscabled Partner Groups

If a partner group has booted successfully but is unable to establish a telnet connection with the management host, the partner group may be cabled together incorrectly.

The interconnect cable connections between dual controller units are critical for determining which unit is the master controller and which is the alternate master. If the interconnect cables are not properly installed on the interconnect cards, the top

unit could boot as the master controller, and the bottom unit would assume alternate master status. This becomes a problem because the host has been configured to use the MAC address of the bottom unit.

If the bottom unit is incorrectly cabled, making the bottom unit the alternate master, the bottom unit's Ethernet port will be inactive unless a fail over situation occurs. In that event, the IP and MAC address of the bottom unit will take over the values of the master (top) unit.

If the partner group has been cabled together incorrectly, the following procedure can help determine if the top unit is acting as the master controller.

1. **Determine the MAC address of the top unit.**

   The MAC address is located on a pull-out tab at the front of the unit, to the left of the first disk drive. (FIGURE 3-4).

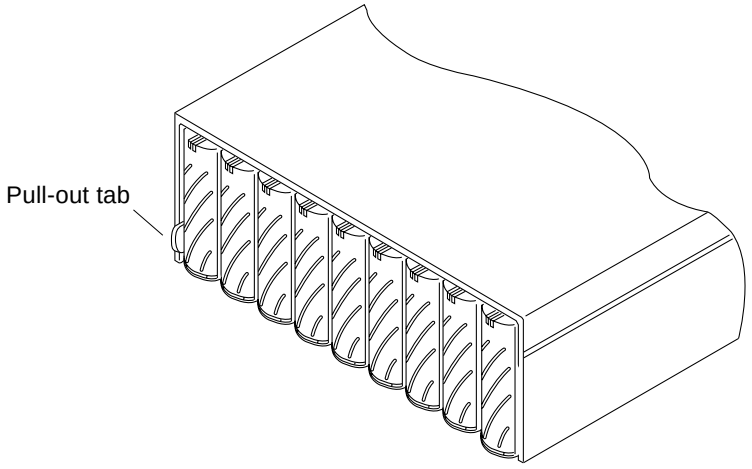

FIGURE 3-4 MAC Address on Pull-out Tab

2. **Edit the files on the RARP server to include the MAC address of the top unit.**

   a. **Edit the `/etc/ethers` file by adding the MAC address and disk tray name.**

   For example:

```
8:0:20:7d:93:7e disk-tray-name
```

   In this example:

   - `8:0:20:7d:93:7e` is the MAC address
   - *disk-tray-name* would be the name of the master controller unit.

b. Edit the `/etc/hosts` file with the IP address and disk tray name.

For example:

```
123.123.123.111 disk-tray-name
```

In this example, `123.123.123.111` is the assigned IP address.

c. Edit the `/etc/nsswitch.conf` file to reference the local system files.

To ensure the Solaris software environment uses the changes made to `/etc/ethers` and `/etc/hosts` files, edit the `host` and `ethers` entries in the `/etc/nsswitch.conf` file so that the files parameter appears before the `[NOTFOUND=return]` statements as shown:

```
hosts:      nis files [NOTFOUND=return]
ethers:     nis files [NOTFOUND=return]
```

d. Determine if the RARP daemon is running by typing:

```
# ps -eaf | grep rarpd
```

- If the RARP daemon is running, proceed to Step 3.
- If the RARP daemon is not running, continue to Step e.

e. Start the RARP daemon in the Solaris environment by typing:

```
# /usr/sbin/in.rarpd -a &
```

3. **Make sure there is an Ethernet connection to the 10BASE-T port of the top unit.**

4. **Press the power switch on the power and cooling units on both disk trays to remove AC power (**FIGURE 3-5**).**

It may take some time for the units to power off while shutdown procedures are performed. Wait until the units have powered off completely.

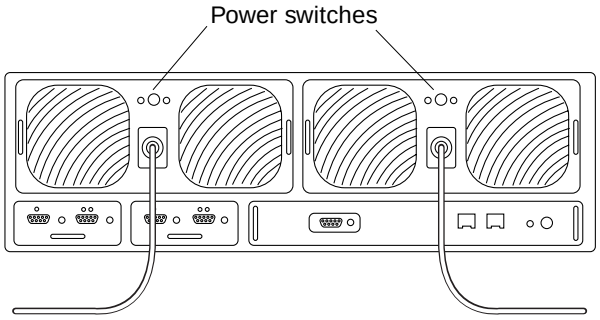

FIGURE 3-5 Power Switch Locations

5. **After both units have powered off, press the power switch on the power and cooling units again to restore power to and reset the disk trays.**

   It may take up to several minutes for the disk trays to power on and come back online. All LEDs will be green when the unit is fully powered on.

6. **After the units are fully powered on, start a telnet session.**

   The telnet session will connect to the top unit.

   If the host cannot telnet to the Sun StorEdge T3, investigate the following other possible causes:

   - **RARP server not responding.** To determine if this is the problem:
     - Verify that the RARP daemon is running on the host system.
     - Verify that the `/etc/nsswitch.conf` file is properly configured on the RARP server.
     - In the Solaris environment, use the `snoop` command to verify that the disk tray is attempting to establish RARP communication with the Solaris server.
   - **MAC address is incorrect.** In the Solaris environment, use the `snoop` command to specify the MAC address of the disk tray and see if any RARP packets are transmitted. If nothing is observed during a reboot of the disk tray, verify that the MAC address on the disk tray label matches the MAC address configured on the RARP server.
   - **Netmask is incorrect.** The default netmask address used on the disk tray is 255.255.255.0. If the local subnet uses a different netmask, the RARP operation may not work.
   - **Inoperable network connections.** If using hubs to connect to the network, try eliminating or replacing the hub.
   - **Incorrect IP address.** Connect to the disk tray through the serial port, and verify IP address is correct.

3.9 Identifying Data Channel Failures

The data channel encompasses the host data path that extends from the host bus adapter to the media interface adapter (MIA) attached to the disk tray. Errors in the host data channel are outside of the scope of the Sun StorEdge T3 disk tray. To determine failures in the data path, use host-based application diagnostics, such as the StorTools product for the Solaris operating environment.

Refer to the documentation of the selected diagnostics tool for information on identifying data channel failures.

CHAPTER 4

Controller Card Assembly

This chapter describes how to monitor and replace the controller card, and upgrade the firmware.

This chapter contains the following sections:

- Controller Card LEDs
- Removing and Replacing a Controller Card
- Upgrading Controller Firmware
- Upgrading EPROM Firmware

4.1 Controller Card LEDs

The controller card has a channel active LED for the host interface port, a controller status (online) LED, and a reset switch. TABLE 4-1 lists the possible states of the channel active LED with a description of each state. TABLE 4-2 lists the possible states and descriptions for the controller status LED.

FIGURE 4-1 Controller Card LEDs

TABLE 4-1 Channel Active LED Descriptions

Channel Active LED (green)	Description
Off	Port disabled
Solid	Port enabled, idle
Flashing	Port enabled, activity

TABLE 4-2 Controller Status LED Descriptions

Controller Status LED (green or amber)	Description
Off	Controller not installed (not recognized)
Green	Controller OK
Amber-solid	Controller boot/shutdown/firmware download in progress
Amber-slow blink	Controller failure; OK to replace controller

Note – Even if the LED indicates a controller card failure, always verify the FRU status using either the CLI or Component Manager before replacing the unit. Refer to Section 3.7.3 “Checking FRU Status” on page 3-18, or the *Sun StorEdge Component Manager User’s Guide* for instructions.

4.2 Removing and Replacing a Controller Card

A controller card can be replaced without system interruption *only* if the disk tray is one in a partner group (redundant controller unit configuration).

Caution – A removed controller card must be replaced within 30 minutes or the Sun StorEdge T3 disk tray and all attached disk trays will automatically shut down and power off.

To replace the controller card:

1. **Observe static electricity precautions.**

   See Section 1.5 “Static Electricity Precautions” on page 1-5

2. **Ensure that the controller card is showing failure status.**
3. **Remove the Ethernet cable from the 10BASE-T connector.**
4. **Remove the fiber-optic cable and MIA from the FC-AL connector.**
5. **Unlock the controller card by pushing in on the latch handles.**

   Use a coin or small screwdriver to press in and release the latch handle.

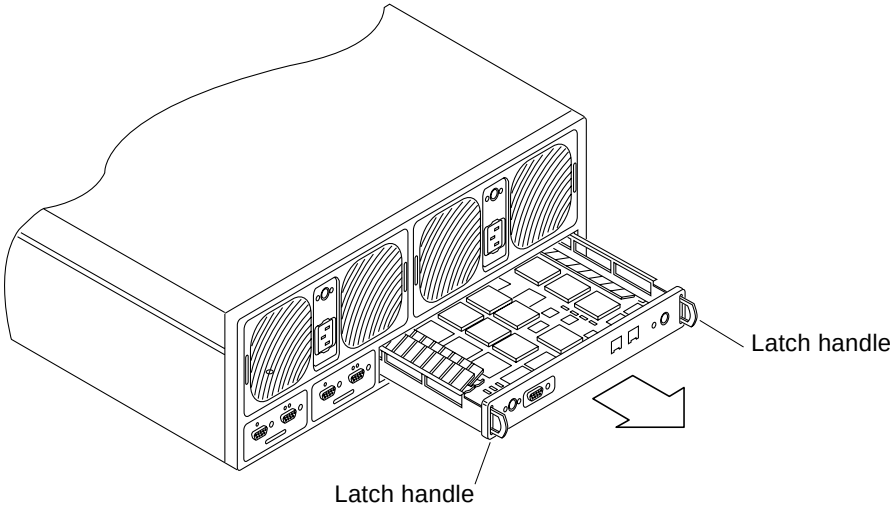

FIGURE 4-2 Removing the Controller Card

6. **Pull the controller card out using the latch handles.**
7. **Insert the new controller card.**
8. **Lock the new controller card by pushing in the latch handles.**

   Use a coin or small screwdriver to press in and secure the latch handle.
9. **Insert the fiber-optic cable and MIA back into the FC-AL connector.**
10. **Insert the Ethernet cable into the 10BASE-T connector.**
11. **Check the controller status LED to determine when the controller is operational.**

    While the controller boots, the controller status LED is solid amber. When the controller is operational, the LED is green.
12. **Verify the status of the controller card using either the CLI or Component Manager.**

    Refer to Section 3.7.3 “Checking FRU Status” on page 3-18, or the *Sun StorEdge Component Manager User’s Guide* for instructions.

Note – In a partner group configuration, when there is a controller card failure in a master unit, the controller fails over to the alternate master. After the controller board has been replaced, the partner group returns back to the *original* fail over configuration of master and alternate master by performing a `reset` command.

4.3 Upgrading Controller Firmware

The controller firmware can be upgraded on an operational system. However, for the upgrade to take effect, the controller must be reset (boot). While the controller boots, the disk tray is not available for storage.

The firmware upgrade procedures that follow must be done through the Ethernet connection. The latest firmware version is located on the SunSolve web site:

```
http://sunsolve.sun.com
```

- The firmware has to be resident on the host for this operation.
- The Sun StorEdge T3 disk tray has to have a root password prior to attempting this procedure.

To upgrade the firmware:

1. **Use `ftp` to transfer the firmware to the storage system/s `/` directory using binary mode.**

   See Section 2.3 “Establishing an ftp Session” on page 2-5.

2. **Establish a `telnet` connection to the disk tray.**

   See Section 2.2 “Establishing a Telnet Session” on page 2-3.

3. **Install the firmware using the `boot -i` command.**

```
:/:<2>boot -i /filename
```

   Check the firmware patch `README` file for instructions specific to that release.

4. **Reboot the disk tray using the `reset` command.**

```
:/:<3>reset
```

Caution – Resetting a Sun StorEdge T3 disk tray will cause an interruption in disk tray operation. Consult the customer site administrator before executing a `reset` command.

4.4 Upgrading EPROM Firmware

The EPROM firmware is stored in the FLASH memory device (FMD) on the controller card. The disk tray can be operational during the EPROM firmware upgrade.

Note – To upgrade the EPROM firmware in a partner group, you need to perform this procedure only once for both units to be upgraded.

The latest firmware versions are located on the SunSolve web site:

`http://sunsolve.sun.com`

Firmware is released as a patch which consists of an entire `tar` file with an automated uploader script that copies the files (including the `ep` and `lpc` images) to the Sun StorEdge T3 being upgraded.

The generalized firmware upgrade procedures described below must be done through the Ethernet connection. The firmware has to be resident on the host for this operation.

Note – The Sun StorEdge T3 disk tray has to have a root password prior to attempting this procedure.

To upgrade the EPROM firmware:

1. **Use `ftp` to transfer the firmware to the storage systems `/` directory using binary mode.**

   See Section 2.3 “Establishing an ftp Session” on page 2-5.

2. **Establish a `telnet` connection to the disk tray.**

   See Section 2.2 “Establishing a Telnet Session” on page 2-3.

3. **Install the firmware using the `ep download` command.**

```
:/:<2>ep download /filename
```

An `ep download` is only required once in a partner group because controllers get upgraded at the same time.

The EPROM firmware when downloaded is immediately effective and a reset is not required, however, the release version number will not be updated in a `fru list` output until the disk tray is rebooted.

Caution – Resetting a Sun StorEdge T3 disk tray will cause an interruption in disk tray operation. Consult the customer site administrator before executing a `reset` command.

CHAPTER 5

Disks and Drives

This chapter describes how to monitor and replace the disk drives, upgrade the firmware, and repair corrupted disk labels.

This chapter contains the following sections:

- Monitoring Drive Status
- Disk Drive LEDs
- Repairing Disk Drives
- Upgrading Disk Drive Firmware
- Clearing Corrupted Disk Labels

5.1 Monitoring Drive Status

The following sections describe commands for monitoring the status of the drives. Disk status can be checked by using a variety of CLI commands. This section discusses how to monitor the following:

- Checking Drive Status Codes
- Checking the Hot Spare
- Checking Data Parity
- Checking Drive Temperature

1. **On the host, use the `telnet` command with the disk tray name (or IP address) to connect to the disk tray.**

```
mngt_host# telnet disk-tray-name
Trying 129.150.47.101...
Connected to 129.150.47.101.
Escape character is '^]'.

pSOSystem (129.150.47.101)
```

2. **Log in to the disk tray by typing** `root` **and the root password at the prompts.**

5.1.1 Checking Drive Status Codes

- **Use the** `vol stat` **command to check drive status codes.**

  All drives should show a status of 0 under normal conditions.

```
:/:<40>vol stat

v0            u1d1   u1d2   u1d3   u1d4   u1d5   u1d6   u1d7   u1d8   u1d9
mounted        0      0      0      0      0      0      0      0      0
v1            u2d1   u2d2   u2d3   u2d4   u2d5   u2d6   u2d7   u2d8   u2d9
mounted        0      0      0      0      0      0      0      0      0
```

The numeric drive status codes are listed in the following table.

TABLE 5-1 Drive Status Messages

Value	Description
0	Drive mounted
2	Drive present
3	Drive is spun up
4	Drive is disabled
5	Drive has been replaced
7	Invalid system area on drive
9	Drive not present
D	Drive disabled; drive is being reconstructed
S	Drive substituted

5.1.2 Checking the Hot Spare

1. **Use the** `vol list` **command to check the location of the hot spare (standby) drive.**

```
:/:<41>vol list

volume        capacity   raid   data     standby
v0            125.2 GB    5     u1d1-8   u1d9
v1            125.2 GB    5     u2d1-8   u2d9
```

2. **Use the** `vol stat` **command to check the status of the hot spare drive.**

```
:/:<42>vol stat

v0            u1d1   u1d2   u1d3   u1d4   u1d5   u1d6   u1d7   u1d8   u1d9
mounted        0      0      0      0      0      0      0      0      0
v1            u2d1   u2d2   u2d3   u2d4   u2d5   u2d6   u2d7   u2d8   u2d9
mounted        0      0      0      0      0      0      0      0      0
```

All drives should show a status of `0`. See TABLE 5-1 for definitions of drive status codes.

5.1.3 Checking Data Parity

Caution – It can take up to several hours for the parity check once the `vol verify` command is executed. Execution of this command may affect system performance depending on system activity and the verification rate selected.

- **Use the `vol verify` command to perform a parity check of the drives.**

```
:/:<7>vol verify volume-name
```

You can also use the `fix` and `rate` options:

```
:/:<7>vol verify volume-name [fix] [rate <1-8>]
```

Where:

- `fix` recalculates and rewrites the parity block if a mismatch is detected.
- rate specifies the speed with 1= slowest and 8 = fastest.

Note – The `vol` command is not re-entrant. Other `vol` commands cannot run on the disk tray or partner group until the `vol verify` operation has completed.

Note – It is a good practice to run `vol verify` before recycling backup tapes to be sure the image is correct before over-writing previous images.

5.1.4 Checking Drive Temperature

- **Use the** `fru stat` **command on the disk tray to check disk drive temperatures:**

```
:/:<43>fru stat
CTLR    STATUS   STATE       ROLE        PARTNER    TEMP
------  -------  ----------  ----------  -------    ----
u1ctr   ready    enabled     master      u2ctr      33.5
u2ctr   ready    enabled     alt master  u1ctr      33.5

DISK    STATUS   STATE       ROLE        PORT1      PORT2      TEMP  VOLUME
------  -------  ----------  ----------  ---------  ---------  ----  ------
u1d1    ready    enabled     data disk   ready      ready      25    v0
u1d2    ready    enabled     data disk   ready      ready      20    v0
u1d3    ready    enabled     data disk   ready      ready      24    v0
u1d4    ready    enabled     data disk   ready      ready      26    v0
u1d5    ready    enabled     data disk   ready      ready      27    v0
u1d6    ready    enabled     data disk   ready      ready      27    v0
u1d7    ready    enabled     data disk   ready      ready      25    v0
u1d8    ready    enabled     data disk   ready      ready      31    v0
u1d9    ready    enabled     data disk   ready      ready      31    v0
u2d1    ready    enabled     data disk   ready      ready      25    v1
u2d2    ready    enabled     data disk   ready      ready      21    v1
u2d3    ready    enabled     data disk   ready      ready      26    v1
u2d4    ready    enabled     data disk   ready      ready      25    v1
u2d5    ready    enabled     data disk   ready      ready      23    v1
u2d6    ready    enabled     data disk   ready      ready      22    v1
u2d7    ready    enabled     data disk   ready      ready      29    v1
u2d8    ready    enabled     data disk   ready      ready      28    v1
u2d9    ready    enabled     data disk   ready      ready      29    v1

LOOP    STATUS   STATE       MODE        CABLE1     CABLE2     TEMP
------  -------  ----------  -------     ---------  ---------  ----
u2l1    ready    enabled     master      installed  -          29.5
u2l2    ready    enabled     slave       installed  -          34.0
u1l1    ready    enabled     master      -          installed  30.5
u1l2    ready    enabled     slave       -          installed  33.5

POWER   STATUS   STATE       SOURCE  OUTPUT  BATTERY  TEMP    FAN1    FAN2
------  -------  ---------   ------  ------  -------  ------  ------  ------
u1pcu1  ready    enabled     line    normal  normal   normal  normal  normal
u1pcu2  ready    enabled     line    normal  normal   normal  normal  normal
u2pcu1  ready    enabled     line    normal  normal   normal  normal  normal
u2pcu2  ready    enabled     line    normal  normal   normal  normal  normal
```

Note – A warning message will appear in the disk tray syslog file if a disk drive reaches 65 degrees C. The disk tray will automatically start spinning down an individual drive if it reaches 75 degrees C.

5.2 Disk Drive LEDs

The top of each disk drive has LEDs that indicate drive activity and status. These LEDs can be seen with the front cover on the unit. TABLE 5-2 lists the possible drive LED states and a description for each state.

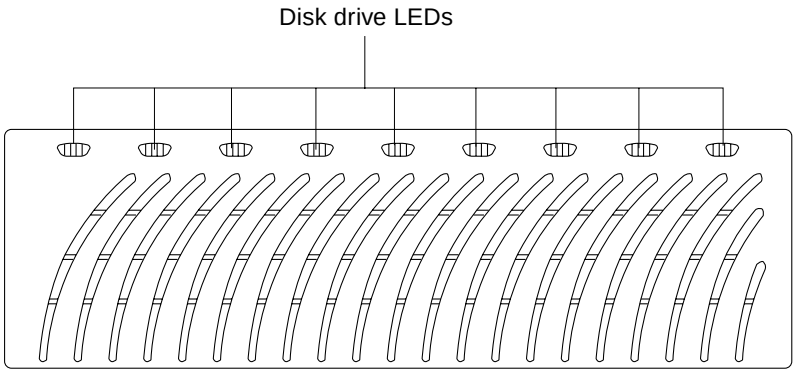

FIGURE 5-1 Disk Drive LEDs (Viewed Through Front Cover)

TABLE 5-2 Disk Drive LED Descriptions

Drive Activity (green)	Drive Status (amber)	Descriptions
Off	Off	Drive not installed (not recognized)
Slow blink	Off	Drive is spinning up or down
Solid	Off	Drive OK, idle

TABLE 5-2 Disk Drive LED Descriptions *(Continued)*

Drive Activity (green)	Drive Status (amber)	Descriptions
Flashing	Off	Drive OK, activity
Off	Solid	Drive reconstruct/firmware download in progress
Off	Slow blink	Drive failure; OK to replace drive

Note – Even if the LED indicates a drive failure, always verify the FRU status using either the CLI or Component Manager before replacing the drive. Refer to Section 3.7.3 “Checking FRU Status” on page 3-18, or the *Sun StorEdge Component Manager User’s Guide* for instructions.

5.3 Repairing Disk Drives

Caution – Replace only one disk drive in a disk tray at a time to ensure that no data is lost. Complete any volume reconstructions before and ensure that the disk drive is fully functional and in operation before replacing another disk drive in the same disk tray.

The default configuration for the disk tray is to automatically spin up and reenable a replaced disk drive, then automatically reconstruct the data from the parity or hot spare disk drives. The time for the disk drive spinup takes about 30 seconds, and reconstruction of the data on the disk drive can take up to one hour depending on system activity.

Note – The disk tray must remain powered on while replacing a disk drive to enable auto reconstruction of the drive data.

To prevent automatic reenabling of the disk drive, change the default setting using the `sys` command. For more information on the `sys` command, refer to *Sun StorEdge T3 Administrator’s Guide*.

5.3.1 Removing and Replacing a Disk Drive

1. **Observe static electricity precautions.**

   See Section 1.5 “Static Electricity Precautions” on page 1-5

2. **Remove the front panel by pressing in on the side latches and pulling the cover forward. See** FIGURE 5-2**.**

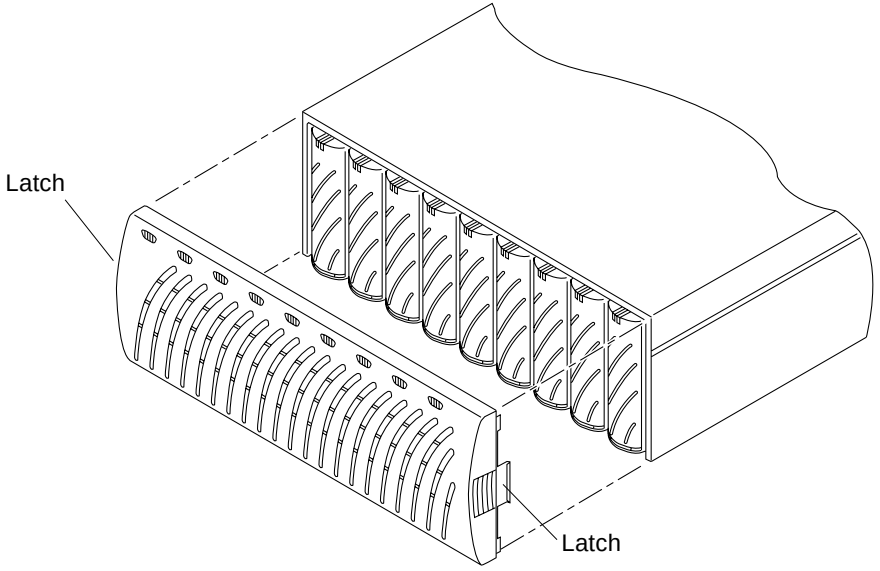

FIGURE 5-2 Removing the Front Panel

3. **Locate the disk drive that needs to be replaced.**

   Disk drives are numbered from 1 to 9 starting on the left side of the disk tray.

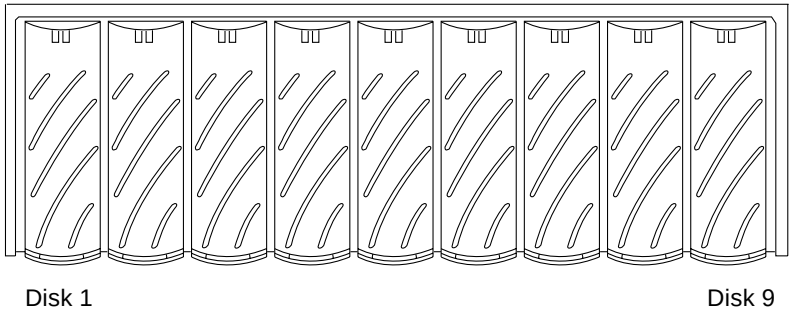

FIGURE 5-3 Disk Drive Numbering

4. **Use a coin or small screwdriver to press in and release the drive latch handle.**

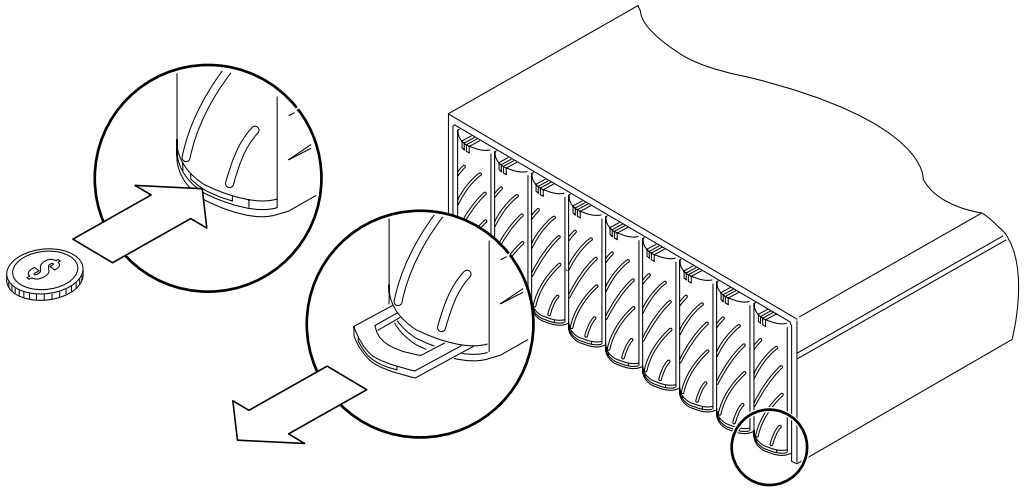

FIGURE 5-4 Releasing the Latch Handle

5. **Use the latch handle to slowly pull the disk drive out 1 inch (2.5 cm).**

   Wait 30 seconds, and then pull the drive out completely. This gives the disk drive time to spin down.

6. **Remove the disk drive from the disk tray. See** FIGURE 5-5**.**

   Push in the latch handle on the removed disk drive to protect it from damage.

Caution – Any disk drive that is removed must be replaced within 30 minutes or the Sun StorEdge T3 disk tray and all attached disk trays will automatically shut down and power off.

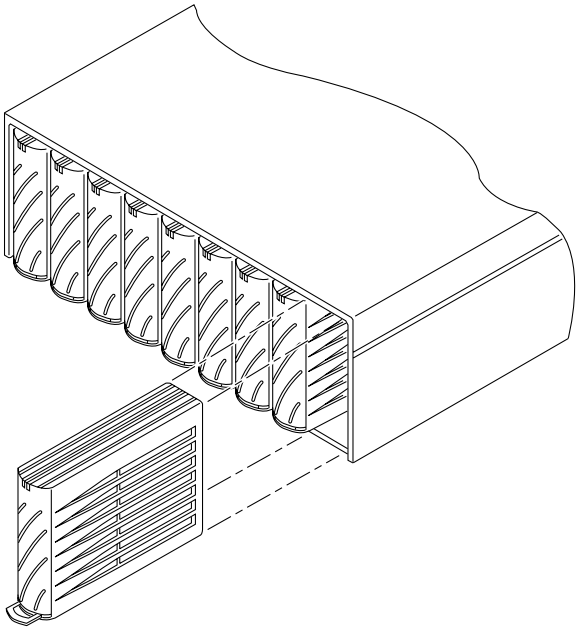

FIGURE 5-5 Removing a Disk Drive

7. **Release the latch handle on the disk drive to be installed.**
8. **Insert the new disk drive gently on the middle of the rails and push it in until it is seated with the centerplane connector.**

   Use a coin or small screwdriver to press in and lock the latch handle.
9. **Replace the front panel.**

Note – Replace the front panel for the disk tray to meet FCC compliance requirements.

---

10. **Type** `fru list u`*n*`d`*n* **to verify the firmware revision of the new disk drive, where:**

    - un is the unit (u) number (*n*)
    - dn is the drive (d) number(*n*).

    See Section 5.4 “Upgrading Disk Drive Firmware,” for instructions, if necessary.

5.3.2 Rebuilding a Replaced Drive FRU

A replaced drive FRU should begin to automatically rebuild itself.

Note – A copy back of data from a hot spare to a newly replaced data drive does not occur until the reconstruction of data to the hot spare from parity is completed. This means that you might drop in a disk and not see any activity lights on that drive right away.

If automatic reconstruction does not start or fails, begin the rebuild of the replaced drive FRU manually as follows:

1. **On the host, use the** `telnet` **command with the disk tray name (or IP address) to connect to the disk tray.**

```
mngt_host# telnet disk-tray-name
Trying 129.150.47.101...
Connected to 129.150.47.101.
Escape character is '^]'.

pSOSystem (129.150.47.101)
```

2. **Log in to the disk tray by typing** `root` **and the root password at the prompts.**

3. **On the disk tray, type**:

```
:/:<34>vol recon volume-name from_standby
```

4. **Start a second telnet session with the disk tray to check rebuild progress.**

5. **Check the rebuild progress.**

   Use the information in the `PERCENT` column and the `TIME` column, which shows the elapsed time, for estimating when the volume will complete reconstruction.

```
:/:<35>proc list

VOLUME         CMD_REF PERCENT    TIME COMMAND
v1               20241      23    0:09 vol recon
```

Note – If all power is removed from the disk tray while the drive is being reconstructed, the reconstruction process will start at the beginning when power is restored.

6. **Check the drive status to ensure that the reconstruction of the replaced drive FRU has completed.**

```
:/:<43>fru stat
CTLR    STATUS   STATE       ROLE        PARTNER    TEMP
------  -------  ----------  ----------  -------    ----
u1ctr   ready    enabled     master      u2ctr      34.5
u2ctr   ready    enabled     alt master  u1ctr      35.5

DISK    STATUS   STATE       ROLE        PORT1      PORT2      TEMP  VOLUME
------  -------  ----------  ----------  ---------  ---------  ----  ------
u1d1    ready    enabled     data disk   ready      ready      33    v0
u1d2    ready    enabled     data disk   ready      ready      30    v0
u1d3    ready    enabled     data disk   ready      ready      29    v0
u1d4    ready    enabled     data disk   ready      ready      27    v0
u1d5    ready    enabled     data disk   ready      ready      24    v0
u1d6    ready    enabled     data disk   ready      ready      26    v0
u1d7    ready    enabled     data disk   ready      ready      25    v0
u1d8    ready    enabled     data disk   ready      ready      31    v0
u1d9    ready    enabled     data disk   ready      ready      34    v0
u2d1    ready    enabled     data disk   ready      ready      31    v1
u2d2    ready    enabled     data disk   ready      ready      31    v1
u2d3    ready    enabled     data disk   ready      ready      30    v1
u2d4    ready    enabled     data disk   ready      ready      26    v1
u2d5    ready    enabled     data disk   ready      ready      34    v1
u2d6    ready    enabled     data disk   ready      ready      26    v1
u2d7    ready    enabled     data disk   ready      ready      28    v1
u2d8    ready    enabled     data disk   ready      ready      32    v1
u2d9    ready    enabled     data disk   ready      ready      27    v1

LOOP    STATUS   STATE       MODE        CABLE1     CABLE2     TEMP
------  -------  ----------  -------     ---------  ---------  ----
u2l1    ready    enabled     master      installed  -          31.5
u2l2    ready    enabled     slave       installed  -          35.0
u1l1    ready    enabled     master      -          installed  31.5
u1l2    ready    enabled     slave       -          installed  35.0
POWER   STATUS   STATE       SOURCE  OUTPUT  BATTERY  TEMP    FAN1    FAN2
------  -------  ---------   ------  ------  -------  ------  ------  ------
u1pcu1  ready    enabled     line    normal  normal   normal  normal  normal
u1pcu2  ready    enabled     line    normal  normal   normal  normal  normal
u2pcu1  ready    enabled     line    normal  normal   normal  normal  normal
u2pcu2  ready    enabled     line    normal  normal   normal  normal  normal
```

5.4 Upgrading Disk Drive Firmware

The latest disk drive firmware versions are located on the SunSolve web site:

```
http://sunsolve.sun.com
```

During a disk drive firmware download, the functionality of the disk tray is limited. To avoid system problems, verify:

- A current backup copy of disk tray data exists.
- The data path to the host has been quiesced. There must not be any I/O activity during the disk drive firmware download.
- The Ethernet connection is not being used for any other operation during this procedure. If Component Manager is being used to monitor the disk tray, disable the automatic polling utility. Refer to the current *Sun StorEdge Component Manager Users Guide* for instructions to disable polling.

Caution – If a host-mounted utility program such as Component Manger is actively polling, problems may occur during the firmware download. Disable the polling utility within Component Manager during this procedure to avoid problems.

- No unnecessary command line program interaction with the disk tray is performed during the disk drive firmware download.

Note – The disk firmware download will take approximately 20 minutes for 9 drives. Do not attempt to interrupt the download or perform other command line functions during the process. The command prompt will return after the download process has completed.

To upgrade the firmware:

1. **Use `ftp` to transfer the firmware to the disk tray `root` directory in binary mode.**

   See Section 2.3 “Establishing an ftp Session” on page 2-5 for additional information.

Note – The file name of files being transferred to the local disk must be 12 characters or less in size and start with an alphabetic character (not numeric).

2. **Establish a `telnet` connection to the disk tray.**

   See Section 2.2 “Establishing a Telnet Session” on page 2-3.

3. **Verify that all disk drives are in an optimal state as follows:**

   a. **Use the** `fru stat` **command to confirm that all disks are ready and enabled.**

   b. **Use the** `vol stat` **command to confirm that all disks that are configured into volumes are in an optimal state, reported as drive state** `0`**.**

   If either of these commands display drive issues, correct problems before proceeding with the firmware download.

4. **Use the** `proc list` **command to verify that there are no volume operations in progress.**

   If a volume operation is in progress, it must be allowed to complete before proceeding with the firmware download.

5. **Use the** `refresh -s` **command to verify that there are no battery refresh operations in progress.**

   If a battery refresh is in progress, it must be allowed to complete before proceeding with the firmware download.

6. **Unmount the disk tray volumes(s) from the host to ensure there is no host I/O activity.**

```
# umount /t3-filesystem-name
```

7. **Unmount internal disk tray volume(s).**

```
:/:<1>vol unmount volume-name
```

8. **Install the firmware using the** `disk download` **command.**

```
:/:<2>disk download u1d1-9 filename
```

   The *filename* is the file name of the disk drive firmware image that was ftp'd to the disk tray in Step 1.

Caution – If the disk tray is configured with different manufacturers types of disk drives, the `disk` command can download firmware for only one manufacturers drive type at a time. Verify that the download was successful using either the CLI or Component Manager.

9. **Use the** `fru list` **command to verify that the firmware download was successful.**

   The current drive firmware level is displayed in the `fru list` output.

10. **Use the `reset` command to reboot the Sun StorEdge T3 disk tray after all drives have been upgraded.**

```
:/:<3> reset
```

11. **After the disk tray is back online, log in to the disk tray and verify that all FRU states are optimal as follows:**

    a. **Use the `fru stat` command to confirm that all drives are ready and enabled.**

    b. **Use the `fru list` command to display the current drive model number and firmware version.**

    c. **Use the `vol stat` command to display drive states.**

    All drives must report a drive state of `0` for optimal condition.

12. **Remount the volume(s) on the disk tray.**

```
:/:<4>vol mount volume-name(s)
```

5.5 Clearing Corrupted Disk Labels

This procedure describes how to recover from corruption of disk labels on all nine disks of a master unit.

Caution – This procedure is equivalent to doing a `newfs` on the Sun StorEdge T3 local disk. It will destroy all disk data. *This procedure uses a private command intended for Sun internal use only. It should not be used unless all other avenues to fix the problem have been exhausted!*

An indication of corrupted labels are messages similar to:

```
Checking local file system...
Local volume can not be fixed
Verify volume fails on u1d1
error code = 0X2202
The File System in u1d1 is BAD
```

Note – Prior to doing this procedure, ensure all data that is salvageable is backed up. *Backup customer data if you are able to access the LUNs from the host*.

The files in the Sun StorEdge T3's local `/etc`, `/web`, and `/webgui` directories will be cleared away and will need to be restored for the T3 to work correctly with Component Manager.

To recover from corrupted labels, do the following:

1. **If not already available, configure the `tftpboot` server so the T3 can be `tftp` booted**

   See Section 2.5 "Configuring a Server For tftp Booting" on page 2-8.

2. **Establish a serial port connection to the disk tray.**

   See Section 2.1 "Establishing a Serial Port Connection" on page 2-1.

3. **Ensure that the `tftpfile` and `tftphost` values are properly set.**

```
:/: set tftphost host_IP_address
:/: set tftpfile nbxxx.bin
```

   Where *host_IP_address* is the IP address of the host and where `nb`*xxx*`.bin` is the current boot code file identification number. For example `nb101.bin`.

4. **Verify that the `tftpfile` is readable from the `/tftpboot` directory of the tftphost.**

```
:/: ls /tftpboot
# nb101.bin
```

5. **Verify the boot values with the `set` command.**

```
:/: set
bootmode  auto
bootdelay 3
sn        000596
ip        123.123.123.7
netmask   255.255.255.0
gateway   0.0.0.0
tftphost  123.123.123.6
tftpfile  nb113.bin
hostname  T3-1
vendor    SUN
model     0082f-f0
revision  0210
logto     *
loglevel  3
rarp      on
mac       00:20:f2:00:02:ba
```

Where:

- `bootmode` should be `tftp`
- `tftphost` should be the IP address of the `tftpboot` host machine
- `tftpfile` is the file you specified in Step 3

6. **Enable tftp booting.**

```
:/: set bootmode tftp
```

7. **Reboot system with the `.boot -c` command.**

Answer "Yes" to the "Clear internal disk label.." question.

```
:/:% .boot -c
Clear internal disk label and configuration, then system will
reset, are you sure? [N]:
y
```

The system will `tftp` boot and sit at the `u1: Configuration local data` display for a long time.

8. **Once system is back up, login and** `ftp` **the bootcode file (**`nb`*xxx*`.bin`**) into the disk tray's root directory (**`/`**)**

   Where *xxx* is the current boot code identification number that was set in Step 3. For example `nb101.bin`. See Section 5.4 "Upgrading Disk Drive Firmware" on page 5-13 for a description of this process.

9. **Set** `bootmode` **back to** `auto`**.**

```
:/: set bootmode auto
```

10. **Install the autoboot firmware onto the disk drives with the** `boot -i` **command.**

```
:/: boot -i nbxxx.bin
```

    Where *xxx* is the current boot code identification number that was set in Step 3. For example `nb101.bin`. (There is also a SunSolve patch that uploads all files to the T3.)

11. **Use** `ftp` **to restore the files in the** `/etc`, `/web` **and** `/webgui` **directories from** `http://sunsolve.sun.com`**.**

12. **Reset the Sun StorEdge T3 disk tray.**

```
:/: reset -y
```

    The disk tray should cleanly boot off its own disks.

13. **Re-create the volumes and restore customer data.**

CHAPTER 6

Interconnect Card Assemblies

This chapter describes how to monitor and replace the interconnect card, and upgrade firmware.

This chapter contains the following sections:

- Interconnect Card LEDs
- Removing and Replacing an Interconnect Card
- Upgrading Interconnect Card Firmware

6.1 Interconnect Card LEDs

Each of the interconnect cards has a status LED for each interconnect cable. TABLE 6-1 lists the possible interconnect card status LED states with descriptions of each state.

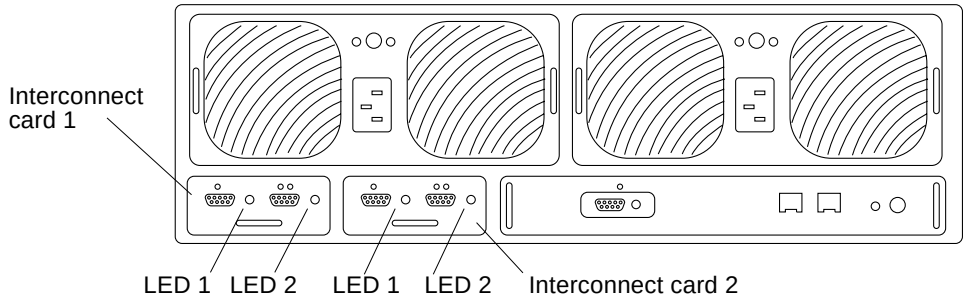

FIGURE 6-1 Interconnect Card LEDs

TABLE 6-1 Interconnect Card LED Descriptions

Interconnect Card Status LED (green or amber)	Description
Off	Interconnect card not installed (not recognized)
Green-solid	Interconnect card OK Cable OK (if present)
Green-slow blink	Interconnect card OK, possible communication problem with other cards. Cable may be bad; OK to replace cable
Amber-solid	Interconnect card firmware download in progress
Amber-slow blink	Interconnect card failure; OK to replace interconnect card

Note – Even if the LED indicates an interconnect card failure, always verify the FRU status using either the CLI or Component Manager before replacing the interconnect card. Refer to Section 3.7.3 “Checking FRU Status” on page 3-18, or the *Sun StorEdge Component Manager User’s Guide* for instructions.

6.2 Removing and Replacing an Interconnect Card

Caution – The interconnect cables are only to cable Sun StorEdge T3 disk trays together using the interconnect card connectors. Do *not* use these cables for any other FC-AL connection.

Caution – The interconnect card is extremely sensitive to static electricity. Use proper grounding wrist straps and antistatic procedures when handling any FRU.

Caution – Replace one interconnect card at a time. Pulling both interconnect cards at one time could cause a system shutdown. Follow the procedure as described to ensure that there is no interruption in system operation or loss of data.

To prevent interruption of the data host system operation during interconnect card replacement, make sure that:

- In a single controller unit configuration, remove only the failed interconnect card. Leave the second interconnect card intact in the disk tray.
- In a partner group, remove the interconnect cable only from the failed interconnect card. Leave the interconnect cable attached to the working interconnect card.

To replace a interconnect card:

1. **Ensure that the interconnect card to be replaced is showing failure status.**

   Refer to FIGURE 6-1

2. **Observe static electricity precautions.**

   See Section 1.5 “Static Electricity Precautions” on page 1-5

3. **Remove the interconnect cable from the failed interconnect card only.**

Note – If a single controller-unit configuration, ignore this step and proceed to Step 4.

Mark the connector with either 1 or 2.

4. **Unlock the failed interconnect card by pushing in on the latch handle.**

   Use a coin or small screwdriver to press in and release the latch handle.

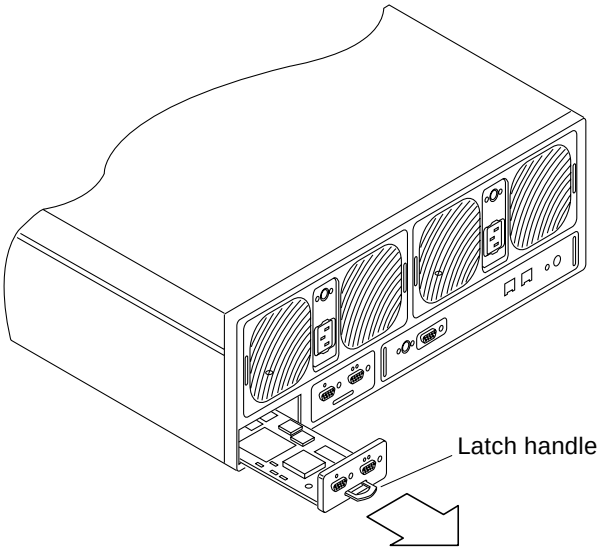

FIGURE 6-2 Removing the Interconnect Card

5. **Pull the interconnect card out using the latch handle.**

Caution – The interconnect card that is removed must be replaced within 30 minutes or the Sun StorEdge T3 disk tray and all attached disk trays will automatically shut down and power off.

6. **Insert the new interconnect card, making sure that the card sets on the frame.**
7. **Lock the new interconnect card in place by pushing in the latch handle.**

   Use a coin or small screwdriver to press in and secure the latch handle.

8. **Reconnect the interconnect cable to the interconnect card.**
9. **Verify that the LEDs on the interconnect card show that the interconnect card has initialized properly.**
10. **Verify the status of the interconnect card using either the CLI or Component Manager.**

    Refer to Section 3.7.3 “Checking FRU Status” on page 3-18, or the *Sun StorEdge Component Manager User’s Guide* for instructions.

11. **Type** `lpc version` **to view and verify the firmware level of the new interconnect card.**

    See Section 6.3 “Upgrading Interconnect Card Firmware” for instructions, if necessary.

6.3 Upgrading Interconnect Card Firmware

The interconnect card firmware is stored in the FLASH memory device on the interconnect card. The disk tray can be operational during the interconnect card firmware upgrade.

The firmware upgrade procedures that follow must be done through the Ethernet connection. The latest firmware versions are located on the SunSolve web site:

`http://sunsolve.sun.com`

- The firmware has to be resident on the host for this operation.
- The Sun StorEdge T3 disk tray has to have a root password prior to attempting this procedure.

To upgrade the firmware:

1. **Use** `ftp` **to transfer the firmware to the storage system/s / directory using binary mode.**

   See Section 2.3 “Establishing an ftp Session” on page 2-5.

2. **Establish a** `telnet` **connection to the disk tray.**

   See Section 2.2 “Establishing a Telnet Session” on page 2-3.

3. **Install the firmware using the** `lpc` **command.**

   The example shows downloading the firmware to a partner group (four interconnect cards).

```
T3:/:<2>lpc download u1l1 /filename
T3:/:<3>lpc download u1l2 /filename
T3:/:<4>lpc download u2l1 /filename
T3:/:<5>lpc download u2l2 /filename
```

   Install the firmware on each interconnect card as shown in the example.

4. **Verify the version level. Type** `lpc version`**.**

Note – Rebooting the disk tray for the interconnect card firmware to become effective is not necessary.

CHAPTER 7

Power and Cooling Unit Assemblies

This chapter describes how to replace the power and cooling unit and monitor the UPS battery.

This chapter contains the following sections:

- Power and Cooling Unit
- Power and Cooling Unit LEDs
- Removing and Replacing a Power and Cooling Unit
- UPS Battery

7.1 Power and Cooling Unit

The power and cooling unit has two active power sources: standby and primary power. Standby power, which is used to power the micro controller on the interconnect card, is activated when AC power is present. Primary power, which is used to power all remaining circuits and disk drives, is activated when AC or battery power is present and the power switch is on.

Each power and cooling unit has a power switch in the rear upper center of the unit. Turning off the power on a power and cooling unit affects only that power and cooling unit. Therefore, to power off all primary power to the unit, both power switches on both power and cooling units must be turned off. After the switches are turned off, system primary power will not actually turn off until the controller has performed an orderly shutdown, including writing any data cache to disk. This process can take up to two minutes.

Separate power cords are used for the connector on each power and cooling unit to provide redundant cabling. The power cords need to be connected to separate AC power sources for full redundancy.

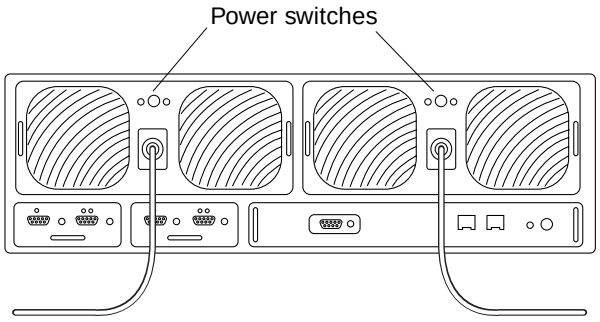

FIGURE 7-1 Power Cords Connected to the Power and Cooling Units

Caution – Do not handle the power and cooling unit when the power cord is connected. Line voltages are present within the power and cooling unit when the power cord is connected even if the power switch is off.

At the rear of the power and cooling unit is a recessed PC card connector. Do not touch this connector or allow any metal object to touch it. The power and cooling unit contains the UPS battery backup. There are no serviceable parts inside this unit.

Note – The batteries in the power and cooling units recharge after powering on the disk tray. If the batteries are less than fully charged, `fru stat` output will display batteries in a “fault” condition, and write-behind cache is disabled until the batteries are charged. Note that the system can take several hours to determine the health of the batteries after the system is turned back on so batteries will reflect a non-optimal state after power loss events and also after turning off power switches.

7.2 Power and Cooling Unit LEDs

Each of the power and cooling units has an AC LED and a power supply (PS) LED. TABLE 7-1 lists the possible conditions of these LEDs with a description of each state.

7.2.0.1 Power and Cooling Unit LEDs

Each power and cooling unit has an AC LED and a power-supply (PS) LED. TABLE 7-1 lists the possible conditions of these LEDs and describes each state.

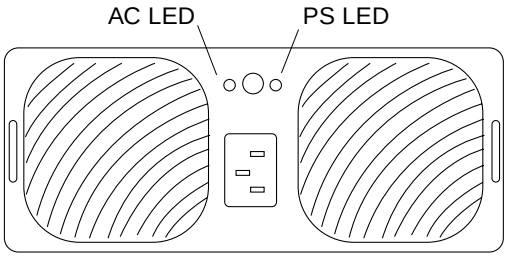

FIGURE 7-2 Power and Cooling Unit LEDs

TABLE 7-1 Power and Cooling Unit LED Descriptions

AC LED (green or amber)	PS LED (green or amber)	Description
Off	Off	• Power is off • No AC input
Amber	Off	• Power is off • Power switch turned off • AC power is available
Green	Off	Occurs when disk tray is shut down: • PCU disabled • AC power is available
Green	Green	Normal operating state: • PCU receiving AC power • Power switch is turned on • AC power is available
Amber	Amber	• Switch is off; disk tray will power off after PCU is disabled

TABLE 7-1 Power and Cooling Unit LED Descriptions

AC LED (green or amber)	PS LED (green or amber)	Description
Green	Amber	Indicates one or more of following: • Over-temperature condition; PCU disabled • DC power not available; PCU disabled • Both fans fault; PCU disabled • Battery on refresh cycle
Green	Blinking green	• Battery not OK
Green	Blinking amber	Indicates one or more of following: • PCU disabled • One fan fault • Battery hold-time low; PCU remains enabled • Battery out of warranty; PCU remains enabled • Battery life-span failure; PCU remains enabled Note—Verify a power and cooling unit failure using the CLI or Component Manager.

Note – Even if the LED indicates a power cooling unit failure, always verify the FRU status using either the CLI or Component Manager before replacing the power cooling unit. Refer to Section 3.7.3 “Checking FRU Status” on page 3-18, or the *Sun StorEdge Component Manager User’s Guide* for instructions.

7.3 Removing and Replacing a Power and Cooling Unit

Caution – To ensure correct airflow for system cooling, both power and cooling units must be in the installed position for normal operation. A failed power and cooling unit should be removed only when a replacement power and cooling unit is available to be inserted.

Caution – Replace only one power and cooling unit at a time to prevent system interruption.

To replace a power and cooling unit:

1. **Observe static electricity precautions.**

   See Section 1.5 “Static Electricity Precautions” on page 1-5

2. **Power off the power and cooling unit by pressing the power switch (**FIGURE 7-1**).**

   Make sure that the AC LED is amber and the PS LED is off (FIGURE 7-2).

3. **Disconnect the power cord from the AC outlet.**

4. **Disconnect the power cord from the power and cooling unit connector by squeezing both sides of the connector and pulling straight out (**FIGURE 7-1**).**

5. **Unlock the power and cooling unit by using a coin or small screwdriver to push in and release the two latch handles** FIGURE 7-3**).**

6. **Pull the power and cooling unit out of the disk tray.**

   Put one index finger through each of the latch handles. With thumbs on the top of the chassis for support, pry the power and cooling unit out of its connectors with an upward rotation. Once it is out approximately 1 inch (2.5 cm), it will be free to slide out of the frame on its rails.

Caution – Any power and cooling unit that is removed must be replaced within 30 minutes or the Sun StorEdge T3 disk tray and all attached disk trays will automatically shut down and power off.

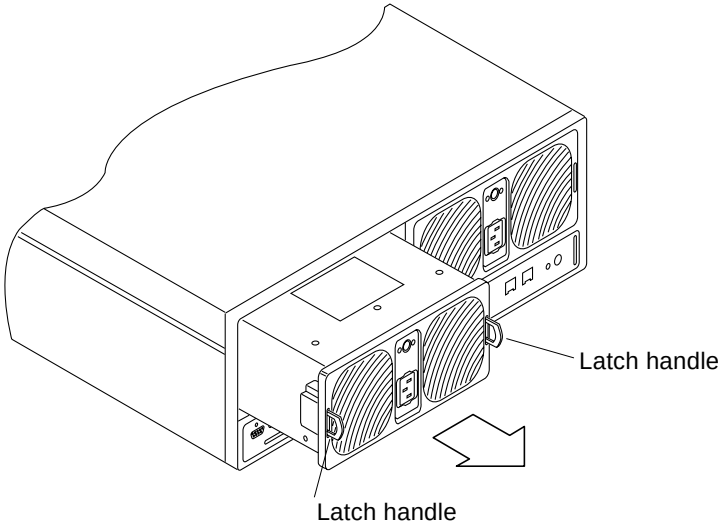

FIGURE 7-3 Removing the Power and Cooling Unit

7. **Insert the new power and cooling unit.**

8. **Lock the new power and cooling unit by pushing in both latch handles.**

9. **Insert the power cord into the power and cooling unit connector.**

10. **Connect the power cord into the AC outlet.**

    Verify that the AC LED on the power and cooling unit is amber, indicating that AC power is present.

11. **Push the power and cooling unit power switch on.**

    Verify that both LEDs on the power and cooling unit are green, indicating that the unit is receiving power.

12. **Verify the status of the power and cooling unit using either the CLI or Component Manager.**

    Refer to Section 3.7.3 “Checking FRU Status” on page 3-18, or the *Sun StorEdge Component Manager User’s Guide* for instructions.

Note – After installing the new power and cooling unit, the batteries will take some time to recharge.

7.4 UPS Battery

The UPS battery is located within the power and cooling unit. The battery provides backup in case of a complete AC power failure and will sustain power to the disk tray long enough to flush cache data to the drives.

When a Sun StorEdge T3 disk tray is first powered up, there will be a period of time where write-behind caching will be disabled (cache will run in write-through mode). This occurs during cold boots (even if AC power has not been removed from the disk tray) as the firmware attempts to determine the condition of the internal PCU batteries. Once the system has determined the batteries are in an optimal state, system cache mode will be returned to write-behind. The amount of time it takes for a disk tray to re-enable write-behind cache mode after a power down is approximately two hours.

During a power failure, if the battery is flushing cache data to the drives, battery power becomes depleted. Once AC power is available, the battery will recharge. While the battery is recharging, write-behind cache mode is disabled and write-through cache mode is enabled until the battery is fully recharged. The battery recharge could take up to 12 hours, depending on the length of the power outage and the amount of cache data that was flushed to the drives.

Note – The batteries in the power and cooling units recharge after powering on the disk tray. If the batteries are less than fully charged, `fru stat` output will display batteries in a fault condition, and write-behind cache is disabled until the batteries are charged.

7.4.1 Checking the Battery

1. **On the host, use the** `telnet` **command with the disk tray name (or IP address) to connect to the disk tray.**

```
mngt_host# telnet disk-tray-name
Trying 123.123.123.101...
Connected to 123.123.123.101.
Escape character is '^]'.

pSOSystem (123.123.123.101)
```

2. **Log in to the disk tray by typing** `root` **and the root password at the prompts.**

3. **Use the** `id read` **command to display battery life related information.**

   (Unit number *n* = 1 or 2; power cooling unit number *n* = 1 or 2.)

```
:/:<51>id read unpcun
    Revision             : 0000
    Manufacture Week     : 00421999
    Battery Install Week : 00421999
    Battery Life Used    :  24 days, 21 hours
    Battery Life Span    : 730 days, 12 hours
    Serial Number        : 005277
    Battery Warranty Date: 20000124142032
    Battery Internal Flag: 0x00000000
    Vendor ID            : TECTROL-CAN
    Model ID             : 300-1454-01(50)
```

4. **Use the** `refresh -s` **command to check the status of a battery refresh cycle.**

   The following examples show a battery refresh in progress and a normal battery status (no refresh cycle):

```
:/:<18>refresh -s

PCU1                    PCU2
-------------------------------------------------------------------
U1                      Completed                       Recharging

Current Time            Fri May 26 18:32:07 2000
Start Time              Thu May 25 20:31:19 2000
Last Refresh            Thu May 11 20:27:53 2000
Next Refresh            Thu Jun 08 20:31:19 2000
Total time elapsed :    22 hours, 0 minutes, 48 seconds.
```

```
:/:<53>refresh -s
No battery refreshing Task is currently running.

                        PCU1                    PCU2
-------------------------------------------------------------------
U1                      Normal                  Normal
U2                      Normal                  Normal

Current Time            Wed Dec 08 18:54:26 1999
Last Refresh            Fri Nov 12 07:41:51 1999
```

7.4.2 Battery Maintenance

The battery has been configured for a refresh cycle that occurs automatically once every 14 days. The battery refresh cycle is sequential, ensuring that only one battery in a unit is refreshed at a time. The refresh cycle consists of a discharge period that will take 10 to 12 minutes followed by a recharge period of 10 to 12 hours.

The refresh cycle verifies the health of the battery. During the refresh, if a problem is detected with the battery, future refresh operations are suspended until the problem is fixed. If this happens, write-behind caching is turned off automatically as a safety precaution.

Note – During the discharge period of a refresh cycle (approximately 12 minutes), write-behind cache is turned off.

A battery refresh operation in progress is indicated in the `syslog` file. Use the `refresh -s` command to view an active refresh operation. Refer to *Sun StorEdge T3 Administrator's Guide* for more information on this command. Refresh cycle time is controlled by the disk tray's `/etc/schd.conf file`. For example:

```
:/:<14>cat /etc/schd.conf
BAT_CYC 14
```

You can tune the `/etc/schd.conf` file to specify the interval between battery refresh cycles and initiate a refresh on a particular day. To specify begining a battery refresh cycles at a particular time, edit the BAT_BEG *MM-DD-YYYY,hh-mm-ss* value in the `/etc/schd.conf` file. Where:

- *MM* is the month number (January = 1)
- *DD* is the day number
- *YYYY* is the year
- *hh* is the hour using a 24 hour clock (6pm = 18)
- *mm* is the minute
- *ss* is the second (this element is optional)

Caution – The battery service life is dependent on a battery refresh cycle of 14 days. Altering this time span can decrease battery life.

For example, to specify that a battery refresh cycle begin on January 15, 2001 at 11pm, the entry in the `/etc/schd.conf` file would look like this:

```
BAT_BEG 1-15-2001,23-00-00
```

Note that the next refresh start time is always calculated from the start time of the previous refresh cycle. If a user manually starts a refresh cycle, then next refresh will depend on the starting time of the manually activated refresh cycle.

Note – If a controller failover occurs, the scheduler daemon will start and behave as it does during a normal system boot. The scheduler will read the `schd.log` file, and based on `schd.conf` file, will begin the next refresh process. If during the discharge period (10 to 12 minutes) or recharge period (10 to 12 hours) a controller failover occurs, the current refresh process will be killed and the next refresh cycle will start at the scheduled refresh time based on the `schd.conf` file. Consequently, the refresh cycles will begin as scheduled previously.

The battery service life is 2 years. When the battery approaches its end of life, Warning messages will be sent to the `syslog` file. The first message is sent 45 days before the end of life, followed by a Warning message every 5 days thereafter. The power and cooling unit that contains the battery *must* be replaced within 45 days of receiving the first Warning message.

7.4.3 Removing and Replacing the UPS Battery

The UPS battery itself is *not* a serviceable FRU. To replace the battery, replace the entire power and cooling unit. The Warning message will indicate which power and cooling unit needs to be replaced.

CHAPTER 8

Diagnosing and Correcting FC_AL Loop Problems

This chapter describes how to diagnose and correct back-end FC_AL drive loop problems with the Sun StorEdge T3 disk tray. It contains the following sections:

- Overview
- Normal Status
- Diagnosing an FC_AL Loop
- Repair Procedures

There are several failure conditions within the back-end loop that do not manifest themselves with a "`failed FRU`" status. These kind of failures can only be diagnosed by collecting data from various sources within the system such as, `iostat` performance data, CLI status commands, StorTools, StorTools message monitoring, Component Manager, the Sun StorEdge T3 disk tray `syslog`, and the FC_AL connected host messages file. Data from these sources is used to determine the most likely failed FRU within the T3 system.

8.1 Overview

The procedures in this chapter assume that the person servicing the equipment has been trained on the product and that the required service manuals are available.

A serial maintenance cable kit must be available (part number 370-4119), along with a terminal or host port connection.

Note – In order to collect the information required to diagnose back-end FC_AL loop problems, several of the engineering-only "dot" commands must be used. Only the status options of these dot commands are used.

Diagnosing and correcting back-end FC_AL loop problems can have up to five steps:

1. **Determine that there has been a failure in the back-end drive loop.**

   Diagnosing the problem requires that you analyze the collected data and make a determination of which is the most likely failed FRU from the data available. This procedure is described in Section 8.3 “Diagnosing an FC_AL Loop” on page 8-9.

   Once a suspect FRU has been identified, one or more of the following steps are used to isolate and then replace the failed FRU.

2. **Isolate, replace, and verify the interconnect cards and/or the loop cable.**

   (Interconnect cards are sometimes referred to as “*unit interconnect cards*” or “*UIC.*”)

   These FRUs can be replaced without affecting the on-line operation of the product, though there may be some performance impact. Section 8.4.1 “Interconnect Card Replacement Procedure” on page 8-20

3. **Isolate, replace, and verify the RAID Controllers.**

   Replacement of these FRUs will cause a LUN/Controller-path fail-over. This may require some kind of manual procedure by the customer to continue running and it will affect the overall system performance. Section 8.4.2 “RAID Controller Replacement Procedure” on page 8-21

4. **Isolate, replace, and verify the FC_AL disk drives.**

   In order to run the loop diagnostics to identify a failed drive FRU, the Sun StorEdge T3 disk tray must be removed from operation. This is highly disruptive to the customer and should only be used if steps 2 and 3 fail to resolve the problem. Section 8.4.3 “Off-Line Drive Diagnostics and Replacement” on page 8-22

5. **Replace and verify the chassis/mid-plane.**

   If by the end of step 4 there is still a problem the chassis and mid-plane will need to be replaced. This is highly disruptive to the customer and should only be used if steps 2, 3 and 4 have failed to resolve the problem. Section 8.4.4 “Chassis Replacement Procedure” on page 8-28 and Chapter 9 “Chassis/Backplane Assembly.”

8.2 Normal Status

This section presents an overview of the product FC_AL architecture for clarity on determining back-end loop problems.

FIGURE 8-1 contains a block diagram showing the two back-end drive loops in a normal (no failures) configuration.

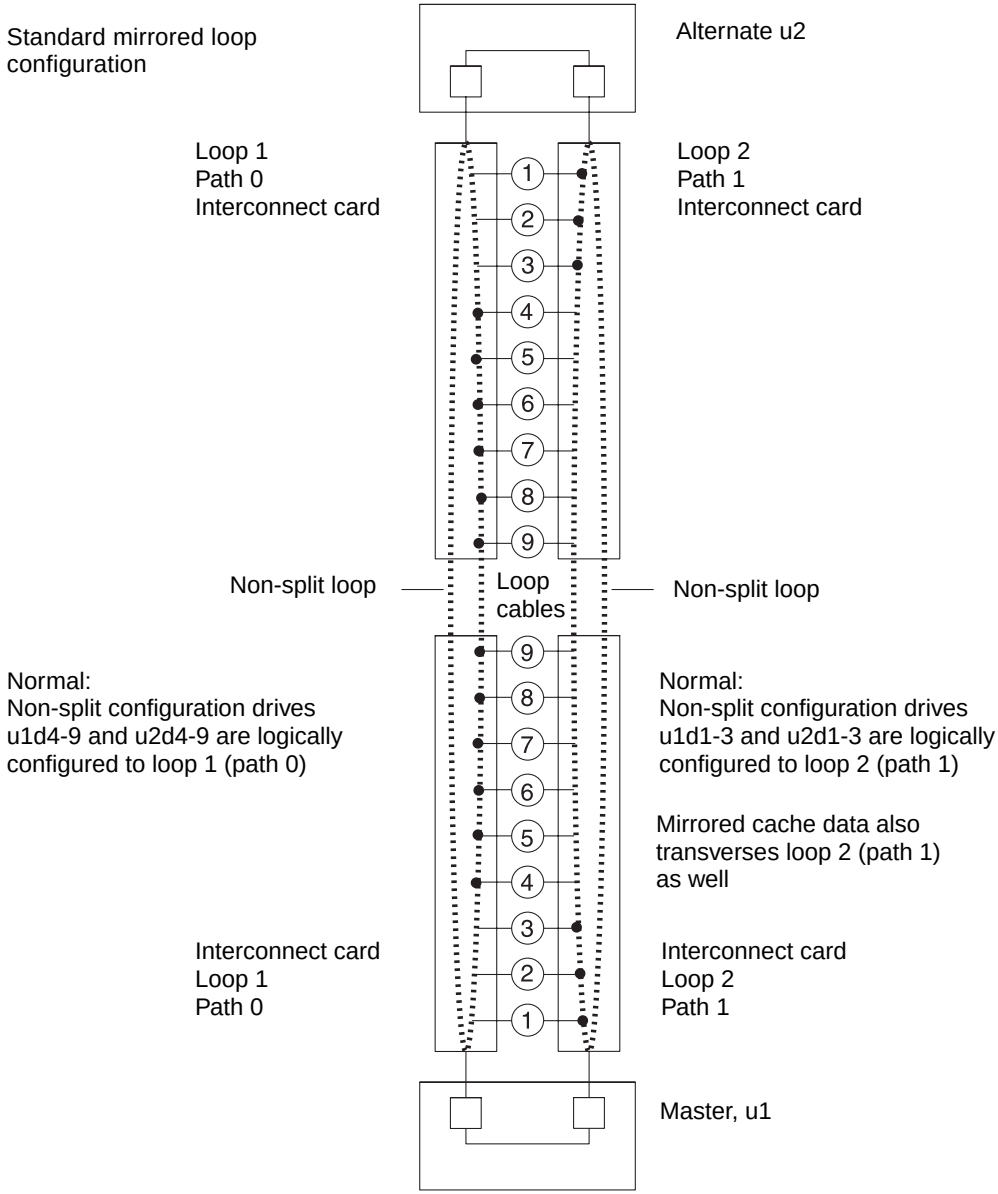

FIGURE 8-1 Back-end Loop Configuration

Drives u1d1-9 and u2d1-9 are both logically configured and electrically connected to both RAID controllers through loop 2 (path 1). During normal operations, drive u1d1-3 will only be accessed by u1ctr through u1l2, loop 2 (path 1) and drives u2d1-3 will only be accessed by u2ctr through u2l2, loop 2 (path 1).

Drives u1d1-9 and u2d1-9 are logically configured and electrically connected to both RAID controllers through loop 1 (path 0)and loop 2 (path 1).

The normal configuration information can be determined by using the following CLI commands and interpreting the results.

- `fru stat` (see Section 8.2.1 “The fru stat Command” on page 8-4)
- `vol mode` (see Section 8.2.2 “The vol mode Command” on page 8-5)
- `port listmap` (see Section 8.2.3 “The port listmap Command” on page 8-6)
- `.loop stat` (see Section 8.2.4 “The .loop stat Command” on page 8-6)
- `.disk pathstat` (see Section 8.2.5 “The .disk pathstat Command” on page 8-7)
- `.disk linkstat` (see Section 8.2.6 “The .disk linkstat Command” on page 8-8)

The examples that follow show a Sun StorEdge T3 disk tray in a redundant partner group configuration, with no failed FUR’s.

8.2.1 The `fru stat` Command

The `fru stat` command will show the current condition of the both the disk ports (port 1 and port 2), as well as the status of the interconnect cards. If there are loop problems, this might indicate certain disk ports have a status other than `ready`, or the loop cards with a status other than `ready` or `enabled`.

CODE EXAMPLE 8-1 `fru stat` Command Output

```
:/:<1> fru stat
CTLR STATUS STATE   ROLE       PARTNER TEMP
----- ----- ------- ------     ------- ----
u1ctr ready enabled master     u2ctr   37.5
u2ctr ready enabled alt master u1ctr   39.5
DISK STATUS STATE  ROLE      PORT1 PORT2 TEMP VOLUME
---- ----- ------- --------- ----- ----- ---  ------
u1d1 ready enabled data disk ready ready 35   v0
u1d2 ready enabled data disk ready ready 30   v0
u1d3 ready enabled data disk ready ready 30   v0
u1d4 ready enabled data disk ready ready 29   v0
u1d5 ready enabled data disk ready ready 35   v0
u1d6 ready enabled data disk ready ready 31   v0
u1d7 ready enabled data disk ready ready 35   v0
u1d8 ready enabled data disk ready ready 32   v0
u1d9 ready enabled data disk ready ready 37   v0
```

CODE EXAMPLE 8-1 `fru stat` Command Output

```
u2d1 ready enabled data disk ready ready 33   v1
u2d2 ready enabled data disk ready ready 33   v1
u2d3 ready enabled data disk ready ready 31   v1
u2d4 ready enabled data disk ready ready 31   v1
u2d5 ready enabled data disk ready ready 27   v1
u2d6 ready enabled data disk ready ready 32   v1
u2d7 ready enabled data disk ready ready 35   v1
u2d8 ready enabled data disk ready ready 30   v1
u2d9 ready enabled data disk ready ready 33   v1

LOOP STATUS STATE   MODE   CABLE1     CABLE2    TEMP
---- ------ ------- ------ ---------  --------  ----
u2l1 ready  enabled master installed -           -
u2l2 ready  enabled slave  installed -           -
u1l1 ready  enabled master -           installed 37.5
u1l2 ready  enabled slave  -           installed 41.0

POWER STATUS STATE   SOURCE OUTPUT BATTERY TEMP   FAN1   FAN2
----- ------ ------- ------ ------ ------- ------ ------ ------
u1pcu1 ready enabled line   normal normal  normal normal normal
u1pcu2 ready enabled line   normal normal  normal normal normal
u2pcu1 ready enabled line   normal normal  normal normal normal
u2pcu2 ready enabled line   normal normal  normal normal normal
```

8.2.2 The `vol mode` Command

The `vol mode` command will show the current cache mode. If there are loop problems, this might be indicated by a cache status other than `writebehind`.

CODE EXAMPLE 8-2 vol mode Command—Normal Ouputs

```
:/:<2> vol mode
volume mounted cache        mirror
v0     yes     writebehind  on
v1     yes     writebehind  on
```

8.2.3 The `port listmap` Command

The `port listmap` command will show the current controller to volume path. If there are loop problems this might be indicated by one or the other controller having control over all the configured volumes.

CODE EXAMPLE 8-3 port listmap Command—Normal Ouput

```
:/:<3> port listmap
port targetid addr_type lun volume owner access
u1p1 1        hard      0   v0     u1    primary
u1p1 1        hard      1   v1     u2    failover
u2p1 2        hard      0   v0     u1    failover
u2p1 2        hard      1   v1     u2    primary
```

8.2.4 The `.loop stat` Command

The `.loop stat` command will show the current loop configuration in regards to the electrical connections between the loop cards. If there are loop problems this might be indicated by a loop configuration other than the example below.

Note – The “+” symbol represents the presence of the isp2100 chip.

CODE EXAMPLE 8-4 `.loop stat` Command—Normal Ouput

```
:/:<4> .loop stat
Loop 1: <1+2+>
Loop 2: <1+2+>
```

Where:

- **<1+>** means u1d1-9 and u1ctr ISP2100 are on the loop.
- <2+> means u2d1-9 are u2ctr ISP2100 are on the loop.
- <1+><2+> means the loop is split into 2 segments.
- <1+2+> means u1d1-9 and u2d1-9 and u1ctr and u2ctr ISP2100s are all on the loop.
- <1+2> means u1d1-9 and u2d1-9 and u1ctr ISP2100 are on the loop(1 CU and 1 EU would result in this configuration).

8.2.5 The `.disk pathstat` Command

The `.disk pathstat` command will show the current disk path logical configuration. If there are loop problems this might be indicated by a path status other than what is displayed below.

Note – The `telnet` session will always run the command through the Master controller, the Alternate can only run the command when a serial cable is connected to it and a `tip` session is opened to that port.

CODE EXAMPLE 8-5 `.disk pathstat` Command—Normal Ouput

```
:/:<5> .disk pathstat u1d1-9
DISK PPATH APATH CPATH PATH_POLICY FAIL_POLICY
------------------------------------------------
u1d1 [0 U] [1 U] APATH APATH       PATH
u1d2 [0 U] [1 U] APATH APATH       PATH
u1d3 [0 U] [1 U] APATH APATH       PATH
u1d4 [0 U] [1 U] PPATH PPATH       PATH
u1d5 [0 U] [1 U] PPATH PPATH       PATH
u1d6 [0 U] [1 U] PPATH PPATH       PATH
u1d7 [0 U] [1 U] PPATH PPATH       PATH
u1d8 [0 U] [1 U] PPATH PPATH       PATH
u1d9 [0 U] [1 U] PPATH PPATH       PATH
pass

:/:<6> .disk pathstat u2d1-9
DISK PPATH APATH CPATH PATH_POLICY FAIL_POLICY
------------------------------------------------
u2d1 [0 U] [1 U] APATH APATH       PATH
u2d2 [0 U] [1 U] APATH APATH       PATH
u2d3 [0 U] [1 U] APATH APATH       PATH
u2d4 [0 U] [1 U] APATH PPATH       PATH
u2d5 [0 U] [1 U] APATH PPATH       PATH
u2d6 [0 U] [1 U] APATH PPATH       PATH
u2d7 [0 U] [1 U] APATH PPATH       PATH
u2d8 [0 U] [1 U] APATH PPATH       PATH
u2d9 [0 U] [1 U] APATH PPATH       PATH
```

Where:

- `[0 U]` means Loop 1 (path_id = 0) is Up.
- `[1 U]` means Loop 2 (path_id = 1) is Up.
- `[0 D]` means Loop 1 (path_id = 0) is Down.
- `[1 D]` means Loop 2 (path_id = 1) is Down.

- PPATH means primary path.
- APATH means alternate path.
- CPATH means current path.
- PATH_POLICY means the preferred path (notice the 3/6 split).
- FAIL_POLICY is not supported (always PATH for path failover vs. loop failover).

Note that `.disk failover` will cause CPATH to change to the other loop and `.disk failback` will cause CPATH to change to the preferred path.

8.2.6 The `.disk linkstat` Command

The `.disk linkstat` command will show if a device port link status register can be accessed by a controller in its current configuration. If the link status register cannot be accessed this may indicate a path problem to those disk(s) ports.

Note – The `telnet` session will always run the command through the Master controller, the Alternate can only run the command when connected to a serial cable during a `tip` session.

CODE EXAMPLE 8-6 `.disk linkstat` Command—Normal Ouput

```
:/:<9> .disk linkstat u1d1-9 path 0
DISK LINKFAIL LOSSSYNC LOSSSIG PROTOERR INVTXWORD INVCRC
-------------------------------------------------------
u1d1  1        10       0       0        77        0
u1d2  1        1        0       0        20        0
u1d3  2        24       0       0        112       0
u1d4  1        10       0       0        78        0
u1d5  1        1        0       0        20        0
u1d6  1        7        0       0        90        0
u1d7  1        11       0       0        76        0
u1d8  1        2        0       0        20        0
u1d9  1        16       0       0        45        0
```

The status for the command example shown below is correct for the normal loop configuration when done from the Alternate controller.

CODE EXAMPLE 8-7 `.disk linkstat` Command—Normal Ouput (alternate)

```
 :/:<28> .disk linkstat u1d1-9 path 0

DISK LINKFAIL LOSSSYNC LOSSSIG PROTOERR INVTXWORD INVCRC
--------------------------------------------------------
u1d1  1        16       0       0        10        0
u1d2  1        1        0       0        0         0
u1d3  3        31       0       0        102       0
u1d4  1        12       0       0        75        0
u1d5  1        0       0        0         0
u1d6  1        13       0       0        76        0
u1d7  1        13       0       0        75        0
u1d8  1        4        0       0        0         0
u1d9  1        16       0       0        75        0
pass

:/:<29> .disk linkstat u1d1-9 path 1

DISK LINKFAIL LOSSSYNC LOSSSIG PROTOERR INVTXWORD INVCRC
--------------------------------------------------------
u1d1  1        11       0       0        27        0
u1d2  1        1        0       0        12        0
u1d3  2        32       0       0        45        0
u1d4  1        10       0       0        42        0
u1d5  1        1        0       0        12        0
u1d6  1        16       0       0        32        0
u1d7  1        11       0       0        90        0
u1d8  1        2        0       0        12        0
u1d9  1        16       0       0        32        0
pass
```

8.3 Diagnosing an FC_AL Loop

This section describes how to diagnose an FC_AL loop problem it contains the following sections:

- FC_AL Loop Problem Indicators
- Checking Performance Against Baseline Data
- StorTools Message Monitoring
- Component Manager Status Indicator
- Manual Examination of the syslog File
- Example syslog Error Messages

- Using CLI Diagnostic Commands
- Using the ofdg Diagnostic Utility

8.3.1 FC_AL Loop Problem Indicators

The following symptoms might indicate possible FC_AL loop problems:

1. The first indication observed by a customer might be performance degradation in the suspect Sun StorEdge T3 disk tray. See Section 8.3.2 “Checking Performance Against Baseline Data” on page 8-11 for more detail.

2. A second indication might be StorTools message monitoring from the host that is receiving remote disk tray `syslog` messages. StorTools monitoring can be configured to look for particular message classes in the log file that the disk tray entries are written to. The program will look through this log file at a customer determined frequency for the specified type of messages, and send email if a match is made. Typically, StorTools message monitoring is configured to scan for `warning` or `error` messages. These message can also be examined in the disk tray, local syslog. The email recipient can be the customer or any other destination the customer wishes the message to go to. See Section 8.3.3 “StorTools Message Monitoring” on page 8-12 for more detail.

3. A third indication of a problem may be a message or change of status in the Component Manager maintenance program GUI display. For example, a suspect FRU highlighted in red. Component Manager will also send email to whomever the customer specifies and log the failure into a customer designated log file on the host that Component Manager is running on. See Section 8.3.4 “Component Manager Status Indicator” on page 8-12 and Section 8.3.6 “Example syslog Error Messages” on page 8-13 for more details.

4. A fourth indication of a problem may be a `warning` or `error` log entry in the local Sun StorEdge T3 disk tray `syslog` file. This file can be examined by using CLI commands via a `telnet` or `tip` connection. This file can also be transferred via `ftp` to another host for examination and archiving. See Section 8.3.5 “Manual Examination of the syslog File” on page 8-12 and Section 8.3.6 “Example syslog Error Messages” on page 8-13 for more details.

5. Additional indications of an FC_AL loop problem can provided by running the CLI commands described in Section 8.2 “Normal Status” on page 8-2. See Section 8.3.7 “Using CLI Diagnostic Commands” on page 8-14 for more detail.

If after this information has been gathered and examined and it has been determined that one of the back-end FC_AL loops has failed, but no definitive FRU an be identified, perform one or more of the diagnostic procedures described in the following sections.

8.3.2 Checking Performance Against Baseline Data

If the customer regularly runs a performance monitoring program where thresholds have been set, it can be seen if one path to a Sun StorEdge T3 disk tray partner group is not performing to the established base line. For example:

CODE EXAMPLE 8-8 `iostat` output for normal (baseline) operation

```
r/s w/s Mr/s Mw/s wait actv wsvc_t asvc_t %w %b device
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c1t6d0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c0t0d0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c0t2d0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c2t7d0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c2t6d0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c3t1d0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c4t2d1
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c5t1d1
54.0 28.5 0.4 7.0 0.0 0.7 0.0 8.3 0 60 c5t1d0 (normal u1ctr I/O)
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c3t1d1
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c4t2d0
53.3 26.1 2.2 6.4 0.0 1.6 0.0 19.7 0 59 c6t2d1 (Normal u2ctr I/O)
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c6t2d0
```

CODE EXAMPLE 8-9 `iostat` output for abnormal (problem) operation

```
r/s w/s Mr/s Mw/s wait actv wsvc_t asvc_t %w %b device
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c1t6d0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c0t0d0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c0t2d0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c2t7d0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c2t6d0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c3t1d0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c4t2d1
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c5t1d1
13.6 2.1 0.1 0.4 0.0 0.1 0.0 4.4 0 5 c5t1d0 (abnormal u1ctr I/O)
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c3t1d1
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c4t2d0
53.0 18.6 3.9 4.4 0.0 2.5 0.0 34.6 0 37 c6t2d1 (normal u2ctr I/O)
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0 c6t2d0
```

In the above example, if the normal `iostat` is used as a notification threshold, the impacted `iostat` would seem to indicate that there may be a problem in the Master u1ctr controller in this redundant partner group.

8.3.3 StorTools Message Monitoring

If StorTools message monitoring is installed and running, it will send email messages indicating problems. For example, in the case of the performance impact illustrated above, the email might have the following data in it:

CODE EXAMPLE 8-10 Example StorTools Message Monitoring Email Message Data

```
Mar 07 18:33:22 T3a ISR1[1]: W: u1d9 SVD_PATH_FAILOVER: path_id = 0
Mar 07 18:33:22 T3a ISR1[1]: W: u1d8 SVD_PATH_FAILOVER: path_id = 0
Mar 07 18:33:22 T3a ISR1[1]: W: u1d7 SVD_PATH_FAILOVER: path_id = 0
Mar 07 18:33:22 T3a ISR1[1]: W: u1d6 SVD_PATH_FAILOVER: path_id = 0
Mar 07 18:33:22 T3a ISR1[1]: W: u1d5 SVD_PATH_FAILOVER: path_id = 0
Mar 07 18:33:22 T3a ISR1[1]: W: u1d4 SVD_PATH_FAILOVER: path_id = 0
```

This data was pulled by StorTools message monitoring from the remote host log file that the Sun StorEdge T3 disk tray sent `syslog` entries to. StorTools message monitoring was run on that host and scanned the log looking for disk tray log file messages of a `warning` or `error` class. The data in the example above indicates that drives u1d4-9 in the u1ctr controller completed a path fail over from loop 1 (path 0) to loop 2 (path 1). This means that a hard failure or a threshold count was exceeded on the u1l1 loop. At this time, drives u1d4-9 are being serviced by the u1ctr only through the u1l2 loop. This is a very good indication that there has been some kind of failure in the u1l1 interconnect card, the u1ctr controller, or one of the u1d1-9 drives.

8.3.4 Component Manager Status Indicator

Because of the way Component manager operates, it will only change its state if there has been a change of status for a FRU in a partner group. Unless a FRU has been marked as failed, missing or disabled by the disk tray firmware, there will be no red highlighted FRU in the GUI display. Most back-end loop problems will not cause a change in the FRU status. The example failure illustrated above will not change the normal status displayed by the GUI. If the disk tray does mark a FRU as failed, Component Manager will display that change in status and that FRU will be the first choice for removal and replacement.

8.3.5 Manual Examination of the `syslog` File

If neither StorTools message monitoring nor Component Manager are running, the Sun StorEdge T3 disk tray CLI interface can be used to examine the unit's `syslog`. This can be done by using either the `cat` or `more` command on the log file which will dump the complete log to the `telnet` or `tip` session screen. Alternatively, you

can `ftp` the `syslog` file to the `telnet` or `tip` host and examine it with a text editor capable of performing text searches with a character match. In the case of the example shown above, a search would be done for the error message type field of a `W:`. Such a search might display data similar to the following:

```
Mar 07 18:33:22 ISR1[1]: W: u1d9 SVD_PATH_FAILOVER: path_id = 0
Mar 07 18:33:22 ISR1[1]: W: u1d8 SVD_PATH_FAILOVER: path_id = 0
Mar 07 18:33:22 ISR1[1]: W: u1d7 SVD_PATH_FAILOVER: path_id = 0
Mar 07 18:33:22 ISR1[1]: W: u1d6 SVD_PATH_FAILOVER: path_id = 0
Mar 07 18:33:22 ISR1[1]: W: u1d5 SVD_PATH_FAILOVER: path_id = 0
Mar 07 18:33:22 ISR1[1]: W: u1d4 SVD_PATH_FAILOVER: path_id = 0
```

As can be seen, the data is the similar to what StorTools message monitoring would display, and indicates the same possible failure condition on loop 1 (path 0).

8.3.6 Example `syslog` Error Messages

CODE EXAMPLE 8-11 displays some example `syslog` error messages that might indicate a back-end FC_AL drive loop problem.

CODE EXAMPLE 8-11 Drive Loop Problem Example Error Messages

```
Sep 27 18:36:53 T3A ROOT[1]:W:u1ctr Hardware Reset (1000) occurred
Sep 27 18:48:46 T3A ISR1[1]:W:SCSI Disk Error Occurred (path = 0x1, port =
0x1, lun = 0x0)
Sep 28 06:52:23 T3A CFGT[1]:W:u2ctr:Disabled
Sep 28 06:53:49 T3A LPCT[1]:E:u2ctr:Not present
Sep 28 06:53:49 T3A TMRT[1]:E:u2ctr:Missing; system shutting down in 30
minutes
Sep 28 06:53:49 T3A LPCT[1]:E:u2ctr:Not present
Sep 28 07:01:41 T3A ISR1[2]:W:u2d1 SCSI Disk Error Occurred (path = 0x1)
Sep 28 07:01:41 T3A ISR1[2]:W:Sense Data Description = Logical Unit Not
Ready, Initializing CMD Required
Sep 28 07:01:41 T3A ISR1[2]:W:u2d1 SCSI Disk Error Occurred (path = 0x1)
Sep 28 07:01:41 T3A ISR1[2]:W:Sense Key = 0x2, Asc = 0x4, Ascq = 0x2
Sep 28 07:01:41 T3A WXFT[2]:W:u2d1:Failed
Sep 28 07:01:41 T3A WXFT[2]:W:u2d1 hard err in vol (vol001) starting auto
disable
Sep 28 07:10:27 T3A LT01[1]:W:u2d1 Recon attempt failed
Sep 28 07:15:05 T3A ISR1[1]:W:SCSI Disk Error Occurred (path = 0x1, port =
0x1, lun = 0x0)
Sep 28 07:15:05 T3A ISR1[1]:W:Sense Data Description = SCSI Parity Error
Sep 28 07:18:03 T3A ISR1[1]:W:Sense Data Description = SCSI Parity Error
```

8.3.7 Using CLI Diagnostic Commands

Once the `syslog` file has been examined for `warning` or `error` messages and a conclusion is reached on which is the possible failed loop, other CLI commands can be used to verify or support that conclusion. These commands will display the various status and current configuration of the loops.

By the use of a serial cable and `tip` session, both controllers loop status information can be collected and analyzed. The serial cable is necessary to see the loop configuration for the Alternate controller, as the `telnet` session only displays the current loop status as it is seen from the Master controller.

For the example problem above, the CLI commands produce these results.

- The `fru stat` command would show a normal status for this failure.
- The `vol mode` command would show a normal status for this failure.
- The `port listmap` command would show a normal status for this failure.
- The `.loop stat` command would show a normal status for this failure.
- The `.disk pathstat` command would show a normal status for this failure.
- The `.disk linkstat` command would show the following error conditions for this failure.

CODE EXAMPLE 8-12 Example `.disk linkstat` Error Data

```
 .disk linkstat u1d1-9 path 0 (master controller)
 DISK LINKFAIL LOSSSYNC LOSSSIG PROTOERR INVTXWORD INVCRC
-------------------------------------------------------
u1d1 Disk Link Status Failed
u1d2 Disk Link Status Failed
u1d3 Disk Link Status Failed
u1d4 Disk Link Status Failed
u1d5 Disk Link Status Failed
u1d6 Disk Link Status Failed
u1d7 Disk Link Status Failed
u1d8 Disk Link Status Failed
u1d9 Disk Link Status Failed
fail
```

When the `.disk linkstat` command is run from the Master controller, it is unable to access any of the link registers for drives u1d1-9. This supports the conclusion that loop 1 (path 0) has had a failure.

Once a suspect loop has been determined, use a process of elimination to locate the failed FRU on that loop as described in the following sections.

8.3.8 Using the ofdg Diagnostic Utility

If the problem is still unresolved, the last diagnostic tool to use is the off-line drive diagnostic utility (ofdg). Because the ofdg diagnostic requires that the T3 partner group be removed from host access it is a highly disruptive procedure which stops all data access to the T3 system. This down time will have to be coordinated and then scheduled with the customer.

To view the available ofdg utility command parameters, simply enter **ofdg** on the command line with no options.

```
:/:<15> ofdg
usage:
ofdg health_check
ofdg fast_test u<1-8>l<1-2> [count <loops>]
ofdg fast_find u<1-8>l<1-2>
ofdg find u<1-8>l<1-2>
```

The ofdg parameters are:

- health_check does a fast Go / Nogo test of both loops using the current loop configuration. health_check uses fast_test, but no other parameters are required. (See Section 8.3.8.1 “The health_check Option” on page 8-17 for additional details.)
- fast_test does a fast Go / Nogo test of the selected enclosure and loop with the current loop configuration. (See Section 8.3.8.2 “The ofdg fast_test Option” on page 8-17 for additional details.)
- fast_find does a fast Go / Nogo test of the selected enclosure and loop. It will also do a simplified loop fault isolation diagnostic. (See Section 8.3.8.3 “The ofdg fast_find Option” on page 8-18 for additional details.)
- find does an extensive Go / Nogo test. If loop failures are detected, it will automatically initiate the full loop fault isolation diagnostic. This is similar to ondg find. (See Section 8.3.8.4 “The ofdg find Option” on page 8-18 for additional details.)

See Section 8.4.3 “Off-Line Drive Diagnostics and Replacement” on page 8-22 for a step-by-step description of using this utility to diagnose and replace a bad drive.

Caution – There are limitations to using the ofdg utility. Make sure you are aware of these limitations before running ofdg.

The following are limitations for using ofdg:

- Before running the ofdg utility, all disks other than those located in the u1 tray must be assigned to a LUN. Problems may occur if `ofdg` is run on systems where non `u1` disks have not been assigned to volumes.
- `ofdg` will not detect missing loop cables.
- `ofdg` output goes to the `syslog` and serial port only.
- `ofdg` assumes at least one back-end loop cable is good.
- After installing a new drive, wait two minutes before running `ofdg`.

Follow these steps to run `ofdg`:

1. **Perform an `ofdg` health check.**

```
:/:<1> ofdg health_check
```

All loops are given either a “Go” or “No-Go” status.

- If there is a “Go” status, this indicates that the `ofdg` test did not detect any problems with the configuration and that there is no need for further tests.
- If there is a “No-Go” status, proceed to the next step.

2. **Perform an `ofdg` fast test.**

```
:/:<2> ofdg fast_test u1l1
```

All loops are given either a “Go” or “No-Go” status.

- If there is a “Go” status, this indicates that the `ofdg` test did not detect any problems with the configuration and that there is no need for further tests.
- If there is a “No-Go” status, proceed to the next step.

3. **Perform an `ofdg` fast find.**

```
:/:<3> ofdg fast_find u1l1
```

The loop is given a “Go” or “No-Go” status with progress indications. If a failure is reported on the first or nearest enclosure then the loop card in that enclosure should be swapped before repeating the test with the next unit.

If a failure is reported for the second (or further) enclosure, `fast_find` will only be able to isolate the bad FRU(s) to either a bad interconnect cable or the two interconnect cards (which are connected to the interconnect cable in question). In this case, `fast_find` should be run from the partner controller to eliminate some FRUs.

If, after running `fast_find` in both directions, the problem has not been isolated to a single bad FRU, the bad FRU may be either the interconnect cable, the interconnect card, or both.

a. Replace the interconnect cable and retest.

b. Replace the interconnect card and retest

If the problem persists, continue to the next step.

4. Perform an `ofdg find` operation.

```
:/:<4> ofdg find u1l1
```

The loop is given a “Go” or “No-Go” status with progress indications. If a failure is detected, then Loop Fault Diag is automatically invoked to find the bad disk ports.

If `ofdg find` is not successful in solving the problem, the backplane should be suspected. See Chapter 9 “Chassis/Backplane Assembly” for details.

8.3.8.1 The `health_check` Option

The `health_check` option provides a “fast” Go/No-Go Loop test for all the loops in the Sun StorEdge T3 disk tray. The `health_check` option will probably call `fast_test` multiple times; one time for each loop.

8.3.8.2 The `ofdg fast_test` Option

The `fast_test` option provides a “fast” Go/No-Go Loop test.

The `fast_test` option performs the following steps:

1. LAC_Reserve the FC-AL Loop device under test (DUT)
2. Test next nearest enclosure on Loop DUT
3. Repeat Step 2 until all enclosures are tested
4. LAC_Release the FC-AL Loop device under test (DUT)

The `fast_test` option uses only the two worst case data patterns as shown below:

```
#define ONDG_PATTERN_FOUR            0x7E7E7E7E     /* from SUN */
#define ONDG_PATTERN_SIX             0x4A4A4A4A     /* from SUN */
```

For each data pattern, the `fast_test` option performs the following:

- 2 synchronous Write / Read / Compares @ 64KB
- 250 asynchronous Read / Writes @ 64KB
- Monitors for errors (using all the FC-AL port counters on the Loop DUT, plus the counters from the single disk DUT).

8.3.8.3 The `ofdg fast_find` Option

The `fast_find` option provides a "fast" Go / No-Go Loop test (identical to `fast_test`), plus a simplified Loop Fault Diag.

The `fast_find` option performs the following steps:

1. LAC_Reserve the FC-AL Loop device under test (DUT)
2. Reconfigure Loop (via MUX) with next nearest enclosure on Loop DUT
3. Test next nearest enclosure on Loop DUT
4. Repeat Step 2 and Step 3 until all enclosures are tested

5) LAC_Release the FC-AL Loop device under test (DUT)

The big difference between `fast_find` and `find` is that `fast_find` will not attempt to drill down to a disk port (i.e., detect and isolate down to a bad disk port), while `find` will try using Type 1 and Type 2 algorithms.

The `fast_find` option assumes that the probability of loop failures caused by either a bad interconnect cable or Loop card is much higher than the probability of loop failures caused by a bad disk port. Therefore, `fast_find` should be used before `find` to first weed out bad interconnect cables and loop cards (then find should be used to weed out bad disk ports if problems still exist).

8.3.8.4 The `ofdg find` Option

The `find` option provides a Go / No-Go Loop test. If the loop test fails Loop Fault Diag is invoked to drill-down and find the bad FRU(s).

The `find` option uses two different Drill-down algorithms in order to detect bad FRU(s).

- Type 1 - bypass one disk port at a time and test
- Type 2 - find any three disk ports that work, then enable one disk port at a time and test. Type 2 is only used if Type 1 is unsuccessful.

The Loop Fault Diag has the capability to detect and isolate down to a single disk port but it is very time consuming.

8.3.8.5 Known ofdg Issues

4339555: ofdg *run with a bad* u2l1 *can cause disk tray reboot loop.*

If ofdg is run on a system with failed FRUs, this results in both back-end loops being disabled. If this occurs and you detect a reboot loop:

1. **Power off the partner group.**
2. **Remove AC power from the master unit for 5 seconds.**
3. **Power on and boot the system.**

4340656: Running ofdg fast_find *with a bad drive in* u2 *can cause drives in* u1 *to be bypassed.*

To avoid this limitation, use the fru stat and fru list commands to detect bad drive FRUs before using ofdg. Correct any drive errors before proceeding with ofdg diagnostic operations.

4338471: An open interconnect cable between u1l1 *and* u2l1 *causes* ofdg *to fail on all interconnect cards.*

In certain cases where interconnect cables have problems, ofdg has proven ineffective in isolating the root cause of the failure. In some cases, ofdg health_check operations indicate that all interconnect cards fail the test. If you observe these kind of results, replace both back-end interconnect cables before replacing the interconnect cards.

4341673: Open serial lines in an interconnect cable causes inconsistent results with ofdg.

In cases where there are broken pins in the interconnect cable responsible for serial communication between controllers, ofdg test results can be inconsistent. For example, an ofdg health_check operation can return pass/fail results that are inconsistent with ofdg fast_find operations on the same unit. If you observe this behavior, replace both back-end interconnect cables and run the ofdg operation again.

8.4 Repair Procedures

Begin by replacing the FRU that will have the minimum impact to the customer's operation, as shown in the following order:

1. Section 8.4.1 "Interconnect Card Replacement Procedure" on page 8-20
2. Section 8.4.2 "RAID Controller Replacement Procedure" on page 8-21
3. Section 8.4.3 "Off-Line Drive Diagnostics and Replacement" on page 8-22
4. Section 8.4.4 "Chassis Replacement Procedure" on page 8-28

8.4.1 Interconnect Card Replacement Procedure

A single interconnect card can be removed without affecting the customer operation (assuming that the other card is working, of course). Data accessibility is maintained during the replacement and testing of a single interconnect card with no change in the host configuration.

For the example of a suspected loop 1 (path 0) problem, perform the following steps.

1. **From the CLI, disable the u1l1 interconnect card.**

```
:/:<1> disable u1l1
```

2. **When the u1l1 LED is flashing amber, remove and replace the interconnect card from the u1l1 position.**

   See Section 6.2 "Removing and Replacing an Interconnect Card" on page 6-3

3. **From the CLI, enable the u1l1 interconnect card.**

```
:/:<2> enable u1l1
```

4. **Verify the repair by using the listed CLI status commands.**

   See Section 8.3.7 "Using CLI Diagnostic Commands" on page 8-14.

5. **If this did not correct the problem, proceed to replacing the RAID controller as described in the next section.**

8.4.2 RAID Controller Replacement Procedure

If replacing the interconnect cards and cables did not resolve the loop 1 (path 0) problem, the next least-disruptive repair action is the removal and replacement of a RAID controller.

In a partner group, a single RAID controller card can be removed without denying access to all data (assuming appropriate multipathing software has been configured on the host). While data accessibility is maintained during the replacement and testing of a single RAID controller, there will be reduced performance during this procedure. The customer may elect to schedule the repair action during a time of reduced operations to the Sun StorEdge T3 system.

For the above example of a suspected loop 1 (path 0) problem, perform the following steps.

1. **From the CLI, disable the u1 RAID controller card.**

```
:/:<1> disable u1
```

   This will cause a controller failure over to the other controller. The `telnet` session will fail and Component Manager will report a loss of polling as the Alternate controller becomes the Master. Veritas, if used, will redirect the host I/O through the remaining path for the failed controllers volumes.

2. **When the u1 LED is flashing amber, remove and replace the u1 controller card.**

   See Section 4.2 “Removing and Replacing a Controller Card” on page 4-3

3. **After the controller boots, verify the LED on u1 interconnect card is a solid green.**

4. **Restart a `telnet` session to the Sun StorEdge T3 disk tray.**

5. **It may be necessary to disable and then enable the controller with the CLI commands to return it to service.**

   For example:

```
:/:<2> disable u1
:/:<3> enable u1
```

6. **Verify that Veritas, if used, completes a path fail back to the replaced controller.**

   Consult your Veritas documentation for Veritas diagnostic procedures.

7. **Verify the repair by using the listed CLI status commands.**

   See Section 8.3.7 “Using CLI Diagnostic Commands” on page 8-14.

8. **If replacing the u1 controller card did not correct the problem, replace the u2 RAID controller in the u2 enclosure.**

9. **If replacing the two RAID controllers did not correct the problem, proceed to replacing disk drives as described in the next section.**

8.4.3 Off-Line Drive Diagnostics and Replacement

If replacing the interconnect and RAID controller cards did not resolve the loop 1 (path 0) problem, the next step is to test, and if necessary replace, any suspect disk drives.

The test to use is the `ofdg` off-line diagnostic utility. The `ofdg` diagnostic requires the Sun StorEdge T3 disk tray partner group to be removed from host access. This is a highly disruptive procedure which stops all data access to the disk tray. This down time will have to be coordinated and then scheduled with the customer.

This test also requires that Component Manager halt all polling to the Sun StorEdge T3 disk tray. Because HTTP polling by Component Manager is blocked during the course of this test, Component Manager may report rejected requests or other problems.

In order to administer and monitor the test, a serial maintenance cable must be connected and a `tip` session opened to the Sun StorEdge T3 disk tray.

The following steps describe how to test for the above example of a suspected loop 1 (path 0) problem.

Note – Before running the ofdg utility, all disks other than those located in the u1 tray must be assigned to a LUN. Problems may occur if `ofdg` is run on systems where non `u1` disks have not been assigned to volumes.

---

1. **Make sure that all disks other than u1 are assigned to a LUN.**

2. **Quiesce all I/O going to all volume(s) in that disk array and associated partner group.**

   Notify all applications to stop accessing any affected volumes. This may require stopping the application.

   Verify that all drive activity has stopped. The drive activity LEDs will be solid green, indicating that the drives are idle.

3. **If using any volume manager software, such as VERITAS, disable transactions to the volumes that reside on the disk tray backplane you wish to replace and all other volumes in that partner group.**

   Consult the appropriate volume manager documentation for information on disabling the data hosts access to the disk tray volumes.

4. **Unmount the volume(s) from the Solaris host.**

```
# umount /T3-filesystem-name
```

5. **Unmount the internal disk tray volume(s).**

```
:/:<4> vol unmount v0
```

6. **Disconnect the fibre channel optical cables from the disk tray MIAs.**

7. **Disable Component Manager polling to the target Sun StorEdge T3 disk tray.**

   Consult your Component Manager documentation for details.

8. **Establish a serial connection and tip session to the** Master RAID controller **of the problem disk tray.**

   See Section 2.1 “Establishing a Serial Port Connection” on page 2-1.

9. **Execute the** `set` **command and note the current values of** `logto` **and** `loglevel`**.**

```
:/:<1> set
bootmode  auto
bootdelay 3
sn        001893
ip        123.123.123.24
netmask   255.255.255.0
gateway   123.123.123.1
tftphost  0.0.0.0
tftpfile  hostname  T3a
vendor    SCI-SJ
model     375-0084-01-j-j2
revision  0210 logto     * ( in nvram)
loglevel  3
rarp      on
mac       00:20:f2:00:07:65
```

   You will need these values in step Step 21.

10. **From the host tip session, set the** `logto` **to** `1` **and the** `loglevel` **to** `4`**.**

```
:/:<2> set logto 1
:/:<3> set loglevel 4
```

This will display all messages to the `tip` session screen. It will include all messages from `information` up to `error`.

11. **Run a** `find` **test against loop 1.**

```
:/:<4> ofdg find u1l1
WARNING - Volume data will be offline while OFDG is running.
Continue ? [N]: y
```

How far the test has go into the loop to identify the failed FRU will determine how long the test will run. The `find` test may also have to be run again with the `u2l1` parameter if no failures are found with the `u1l1` parameter.

12. **Examine the output in detail to identify the failed FRU.**

For comparison, a test run that found no errors is shown in CODE EXAMPLE 8-13. (This test might take 8 minutes to complete.)

CODE EXAMPLE 8-13 ofdg Sample Output (No Errors)

```
:/:<4> ofdg find u1l1
WARNING - Volume data will be offline while OFDG is running.
Continue ? [N]: y
ONDG Initiated
FIND Initiated on u1l1
Loop 1 Configured as  <1>
Loop 2 Not Available
Loop 1 Configured as  <1+>
Loop 2 Not Available
Loop 1 Configured as  <1>
Loop 2 Not Available
Loop 1 Configured as  <1+>
Loop 2 Not Available
FIND Completed on u1l1
STATUS = PASS
u1 PASS
ONDG Completed
```

```
In Syslog:
May 26 19:18:03 pshc[1]: N: ofdg find u1lp1
May 26 19:18:18 pshc[1]: N: ofdg find u1l1
May 26 19:18:22 ONDG[1]: N: ONDG Initiated
May 26 19:18:22 ISR1[1]: N: u1ctr ISP2100[2] Received LIP(f7,e8) async event
May 26 19:18:22 FCC0[1]: N: u1ctr Port event received on port 0, abort 0
May 26 19:18:23 BELP[1]: N: u1l1 ONDG Loop Fault Diag Initiated
May 26 19:18:28 CFGT[1]: N: u1ctr: Reserved A Loop: A Mask=<1>; B Mask=<1>
May 26 19:18:38 ISR1[1]: W: u1d4 SVD_PATH_FAILOVER: path_id = 0
May 26 19:18:38 ISR1[1]: W: u1d5 SVD_PATH_FAILOVER: path_id = 0
May 26 19:18:38 ISR1[1]: W: u1d6 SVD_PATH_FAILOVER: path_id = 0
May 26 19:18:38 ISR1[1]: W: u1d7 SVD_PATH_FAILOVER: path_id = 0
May 26 19:18:38 ISR1[1]: W: u1d8 SVD_PATH_FAILOVER: path_id = 0
May 26 19:18:38 ISR1[1]: W: u1d9 SVD_PATH_FAILOVER: path_id = 0
May 26 19:18:41 LPCT[1]: N: u1ctr: ISP not ready on loop 1
May 26 19:18:50 LPCT[1]: N: u1d1: Bypassed on loop 1
May 26 19:18:50 LPCT[1]: N: u1d2: Bypassed on loop 1
May 26 19:18:50 LPCT[1]: N: u1d3: Bypassed on loop 1
May 26 19:18:50 LPCT[1]: N: u1d4: Bypassed on loop 1
May 26 19:18:50 LPCT[1]: N: u1d5: Bypassed on loop 1
May 26 19:18:50 LPCT[1]: N: u1d6: Bypassed on loop 1
May 26 19:18:50 LPCT[1]: N: u1d7: Bypassed on loop 1
May 26 19:18:50 LPCT[1]: N: u1d8: Bypassed on loop 1
May 26 19:18:50 LPCT[1]: N: u1d9: Bypassed on loop 1
May 26 19:19:11 LPCT[1]: N: u1ctr: ISP not ready on loop 1
May 26 19:19:31 ISR1[1]: N: u1ctr ISP2100[0] Received LIP(f8,d1) async event
May 26 19:19:32 LPCT[1]: N: u1d1: Not bypassed on loop 1
May 26 19:19:32 LPCT[1]: N: u1d2: Not bypassed on loop 1
May 26 19:19:32 LPCT[1]: N: u1d3: Not bypassed on loop 1
May 26 19:19:32 LPCT[1]: N: u1d4: Not bypassed on loop 1
May 26 19:19:32 LPCT[1]: N: u1d5: Not bypassed on loop 1
May 26 19:19:32 LPCT[1]: N: u1d6: Not bypassed on loop 1
May 26 19:19:32 LPCT[1]: N: u1d7: Not bypassed on loop 1
May 26 19:19:32 LPCT[1]: N: u1d8: Not bypassed on loop 1
May 26 19:19:32 LPCT[1]: N: u1d9: Not bypassed on loop 1
May 26 19:19:33 SVDT[1]: N: 9 fcal ports were detected on l1
May 26 19:19:41 ISR1[1]: N: u1ctr ISP2100[0] Received LIP(f7,ef) async event
May 26 19:19:43 SVDT[1]: N: 10 fcal ports were detected on l1
May 26 19:20:04 BELP[1]: N: u1l1 ONDG No Loop Trouble Found
```

```
May 26 19:20:04 CFGT[1]: N: u1ctr: Release A Loop: A Mask=<1>; B Mask=<1>
May 26 19:20:05 ISR1[1]: N: u1d4 SVD_PATH_FAILBACK: path_id = 1
May 26 19:20:05 ISR1[1]: N: u1d5 SVD_PATH_FAILBACK: path_id = 1
May 26 19:20:05 ISR1[1]: N: u1d6 SVD_PATH_FAILBACK: path_id = 1
May 26 19:20:05 ISR1[1]: N: u1d7 SVD_PATH_FAILBACK: path_id = 1
May 26 19:20:05 ISR1[1]: N: u1d8 SVD_PATH_FAILBACK: path_id = 1
May 26 19:20:05 ISR1[1]: N: u1d9 SVD_PATH_FAILBACK: path_id = 1
May 26 19:20:10 BELP[1]: N: u1l1 ONDG Loop Fault Diag Completed
May 26 19:20:10 ONDG[1]: N:   FIND Initiated on u1l1
May 26 19:20:10 ONDG[1]: N:   FIND Completed on u1l1
May 26 19:20:10 ONDG[1]: N:     STATUS = PASS
May 26 19:20:10 ONDG[1]: N:       u1 PASS
May 26 19:20:13 ONDG[1]: N: ONDG Completed
```

13. **Once the failed disk drive FRU has been identified, remove the suspect disk drive from the configuration with the** `vol disable` **command.**

```
:/:<8> fru s u1d1-9

DISK    STATUS   STATE       ROLE        PORT1      PORT2      TEMP  VOLUME
------  -------  ----------  ----------  ---------  ---------  ----  ------
u1d1    ready    enabled     data disk   ready      ready      44    v0
u1d2    ready    enabled     data disk   ready      ready      45    v0
u1d3    ready    enabled     data disk   ready      ready      37    v0
u1d4    ready    enabled     data disk   ready      ready      35    v0
u1d5    ready    enabled     data disk   ready      ready      38    v0
u1d6    ready    enabled     data disk   ready      ready      39    v0
u1d7    ready    enabled     data disk   ready      ready      40    v0
u1d8    ready    enabled     data disk   ready      ready      38    v0
u1d9    ready    enabled     data disk   ready      ready      37    v0

:/:<9> vol disable u1d9

:/:<10> fru s u1d1-9
DISK    STATUS   STATE       ROLE        PORT1      PORT2      TEMP  VOLUME
------  -------  ----------  ----------  ---------  ---------  ----  ------
u1d1    ready    enabled     data disk   ready      ready      44    v0
u1d2    ready    enabled     data disk   ready      ready      45    v0
u1d3    ready    enabled     data disk   ready      ready      37    v0
u1d4    ready    enabled     data disk   ready      ready      35    v0
u1d5    ready    enabled     data disk   ready      ready      38    v0
u1d6    ready    enabled     data disk   ready      ready      39    v0
u1d7    ready    enabled     data disk   ready      ready      40    v0
u1d8    ready    enabled     data disk   ready      ready      39    v0
u1d9    fault    disabled    data disk   ready      ready      -     v0
```

14. **Remove and replace the suspect disk drive from the enclosure.**

    See Section 5.3 “Repairing Disk Drives” on page 5-7.

    The drive will spin up and the `sysarea` data will be copied to it from another drive in the u1 enclosure. After the copy is complete, a volume reconstruction will start.

15. **Stop the volume reconstruction operation.**

    To do this, perform a `proc list` to determine the process number of the volume reconstruction nd use that process number with the `proc kill` command to stop the reconstruction.

```
:/:<11> proc list

VOLUME         CMD_REF PERCENT    TIME COMMAND
v0                8465       3    1:05 vol recon
:/:<12> proc kill 8465
```

16. **Rerun the `ofdg find` diagnostic through the suspect loop as described in Step 11 and Step 12.**

    Once the test completes, examine and compare the two outputs to insure that the fault has been corrected.

    a. **If the problem is resolved, proceed with Step 18 through Step 17.**

    b. **If the problem is not resolved, proceed with Step 18 through Step 17 and then replace the backplane chassis.**

       See Section 8.4.4 “Chassis Replacement Procedure” on page 8-28 and Chapter 9 “Chassis/Backplane Assembly.

17. **Remount the volumes.**

```
:/:<14> vol mount v0

:/:<15> vol stat

v0            u1d1   u1d2   u1d3   u1d4   u1d5   u1d6   u1d7   u1d8   u1d9
mounted        0      0      0      0      0      0      0      0      0
v1            u2d1   u2d2   u2d3   u2d4   u2d5   u2d6   u2d7   u2d8   u2d9
mounted        0      0      0      0      0      0      0      0      0
```

18. **Restart the volume reconstruction with the `vol recon` command on the replaced disk drive.**

```
:/:<13> vol recon u1d9
```

19. **Reconnect the fibre optic cable to the MIAs,**

20. **Re-enable Component Manager polling of the unit.**

    Consult your Component Manager documentation for details.

21. **Reset logto and loglevel to the original values noted in Step 9.**

```
:/:<16> set logto *
:/:<17> set loglevel 3
```

8.4.4 Chassis Replacement Procedure

If none of the above procedures resolve the problem, the next repair action is replacement of the chassis/backplane assembly. A replacement part must be on site before beginning this procedure. Before starting, the customer must off load all the data that is contained in the Sun StorEdge T3 disk tray. The disk tray must then be removed from host operation.

The procedure for replacing a backplane is described in Chapter 9 “Chassis/ Backplane Assembly.

Once the backplane has been replaced and the previous FRUs installed, the `ofdg` diagnostics need to be rerun.

If the problem persists, replace the entire Sun StorEdge T3 disk tray.

CHAPTER 9

Chassis / Backplane Assembly

This chapter describes how to replace the chassis / backplane assembly.

The disk tray chassis FRU rarely needs to be replaced. However, the chassis part number is available to replace the backplane and chassis if necessary. (These must be replaced together, because they are factory aligned.)

Problems with the backplane would most likely occur due to an electrical short or a bent or broken pin connector. These problems would first appear as a failure of another FRU component, such as an interconnect failure or drive failure. If replacing the FRU that appears to be failed does not correct the problem, then the backplane connector that the FRU connects to should be examined for bent or broken pins. If nothing is obvious, then another spare FRU could be installed to verify that it is not a failed FRU component causing the problem. If all possibility of a FRU component failure has been eliminated and the problem still remains, it is likely to be a backplane failure.

If there is a backplane failure, replace it with the following procedure.

Caution – Replacing a Sun StorEdge T3 disk tray chassis will cause an interruption in disk tray operation.

Note – If the Sun StorEdge T3 is part of a partner group, access to all volumes in the partner group will be unavailable during this backplane replacement procedure. The impact of unmounting volumes and stopping applications should be assessed prior to starting this procedure.

1. **Perform full backups of data on affected partner groups for all accessible volumes.**

2. **From the data hosts, quiesce all I/O going to all volume(s) in that disk array and associated partner group.**

   Notify all applications to stop accessing any affected volumes by unmounting the volume(s) or stopping the application if necessary.

   Verify that all drive activity has stopped. The drive activity LEDs will be solid green, indicating that the drives are idle.

3. **If using any volume manager software, such as VERITAS, disable transactions to the volumes that reside on the Sun StorEdge T3 backplane you wish to replace and all other volumes in that partner group.**

   Consult the appropriate volume manager documentation for information on disabling the data hosts access to the T3 volumes.

4. **Execute the** `shutdown` **command.**

```
T3:/:<1>shutdown
Shutdown the system, are you sure? [N]: y
```

5. **Power down the failed disk array.**

   Press the power button once on each power and cooling unit to turn the switch off (FIGURE 9-1).

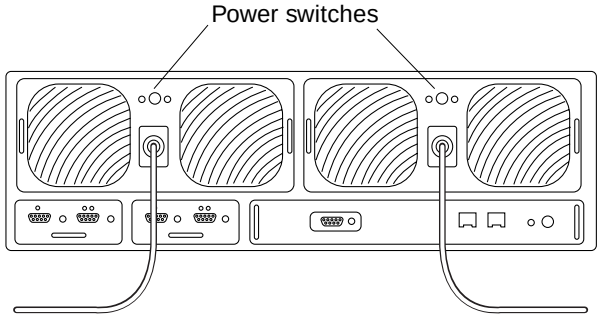

FIGURE 9-1 Power Switch Location

   All trays will power down automatically when any one tray in the partner group is powered down.

6. **On the Sun StorEdge T3 disk array, disconnect all external cables.**

   This includes power cables, interconnect cables, host FC-AL, MIA and ethernet.

Note – If the array is part of a partner group, note down the placement of the host FCAL connections and loop cables. You will need this information in Step 11.

---

7. **Remove the chassis if it is mounted in a cabinet:**

   a. **Remove the two screws at the back of the chassis that secure it to the side rails in the cabinet.**

   b. **Slide the chassis out of the cabinet (**FIGURE 9-2**).**

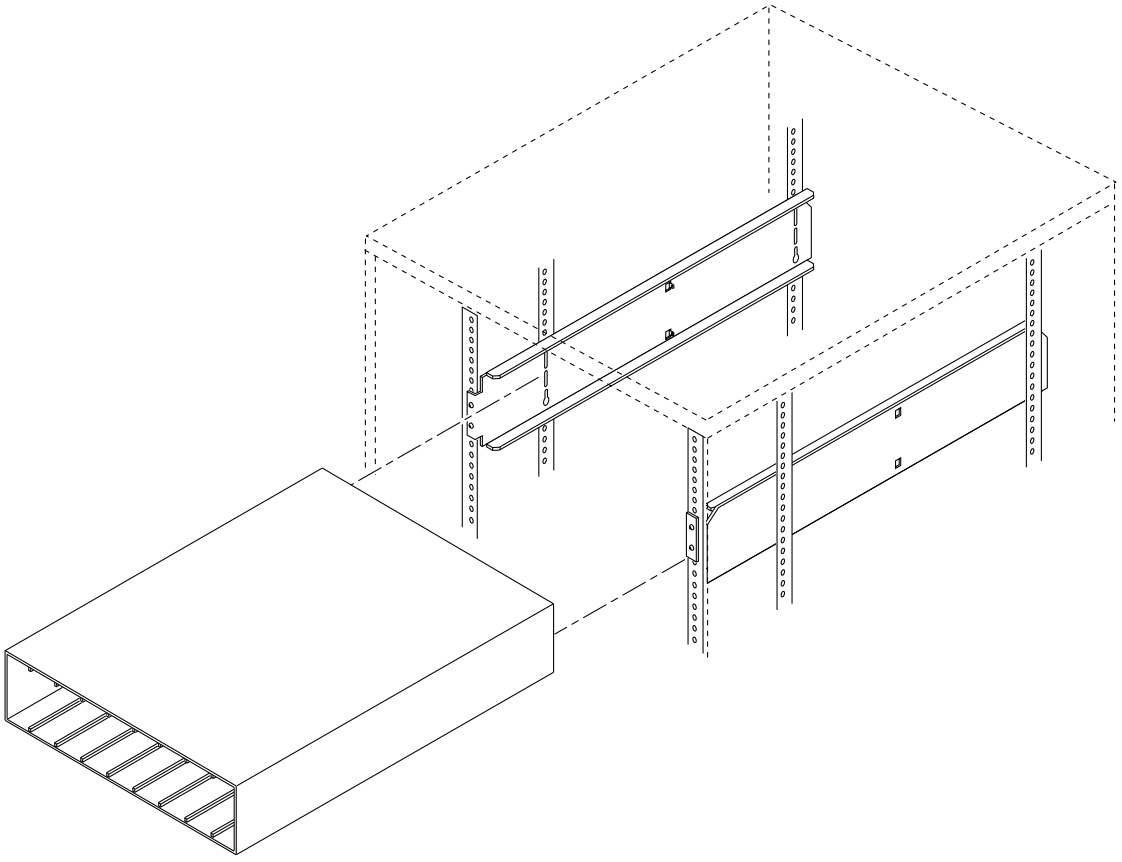

FIGURE 9-2 Removing the Chassis

8. **Move the failed array to an area that both the front and back can be easily accessed.**

Caution – Use 2 people to lift and move the disk array. It can weight up to 67 lbs (30 kg)

9. **One at a time, remove all the FRU components from the failed chassis and put them in the new chassis, ensuring same location placement.**

Caution – FRU's are extremely sensitive to static electricity. Use proper grounding wrist straps and antistatic procedures when handling any FRU and observe all static electricity precautions as described in Section 1.5 "Static Electricity Precautions" on page 1-5

a. **Unlock FRU's by pushing in on the latch handle(s) with a coin or small screwdriver to release the latch handle(s).**

b. **Pull FRU straight out.**

c. **Lock FRU back into place in the new chassis by pushing in and securing the latch handle(s) with a coin or small screwdriver.**

Caution – Maintain disk positions, or data could be lost.

d. **Remove and replace the controller card.**

See Section 4.2 "Removing and Replacing a Controller Card" on page 4-3 for instructions.

e. **Remove and replace the interconnect cards.**

See Section 6.2 "Removing and Replacing an Interconnect Card" on page 6-3 for instructions.

f. **Remove and replace the power and cooling units.**

See Section 7.3 "Removing and Replacing a Power and Cooling Unit" on page 7-4 for instructions.

g. **Remove and replace the disk drives.**

See Section 5.3 "Repairing Disk Drives" on page 5-7 for instructions.

Note – When removing a disk drive, label each one with its slot position in the unit so that they can be replaced in the correct slots.

10. **Move the replacement chassis back into place.**

If the chassis is to be mounted in a cabinet:

a. **Prepare for the new chassis by installing the base plate.**

Use the base plate from the old chassis.

b. **Align the new chassis with the side rails and slide it into the cabinet.**

c. Replace the two screws at the back of the chassis to secure it to the cabinet.

11. Connect all cables previously removed, but DO NOT power up the array(s).

Note – If the array is part of a partner group, make sure that the host FCAL cables are recabled to the same Sun StorEdge T3 FCAL connections that they were removed from as you noted down in Step 6. Also ensure that loop cables are properly recabled.

---

12. Locate the MAC address on the new chassis.

Locate the pull-out tab at the left side of the disk tray next to the first disk drive.

This tab contains the disk tray serial number and media access control (MAC) address. Record this information—you will need the MAC address for the next step. See FIGURE 9-3 on page 9-5.

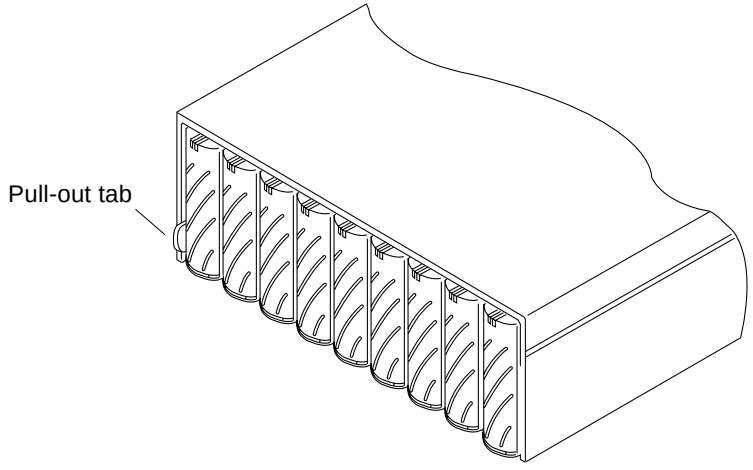

FIGURE 9-3 Serial Number and MAC Address on Pull-out Tab

13. On the RARP server, update the `/etc/ethers` file.

Replace the failed chassis MAC address entry with the MAC address of the new chassis. For example:

```
8:0:20:6d:93:7e disk-tray-name
```

In this example:

- `8:0:20:6d:93:7e` is the new MAC address
- *disk-tray-name* is the same name that the disk tray had previously.

Note that if the failed unit was an alternate master, it's MAC address may not be in the `/etc/ethers` file. In this case, no file changes are required.

14. **Verify that the `/etc/hosts` file contains the previous IP address and disk tray name.**

    For example:

```
192.129.122.111 disk-tray-name
```

    In this example, `192.129.122.111` is the IP address assigned previously.

15. **Verify that the `/etc/nsswitch.conf` file on the RARP server references the local system files.**

    To ensure the Solaris software environment uses the changes made to the `/etc/ethers` and `/etc/hosts` files, edit the `host` and `ethers` entries in the `/etc/nsswitch.conf` file so that the `files` parameter appears before the `[NOTFOUND=return]` statements. For example:

```
hosts:      nis files [NOTFOUND=return]
ethers:     nis files [NOTFOUND=return]
```

16. **Ensure that the RARP daemon is running on the RARP server:**

```
rarpserver# ps -eaf | grep rarpd
```

17. **If the RARP daemon is not already running on the RARP server, start it by entering:**

```
rarpserver# /usr/sbin/in.rarpd -a &
```

18. **Verify that AC power is present on each of the chassis' power and cooling units.**

    The AC LED on each power and cooling unit will be solid amber and the fans will turn at low speed.

19. **Press the power button on the power and cooling units to power on the disk tray(s).**

    FIGURE 9-1 on page 9-2 shows the power button location. The AC and power supply (PS) LEDs on the power and cooling units will be green.

    After you power on, the Sun StorEdge T3 JumpStart™ feature will reassign the disk tray's previous IP address to the new MAC address.

    Allow time to complete the boot cycle. When all LED's are green, proceed to the next step.

20. **Check the LEDs at the front and back of the unit to ensure that all components are receiving power and are functional.**

    While the drives are spinning up, the LEDs will blink. The disk tray boot time will take up to several minutes, after which all LEDs should be solid green, indicating that the unit is receiving power and there is no drive activity.

Note – The batteries in the power and cooling units recharge after powering on the unit. While the batteries are recharging, write-behind cache is disabled.

Note – If the green power and cooling unit LEDs on connected units do not light, press the power switches on those units.

---

21. **Verify that all components are functioning properly using either the CLI or Component Manager.**

    To do this using the CLI, open a `telnet` session to the disk array and verify volume and FRU status. as described Section 3.7.3 "Checking FRU Status" on page 3-18, or the *Sun StorEdge Component Manager User's Guide*.

```
T3:/:<1> fru stat
T3:/:<2> vol stat
```

    Note that when the backplane is replaced, the data host volume's WWN changes. The WWN is derived from the backplane S/N. Since the volume WWN is part of the volume's device path on the data host, the device path definition on the data host will change. Therefore, you must reconfigure the data host to recognize the new WWN's

22. **Configure the data host to recognize the new WWN's by executing the following command on the data host:**

```
datahost# drvconfig; disks; devlinks
```

Note – Any applications specifically dependent on the volume's device path will also need to be changed, refer to those application's documentation for instructions in handling this situation.

23. **Execute a format command on the data host to verify the Sun StorEdge T3 devices are seen.**

    The Sun StorEdge T3 volumes are now usable by the data host and can be mounted or re-enabled with the appropriate volume manager software.

CHAPTER 10

Hardware Reconfiguration

This chapter provides procedures for reconfiguring existing disk tray hardware to create new configurations. It includes the following:

10.1 Connecting Single Controller Units to Form a Partner Group

Caution – This procedure will destroy data. Make sure to back up all your data before beginning this procedure.

This section describes how to reconfigure two existing single controller units that contain data to form a partner group (redundant controller units). You will need two interconnect cables to connect the units. See Appendix A for a part number and illustration of the interconnect cable.

This procedure includes:

- Preparing the Disk Trays
- Cabling a Partner Group
- Establishing a New IP Address
- Defining and Mounting Volumes on the Alternate Master

10.1.1 Preparing the Disk Trays

1. **Identify which unit will be the master controller and which will be the alternate master.**
2. **Backup the data on both disk trays.**

Caution – Make sure you back up data on both units *before* proceeding! You will need to re-create the volume(s) on the alternate master after cabling the units together.

3. **Ensure that the data path between the host and both disk trays has been quiesced.**

   There must not be any I/O activity.

4. **Start a telnet session with both disk trays.**

   a. **On the host, use the** `telnet` **command with the disk tray name (or IP address) to connect to the disk tray.**

```
# telnet disk_tray_name
Trying 129.150.47.101...
Connected to 129.150.47.101.
Escape character is '^]'.

pSOSystem (129.150.47.101)
```

   b. **Log in to the disk tray by typing** `root` **and your password at the prompts.**

      The disk tray prompt is displayed.

5. **Verify that firmware levels for all disk tray firmware is the same on the master unit and alternate master unit.**

   On both disk trays:

   a. **Type** `ver` **to display the controller firmware level.**

      For example:

```
t300:/:<1>ver

T300 Release 1.14 2000/08/01 10:43:22 (129.150.47.135)
Copyright (C) 1997-2000 Sun Microsystems, Inc.
All Rights Reserved.
```

      In this example, the controller firmware level is listed as `Release 1.14`.

b. Type `fru list` to display EEPROM, disk drive, and interconnect card firmware levels.

For example:

```
t300:/:<2>fru list
ID      TYPE                VENDOR       MODEL          REVISION       SERIAL
------  ------------------  -----------  -----------  -------------  --------
u1ctr   controller card     SUN          0082f-f0     0210           000596
u1d1    disk drive          SEAGATE      ST118202FSUN EA29           LKG88867
u1d2    disk drive          SEAGATE      ST118202FSUN EA29           LKG89225
u1d3    disk drive          SEAGATE      ST118202FSUN EA29           LKG88938
u1d4    disk drive          SEAGATE      ST118202FSUN EA29           LKG89528
u1d5    disk drive          SEAGATE      ST118202FSUN EA29           LKG89846
u1d6    disk drive          SEAGATE      ST118202FSUN EA29           LKG90455
u1d7    disk drive          SEAGATE      ST118202FSUN EA29           LKG89362
u1d8    disk drive          SEAGATE      ST118202FSUN EA29           LKG55303
u1d9    disk drive          SEAGATE      ST118202FSUN EA29           LKG78649
u1l1    loop card           SCI-SJ       375-0085-01-  5.01 Flash    000867
u1l2    loop card           SCI-SJ       375-0085-01-  5.01 Flash    001491
u1pcu1  power/cooling unit  TECTROL-CAN  300-1454-01( 0000           003132
u1pcu2  power/cooling unit  TECTROL-CAN  300-1454-01( 0000           003134
u1mpn   mid plane           SCI-SJ       370-3990-01- 0000           000698
```

In this example:

- EEPROM firmware version is listed as `Controller card, Revision 0210`
- Disk drive firmware version is listed as `Revision EA29`
- Interconnect card (`loop card`) firmware version is listed as `Revision 5.01 Flash`

c. Upgrade firmware, if necessary.

- If the firmware levels match between the units, then proceed to Step 6.
- If the firmware levels for any of the four types of firmware are different between the master and alternate master, upgrade the firmware that does not match on both units. Refer to the upgrading firmware instructions in this document or in Chapter 5 of the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual*.

6. On both units, use the `set -z` command to return critical disk tray settings to factory defaults.

When prompted to respond, answer `y` (yes). For example:

```
t300:/:<3>set -z
WARNING - Resetting system NVRAM to default, are you sure? [N]: y
t300:/:<4>
```

Note – Using the `set -z` command will reset the system cache block size back to the factory default, 64 Kbytes. If you want a block size other than the default, you can change it after you have connected the partner group. To do so, delete the master unit volumes, set the block size, and then re-create the master unit volumes. Refer to the *Sun StorEdge T3 Disk Tray Administrator's Guide* for more detailed information on setting block size.

Caution – Using the `set -z` command will reset the IP address of the units to 0.0.0.0. You will need to reassign the IP address to the master unit after you cable the partner group together, but *before* powering on, as described in the next section.

7. **Power off both units.**

   a. **Type:**

```
t300:/:<5>shutdown
Shutdown the system, are you sure? [N]: y
```

   b. **Press the power button once on each power and cooling unit to turn the switch off.**

10.1.2 Cabling a Partner Group

After the disk tray settings on the alternate master have been changed to the factory default, and the firmware levels on both units have been verified as the same levels, you are ready to connect the disk trays.

1. **Place the alternate master on top of the master unit.**
   - If the units are installed in a cabinet, make sure that the alternate master is installed in the slot directly above the master unit. If you need to change the position in the cabinet, refer to the rackmount installation instructions in Chapter 2 of the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual*.
   - If the units are currently cabled to the hosts and power sources such that they cannot be placed in close proximity, you need to rearrange the cabling so that the units can be placed together.
2. **Make sure that the 10BASE-T cables are connected to a network with the same management host.**

3. **Connect the interconnect cables to the interconnect cards as shown in** FIGURE 10-1**.**

   Make sure you connect the cables to the correct interconnect card connectors *exactly* as shown in the figure. This cable connection determines the master and alternate master relationship. Tighten the retaining screws.

   The remaining connectors are reserved for expansion units.

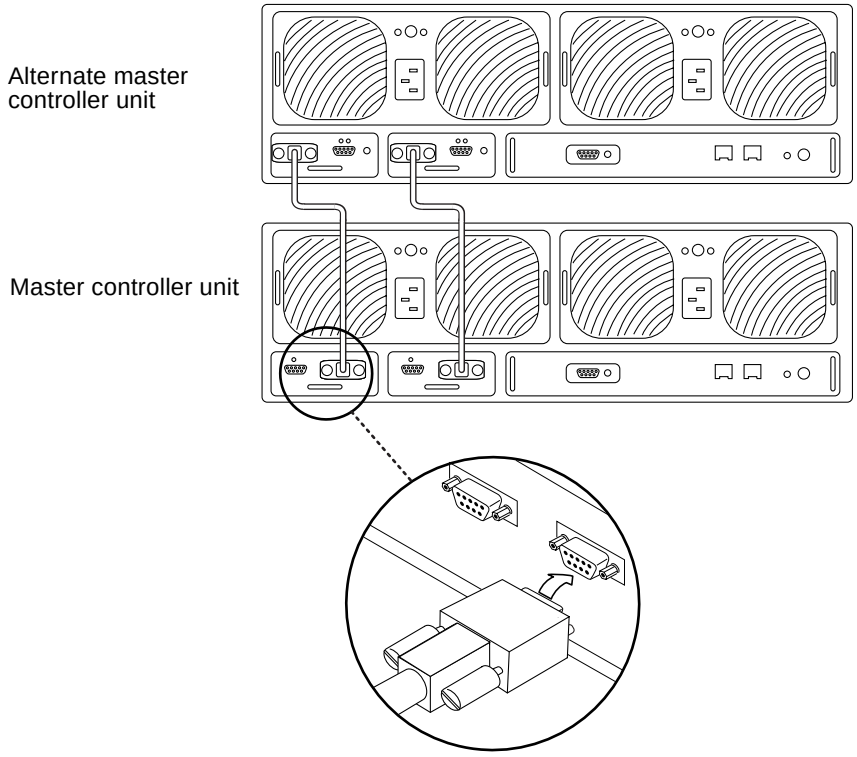

FIGURE 10-1 Connecting the Interconnect Cables

A fully cabled partner group is shown below.

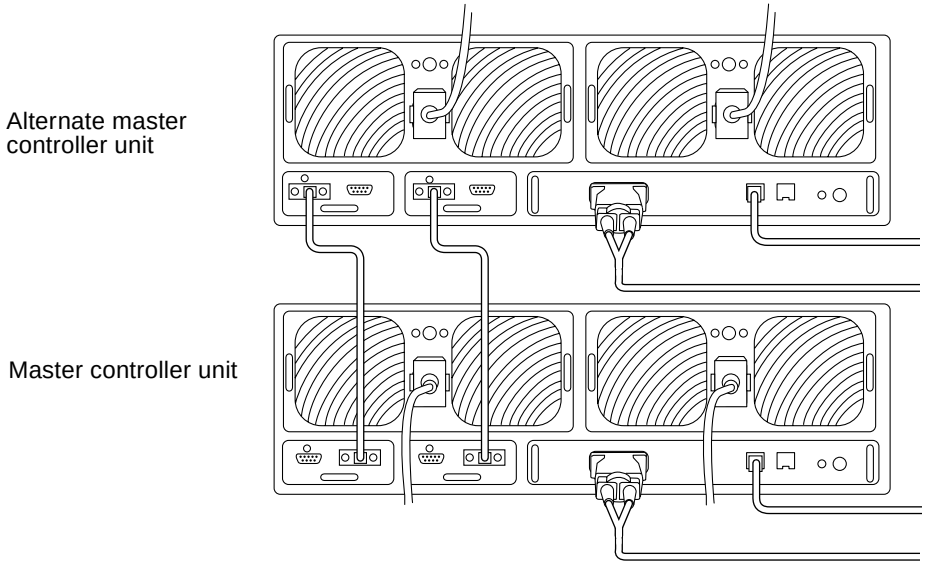

FIGURE 10-2 Fully Cabled Partner Group

Caution – Do not power on the disk trays yet. You must configure a RARP server, connected to the disk tray, with the IP address *before* powering on.

10.1.3 Establishing a New IP Address

The JumpStart™ feature automatically downloads a newly assigned IP address to the disk tray. To enable this feature, you must edit your host file on a RARP server before powering on the disk tray. After you power on, the IP address is automatically assigned. Before you begin, make sure you have the following:

- **MAC address**. The MAC address is located in the pullout tab at the front of the disk tray (FIGURE 10-3).

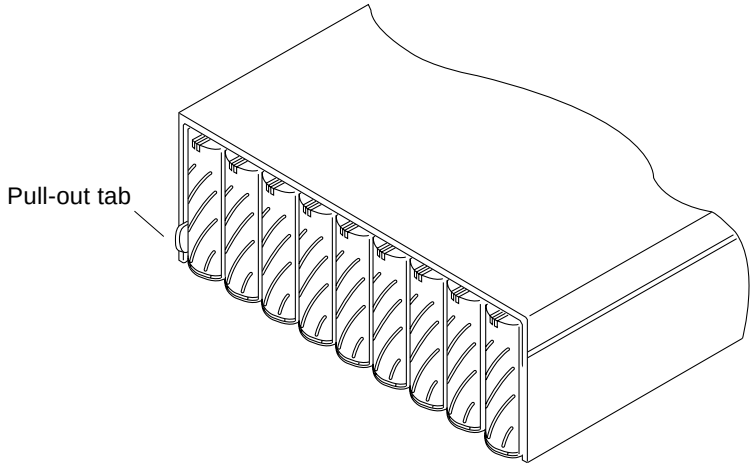

FIGURE 10-3 Location of Pull-out Tab with MAC Address

- **IP address.** For this information, contact the person who maintains your network.
- **Disk tray name.** This is the user-assigned name of the disk tray.

To set the network IP address for the disk tray:

1. **On a host connected to the same subnet as the disk tray, edit the** `/etc/ethers` **file by adding the MAC address and disk tray name.**

   For example:

   ```
   8:0:20:7d:93:7e disk-tray-name
   ```

   In this example:

   - `8:0:20:7d:93:7e` is the MAC address.
   - *disk-tray-name* is the name of the disk tray you are installing.

2. **Edit the** `/etc/hosts` **file with the IP address and disk tray name.**

   For example:

   ```
   192.129.122.111 disk-tray-name
   ```

   In this example, `192.129.122.111` is the assigned IP address.

3. **Edit the `/etc/nsswitch.conf` file to reference the local system files.**

   To ensure that the Solaris software environment uses the changes made to `/etc/ethers` and `/etc/hosts` files, edit the `host` and `ethers` entries in the `/etc/nsswitch.conf` file so that the `files` parameter appears before the `[NOTFOUND=return]` statements.

```
hosts:      nis files [NOTFOUND=return]
ethers:     nis files [NOTFOUND=return]
```

4. **Determine if the RARP daemon is running by typing:**

```
# ps -eaf | grep rarpd
```

   - If the RARP daemon is running, proceed to Step 6.
   - If the RARP daemon is not running, proceed to the next step.

5. **Start the RARP daemon in the Solaris software environment by typing:**

```
# /usr/sbin/in.rarpd -a &
```

6. **Power on both disk trays by pressing the power button on each power and cooling unit.**

   All power and cooling unit LEDs on both units will turn green, indicating that power has been restored. The IP address will automatically download to the master controller unit after you power on.

Note – In some cases, it is possible that the disk tray could time out before it receives the RARP request through an Ethernet switch. If this happens, the disk tray cannot receive the assigned IP address. If the disk tray should time out before receiving the RARP request, it could be due to an improper spanning-tree setting of the Ethernet switch. Refer to your switch vendor documentation for information on spanning-tree settings and how to change them. Changing this setting properly will enable the disk tray to receive the RARP request before timing out.

10.1.4 Defining and Mounting Volumes on the Alternate Master

Once the units are cabled and power has been restored to both units successfully, you can define and mount the volume(s) on the alternate master.

Note – Make sure that both units have come online and that all LEDs are green. It can take up to several minutes after powering on for the units to be ready.

---

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

   a. **On the host, use the** `telnet` **command with the disk tray name (or IP address) to connect to the master unit.**

```
# telnet disk_tray_name
Trying 129.150.47.101...
Connected to 129.150.47.101.
Escape character is '^]'.

pSOSystem (129.150.47.101)
```

Note – The telnet session will verify that your network connection is good. If you cannot connect through the telnet session, you may have miscabled the partner group. See Section 3.8 “Identifying Miscabled Partner Groups” on page 3-19 to determine if this is the problem. If the partner group is cabled correctly, then it is possible that the IP address has not been assigned correctly. If you suspect this as the problem, verify the IP address in a serial cable connection and verify that the RARP server is functional.

---

   b. **Log in to the disk tray by typing** `root` **and your password at the prompts.**

   The disk tray prompt is displayed.

2. **Check the FRU status using the `fru list` and `fru stat` commands.**

   Make sure that all FRUs are displayed and that FRU conditions are good, as shown in the following examples:

```
t300:/:<1>fru list
ID      TYPE                VENDOR       MODEL          REVISION       SERIAL
------  ------------------  -----------  -----------  -------------  --------
u1ctr   controller card     SCI-SJ       375-0084-01-  0210           000980
u2ctr   controller card     SCI-SJ       375-0084-01-  0210           001098
u1d1    disk drive          SEAGATE      ST118202FSUN EA29           LKG78761
u1d2    disk drive          SEAGATE      ST118202FSUN EA29           LKG89101
u1d3    disk drive          SEAGATE      ST118202FSUN EA29           LKG86881
u1d4    disk drive          SEAGATE      ST118202FSUN EA29           LKG89487
u1d5    disk drive          SEAGATE      ST118202FSUN EA29           LKH31924
u1d6    disk drive          SEAGATE      ST118202FSUN EA29           LKH32009
u1d7    disk drive          SEAGATE      ST118202FSUN EA29           LKG90435
u1d8    disk drive          SEAGATE      ST118202FSUN EA29           LKG82282
u1d9    disk drive          SEAGATE      ST118202FSUN EA29           LKG95302
u2d1    disk drive          SEAGATE      ST118202FSUN EA29           LKG63405
u2d2    disk drive          SEAGATE      ST118202FSUN EA29           LKH57340
u2d3    disk drive          SEAGATE      ST118202FSUN EA29           LKD20515
u2d4    disk drive          SEAGATE      ST118202FSUN EA29           LKG89040
u2d5    disk drive          SEAGATE      ST118202FSUN EA29           LKG89845
u2d6    disk drive          SEAGATE      ST118202FSUN EA29           LKG82866
u2d7    disk drive          SEAGATE      ST118202FSUN EA29           LKG95090
u2d8    disk drive          SEAGATE      ST118202FSUN EA29           LKG90324
u2d9    disk drive          SEAGATE      ST118202FSUN EA29           LKG95460
u1l1    loop card           SCI-SJ       375-0085-01-  5.01 Flash    001594
u1l2    loop card           SCI-SJ       375-0085-01-  5.01 Flash    001579
u2l1    loop card           SCI-SJ       375-0085-01-  5.01 Flash    001562
u2l2    loop card           SCI-SJ       375-0085-01-  5.01 Flash    001735
u1pcu1  power/cooling unit  TECTROL-CAN  300-1454-01( 0000           001274
u1pcu2  power/cooling unit  TECTROL-CAN  300-1454-01( 0000           001566
u2pcu1  power/cooling unit  TECTROL-CAN  300-1454-01( 0000           002283
u2pcu2  power/cooling unit  TECTROL-CAN  300-1454-01( 0000           002072
u1mpn   mid plane           SCI-SJ       370-3990-01- 0000           000963
u2mpn   mid plane           SCI-SJ       370-3990-01- 0000           000833
```

```
t300:/:<2>fru stat
CTLR    STATUS   STATE       ROLE        PARTNER    TEMP
------  -------  ----------  ----------  -------    ----
u1ctr   ready    enabled     master      u2ctr      32.5
u2ctr   ready    enabled     alt master  u1ctr      32.5

DISK    STATUS   STATE       ROLE        PORT1      PORT2      TEMP  VOLUME
------  -------  ----------  ----------  ---------  ---------  ----  ------
u1d1    ready    enabled     data disk   ready      ready      37    v0
u1d2    ready    enabled     data disk   ready      ready      39    v0
u1d3    ready    enabled     data disk   ready      ready      36    v0
u1d4    ready    enabled     data disk   ready      ready      38    v0
u1d5    ready    enabled     data disk   ready      ready      37    v0
u1d6    ready    enabled     data disk   ready      ready      35    v0
u1d7    ready    enabled     data disk   ready      ready      40    v0
u1d8    ready    enabled     data disk   ready      ready      36    v0
u1d9    ready    enabled     data disk   ready      ready      29    v0
u2d1    ready    enabled     unassigned  ready      ready      38    -
u2d2    ready    enabled     unassigned  ready      ready      40    -
u2d3    ready    enabled     unassigned  ready      ready      40    -
u2d4    ready    enabled     unassigned  ready      ready      34    -
u2d5    ready    enabled     unassigned  ready      ready      39    -
u2d6    ready    enabled     unassigned  ready      ready      38    -
u2d7    ready    enabled     unassigned  ready      ready      42    -
u2d8    ready    enabled     unassigned  ready      ready      36    -
u2d9    ready    enabled     unassigned  ready      ready      37    -

LOOP    STATUS   STATE       MODE        CABLE1     CABLE2     TEMP
------  -------  ----------  -------     ---------  ---------  ----
u2l1    ready    enabled     master      installed  -          29.5
u2l2    ready    enabled     slave       installed  -          33.0
u1l1    ready    enabled     master      -          installed  28.0
u1l2    ready    enabled     slave       -          installed  32.0

POWER   STATUS   STATE       SOURCE  OUTPUT  BATTERY  TEMP    FAN1    FAN2
------  -------  ---------   ------  ------  -------  ------  ------  ------
u1pcu1  ready    enabled     line    normal  normal   normal  normal  normal
u1pcu2  ready    enabled     line    normal  normal   normal  normal  normal
u2pcu1  ready    enabled     line    normal  normal   normal  normal  normal
u2pcu2  ready    enabled     line    normal  normal   normal  normal  normal
```

Note – The batteries in the power and cooling units recharge after powering on the unit. During the recharge, a “fault” message is displayed in the `fru stat` output for the batteries. While the batteries are recharging, write-behind cache is disabled.

3. **Use the** `vol add` **command to create the volume(s) on the alternate master as follows:**

   a. **Define the volume name (**`vol add` *volume-name*`)`**.**

   b. **Define the drives (**`data u2d`*n*`-`*n*`)` **on which the volume will reside, where:**

   - `u2` is the disk tray unit number
   - `d`*n*`-`*n* are the disk drives, *n* = 1 to 9

   c. **Define the RAID level (**`raid` *n*`)`**, where** *n* **= 0, 1, or 5.**

   d. **Optional: define the hot spare drive (**`standby u`*n*`d9`**) where:**

   - `u2` is the disk tray unit number
   - `d9` is the number of the hot spare disk drive

```
t300:/:<3>vol add volume-name data undn-n raid n standby und9
```

   For example:

```
t300:/:<4>vol add v1 data u2d1-8 raid 5 standby u2d9
```

   - `v1` is the volume name
   - `u2d1-8` indicates the location of the volume: unit 2, disk drives 1 through 8
   - `raid 5` is RAID level 5
   - `standby u2d9` is the location of the hot spare: unit 2, drive 9

4. **Check the status of the volumes and make sure that you created the volume correctly.**

   The status of all drives must be `0`. For example:

```
t300:/:<5>vol stat

v0            u1d1   u1d2   u1d3   u1d4   u1d5   u1d6   u1d7   u1d8   u1d9
mounted        0      0      0      0      0      0      0      0      0
v1            u2d1   u2d2   u2d3   u2d4   u2d5   u2d6   u2d7   u2d8   u2d9
unmounted      0      0      0      0      0      0      0      0      0

t300:/:<6>vol list

volume        capacity   raid   data     standby
v0            125.2 GB    5     u1d1-8   u1d9
v1            125.2 GB    5     u2d1-8   u2d9
```

5. **Initialize the volume.**

   Depending on system activity at the time of initialization, it can take up to an hour to initialize a volume. Only one volume can be initialized at a time.

```
t300:/:<7>vol init volume-name data
```

6. **After the** `vol init` **process has completed, mount the volume.**

```
t300:/:<8>vol mount volume-name
```

7. **Use the** `luxadm(1M)` **command on a Solaris host to recognize the new volume.**

   The `luxadm(1M)` command probes for new devices. Refer to the `luxadm(1M)` man page for more information on this command.

   a. **Make sure there is a** `/dev/es` **directory on the host system. If not, type:**

```
# mkdir /dev/es
```

   The `/dev/es` directory is necessary for running the `luxadm` command.

   b. **On the host system, type** `luxadm insert`:

```
# luxadm insert
```

Note – If the `luxadm` utility is not available, you will have to do a reconfiguration reboot (`boot -r`) to ensure that the host recognizes the new volumes. It is preferable, however, to use the `luxadm` command for this procedure instead of the `boot -r` command.

After the `luxadm` command has completed, you can remount the volumes on the data host and restore the original data.

10.2 Disconnecting a Partner Group to Form Single Controller Units

Caution – Back up all data before beginning this procedure.

This section describes how to reconfigure a partner group to form two existing single controller units.

This procedure includes:

- Preparing the Disk Trays
- Establishing a New IP Address
- Establishing a Network Connection
- Defining and Mounting Volumes

10.2.1 Preparing the Disk Trays

1. **Backup all data on the partner group.**

Caution – Make sure you back up data *before* proceeding.

2. **Ensure that the data path between the host and the partner group has been quiesced.**

   There must not be any I/O activity.

3. **Start a telnet session with the master unit.**

   a. **On the host, use the** `telnet` **command with the disk tray name (or IP address) to connect to the disk tray.**

```
# telnet disk_tray_name
Trying 129.150.47.101...
Connected to 129.150.47.101.
Escape character is '^]'.

pSOSystem (129.150.47.101)
```

   b. **Log in to the disk tray by typing** `root` **and your password at the prompts.**

      The disk tray prompt is displayed.

4. **Power off both units.**

   a. **Type**:

```
t300:/:<5>shutdown
Shutdown the system, are you sure? [N]: y
```

   b. **Press the power button once on each power and cooling unit to turn the switch off.**

5. **Remove the interconnect cables from the back of each disk tray.**

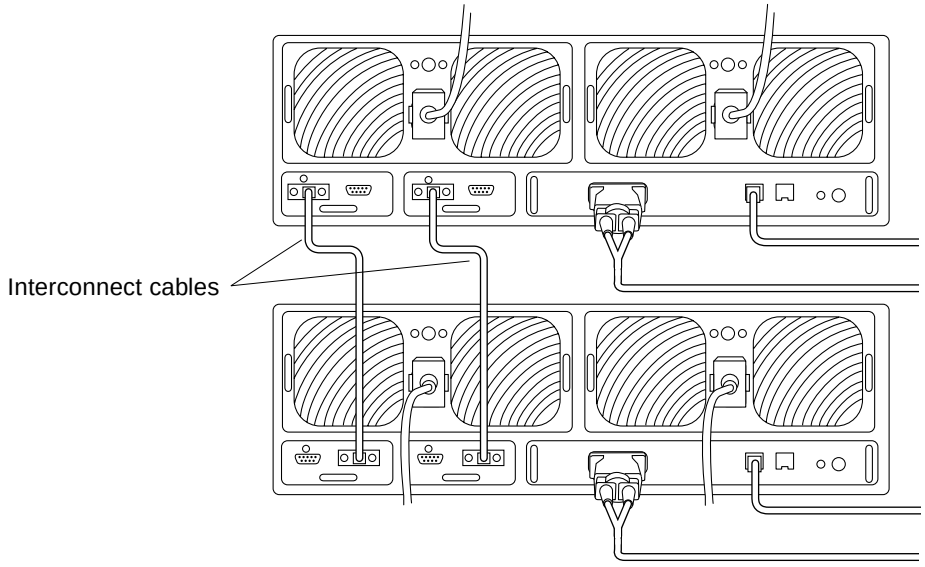

FIGURE 10-4 Interconnect Cable Location

At this point, you can physically move the disk trays apart. You will need to remove the other cables if you are moving the disk trays to different locations and then replace the cables, except for the interconnect cable, when the disk trays are at their permanent locations.

Note – Do not power on the disk trays until you have completed the instructions in Section 10.2.2 “Establishing a New IP Address” on page 10-16.

10.2.2 Establishing a New IP Address

In a partner group, the alternate master unit assumes the IP address of the master unit. When the partner group is disconnected, you must assign a new IP address to the previous alternate master unit for it to operate as a single controller unit. The JumpStart™ feature automatically downloads a newly assigned IP address to the disk tray. To enable this feature, you must edit your host file on a RARP server before powering on the disk tray. After you power on, the IP address is automatically assigned. See Section 10.1.3 “Establishing a New IP Address” on page 10-6 for detailed instructions.

10.2.3 Establishing a Network Connection

After powering on, make sure that both disk trays are functioning properly and recognizing the host by establishing a network connection to each disk tray.

1. **On the host, use the** `telnet` **command with the disk tray name (or IP address) to connect to the disk tray.**

```
# telnet disk_tray_name
Trying 129.150.47.101...
Connected to 129.150.47.101.
Escape character is '^]'.

pSOSystem (129.150.47.101)
```

Note – The telnet session will verify that your network connection is good. If you cannot connect through the telnet session, you may have miscabled the partner group. See Section 3.8 “Identifying Miscabled Partner Groups” on page 3-19 to determine if this is the problem. If the partner group is cabled correctly, then it is possible that the IP address has not been assigned correctly. If you suspect this as the problem, verify the IP address in a serial cable connection and verify that the RARP server is functional.

---

2. **Log in to the disk tray by typing** `root` **and your password at the prompts.**
   - If you are logging in to the previous master unit, use the password for that unit.
   - If you are logging in to the previous alternate master unit, you will need to assign a new password. When prompted for a password, press Return.

Note – If you need to create a new password or change some of the parameters, such as the gateway, netmask, and others, refer to Chapter 2 of the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual* for instructions.

10.2.4 Defining and Mounting Volumes

This section describes the steps required for configuring the former master and alternate master units into single controller units.

10.2.4.1 Master Unit to a Single Controller Unit

After the disk trays are disconnected from each other and the former master unit is powered on, it will continue to display volumes that were formerly available in the partner group on the alternate master unit. These *phantom* volumes do not exist but continue to display from the command line.

In the example that follows, `v1` is a phantom volume on a standalone disk tray that was previously connected in a partner group:

```
:/:<3>vol list

volume        capacity   raid   data     standby
v0            289.6 GB    5     u1d1-9    none
v1              0.0 GB    5     u2d1-9    none

:/:<4>vol stat

v0            u1d1   u1d2   u1d3   u1d4   u1d5   u1d6   u1d7   u1d8   u1d9
mounted        0      0      0      0      0      0      0      0      0
v1            u2d1   u2d2   u2d3   u2d4   u2d5   u2d6   u2d7   u2d8   u2d9
mounted        9      9      9      9      9      9      9      9      9
```

Note – This situation occurs only on the former master unit. The former alternate master unit does not require this procedure.

To correct this issue, unmount the phantom volume and delete it:

1. **Type** `vol unmount v1`**.**
2. **Type** `vol remove v1`**.**

3. **Use the** `vol list` **and** `vol stat` **commands to verify that the phantom volume has been deleted and that the existing volume remains.**

   For example:

```
:/:<8>vol list

volume        capacity   raid   data     standby
v0            289.6 GB    5     u1d1-9    none

:/:<9>vol stat
v0            u1d1   u1d2   u1d3   u1d4   u1d5   u1d6   u1d7   u1d8   u1d9
mounted        0      0      0      0      0      0      0      0      0
```

4. **Use the** `fru list` **and** `fru stat` **commands to verify that the disk tray is functional and ready for operation.**

   For example:

```
:/:<10>fru list
ID      TYPE                VENDOR       MODEL          REVISION       SERIAL
------  ------------------  -----------  -----------  -------------  --------
u1ctr   controller card     SCI-SJ       375-0084-01- 0210           003636
u1d1    disk drive          SEAGATE      ST136403FSUN D44A           LT067917
u1d2    disk drive          SEAGATE      ST136403FSUN D44A           LT128949
u1d3    disk drive          SEAGATE      ST136403FSUN D44A           LT182205
u1d4    disk drive          SEAGATE      ST136403FSUN D44A           LT133265
u1d5    disk drive          SEAGATE      ST136403FSUN D44A           LT152632
u1d6    disk drive          SEAGATE      ST136403FSUN D44A           LT183848
u1d7    disk drive          SEAGATE      ST136403FSUN D44A           LT187470
u1d8    disk drive          SEAGATE      ST136403FSUN D44A           LT188683
u1d9    disk drive          SEAGATE      ST136403FSUN D44A           LT151139
u1l1    loop card           SCI-SJ       375-0085-01-  5.02 Flash    002719
u1l2    loop card           SCI-SJ       375-0085-01-  5.02 Flash    003711
u1pcu1  power/cooling unit  TECTROL-CAN  300-1454-01( 0000           008917
u1pcu2  power/cooling unit  TECTROL-CAN  300-1454-01( 0000           008831
u1mpn   mid plane           SLR-MI       370-3990-01- 0000           010519
```

```
:/:<12>fru stat
CTLR    STATUS   STATE       ROLE        PARTNER    TEMP
------  -------  ----------  ----------  -------    ----
u1ctr   ready    enabled     master      -          34.5

DISK    STATUS   STATE       ROLE        PORT1      PORT2      TEMP  VOLUME
------  -------  ----------  ----------  ---------  ---------  ----  ------
u1d1    ready    enabled     data disk   ready      ready      33    v0
u1d2    ready    enabled     data disk   ready      ready      29    v0
u1d3    ready    enabled     data disk   ready      ready      30    v0
u1d4    ready    enabled     data disk   ready      ready      28    v0
u1d5    ready    enabled     data disk   ready      ready      28    v0
u1d6    ready    enabled     data disk   ready      ready      36    v0
u1d7    ready    enabled     data disk   ready      ready      27    v0
u1d8    ready    enabled     data disk   ready      ready      27    v0
u1d9    ready    enabled     data disk   ready      ready      34    v0

LOOP    STATUS   STATE       MODE        CABLE1     CABLE2     TEMP
------  -------  ----------  -------     ---------  ---------  ----
u1l1    ready    enabled     master      -          -          28.0
u1l2    ready    enabled     slave       -          -          31.0

POWER   STATUS   STATE       SOURCE  OUTPUT  BATTERY  TEMP    FAN1    FAN2
------  -------  ---------   ------  ------  -------  ------  ------  ------
u1pcu1  ready    enabled     line    normal  normal   normal  normal  normal
u1pcu2  ready    enabled     line    normal  normal   normal  normal  normal
```

If the disk tray reports a ready status with functional FRUs, you can now restore the data, if necessary, and return the disk tray to operation as a single controller unit.

10.2.4.2 Alternate Master Unit to a Single Controller Unit

The former alternate master unit will contain the same volume(s) as it did when connected in the partner group, and those volumes will be available when the unit is powered on. The only potential issue is that the former alternate master unit could be operating on an outdated file system. This occurs if you had applied a firmware patch to the disk trays while they were connected in the partner group; the files contained on the disk tray's reserved system area are not upgraded on the alternate master, but only on the master unit. When the units are disconnected, the alternate master unit reverts to the file system stored on its reserved system area.

To correct this situation and ensure that the disk tray is ready for operation:

1. **Install the latest firmware patch on the disk tray.**

   This patch is available on the SunSolve™ web site: `http://sunsolve.sun.com`.

a. From the SunSolve web site, select Patches under the SunSolve Online column.

b. Select the Storage Products option from the Patches web page.

Refer to the README file on the web page for specific details on installing the patch for the Sun StorEdge T3 disk tray firmware.

2. Use the `vol list` and `vol stat` commands to verify that the volume(s) is mounted correctly.

For example:

```
:/:<8>vol list

volume        capacity   raid   data     standby
v1            289.6 GB    5     u1d1-9    none

:/:<9>vol stat
v1            u1d1   u1d2   u1d3   u1d4   u1d5   u1d6   u1d7   u1d8   u1d9
mounted        0      0      0      0      0      0      0      0      0
```

3. Use the `fru list` and `fru stat` commands to verify that the disk tray is functional and ready for operation.

For example:

```
:/:<10>fru list
ID      TYPE                VENDOR       MODEL          REVISION       SERIAL
------  ------------------  -----------  -----------  -------------  --------
u1ctr   controller card     SCI-SJ       375-0084-01-  0210           003636
u1d1    disk drive          SEAGATE      ST136403FSUN  D44A           LT067917
u1d2    disk drive          SEAGATE      ST136403FSUN  D44A           LT128949
u1d3    disk drive          SEAGATE      ST136403FSUN  D44A           LT182205
u1d4    disk drive          SEAGATE      ST136403FSUN  D44A           LT133265
u1d5    disk drive          SEAGATE      ST136403FSUN  D44A           LT152632
u1d6    disk drive          SEAGATE      ST136403FSUN  D44A           LT183848
u1d7    disk drive          SEAGATE      ST136403FSUN  D44A           LT187470
u1d8    disk drive          SEAGATE      ST136403FSUN  D44A           LT188683
u1d9    disk drive          SEAGATE      ST136403FSUN  D44A           LT151139
u1l1    loop card           SCI-SJ       375-0085-01-   5.02 Flash    002719
u1l2    loop card           SCI-SJ       375-0085-01-   5.02 Flash    003711
u1pcu1  power/cooling unit  TECTROL-CAN  300-1454-01(  0000           008917
u1pcu2  power/cooling unit  TECTROL-CAN  300-1454-01(  0000           008831
u1mpn   mid plane           SLR-MI       370-3990-01-  0000           010519
```

```
:/:<12>fru stat
CTLR    STATUS   STATE       ROLE        PARTNER    TEMP
------  -------  ----------  ----------  -------    ----
u1ctr   ready    enabled     master      -          34.5

DISK    STATUS   STATE       ROLE        PORT1      PORT2      TEMP  VOLUME
------  -------  ----------  ----------  ---------  ---------  ----  ------
u1d1    ready    enabled     data disk   ready      ready      33    v0
u1d2    ready    enabled     data disk   ready      ready      29    v0
u1d3    ready    enabled     data disk   ready      ready      30    v0
u1d4    ready    enabled     data disk   ready      ready      28    v0
u1d5    ready    enabled     data disk   ready      ready      28    v0
u1d6    ready    enabled     data disk   ready      ready      36    v0
u1d7    ready    enabled     data disk   ready      ready      27    v0
u1d8    ready    enabled     data disk   ready      ready      27    v0
u1d9    ready    enabled     data disk   ready      ready      34    v0

LOOP    STATUS   STATE       MODE        CABLE1     CABLE2     TEMP
------  -------  ----------  -------     ---------  ---------  ----
u1l1    ready    enabled     master      -          -          28.0
u1l2    ready    enabled     slave       -          -          31.0

POWER   STATUS   STATE       SOURCE  OUTPUT  BATTERY  TEMP    FAN1    FAN2
------  -------  ---------   ------  ------  -------  ------  ------  ------
u1pcu1  ready    enabled     line    normal  normal   normal  normal  normal
u1pcu2  ready    enabled     line    normal  normal   normal  normal  normal
```

If the disk tray reports a ready status with functional FRUs, you can now restore the data, if necessary, and return the disk tray to operation as a single controller unit.

10.3 Changing the Port ID on the Disk Tray

If you are adding a partner group to a hub configuration, you must set the port ID values on the disk trays to unique values. This is because Sun systems support hard addressing only. However, the `port` command on the Sun StorEdge T3 disk tray contains the option to set soft addressing. Changing the setting to soft addressing can create problems with host site HBAs. In addition, with soft addressing, there is the risk of ending up with new c*x*t*x*d*x* node names after performing a system reboot.

Note – Sun StorEdge T3 disk trays that are factory configured in cabinets with hubs have unique port ID values assigned. This procedure applies only to standalone partner groups that are being added to an existing hub configuration.

To change the port ID on a Sun StorEdge T3 disk tray:

1. **Connect to the disk tray in a telnet session.**

   See Section 2.2 “Establishing a Telnet Session” on page 2-3 for instructions.

2. **Use the `port` command on the disk tray to change the port ID.**

   You must select a new numerical value for the port identifier. For example, to change a port id on u1p1 from a value of 1 to a value of 20, Type:

```
:/:<1>port set u1p1 targetid 20
```

3. **On the disk tray, type `reset` for the new port ID to take effect.**

APPENDIX **A**

Illustrated Parts Breakdown

This appendix contains part numbers and illustrations of field-replaceable units (FRUs).

The following assemblies are illustrated in this chapter:

- Sun StorEdge T3 Disk Tray Assemblies
- Door Assembly
- Interconnect Card Assembly
- Power Supply and Cooling Unit
- Controller Card
- Drive Assembly
- Cable and Interconnect Assemblies

A.1 Sun StorEdge T3 Disk Tray

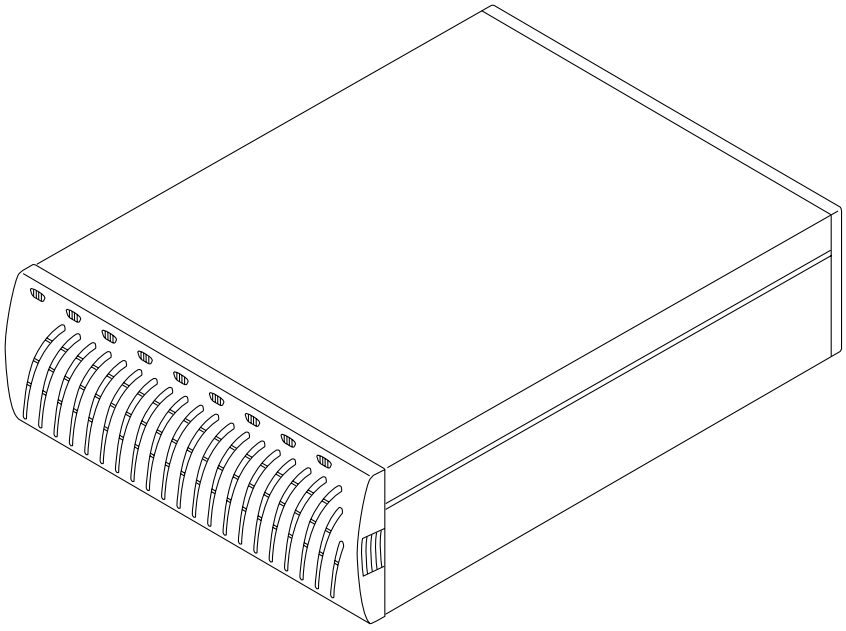

FIGURE A-1 Sun StorEdge T3 Disk Tray (Front View)

A.2 Sun StorEdge T3 Disk Tray Assemblies

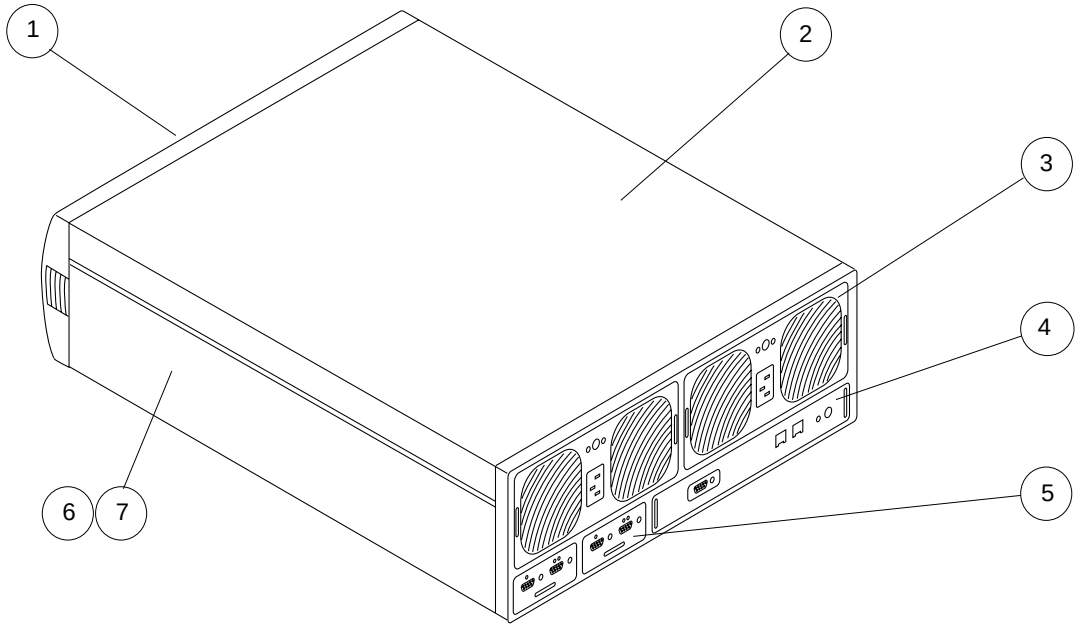

FIGURE A-2 Sun Sun StorEdge T3 Disk Tray (Back View)

TABLE A-1 Sun StorEdge T3 Disk Tray Assemblies

Item	Part Number	Description
1	F540-4306	Door Assembly
2	F370-3990	Empty Chassis/Backplane Assembly
3	F300-1454	Power Supply and Cooling Unit
4	F375-0084	Controller Card
5	F375-0085	Interconnect Card Assembly
6	F540-4287	Drive Assembly, 18 GB (not shown in this view)
7	F540-4367	Drive Assembly, 36 GB (not shown in this view)

A.3 Door Assembly

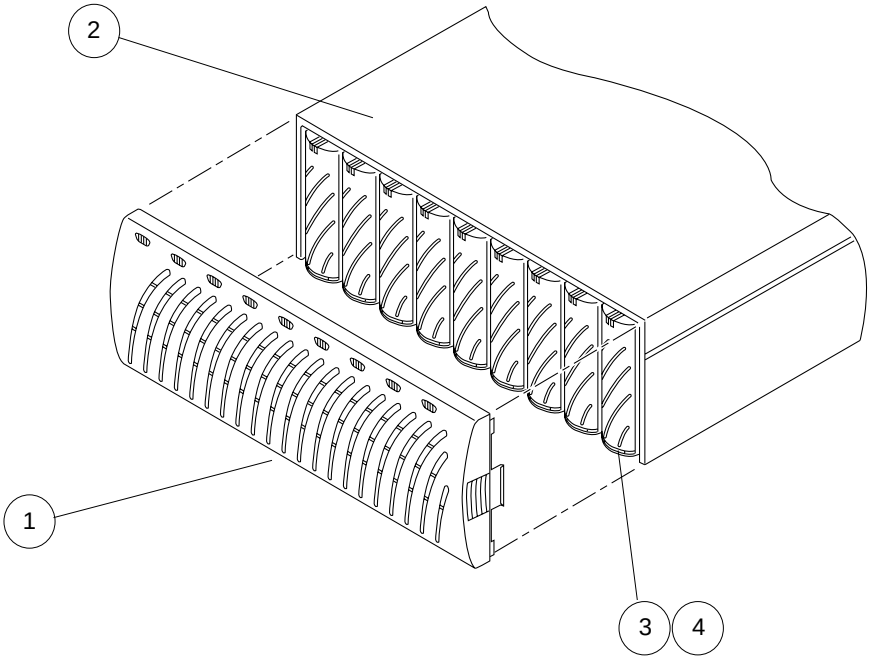

FIGURE A-3 Door Assembly

TABLE A-2 Door Assembly

Item	Part Number	Description
1	F540-4306	Door Assembly
2	F370-3990	Empty Chassis/Backplane Assembly
3	F540-4287	Drive Assembly, 18 GB
4	F540-4367	Drive Assembly, 36 GB

A.4 Interconnect Card Assembly

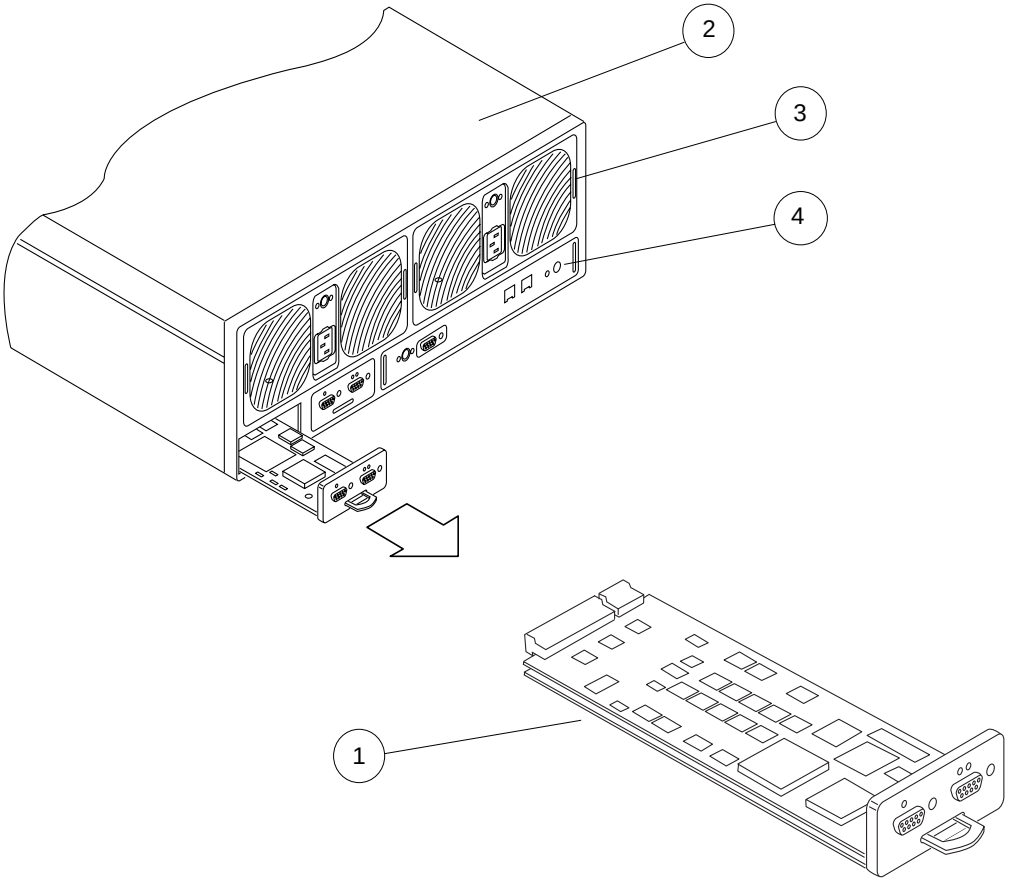

FIGURE A-4 Interconnect Card Assembly

TABLE A-3 Interconnect Card Assembly

Item	Part Number	Description
1	F375-0085	Interconnect Card Assembly
2	F370-3990	Empty Chassis/Backplane Assembly
3	F300-1454	Power Supply and Cooling Unit
4	F375-0084	Controller Card

A.5 Power Supply and Cooling Unit

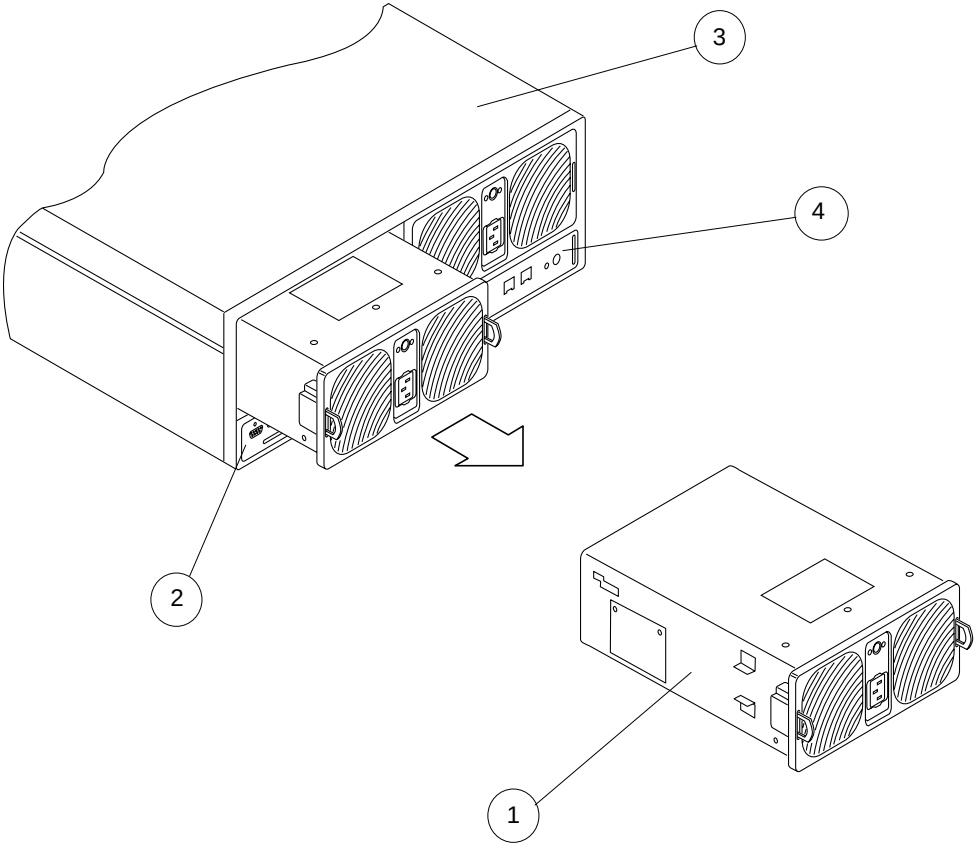

FIGURE A-5 Power Supply

TABLE A-4 Power Supply

Item	Part Number	Description
1	F300-1454	Power Supply and Cooling Unit
2	F375-0085	Interconnect Card Assembly
3	F370-3990	Empty Chassis/Backplane Assembly
4	F375-0084	Controller Card

A.6 Controller Card

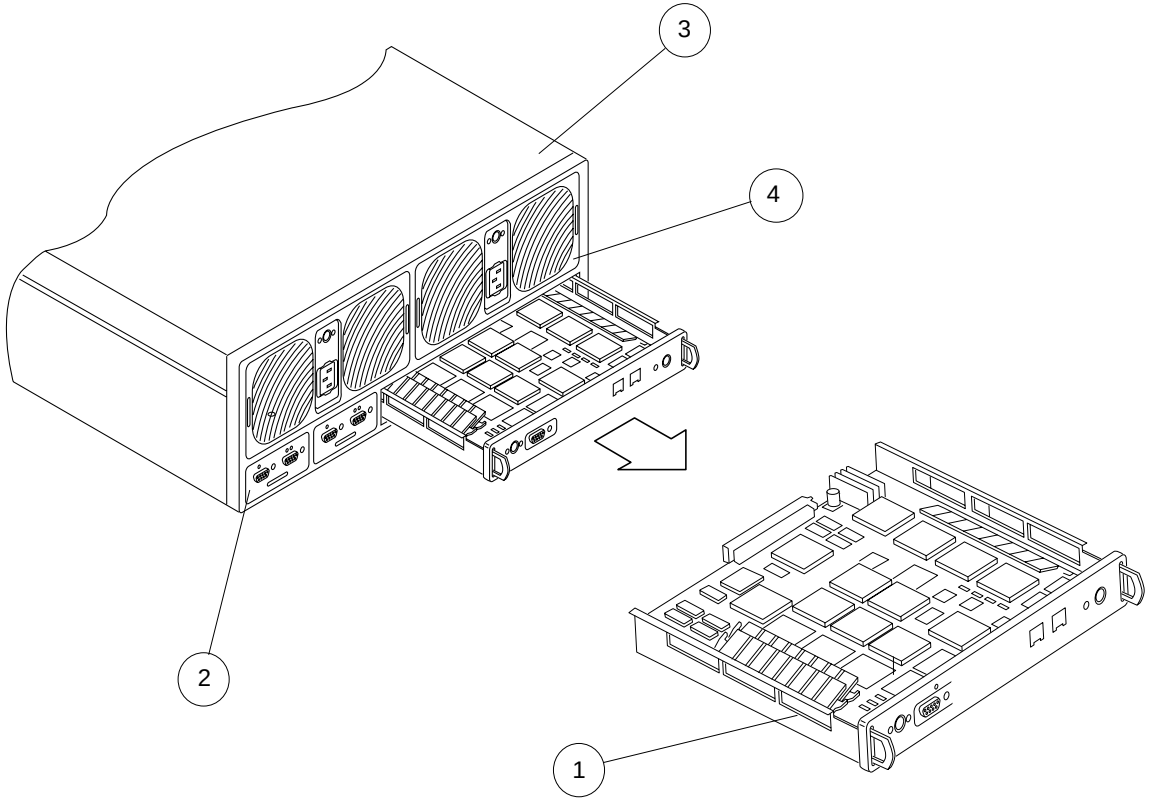

FIGURE A-6 Controller Card

TABLE A-5 Controller Card

Item	Part Number	Description
1	F375-0084	Controller Card
2	F375-0085	Interconnect Card Assembly
3	F370-3990	Empty Chassis/Backplane Assembly
4	F300-1454	Power Supply and Cooling Unit

A.7 Drive Assembly

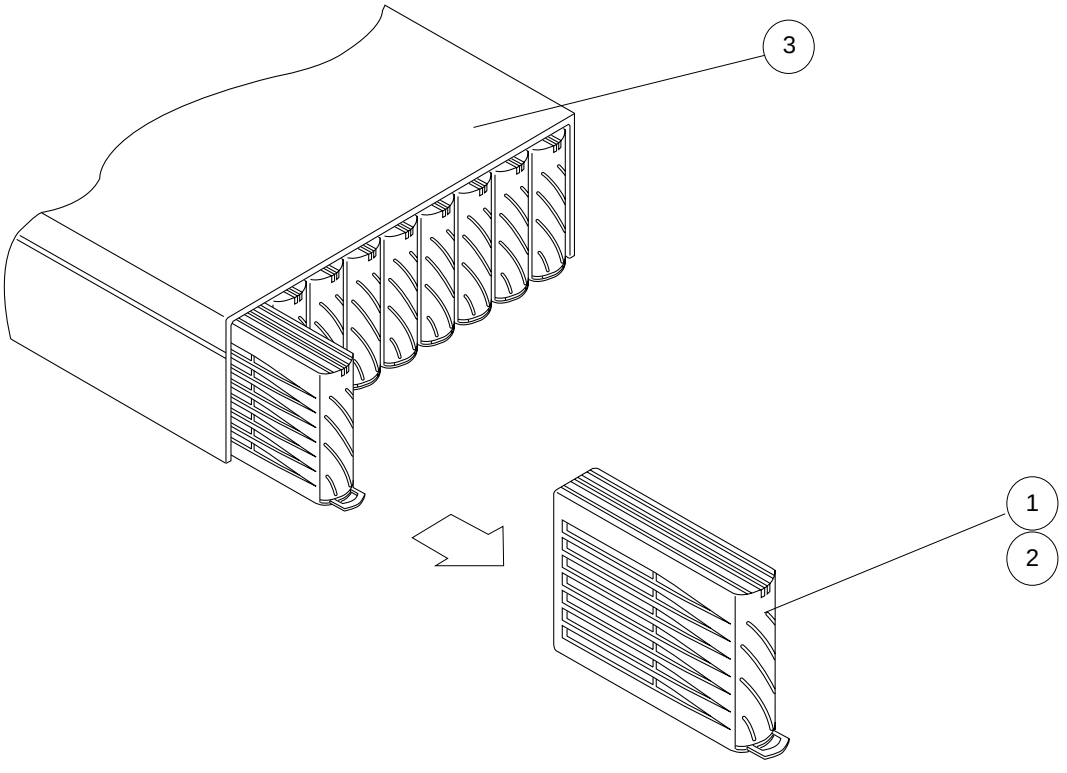

FIGURE A-7 Drive Assembly

TABLE A-6 Drive Assembly

Item	Part Number	Description
1	F540-4287	Drive Assembly, 18 GB
2	F540-4367	Drive Assembly, 36 GB
3	F370-3990	Empty Chassis/Backplane Assembly

A.8 Cable and Interconnect Assemblies

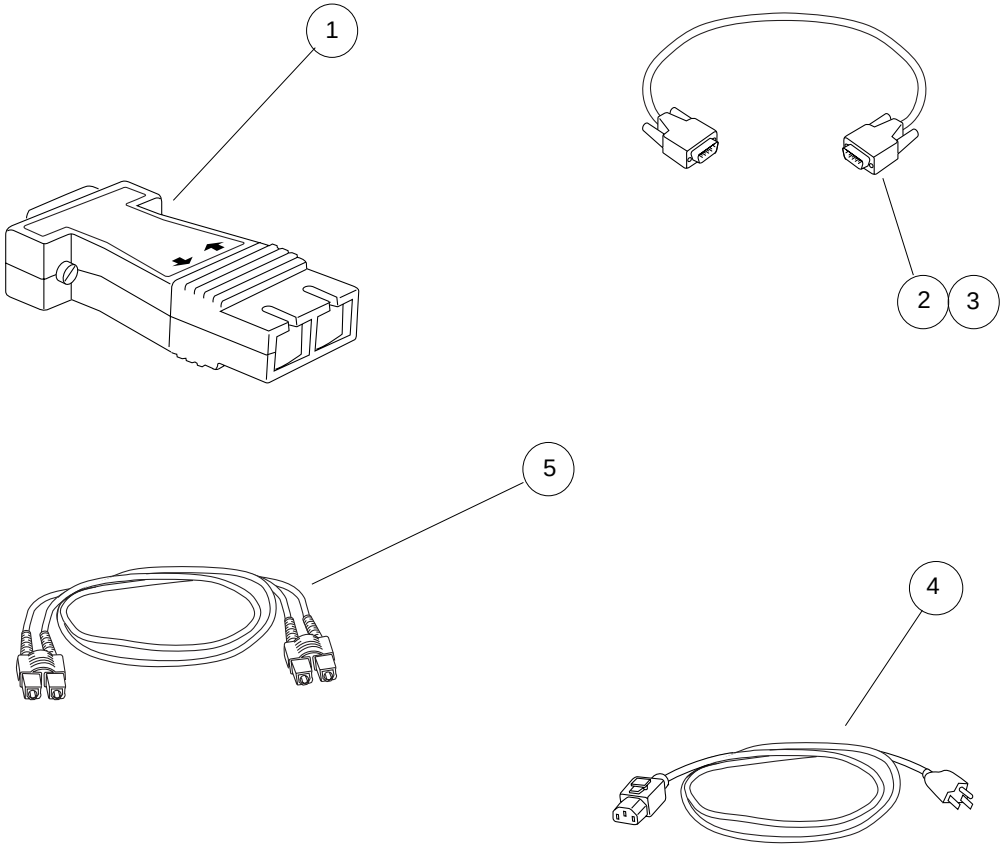

FIGURE A-8 Cables and Interconnects

TABLE A-7 Cable and Interconnect Assemblies

Item	Part Number	Description
1	F370-3989	MIA Adapter
2	F530-2842	Interconnect Cable, Short
3	F530-2843	Interconnect Cable, Long
4	F180-1918	Locking Power Cord
5	F537-1020	5M Fiber-Optic Cable

APPENDIX **B**

Sun StorEdge T3 System Defaults

This appendix lists the Sun StorEdge T3 disk tray defaults and is divided into the following sections:

B.1 Boot Defaults

Boot defaults are specified with the `set` command. When run without any parameters, the set command displays the current values. See *Sun StorEdge T3 Administrator’s Guide* for information on using the `set` command.

TABLE B-1 Default Settings - `set` List

Parameter	Default	Variables
`bootmode`	`auto`	[auto | tftp | none]
`bootdelay`	`3`	Number of seconds
`sn`	*Number*	Serial number
`ip`	*n.n.n.n*	Unit IP address
`netmask`	`255.255.255.0`	Unit netmask
`gateway`	*n.n.n.n*	Network gateway IP address
`tftphost`	*n.n.n.n*	IP address of tftp server
`tftpfile`	*value*	Boot code file identification number (39 character maximum)

TABLE B-1 Default Settings - `set` List

Parameter	Default	Variables
`hostname`	*machinename*	Machine name of the Sun StorEdge T3 host machine (39 character maximum)
`vendor`	*vendorname*	Name of manufacturer or vendor
`model`	*modelnumber*	Controller model number (set at EP level)
`revision`	`0`*nnn*	Controller EP revision (EP writes this value)
`logto`	*	[1 | * | *filename*] where: 1=Forces logging to serial console *=Directs logging daemon to direct logging as specified in the `/etc/syslog.conf` file.
`loglevel`	`3`	[0|1|2|3|4-] where: 0=No logging at all 1=Error messages only 2=Warning and higher messages 3=Notice and higher messages 4=All message levels including info
`rarp`	`on`	[on | off]
`mac`	*n:n:n:n:n:n*	Controller MAC address. Set by firmware

B.2 System Defaults

System defaults are specified with the `sys` command. See *Sun StorEdge T3 Administrator's Guide* for information on using the `sys` command.

TABLE B-2 System Default Settings

Sys Parameter	Default	Variables
`blocksize`	`64k`	[16k | 32k | 64k]
`cache`	`auto`	[auto|writebehind|writethrough|off]
`mirror`	`auto`	[auto | off]
`mp_support`	`none`	[rw | none] Multi-pathing support
`rd_ahead`	on	Set to off to always perform datablock read ahead.
`recon_rate`	medium	[high, medium, low] Reconstruction rate.
`memsize`	32	Set by controller, read-only. In MBytes
`cache memsize`	256	Set by controller, read-only. In MBytes

B.3 Volume Defaults

System defaults are specified with the `vol` command. See *Sun StorEdge T3 Administrator's Guide* for information on using the `vol` command.

TABLE B-3 Volume Defaults

Parameter	Default	Variables
`init [rate n]`	16	[1-16] 1 is lowest, 16 is highest..
`verify [rate n]`	1	[1-8] Rate parameter refers to host interleave factor (contention with host IOs). Default is 1. There is currently no feature that spawns a `vol verify` process.

The default for the SCSI "vendor ID field" is `Sun`. This value can be displayed or changed with the `port` command.

The default Sun StorEdge T3 Volume Configuration as shipped from the factory is 9 drive RAID 5 with no standby disk.

The volume is configured as follows:
- vol add v0 data u1d1-9 RAID 5
- vol init v0 sysarea
- vol init v0 data rate 16

B.4 Default Directories and Files

TABLE B-4 lists the default file system shipped with the disk tray.

TABLE B-4 Default Directories and Files

Filename	Description
`/nb113.bin`	Controller Firmware (RR Sum: 23020 5000)
`/lplc_05.01`	Interconnect Card FW (RR Sum: 63295 21)
`/BITMAP.SYS`	Contains a map of used and free blocks
`/ep2_10.bin`	Controller EPROM Flash (RR Sum: 3221 1023)
`/FLIST.SYS`	Contains the file descriptors
`/cmdlog`	Log of all commands executed on the system

TABLE B-4 Default Directories and Files

Filename	Description
`/adm`	Legacy directory formerly used for syslog files
`/webgui`	Contains old browser based admin files
`/etc/hosts`	Default hosts with comments on format of file
`/etc/schd.conf`	Battery Refresh File. Contents: BAT_CYC 14
`/etc/syslog.conf`	System logging configuration file
`/syslog`	Default system logging file
`/web/*.htm`	Component Manager required file
`/web/snmp/T3.mib`	SNMP required file

Note – No controller firmware, interconnect card binaries, EP binaries, or drive firmware images are placed in Sun StorEdge T3 system disks at time of manufacture. Should any of these be needed later they can download from SunSolve.

APPENDIX **C**

Sun StorEdge T3 Messages

This appendix contains a description of the messages that can be reported by the disk tray.

See *Sun StorEdge T3 Administrator's Guide* for explanations of the more important error messages.

This chapter contains the following sections:

- Message Syntax
- Reset Log Types

C.1 Message Syntax

Error message syntax consists of the following three components:

- Message type
- FRU identifier
- Message text

These components are described in the following subsections, including a listing of possible error and warning messages.

See *Sun StorEdge T3 Administrator's Guide* for explanations of the more important error messages.

C.1.1 Message Types

A syslog daemon exists in the hardware RAID controller that records system messages and provides for remote monitoring. There are four possible levels of messages, listed in TABLE C-1 in order of severity.

TABLE C-1 Message Types

Message Type	Definition
`Error`	Indicates a critical system event requiring immediate user intervention or attention. For example, an overtemperature condition or a detected FRU being removed.
`Warning`	Indicates a possible event requiring eventual user intervention. For example, a FRU being disabled and recovery procedure executed.
`Notice`	Indicates a system event that may be a side effect of other events or may be a normal condition. For example, the power switch is turned off.
`Information`	Indicates a system event that has no consequence on the running health of the system. For example, a good state of a FRU.

C.1.2 FRU Identifiers

The syntax of the error message uses a FRU identifier to refer to a particular FRU in a disk tray. This identifier contains a unit constant (`u`), the unit number (*n*), the FRU constant (`ctr` for controller card, `pcu` for power and cooling unit, `l` for interconnect card, `d` for disk drive), and the FRU number (*n*).

TABLE C-2 FRU Identifiers

FRU	Identifier	Unit number
Controller card	u*n*ctr	*n* = unit number (1, 2, ...)
Power and cooling unit	u*n*pcu*n*	*n* = unit number (1, 2, ...) *n* = pcu number (1, 2)
Interconnect card	u*n*l*n*	*n* = unit number (1, 2, ...) *n* = interconnect number (1, 2)
Disk drive	u*n*d*n*	*n* = unit number (1, 2, ...) *n* = disk drive number (1 to 9)

C.2 Reset Log Types

If the error level is set to Notice (2) or higher (Warning or Error), trace the reason for the reset through the `syslog` file.

TABLE C-3 Reset Log Types

Index	Type	Type Value	Description
0	Hardware	0x1000	User reset
1	Exception	0x2000	Exception
2	Assertion	0x3000	Software assertion
3	RaidFail	0x4000	RAID fatal error
4	Takeover	0x5000	Takeover
5	PsosFail	0x6000	pSOS fatal error
6	SysFail	0x7000	System error

TABLE C-4 Default System Files And Directories

Files and Directories	Description
`/adm`	# Empty directory
`/etc/hosts`	# Default hosts with comments on format of file
`/etc/schd.conf`	# Battery Refresh File - Contents: BAT_CYC 7
`/etc/syslog.conf`	# System Logging Configuration File
`/web/elemprop.htm`	# Component Manager Req'd File
`/web/encmap.htm`	# Component Manager Req'd File
`/web/sysprop.htm`	# Component Manager Req'd File
`/web/voloper.htm`	# Component Manager Req'd File
`/web/snmp/t3.mib`	# SNMP Req'd File
`/webgui`	# Contains old browser based admin files

APPENDIX **D**

Sun StorEdge T3 System Commands

This appendix lists the commands supported by the Sun StorEdge T3 disk tray and is divided into the following sections:

- Commands List
- FRU Identifiers

D.1 Commands List

To view the available command line interface (CLI) commands on the disk tray, type `help` at the prompt.

```
T3:/:<184>help
ftp     telnet
arp     cat     cd      cmp     cp      date    echo    head
help    ls      mkdir   mv      ping    pwd     rm      rmdir
tail    touch
boot    disable disk    enable  fru     id      logger  lpc
more    passwd  port    proc    reset   set     shutdown
sync    sys     tzset   ver     vol     ep      refresh route
```

To display command syntax, use the *command-name* `help` command. For example, for information on the `reset` command, type:

```
T3:/:<9>reset help
usage:  reset [ -y ]
```

TABLE D-1 contains an alphabetical listing of the CLI commands supported by the disk tray.

See *Sun StorEdge T3 Administrator's Guide* for a detailed description of each command's syntax, options, and arguments.

TABLE D-1 Commands Listed in Alphabetical Order

Command	Description
`boot`	Boot system
`disable`	Disable certain FRUs
`disk`	Disk administration
`enable`	Enable certain FRUs
`ep`	Program the flash eeprom
`fru`	Display the FRU information
`help`	Display reference manual pages
`id`	Display FRU identification summary
`lpc`	Get interconnect card property
`port`	Configure the interface port
`proc`	Displays status of outstanding `vol` processes
`refresh`	Start/stop battery refreshing or display its status
`reset`	Reset system
`set`	Display or modify the set information
`shutdown`	Shut down disk tray or partner group
`sys`	Display or modify the system information
`ver`	Display software version
`vol`	Display or modify the volume information

D.2 FRU Identifiers

Many commands use a FRU identifier to refer to a particular FRU in a disk tray. This identifier contains a unit constant (`u`), the unit number (e*ncid*), the FRU constant (`ctr` for controller card, `pcu` for power and cooling unit, `l` for interconnect card, `d` for disk drive) and the FRU number (*n*). TABLE D-2 lists the possible FRU variables as they appear in this appendix.

TABLE D-2 FRU Identifiers

FRU	Identifier	Unit number
Controller card	u*encid*`ctr`	*encid* = unit number (1, 2, ...)
Power and cooling unit	u*encid*`pcu[1|2]`	*encid* = unit number (1, 2, ...) *n* = pcu number (1, 2)
Interconnect card	u*encid*`l[1|2]`	*encid* = unit number (1, 2, ...) *n* = interconnect card number (1, 2)
Disk drive	u*encid*`d`*n*	*encid* = unit number (1, 2, ...) *n* = disk drive number (1 to 9)

APPENDIX **E**

FC_AL Loop Identifiers

This Appendix lists the FC_AL loop identifies by AL_PA (hex), Switch (hex) and Setting (decimal) values.

The values are listed from lowest to highest priority. The AL_PA value of 00 is reserved for an FL_PORT. The value -- is not available.

TABLE E-1 Assigned Loop Identifier

AL_PA (hex)	Switch (hex)	Setting (dec)	AL_PA (hex)	Switch (hex)	Setting (dec)	AL_PA (hex)	Switch (hex)	Setting (dec)
EF	00	2	9F	2C	44	4B	58	88
E8	01	1	9E	2D	45	4A	59	89
E4	02	2	9D	2E	46	49	5A	90
E2	03	3	9B	2F	47	47	5B	91
E1	04	4	98	30	48	46	5C	92
E0	05	5	97	31	49	45	5D	93
DC	06	6	90	32	50	43	5E	94
DA	07	7	8F	33	51	3C	5F	95
D9	08	8	88	34	52	3A	60	96
D6	09	9	84	35	53	39	61	97
D5	0A	10	82	36	54	36	62	98
D4	0B	11	81	37	55	35	63	99
D3	0C	12	80	38	56	34	64	100
D2	0D	13	7C	39	57	33	65	101
D1	0E	14	7A	3A	58	32	66	102
CE	0F	15	79	3B	59	31	67	103

TABLE E-1 Assigned Loop Identifier

AL_PA (hex)	Switch (hex)	Setting (dec)	AL_PA (hex)	Switch (hex)	Setting (dec)	AL_PA (hex)	Switch (hex)	Setting (dec)
CD	10	16	76	3C	60	2E	68	104
CC	11	17	75	3D	61	2D	69	105
CB	12	18	74	3E	62	2C	6A	106
CA	13	19	73	3F	63	2B	6B	107
C9	14	20	72	40	64	2A	6C	108
C7	15	21	71	41	65	29	6D	109
C6	16	22	6E	42	66	27	6E	110
C5	17	23	6D	43	67	26	6F	111
C3	18	24	6C	44	68	25	70	112
BC	19	25	6B	45	69	23	71	113
BA	1A	26	6A	46	70	1F	72	114
B9	1B	27	69	47	71	1E	73	115
B6	1C	28	67	48	72	1D	74	116
B5	1D	29	66	49	73	1B	75	117
B4	1E	30	65	4A	74	18	76	118
B3	1F	31	63	4B	75	17	77	119
B2	20	32	5C	4C	76	10	78	120
B1	21	33	5A	4D	77	0F	79	121
AE	22	34	59	4E	78	08	7A	122
AD	23	35	56	4F	79	04	7B	123
AC	24	36	55	50	80	02	7C	124
AB	25	37	54	51	81	01	7D	125
AA	26	38	53	52	82			
A9	27	39	52	53	83	00	7E	126
A7	28	40	51	54	84	--	7F	127
A6	29	41	4E	55	85			
A5	2A	42	4D	56	86			
A3	2B	43	4C	57	87			

APPENDIX **F**

T3 Configuration Worksheets

This chapter contains a blank worksheet for the qualified service provider to make notes at each customer site.

F.1 Worksheets

The following information is required to successfully troubleshoot a Sun Sun StorEdge T3 disk tray.

Use this worksheet to access the data, ethernet, and TFTP connections from the application, management and TFTP host system(s). The application, management and TFTP host can all be resident on the same server.

Root access is required for all hosts during troubleshooting.

Host types are defined as the following:

Application host	The application host utilizes the FC-AL fibre channel connection as a data path to and from the Sun StorEdge T3 disk tray
Management host	The management host will administer configuration and health monitoring of the Sun StorEdge T3 disk tray, through a network connection
TFTP host	The TFTP host is used to download bootcode to the Sun StorEdge T3 disk tray, through a network connection

F.2 System Information Worksheets

The following information should be documented before troubleshooting any Sun Sun StorEdge T3 disk tray. Make copies of this blank form, and complete it for each T3 disk tray.

TABLE F-1 Sun Sun StorEdge T3 Disk Tray Information Worksheet

	Management Host	Application Host	TFTP Host
Host ID			
Host Name			
Host IP Address			
Gateway IP Address			
Sun StorEdge T3 IP Address			
Sun StorEdge T3 Tray Name			
TFTP Host Address			
OS/Patch Revision Level			
Veritas DMP Release			
Primary Application			
StorTools Release			
Component Manager Release			

TABLE F-1 Sun Sun StorEdge T3 Disk Tray Information Worksheet

	Management Host	Application Host	TFTP Host

Legend:

Required Field	
Optional Field	
Not Applicable	

Glossary

A

administrative domain Partner groups (interconnected controller units) that share common administration through a master controller.

alternate master unit The secondary disk tray unit in a partner group that provides failover capability from the master unit.

alternate pathing (AP) A mechanism that reroutes data to the other disk tray controller in a partner group upon failure in the host data path. Alternate pathing requires special software to perform this function.

auto cache mode The default cache mode for the Sun StorEdge T3 disk tray. In a fully redundant configuration, cache is set to write-behind mode. In a nonredundant configuration, cache is set to write-through. Read caching is always performed.

auto disable The Sun StorEdge T3 disk tray default that automatically disables a disk drive that has failed.

auto reconstruction The Sun StorEdge T3 disk tray default that automatically reconstructs data onto a new disk drive from one of the other drives.

B

buffering Data that is being transferred between the host and the drives.

C

command line interface (CLI) The interface between the Sun StorEdge T3 disk tray's pSOS operating system and the user in which the user types commands to administer the disk tray.

controller unit A StorEdge T310 disk tray that includes a controller card. It can be use as a standalone unit or configured with other Sun StorEdge T3 disk trays.

E

expansion unit A StorEdge T301 disk tray without a controller card. It must be connected to a StorEdge T310 disk tray to be operational.

electrically erasable programmable read-only memory (EPROM) Memory stored on the controller card; useful for stable storage for long periods without electricity while still allowing reprogramming.

F

Fibre Channel Arbitrated Loop (FC-AL) A 100 MB/s serial channel, which allows connection of multiple devices (disk drives and controllers).

field-replaceable unit (FRU) A component that is easily removed and replaced by a field service engineer or a system administrator.

G

gigabit interface converter (GBIC) An adapter used on an SBus card to convert fiber-optic signal to copper.

gigabyte (GB or Gbyte) One gigabyte is equal to one billion bytes (1x109).

graphical user interface (GUI) A software interface that enables configuration and administration of the Sun StorEdge T3 disk tray using a graphic application.

H

hot spare A drive in a RAID 1 or RAID 5 configuration that contains no data and acts as a standby in case another drive fails.

hot-swap The characteristic of a field-replaceable unit (FRU) to be removed and replaced while the system remains powered on and operational.

I

input/output operations per second (IOPS) A performance measurement of the transaction rate.

interconnect cable An FC-AL cable with a unique switched loop architecture that is used to interconnect multiple Sun StorEdge T3 disk trays. Sometimes referred to as a *loop cable*.

interconnect card A disk tray component that contains the interface circuitry and two connectors for interconnecting multiple Sun StorEdge T3 disk tray units. Sometimes referred to as a *loop card*.

L

light emitting diode (LED) A device that converts electrical energy into light that is used to display activity.

logical unit number (LUN) One or more drives that can be grouped into a unit; also called a *volume*.

loop cable Interconnect cable.

loop card Interconnect card.

M

master unit The main controller unit in a partner group configuration.

media access control (MAC) address A unique address that identifies a storage location or a device.

media interface adapter (MIA) An adapter that converts fiber-optic light signals to copper.

megabyte (MB or Mbyte) One megabyte is equal to one million bytes (1x106).

megabytes per second (MB/s) A performance measurement of the sustained data transfer rate.

P

parity Additional information stored with data on a disk that enables the controller to rebuild data after a drive failure.

partner group A pair of interconnected controller units. Expansion units interconnected to the pair of controller units can also be part of the partner group.

power and cooling unit A FRU component in the Sun StorEdge T3 disk tray. It contains a power supply, cooling fans, and an integrated UPS battery. There are two power and cooling units in a Sun StorEdge T3 disk tray.

pSOS A real-time operating system used as the primary operating system for the Sun StorEdge T3 disk tray.

R

read caching Data for future retrieval, to reduce disk I/O as much as possible.

reliability, availability, serviceability (RAS) A term to describe product features that include high availability, easily serviced components, and very dependable.

redundant array of independent disks (RAID) A configuration in which multiple drives are combined into a single virtual drive, to improve performance and reliability.

S

Simple Network Management Protocol (SNMP) A network management protocol designed to give a user the capability to remotely manage a computer network.

synchronous dynamic random access memory (SDRAM) A form of dynamic random access memory (DRAM) that can run at higher clock speeds than conventional DRAM.

system area Located on the disk drive label, the space that contains configuration data, boot firmware, and file system information.

U

uninterruptable power source (UPS) A component within the power and cooling unit. It supplies power from a battery in the case of an AC power failure.

unit interconnect card (UIC) *See* Interconnect Card.

V

volume Also called a LUN, a volume is one or more drives that can be grouped into a unit for data storage.

W

write caching Data used to build up stripes of data, eliminating the read-modify-write overhead. Write caching improves performance for applications that are writing to disk.

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