StorageTek Virtual Tape Storage System (VTSS) for VSM5®

Installation and Service Guide

Part Number: 96254
Revision: A

Virtual Tape Storage Subsystem (VTSS)

for VSM5®

Installation and Service Guide

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Revision A (September 2006)

This document contains 354 pages. “Revision History / Summary of Changes” on page v lists release dates, part numbers, and editions for this document, plus a brief summary of significant content changes.

Revision History / Summary of Changes

EC	Doc PN	SAP Revision	Release Date	Supported Versions / Summary of Changes
133687	96254	A	September 2006	New document created for FRS release of VSM5-VTSS. Includes content for 2Gb back-end FC loops, VCF3 cards, 146GB drives, and detached operator panel.

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Warranty Notice

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Any changes or modifications made to this equipment which are not expressly approved in advance by Sun will void the warranty, and may cause the equipment to create harmful interference.

Class 1 Laser Product Notice

Laser transceivers are classified as Class 1 Laser Product, and have an output less than 70 microwatts and a wavelength of 850 nm. Sun Class 1 Laser Products comply with EN 60 825-1(+A-11) and with sections 21 CFR 1040.10 and 1040.11 of the Food and Drug Administration (FDA) regulations. The following translations are provided to identify laser safety and classification:

Finnish: Luokan 1 laserlaite
French: appariel A laser de classe 1
Swedish: klasse 1 laser apparat

DANGER !!

Lasers and high-frequency signals used in optical fiber cables can cause eye injury if safety precautions are not followed. To prevent injury, observe these precautions: Never look directly into an optical fiber cable, laser transceiver, or connector; ensure that all transceiver optical ports are terminated with a cable or cover; and comply with all warning labels on fiber optic components.

Cabling Notice

Cables used to connect peripherals to a VSM5-VTSS must be shielded and grounded. Operation of peripheral equipment with cables that are not shielded and correctly grounded may result in interference to radio and TV reception.

■ Hazardous Materials Handling

Lead-acid battery packs and lithium-battery cards used in a VSM5-VTSS are classified as hazardous materials. Sun personnel are required to comply with U.S. Department of Transportation (DOT), International Civil Aviation Organization (ICAO) and International Maritime Dangerous Goods (IMDG) Code requirements for shipping, recycling, and disposal of hazardous materials. If you have questions about these requirements, contact the Sun Environmental Health and Safety (EHS) group in Louisville, Colorado (USA).

■ Standards Conformance

This VSM5-VTSS conforms to all necessary North American (U.S./Canada) and international standards for product safety, electromagnetic compatibility (EMC), body schemes, and binary multiples as defined below.

Product Safety Standards

This VSM5-VTSS complies with the following product safety standards:

- Underwriters Laboratories (UL) – Listed by Underwriters Laboratories UL 1950, Information Technology Equipment, Third Edition
- Canadian Standards Association (CSA) – Certified to Canadian Standards Association, CAN/CSA C22.2 No. 950-95, Information Technology Equipment, Third Edition
- International Electrotechnical Commission (IEC) – Complies with IEC Publication 950, Safety Information Technology Equipment through TUV (Technischer Ueberwachungsverein).

Electromagnetic Compatibility

This VSM5-VTSS complies with the following referenced standards for electromagnetic compatibility (EMC):

United States: Federal Communications Commission (FCC) – This equipment complies with FCC Title 47, Part 15 Subpart B, Unintentional Radiators Class A.

FCC Compliance Statement: This equipment has been tested and found to comply to the limits for Class A digital devices pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.

Canada: Canadian Department of Communications (CDC) – This equipment complies with Canadian EMC law CDC ICES-003.

European Union (CE Mark) – This equipment complies with Electromagnetic Compatibility Directive 89/336 (as amended).

Australia/New Zealand – This equipment complies with EMC Framework—AS/NZS 3548: 1995.

China – This equipment complies with CNS 13438.

Korea – This equipment complies with Korean EMC Law.

Japan: Voluntary Control Council for Interference (VCCI) – This equipment complies with VCCI (Japan) Class A (C15PR22).

VCCI Compliance Statement (Japanese translation):

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。

VCCI Compliance Statement (English translation): This is a Class A product based on the Technical Requirement of the Voluntary Control Council for Interference (VCCI) by information technology equipment. In a domestic environment, this product may cause radio interference, in which case the user may be required to take corrective action.

Taiwan: Bureau of Commodity Inspection and Quarantine (BCIQ) – This equipment complies withBCIQ EMC Law—Taiwan: CNS13438.

The following warning label statement pertains to BSMI regulations in Taiwan, R.O.C.:

Taiwan Warning Label Statement (Taiwanese translation):

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。

Taiwan Warning Label Statement (English translation): This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

CISPR 22 and EN55022 Warning – This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Internal Code License Statement

NOTICE

INTERNAL CODE LICENSE

PLEASE READ THIS NOTICE CAREFULLY BEFORE INSTALLING AND OPERATING THIS EQUIPMENT. THIS NOTICE IS A LEGAL AGREEMENT BETWEEN YOU (EITHER AN INDIVIDUAL OR ENTITY), THE END USER, AND SUN MICROSYSTEMS, INC. ('SUN'), THE MANUFACTURER OF THE EQUIPMENT. BY OPENING THE PACKAGE AND ACCEPTING AND USING ANY UNIT OF EQUIPMENT DESCRIBED IN THIS DOCUMENT, YOU AGREE TO BECOME BOUND BY THE TERMS OF THIS AGREEMENT. IF YOU DO NOT AGREE WITH THE TERMS OF THIS AGREEMENT, DO NOT OPEN THE PACKAGE AND USE THE EQUIPMENT. IF YOU DO NOT HAVE THE AUTHORITY TO BIND YOUR COMPANY, DO NOT OPEN THE PACKAGE AND USE THE EQUIPMENT. IF YOU HAVE ANY QUESTIONS, CONTACT THE AUTHORIZED SUN DISTRIBUTOR OR RESELLER FROM WHOM YOU ACQUIRED THIS EQUIPMENT. IF THE EQUIPMENT WAS OBTAINED BY YOU DIRECTLY FROM SUN, CONTACT YOUR SUN REPRESENTATIVE.

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   a. "Derivative works" are defined as works based upon one or more pre-existing works, such as a translation or a musical arrangement, or any other form in which a work may be recast, transformed, or adapted. A work consisting of editorial revision, annotations, elaboration, or other modifications which, as a whole, represent an original work of authorship, is a Derivative work.

   b. "Internal Code" is Microcode that (i) is an integral part of Equipment, (ii) is required by such Equipment to perform its data storage and retrieval functions, and (iii) executes below the user interface of such Equipment. Internal code does not include other Microcode or software, including data files, which may reside or execute in or be used by or in connection with such Equipment, including, without limitation, Maintenance Code.

   c. "Maintenance Code" is defined as Microcode and other software, including data files, which may reside or execute in or be used by or in connection with Equipment, and which detects, records, displays, and/or analyzes malfunctions in the Equipment.

   d. "Microcode" is defined as a set of instructions (software) that is either imbedded into or is to be loaded into the Equipment and executes below the external user interface of such Equipment. Microcode includes both Internal Code and Maintenance Code, and may be in magnetic or other storage media, integrated circuitry, or other media.

2. The Equipment you have acquired by purchase or lease is manufactured by or for Sun and contains Microcode. By accepting and operating this Equipment you acknowledge that Sun or its licensor(s) retain(s) ownership of all Microcode, as well as all copies thereof, that may execute in or be used in the operation of servicing of the Equipment and that such Microcode is copyrighted by Sun or its licensor(s).

3. Sun hereby grants you, the end user of the Equipment, a personal, nontransferable (except as permitted in the transfer terms in paragraph 7 below), nonexclusive license to use each copy of the Internal Code (or any replacement provided by Sun or your authorized Sun distributor or reseller) which license authorizes you, the end user, to execute the Internal Code solely to enable the specific unit of Equipment for which the copy of Internal Code is provided to perform its data storage and retrieval functions in accordance with Sun's (or its licensor's) official published specifications.

4. Your license is limited to the use of the Internal Code as set forth in paragraph 3 above. You may not use the Internal Code for any other purpose. You may not, for example, do any of the following:

   (a) access copy, display, print, adapt, alter, modify, patch, prepare Derivative works of, transfer, or distribute (electronically or otherwise) or otherwise use the Internal Code;

   (b) reverse assemble, decode, translate, decompile, or otherwise reverse engineer the Internal Code (except as decompilation may be expressly permitted under applicable European law solely for the purpose of gaining information that will allow interoperability when such information is otherwise not readily available); or

   (c) sublicense, assign, or lease the Internal Code or permit another person to use such Internal Code, or any copy of it.

   If you need a backup or archival copy of the Internal Code, Sun, or your authorized Sun distributor or reseller, will make one available to you, it being acknowledged and agreed that you have no right to make such a copy.

5. Nothing in the license set forth in paragraph 3 above or in this entire Notice shall convey, in any manner, to you any license to or title to or other right to use any Maintenance code, or any copy of such Maintenance Code. Maintenance Code and Sun's service tools and manuals may be kept at your premises, or they may be supplied with a unit of Equipment sent to you and/or included on the same media as Internal Code, but they are to be used only by Sun's customer service personnel or those of an entity licensed by Sun, all rights in and to such Maintenance Code, service tools and manuals being reserved by Sun or its licensors. You agree that you shall not use or attempt to use the Maintenance Code or permit any other third party to use and access such Maintenance Code.

6. You, the end user, agree to take all appropriate steps to ensure that all of your obligations set forth in this Notice, particularly in paragraphs 4 and 5, are extended to any third party having access to the Equipment.

7. You may transfer possession of the Internal Code to another party only with the transfer of the Equipment on which its use is authorized, and your license to use the Internal Code is discontinued when you are no longer an owner or a rightful possessor of the Equipment. You must give such transferee all copies of the Internal Code for the transferred Equipment that are in your possession, along with a copy of all provisions of this Notice. Any such transfer by you is automatically (without further action on the part of either party) expressly subject to all the terms and conditions of this Notice passing in full to the party to whom such Equipment is transferred, and such transferee accepts the provisions of this license by initial use of the Internal Code. You cannot pass to the transferee of the Equipment any greater rights than granted under this Notice, and shall hold Sun harmless from any claim to the contrary by your transferee or its successors or assigns. In addition, the terms and conditions of this Notice apply to any copies of Internal Code now in your possession or use or which you hereafter acquire from either Sun or another party.

8. You acknowledge that copies of both Internal Code and Maintenance Code may be installed on the Equipment before shipment or included with the Equipment and other material shipped to you, all for the convenience of Sun's service personnel or service providers licensed by Sun, and that during the warranty period, if any, associated with the Equipment, and during periods in which the Equipment is covered under a maintenance contract with Sun or service providers licensed by Sun, both Internal Code and Maintenance Code may reside and be executed in or used in connection with such Equipment, and you agree that no rights to Maintenance Code are conferred upon you by such facts. Sun or the licensed service provider may keep Maintenance Code and service tools and manuals on your premises but they are to be used only by Sun's customer service personnel or those of service providers licensed by Sun. You further agree that upon (i) any termination of such warranty period or maintenance contract period; or (ii) transfer of possession of the Equipment to another party, Sun and its authorized service providers shall have the right with respect to the affected Equipment to remove all service tools and manuals and to remove or disable all Maintenance Code and/or replace Microcode which includes both Internal Code and Maintenance Code with Microcode that consists only of Internal Code.

Safety / Fiber Optic / ESD Precautions

The following precautions must be followed during all phases of equipment installation, operation, and servicing. Equipment users are responsible for following warnings and cautions, and for taking other appropriate steps to assure safe equipment operation. Sun assumes no liability for failure to comply with these requirements.

■ Safety Precautions

To prevent hazardous conditions and personal injury, follow these safety precautions:

Verify Proper Equipment Grounding

Ensure cabinet frames are properly connected to an electrical earth ground. AC power supplies require a three-conductor power cable. Source power cables must be plugged into approved three-contact electrical outlets. Power cable jacks and mating plugs must meet electrical code requirements for the intended area of use and also comply with International Electrotechnical Commission (IEC) safety standards.

Avoid Electric Shocks

Only qualified personnel may remove equipment covers for servicing. Before starting a service procedure, remove conductive metal objects from your person including rings, watches, necklaces, and badge chains. Use a conductive wrist strap and work mat grounded to a jack or unpainted metal surface on a cabinet frame. Never touch exposed connector pins or sockets, or leave ‘live’ cable ends exposed.

Use Only Approved Tools and Test Equipment

Use only approved tools and test equipment supplied in the standard CSE tool kit. Always ground test equipment to a grounding jack on the cabinet frame. Repair or replace any damaged tools or test equipment prior to use.

Be Aware of Your Operating Environment

Never operate electrical or electronic equipment in the presence of flammable gases or fumes, as these can create an explosion hazard.

Never Service or Adjust Equipment Alone

Never service or adjustment equipment unless another person capable of rendering first aid and resuscitation is present.

Do Not Substitute Parts or Modify Equipment

To assure equipment safety features are maintained, and to avoid introducing additional hazards, never install substitute parts or modify Sun equipment without explicit permission from Sun technical support personnel. Never remove, cut, or relocate raised-floor tiles without first receiving customer permission.

Provide Adequate Equipment Clearances

Make sure there is sufficient clearance around equipment to facilitate airflow and heat dissipation, and to maintain ambient system temperatures within recommended operating ranges. Provide clearances that allow cabinet doors to open at least 90 degrees, and to be easily removed for servicing equipment or in emergency situations.

Strictly Comply With Caution and Warning Messages

To prevent injury and equipment damage, comply with all caution and warning messages in this document. Also employ any and all other precautions which you deem necessary for safe operation of equipment in your specific operating environment.

Carefully Follow Procedural Steps

Always complete procedural steps in listed order. Performing steps out of order can expose you to potentially hazardous or lethal conditions.

Protect Yourself From Moving Parts

Restrict loose clothing and long hair to avoid becoming entangled in moving parts such as fans, impellers, and blowers.

Promptly Reinstall Covers and Doors

After completing service procedures, promptly reinstall cabinet covers, and close and lock cabinet doors to maintain proper cabinet airflow, prevent overheating, and restrict accessibility to energized FRUs.

Miscellaneous Safety Precautions

To prevent tipovers, never tilt a cabinet beyond a 15-degree angle (e.g., when ascending or descending ramps). Use caution when working near open floor tiles. Use good housekeeping practices to avoid fire hazards and to reduce the potential for mishaps.

■ Electrostatic Discharge Precautions

Electrostatic discharge (ESD)-sensitive components must always be handled under protected conditions, and ESD-preventive equipment must be used when servicing equipment. Employees who handles ESD-sensitive parts must be aware of the damage that ESD can cause, and must take the following precautions to prevent it.

Use ESD-Preventive Equipment

Always use Field Service Grounding Kit P/N 4711 when installing or servicing Sun equipment. Always use a conductive wrist strap and antistatic work mat, and ensure those are grounded to a jack or unpainted metal on the cabinet frame when working.

Regularly Check and Clean ESD-Preventive Equipment

Regularly (at least monthly during frequent use) verify the resistance of wrist-strap grounding cords to be between 0.8M ohm (Ω) and 1.2M ohm (Ω), and work mat cords to be less than 1.2M ohm (Ω); replace damaged cords or any that do not meet these specifications. Regularly (at least monthly during frequent use) clean antistatic work mats; ACL Conductive Cleaner is preferred for this purpose since it leaves no residue, but isopropyl alcohol or a mild detergent and water solution can also be used.

Remove Conductive Personal Items

Before beginning service procedures inside a cabinet, remove all conductive metal objects from your person including rings, watches, necklaces, and badge chains.

Handle ESD-Sensitive Components Carefully

Keep circuit cards, ASICs, and other ESD-sensitive components away from ESD sources and extraneous electrical currents. Keep parts in ESD-protective packaging until installation, and store removed ESD-sensitive parts in protective packaging.

Fiber Optic Component Handling Precautions

To prevent damage to optical fiber cables and connectors, and to mitigate inherent hazards from laser-light emissions, always follow these general handling precautions:

Protect Your Eyes

Never aim the output of a laser, or of an optical fiber connected to a laser, directly into your eyes. Do not examine an optical connector on any cable that is still attached to its data transmission port, since laser light may be present in the cable. Before examining the end of an optical fiber, verify that no laser-light signals are present. Always cap unused data transmission ports on channel interface cards.

Handle Fiber Optic Components Gently

Handle fiber cables and connectors gently to prevent damage. Never grasp cables or connectors with pliers or grippers, or attach pulling devices to them. Never bend fiber cables (e.g., when routing along cable paths or guides) to a radius of <12 mm (<0.5 in.), and do not coil cables to <96 mm (<3.74 in.) in diameter. Use strain-relief mechanisms to prevent the weight of cables from damaging fibers. Protect cables from sharp edges or protrusions, heat sources, and other damaging conditions. Ensure that equipment openings and floor cutouts have protective edging at cable contact points.

Prevent Contamination of Cable Ends

Avoid touching the core of optical cables, as this can contaminate fibers and prevent light transmission. If a cable-end becomes contaminated, remove any loose debris using canned air or by gently tapping the connector, then clean the cable-end with an approved cleaning kit. Leave protective caps on cable-ends until cables are attached to a connector; after disconnecting cables, always reinstall clean protective caps.

About This Guide

Product Overview

Virtual Storage Manager® (VSM®) is a disk-based virtual tape system that provides enterprise-class storage management capabilities for MVS-based systems. Its scalable design, which includes Virtual Tape Control System (VTCS) host software and an intelligent Virtual Tape Storage Subsystem (VTSS) disk buffer, optimizes streaming workloads and backup and recovery functions, reduces management overhead, and maximizes tape capacity utilization to reduce data protection costs in a wide range of storage environments.

Intended Audience

This document is intended for use by Sun Microsystems personnel and other qualified service providers (QSPs)[1] involved with site planning, installation, configuration, testing, certification, servicing, and technical support of VSM5 system equipment.

Users of this document should have a working knowledge of the following concepts and technologies: virtualization; Ethernet; FICON, fibre channel, and network topologies; tape storage (tape drives and tape libraries); and disk storage.

Providing Feedback About This Document

Your feedback helps ensure the accuracy and completeness of this document. Please direct all comments regarding this publication to the Sun Learning Services e-mail feedback system at slsfs@sun.com.

To assure proper handling of your correspondence, specify the publication name, part number, edition number, and referenced page(s) in your e-mail. If you would like a personal response, you must also include your contact information. Submitted content becomes the sole property of Sun.

Optimizing Content For Electronic Viewing

If a digitized photograph, screen capture, line drawing, or other graphic has been reduced to fit in this document, small text in the image may be unreadable when viewed in an Adobe Acrobat® PDF file at 100% or lower scaling on some electronic displays.

To correct this problem, use Acrobat Reader scaling tools to increase the image size until affected text becomes legible. The amount of ‘upscaling’ required will depends on several factors, including: the original point size of the text; the original dimensions and resolution of the image; and how much the image was scaled down.

1. Third-party contractors certified and authorized by Sun to work with the systems and equipment described in this guide.

Alert Messages

Alert messages used within this document are presented as follows:

Note: A note provides emphasis or additional useful detail about a topic or procedure, and can either precede or follow the information it references.

CAUTION !

A caution directs urgent attention to an action or condition which could damage equipment or corrupt data or system software if the accompanying procedure is not completed or is performed incorrectly. A caution <u>always precedes</u> the information it references.

DANGER !!

A danger message directs urgent attention to an action or condition that has potential to create a hazardous situation or to cause immediate, severe, and possibly fatal injury or adverse long-term health effects if the accompanying procedure is not completed or is performed incorrectly. A danger message <u>always precedes</u> the information it references.

Notational and Typographic Conventions

The following notational and typographic conventions are used throughout this document to highlight key words, phrases, and actions.

Item	Example(s)	Description of Convention
Publications; course titles	*Installation and Service Guide*	Italic font
MS Windows or GUI screen titles	*<u>Ethernet Setup</u>* screen	Italic underlined font
Computer keyboard input keys	Press the [<u>Enter</u>] key.	Monospaced underlined font in square brackets [ ]
User-keyed non-variable inputs; system-generated outputs	**show systemstate**	Monospaced bold font
User-keyed variable inputs	**Name = *<system name>***	Monospaced italic bold font in angled brackets < >
E-mail and IP addresses; URLs; file and folder names; active fields and icons in GUI windows	<u>glsfs@sun.com</u>; click <u>Submit</u>; <u>www.support.storagetek.com</u>; <u>cli.exe</u> file; <u>129.80.64</u> subnet	Monospaced underlined font
Emphasized text	Do <u>not</u> touch exposed wiring...	Underlined font
Physical VTSS labels for FRUs, LED indicators, ports, or switches	**POWER ON** indicator; **ETH0** port; **POWER ENABLE** switch	Bold caps font
Hypertext link (in PDF file) to a figure, table, procedure step, or section heading	See Figure 2-1 on page 2-27; Repeat Step 3; See "Assigning Passwords" on page 4-11.	Blue font (prints black in black and white photocopies)
Text references to numbered callouts in accompanying artwork	Pull the D-ring handle **[3]**.	Bold font in bold square brackets **[ ]**

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Where to Find Additional Information

Additional information about the complete line of Sun StorageTek products and services is provided through various media, as described below.

Reference Documents

The VSM5 Virtual Tape Storage Subsystem (VTSS) is one of several hardware and software components that link together to create the VSM5 system. Besides this document, it may be useful to consult some or all of the reference documents listed below to complete planning, system assurance, installation, and service tasks for other VSM components designed for a specific customer site.

Document Name and Part Number	Availability
VSM Hardware	
VTSS for VSM5 – Planning and System Assurance Guide, 96257	1
VTSS for VSM5 – Installation and Service Guide, 96254	1
T9x40 Tape Drive Planning and Migration Guide, MT6004	1
Nearline Physical Planning Guide, ML0041	1
Nearline Enterprise 9310/4410/9360 LSM System Assurance Guide, ML6500	1
TimberWolf 9740 Library Storage Module System Assurance Guide, MT5100	1
VSM Software	
VTCS *n.n* * Quick Reference Guide	1, 2
VTCS *n.n* * Installation and Configuration Guide	1, 2
VTCS *n.n* * Administrator’s Guide	1, 2
VTCS *n.n* * Command and Utility Reference	1, 2
VTCS *n.n* * Messages and Codes	1, 2
VTCS *n.n* * XML Reference	1, 2
Remote Service and Support	
Service Delivery Platform System Assurance Guide	1, 3
Service Delivery Platform Installation and Configuration Guide	1, 3

Notes:

1. Sun StorageTek Customer Resource Center (CRC) website: www.support.storagetek.com.
2. Sun StorageTek Software Manufacturing and Distribution – Web: www.support.storagetek.com, then under *CRC Tools* click *Software Manufacturing and Distribution*; E-mail: LSVSMD-list@louisville.stortek.com; Phone: U.S. (outside Colorado) and Canada 1.800.436.5554, International and within Colorado 1.303.673.8562.
3. Sun StorageTek Hardware Manual Scheduling – Phone: 1.303.673.6241.

- * Use documents labeled as version 6.0 or higher, which is the minimum host software level required for compatibility with VTSS back-end FICON channels.

VSM Engineering Website

Extensive and detailed information about VSM, including engineering documents, Redbooks, White Papers, and standards, is available through the VSM Engineering website at http://vsm.stortek.com. Website access is restricted to Sun employees.

Customer Resource Center

The Sun StorageTek Customer Resource Center (CRC) website at www.support.storagetek.com provides resources including product documents, software keys, code downloads, SE tools, and information on product education and training. Website access is restricted to Sun employees, registered customers with a current warranty or maintenance service agreement, and registered partners.

Product-Specific Documentation

The latest editions of documents for all Sun StorageTek products can be printed from PDF files available on the CRC website; see "Customer Resource Center" above for more information. VSM documents, including those for VTCS software and VTSS hardware, are available through the path Current Products > Tape Products > Virtual Storage Manager on the CRC website.

VTCS software documents, including a *Quick Reference Guide*, *Installation and Configuration Guide*, *Administrator's Guide*, *Command and Utility Reference, Messages and Codes*, and *XML Reference*) also are provided on a CD-ROM that ships with each VSM system. To order additional CDs, contact Sun StorageTek Software Manufacturing and Distribution (SMD) at 800.436.5554, 303.673.8600, or www.support.storagetek.com, and request the *VTCS Information* CD. To order individual software documents in bound-book format, contact the SMD group.

Product Education and Training

The Sun StorageTek Learning Network website at http://learning.stortek.com provides education and training courses for all Sun products, including the VTSS for VSM5. Website access is restricted to Sun employees. Courses for the VSM5 system include:

- CRS-100178 – *VSM MVS Systems Administration* for employees
- CRS-100267 – *VSM MVS Systems Administration* for customers
- CRS-102711 – *Detached Operator Panel (DOP)* webinar
- CRS-101*nnn* – *VTSS for VSM5 Differences*
- CRS-100014 – *SVA9500 and VSM Installation and Maintenance*
- CRS-101182 – *FICON Native - T9X40 Tape Drive*.

SE Support Tools

SE tools, white papers, and other content for use with Sun StorageTek products, including VSM5 system equipment, are available through the SE Support Tools website at http://gandalf.stortek.com/SE_Tools/index.html. Website access is restricted to Sun employees.

Global Services Field Support Tools

Resources to assist with sales and support of VSM5 system equipment and other Sun StorageTek products and services are located on the Global Services field Support Tools website at http://sunsolve.central.sun .com/handbook_internal/FieldTools/. Website access is restricted to Sun employees.

Storage Sales Community

Marketing collaterals and configuration documents for all Sun StorageTek products, including VSM5 system equipment, are available on the Storage Sales Community website at https://portal.storagetek.com/sales. Website access is restricted to Sun employees.

Partners

The Sun StorageTek Partners website at https://members.storagetek.com provides information about products, services, customer support, upcoming events, training programs, and sales tools to support Sun Partners. Website access is restricted to Sun employees and registered Sun partners.

'Documents on CD'

Documents on CD is a set of CD-ROMs that contain documents for many Sun StorageTek tape, disk, and storage networking products, and is shipped quarterly to field offices. Contact your manager to obtain a current copy.

■ Colophon

This document was created using Adobe FrameMaker 7.0 publishing software, and was converted to a PDF (portable document format) file using Adobe Acrobat Writer 7.0 document conversion software. Acrobat Reader software (Version 5.0 or higher)[1] is required to view PDF versions of this document.

1. This software can be downloaded free from www.adobe.com.

Installing a VSM5-VTSS

1

This chapter provides information and defines procedures related to installation of a VSM5-VTSS cabinet by a Sun customer service engineer (CSE) or other qualified service provider (QSP)[1]. Content includes:

Note: To ensure correct operation of the VSM5-VTSS, and synchronization with customer and Sun equipment and other resources, installation procedures should always be completed in the same sequence as outlined in this chapter.

1. Third-party contractors certified and authorized by Sun to work with the systems and equipment described in this guide.

■ Verifying Installation Readiness

Before beginning installation of a VTSS for VSM5, review the *Planning and System Assurance Guide* that has been prepared for this site. Ensure that all tasks and activities defined in that guide have been completed, and that site-specific information recorded in forms and worksheets in that guide is correct and complete. If omissions or errors are noted, or if you do not have a filled-out copy of the planning guide, contact your Sun account executive (AE), Professional Services, or Technical Support for assistance before continuing.

This installation procedure assumes that all needed cables (power cables, channel cables, Ethernet cables, etc.) have been ordered and are available at the site prior to beginning the installation. Notify your manager of any cabling problems before continuing.

Note: You are required to comply with applicable national and local codes and regulations for cable routing. If there are unresolved cabling issues, consult with the customer data center manager to resolve those issues before continuing. Contact Sun Professional Services for further assistance as needed.

■ Required Tools and Equipment

Most tools needed for installing a VSM5-VTSS are included in the standard CSE tool kit. The following tools also are required, and can be ordered through parts depots:

- Cutting blade (box cutter, Stanley knife, X-Acto knife, or similar)
- 10mm (3/8-inch) ratchet or socket wrench
- 19mm (3/4-inch) ratchet or socket wrench
- Cabinet door key, PN 05J5252 (one pair ships with the VTSS cabinet)
- Torx kit, PN 93F2830
- Torx T-30 insert bit, PN 25F9672
- Field Service Grounding Kit

Required Hardware and Software for DOP Connection

The following hardware and software is required to use your service laptop PC for accessing the VTSS for VSM5 through the detached operator panel (DOP) facility:

- MS Windows 2000, NT 4.0 or higher, or XP 5.1 or higher operating system
- Internet Explorer 6.0 or higher
- Detached operator panel (DOP) installation software
- CAT5 network Ethernet cable; straight-through type (PN 410828901) or cross-over type (PN 24100163), depending on the DOP connection location[1]

Related Procedures

- "Configuring the Service Laptop PC" on page 1-31
- "Enabling the Detached Operator Panel" on page 1-47.

1. When connecting a service laptop PC to the A-Hub Ethernet port at the front of the VTSS, either cable type can be used. When connecting a service laptop PC to a remote-link Ethernet port at the back of the VTSS (**ETH0** or **ETH1**), a cross-over cable is required.

■ Configuring the Service Laptop PC

Complete these steps to configure your service laptop PC for use with a VTSS for VSM5:

Setting the TCP/IP Configuration

Complete these steps to set the TCP/IP configuration on your service laptop PC:

1. From the PC desktop, click Start > Settings > Network and Dial-Up Connections.
2. Click the Local Area Connection icon, then click Properties.
3. Check the box for Internet Protocol (TCP/IP), highlight that component, then click the Properties button.
4. Select the radio button labeled Use the following IP address. Type 129.80.64.1[1] in the IP address field, and 255.255.255.0 in the Subnet mask field, then click OK.
5. Reboot your PC as needed to enable the connection.

Note: If the VTSS will be on a virtual private network (VPN) behind the Service Delivery Platform (SDP), an IP address in the range of 192.168.0.2 to 192.168.0.19 must be used for the service laptop PC instead of the address shown above.

Downloading and Installing the DOP Software Package

Complete these steps to download the detached operator panel (DOP) facility software package to your service laptop PC, and to install the package components:

1. Ensure the browser on your PC is set to allow popups. Navigate to the C: drive Temp folder and create a subfolder titled DOP to hold the package downloads.
2. At the SVA-VSM code download page (http://gandalf.stortek.com/microcode/SVA_V2Xf/ec/), click the cse_dop_revf.exe link to display a download window for the file, then click Open. Ensure the folder C:\Temp\DOP is listed in the Unzip to folder: field, then click Unzip to download the files to that location.
3. Next, click the dop_rev_h_upgrade.exe link to display a download window for that file, then click Open. Ensure the folder C:\Temp\DOP is listed in the Unzip to folder: field, then click Unzip to download the upgrade files to that location. These upgrade files contain VSM5-specific DOP updates.
4. Click the C:\Temp\DOP folder to display the downloaded files. Click the readme.txt file and follow the instructions to install the Apache Server, Perl Interpreter, and VShell components, plus miscellaneous graphic, html, and cgi filetypes for DOP support.

Note: The Perl Interpreter is not intended for customer use. A separate DOP package without the Perl application is available for customers to download at the website http://www.activestate.com/.

1. This address (on the 129.80.64 subnet) should always be valid for use when the VTSS IP address is 129.80.64.242 (the default address assigned to VTSS units during manufacturing). If the customer has assigned the VTSS a different (non-default) IP address, the address selected for this field must be on that customer-assigned subnet.

Obtaining Keys for VTSS Features and Options

The VSM5-VTSS uses unique 'keys' (alpha-numeric character strings) to enable its installed hardware, software, and options[1]. Keys are supplied through the Sun StorageTek Customer Resource Center (CRC) website at www.support.storagetek.com and should be requested at least 24 hours before you arrive at the installation site.

At the CRC website, under the Tools and Services heading, click Software Keys. Locate the V2XF Features and Softwares heading and click the V2XF heading. Complete the form and click Submit. Requested keys will be sent to you by e-mail within 24 hours. Contact your Account Executive (AE) if you lack information needed to complete the form, including the SAP/STK sales order number, site ID, VTSS serial number, etc.

Permanent keys are issued from 7:30 am to 3:30 pm (07h30-15h30) MST (U.S.) Monday through Friday. If you need a key outside the hours listed above, use the emergency key generator on the website noted above to generate a temporary key good for 7 days, after which you will need to obtain a permanent key.

Related Procedure

- "Installing VTSS Options" on page 1-47

Setting Up Service Delivery Platform Equipment

In accounts using the Service Delivery Platform, SDP equipment should be set up prior to installing the VSM5-VTSS. If SDP equipment has not been installed, obtain current instructions from the Sun StorageTek Customer Resource Center (CRC) website at www.support.storagetek.com and install the equipment before continuing.

Unpacking the VTSS Cabinet

See Figure 1-1 on page 1-33 and complete these steps to unpack a VSM5-VTSS cabinet:

1. Check the two 'tip and tell' indicators on the VTSS shipping container to verify proper handling of the cabinet during transit. If the indicators show problems may have occured, contact Sun Technical Support before continuing with the installation. Additional checks for damage or problems will be completed later, as described in "Inspecting the VTSS for Moisture and Damage" on page 1-37.
2. Move the crated cabinet from the shipping dock to a pre-installation staging area or to the installation site, according to customer requirements.
3. Remove the bag of nuts and washers from the pallet ramp; these will be used to fasten the ramp to the pallet.

Caution: To avoid personal injury and damage to VTSS components, use caution when cutting the ramp retaining straps in Step 4 below. The ramp weighs >10.0 kg (22.0 pounds), and the straps are the only restraint holding it in place. Be sure you have a firm grip on the ramp before cutting its last retaining strap.

1. Options enabled with keys include: maintenance capability; clustered VTSS; cache size; 32 CIP ports; and physical array capacity.

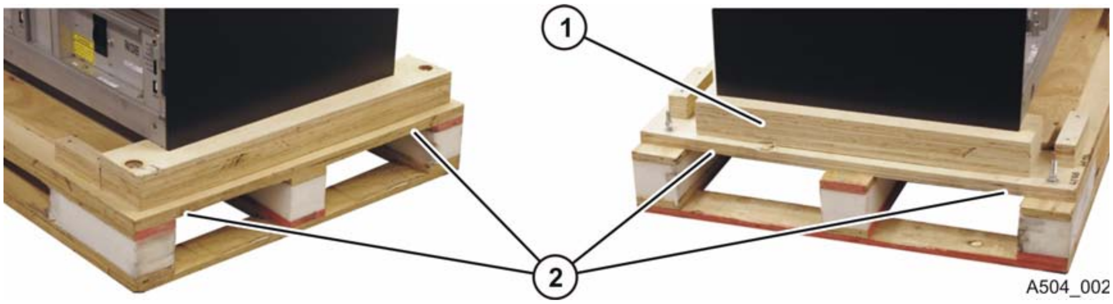
4. With one hand firmly holding the ramp, carefully cut the three retaining straps that secure the ramp to the pallet and packaging, then carefully lower the ramp to the floor.
5. Cut and discard the two remaining horizontal straps securing the cardboard shipping container, then remove and discard the cardboard shipping container.
6. Remove and discard the plastic shipping bag covering the VTSS cabinet.
7. Remove the shipping kit from the top of the VTSS cabinet and verify that it contains two power cables and four wire wheel blocks.

Figure 1-1. VSM5-VTSS in Shipping Container on Shipping Pallet

1. Shipping kit – box strapped to top of VTSS shipping container; contains CD-ROM with customer (software) documents, plus two wire wheel chocks to keep the cabinet from rolling. 2. ‘Tip and Tell’ indicators – 2 total; used to indicate whether the cabinet was tipped beyond a certain angle or roughly handled during transit, which could indicate that damage or dislocation has occurred to the cabinet frame, racks, or internal components.	3. Pallet ramp – used to support the cabinet as it is rolled off the shipping pallet. 4. Pallet ramp hardware – packaged washers and nuts; used to secure the ramp to the shipping pallet. 5. Banding straps – 3 horizontal, 2 vertical (5 total); used to secure the shipping container and pallet ramp during transit.

8. Referencing Figure 1-2 and Figure 1-3 below, unfasten the four cabinet frame hold-down bolts on the underside of the pallet.

Figure 1-2. Location of Cabinet Frame Hold-Down Bolts and Removable Shipping Block

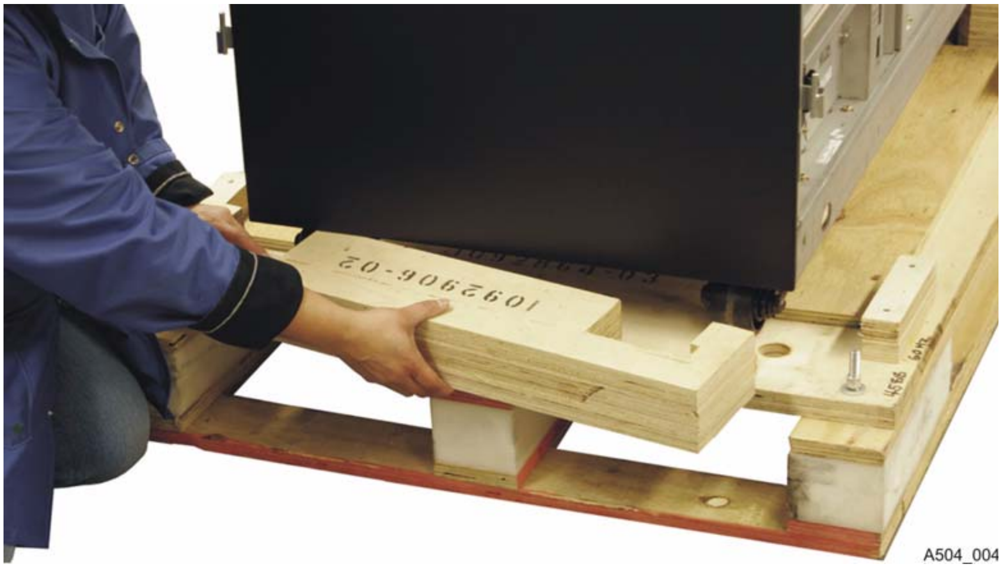


1. Removable shipping block. **Note**: A similar block on the other end of the pallet is nailed in place and is not intended to be removed.	2. Locations of cabinet frame hold-down bolts (4 total)

Figure 1-3. Removing the Cabinet Frame Hold-Down Bolts

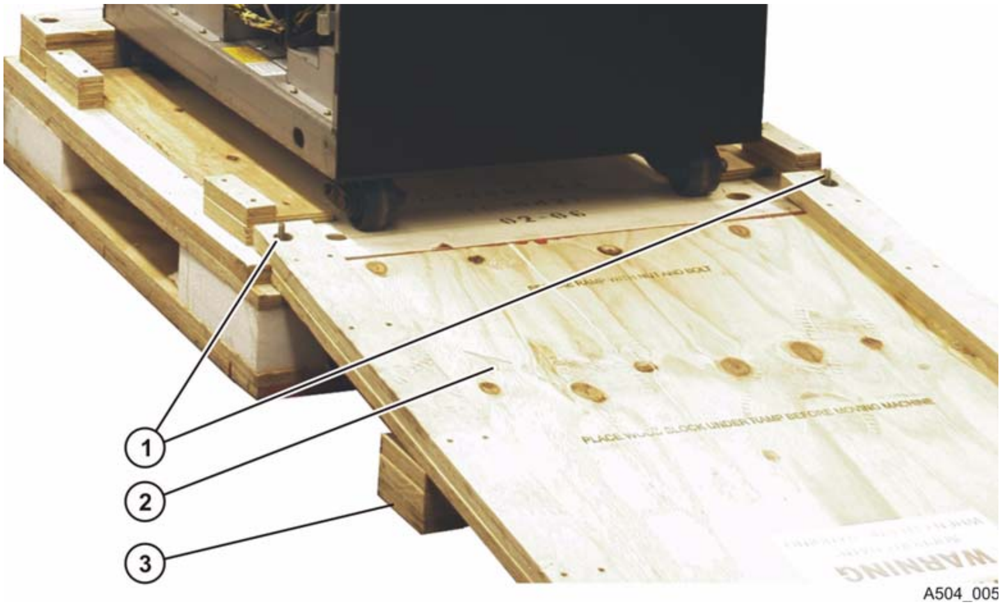
9. Referencing Figure 1-2 above and Figure 1-4 below, remove the shipping block and set it aside for later use as a ramp support.

Figure 1-4. Removing the Shipping Block



10. Referencing Figure 1-5 below, attach the ramp to its hold-down bolts and fasten it using the nuts and washers removed in Step 3 above, then place the shipping block under the center of the ramp to support the VTSS cabinet as it is rolled off the pallet.

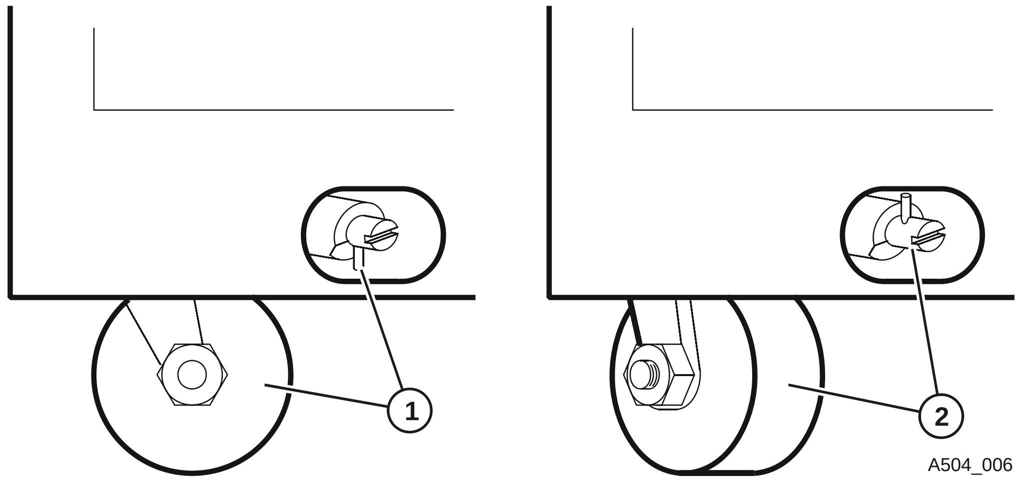
Figure 1-5. Installing the Pallet Ramp and Shipping Block



1. Nuts and washers attached to ramp hold-down bolts 2. Pallet ramp	3. Removeable shipping block placed under pallet ramp for support

11. Referencing Figure 1-6 below, locate the two locking swivel casters and ensure those are set to the locked position; the two free-swiveling casters on the other end of the VTSS cannot be locked.

Figure 1-6. Cabinet Locking-Caster Pin Positions



1. Caster and locking pin in 'locked' position	2. Caster and locking pin in 'unlocked' position

Warning: A populated VSM5-VTSS cabinet is extremely heavy (up to 445 kg; 982 lbs). To avoid injury, and damage to the VTSS, follow these safety precautions:

- **Always use two persons to move a VTSS from one location to another.**
- **Ensure both locking swivel casters on the VTSS cabinet are in a locked (fixed-forward) position before moving the cabinet up or down a ramp.**
- **When moving a VTSS up or down an incline, NEVER allow it to tilt more than 15 degrees, since it is likely to tip over beyond that angle.**
- **Ensure that all raised-floor tiles in the data center are properly installed along the path where the VTSS will be moved.**

12. While observing the warnings above, carefully roll the VTSS off its pallet ramp and transport it to a climate-controlled environment (staging area, installation area, etc.).
13. Remove the shipping bag containing subsystem door keys that is attached to the front of the VTSS cabinet, then unlock and open the cabinet doors to facilitate acclimation of the unit as needed.
14. At the front of the VTSS, remove both doors, the controller card cage cover, and the fiber-cable cover, and set those aside.
15. At the rear of the VTSS, remove both doors and set those aside.

Inspecting the VTSS for Moisture and Damage

DANGER !!

Damaged or loose cable connectors, circuit cards, etc., create potential shock hazards. If you notice a damaged VTSS part, obtain a replacement before continuing. If you notice a loose part, reseat it before continuing.

DANGER !!

Moisture and condensation on VTSS components create potential shock hazards. Always acclimate a VTSS in the operating environment using the guidelines below before handling components or powering on the VTSS.

Inspect the VTSS cabinet, frame, and internal components for any evidence of damage or moisture. Check for:

- Damaged external covers or doors
- Bent internal framing
- Damaged circuit cards
- Dislocated or broken wires, connectors, switches, or indicators
- Loose fasteners or plugs
- Moisture or condensation on components, especially on array disk drives.

Note: VTSS components may not show visible evidence of condensation. If you know that the cabinet has experienced temperature differences of 11º C (20º F) or more between its shipping, staging, and operating environments, allow it to acclimate in the operating environment for one hour per 11º C (20º F) of temperature change. Removing the cabinet doors facilitates acclimation, and evaporation of moisture.

If any damage is seen, obtain replacement parts before continuing. Notify your manager of installation delays caused by damaged components, or by acclimation requirements.

Positioning and Securing the VTSS Cabinet

Note: When installing a VTSS for VSM5 cabinet, maintain minimum clearances of 53.3 cm (21.0 inches) at the front and back of the cabinet to allow easy service access and to ensure adequate heat dissipation; see “Physical Space Requirements” on page B-154 for details. If these recommended clearances are not used, ensure that the cabinet can be moved as needed to provide sufficient access clearances.

Complete these steps to position and secure the VTSS cabinet:

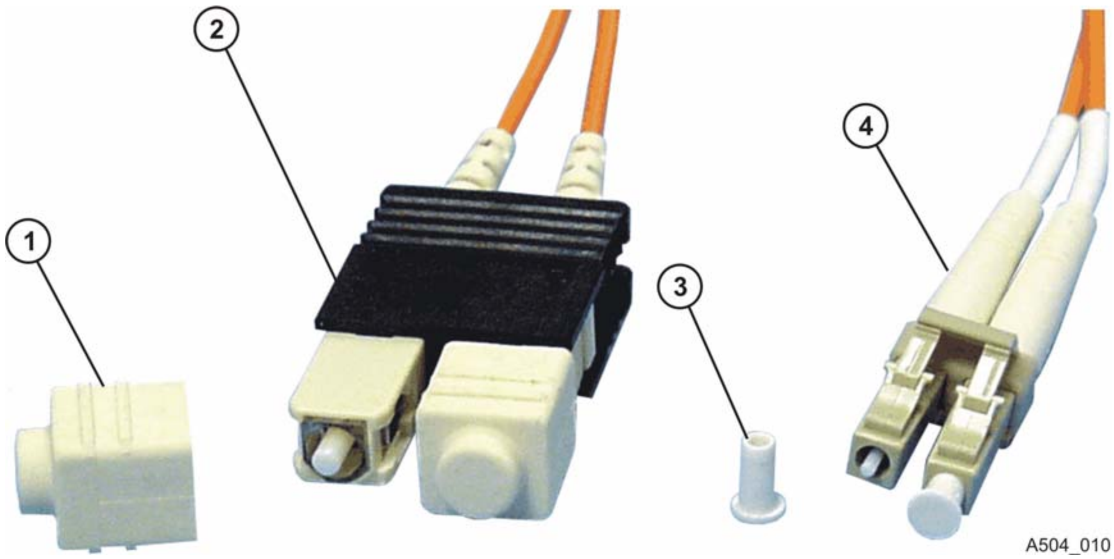
1. As needed, unlock the two locking swivel casters, then position the VTSS cabinet over the raised-floor cable-access cutout in the data center; see Figure 1-6 on page 1-36 for details.
2. Install a wire wheel block on each caster to prevent the VTSS cabinet from rolling.

Connecting the FICON Channel Cables

Caution: To prevent cross-cabling that could disable a channel link or cause data loss, label each fiber cable to show its assigned channel, CPU, and director number, consistent with local codes and customer requirements. Ensure that all cables are routed as defined in the *Planning and System Assurance Guide* worksheets that have been prepared for this site.

Caution: Fiber cables are susceptible to contamination and damage. To prevent problems, review 'Fiber Optic Component Handling Precautions" on page xxiii before continuing. If cable connectors have protective caps in place, leave those intact while routing the cables to prevent contamination of the cable ends.

Figure 1-7. VCF3 Card FICON Cables and Protective Caps



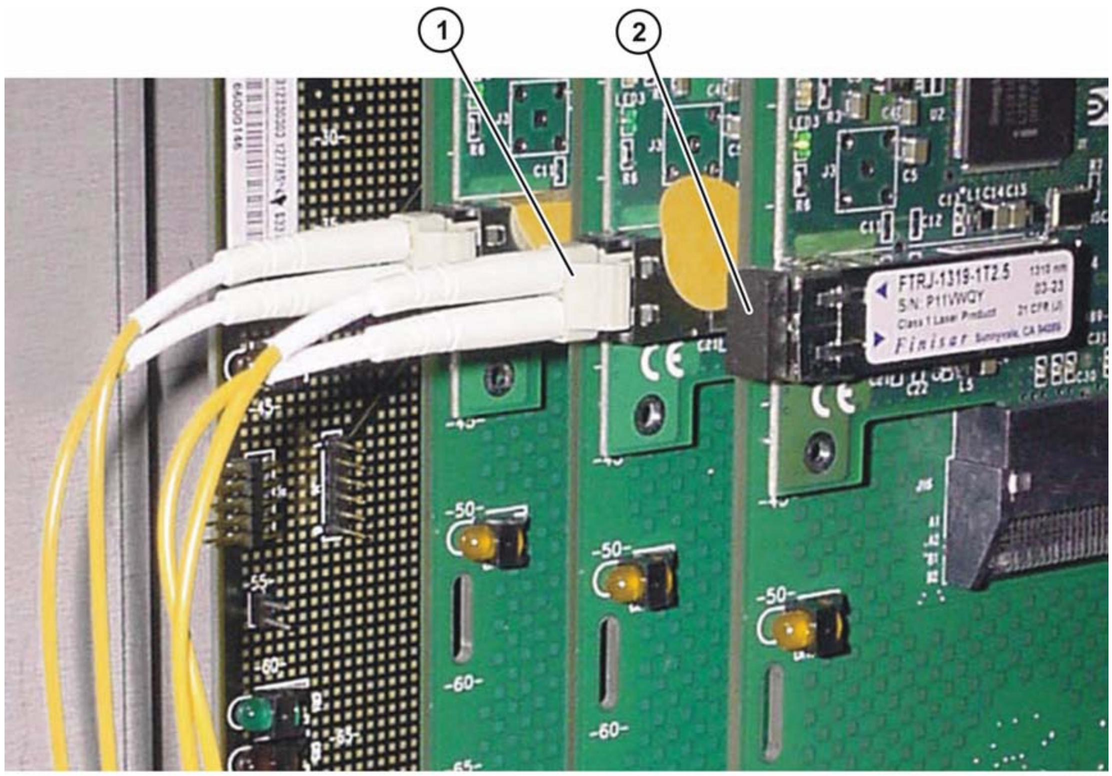
1. Protective cap for long-wave FICON channel cable connector	3. Protective cap for short-wave FICON channel cable connector
2. Long-wave (1310nm) FICON cable for connecting to VCF3 card ports	4. Short-wave (850nm) FICON cable for connecting to VCF3 card ports

Complete these steps to route and connect channel cables between the host system(s) and VCF3 cards in the VTSS, for clustered and non-clustered VTSS applications:

1. Ensure the controller card cage cover and fiber-cable cover have been removed from the front of the VTSS.
2. Route the 'VTSS' end of each cable up through the floor cutout to the front of the VTSS, then through the cable path and cable guides to the VCF3 cards.

3. Remove and discard protective caps from the cable ends and from the VCF3 card ports that will be used.
4. Referring to Figure 1-8, insert the cable ends into their corresponding VCF3 card port jacks.
5. Use retainers in the cable path and on VTSS frame members below the card cage to secure each cable. Adjust each cable to be within its proper bend radius, and ensure that it will not interfere with removal of other cards. See Table B-12 on page B-168 for fiber-optic cable bend radius specifications.

Figure 1-8. VCF Card Cable Attachment Locations



A504 011

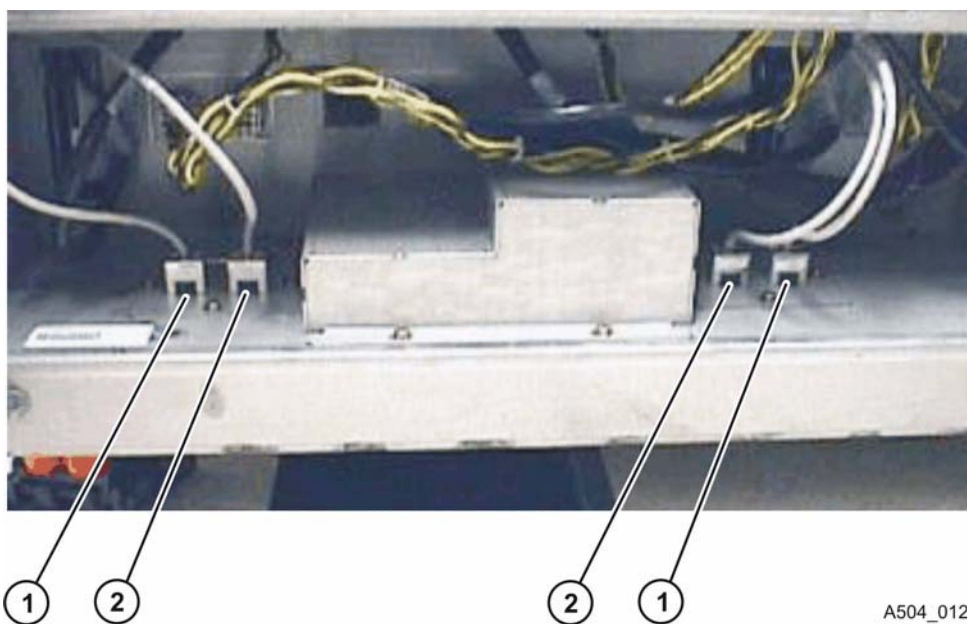
1. VCF3 card port with short-wave (850nm) FICON channel cable attached to short-wave SFP connector	2. VCF3 card port with protective plug (no cable attached)

Connecting Remote Maintenance Cables

The following procedures describe how to connect cables used for linking the VTSS to a Sun StorageTek Remote Resolution Center (RRC) server to provide remote service and support functionality.

Figure 1-9. ServiceTek and SDP Cable Connection Ports (Right Rear Side of VTSS)

Figure 1-10. Remote Maintenance Connection Jack Locations (Rear of VTSS)



1. ServiceTek+ serial modem cable connection ports (CSRC0 on right, CSRC1 on left)	2. Service Delivery Platform (SDP) Ethernet cable connection ports (ETH0 on right, ETH1 on left)

Connecting Service Delivery Platform Ethernet Cables

See Figure 1-9 and Figure 1-10 on page 1-40 and complete these steps to connect and route Service Delivery Platform (SDP) Ethernet cables between a VTSS and data director:

1. At the rear of the VTSS, connect the Ethernet cables to the **ETH0** and **ETH1** jacks. Do not use the ports labeled **CSRC0** or **CSRC1** to connect Ethernet cables.
2. Route the Ethernet cables to the data director along the path defined in the *Planning and System Assurance Guide* worksheets that have been completed for this site, then connect each Ethernet cable to the data director on its assigned port or connector.

For information on installing, configuring, and using SDP, consult documents including the *Service Delivery Platform Installation and Configuration Guide* and *Service Delivery Platform User Guide*, available on the Sun StorageTek Customer Resource Center (CRC) website at www.support.storagetek.com under the Services and Tools heading.

Connecting ServiceTek+ Modem Cables

See Figure 1-9 and Figure 1-10 on page 1-40 and complete these steps to connect and route ServiceTek + serial modem cables between a VTSS and MARS box or data director:

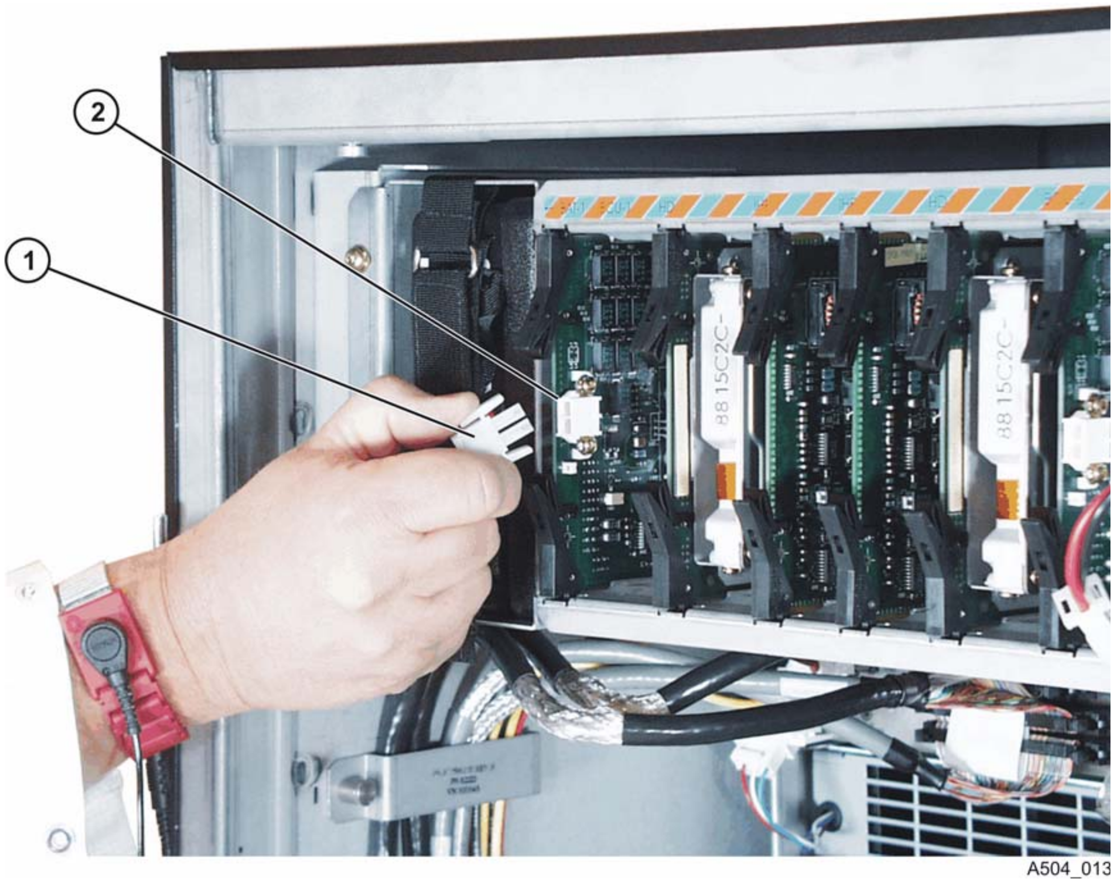
1. At the rear of the VTSS, plug the modem cables into the ports labeled **CSRC0** and **CSRC1**. Do not use the ports labeled **ETH0** or **ETH1** to connect modem cables.
2. Route the cables to the data director along the path defined in the *Planning and System Assurance Guide* that has been prepared for this site, then connect each cable to the designated MARS box on its assigned port or connector.

■ Enabling the NVS Battery Backup Power System

Referring to Figure 1-11 below, connect each battery pack cable to its battery charger unit connector at the back of the VTSS by plugging the connector **[1]** into its jack **[2]**.

Caution: If batteries for the NVS backup system are completely discharged, it can take up to 24 hours to fully recharge those for use. Do not turn over the system to the customer before the batteries are fully charged and available, as shown on the *Subsystem Availability* screen, Figure C-8 on page C-190.

Figure 1-11. Connecting the NVS Battery Backup Power System



1. Battery pack cable connector (locking clips open)	2. Battery charger unit connection jack

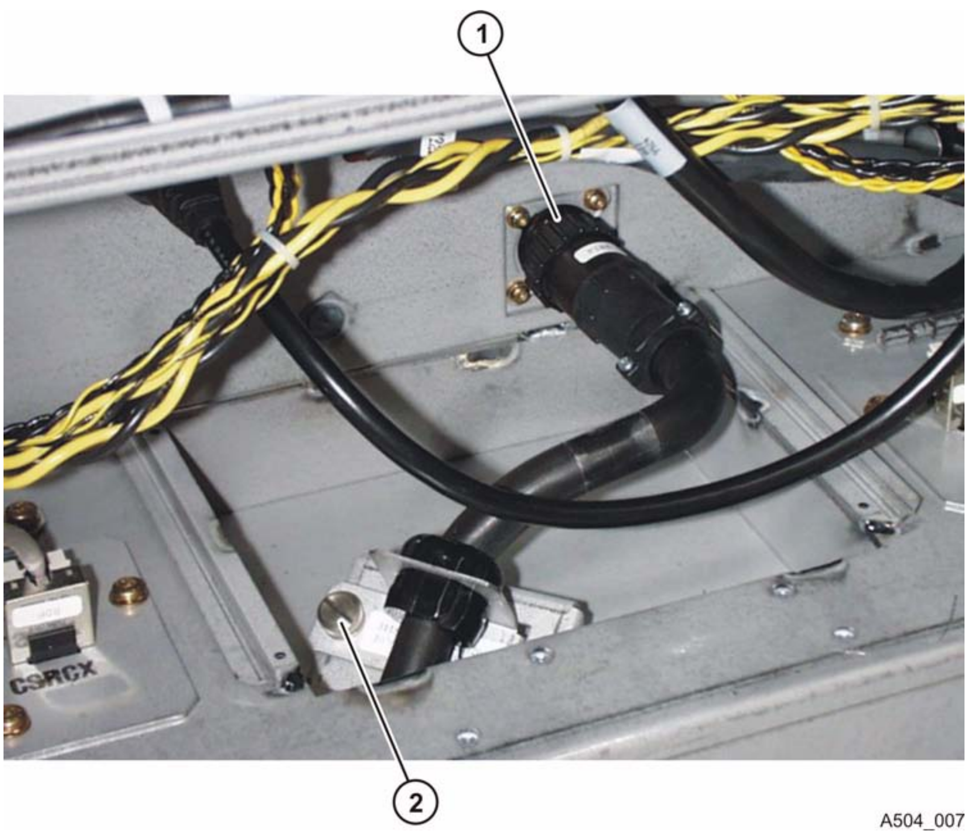
Connecting Power Cables

Caution: To prevent cross-cabling that could cause a power system failure, label each PDU and AC source power cable to show its assigned breaker panel location and breaker number, consistent with local codes and customer requirements. Ensure that cables are routed as defined in the *Planning and System Assurance Guid*e that has been prepared for this site.

See Figure 1-12 and complete these steps to route and connect VTSS power cables:

1. At the rear of the VTSS, remove both PDU power connector covers.
2. Secure each PDU power cable fastener to the bottom of the VTSS frame.
3. Attach each power cable connector to its corresponding PDU.
4. Re-install the PDU power connector covers.
5. Route PDU power cables to the source power breaker panel (50 Hz) or power cable/ outlet (60 Hz), but <u>do not</u> connect the cables at this time.

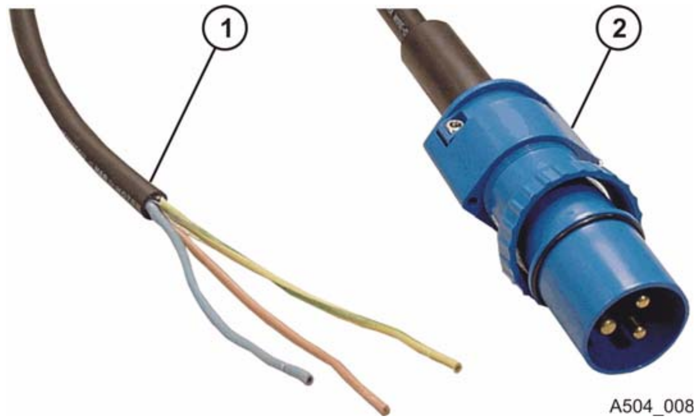
Figure 1-12. Power Cable Frame Fastener and PDU Connection



1. PDU power cable connection location (rear of VTSS)	2. Power cable fastener (attached to VTSS frame)

Figure 1-13 shows the configurations for 50 Hz and 60 Hz AC source power cable-ends.

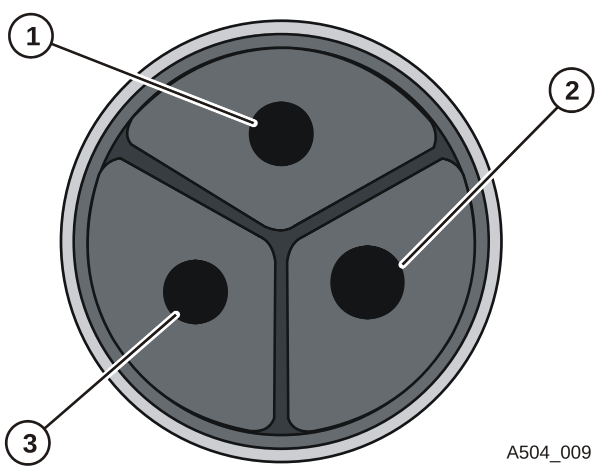
Figure 1-13. AC Source Power Cable Ends



1. 50 Hz cable end (non-U.S./Canada accounts)	2. 60 Hz male cable end (U.S./Canada accounts)

Figure 1-14 shows the configuration of a 60 Hz (U.S./Canada) female power connector. Because 50 Hz connectors vary by country and locality, the many variations of those connectors are not depicted here.

Figure 1-14. 60 Hz Source PowerConnector (Single-Phase Female)



1. Power phase A 2. Ground (slightly larger hole)	3. Power phase B

Checking Power Component Settings

Before you attach VTSS power cables to AC source power receptacles, complete these checks of power components:

1. At the customer AC source power breaker panel, verify both breakers that will supply power to the VTSS are set to the ‘0’ (off) position.
2. At each VTSS power distribution unit (PDU), verify that the **POWER** breaker is set to the ‘0’ (off) position; see Figure A-11 on page A-148 for details.
3. At the VTSS power control panel, ensure that the **UNIT EMERGENCY** and **POWER ENABLE** switches are set to the ‘0’ (off) position.

Checking AC Source Power Connections

Using a voltmeter, verify that the voltage of each AC source power connection matches the range shown in Table 1-1 below., and that correct connector types are being used.

Table 1-1. VSM5-VTSS AC Source Power Specifications and Connectors

Power Requirement	AC Sourse Power Specification
Power / Current / Frequency	Single-phase, 3-wire, 170V-240V, 30A @ 47-63 Hz
Heat Dissipation	4.77 minimum kBTU/hr — 7.64 maximum kBTU/hr
kVA	1.42 minimum kVA — 2.29 maximum kVA
Connector Type or Location	**Connector Specification**
Sun-supplied VTSS power cables (from VTSS power strips to AC source connector)	• RussellStoll RS3750DP* (North America sites only) • No connector (all sites outside North America)
Customer-supplied wall receptacles or connector cables (from AC source connector to VTSS power strips)	• RussellStoll RS 9R33u0W (rigid mount) • RussellStoll RS 9C33U0 (flexible mount)

Notes:
- Abbreviations key: AC = alternating current; Hz = hertz; kVA = kilovolt-amperes; V = volt(s)
- * There is no equivalent Hubbell connector.

Connecting the VTSS to AC Source Power

Attach one or both VTSS power cables (according to customer requirements) to assigned locations on the AC source power breaker panel (50Hz-type), or plug one or both VTSS power cables into the assigned AC source receptacles (60Hz-type), or into AC source power cables located under a raised floor (60Hz-type).

Powering On and IMLing the VTSS

DANGER !!

To avoid injury, and damage to the VTSS during the power-on process, follow these precautions, and watch for these conditions:

- **If a ground fault occurs during the power-on process, the POWER breaker trips on each PDU and the POWER CHECK indicator lights on the power control panel. DO NOT try to override the tripped breakers. Instead, contact Sun Technical Support to help isolate the failure before continuing.**
- **If any conditions stated in this procedure do not occur, or if the POWER CHECK indicator lights on the power control panel but PDU breakers do not trip, contact Sun Technical Support and isolate the failure before continuing.**
- **Never turn on VTSS power if there is evidence of moisture or damage either outside or inside the VTSS cabinet. Instead, follow steps described in** "Inspecting the VTSS for Moisture and Damage" on page 1-37**, and contact Sun Technical Support for further guidance before continuing.**

Note: If the VTSS cabinet doors are closed, some events and/or conditions listed below will not be visible. To properly verify all indications listed below, ensure that the VTSS cabinet doors remain open during the power-on process.

Complete these steps to power on the VTSS and complete the initial microcode lode (IML) process:

1. At the customer AC source power breaker panel, set both breakers that will supply the VTSS to the '1' (on) position.
2. At each VTSS PDU, set the **POWER** breaker to the '1' (on) position.
3. At the VTSS power control panel, set the **POWER ENABLE** switch to the '1' (on) position and verify that these events start to occur almost immediately:
   - The green **POWER ON** indicator lights on the VTSS power panel and both PDUs
   - The array and controller impellers start spinning.
4. After several minutes, verify that these events and conditions occur at the VTSS:
   - Test/validation LEDs light on all FRUs that are equipped with those indicators
   - The green **POWER SEQUENCE COMPLETE** indicator lights on the VTSS power control panel, indicating successful completion of the power-on and IML processes.

Note: Powering on and IMLing the VTSS can take an hour or longer, based on the VTSS cache size and the number of disk arrays.

Enabling the Detached Operator Panel

Note: Before starting this procedure, review "Required Hardware and Software for DOP Connection" on page 1-30, and ensure all steps listed in "Downloading and Installing the DOP Software Package" on page 1-31 have been completed.

Complete these steps to enable the detached operator panel (DOP) facility:

1. Connect a straight-through type or cross-over type Ethernet cable between the RJ45 Ethernet port on your service laptop PC and the RJ45 LAPTOP port on the VTSS A-Hub card assembly; see "A-Hub Card Assembly" on page A-145 for details.
2. Turn on your PC and click the Internet Explorer icon to open a network connection.
3. In the Address box, type in the URL localhost and press [Enter]. The *VSM Operator Panel Connection* screen, Figure C-1 on page C-180, displays.
4. In the active field of the *VSM Operator Panel Connection* screen, enter the default IP address for the VTSS (129.80.64.242)[1] and click Connect. The *Main Menu / Login* screen, Figure C-2 on page C-181, displays.

Logging Into the Support Facility Menu System

In the active field of the *Main Menu / Login* screen, enter a CSE password (B*******; default B0022222) and click Logon to display the *CSE Main Menu* screen, Figure C-6 on page C-188.

Installing VTSS Options

Note: Each VTSS ships with customer-ordered options installed but disabled, and each option requires a proprietary alphanumeric storage key to enable it. You should already have ordered all required keys from the CRC website and received e-mail responses containing the keys, which you will use in this procedure. See "Obtaining Keys for VTSS Features and Options" on page 1-32 for details. Installing and enabling VTSS options is nondisruptive (i.e., it does not require an IML of the VTSS).

1. Access the CSE-level *Subsystem Configuration and Status* screen, Figure C-9 on page C-191. In the Options field, click the red 'X' next to the option you want to install (e.g., Maintenance). In this example, the *Enter Maintenance Option Key* screen, Figure C-11 on page C-193, displays. Copy and paste the appropriate key from the CRC e-mail in the designated field, then click Submit to enable the option.
2. Once the Submit button is clicked, VTSS HIC software automatically completes the following tasks and displays these messages in the onscreen Status field:
   - Validates security keys using the security task, then displays the message **Security Options File implemented.**
   - Validates the option change, then displays the message **Options File passed validation**, followed by **Options File processed successfully.**

1. This address can be changed as needed at the *Ethernet Setup* screen, Figure C-33 on page C-215.

Note: If the Status field displays the message **SECURITY VIOLATION FSC: 0*xnnnn***, the options installation failed. If repeated attempt to reinstall an option fail, contact Sun Technical Support for assistance in correcting the problem.

3. In the onscreen Options field, verify that the option is installed, as indicated by a green check mark next to the option. Maintenance screens and functionality should now be accessible by entering a valid CSE-level password (B*******; default B0022222) at the *Main Menu / Login* screen.

4. Repeat Step 1 of this procedure to enable other installed options, which may include one or more of the following: physical capacity control (PCap); 32MB volatile cache; clustered VTSS; and 32 CIP ports.

Reporting of Options Installation Failure

If options installation problems are not corrected in a timely manner, a series of escalating SIMs and MIMs is issued at the host console and repeated every 24 hours until corrective action is taken; see “Service Information Messages (SIMs)” on page 2-70 and “Machine-Initiated Maintenance (MIM)” on page 2-73 for details.

In accounts with remote maintenance capability, messages also are issued to the Sun Remote Resolution Center (RRC) server. These messages can be prevented or overridden by reinstalling VTSS options successfully. If subsequent options installation attempts fail, contact Sun Technical Support before continuing with the installation.

Verifying FRU Status and Availability

Complete these steps to verify that the system IML process completed error-free and that all system FRUs are operational and available (i.e., not fenced):

1. At the *CSE Main Menu* screen, click the Configuration field to display the *Configuration / Status Menu* screen, Figure C-7 on page C-189.

2. At the *Configuration / Status Menu* screen, click the Subsystem Availability field to display the *Subsystem Availability* screen, Figure C-8 on page C-190.

3. At the *Subsystem Availability* screen, look for the message **Full Box IML Complete** in the Status field to verify the IML completed successfully.

4. If a screen fields show <100% availability for a listed VTSS resource or component, see “Troubleshooting VTSS Startup Problems” on page 1-49. Problem troubleshooting can be done only after the VTSS has been connected to a remote maintenance server (see “Connecting to the Remote Maintenance Server” on page 1-49), and after maintenance capabilities are enabled (see “Installing VTSS Options” on page 1-47).

5. At the *Subsystem Availability* screen, click Main to return to the *CSE Main Menu* screen, then click the FRU Status field to display the *FRU Status* screen, Figure C-43 on page C-225.

6. At the *FRU Status* screen, use the scroll bar to check the FRU Fence column on all listed FRUs. Record all fenced FRUs by U.T.S. location (e.g., CU.1.VCF00), then see “Troubleshooting VTSS Startup Problems” on page 1-49 to correct the problems.

7. At the *FRU Status* screen, click Main to return to the *CSE Main Menu* screen.

Troubleshooting VTSS Startup Problems

If a card, cable, hard drive, or other VTSS component was improperly installed during manufacturing or was dislodged or damaged during transit, it could cause one or more FRUs to be logged into a 'suspect FRU' database during IML, then fenced and restricted from use until the problem is corrected. Complete these steps to identify and fix suspected FRU problems:

1. Access the *GFR – Main Menu* screen, Figure C-46 on page C-228. Click the List Field Replaceable Units (FRU) field to display the *GFR – Field Replaceable Units* entry screen, Figure C-48 on page C-230.
2. At the *GFR – Field Replaceable Units* entry screen, complete these steps:
   a. Click one of the seven trays listed under the Control Unit or Disk Array headings where a fenced FRU exists (based on the list compiled in the procedure "Verifying FRU Status and Availability" on page 1-48).
   b. Select a fenced FRU, select the radio button in the Diag column, then click the Submit button to run diagnostics.
   c. Once diagnostics are completed, click the hic_stat button to display the hic_stat.dia file for the FRU showing diagnostics details.
3. If indicated by diagnostics messages, return to the appropriate GFR menu, select the FRU for replacement, and replace it using the Guided FRU Replacement (GFR) facility; see Chapter 3 for GFR details.
4. Repeat Step 2b, Step 2c, and Step 3 as needed to diagnose, replace, and validate all other fenced FRUs. If problems persist after these corrective actions are taken, contact Sun Technical Support. Do not continue with the installation until all problems are corrected and all defective FRUs have been replaced and validated.

Connecting to the Remote Maintenance Server

Note: In secured accounts that do not allow connection to a Sun remote maintenance server using either the Service Delivery Product (SDP) or ServiceTek+, consult with the customer data center manager to determine alternate procedures for notifying Sun Technical Support personnel about VSM solution problems, and to schedule repairs, maintenance, code and hardware upgrades, etc.

Enabling a Service Delivery Platform Connection

Complete these steps to enable a Service Delivery Platform (SDP) Ethernet connection between a VTSS and a Sun Remote Resolution Center (RRC) maintenance server:

1. Access the ***Ethernet Setup*** screen, Figure C-33 on page C-215.
2. In the IP Requested field, click the address link to display the ***Enter the (VSM Private Network) IP Address*** screen, Figure C-34 on page C-216. In the active field, key in the static IP address of the VSM private network[1], then click Submit. The message **Set server address successful** displays, verifying that the new value has been written to the ISP hard drives[2]. Click Return to return to the ***Ethernet Setup*** screen.
3. In the Subnet Requested field, click the address link to display the ***Enter the Subnet IP Address*** screen, Figure C-35 on page C-217. In the active field, key in the address 255.255.254.0 (where 254.0 is the subnet mask of the site unit), then click Submit. The message **Set subnet address successful** displays, verifying the value has been written to the ISP hard drives[2]. Click Return to return to the ***Ethernet Setup*** screen.
4. In the Gateway Requested field, click the blue address link to display the ***Enter the Gateway Address*** screen, Figure C-36 on page C-218. In the active field, key in the IP address of the SDP private network Ethernet card[3], then click Submit. The message **Set gateway address successful** displays, verifying the new value has been written to the ISP hard drives[2]. Click Return to return to the ***Ethernet Setup*** screen.
5. To activate the requested values, switch the ISP master two times as follows:

   a. Access the ***Subsystem Debug*** screen, Figure C-67 on page C-249.

   b. Click the Switch ISP Master button to display the ***Switch ISP Master*** screen, then click Continue to switch the ISP master. The ISP card resets and the first value becomes active. Click Return to return to the ***Subsystem Debug*** screen.

   c. Click Switch ISP Master again to display the ***Switch ISP Master*** screen, then click Continue to switch the ISP master back to its original setting.

   During the discovery process, the VSM IP address is input into the SDP NMS console. The VSM private network static IP address must then be input into the SDP NMS console and must be part of the network 172.18.18.0 through 172.18.18.63 where:

   - 172.18.18.1 is reserved for the site unit
   - 172.18.18.2 through 172.18.18.63 are reserved for static IP address assignments.

   Note: Each VSM device must be assigned a unique static address within the static range listed above.

---

1. The VSM virtual private network (VPN) reserves the IP addresses 172.18.18.2 through 172.18.18.63 for static VSM IP use. Each device must have a unique address. For example, if the SDP private Ethernet adaptor is set to 172.18.18.1, the first VSM IP address could be set to 127.18.18.2, the second VSM could be set to 172.18.18.3, and so on.
2. During initial IML of the ISP hard drives, default values for these addresses are displayed as the 'active' addresses on the ***Ethernet Setup*** screen, Figure C-33 on page C-215. The 'requested' values set the create/write access to the configuration files in the root directory of the ISP hard drives. The newly-requested values become the active values the next time both ISPs are IMLd.
3. In this example, the Gateway Requested IP address would be set to 172.18.18.1.

Setting Passwords and Defining ServiceTek+ Parameters

Complete these steps to set VTSS access passwords and define ServiceTek+ connection parameters between a VTSS, customer host system, and a Sun Remote Resolution Center (RRC) maintenance server:

1. Access the *Access Control* screen, Figure C-20 on page C-202. Under the Passwords heading, provide requested information as follows:
   - Password – click the field showing the default password (A0022222) to display the *Enter Customer Password* screen, Figure C-21 on page C-203. Enter a password, then click Submit to enable it and to receive the message **Set Customer Password Successful**. See "Customer Logon Password" on page 2-60 for details.
   - CSE Password – click the field showing the default password (B0022222) to display the *Enter CSE Password* screen, Figure C-22 on page C-204. Enter a password, then click Submit to enable it and to receive the message **Set CSE Password Successful**. See "CSE Logon Password" on page 2-60 for details.
2. Under the CSRC heading, provide requested information as follows:
   - Allow Connection – click the green check mark or red 'X' to display the *Select the CSRC Connection Enabled State* screen, Figure C-23 on page C-205. Check the Enabled box, then click Submit to enable the connection and receive the message **CSRC Connection Successful**. Leave the box unchecked to disable this function.
   - Baud Rate – click the field showing the default baud rate (19200) to display the *Select the CSRC Baud Rate* screen, Figure C-24 on page C-206. From the pull-down list, select the setting that matches the CSRC modem transmission rate, then click Submit to enable it and to receive the message **Set CSRC Baud Rate Successful**.
   - Connection Password – click the field showing the default password (22222) to display the *Enter CSRC Password* screen, Figure C-25 on page C-207. Enter a password, then click Submit to enable it and to receive the message **Set CSRC Password Successful**. See "CSRC Connection Password" on page 2-61 for details.
3. Under the Back End Usage heading, provide requested information as follows:
   - Log Interval – click the field showing the default log display interval (24 hours) to display a *Select SIM (Log Interval) Display Level* screen, Figure C-26 on page C-208. From the pull-down list, select the desired setting, then click Submit to enable the setting. The message **Set SIM Display Level Successful** displays.
4. Under the SIM/MIM heading, provide requested information as follows:
   - SIM Display Level – click the field showing the default SIM display level (Service) to display a *Select SIM (Message) Display Level* screen, Figure C-27 on page C-209. Use the pull-down menu to select the desired setting, then click Submit to enable the setting. The message **Set SIM Display Level Successful** displays.

Note: This setting is used to select the minimum SIM severity levels to be shown at the host console: 'Service' displays Service, Moderate, Serious, and Acute SIMs; 'Moderate' displays Moderate, Serious, and Acute SIMs, etc.

   - MIM Call Enabled – click the green check mark or red 'X' to display the *Select the Ethernet MIM Report State* screen, Figure C-30 on page C-212. Check the Enabled box, then click Submit to enable the connection, which sends a MIM to the RRC server when a SIM is sent to the host. The message **Enable MIM Call Successful** displays.

- MIM Call on Check 0 – click the green check mark or red ‘X’ to display the *Select the Check 0 MIM Call State* screen, Figure C-29 on page C-211. Check the Enabled box, then click Submit to enable the connection, which sends a MIM to the RRC server if a Check 0 is sent to the host. The message **Enable Check 0 MIM Call Successful** displays.
- Ethernet MIM Offload – click the green check mark or red ‘X’ to display the *Select the MIM Call State* screen, Figure C-28 on page C-210. Check the Enabled box, then click Submit to enable the connection, which sends MIMs to the RRC server. The message **Enable MIM Call State Successful** displays. Leave the box unchecked to disable this function. For this functionality to work, the ‘Maintenance’ option must already be enabled on the VTSS; see “Installing VTSS Options” on page 1-47 for details.

Note: When MIM offloads are enabled through the Service Delivery Platform, Service Tek+ ‘phone home’ capability is automatically disabled. However, test calls are attempted through both connections — through SDP first, then through ServiceTek+.

- Test Call Interval – click the field showing the call interval to display the *Set MIM Test Call Interval* screen, Figure C-31 on page C-213. Select appropriate parameters from the pull-down lists, then click the Submit button to enable the setting. The message **Set MIM Test Call Interval Successful** displays.

Note: Selecting ‘0’ in the first field disables test-calling capability.

- Primary Phone Number – click to the right of this heading to display the *Enter the Primary Phone Number* screen, Figure C-32 on page C-214. Enter the primary number used to connect to the Sun remote maintenance server, then click the appropriate radio button to select either Tone Phone or Pulse Phone. Once all required information has been entered, click Submit to enable the settings. The message **Set Primary Phone Number Successful** displays.

  The following rules apply for defining both primary and secondary phone numbers:

  - The number can be up to 34 digits including required dialing pauses, credit card numbers, international dialing sequences, country codes, area codes, and other local requirements.
  - Dialing pauses briefly when an asterisk (*) character is inserted in the number sequence. Asterisks are typically used when a number (e.g. ‘9’) must be dialed to connect to an outside line, but requires a short interval to complete the connection. Example: To set up a number that requires connection to an outside line with a brief pause to complete the connection, a U.S. area code of ‘303’, and a local-exchange number of ‘555-1212’, key in ‘9*3035551212’ in the field.
  - When entering credit card numbers or country codes, fields starting with ‘0’ must use an asterisk (*) as the first digit. Example: ‘0035’ must be entered as ‘*0035’. This will generate pauses but will not cause problems in completing a call.

- Secondary Phone Number – click to the right of this heading to display the *Enter the Secondary Phone Number* screen (essentially similar to Figure C-32 on page C-214). Enter the secondary number used to connect to the remote maintenance server, then click the appropriate radio button to select either Tone Phone or Pulse Phone. Once all required information has been entered, click Submit to enable the settings. The message **Set Secondary Phone Number Successful** displays. Use the same rules as for the Primary Phone Number.

Modifying and Configuring VTSS Settings

To modify and configure VTSS settings including the site name, site location, system date and time, and passwords, access the CSE-level *Subsystem Configuration and Status* screen, Figure C-9 on page C-191, then complete the appropriate procedure below.

Changing the Customer Site Name

1. At the *Subsystem Configuration and Status* screen, click the current data in the Site Name field to display the name-change screen for that field.
2. Key in a new site name comprised of one to eight alphanumeric characters.
3. Click Continue to save a change, or Cancel to void the request.

Resetting the Subsystem Name to a Default Value

The VTSS Subsystem Name parameter is defined through the VTCS Configuration Utility and cannot be modified from a system operator panel. If the name has been inadvertently changed and needs to be reset, click on the field to the right of the Subsystem Name heading to display another screen for resetting the value to its default setting (99999999). This signals the VTCS host software that the name needs to be reset.

Changing the Customer Site Location Number

1. At the *Subsystem Configuration and Status* screen, click on the field to the right of the Site Location heading to display another screen for resetting that value.
2. Key in a new site location number comprised of one to six numeric characters.
3. Click Continue to save the change, or Cancel to void the request.

Note: The VTSS support facility runs a validation algorithm to verify that the entered number is not assigned to another site before allowing the change.

Changing the Subsystem Date and Time

Note: The default date/time settings for the VTSS Real Time Clock (RTC) are the same as the for the Sun remote maintenance server. These default settings can be re-stored by clicking the Reset button, then the Continue button.

1. At the *Subsystem Configuration and Status* screen, click the field to the right of either the Date or Time heading to display the *Set the VSM Subsystem Time* screen, Figure C-10 on page C-192.
2. To restore default date/time settings for the VTSS Real Time Clock, click the Reset button, then the Continue button. Otherwise, continue with Step 3 below.
3. In the three Select Date fields, use the drop-down lists to select the desired month, day, and year settings. and in the three Select Time fields, use the drop-down lists to select the desired hour, minute, and second settings.
4. Click Continue to save the changes, or Cancel to void the request.

■ Configuring VCF Cards for Nearlink Use

Each VCF (FICON) channel card initially has a default setting of 'host' assigned to both of its channels/links/ports by the VTSS support facility, which allows connection to front-end MVS host images and between primary and secondary VTSSs in clustered VTSS applications. Configuring ports for Nearlink use allows connection to back-end RTDs and between primary and secondary VTSSs in clustered VTSS applications.

Typically, one port per VCF card is designated as a 'host' channel and the other as a 'Nearlink' channel. It does not matter which ports are used for a particular connection, but consistency should be maintained across all VCF cards in the VTSS. That is, all top ports should be designated as either 'host' or 'Nearlink' (but not both), and all bottom ports as either 'host' or 'Nearlink' (but not both).

Complete these steps to change the configuration of VCF cards from host to Nearlink, according to customer requirements:

1. Access the *Channel Configuration Status* screen, Figure C-38 on page C-220, to view the status of each VCF card and its channels/links/ports.
2. In the far-left (Card) column, click the VCF card whose configuration will be changed. This displays the *Channel Configuration* screen, Figure C-39 on page C-221.
3. At the Channel field, select 0 or 1 from the pull-down list to assign which channel/link/port on the designated VCF card will have its configuration changed to Nearlink.
4. At the Type field, select Nearlink from the pull-down list, then click Continue to enable the configuration change. The message **Success** displays on another screen, indicating the configuration change completed successfully.

■ Connecting FICON Cables to External Devices

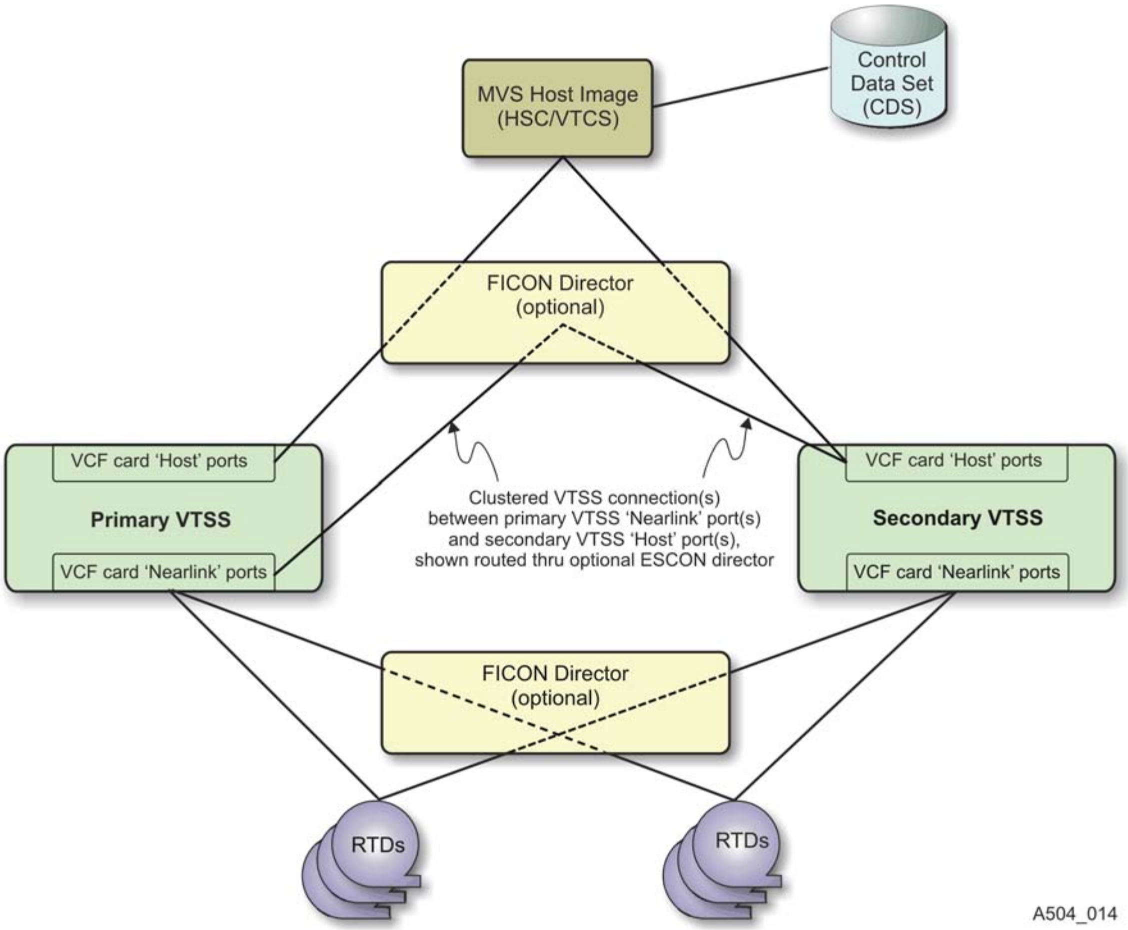
This section defines procedures for connecting FICON channel cables to external devices on the VTSS front end (host systems, FICON directors/switches, etc.) and back end (RTDs, CLINKs, clustered VTSSs, etc.). Figure 1-15 on page 1-55 shows configuration examples for clustered VTSS.

Connecting a VTSS Directly to a Host System

Complete these steps to connect a VTSS directly to a host system, for clustered and non-clustered VTSS applications:

1. At the VTSS, attach a cable to each VCF3 card port listed as a Host interface on the *Channel Configuration Status* screen, Figure C-38 on page C-220.
2. Route the cables along the defined path to the host system, then attach each cable to its assigned host system input port.

Figure 1-15. VSM5-VTSS Clustered VTSS Configuration Example



Notes:

- A VSM5-VTSS contains 1 to 4 pairs of VCF (FICON) channel cards (2 to 8 cards total), with card pairs evenly distributed between storage clusters 0 and 1. Each VCF card initially has a default setting of 'host' assigned to both of its ports, which allows connection to front-end MVS host images and between primary and secondary VTSSs in clustered VTSS applications. Configuring ports for Nearlink use allows connection to back-end RTDs and between primary and secondary VTSSs in clustered VTSS applications. Typically, one port per card is designated as a 'host' channel and the other as a 'Nearlink' channel. It does not matter which ports are used for a particular connection, but consistency should be maintained across all VCF cards in the VTSS. That is, all top ports should be designated as either 'host' or 'Nearlink' (but not both), and all bottom ports as either 'host' or 'Nearlink' (but not both); see "Configuring VCF Cards for Nearlink Use" on page 1-54 for additional details.
- A FICON switch/director is not needed to implement clustered VTSS, but allows a maximum number of channels to be defined between a secondary VTSS and MVS host image when some VCF card host interfaces are designated for connection to a primary VTSS. If a switch/director is not used, connect cables directly between the primary and secondary VTSS as described in "Connecting a Primary VTSS Directly to a Secondary VTSS" on page 1-57.

Connecting a VTSS to a Host System Through a Director

Complete these steps to physically connect a VTSS to a host system through a FICON director, for clustered and non-clustered VTSS applications:

1. At the VTSS, attach a cable to each VCF3 card port listed as a Host interface on *Channel Configuration Status* screen, Figure C-38 on page C-220.
2. Route the cables along the defined path to the director, then connect each cable to its assigned input port on the director.
3. At the assigned output port on the director, attach a cable for each VCF3 card port and route it along the defined path to the host system, then attach each cable to its assigned input port on the host system.

Connecting a VTSS Directly to a Real Tape Drive

See Figure 1-15 on page 1-55 and complete these steps to physically connect a VTSS directly to a RTD (types 9840B, 9840C, 9940B, or T10000) using FICON connections, for clustered and non-clustered VTSS applications:

1. At the VTSS, attach a cable to each VCF3 card port listed as a Nearlink interface on *Channel Configuration Status* screen, Figure C-38 on page C-220.
2. Route the cables along the defined path to the RTD, then attach each cable to its assigned input port on the RTD. The *Channel Configuration Status* screen should now display an RTD Port ID for each Nearlink port, indicating the director port where the RTD is connected.

Connecting a VTSS to a Real Tape Drive Through a Director

See Figure 1-15 on page 1-55 and complete these steps to physically connect a VTSS to a RTD through a FICON director, for clustered and non-clustered VTSS applications:

1. At the VTSS, attach a cable to each VCF3 card port listed as a Nearlink interface on the *Channel Configuration Status* screen, Figure C-38 on page C-220.
2. Route the cables along the defined path to the director, then attach each cable to its assigned input port on the director.
3. At the assigned output port on the director, attach a cable for each VCF3 card port. Route the cables to the RTD, then attach each cable to its assigned input port on the RTD. The *Channel Configuration Status* screen should now display an RTD Port ID for each Nearlink port, indicating the director port where the RTD is connected.

Connecting a Primary and Secondary VTSS Thru a Director

Note: A FICON director is *not* required to enable clustered VTSS, but allows the maximum number of connections to be defined between a secondary VTSS and MVS host image, since some VCF3 card 'host' ports must be dedicated for connection to the primary VTSS. To directly connect a primary and secondary VTSS without a director, see "Connecting a Primary VTSS Directly to a Secondary VTSS" below.

See Figure 1-15 on page 1-55, then complete these steps to connect a primary VTSS to a secondary VTSS through a FICON director, for clustered VTSS applications only:

1. At the primary VTSS, attach a cable to each VCF3 card port listed as a Nearlink interface on the *Channel Configuration Status* screen, Figure C-38 on page C-220.
2. Route the cables along the defined path to the director, then attach each cable to its assigned input port on the director.
3. At the assigned output port on the director, attach a cable for each VCF3 card from the primary VTSS and route it along the defined path to the secondary VTSS, then attach each cable to its assigned input port on the secondary VTSS.
4. At the secondary VTSS, attach each cable from the output port on the director to each VCF3 card port listed as a Host interface on the *Channel Configuration Status* screen.

Connecting a Primary VTSS Directly to a Secondary VTSS

Note: Attaching FICON cables directly between a primary and secondary VTSS does not allow the maximum number of connections to be defined between the secondary VTSS and MVS host image, since some VCF3 card 'host' ports must be dedicated for primary VTSS connections. Attaching VTSSs through a director eliminates this problem; see "Connecting a Primary and Secondary VTSS Thru a Director" above.

See Figure 1-15 on page 1-55, then complete these steps to connect a primary VTSS directly to a secondary VTSS, for use in clustered VTSS applications only:

1. At the primary VTSS, attach a cable to each VCF3 card port listed as a Nearlink interface on the *Channel Configuration Status* screen, Figure C-38 on page C-220.
2. Route cables along the defined path to the front of the secondary VTSS, then attach each cable to its assigned VCF3 card port listed as a Host interface on the *Channel Configuration Status* screen.

■ Turning Over the Solution to Professional Services

After the above procedures have been completed, turn over the VTSS to Sun Professional Services to begin the solution implementation process, which includes these procedures and tasks defined in the *VTCS 6.*n *Installation and Configuration Guide*:

- Defining storage policies, solution defaults, and host access
- Zoning external switches (SAN implementation)
- Configuring VTSS components and settings (arrays, remote maintenance, etc.)
- Configuring the virtual entities (VACSs, VTDs, VTVs, etc.)
- Assigning real ACS resources and disk volumes.

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Managing a VSM5-VTSS

2

This chapter defines how to perform operational, administrative, and upgrade tasks on a VTSS for VSM5.

■ Using the Detached Operator Panel

Through the VTSS operator panel graphical user interface (GUI), users can remove and replace FRUs, download data, monitor system performance and status, modify configurations, and perform routine maintenance and diagnostics tasks, among other functions.

Two operator panel types can be used with a VTSS: detached (at the same physical location as the VTSS) and remote (at a different physical location than the VTSS).

A remote simulated operator panel display allows remote support personnel at the Sun Remote Resolution Center (RRC) to diagnose and service problems. The remote panel connection consists of a PC paired with proprietary software and linked to the VTSS by a modem or Ethernet connection to emulate a detached operator panel display. Functionality of the remote operator panel is less than for a local detached operator panel (e.g., a remote panel cannot enable VTSS power).

Operator Panel Mastership

One VTSS operator panel (either local or remote) must be established as 'master' to perform tasks from that panel. To establish mastership, enter a valid password at the *Main Menu / Login* screen, Figure C-2 on page C-181. Once mastership is established, the functionality of that panel is enabled, and the functionality of any second, or 'slave' panel (if connected) becomes disabled, and the slave panel becomes view-only.

A slave panel can display the content of a master panel but cannot perform any functions while the master is in use. To forfeit mastership, click Logout on any screen. Mastership expires automatically if no panel activity is detected for three minutes.

A *Password Override* screen, Figure C-3 on page C-184, displays when another user is already logged into a VTSS, and allows another user to override the current user to gain access to the VTSS in an emergency.

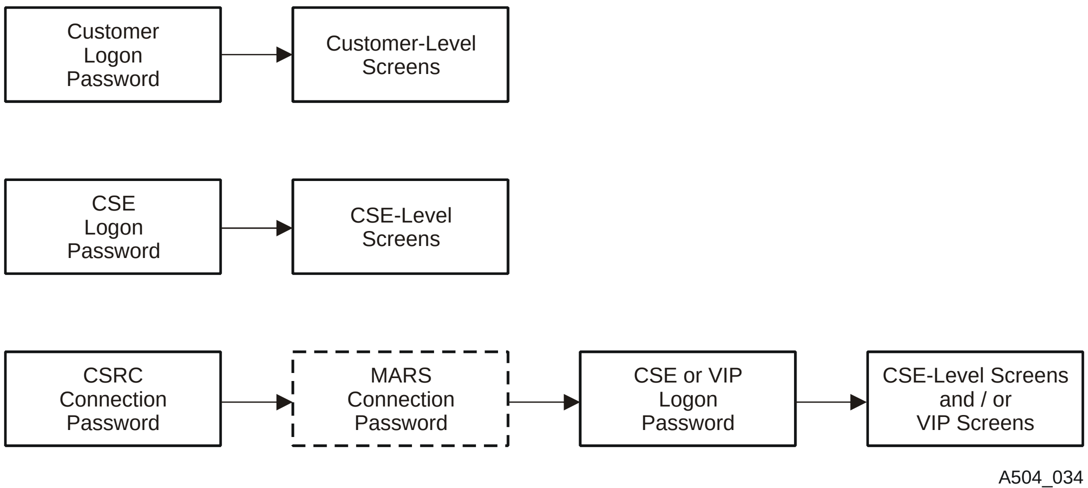
Operator Panel Help

Click Help on any screen to access screen-specific help information.

Operator Panel Access Passwords

VTSS control and maintenance functions are protected from unauthorized access by the passwords described below. Figure 2-1 shows access permissions by password type. All passwords are controlled by the VSM operator or data center manager. If a user enters an incorrect password, a screen prompts the user to enter another. If an incorrect password is entered five times, the display reverts to the *Main Menu / Login* screen, Figure C-2 on page C-181, and a SIM notifies the host system of the problem.

Figure 2-1. Required Passwords for Operator Panel Screen Access



Customer Logon Password

The ‘Customer Logon’ password:

- Must be comprised of eight alphanumeric characters, starting with ‘A,’ followed by seven random alphanumeric characters; the default (preset) is A0022222.
- Can be modified at the *Access Control* screen, Figure C-20 on page C-202.
- Must be keyed in from a local detached operator panel at the *Main Menu / Login* screen, Figure C-2 on page C-181.
- Provides access to all customer-level screens; see “Customer-Level Screens” on page C-186.

CSE Logon Password

The ‘CSE Logon’ password:

- Must be comprised of eight alphanumeric characters, starting with ‘B,’ followed by seven random alphanumeric characters; the default (preset) is B0022222.
- Can be modified at the *Access Control* screen, Figure C-20 on page C-202.
- Must be keyed in from a local detached operator panel at the *Main Menu / Login* screen, Figure C-2 on page C-181.
- Provides access to all CSE-level screens; see “CSE-Level Screens” on page C-188.

CSRC Connection Password

The 'CSRC Connection' password:

- Can be comprised of one to eight alpha and/or numeric characters, and can start with any alphanumeric character; the default (preset) is 22222.
- Can be modified at the *Access Control* screen, Figure C-20 on page C-202.
- Must be keyed in at a remote operator panel (CSRC) at the ISS *Subsystem Parameter Setup* screen.
- Provides access to the *Main Menu / Login* screen, Figure C-2 on page C-181.

Note: If a 'CSRC Connection' password is changed at the *Access Control* screen, it must also be changed at the ISS *Subsystem Parameter Setup* screen.

MARS Connection Password

The 'MARS Connection' password:

- Can be comprised of one to eight alpha and/or numeric characters, and can start with any alphanumeric character; the default (preset) is 022222.
- Can be modified only by a system operator at a host console.
- Is required when a VTSS configuration includes a MARS box that is used to allow remote access to the VTSS.
- Must be keyed in at a remote operator panel at the ISS *Subsystem Parameter Setup* screen after a 'CSRC Low Security Connection' password has been keyed in.
- Provides access to the *Main Menu / Login* screen, Figure C-2 on page C-181.

Viewing Fault Symptom Code (FSC) Descriptions

Fault symptom codes (FSCs) define errors that occur while processing requests from an operator panel or host console. Complete these steps to view FSC descriptions:

1. Note the four-character code shown onscreen.
2. At the bottom of any screen, click FSC/DCC to display the *FSC / DCC Lookup* screen, Figure C-4 on page C-185.
3. Select the radio button next to the text Lookup FSC Description.
4. Key in a valid 4-character code (e.g., 7F36) and click Submit to display a description of the code.

Viewing the System Status Log File

Clicking hic_stat on any screen to display the current hic_stat.dia[1] file, a log containing VSM system status and diagnostics information.

1. Human Interface Control STATus diagnostics

Diagnostics / Failure Management / Error Reporting

The VTSS support facility provides extensive diagnostic, failure management, and error reporting capabilities. Figure 2-2 provides a high-level overview of how these processes work. Figure 2-3 on page 2-63 defines hardware components, software capabilities, and other elements within the VSM system that comprise and support this functionality.

Figure 2-2. Diagnostics / Failure Management / Error Reporting Process Overview

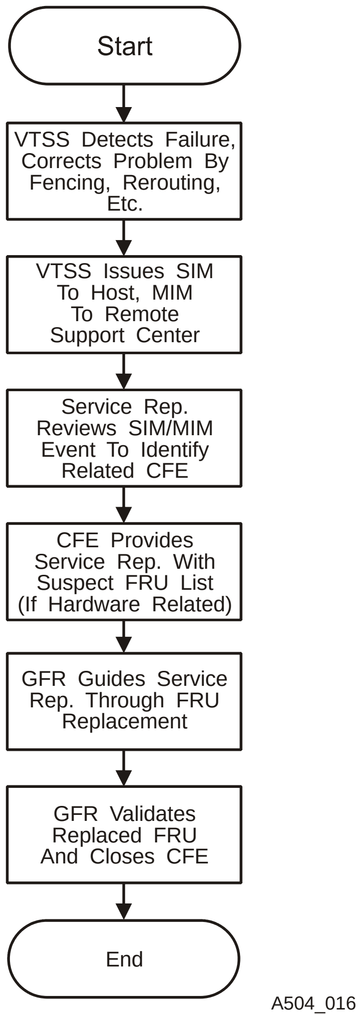
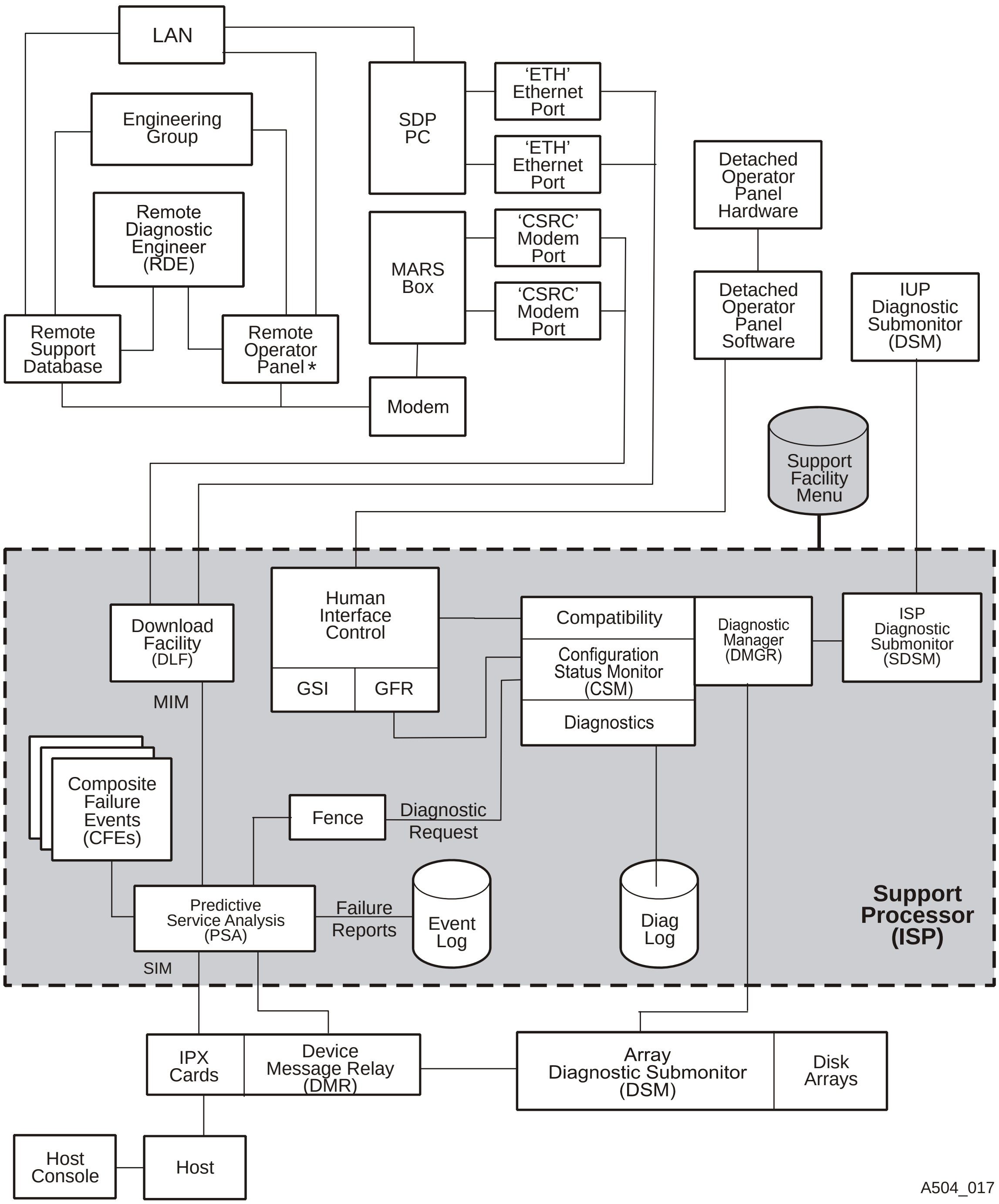


Figure 2-3. Diagnostics / Failure Management / Error Reporting Components



Note: * A simulated operator panel display on a PC at the Sun Remote Resolution Center (RRC).

Predictive Service Analysis (PSA)

Predictive Service Analysis (PSA) is a VTSS support facility function that continuously monitors and analyzes operating characteristics and failure data to help anticipate and proactively fix problems. Figure 2-2 on page 2-62 illustrates the error handling process.

PSA records changes in voltage, temperature, airflow, timing functions, etc. within the VTSS, then uses sets of rules and a database of possible failure conditions and prior failure events to determine whether those variations indicate an actual or potential problem.

Once a problem is identified, PSA begins the fault isolation process, fences defective FRUs, and compiles failure reports and other related information into a Composite Failure Event (CFE) database to assist in identifying and fixing problems. It then relays a SIM to the host system describing the FRU and suspected problem. If the VTSS is linked to a Sun Remote Resolution Center (RRC) maintenance server, the same data is sent there as a MIM message.

PSA-generated information is regularly downloaded to the Sun remote server as part of normal event log MIM processing to allow ongoing analysis and correction of problems; see “Event Logs” on page 2-66 for additional details. As needed, the RRC orders replacement FRUs and schedules service calls to fix VTSS problems.

Fault Isolation

When a threshold value for related failure events is exceeded, a PSA rule is invoked to isolate the CFE. A suspect FRU list (SFL) is compiled based on the general domain of the failure as defined by related fault symptom codes (FSCs), and from failure report path-node information. Fault isolation begins when one of these thresholds is met:

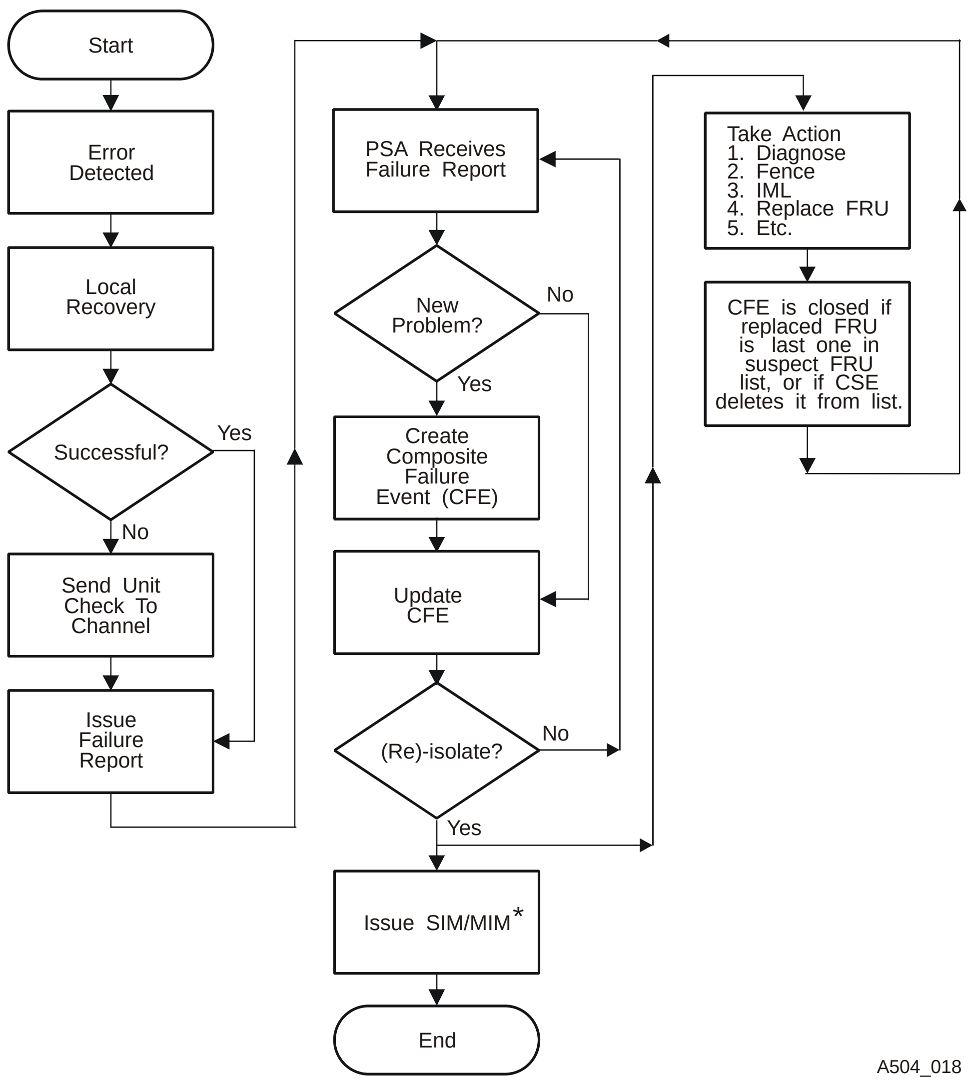
- Persistence Threshold – maximum allowable number of error recovery attempts, beyond which VTSS operation is affected
- Severity Threshold – maximum allowable level of problem severity, beyond which VTSS operation is affected.

Fault isolation ends when there are no more FRUs to execute rules against or when rule execution finishes. After fault isolation finishes, the VTSS tries to send a MIM to the Sun remote maintenance server. A SIM also is sent to the host console if the isolated FRU could cause performance degradation. For more information about SIMs and MIM, see “Service Information Messages (SIMs)” on page 2-70 and “Machine-Initiated Maintenance (MIM)” on page 2-73.

Fencing

PSA invokes fencing to isolate FRU failures, or when operating a VSM system resource could unacceptably degrade performance or pose other risks to the VTSS.[1] If a problem recurs after initial fault isolation and fencing, the suspect FRU list is updated and isolation processing continues. If a problem does not recur, isolation and fencing are complete. The CSE then uses the Guided FRU Replacement (GFR) facility through the VTSS local detached operator panel to replace the defective FRU(s) and correct the problem.

Figure 2-4. PSA Error Handling Process



Notes:

- This chart does not reflect error processing loops for GFR, SIMs, etc.
- * A MIM is always attempted, but issuance to a Sun remote server is customer-controlled. A SIM is sent to the host console only if the isolated FRU can cause a performance degradation in the VTSS.

1. Fencing can also be invoked by cache when nonvolatile memory is defective or capable of corrupting data; by GFR during FRU replacement; and by the configuration status monitor (CSM) at the start of IML.

Event Logs

Event log files are a record of diagnostic events, failure reports, SIMs, fence events, and FRU replacement information. These data are used by Sun technical support groups to analyze and correct VSM system problems, and can be collected in three ways:

- If a VTSS is linked to a Sun remote maintenance server, it automatically downloads event log files to the server database at customer-defined intervals.
- If Sun remote support personnel need to analyze event log data before the next automatic download, a log can be manually downloaded to the maintenance server.
- If a VTSS is not linked to a Sun remote maintenance server, a CSE can be dispatched to the customer site to manually copy the files and transmit the files to the appropriate location.

Event logs are integrated from various user accounts into a Sun engineering database. Each VTSS uses this database to create new rules in its PSA database and to update its suspect FRU list, with the goal of continually improving the level of service to users.

State Saves

Note: State saves do not record or compromise customer data and do not store any data on customer array drives. State saves record only maintenance and failure event data, and store it on the VTSS support facility ISP hard drives, while customer data remains undisturbed and fully accessible on the VTSS array drives.

A state save is a snapshot of VTSS status at the moment a microcode, software, or hardware problem occurs. State saves are initiated by Check0 software on the ISP and IPX cards, and by software on array drive cards whenever a problem is detected.

The largest state saves (11 files) are 24MB uncompressed. Compression reduces file size by roughly two-thirds. State save data are automatically compressed and saved in files on VTSS support facility ISP hard drives, which have space allocated for this purpose.

If a VTSS is linked to a Sun remote maintenance server, data can be downloaded automatically at customer-defined intervals, or manually by a CSE. The data is transferred to a network server software simulator, where Sun engineers review the data to isolate a problem, determine a cause, and issue a fix to the field.

Types of State Saves

The three types of state saves that can occur within a VTSS are:

- IPX state saves, containing the file types listed below:
  - Summary file – one file containing a concise summary of all files for a single state save incident
  - Shared memory file – one file containing data shared between the IPX cards
  - Functional (IPX) files – one to eight files containing local data memory content from IPX cards (the number of files corresponds to the number of IPX cards)
- ISP state saves, containing a data file from one controller ISP card
- IFF state saves, containing a data file from one IFF card.

State Save File Naming Convention

State save file types are identified at the ***State Save Directory*** screen, Figure C-71 on page C-253, using the standard DOS naming convention (8-character filename, 3-character extension). Filename characteristics are as follows:

- The first character indicates the file type:
  - For IPX state saves, possible file types are: ‘C’ (collection/summary); ‘F’ (functional); ‘S’ (shared memory).
  - For ISP state saves, file type is always ‘I’ (ISP).
  - For IFF state saves, file types are ‘A’ for all IFF cards.
- The second and third characters indicate the month a state save occurred (01–12).
- The fourth and fifth characters indicate the date a state save occurred (01–31).
- The sixth character indicates one of three possibilities:
  - A functional IPX file number (0–7)
  - An IPX summary file (A)
  - An ISP file that is compressed (C) or uncompressed (U).
- The seventh and eighth characters are a ‘group number’ (01–99) used to link together related files for a specific state save type. For example, each of 10 IPX state save files would have the same month/day (e.g., 12 01) and ‘01’ as the seventh and eighth characters to indicate its relation to other IPX files for December 1. Group numbers do not indicate the number of state saves or the sequence of state saves for a specific day.
- A ‘sum’ extension is used only for IPX summary files.
- A ‘sts’ extension is used for all other filetypes including non-summary IPX files (IPX, shared memory, hash table), ISP files, and IFF files.

State Save Recording and Reporting By the VTSS

When a state save is in progress, the Status field of the *State Save Directory* screen, Figure C-71 on page C-253, displays one of these messages:

- Software Check 0 State Save in Progress [1]
- Hardware Check 0 State Save in Progress [1]
- Double Check 0 State Save in Progress [1]
- ISP State Save in Progress
- IFF State Save in Progress.

State saves are categorized by condition to indicate the type of problem or failure that has occurred. The messages indicate the type of problem or failure, as follows:

- Check 0 condition indicates that a hardware or software failure has occurred.
  - A hardware Check 0 normally occurs if an IPX card cannot complete an operation due to a hardware failure.
  - A software Check 0 occurs if an IPX card cannot complete an operation due to a non-recoverable software failure.
- Double Check 0 condition indicates that a second software or hardware Check 0 occurred before recovery from the first Check 0 has completed.
- In Progress condition message indicates that an IFF card state save or an ISP state save is in progress.

Each state save file has a header identifying its cause, time of occurrence, and options, plus an error value indicating that the state save was completed. When all data have been collected and stored, compression begins and these messages display in the onscreen Status field:

- State Save Completed / ISP State Save Complete [1]
- State Save Compression Started [1]
- State Save Compression Completed.

Note: During data compression, a green light flashes on each ISP drive. DO NOT try to copy or download files until compression has been completed.

When a VTSS records an IPX state save, a SIM is issued to the host system and recorded in a VTSS error recording log. When an ISP state save occurs on a VTSS that is linked to a Sun remote maintenance server, a MIM message is issued to the Sun Remote Resolution Center (RRC). ISP Check 0 or Double Check 0 state saves are assigned severity levels based on the type of problem.[2]

1. * These messages are applicable for IPX state saves only.
2. See “Machine-Initiated Maintenance (MIM)” on page 2-73 for information on MIM severity levels and categories.

Ensuring Adequate Storage Space for Future State Saves

Each time a state save occurs, the VTSS support facility determines if there is enough space on the ISP disk drives to store another. If adequate space is unavailable for a maximum-sized state save (24 MB), an algorithm uses a four-pass process to delete prior state saves in the following order until enough space is available:

- First pass – deletes all state saves more than six months old
- Second pass – (if needed) deletes all state saves less than six months old that have been completely off-loaded
- Third pass – (if needed) deletes all state saves less than six months old that have been partially off-loaded
- Fourth pass – (if needed) deletes the oldest remaining state saves even if these have not yet been off-loaded.

State Save MIM Message Evaluation By the RRC

If the VTSS is linked to a Sun remote maintenance server, a MIM corresponding to the host SIM is issued to the Sun Remote Resolution Center (RRC) for diagnosis. MIMs are assigned a Category number of 00-03 based on severity[1]; a State Flags field indicating 'Trace/State Save Pending', and a Disposition field indicating 'MIM Download'. After evaluating the MIM message, the RRC determines necessary corrective action as follows:

- If problem is correctable, a remote CSE fixes it through the remote maintenance link, or dispatches a CSE for on-site servicing.
- If the RRC cannot resolve the problem (e.g., when a functional code error or motherboard failure occurs), an escalation process requests assistance from other Sun technical support and/or engineering groups.

If an engineering group requests files for analysis, a RRC person opens an incident file to track information about the state save, and offloads the files one of two ways:

- By downloading them directly from the VTSS support facility to the RRC server database
- By authorizing a CSE to copy the files onto their service laptop PC and then download them to the RRC.

MIM database files are electronically accessible through a network link. Any linked engineering group or field office can access state save files in the database.

1. MIM message categories: 00 (Device Inoperable); 01 (Device Degraded); 02 (Threshold, Potential Failure); 03 (Threshold, No Potential Failure). These correspond to IBM SIM categories 'Acute' (0), 'Serious' (1), 'Moderate' (2), and 'Service' (3), respectively.

Service Information Messages (SIMs)

Service Information Messages (SIMs) are sent to a host system console to alert an operator of VTSS problems requiring service or to convey service-related information. SIM functions are controlled by the VTSS support facility. When the PSA function within the support facility determines that a FRU has failed, is about to fail, or is running with degraded performance, it sends a SIM to the host console indicating the:

- General area requiring service (i.e., storage path, channel, FRU, etc.)
- Severity level of the problem[1]
- Most likely FRU needing replacement
- Impact (if any) that servicing will have on normal operations.

All SIMs are reported to the host system console, but operators determine which SIMs are displayed at the console by having the CSE set a display level at the *Access Control* screenm Figure C-20 on page C-202, as follows:

- Level 0 – displays ‘Service’, ‘Moderate’, ‘Serious’, and ‘Acute’ SIMs (all levels)
- Level 1 – displays only ‘Moderate’, ‘Serious’, and ‘Acute’ SIMs
- Level 2 – displays only ‘Serious’ and ‘Acute’ SIMs
- Level 3 – displays only ‘Acute’ SIMs.

If a VTSS is linked to a Sun Remote Resolution Center (RRC) maintenance server, MIM messages[2] also are sent automatically to the RRC. In accounts without a remote maintenance connection, an operator orders replacement FRUs and schedules replacement based on the SIMs received.

Based on information received from SIM and/or MIM messages, the RRC either services the problem or dispatches a CSE for servicing as needed. SIM / MIM information allows the RRC to accurately diagnose problems and dispatch a CSE with the required FRU on the first service call, reducing the mean time between repairs (MTBR). See “Machine-Initiated Maintenance (MIM)” on page 2-73 for more information on MIM messages.

SIM Alert Message Formats and Fields

In general, SIM alert messages sent by the VTSS support facility to the host system console are consistent with those sent by an IBM 3490-E machine. In a few instances, however, the support facility may generate and send SIM alert messages unique to the VTSS.

Figure 2-5 on page 2-71 shows the general format and fields of a SIM alert message. Figure 2-6 and Figure 2-7 on page 2-71 show examples of a SIM alert message for the MVS and VM operating environments, respectively. Table2-1 on page 2-71 describes the various message fields in a SIM alert message.

1. VTSS sends SIMs through ECAM-T to a host. SIMs are ranked in decreasing order of severity per the IBM naming convention as: 0=‘Acute’ (device inoperable; requires service to become operable); 1=‘Serious’ (device degraded; should be serviced); 2=‘Moderate’ (threshold reached; potential for device failure); 3=‘Service’ (threshold reached; no potential for device failure).
2. MIM messages corresponding to host SIMs are ranked as one of four levels (00, 01, 02, 03) per the IBM naming convention. For more information, see “State Save MIM Message Evaluation By the RRC” on page 2-69.

```
MESSAGE, ADDRESS, AREA, SEVERITY, MACHINE TYPE, SERIAL NUMBER
REFERENCE CODE, SUBSYSTEM ID, VOLUME AND SERIAL NUMBER, CYLINDER AND HEAD, REPEATED
```

Figure 2-5. SIM Alert Message Format and Fields

```
IEA480E Ocuu, CACHE, SERVICE ALERT, MT=9500XD3, SER=200-00000001
REFCODE=0000-0000-0000, ID=01, VOLSER=volser, cchh=x'cccc hhhh', REPEATED
```

Figure 2-6. Sample MVS SIM Alert Message

```
DMKDAD403I ccuu, SCU, MODERATE ALERT, MT=9500XD3, SER=200-00000001
REFCODE=0000-0000-0000, ID=01, VOLSER=volser, CChh=x' cccc hhhh', REPEATED
```

Figure 2-7. Sample VM/SP and VM/SP HPO SIM Alert Message

Table 2-1. SIM Alert Message Fields

SIM Alert Message Field	Description
Message	A category of alert for the environment and condition. Messages beginning with ‘IEA’ are MVS related; ones beginning with ‘DMK’ are VM/SP or VM/SP HPO related.
Address	Channel or unit address (I/O address)—‘Ocuu’ in MVS messages and ‘ccuu’ in VM/HPO and VM/SP messages—of the failing functional storage control.
Area	General area of a VTSS requiring service. For example, SCU (Storage Control Unit) in this field shows a fault requiring service has occurred in the non-cached part of the hardware. CACHE in this field shows that a fault requiring service has occurred in the cache or NVS. DASD in this field shows that a fault occurred in the device hardware.
Severity	The severity of the failure. Levels are ACUTE, SERIOUS, MODERATE, or SERVICE.
Machine Type	Identifies the machine type and model number of the reporting unit.
Serial Number	Identifies the serial number of the reporting unit.
REFCODE	Identifies a reference code that provides additional information about the fault or error. See “SIM Reference Codes” on page 2-72.
REPEATED	Identifies a SIM alert as a repeat SIM–a presentation of a previously-reported SIM. This field is blank for the initial SIM presentation.

SIM Reference Codes

Each SIM contains a 12-character (six-byte) reference code (REFCODE) that is used to identify and correct VTSS problems. Characters 1-4 are a Fault Symptom Code (FSC)[1] which identifies the problem that caused the SIM; these bytes are the same as bytes 20 through 21 of the SIM sense data.

The remaining eight characters (four bytes) provide information about the VTSS and the location of the error that caused the SIM; these bytes are the same as bytes 11 through 14 of the SIM sense data. Specifically, characters 5 and 6 list the control region and unit hardware model number where the problem occurred; characters 7 and 8 list the amount of volatile cache in the unit; characters 9 and 10 list the physical device address (the unit/tray/slot, or U.T.S) where the problem occurred; and characters 11 and 12 list MIM information used by the Sun Remote Resolution Center (RRC) to analyze the problem.

Note: A REFCODE of ‘0000-0000-0000’ identifies an information-only SIM. This code does not reflect a machine fault condition and does not require a service call.

Table 2-2. SIM Severity Levels (High to Low)

Severity Field	Meaning	Recommended Action
ACUTE	A major I/O resource in the VTSS is disabled, or damage to the unit is possible. Performance may be severely degraded. System and/or application outages may have occurred.	Treat as an emergency. Evaluate the current or potential effect on system and application operations. Determine appropriate system recovery actions or actions to prevent possible product damage. Call for service action which is required to restore the unit to full operation.
SERIOUS	A primary I/O resource in the VTSS is disabled. Significant performance degradation is possible. System or application outage may have occurred.	Immediately evaluate the effect on system operations. Plan appropriate recovery actions. Call for service action which is required to restore the unit to full operation.
MODERATE	Performance degradation is possible in a heavily loaded environment. No system or application outage has occurred.	Promptly evaluate the effect on system operations. As required, plan for service action by the CSE. If action is deferred, application outages and/or unacceptable performance degradation may occur if previously recoverable exceptions become unrecoverable.
SERVICE	No system or application performance degradation is expected in any environment. No system or application outage has occurred. The SIM is presented purely for informational purposes.	Although presented for informational purposes, the SIM may be part of a larger impact on system operations. Therefore, if accompanied by other higher-severity SIMs, an evaluation of the potential effects on system operations in terms of the higher severity SIMs is warranted. Otherwise, no specific action need be taken unless directed by local site data collection procedures.

1. FSC descriptions are displayed on the *FSC / DCC Lookup* screen (Figure C-4 on page C-185).

Machine-Initiated Maintenance (MIM)

If the VTSS is linked by either a ServiceTek+ modem or Service Delivery Platform (SDP) network Ethernet device to a Sun Remote Resolution Center (RRC) maintenance server, the machine-initiated maintenance (MIM) function automatically reports whether the VTSS is inoperable, degraded, subject to potential failure, or ready to offload event log data. When a fault condition occurs or a download timer expires, a MIM alert message is sent to the RRC.

Messages about actual or potential unit problems are sent as they occur; critical messages are repeated at 24-hour intervals until unit is serviced. The RRC evaluates messages to determine maintenance requirements, then performs remote servicing tasks or dispatches a CSE for service as needed. MIM message categories are:

- Category 00 – Device Inoperable
- Category 01 – Device Degraded
- Category 02 – Threshold, Potential Failure
- Category 03 – Threshold, No Potential Failure
- Category 04 – Reserved For Future Use
- Category 05 – Event Log Download
- Category 06 – Trace Dump Download
- Category 07 – CSE/RRC Initiated Test.

MIM Alert Messages

There are two types of MIM alert messages generated by the VTSS:

- Unit Problem — invoked as needed (asynchronously) if a device is inoperable (Category 00), running with degraded performance (Category 01), or subject to potential failure (Category 02). Messages include the fault symptom code (FSC) assigned to the failure and the content of the host SIM.
- Event Log Download — invoked at customer-defined intervals to download event logs, FRU replacement information, and other threshold data (Category 05).

Managing VTSS Non-Emergency Power Operations

This section describes ‘standard’ VTSS power operations and procedures, which are designed for use under ‘normal’ operating conditions. See “Managing VTSS Emergency Power Operations” on page 2-76 for a description of power operations and procedures designed for use under ‘abnormal’ operating conditions.

Initiating a Controlled Power-Down

DANGER !!

Even after a controlled power shutdown is completed, a ‘keep-alive’ circuit inside each PDU carries LIVE HIGH VOLTAGE current from its AC source power connection. To avoid injury, use caution around energized components.

Complete these steps to initiate a controlled power-down (CPD) sequence in a VTSS:

1. Have an operator vary offline all channels and RTDs between the VTSS and host system.
2. Verify that the VTSS **UNIT EMERGENCY** switch is set to the ‘0’ (off) position, i.e., raised from the power control panel.
3. Set the VTSS **POWER ENABLE** switch to the ‘0’ (off) position, i.e. raised from the power control panel, to initiate the CPD sequence.

Initiating a CPD automatically triggers the following sequence of events within a VTSS:

- Disables each front-end channel and saves its last state for the next IML
- Transfers all customer data and mapping tables from cache to the back-end disk arrays
- Compresses all raw state saves (takes 10 minutes to one hour)
- Logically disconnects both VTSS nonvolatile cache memory (ANV) cards from the battery backup power system to prevent the battery packs from draining
- Disables all VTSS power (except 12V ‘keep-alive’ power at the PDUs), and puts back-end disk arrays in standby mode (i.e., array card cages stay powered on).

CAUTION !

If a VTSS will be physically disconnected from AC source power for more than two weeks, VTSS battery packs and CNV cards must be logically and physically disconnected to prevent battery discharge or damage that could compromise the backup power system. Complete the following steps to properly disconnect battery packs and CNV cards during long-term AC power shutdowns:

1. Do a controlled-power down of the VTSS as described above to destage cache and logically disconnect the battery backup system from CNV cards.

2. Disconnect the plug between each battery pack and its charger unit.

Powering On After a Controlled Power-Down

Note: If any conditions listed below do not occur, or if the **POWER CHECK** indicator lights on the power control panel during the power-on process, run diagnostics at the *System Debug* screen (Figure C-67 on page C-249) to isolate failures before continuing. Contact Sun Technical Support personnel for assistance as needed.

Note: If the VTSS cabinet doors are closed, some events and/or conditions listed below will not be visible. To properly verify all indications listed below, ensure that the VTSS cabinet doors remain open during the power-on process.

Complete these steps to power on a VTSS after a controlled power-down:

1. At the VTSS power control panel, set the **POWER ENABLE** switch to the ‘1’ (on) position, and verify that these events start to occur almost immediately:
   - The **POWER ON** indicator lights on the power control panel and on both PDUs
   - The array and controller impellers start spinning.

2. After several minutes, the VTSS support facility begins a full-system IML and FRU validation. Verify that these events and conditions occur at the VTSS:
   - Array drives start spinning; an amber LED lights on each drive as it spins up, then goes off when the drive reaches operating speed. A green LED then lights on each drive as it is validated, indicating that it is ready to receive data.
   - Amber LEDs (found on certain other FRUs besides array drives) light up, then go off as the FRU is validated.
   - The support facility begns the IML/test verification procedure
   - After the support facility verifies successful completion of the power-on sequence, the **POWER SEQUENCE COMPLETE** indicator lights on the power control panel.

Note: A full-system IML as described in Step 2 can take an hour or longer, based on the cache size and the number of disk arrays in the VTSS.

3. When the IML and FRU validation processes finish, the Status field of the *Main Menu / Login* screen (Figure C-2 on page C-181) displays the messages **Full Box IML Complete**, then **Battery Test Complete**.

4. Verify that the IML completed error-free and that all FRUs are 100% available as defined in “Verifying FRU Status and Availability” on page 1-48. If any problems are noted, see “Troubleshooting VTSS Startup Problems” on page 1-49 to correct those. Ensure that all FRUs are 100% available before continuing with Step 5 below.

5. Have an operator vary online all channels and RTDs between the VTSS and host system, then turn over the VTSS to the operator.

■ Managing VTSS Emergency Power Operations

This section describes VTSS ‘emergency’ power operations and procedures, which are designed for use under ‘abnormal’ operating conditions. See “Managing VTSS Non-Emergency Power Operations” on page 2-74 for a description of power operations and procedures designed for use under ‘normal’ operating conditions.

Operator-Initiated Emergency Power-Off (EPO) Shutdown

DANGER !!

Even after an operator-initiated emergency power-off (EPO) shutdown is completed, a ‘keep-alive’ circuit inside each PDU carries LIVE HIGH-VOLTAGE current from its AC source power connection. Additionally, the battery packs and charger units in the VTSS backup power system also remain charged and energized. To avoid injury, use caution around energized components.

An emergency shutdown of VTSS power can be initiated manually by an operator. To disable power to a VTSS quickly in an emergency, complete these steps:

1. At the VTSS power control panel, lift the protective cover that shields the red UNIT EMERGENCY switch.
2. Set the switch to the ‘1’ (on) position, i.e., flush with the power control panel face.

When a operator-initiated EPO shutdown occurs after the UNIT EMERGENCY switch is pressed by an operator, the following events and conditions occur in the VTSS:

- All VTSS power (except 12V DC power at the battery packs and batter charger units, and ‘keep-alive’ 12V DC power at the PDUs) is disabled
- The VTSS is placed in an ‘EPO’ state, a status that requires specific recovery steps to correct.
- The POWER ON and POWER SEQUENCE COMPLETE indicator lights go off on the VTSS power control panel, indicating that primary power within the unit is disabled.

To restore power to a VTSS after an operator-initiated emergency shutdown, see “Restoring Power After an Operator-Initiated EPO Shutdown” on page 2-77.

Restoring Power After an Operator-Initiated EPO Shutdown

Note: If any conditions listed below do not occur, or if the **POWER CHECK** indicator lights on the VTSS power control panel during the power-on process, run diagnostics at the *System Debug* screen (Figure C-67 on page C-249) to isolate failures before continuing. Contact Sun Technical Support for assistance as needed.

Note: If the VTSS cabinet doors are closed, some events and/or conditions listed below will not be visible. To properly verify all indications listed below, ensure that the VTSS cabinet doors remain open during the power-on process.

Complete these steps to enable VTSS power after a manually-initiated EPO shutdown:

1. Based on the **CUSTOMER/CSE** switch setting on the power control panel, complete the appropriate step below to reset the VTSS and start its power-on sequence.
   - If the switch is set to the **CSE** position, reset it to the **CUSTOMER** position, then set the **UNIT EMERGENCY** switch to the '0' (off) position, i.e., raised from the power control panel surface.
   - If the switch is set to the **CUSTOMER** position, leave it in that position, then set the **UNIT EMERGENCY** switch to the '0' (off) position, i.e., raised from the powr control panel surface.

2. Verify that the following events start to occur almost immediately:
   - The **POWER ON** indicator lights on the power control panel and on both PDUs.
   - All array and controller impellers start spinning.

3. After several minutes, the support facility begins a full-system IML and FRU validation. Verify that these events and conditions occur at the VTSS:
   - Array drives start spinning; an amber LED lights on each drive as it spins up, then goes off when the drive reaches operating speed. A green LED then lights on each drive as it is validated, indicating that it is ready to receive data.
   - Amber LEDs (found on certain other FRUs besides array drives) light up, then go off as the FRU is validated.
   - The VTSS support facility begins the IML / test verification procedure
   - After the support facility verifies successful completion of the power-on sequence, the **POWER SEQUENCE COMPLETE** indicator lights on the power control panel.

Note: A full-system IML as described in Step 3 can take an hour or longer, based on the cache size and the number of disk arrays in the VTSS.

4. When the IML and FRU validation processes finish, the Status field of the *Main Menu / Login* screen (Figure C-2 on page C-181) displays the messages **Full Box IML Complete**, then **Battery Test Complete**.

5. Verify that the IML completed error-free and that all FRUs are 100% available as defined in "Verifying FRU Status and Availability" on page 1-48. If any problems are noted, see "Troubleshooting VTSS Startup Problems" on page 1-49 to correct those. Ensure all FRUs are 100% available before continuing with Step 6 below.

6. Have an operator vary online all channels and RTDs between the VTSS and host system, then turn over the VTSS to the operator.

System-Initiated Emergency Power-Off (EPO) Shutdown

DANGER !!

Even after a system-initiated thermal emergency power-off (EPO) shutdown completes, a ‘keep-alive’ circuit inside each PDU carries LIVE HIGH-VOLTAGE current from its AC source power connection. Additionally, battery packs and charger units in the VTSS backup power system also remain charged and energized. To avoid injury, use caution around energized components.

A thermal emergency power-off (EPO) shutdown is initiated automatically by the VTSS support facility, without any operator intervention, when a VTSS overtemperature condition is recorded by one or more sensors within the VTSS cabinet.

When a thermal EPO shutdown occurs, the following events and conditions occur in the VTSS:

- All VTSS power (except 12V DC power at the battery packs and charger units, and ‘keep-alive’ 12V DC power at the PDUs) is disabled
- The VTSS is placed in an ‘EPO’ state, a status that requires specific recovery steps to correct
- The POWER ON and POWER SEQUENCE COMPLETE indicator lights go off on the VTSS power control panel, indicating that primary power within the unit is disabled.

To restore power to a VTSS after a system-initiated emergency shutdown, see “Restoring Power After a System-Initiated EPO Shutdown” below.

Restoring Power After a System-Initiated EPO Shutdown

DANGER !!

To avoid injury, and damage to the VTSS when trying to restore VTSS power after a thermal EPO, follow these precautions, and watch for these conditions:

- **Before attempting to restore power to the VTSS, contact Sun Technical Support for for help with troubleshooting and correcting problems as needed.**
- **If a ground fault occurs during the power-on process, the POWER breaker trips on each PDU and the POWER CHECK indicator lights on the VTSS power control panel. Do not try to override tripped breakers. Instead, follow instructions from Sun Technical Support to isolate the failure before continuing.**
- **If any conditions stated in the procedure below do not occur, or if the POWER CHECK indicator lights on the power control panel but PDU breakers do not trip, contact Sun Technical Support to isolate the failure before continuing.**
- **Never turn on VTSS power if there is evidence of heat-related damage either outside or inside the cabinet. Instead, contact Sun Technical Support for further guidance before continuing.**

Complete these steps to restore power to a VTSS after a system-initiated thermal EPO shutdown:

1. Have an operator vary offline all channels and RTDs between the VTSS and host system.

2. Open all VTSS cabinet doors and inspect components for indications of fire-, smoke-, or heat-related damage. Make a notation of all damaged components.

3. Check each PDU and verify whether its **POWER** breaker has automatically been tripped to the '0' (off) position. Make note of the position of each PDU breaker.

4. Contact Sun Technical Support. Report the general condition of all FRUs in the VTSS, and the status of the **POWER** breaker on each PDU.

5. If the support person instructs you to power on the VTSS, complete these steps at the VTSS power control panel:

   a. Verify that the **UNIT EMERGENCY** switch is set to the '0' (off) position, i.e., raised from the panel face.

   b. Set the **POWER ENABLE** switch to the '1' (on) position and verify that the following events start to occur almost immediately:

      - The **POWER ON** indicator lights on the panel and on both VTSS power distribution units (PDUs)
      - All array and controller impellers start spinning.

6. After several minutes, the VTSS support facility begins a full-system IML and FRU validation. Verify that these events and conditions occur at the VTSS:

   - Array drives start spinning; an amber LED lights on each drive as it spins up, then goes off when the drive reaches operating speed. A green LED then lights on each drive as it is validated, indicating that it is ready to receive data.
   - Amber LEDs (found on certain other FRUs besides array drives) light up, then go off as the FRU is validated.
   - The support facility begins the IML / test verification procedure
   - After the support facility verifies successful completion of the power-on sequence, the **POWER SEQUENCE COMPLETE** indicator lights on the power control panel.

Note: A full-system IML as described in Step 6 can take an hour or longer, based on the cache size and the number of disk arrays in the VTSS.

7. When the IML and FRU validation processes finish, the Status field of the *Main Menu / Login* screen (Figure C-2 on page C-181) displays the messages **Full Box IML Complete**, then **Battery Test Complete**.

8. Verify that the IML completed error-free and that all FRUs are 100% available as defined in "Verifying FRU Status and Availability" on page 1-48. If any problems are noted, see "Troubleshooting VTSS Startup Problems" on page 1-49 to correct those. Ensure all FRUs are 100% available before continuing with Step 9 below.

9. Have an operator vary online all channels and RTDs between the VTSS and host system, then turn over the VTSS to the operator.

Upgrading FICON Code On An Installed VTSS

Use this procedure to upgrade the following previously-installed FICON-capable VTSS units to the latest level of D01.03.00.00 (VSM5 base level) or higher code[1]:

- A unit running FICON front end-capable VTSS code levels D01.00.00.*xx* or D01.01.*yy.xx*
- A unit running FICON back end (Nearlink)-capable VTSS code level D01.02.*yy.xx* that is being upgraded to a higher level of FICON back end-capable code.

Complete these steps to upgrade to a required FICON Nearlink-capable VTSS code level:

1. Have the system operator vary offline all VTSS devices, RTDs, and channels, stop all applications that are running, and unmount all devices from the host system.
2. Logon to the VTSS and access the *FRU Status* screen (Figure C-43 on page C-225). Check all partitions for fenced FRUs. Correct probems to remove fences and replace affected FRUs. Contact Sun Technical Support for assistance as needed.
3. If the newest code level installed in the VTSS is lower than D01.02.00.00, upload D01.03.00.00 or higher code to the VTSS general delivery directory. If D01.03.00.00 or higher code is already installed, skip this step and continue with Step 4.
4. Do a controlled power down (CPD) of the VTSS. For details, see "Initiating a Controlled Power-Down" on page 2-74.

CAUTION !

All internal covers must be replaced before powering on the VTSS to maintain EMI / RFI emissions within required parameters.

5. Power up the VTSS in VIP mode. At the *VIP Main Menu* screen (Figure C-76 on page C-258), click the Software Release Level field to display the *VIP Select Software Release Level* screen (Figure C-95 on page C-277). Verify that the current (box-checked) code level is at the required FICON-capable level. If not, select a valid software release level (SRL), then click Change the IML SRL to display a screen with the message **IML SRL changed to FICON**. The selected SRL will begin running on the VTSS at the next IML (power on / reset). Click Main to return to the *VIP Main Menu* screen.
6. At the *VIP Main Menu* screen, click IML to display the *VIP IML Start* screen (Figure C-98 on page C-280). Click Submit to initiate the IML. When IML completes successfully, the *Main Menu/Login* screen (Figure C-2 on page C-181) displays and the message **Full Box IML Complete** displays onscreen. Check the hic_stat.dia file to verify the message **FULL BOX IML COMPLETED** is shown at the end of the cold boot screen text, and that there are no hardware failures, indicating a successful IML.

1. Minimum code level for VSM4-VTSS with back-end FICON is D01.02.00.00; the base code level for VSM5-VTSS is D01.03.00.00.

7. Logon to the VTSS and access the *FRU Status* screen (Figure C-43 on page C-225). Check all partitions for fenced FRUs. Correct probems to remove fences and replace affected FRUs. Contact Sun Technical Support for assistance as needed.
8. Using the *Channel Configuration* screen (Figure C-39 on page C-221) and the *Real Tape Drive Status* screen (Figure C-40 on page C-222), change applicable Host interfaces (FIPs) to Nearlink interfaces according to customer configuration requirements; see "Configuring VCF Cards for Nearlink Use" on page 1-54 for details.

Prerequisites for Full FICON Connectivity

Prerequisites for full VSM5-VTSS FICON connectivity to host systems and FICON directors on the front end and to real tape drives (RTDs) and cluster-links (CLINKs) on the back end are:

- One or more VCF card pairs
- VTCS code level 6.0 or higher
- VTSS code level D01.03.00.00 or higher.

Additional prerequisites for back-end FICON connectivity to RTDs are:

- Minimum tape drive microcode levels
  - T9840B tape drives = 1.35.304 or higher
  - T9940B tape drives = 1.35.404 or higher
  - T9840C tape drives = 1.35.504 or higher
  - T10000 tape drives = **x.xx.xxx** or higher
- 3490 Emulation Mode – All RTDs must use 3490 Emulation Mode, which is selected at the Emulation Mode submenu on the T9*X*40.
- Receive Buffer Frame Size – All RTDs must have their receive buffer frame size set to 2048MB, which is selected at the Port A/B Maximum Data Size submenu on the T9*X*40.

Note: See Chapter 5 of the *T9X40 Service Reference Manual* for details on how to verify code levels and set the parameters listed above.

Installing and Enabling VTSS Options

To install and enable VTSS options that are purchased after initial installation of a VTSS, follow the procedures described in "Obtaining Keys for VTSS Features and Options" on page 1-32 and "Installing VTSS Options" on page 1-47.

Installing Engineering Changes (ECs)

Engineering changes (ECs) are installed at the *Select Software Release Level* screen (Figure C-65 on page C-247).

Note: If a software EC upgrade is incompatible with the software release level (SRL) currently running on a VTSS, the EC upgrade installation will fail. For example, release level 1.0.0.2 will be accepted by a VTSS running 1.0 and 1.0.0.1 code, but not by a VTSS running 1.0.0.2 or higher code.

A software EC upgrade is used for replacing database files such as PSA rules. Installing and enabling this type of EC does not require an IML of the software release level (SRL) currently running on the VTSS, of the ISP or IPX circuit cards, or of the entire VTSS. Complete these steps to install a (nondisruptive) software EC upgrade:

1. With your service laptop PC, access the detached operator panel GUI and log on.
2. Access the *Select Software Release Level* screen (Figure C-65 on page C-247) and complete these steps:

   a. Verify the VTSS is running a software release level (SRL) compatible with the SRL being installed (see the **Note** above). If not, contact Sun Technical Support before continuing with Step b. If both SRLs are compatible, skip to Step 3.

   b. Click NDCL to copy the new software EC to the VTSS general delivery directory on the VTSS support facility ISP hard drives.
3. Once the VTSS support facility detects that the last file has been successfully copied to the ISP drives, the screen Status field reads **Copy Completed**, and the FACT utility begins processing commands to install and enable the new SRL.

Note: If all FACT commands process correctly, the screen Status field reads **Complete**. If any commands process incorrectly, the Status field reads **Failed** and the screen displays an alphanumeric fault symptom code[1]; click NDCL to retry. If FACT command processing fails repeatedly, contact Sun Technical Support before continuing.

4. Once the new SRL is successfully installed, it is displayed as the current SRL on screens including the *Subsystem Configuration and Status* screen (Figure C-9 on page C-191) and *Select Software Release Level* screen (Figure C-65 on page C-247).
5. After verifying proper operation of the VTSS, turn over the system to the operator.

1. For fault symptom code descriptions, click FSC/DCC at any operator panel screen where a code is displayed.

■ Managing the Software Release Level

To select and manage SRLs for the VTSS, access the *Select Software Release Level* screen (Figure C-65 on page C-247), then complete the appropriate procedure below.

Deleting Event Log Data From a Software Release Level

1. At the *Select Software Release Level* screen, select the SRL whose event logs you want to delete.
2. Click Delete Event Logs. A screen displays with the message: **Warning: Clicking continue will delete evemt logs from SRL <*SRL name*>.**
3. Click Continue to delete event logs for the selected SRL, or Cancel to void the request.

Deleting a Software Release Level

Caution: This procedure works only on SRLs that are NOT currently running on the VTSS, and deletes the selected SRL from the support facility ISP hard drives.

Note: This procedure is used primarily after a SRL installation fails at the *Select Software Release Level* screen, which typically occurs when a user tries to load a sixth SRL (the support facility allows a maximum of five SRLs to be loaded).

1. At the *Select Software Release Level* screen, select a non-running SRL for deletion.
2. Click Delete Selected SRL. A screen displays with the message: **Warning: Clicking continue will delete SRL <*SRL name*>.**
3. Click Continue to delete the se;ected SRL, or Cancel to void the request.

IMLing the Current Software Release Level

Note: If you select invalid software release level and try to initiate an IML on it, a fault symptom code (FSC) displays and the IML will not occur.

1. Have an operator vary offline all channels and RTDs between the VTSS and host.
2. At the *Select Software Release Level* screen (Figure C-65 on page C-247), select a software release level for IML.
3. Click NDCL to perform a nondisruptive IML of the SRL, or click Disruptive Code Load to perform a disruptive IML of the SRL.

■ Recovering From a ‘Dual-Fenced’ Condition

Note: Because VTSS support facility ISP hard drives are not used to store customer data, customer data is not affected by a ‘dual-fenced’ condition.

When both VTSS support facility ISP hard drives become fenced concurrently, it causes what is known as a ‘dual-fenced’ condition. A dual-fenced condition prevents the support facility from IMLing the VTSS during the power-on process, and must be corrected to resume normal operations.

ISP drives can become fenced in a number of ways: When one ISP drive is fenced or otherwise unusable, and the functioning (i.e., unfenced) ISP drive is in the middle of an IML write operation, one of the following events can trigger a dual-fenced ISP drive condition:

- The UNIT EMERGENCY (EPO) button is pressed on the VTSS power control panel, or;
- There is a rapid, unexpected, and complete loss of power to the VTSS.

When either of the above situations occurs, the second (i.e., functioning) ISP drive becomes fenced. Then, when power is restored to the VTSS, the support facility cannot locate a usable ISP drive to restart the previously-suspended IML process.

Creating a Dual-Fenced Condition

The VTSS writes data to ISP drive cards during IML. During a normal power down, the VTSS support facility finishes all write activity to the ISP drives before shutting down power, thereby avoiding a dual-fenced condition. Typically, only incorrect use of the UNIT EMERGENCY (EPO) button during IML, or repeated loss of power to the VTSS during IML create this condition. Specifically, the condition is caused by:

- Pressing the UNIT EMERGENCY (EPO) button twice during IML. When the button is pressed once, write activity to the ISP drives is interrupted and the VTSS support facility fences the first drive. When the button is pressed a second time, before reconstruction of the first fenced drive is complete, the support facility fences the second drive, thereby causing a dual-fenced condition.
- Repeated customer power outages during IML.

Indications

A dual-fenced condition is indicated during the power-on sequence if the POWER SEQUENCE COMPLETE indicator on the VTSS power control panel does not light and the detached operator panel display on your service laptop PC remains blank.

Recovery

To recover from a dual-fenced condition, you must boot the VTSS from your service laptop PC with a special boot utility. This utility generates reports that display on the local detached operator panel display on your service laptop PC, indicating the condition of the ISP drive. It is likely that only a logging file was corrupted. Once the ISP drive has been repaired, the VTSS may be re-IMLd. Reconstruction of the other fenced ISP drive will also begin with the start of the IML.

Servicing a VSM5-VTSS

3

This chapter defines procedures for servicing VTSS for VSM5 field-replaceable units (FRUs) using the Guided FRU Replacement (GFR) facility, and defines the non-GFR FRU replacement procedure for an array motherboard.

Always read and follow the warnings, cautions, and notes below before beginning the FRU replacement procedures described in this section.

Warning: To avoid injury, always assume that source power connections to PDUs contain LIVE HIGH VOLTAGE, and use extreme caution when working around potentially energized components. Always comply with customer requirements and local codes when working around power sources.

Caution: To avoid injury and minimize the potential for data loss and equipment damage, review "Safety / Fiber Optic / ESD Precautions" on page xxi before starting any FRU replacement procedure, and remove FRUs only if instructed to do so by GFR procedures or by Sun Technical Support personnel.

Caution: Battery packs contain lead and acid, which are hazardous materials. You are responsible for complying with requirements regarding shipping, recycling, and disposal of hazardous materials in countries where you service accounts. If you do not understand applicable requirements, contact your depot manager or the Sun Environmental Health and Safety (EHS) group for guidance.

Caution: Battery packs must always be replaced within four years of the date of manufacture as indicated on the battery housing. Failure to follow this required replacement schedule can compromise the VTSS backup power system. Whenever any FRU is replaced, check the date of manufacture and scheduled replacement date on each battery pack. If replacement is due within 90 days of the current date, schedule replacement of both packs within that timeframe.

Caution: Always replace all VTSS internal covers before powering on a VTSS to maintain EMI / RFI emissions within required parameters.

Caution: To maintain proper airflow and prevent a VTSS overtemperature condition, always replace fans, impellers, and internal covers, and close external doors, as soon as possible after completing service procedures.

Note: Procedures shown on operator panel GFR screens in this chapter are intended as examples only. Specific FRU ID information (name, number, U.T.S location, etc.) may differ from the examples shown, instead corresponding with actual FRUs being replaced. You are responsible for determining the correct FRUs to replace from 'real time' information available on operator panel screens.

Note: Many FRUs have an amber LED that lights when the GFR function selects the FRU for replacement. When a replacement FRU is installed, its amber LED stays on until the FRU is validated by the VTSS support facility.

Replacing FRUs Using the GFR Facility

This section defines procedures for replacing field-replaceable units (FRUs) in a VTSS using the Guided FRU Replacement (GFR) facility.

Selecting a FRU for Replacement

To service field-replaceable units (FRUs) using the Guided FRU Replacement (GFR) facility, complete these steps:

1. Access the *GFR – Main Menu* screen, Figure C-46 on page C-228.
2. Click the List Field Replaceable Units (FRU) field to display the *GFR – Field Replaceable Units* entry screen, Figure C-48 on page C-230.
3. At the *GFR – Field Replaceable Units* entry screen, click a field to the left (e.g., Control Unit lower tray 0) to see a list of FRUs available for GFR in that tray (e.g., *GFR – Field Replaceable Units: Control Unit Lower Tray 0* screen, Figure C-50 on page C-232).
4. At the above screen, select a procedure (*Replace*, *Diag*, *Remove*, *Add*) for the designated FRU, then click Submit to display (in this example) the *GFR – Fence CU.0.PDU1* screen (Figure 3-4 on page 3-91) with FRU replacement instructions.
5. After you click Submit, the VTSS support facility fences the selected FRU, allowing it to be removed and replaced nondisruptively. Complete all GFR steps in the exact order shown onscreen, then click Validate.
6. The VTSS support facility begins validating the FRU and displays a series of status messages, ending with **SUCCESS: FRU 961 at CU.0.PDU1 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Start-up Problems" on page 1-49 and fix the problems before continuing. Contact Sun Technical Support for assistance as needed.
7. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units* entry screen.

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Replacing a PDU Fan

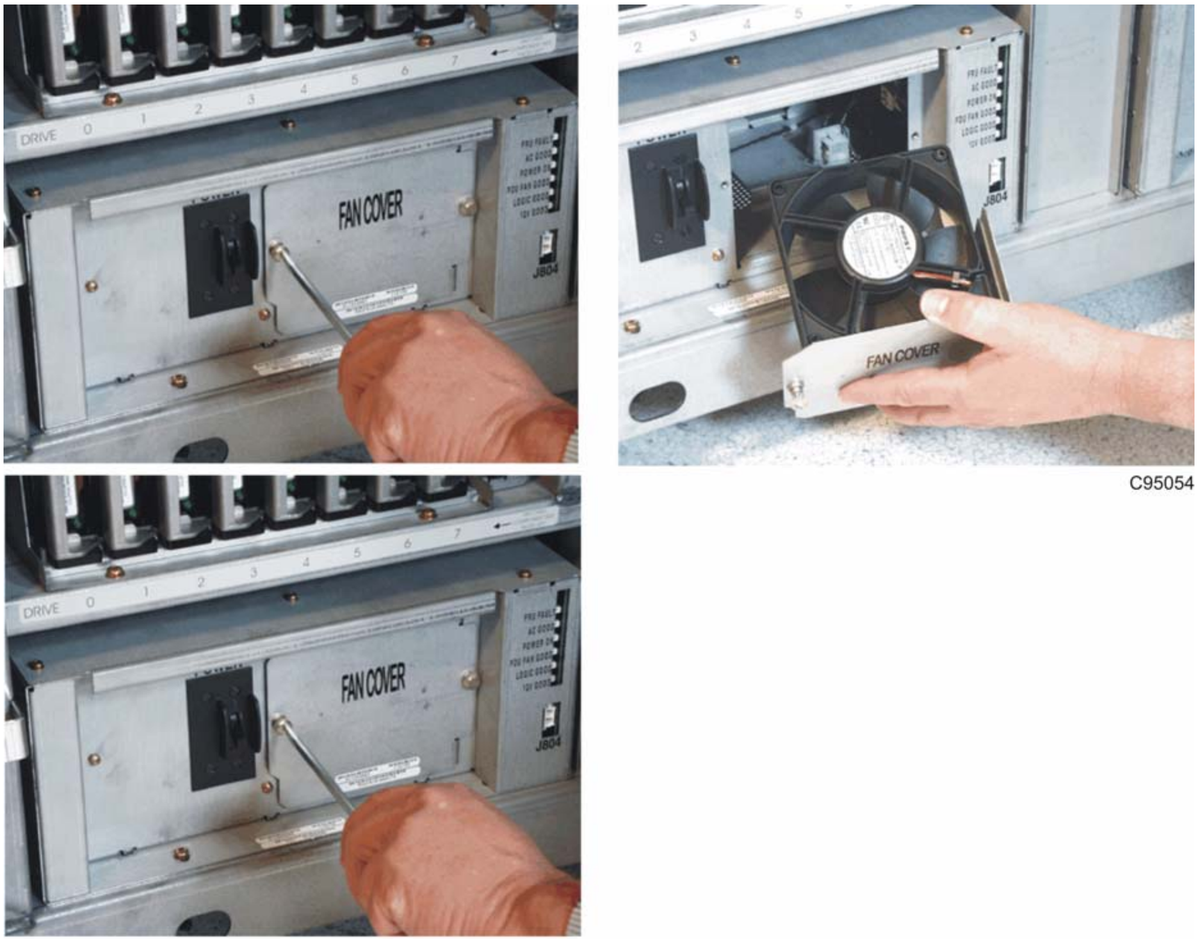

Figure 3-1. Replacing a PDU Fan

See Figure 3-1 on page 3-88, read all accompanying warning messages and notes for this procedure, then complete these steps to replace a power distribution unit (PDU) internal fan:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Lower tray 0 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-49 on page C-231.
2. In the screen field for the PDU fan being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.0.FANn* screen, Figure 3-2 below.

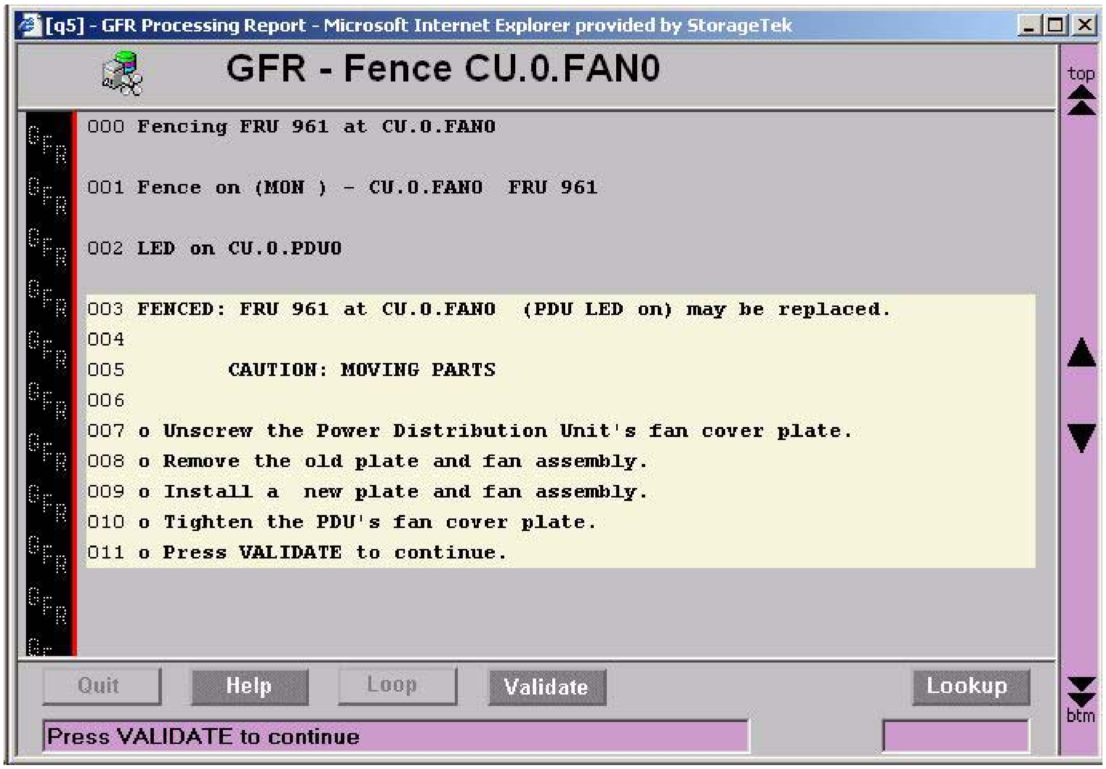

Figure 3-2. GFR Procedure – Power Distribution Unit (PDU) Internal Fan

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 961 at CU.0.FAN0 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.
4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing a Power Distribution Unit

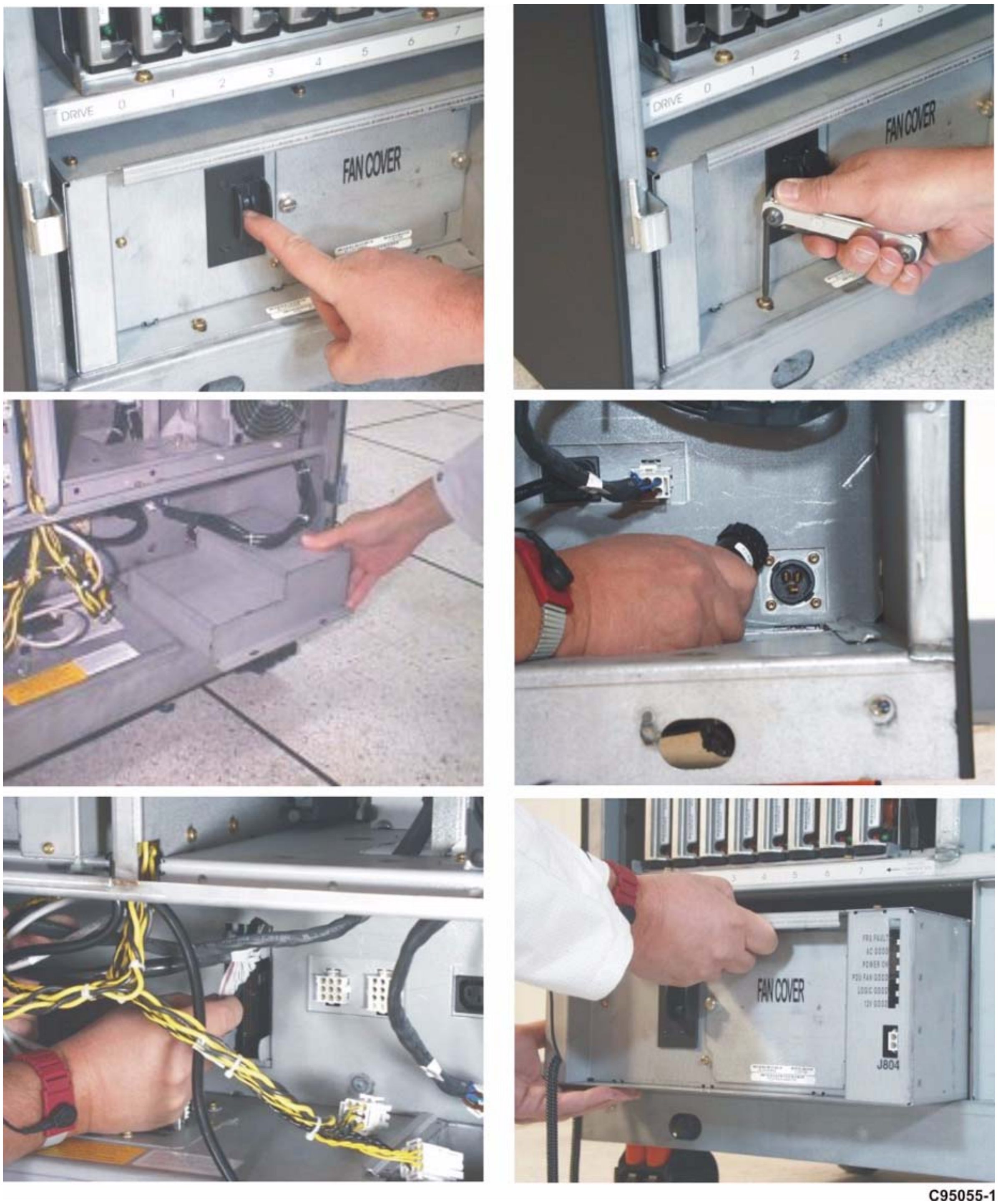

Figure 3-3. Replacing a Power Distribution Unit

See Figure 3-3 on page 3-90, read all accompanying warning and caution messages, then complete these steps to replace a power distribution unit (PDU):

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Lower tray 0 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-49 on page C-231.
2. In the screen field for the PDU being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.0.PDUn* screen, Figure 3-4 below.

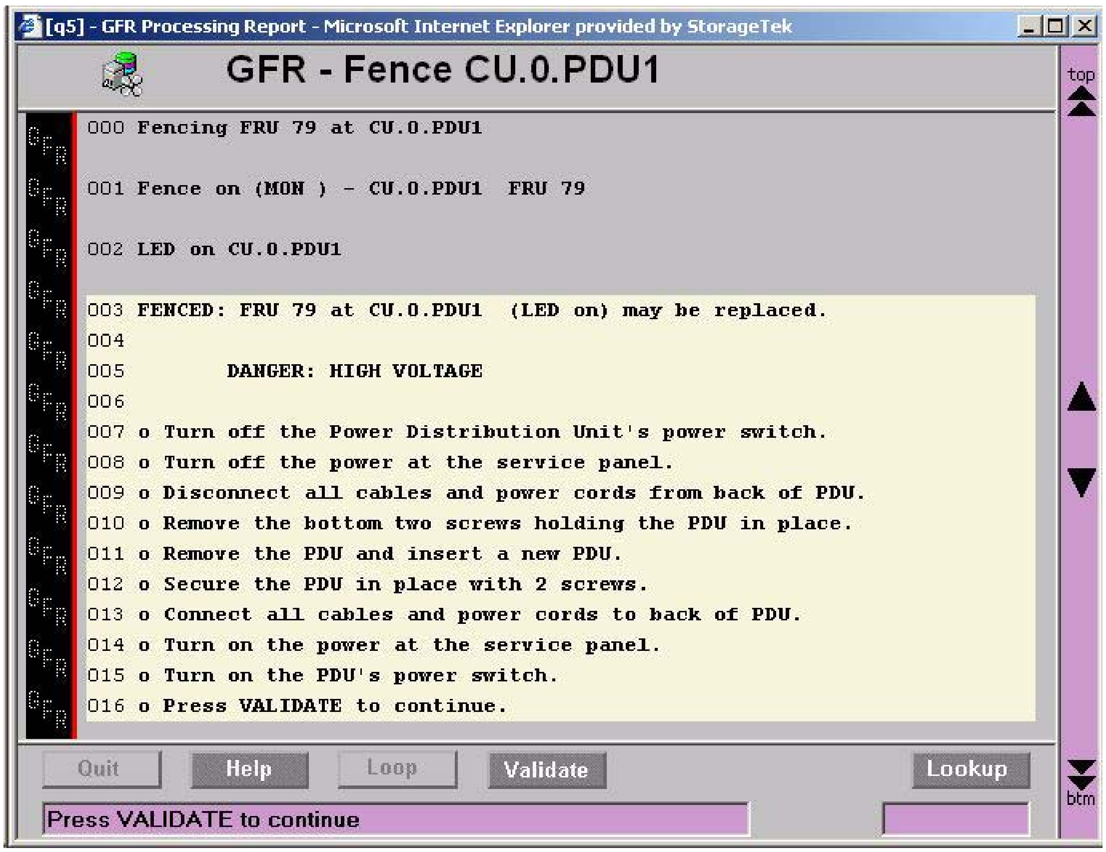

Figure 3-4. GFR Procedure – Power Distribution Unit

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 79 at CU.0.PDU1 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.
4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing a Power Control Panel

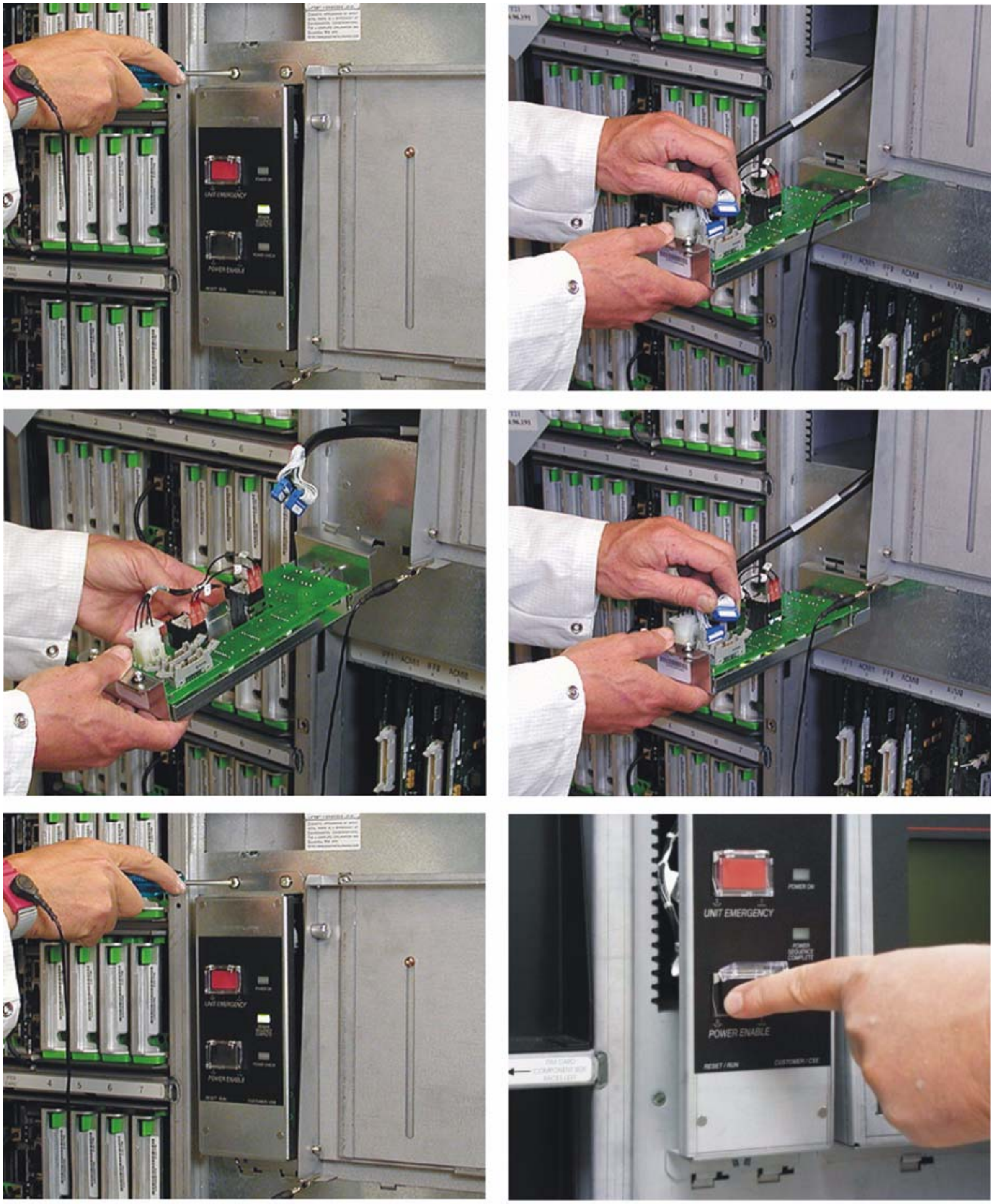

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Figure 3-5. Replacing a Power Control Panel

See Figure 3-5 on page 3-92, then complete these steps to replace a power control panel:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Upper tray 3 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-52 on page C-234.

2. In the screen field for the power control panel, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.3.PPNL* screen, Figure 3-6 below.

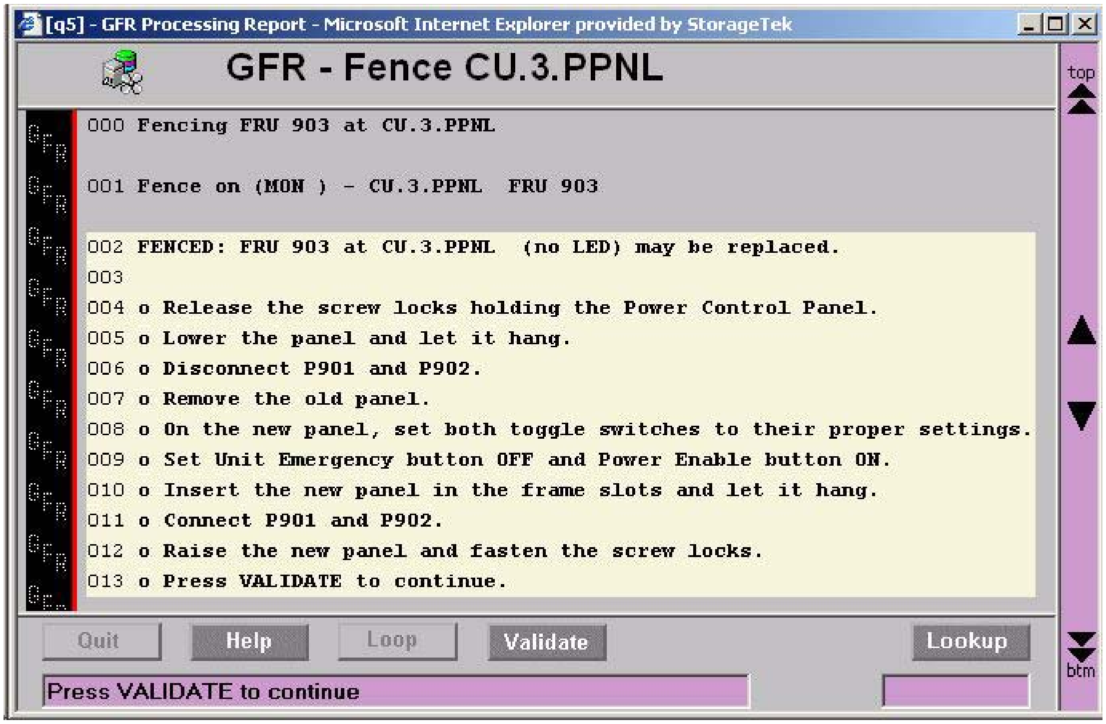

Figure 3-6. GFR Procedure – Power Control Panel

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays a status messages, ending with **SUCCESS: FRU 903 at CU.3.PPNL has been replaced** (in this example) if no problems occur. If problems occur, see “Troubleshooting VTSS Startup Problems” on page 1-49 and fix the problems before continuing.

4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing a Logic Power Supply Fan

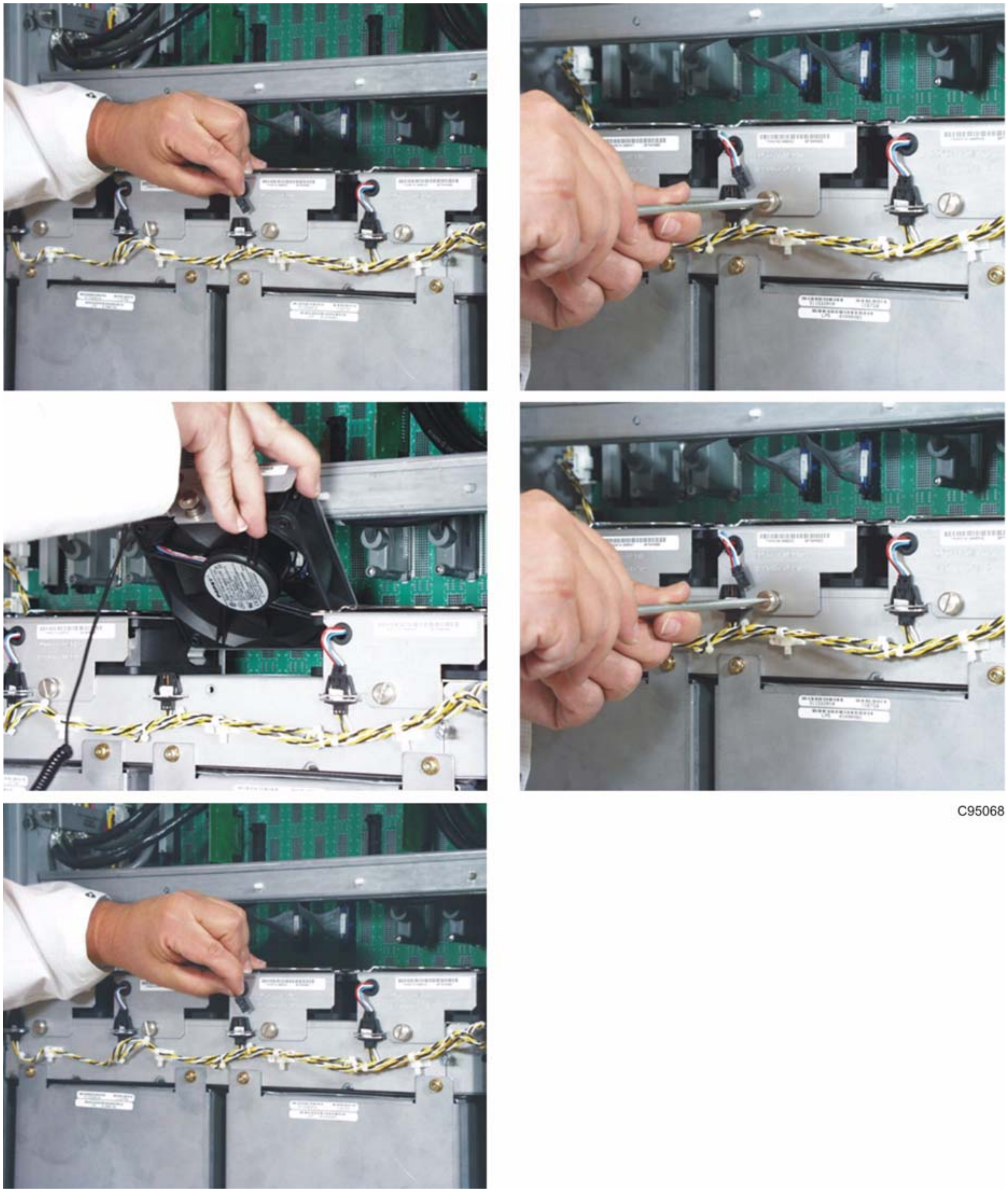

Figure 3-7. Replacing a Logic Power Supply Fan

See Figure 3-7 on page 3-94, read all accompanying warning and caution messages for this procedure, then complete these steps to replace a logic power supply fan:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Cluster tray 1 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-50 on page C-232.
2. In the screen field for the logic power supply fan being replaced, click the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.1.FANn* screen, Figure 3-8 below.

Figure 3-8. GFR Procedure – Logic Power Supply Fan

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 957 at CU.1.FAN0 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.
4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing a Logic Power Supply

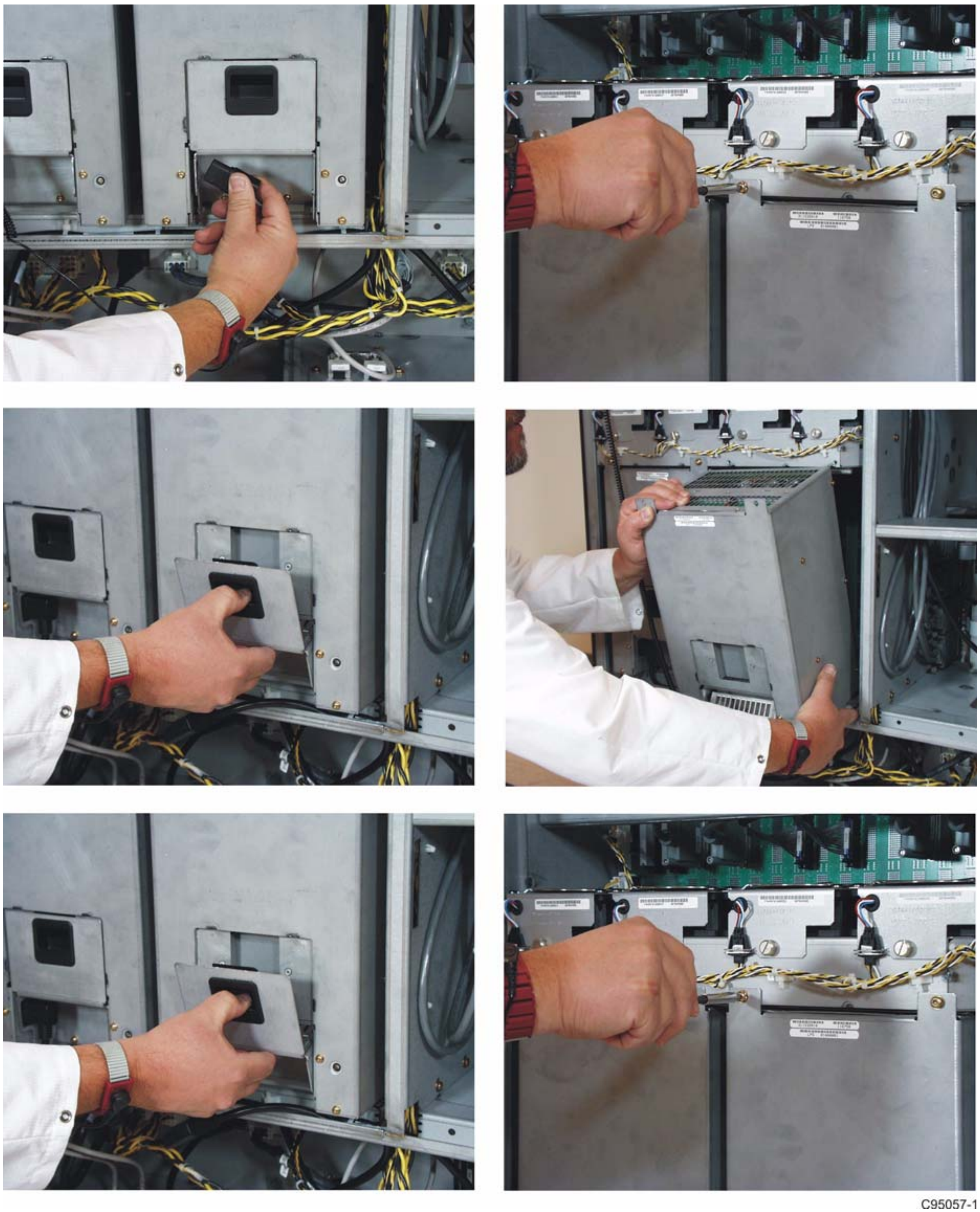

Figure 3-9. Replacing a Logic Power Supply

See Figure 3-9 on page 3-96 and Figure 3-10 on page 3-97, then complete these steps to replace a logic power supply:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Cluster tray 1 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-50 on page C-232.

2. In the screen field for the logic power supply being replaced, click the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.1.LPSn* screen, Figure 3-10 below.

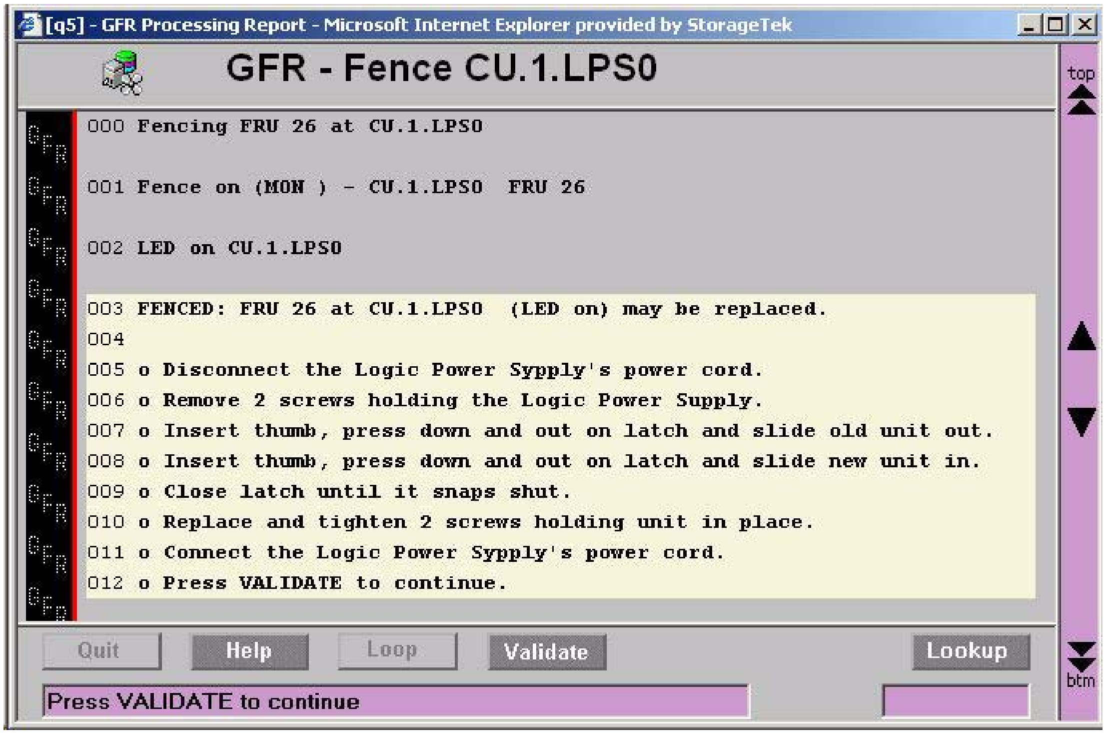

Figure 3-10. GFR Procedure – Logic Power Supply

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 26 at CU.1.LPS0 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.

4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing an Array Power Supply Fan

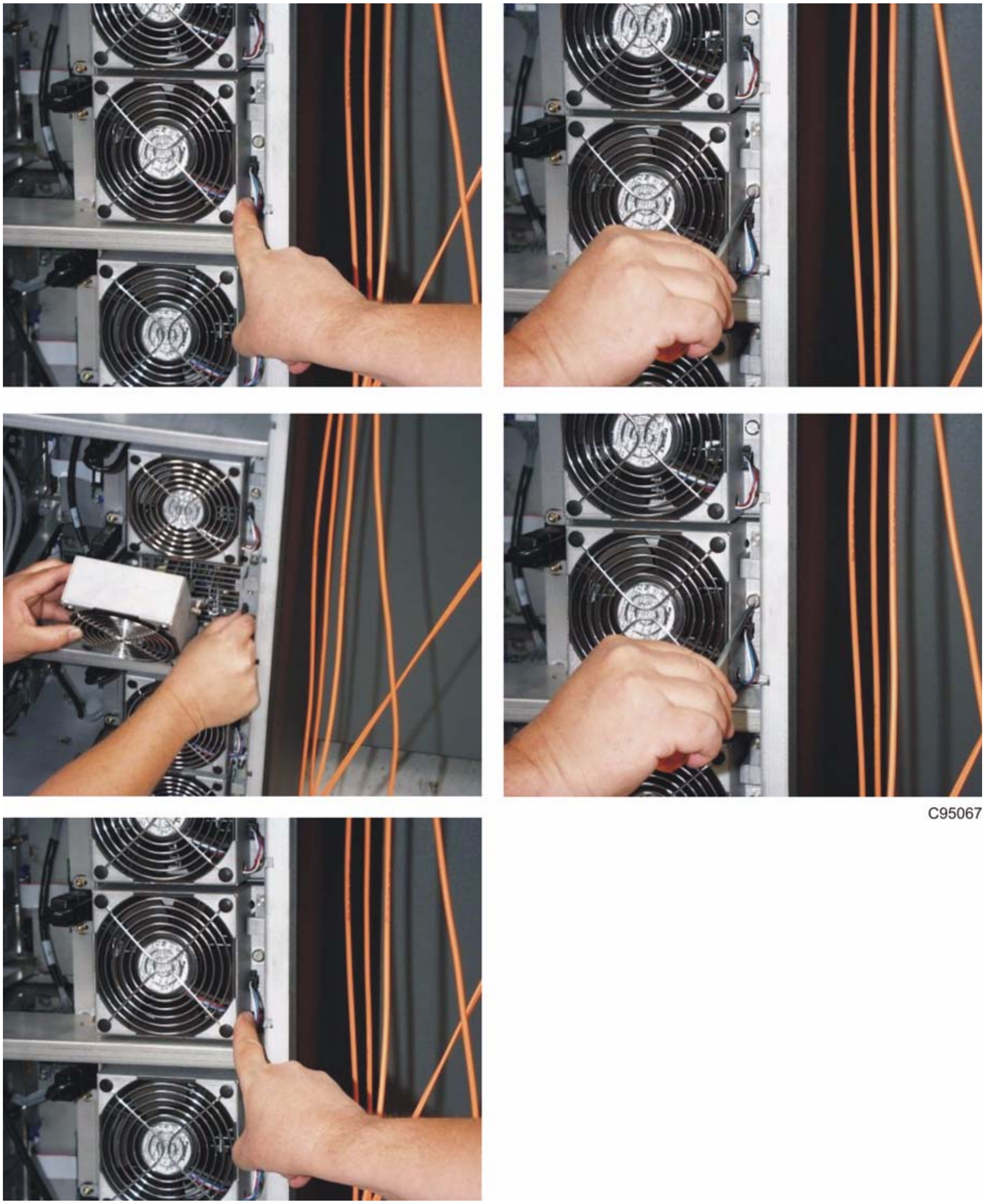

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Figure 3-11. Replacing an Array Power Supply Fan

See Figure 3-11 on page 3-98, then complete these steps to replace an array power supply fan:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Tray *n* text field under the Disk Array heading to list all FRUs in that tray; see Tray 0 example shown in Figure C-53 on page C-235.

2. In the screen field for the array power supply fan being replaced, click the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence DA.n.FAN* screen, Figure 3-12 below.

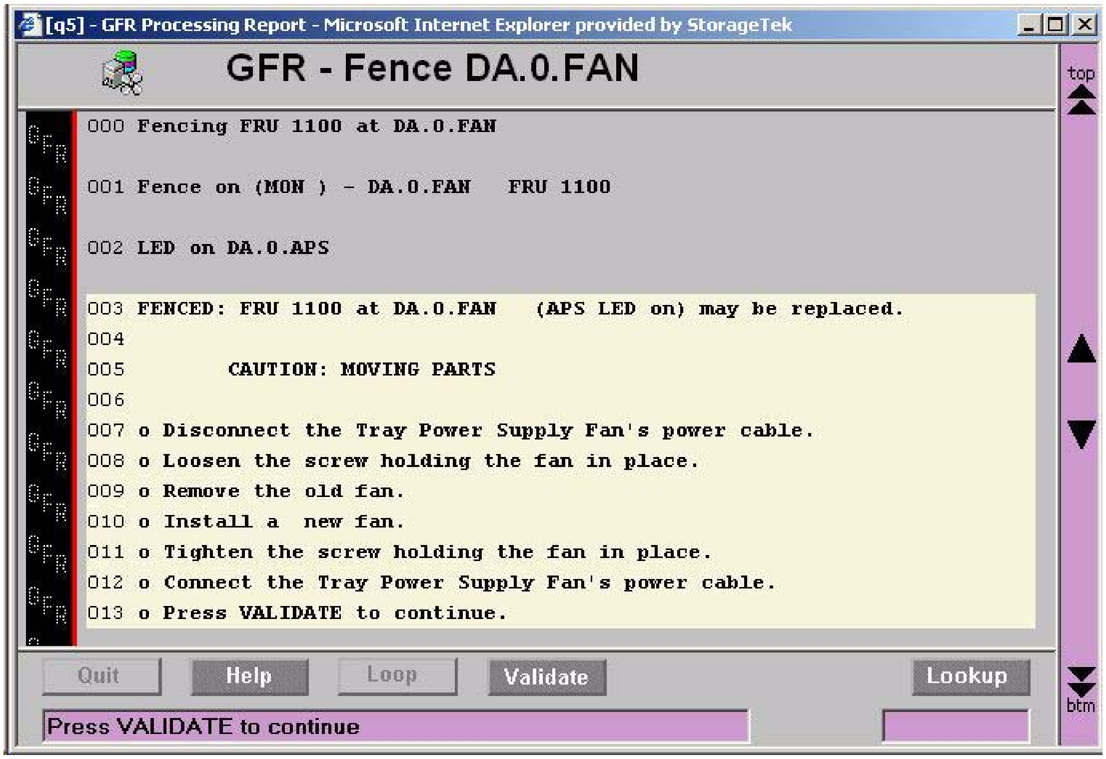
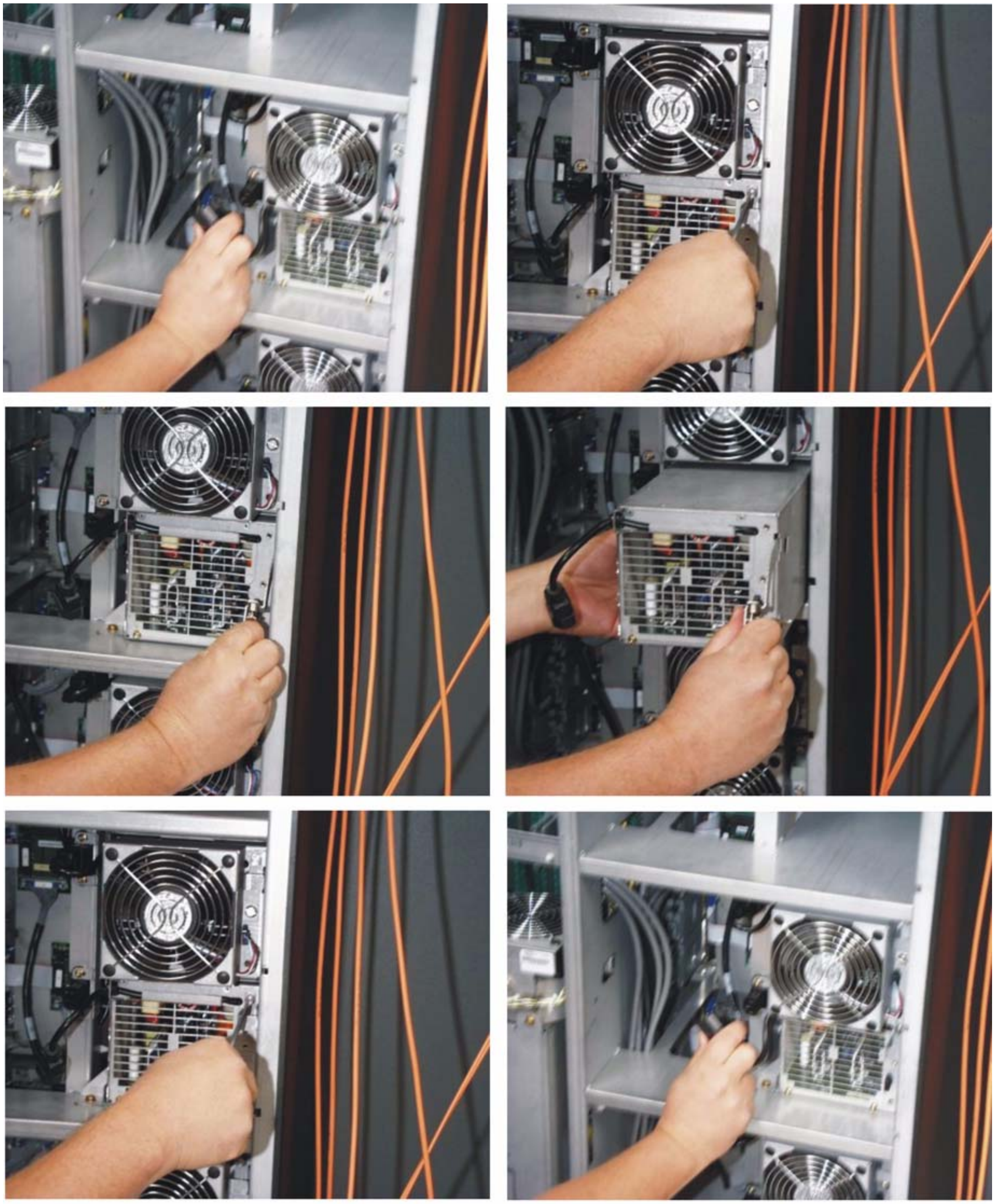


Figure 3-12. GFR Procedure – Array Power Supply Fan

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 1100 at DA.0.FAN has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.

4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing an Array Power Supply



C95058-1

Figure 3-13. Replacing an Array Power Supply

Note: Before removing an array power supply, you must first remove its integral fan. See "Replacing an Array Power Supply Fan" on page 3-98 to remove the fan.

See Figure 3-13 on page 3-100, then complete these steps to replace an array power supply:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Tray *n* text field under the Disk Array heading to list all FRUs in that tray; see Tray 0 example shown in Figure 3-1 on page 3-88.

2. In the screen field for the array power supply being replaced, click the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence DA.n.APS* screen, Figure 3-14 below.

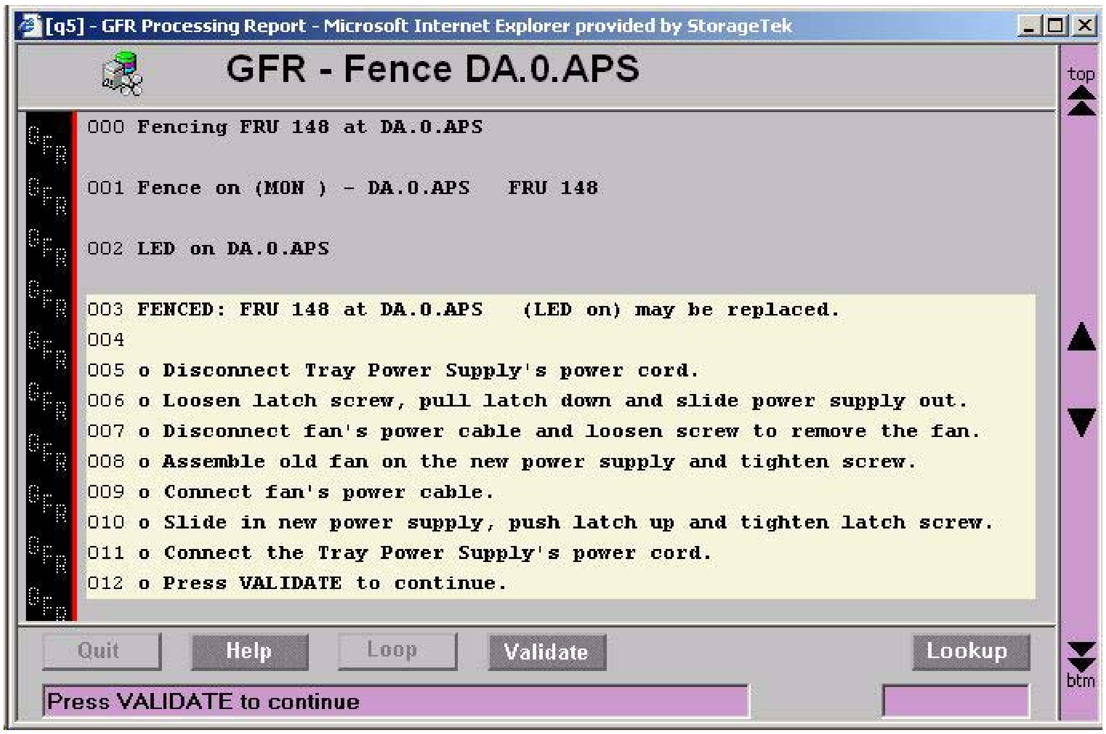
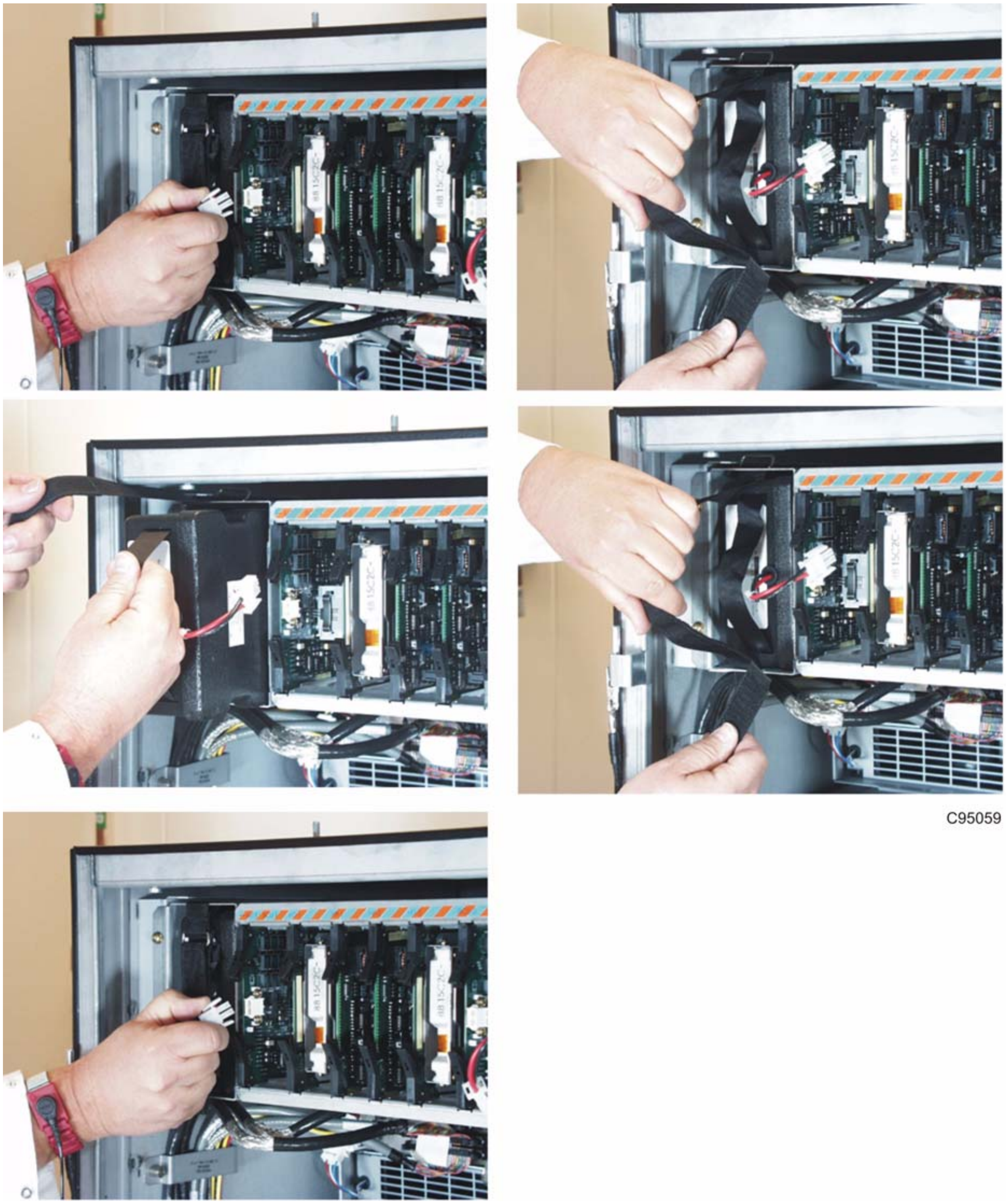


Figure 3-14. GFR Procedure – Array Power Supply

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 148 at DA.0.APS has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.

4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing a Battery Pack



C95059

Figure 3-15. Replacing a Battery Pack

Warning: **Before installing a new battery pack, always verify it is the same type and part number as the battery being replaced. Connecting a wrong battery type to a charger unit can trigger an explosion that may cause injury.**

Caution: Although both battery packs must always be replaced during the same maintenance session, NEVER disconnect both batteries from their charger units at the same time. Doing so disables the backup power system that protects non-volatile cache data if AC source power fails, which in turn creates a potential for data loss if power fails while the batteries are disconnected. First complete all replacement steps for one battery pack and verify that it is 100% charged before disconnecting and replacing the second battery pack.

See Figure 3-15 on page 3-102, read all accompanying warning and caution messages for this procedure, then complete these steps to replace a battery pack:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Upper tray 3 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-52 on page C-234.
2. In the screen field for the battery pack being replaced, click the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.3.BATn* screen, Figure 3-16 below.

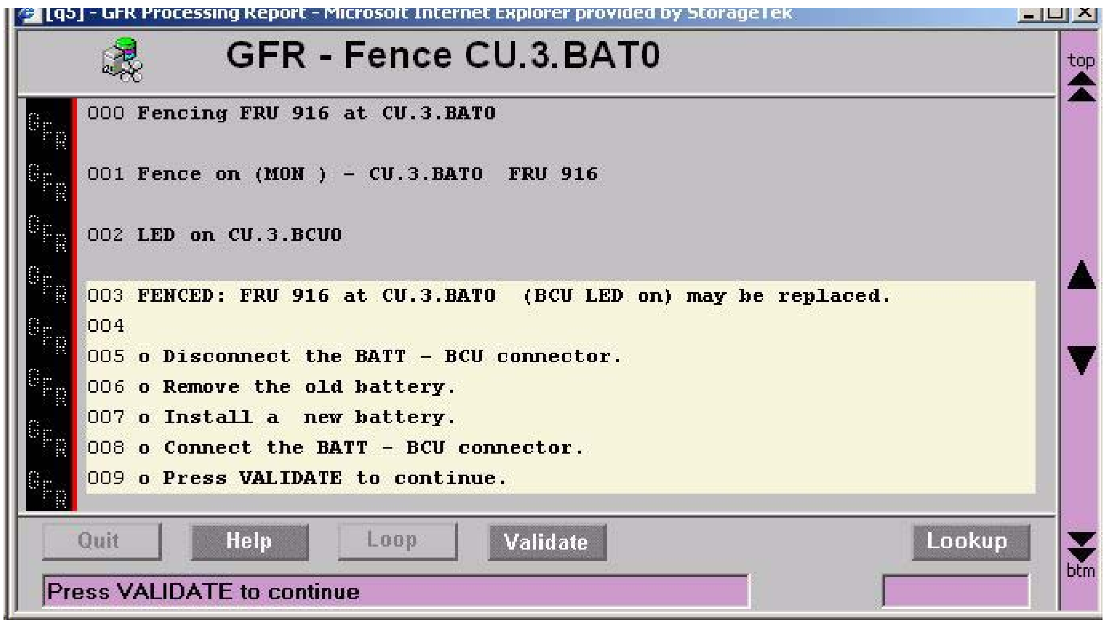


Figure 3-16. GFR Procedure – Battery Pack

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with `SUCCESS: FRU 916 at CU.3.BAT0 has been replaced` (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49, and fix the problems before continuing.
4. After the above `SUCCESS: FRU nnn...` message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing a Battery Charger Unit

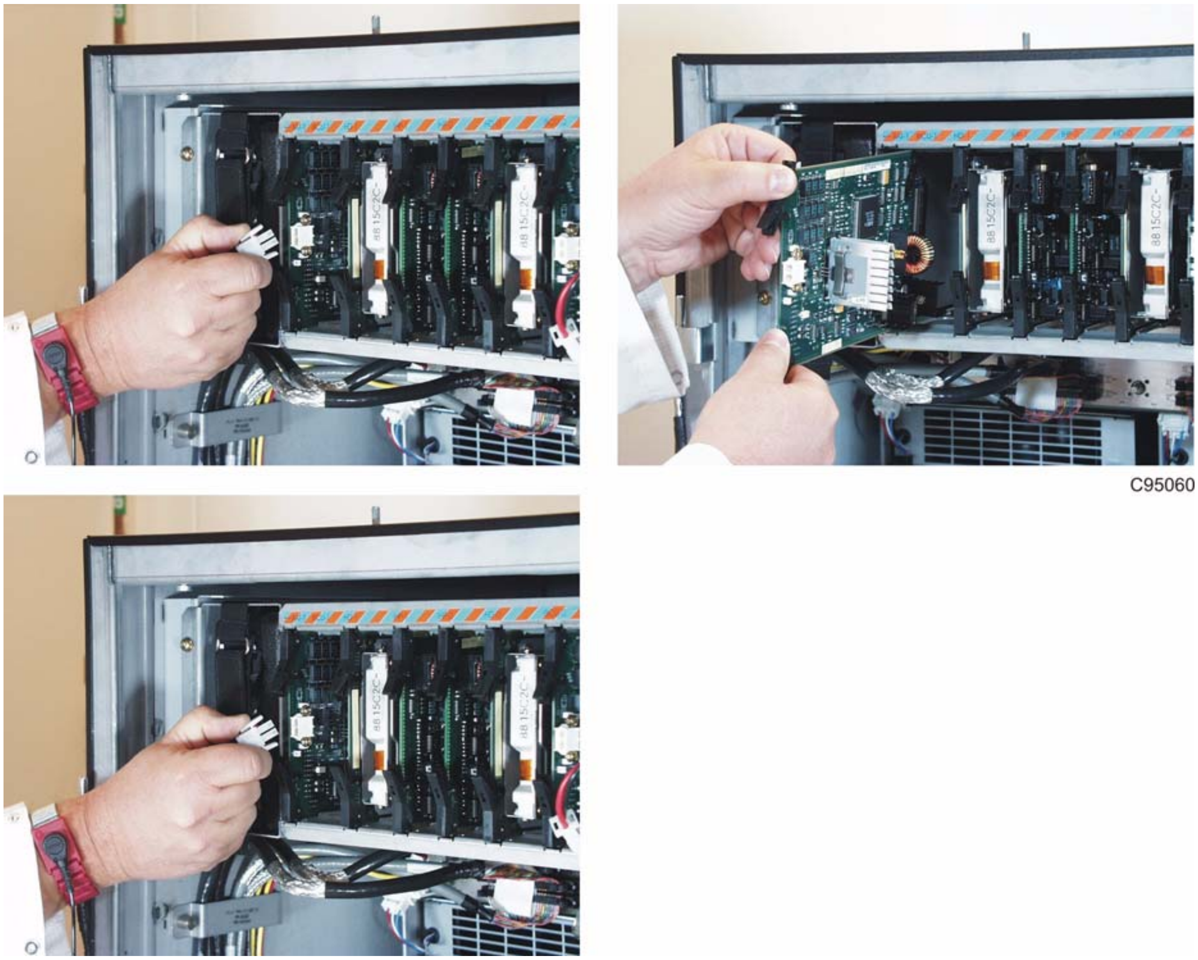


Figure 3-17. Replacing a Battery Charger Unit

DANGER !!

Before installing a new battery charger unit (BCU), always verify that it is the same type and part number as the unit being replaced. Connecting an incorrect BCU to a battery pack can trigger an explosion that may cause injury.

CAUTION !

NEVER disconnect both battery charger units from their battery packs at the same time. Battery packs provide backup power to protect nonvolatile cache data in case AC power fails. Disconnecting both BCUs at the same time stops continuous charging of the batteries, creating a potential for data loss if the batteries become discharged and AC power subsequently fails. To avoid this exposure, always keep one BCU connected to its battery pack at all times. If both BCUs need to be replaced during the same maintenance session, first complete all replacement steps for one BCU and verify that its battery pack is 100% charged before disconnecting and replacing the other BCU.

See Figure 3-17 on page 3-104, read all accompanying warning and caution messages for this procedure, then complete these steps to replace a battery charger unit:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Upper tray 3 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-52 on page C-234.
2. In the screen field for the battery charger unit being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.3.BCUn* screen, Figure 3-18 below.

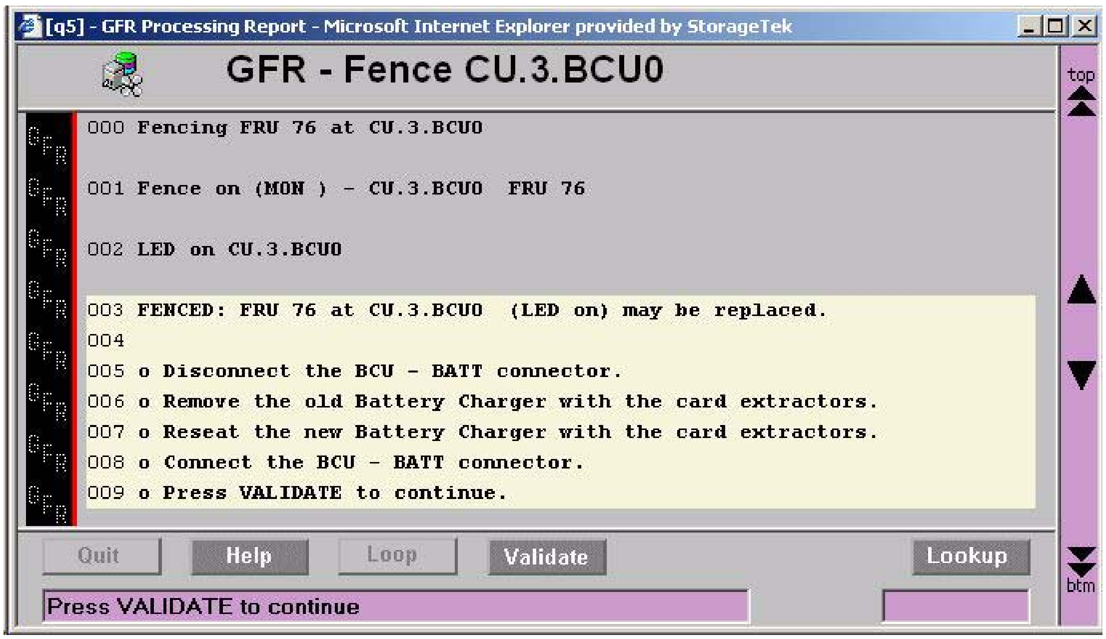


Figure 3-18. GFR Procedure – Battery Charger Unit

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 76 at CU.3.BCU0 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49, and fix the problems before continuing.
4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing an IFES Card

Complete these steps to replace an IFES card:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Tray *n* text field under the Disk Array heading to list all FRUs in that tray; see Tray 0 example shown in Figure C-53 on page C-235.
2. In the screen field for the IFES card being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence DA.n.IFES* screen, Figure 3-19 below.

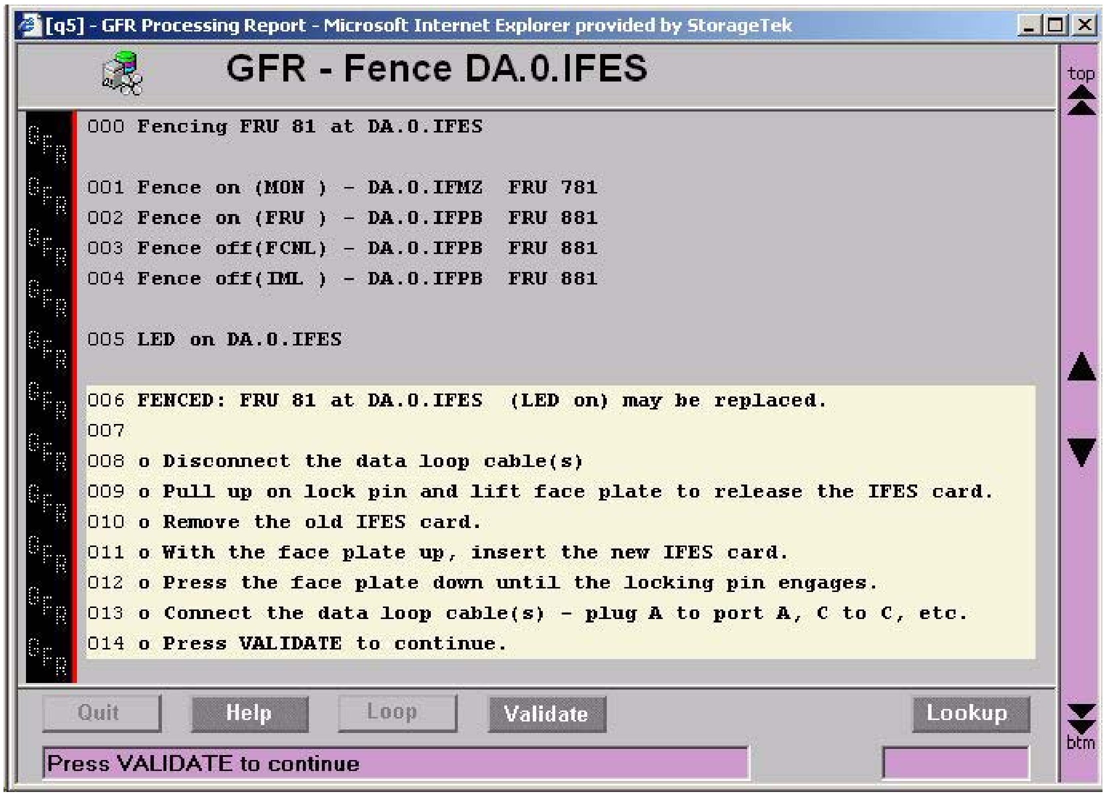


Figure 3-19. GFR Procedure – IFES Card

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 81 at DA.0.IFES has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49, and fix the problems before continuing.
4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing an IFF Card

Complete these steps to replace an IFF card:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Cache tray 2 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-51 on page C-233.
2. In the screen field for the IFF card being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.2.IFFn* screen, Figure 3-20 below.

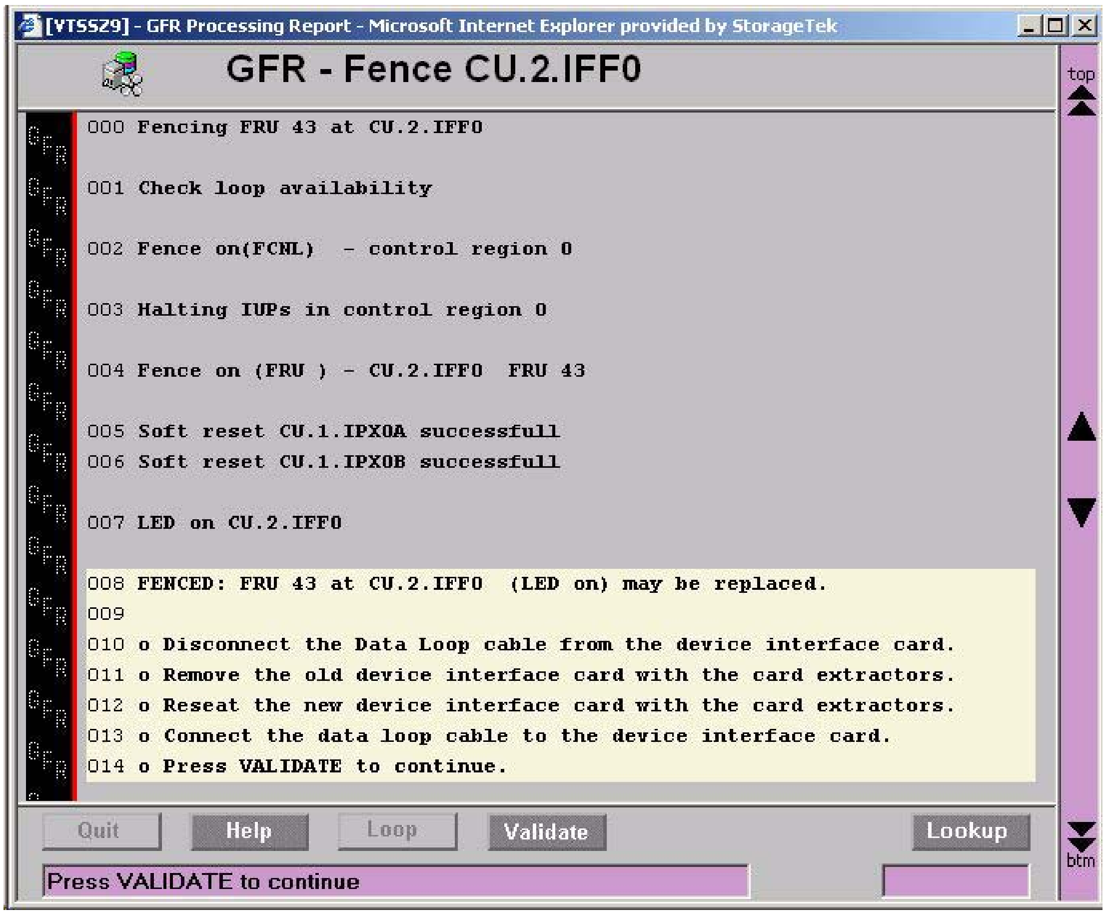
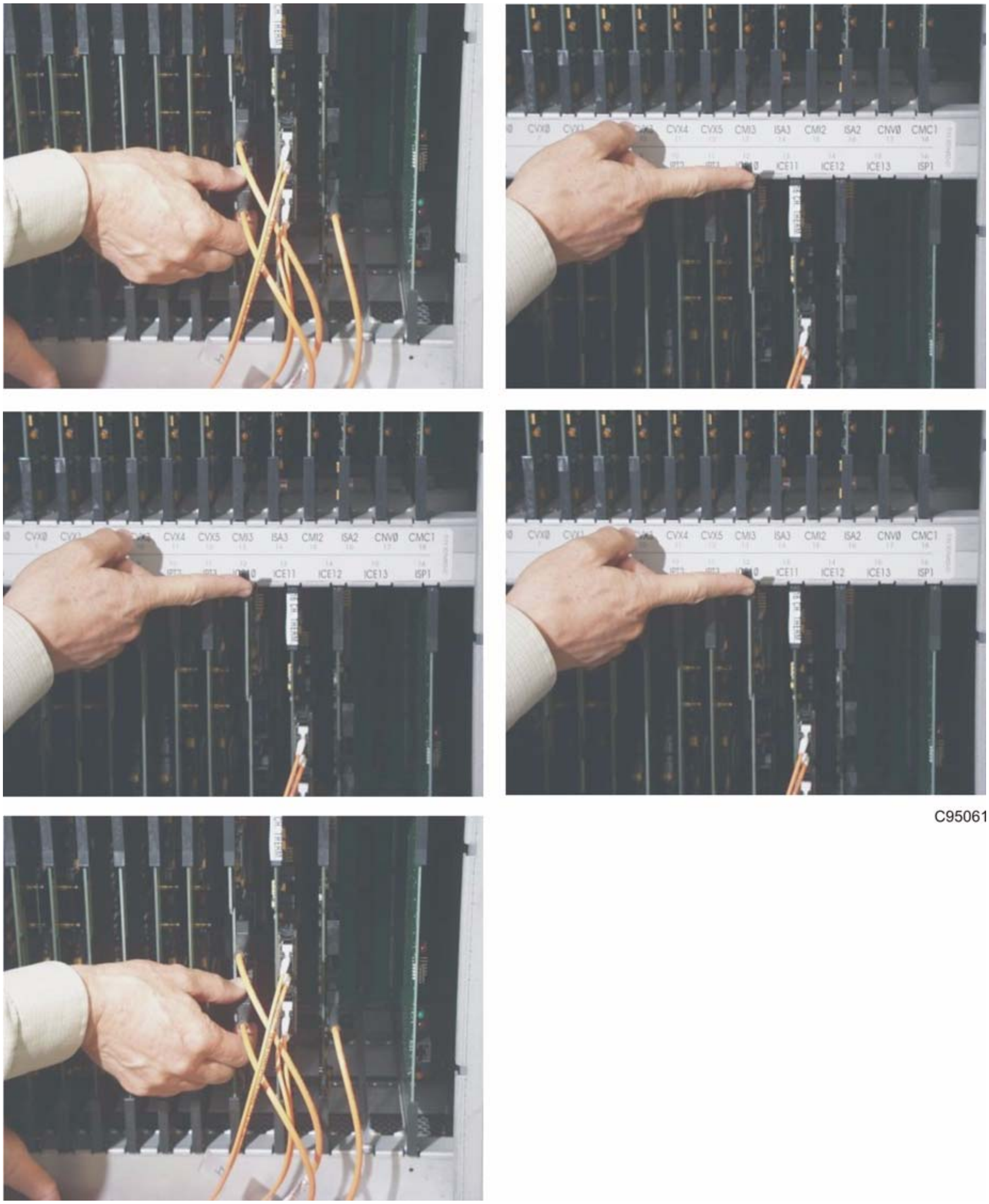


Figure 3-20. GFR Procedure – IFF Card

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 43 at CU.2.IFF0 has been replaced** (in this example) if no problems occur. If problems occur, see “Troubleshooting VTSS Startup Problems” on page 1-49 and fix the problems before continuing.
4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing a VCF Card



C95061

Figure 3-21. Replacing a VCF Card

CAUTION !

Before starting this procedure, have an operator vary offline all affected FICON channel links and real tape drives (RTDs) between the VTSS and affected host systems; otherwise, GFR will fail.

See Figure 3-21 on page 3-108, read all accompanying warning and caution messages for this procedure, then complete these steps to replace a VCF card:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Cluster tray 1 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-50 on page C-232.

2. In the screen field for the VCF card being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.1.VCFnn* screen, Figure 3-22 below.

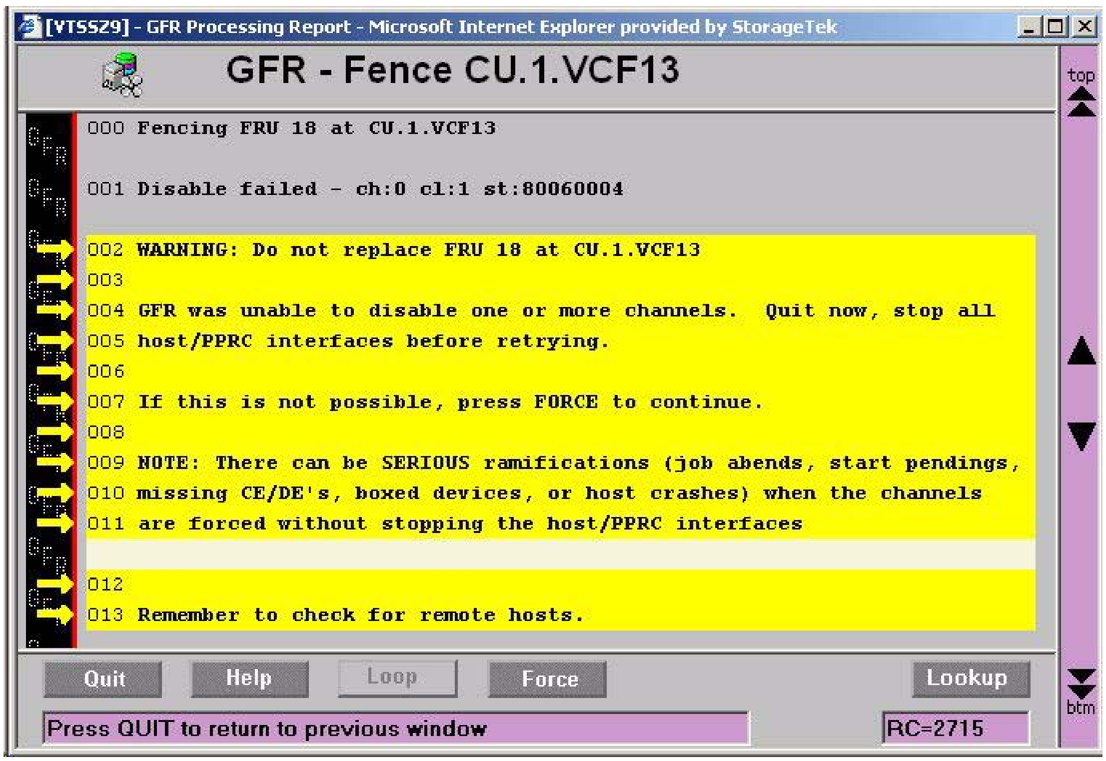


Figure 3-22. GFR Procedure – VCF Card

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and diplays status messages, ending with SUCCESS: FRU 18 at CU.1.VCF13 has been replaced (in this example) if no problems occur. If problems occur, see “Troubleshooting VTSS Startup Problems” on page 1-49, and fix the problems before continuing.

4. After the above SUCCESS: FRU nnn... message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing ACMI / ANV / AUHP / AVM / IPX / ISP Cards

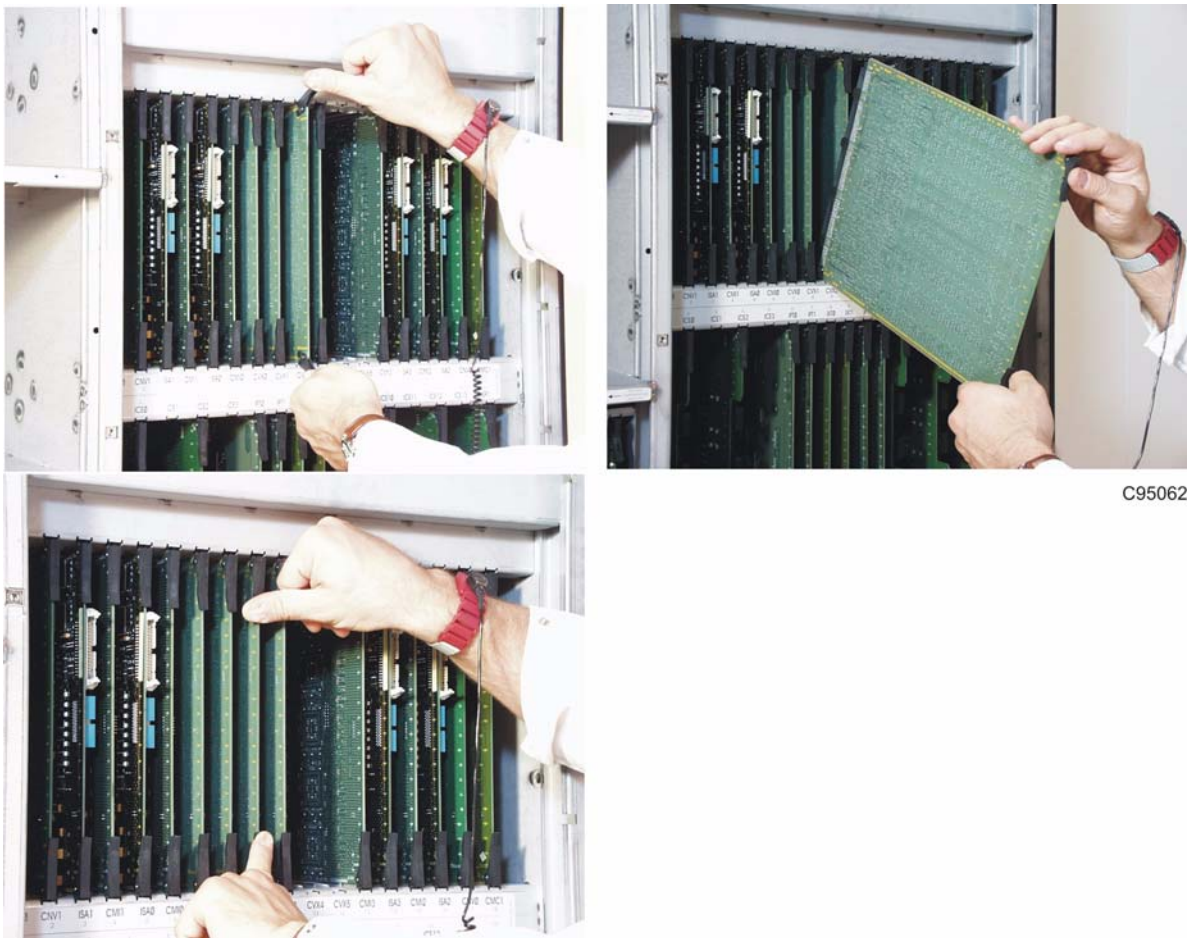


Figure 3-23. Replacing ACMI / ANV / AUHP / AVM / IPX / ISP Cards

Replacing an ACMI Card

See Figure 3-23 on page 3-110, then complete these steps to replace an ACMI card:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Cache tray 2 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-51 on page C-233.

2. In the screen field for the ACMI card being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.2.ACMIn* screen, Figure 3-24 below.

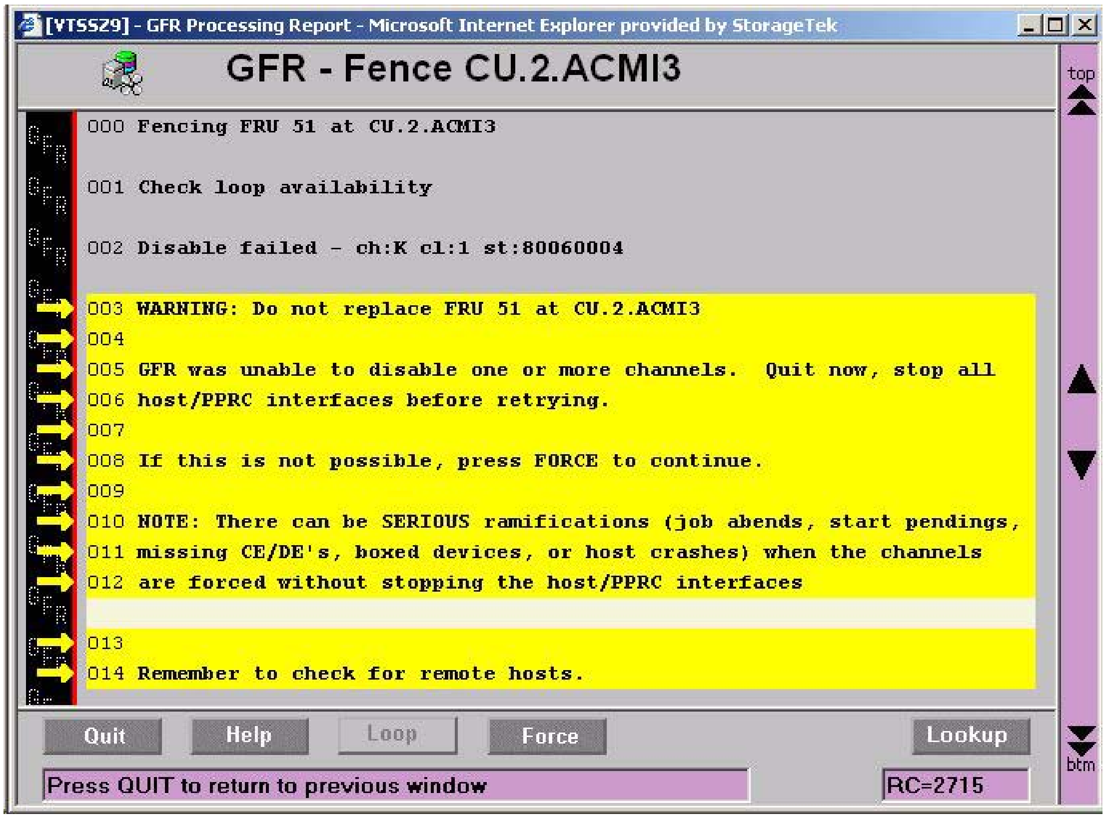


Figure 3-24. GFR Procedure – ACMI Card

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 37 at CU.2.ANV0 has been replaced** (in this example) if no problems occur. If problems occur, see “Troubleshooting VTSS Startup Problems” on page 1-49 and fix the problems before continuing.

4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing an ANV Card

Note: Intermixing ANV card types (e.g., ANV2 and ANV3 cards) is NOT permitted. If mismatched cards are detected at IML, the IML stops, fault symptom code 7050 is generated, and these messages display sequentially in the Status field: **Invalid mixture of ANV cards detected -- IML halted** and **EPO now and correct off line; You Should Now EPO the unit.** Ensure all ANV card configurations are correct before restarting the IML.

See Figure 3-23 on page 3-110, then complete these steps to replace an ANV card:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Cache tray 2 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-51 on page C-233.
2. In the screen field for the ANV card being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.2.ANVn* screen, Figure 3-25 below.

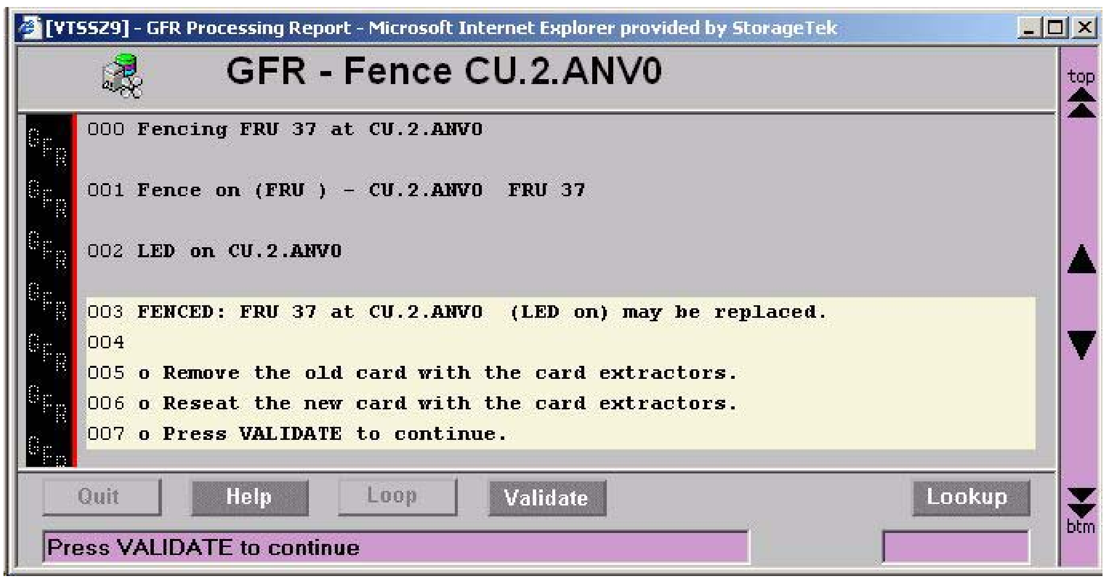


Figure 3-25. GFR Procedure – ANV Card

3. Complete all GFR steps in the order shown, click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 37 at CU.2.ANV0 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.
4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing an AUHP Card

See Figure 3-23 on page 3-110, read all accompanying caution messages and notes for this procedure, then complete these steps to replace an AUHP (ISP hard drive power supply) card:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Upper tray 3 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-52 on page C-234.

2. In the screen field for the AUHP card being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.3.AUHPn* screen, Figure 3-26 below.

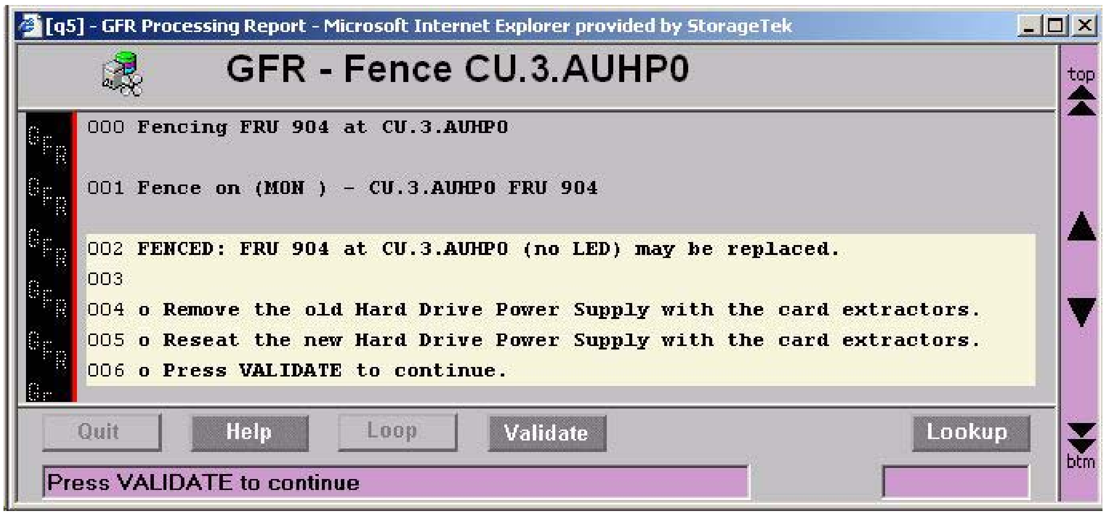


Figure 3-26. GFR Procedure – AUHP Card

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 904 at CU.3.AUHP0 has been replaced** (in this example) if no problems occur. If problems occur, see “Troubleshooting VTSS Startup Problems” on page 1-49 and fix the problems before continuing.

4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing an AVM Card

See Figure 3-23 on page 3-110, then complete these steps to replace an AVM card:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Cache tray 2 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-51 on page C-233.
2. In the screen field for the AVM card being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.2.AVMn* screen, Figure 3-27 below.

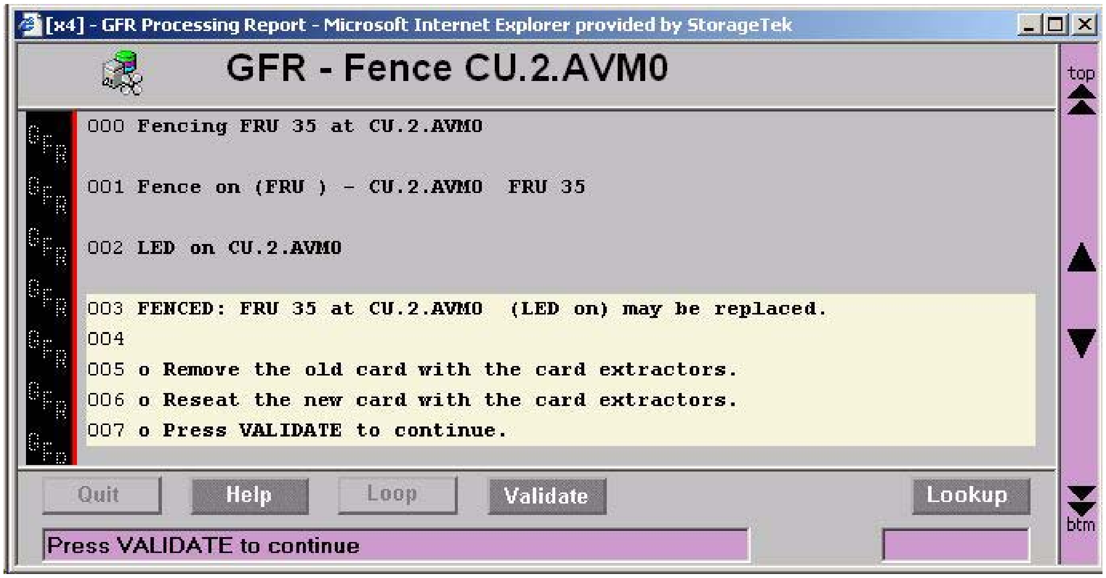


Figure 3-27. GFR Procedure – AVM Card

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 35 at CU.2.AVM0 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49, and fix the problems before continuing.
4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing an IPX Card

See Figure 3-23 on page 3-110, read all accompanying caution messages and notes for this procedure, then complete these steps to replace an IPX card:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Cluster tray 1 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-52 on page C-234.
2. In the screen field for the IPX card being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.1.IPXn* screen, Figure 3-28 below.

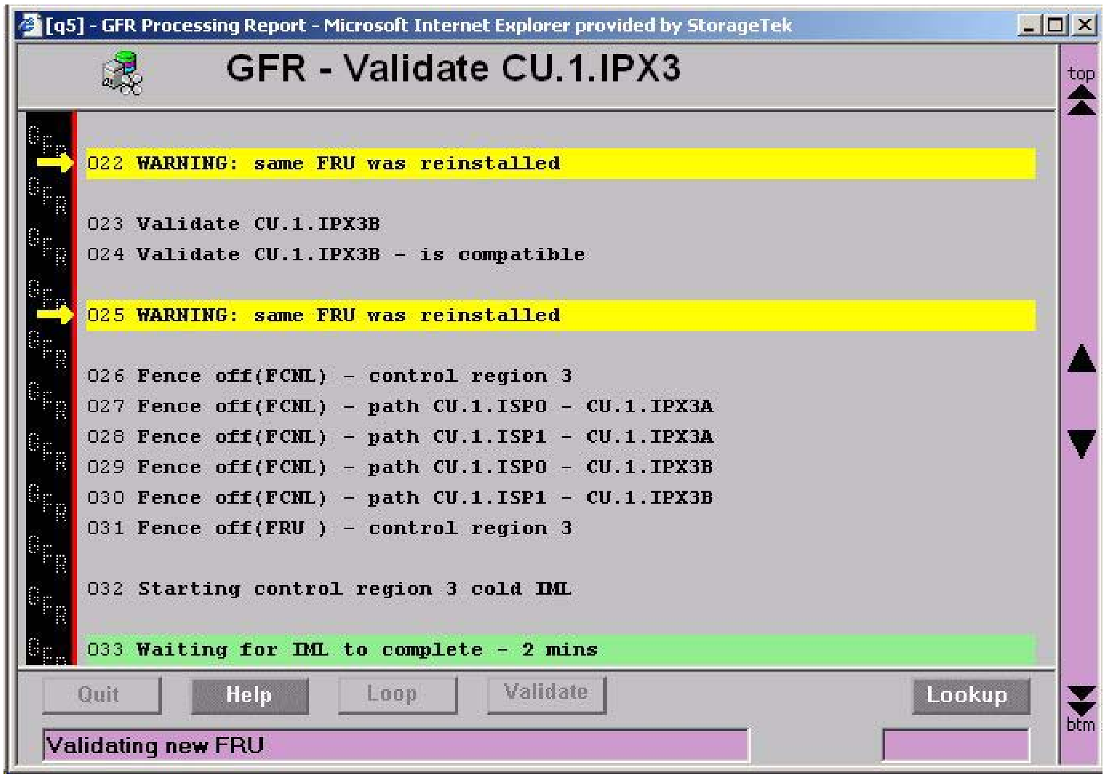


Figure 3-28. GFR Procedure – IPX Card

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 24 at CU.1.IPX3 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.
4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing an ISP Card

See Figure 3-23 on page 3-110, read all accompanying caution messages and notes for this procedure, then complete these steps to replace an ISP card:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Cluster tray 1 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-50 on page C-232.

2. In the screen field for the ISP card being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the selected FRU and displays GFR instructions at the *GFR – Fence CU.1.ISPn* screen, Figure 3-29 below.

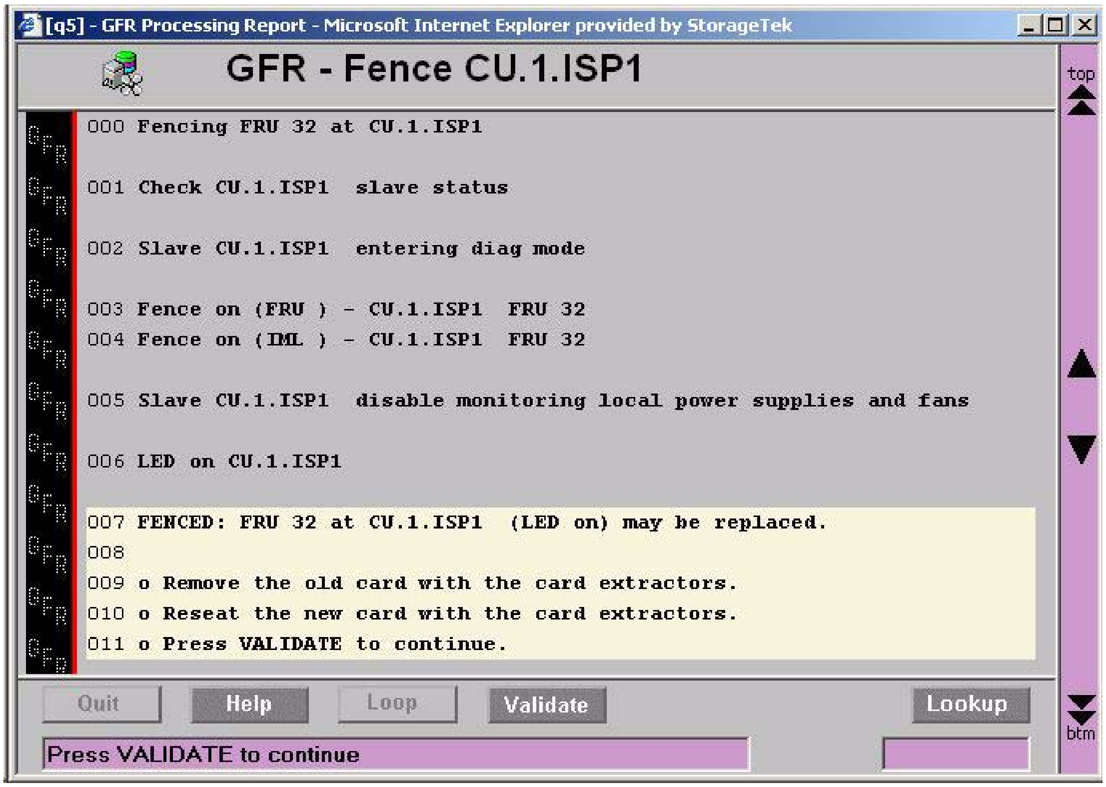


Figure 3-29. GFR Procedure – ISP Card

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 32 at CU.1.ISP1 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.

4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing a PB Card

See Figure 3-23 on page 3-110, then complete these steps to replace a PB card (ISP card battery):

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Cluster tray 1 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-50 on page C-232.

2. In the screen field for the PB card being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.1.PBn* screen, Figure 3-30 below.

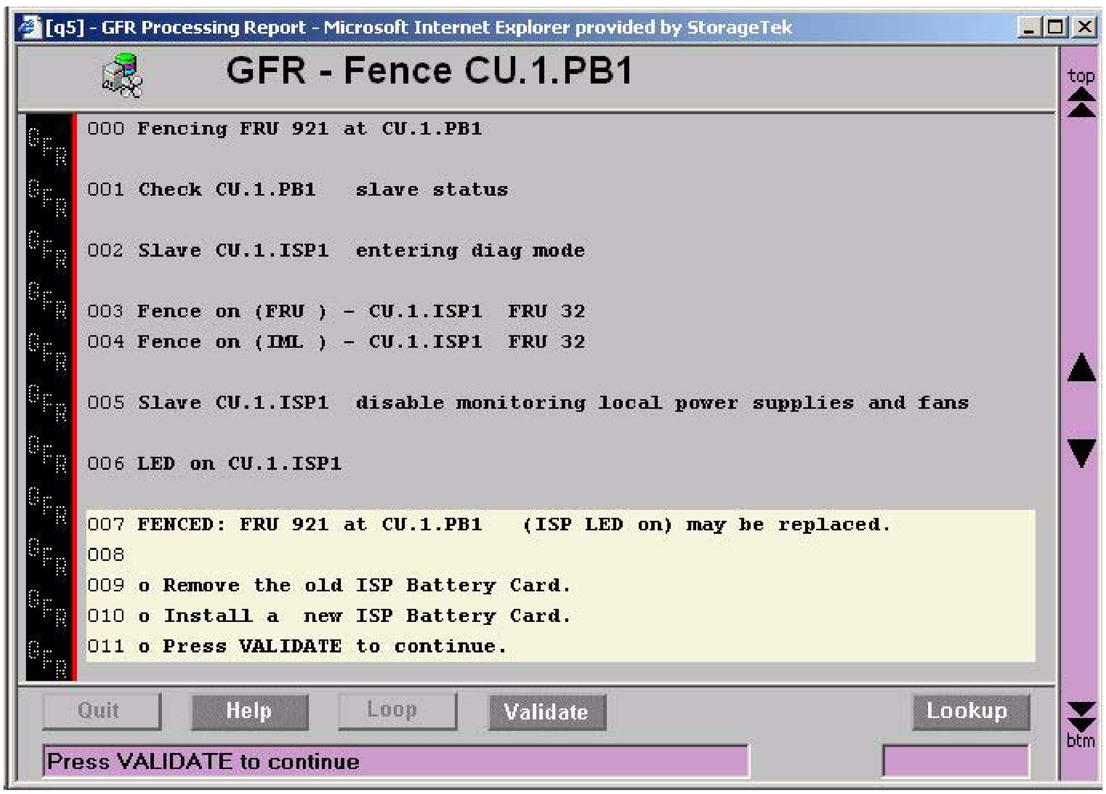


Figure 3-30. GFR Procedure – PB Card

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 921 at CU.1.PB1 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.

4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing an A-Hub Card Assembly

Figure 3-31. Replacing an A-Hub Card Assembly

See Figure 3-31 on page 3-118, read all accompanying caution messages and notes for this procedure, then complete these steps to replace an A-Hub assembly:

1. At the *GFR – Field Replaceable Units Entry*y screen, Figure C-48 on page C-230, click the Upper tray 3 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-52 on page C-234.
2. In the screen field for the A-Hub assembly, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.3.AHUB* screen, Figure 3-32 below.

Figure 3-32. GFR Procedure – A-Hub Card Assembly

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU -- at CU.3.AHUB has been replaced** (in this example) if no problems occur. If problems occur, see “Troubleshooting VTSS Startup Problems” on page 1-49 and fix the problems before continuing.
4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing a Card Cage Impeller

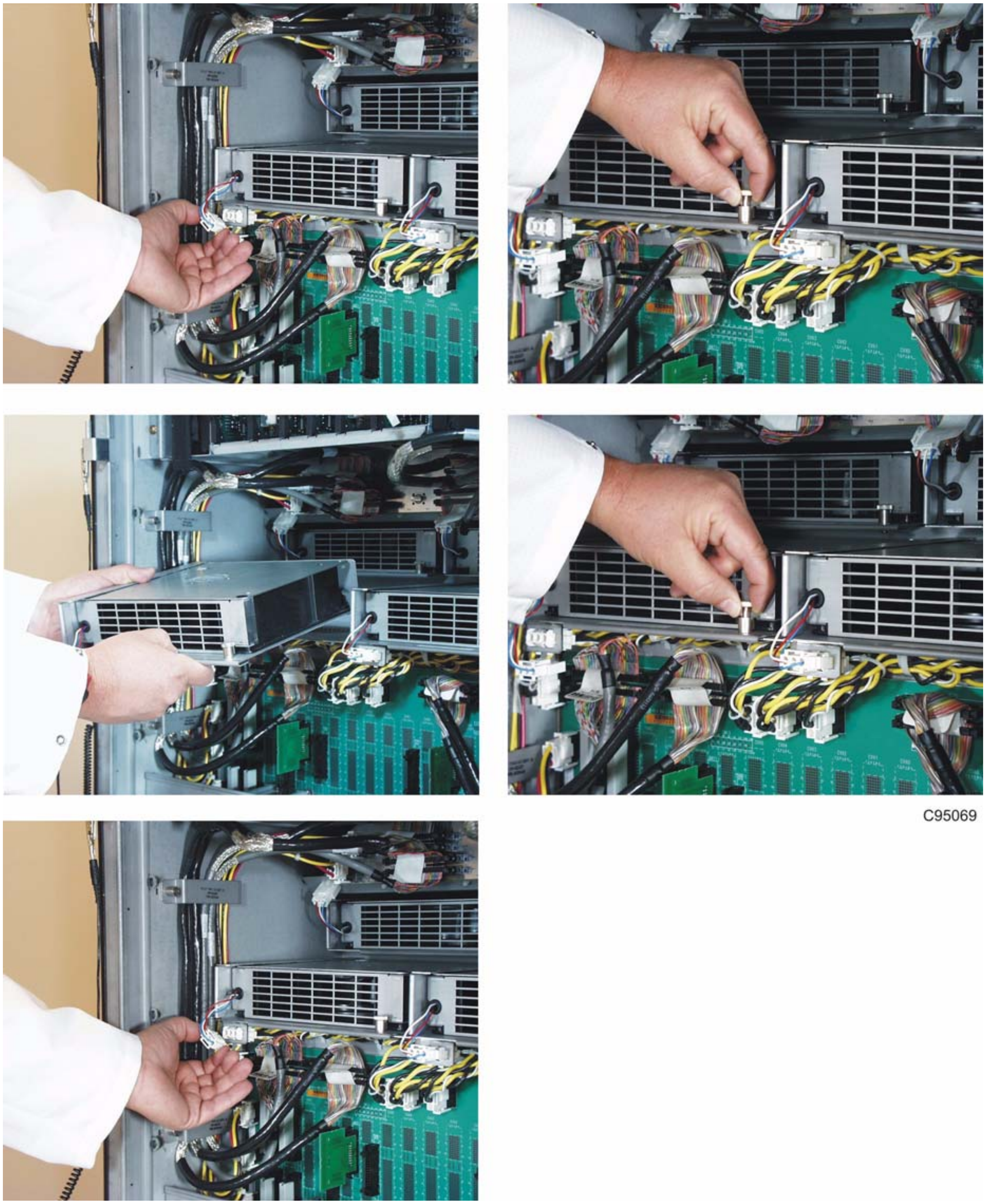


Figure 3-33. Replacing a Card Cage Impeller

See Figure 3-33 on page 3-120, then complete these steps to replace a card cage impeller:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Cache tray 2 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-51 on page C-233.
2. In the screen field for the card cage impeller being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.2.IMPn* screen, Figure 3-34 below.

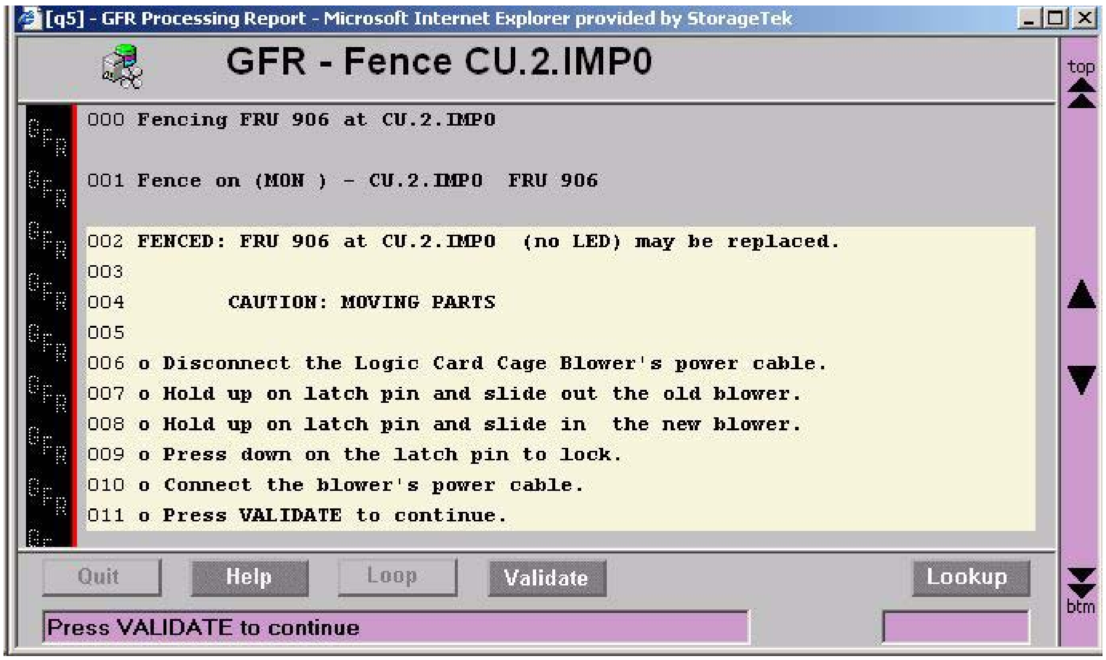


Figure 3-34. GFR Procedure – Card Cage Impeller

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 906 at CU.2.IMP0 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.
4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing an Array Disk Drive Module

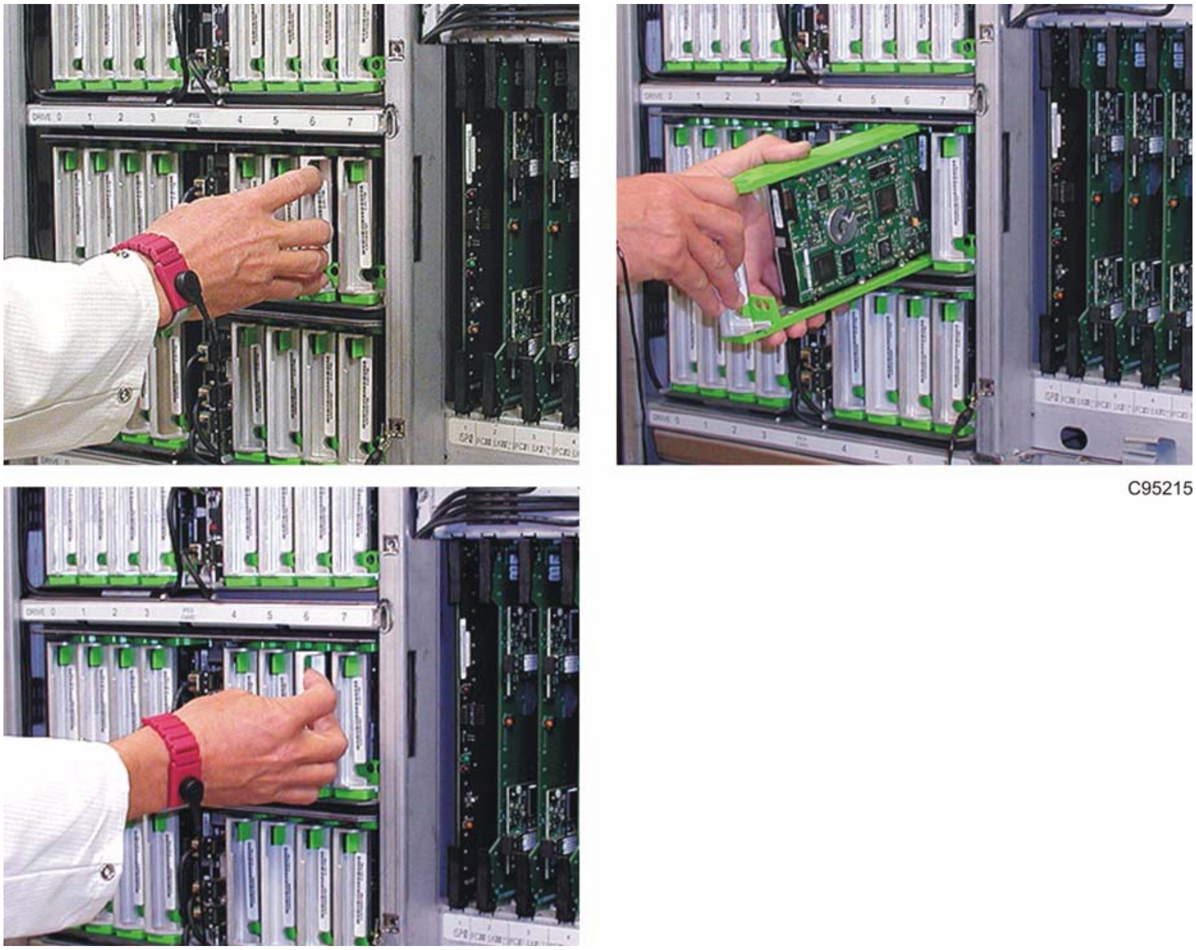


Figure 3-35. Replacing an Array Disk Drive Module

Figure 3-36. Handling an Array Disk Drive Module

See Figure 3-35 and Figure 3-36 on page 3-122, read all accompanying precautions and information for this procedure, then complete these steps to replace an array disk drive module:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Tray *n* text field under the Disk Array heading to list all FRUs in that tray; see Tray 0 example shown in Figure C-53 on page C-235.

2. In the screen field for the array disk drive module being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence DA.*n.*DRV*n screen, Figure 3-37 below.

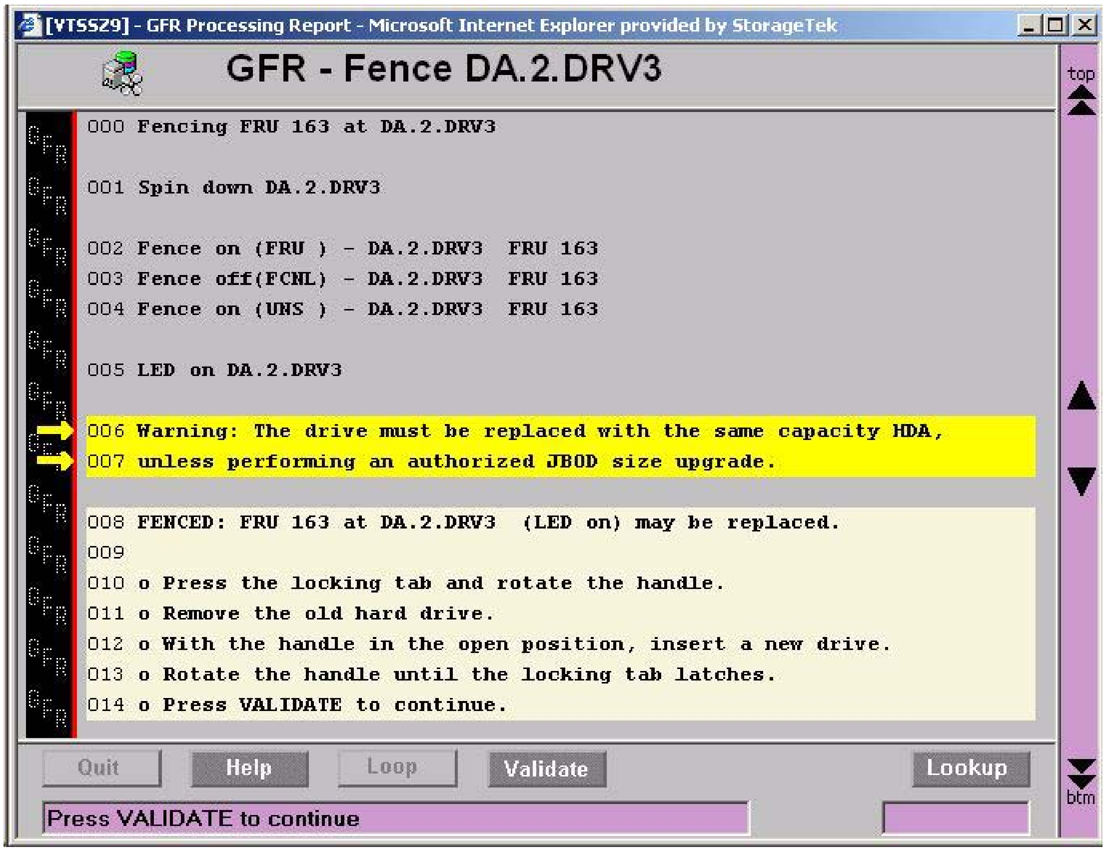


Figure 3-37. GFR Procedure – Array Disk Drive Module

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 163 at DA.2.DRV3 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.

4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Array Disk Drive Module Handling Precautions

Array disk drive module assemblies are easily damaged by electrostatic discharges (ESD) and impacts. Observe the following precautions when handling array disk drive modules:

- Review ESD guidelines in "Electrostatic Discharge Precautions" on page xxii to reduce the potential for damage to array drive modules caused by ESD.
- Inspect the outside of the shipping container of each new array drive. The container is designed to protect the drive from some shocks and mishandling. If a container looks like it has been dropped or shows signs of water damage, report it to the parts depot and order a replacement drive before continuing.
- After unlatching a drive module to remove it from its power source, allow 30 seconds for the drive to spin down before removing it from the card cage. A drive at rest is less susceptible to damage than a spinning one.
- After removing a failed array drive, place it gently on an ESD mat with its cover plate down[1]. Do not place the drive assembly with its circuit card down or stand it on its edge; see Figure 3-36 on page 3-122. If a drive is defective but becomes further damaged by mishandling, Sun may be unable to claim a warranty replacement for the drive.
- Do not remove a new drive module from its shipping container until it is ready to be installed in a VTSS. Once the assembly is removed from its container, avoid setting it down anywhere; instead, place it directly into the slot vacated by the defective drive.
- Carefully package the defective drive module assembly in the anti-static bag and shipping container of the replacement drive module and return it to the parts depot.

Replacing an ISP Hard Drive

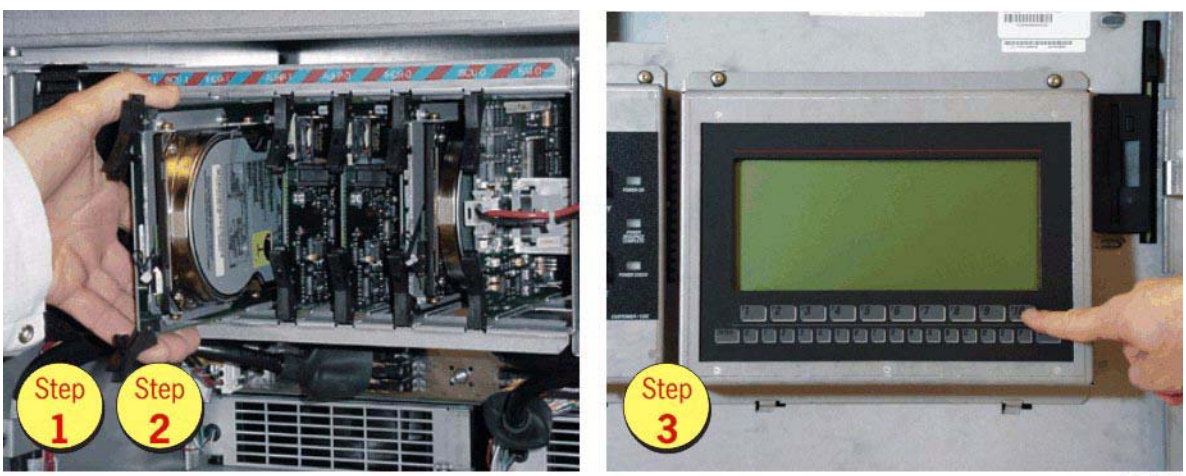


Figure 3-38. Replacing an ISP Hard Drive

1. Placing the array disk drive module with its *cover plate down* prevents small conductive particles from being electrostatically attracted to the drive circuit card, and prevents other objects from damaging the card.

See Figure 3-38 on page 3-124, then complete these steps to replace an ISP hard drive:

1. At the *GFR – Field Replaceable Units Entry* screen, Figure C-48 on page C-230, click the Upper tray 3 text field under the Control Unit heading to list all FRUs in that tray, as shown in Figure C-52 on page C-234.
2. In the screen field for the ISP hard drive being replaced, select the radio button in the Replace column, then click Submit. The VTSS support facility fences the FRU and displays GFR instructions at the *GFR – Fence CU.3.HDn* screen, Figure 3-39 below.

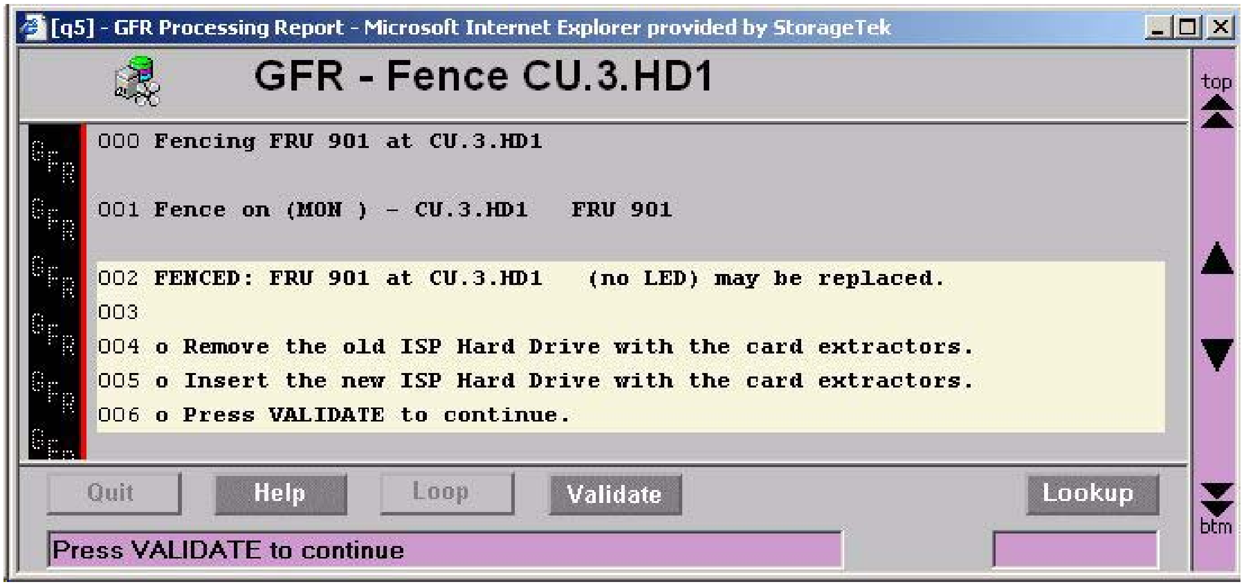


Figure 3-39. GFR Procedure – ISP Hard Drive

3. Complete all GFR steps in the order shown, then click Validate. The VTSS support facility begins validating the FRU and displays status messages, ending with **SUCCESS: FRU 901 at CU.3.HD1 has been replaced** (in this example) if no problems occur. If problems occur, see "Troubleshooting VTSS Startup Problems" on page 1-49 and fix the problems before continuing.
4. After the above **SUCCESS: FRU nnn...** message displays, click Quit to return to the *GFR – Field Replaceable Units Entry* screen.

Replacing FRUs Without GFR Procedures

This section defines procedures for servicing FRUs not covered by GFR procedures.

Removing a Drive Tray Motherboard

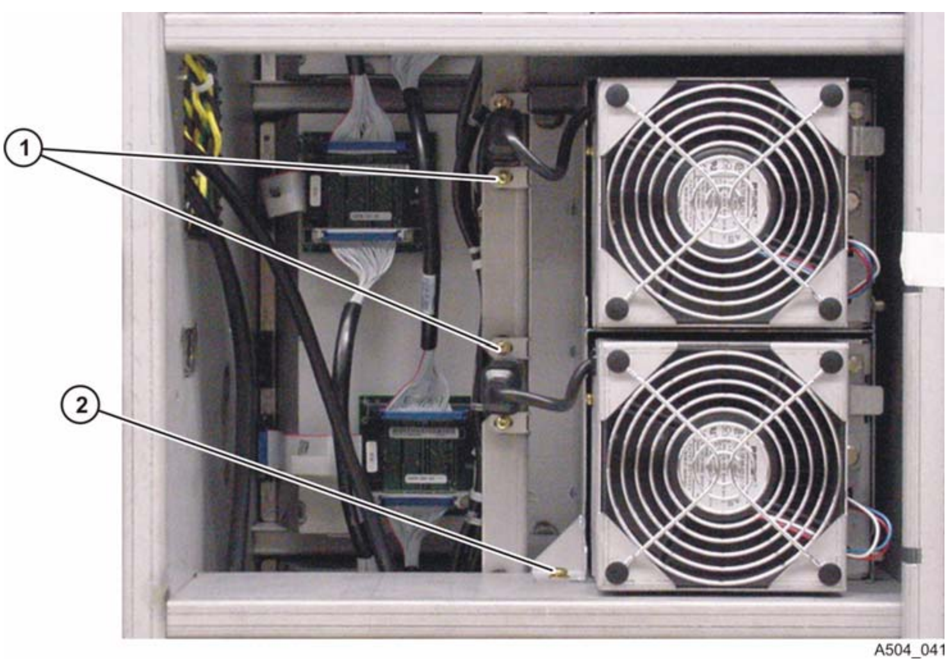
1. Before beginning, inform the data center manager and/or VSM system operator that power to the VTSS will need to be disabled for this procedure, and request the operator to suspend all channel activity between to the host system and VTSS.
2. Once all channel activity to the VTSS is suspended, set the **POWER ENABLE** switch on the VTSS power control panel to off (‘0) to disable VTSS power.

CAUTION !

While removing drive modules in Step 3 below, sequentially number or otherwise keep track of which drive goes in each array slot, then ensure drives are put back in the same slot after the motherboard is replaced. If a drive is not put back in its correct slot, the customer data on it will no longer be readable.

3. Mark and remove all disk drives in the drive tray that will have its motherboard removed. Handle and temporarily store all removed drives carefully, as described in “Array Disk Drive Module Handling Precautions” on page 3-124.
4. Unplug the power cord for each drive tray DCPS, item 1 callout in Figure 3-40.

Figure 3-40. Installed Drive Tray Assembly (Rear of VTSS)



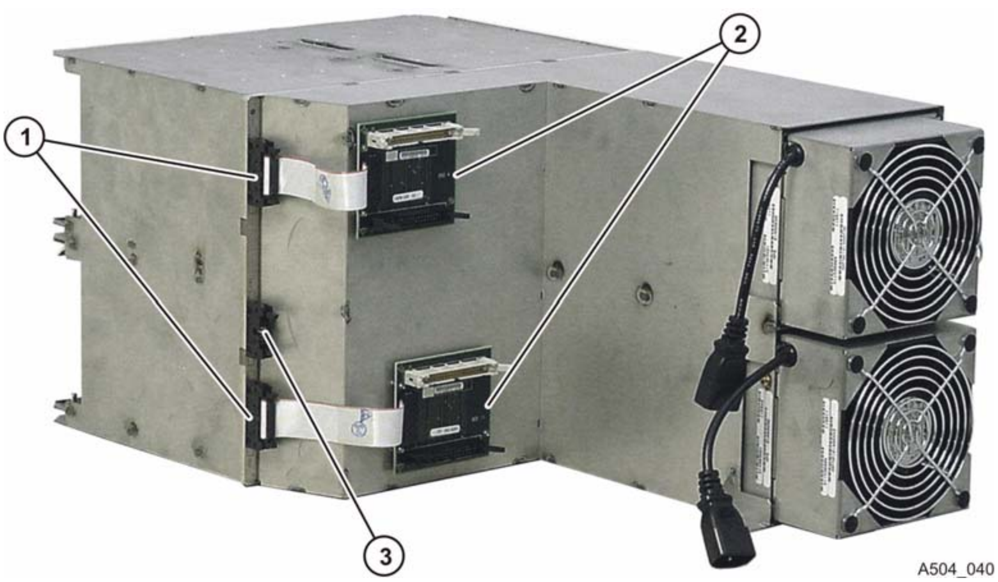
1. Drive tray power supply connector plug (1 per supply)	3. Screw for securing rear drive tray assembly to drive tray cage
2. Drive tray interconnection cables	

CAUTION !

While removing DCPSs in Step 5, keep track of which slot each is removed from, then ensure each is put back in its same slot after the motherboard is replaced. The VTSS correlates the discrete U.T.S ID and FRU ID for each DCPS, and will not recognize or validate a DCPS in a slot other than its original slot.

5. Remove the two array DCPSs from the drive tray assembly and set them on an ESD-safe surface. See “Replacing an Array Power Supply” on page 3-100 as needed.
6. Disconnect the fibre channel loop cables from the two IFES assemblies on the front of the drive tray.
7. Referring to item 1 callout in Figure 3-41, disconnect the ITCC2 card ribbon cables from the drive tray motherboard.
8. Referring to item 2 callout in Figure 3-41, disconnect the tray interconnection cables.

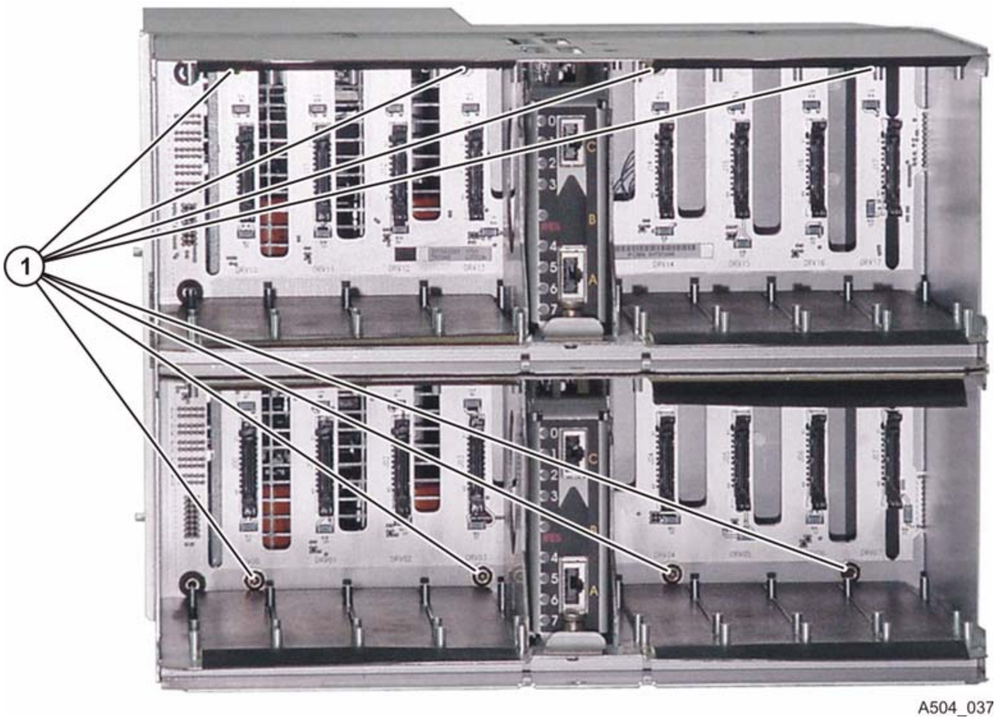
Figure 3-41. Removed Array Drive Tray Assembly



1. Ribbon cables connecting ITCC2 cards to drive tray motherboard (2 per drive tray) 2. ITCC2 card connectors for tray interconnection cables	3. Drive tray motherboard test connector; there should be no cables attached to this connector

9. Referring to item 2 callout in Figure 3-40 on page 3-126, remove the screw securing the rear drive tray assembly, located next to the array power supplies.
10. Lift the front of the assembly slightly to allow the two mushroom-shaped lugs mounted underneath to exit the holes in the VTSS frame, then slide the assembly out the front of the VTSS and set it on a flat working surface.
11. Referring to Figure 3-42 on page 3-128, remove the eight drive tray plenum screws; this allows the plenum assembly to be detached from the rear of the drive tray.

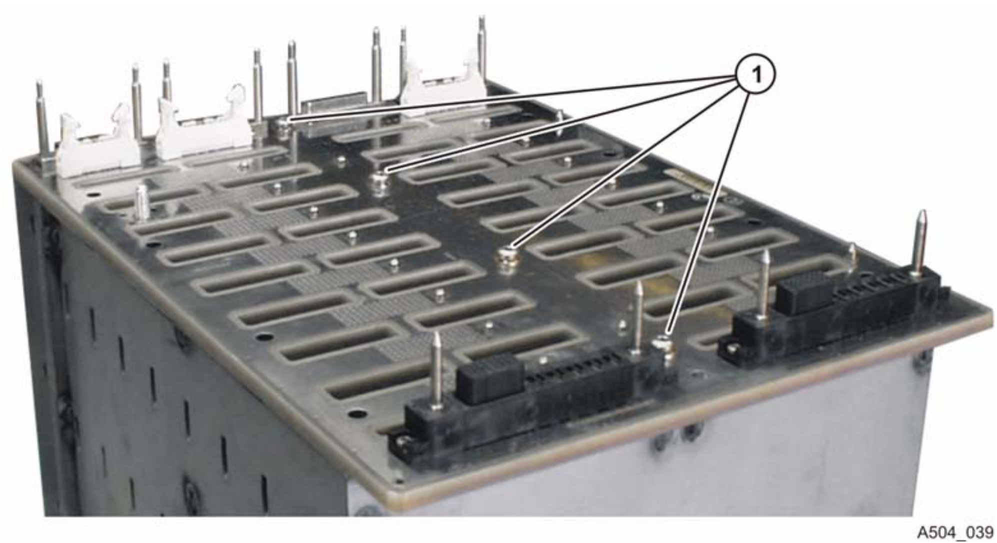
Figure 3-42. Screws Securing Plenum to Drive Tray Assembly (Front of VTSS)



1. Drive tray assembly plenum screws (8 per drive tray)

12. Referring to Figure 3-43 below, remove the four screws securing the motherboard to the drive tray assembly, then lift the motherboard off the drive tray cage.

Figure 3-43. Screws Securing Drive Tray Motherboard to Drive Cage



1. Drive tray motherboard fastening screws (4 per board)

Replacing a Drive Tray Motherboard

1. Fit the new motherboard over the dowel pins and onto the drive tray cage assembly.
2. Referring to Figure 3-43 on page 3-128, secure the motherboard to the card cage with the four screws that were removed in Step 12 of the previous procedure.
3. Referring to Figure 3-42 on page 3-128, slide the plenum assembly into place, and secure it with the eight screws that were removed in the previous procedure.
4. Referring to item 2 callout of Figure 3-41 on page 3-127, reconnect the ribbon cables from the ITCC2 cards to the motherboard.
5. While standing at the front of the VTSS, slide the array drive tray assembly back into place in the empty drive tray.
6. Replace the screw that secures the rear array drive tray assembly.

CAUTION !

In Step 7 below, ensure that each DCPS is put back in its original slot after the array tray motherboard is replaced. The VTSS correlates the discrete U.T.S ID and FRU ID for each DCPS, and will not recognize or validate a DCPS that has been placed in a slot other than its original slot.

7. Replace the two array DC power supplies. Ensure that each DCPS is put back in its original slot.
8. Referring to Figure 3-40 on page 3-126, plug the two array power supplies back into their respective power connectors.
9. Referring to Figure 3-41 on page 3-127, reconnect the ribbon cables from the ITCC2 cards to the drive tray motherboard, and reconnect the tray interconnection cables.
10. Reconnect the fibre channel loop cables to the two IFES assemblies on the front of the array drive tray.

CAUTION !

In Step 11 below, drive modules must be re-inserted in the same slot they were removed from. If a drive is not put back in its correct slot, the customer data on it will no longer be readable.

11. Re-install the array drive modules in their assigned slot.
12. Restore power to the VTSS and allow it to perform a full diagnostic IML, unless other directions have been provided by Sun Technical Support or Engineering.

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Deinstalling a VSM5-VTSS

4

This chapter defines procedures for deinstalling, relocating, and reassembling (as needed) a VTSS for VSM5.

Deinstalling a VTSS

Note: Be sure to order new Direct Field Transfer (DFT) kits for each VTSS deinstallation event to ensure you have the most-current kit information.

Deinstallation is the process of disconnecting, repackaging, and moving a VTSS from a site. Complete these steps to deinstall a VTSS:

1. Order the appropriate Direct Field Transfer (DFT) packaging assembly and packaging instruction kits as follows:
   - Packaging Assembly, DFT, VTSS Surface – P/N 1093169*nn*
   - Packaging Instructions, DFT, VTSS Outbound Surface – P/N 1093170*nn*
   - Packaging Assembly, DFT, VTSS Air – P/N 1093171*nn*
   - Packaging Instructions, DFT, VTSS Outbound Air – P/N 1093172*nn*
2. Check Pinnacle for any Subsystem Service Aids (SSAs) that may relate to VTSS deinstallation procedures.
3. Verify that an operator has created a current backup copy of all VTSS data, then power off the VTSS as described in "Shutting Down VTSS Power" on page 4-132.
4. Follow procedures in appropriate DFT packaging instructions to disassemble, repackage, and ship the VTSS.

Relocating a VTSS

Relocation is the process of disconnecting, moving, and reinstalling a VSM5-VTSS within the same site. Before starting a deinstallation, you should:

- Verify that installation planning requirements have been met for the new site, as defined in the VTSS physical planning guide.
- Check Pinnacle for Subsystem Service Aids (SSAs) that may relate to VTSS relocation procedures.

Note: See "VSM5-VTSS Locations and Functions" on page A-135 to locate switches and LEDs on VTSS power FRUs referenced in the accompanying relocation-related procedures.

Shutting Down VTSS Power

Complete these steps to disable power prior to relocating a VSM5-VTSS:

1. Have an operator vary offline all channels and RTDs between the VTSS and host.

CAUTION !

If the VTSS will remain disconnected from AC source power for two weeks or longer, disconnect the plug between each battery pack and charger unit to prevent the batteries (which comprise the backup power system) from becoming discharged. If a VTSS is powered up while its batteries are discharged, customer data could be lost if a sudden power outage occurred before replacement batteries were installed.

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2. At the VTSS power control panel, set the POWER ENABLE switch to ‘0’ (off). The VTSS initiates a controlled power-down (CPD) sequence, which automatically:
   - Disables each front-end channel and saves its last state for the next IML
   - Transfers all customer data and mapping tables from cache to back-end disk arrays
   - Compresses all raw state saves (takes 10 minutes to one hour)
   - Logically disconnects both VTSS nonvolatile cache memory (ANV) cards from the battery backup power system to prevent the battery packs from draining
   - Disables all VTSS power (except 12V ‘keep-alive’ power at the PDUs), and puts the back-end disk arrays in standby mode (i.e., array card cages stay powered on).
3. At each VTSS PDU, set the POWER breaker to the ‘0’ (off) position.

Disconnecting the VTSS From AC Source Power

1. At the AC source power breaker panels, verify all breakers that supply power[1] to sides 0 and 1 of the VTSS, then set those to ‘off’ to disable VTSS power.
2. Disconnect each VTSS line cable from its source power cable or hard-wired breaker panel connection.

Note: VTSS power cables may either be connected to source power cables (50 Hz/60 Hz) or hard-wired directly to a wall-mounted circuit breaker panel (50 Hz).

1. AC source power supplied by local power company and/or uninterruptible power supply (UPS).

Disconnecting AC Power Cords

1. At each VTSS PDU, disconnect the AC power cord.
2. Disconnect the AC power cord retaining brackets from the VTSS frame.

Disconnecting Remote Maintenance Cables

Follow procedures below to disconnect remote maintenance cables from a VTSS.

Disconnecting Service Delivery Platform Ethernet Cables

1. At the rear of the VTSS, disconnect the Service Delivery Platform (SDP) Ethernet cables from ports labeled ETH0 and ETH1 on the back of the VTSS. If the cables are routed beneath a raised floor, coil each cable and lower it through the raised-floor cutout onto the base (solid) floor. If the cables run at floor level, coil each cable and set it aside, out of foot-traffic areas.
2. As needed, disconnect the other end of each Ethernet cable from its assigned port or connector.

Disconnecting ServiceTek+ Modem Cables

1. At the rear of the VTSS, disconnect the ServiceTek+ serial modem cables from ports labeled CSRC0 and CSRC1 on the back of the VTSS. If the cables are routed beneath a raised floor, coil each cable and lower it through the raised-floor cutout onto the base (solid) floor. If the cables run at floor level, coil each cable and set it aside, out of foot-traffic areas.
2. As needed, disconnect the other end of each modem cable from the modem, FICON director, or MARS box.

Disconnecting FICON Channel Cables

CAUTION !

When handling FICON channel cables, take appropriate precautions to avoid contamination of the optical fibers and damage to fiber optic components, which could impede data transmission. For more information, see “Fiber Optic Component Handling Precautions” on page xxiii**.**

CAUTION !

To prevent contamination of optical fibers and damage to fiber optic components, never re-install original protective caps on fiber card jacks; instead, order replacement caps as needed. For more information, see “Fiber Optic Component Handling Precautions” on page xxiii**.**

1. At the front of the VTSS, disconnect all FICON cables from the VCF cards.
2. Lower the cables through the raised-floor cutout; leave the other ends connected to the host system(s), FICON directors, and RTDs.

DANGER !!

A populated VSM5-VTSS cabinet is heavy (up to 445 kg; up to 982 pounds). To avoid injury, and damage to the VTSS, follow these safety precautions:

- **Always use two persons to move a VTSS from one location to another.**
- **Ensure both locking swivel casters are in the steering (fixed-forward) position before moving a VTSS.**
- **When moving a VTSS up or down an incline, NEVER allow it to tilt more than 15 degrees, since it is likely to tip over beyond that angle.**
- **Ensure that all raised-floor tiles in the data center are properly installed along the path where the VTSS will be moved.**

Note: Depending on the distance of the move and potential for contamination, you may want to re-install external covers before moving a VTSS.

1. Remove the wheel blocks from under the four VTSS casters.
2. Set both locking swivel casters to the steering (fixed-forward) position, as shown in Figure 1-6 on page 1-36.
3. Using two CSEs, carefully roll the VTSS to its new location.

Reassembling a VTSS

To reassemble a VTSS and restore power at a new location, complete all applicable installation procedures found in Chapter 1, "Installing a VSM5-VTSS", starting with "Inspecting the VTSS for Moisture and Damage" on page 1-37.

VSM5-VTSS Locations and Functions

A

This section shows the locations and describes the functions of VTSS for VSM5 field-replaceable units (FRUs) and other non-FRU assemblies and components.

■ VSM5-VTSS Front View

Figure A-1. VSM5-VTSS Front View

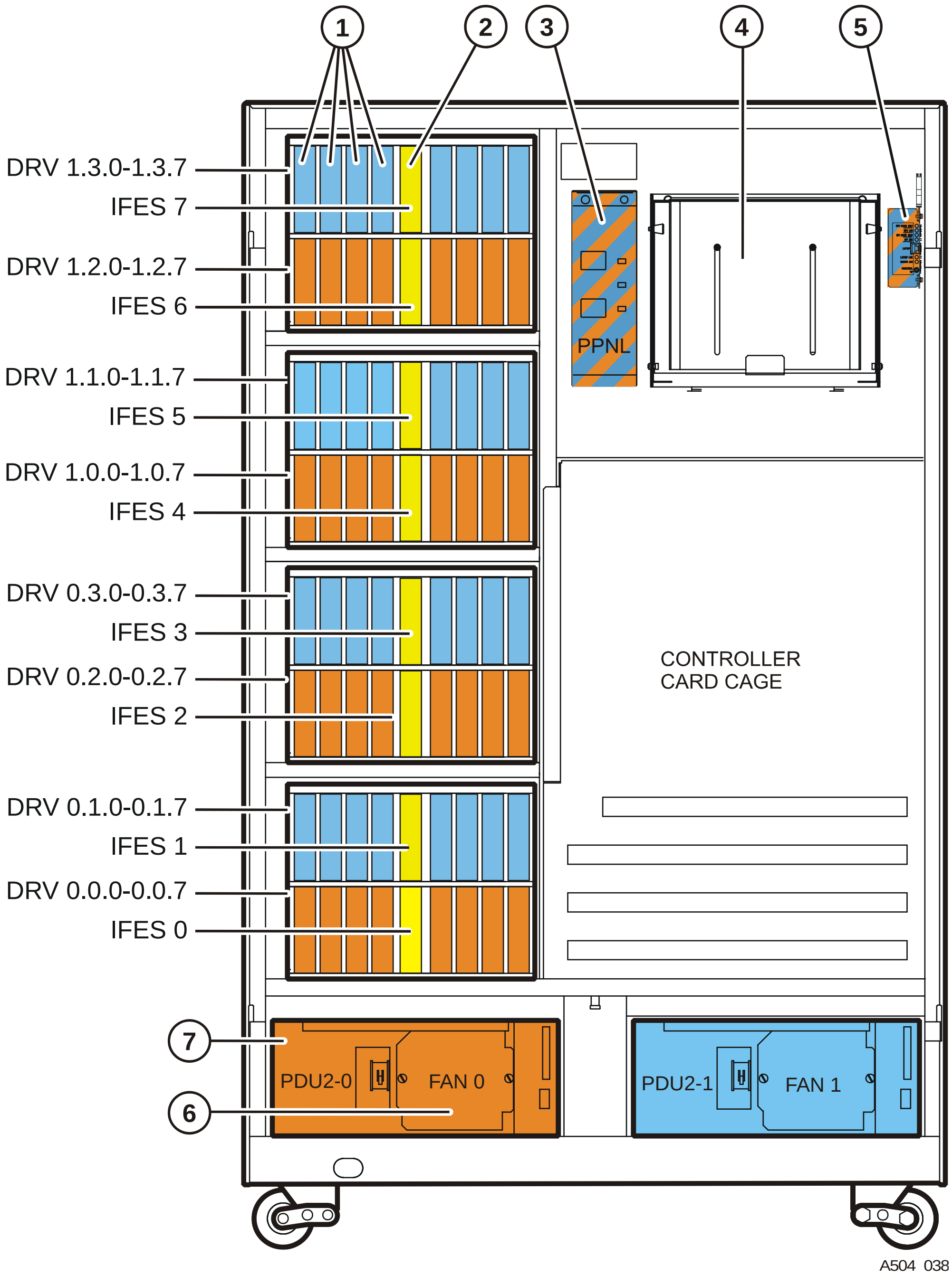


Table A-1. VSM5-VTSS Front View

Figure A-1 Reference	FRU Name	No. in Unit	Function
1	Array Disk Drives	32, 48, or 64	Dual ported, 146GB fibre channel disk drives used as a tape buffer for a VSM system. Minimum VSM5-VTSS cabinet configuration is 32 drives (16 per drive tray); maximum configuration is 64 drives. Drive arrays are grouped in 13+2+1 configuration (13 drives for customer data, 2 for parity data, 1 for a 'hot spare'). Available VTSS cabinet capacities range from 1.25TB to 28TB, depending on model number, customer-selected capacity option, and actual data compression ratio (4:1 typical); see "Model Numbers / Configurations / Capacities" on page B-153 for details. Different drive capacities cannot be intermixed in a VSM5-VTSS cabinet.
2	IFES2 Cards	4, 6, or 8	Storage loop interface cards. IFES cards link to IFF cards via FICON cables (see Figure B-11 on page B-167), working together to manage data transfers across four fibre channel back-end disk drive loops. IFES cards also monitor array power and cooling and send the data to the ISP cards. **Note:** Each IFES card contains a piggyback IFZM card.
3	Power Control Panel	1	Enables and disables power to all VTSS components; displays power status of the VTSS.
4	Laptop Shelf	1	Provides a fold-down work surface for a service laptop PC, enabling a CSE/QSP to readily access the 'laptop' connector on the A-Hub card faceplate assembly for using the detached operator panel (DOP) facility.
5	A-hub Card Assembly	1	Provides visual status of: the ISP0 heartbeat and its link to ISP drive 0; the ISP1 heartbeat and its link to ISP drive 1; the link to a service laptop PC; the link to a remote support device (ServiceTek+ modem or SDP Ethernet connection). Provides a port for attachment of a service laptop PC for code loading, file copying, and other detached operator panel (DOP) functionality. Provides a toggle switch for selecting the type of IML to be performed by the VTSS (functional or VIP) during the power-on cycle. See "A-Hub Card Assembly" on page A-145 for more information.
6	Power Distribution Unit Fans	2	Each fan is integrated into its corresponding PDU for dedicated cooling and can be replaced separately from its PDU as a discrete FRU.
7	Power Distribution Units	2	Each unit receives power from AC inlets and distributes it to AC loads in the VTSS (DCPSs, impeller motors, battery chargers).

■ VSM5-VTSS Rear View

Figure A-2. VSM5-VTSS Rear View

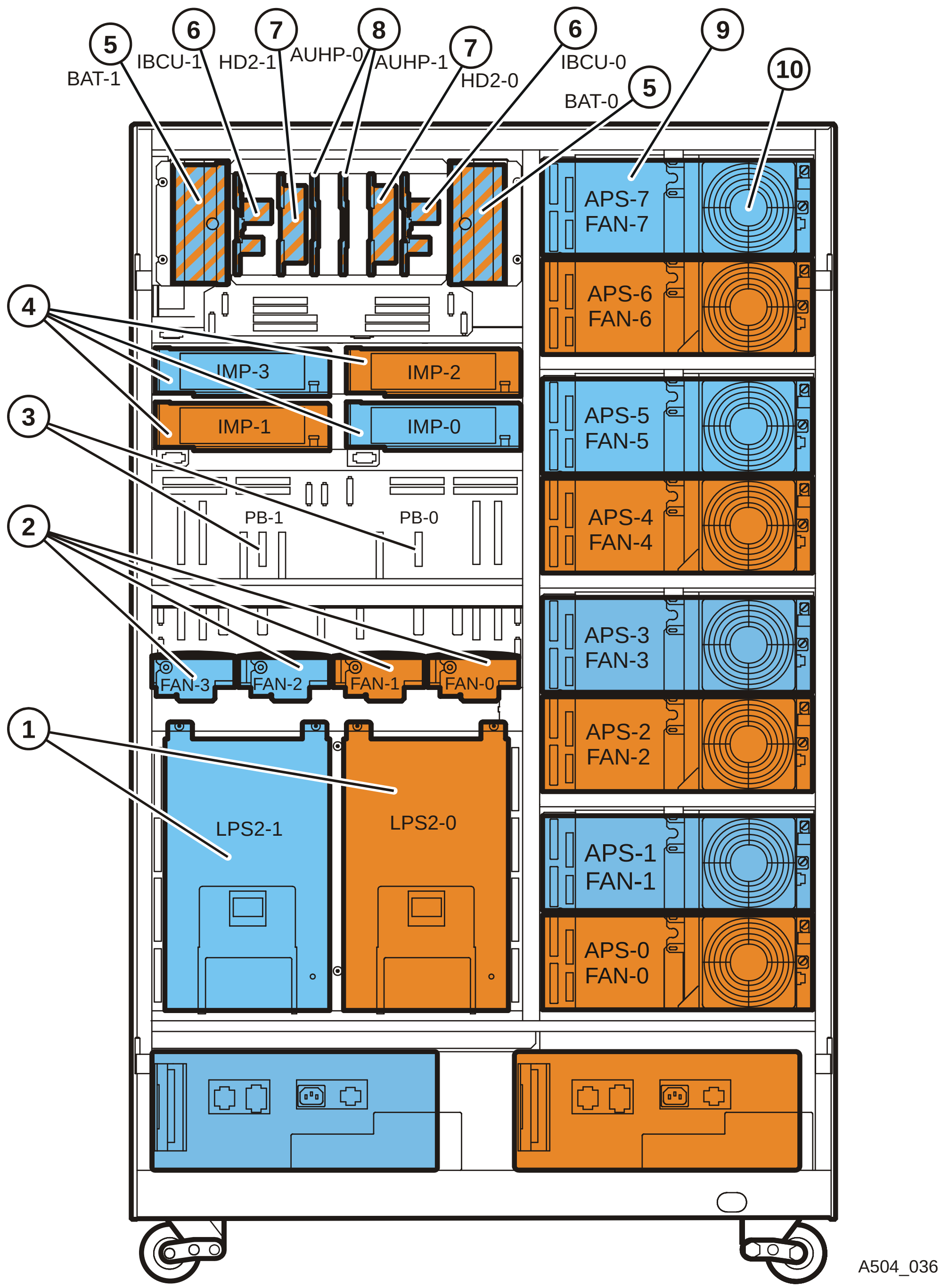


Table A-2. VSM5-VTSS Rear View

Figure A-2 Reference	FRU Name	No. in Unit	Function
1	Logic Power Supplies	2	Each functionally redundant supply provides power to C3 motherboard logic cards and components.
2	Logic Power Supply Fans	4	Each redundant pair provides cooling to its corresponding logic power supply.
3	Battery Cards	2	BIOS battery for the ISP cards. Unlike the NVS batteries, these batteries are not routinely replaced.
4	Controller Impellers	4	Provide cooling to logic card cage FRUs.
5	Battery Packs	2	Supply backup DC power to CNV cards for at least 72 hours during power outages to protect nonvolatile cache (NVS) data. Batteries are rated at 4V 25 AH, with a 7A 250V fuse on the positive output lead.
6	Battery Charger Units	2	Provide continuous charge to battery packs.
7	ISP Hard Drives	2	Each provides 16MB of space to store functional and diagnostic code, plus support facility and event log data, to operate and troubleshoot the VTSS and execute commands. Drive 0 is linked to card ISP3-0, and Drive 1 is linked with card ISP3-1.
8	AUHP (Hot Plug) Cards	2	Supply power and over-current protection to ISP hard drives, floppy drive, and the local operator panel (DACD).
9	Array Power Supplies	4, 6, or 8	Each functionally redundant pair provides power to 16 array drives.
10	Array Power Supply Fans	4, 6, or 8	Each functionally redundant pair provides cooling to 16 array drives.

■ Logic Motherboard Card Side

Figure A-3. Logic Motherboard Card Side

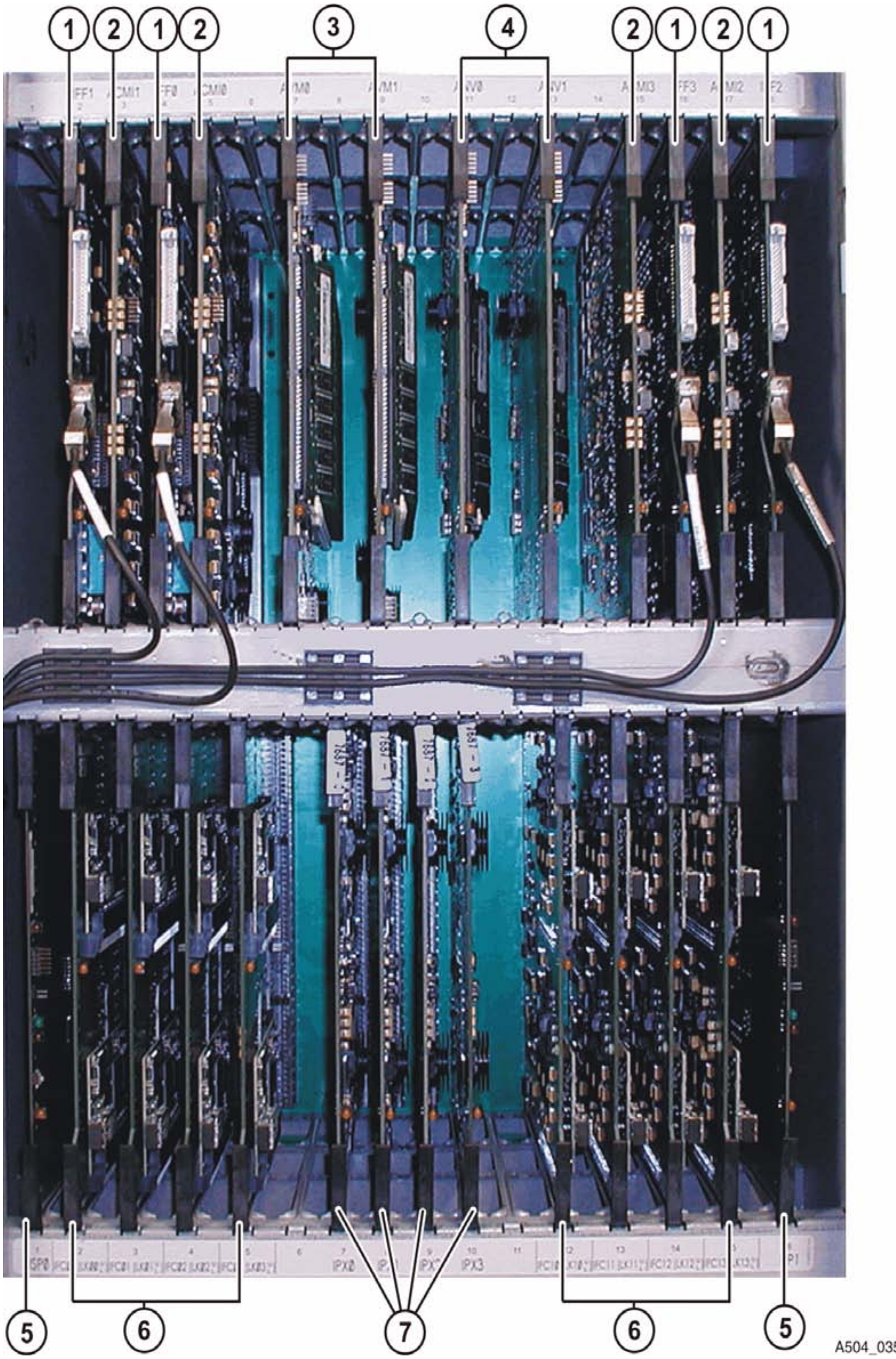


Table A-3. VSM5-VTSS Logic Motherboard Card Side

Figure A-3 Reference	FRU Name	No. in Unit	Function
1	IFF2 Cards	4	IFF cards link to IFES cards via FICON cables (see Figure B-11 on page B-167 for details), working together to manage data transfers across four fibre channel back-end disk drive loops.
2	ACMI Cards	4	Cache memory interface cards; each has 8 data paths to a VCF card. These also provide control region clock distribution logic.
3	AVM16 Cards	2	Volatile cache memory cards. Each card provides 16 GB of volatile memory. Both cards in a VTSS cabinet must be the same capacity and type, i.e. AVM4 and AVM16 cards cannot be intermixed.
4	ANV	2	Non-volatile cache memory cards. These provide 500 MB or NVS cache per card, or 1 GB of NVS cache for the subsystem.
5	ISP3A Cards	2	One ISP card is master (with its corresponding ISP drive), other card is backup (with its ISP drive). If ISP0 is not fenced or inoperable, support facility selects it as master at IML, with primary control of: FRU diagnostics; IML/FMS command execution; array power and cooling; operator panel displays; power sequencing; and maintenance of event, FRU status, and PSA logs. See "ISP3A Cards" on page A-144 for more information.
6	VCF3 Cards	4, 6, or 8	Fiber-optic channel cards for VTSS-to-host FICON connections. Each card has 2 physical ports (top is 0, bottom is 1), and each port provides 64 logical paths (i.e., up to 1024 paths on 8 cards). VCF3 cards support 2Gb speeds and read/writes at 75 MB/sec. or faster. Minimum VSM5 configuration requires 4 VCF3 cards installed in slots VCF00, VCF02, VCF10, and VCF12. Additional cards must be added in pairs, with one of each pair placed in Cluster 0 and the other in Cluster 1 (i.e., the first added pair goes in slots VCF01 and VCF11, second added pair in VCF03 and VCF13). See "VCF3 Cards" on page A-142 for more information.
7	IPX5 Cards	4	Execute software commands to manage customer data; contain control bus, maintenance bus, and shared memory interface hardware.

Card Locations in the Logic Motherboard Card Cage

Figure A-4. VSM5-VTSS Upper Cage Card Locator Strip

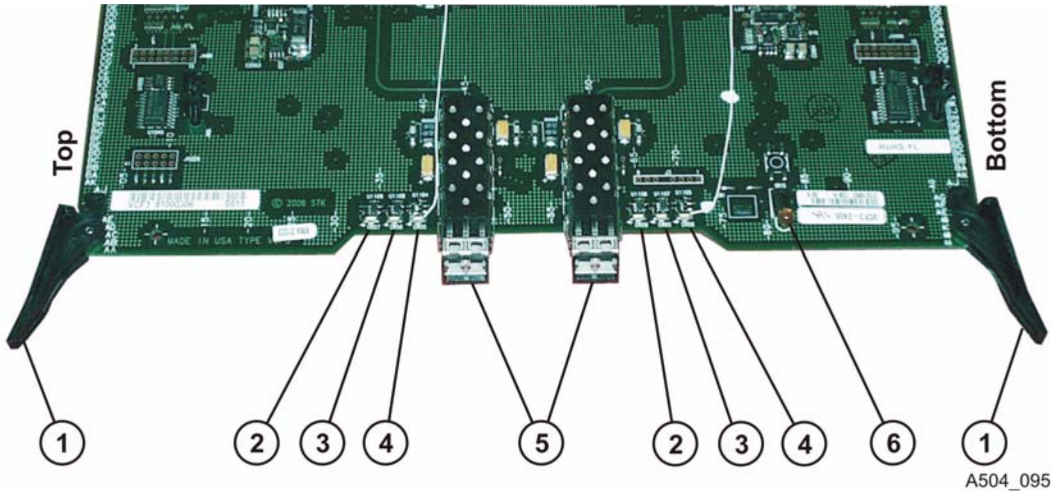
open	IFF1	ACMI1	IFF0	ACMI0	open	AVM0	open	AVM1	open	ANV0	open	ANV1	open	ACMI3	IFF3	ACMI2	IFF2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Figure A-5. VSM5-VTSS Lower Cage Card Locator Strip

ISP0	VCF00	VCF01	VCF02	VCF03	open	IPX0	IPX1	IPX2	IPX3	open	VCF10	VCF11	VCF12	VCF13	ISP1
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

■ VCF3 Cards

Figure A-6. VCF3 Card Components



1. Card ejector tabs – two per card. Used to attach a VCF card to, or detach it from, its logic motherboard connector. Closing the tabs inward seats the card into its connector; opening the tabs outward ejects the card from its connector.
2. Link status LEDs (amber) – one each for Port 0 and Port 1. Indicates the status of the link. When functional code is loaded to the FIP processor during IML (power-on/reset) or GFR, or when the FIP restarts, the LED remains solid 'on' for 3 seconds, then resumes normal functioning. The LED remains off during diagnostic code execution. Table A-4 on page A-143 provides descriptions of the solid 'on' state for the LED at other times (its normal condition) and of blinking patterns for the LED that denote various error conditions.
3. Heartbeat LEDs (green) – one each for Port 0 and Port 1. Indicates whether the port FIP processor is executing its functional code normally. When functional code is loaded to the FIP during IML (power-on / reset) or GFR, or when the FIP restarts, the LED remains solid 'on' for several seconds, then resumes normal functioning; when the LED remains solid 'on' (not blinking) at other times, it indicates a FIP double-fatal condition. The LED remains off during diagnostic code execution. When the LED remains off at other times, it indicates the fibre channel chipset is not yet successfully initialized and the FIP is not yet initialized by IUP; as needed, run validation tests while the card is in place, check the code load in the VTSS, and consider FRU replacement to correct the problem. When the LED is blinking steadily (once per second, with no pause), it indicates the FIP processor is initialized and running normally. During state save offload, the LED may blink erratically; when it blinks erratically at other times, it indicates a potential software problem.
4. ADT traffic LEDs (green) – one each for Port 0 and Port 1. Indicates status of ADT packet transfer traffic between the VCF card and other cards on the ADT bus. Traffic includes internal commands for data movement between the IUP and FIP processor, and data transfers for FICON I/O. In general, LED activity indicates that normal job processing is ongoing, whereas lack of activity indicates no or very little internal signaling or I/O. When the LED remains solid 'on' or flickers rapidly, it indicates sustained or frequent ADT traffic. The LED also remains on during ADT path diagnostic tests. The presence of sustained activity indicates at least one path on the port is active, but does not necessarily indicate all paths that are expected to be active are doing work. When the LED flickers briefly, it indicates brief instances or bursts of ADT traffic; such brief, isolated activity indicates there is basic FICON Protocol signaling between the VCF card and IUP, on at least one logical path that is established on that port.
5. SFP connectors – one each for Port 0 and Port 1. Connection point for FICON cables that enable data transfers between the VCF card and IUPs. VCF cards can use either short-wave (850nm) multi-mode connectors or long-wave (1310nm) single-mode connectors in any combination, based on customer requirements.
6. FRU failure LED (amber) – one per card. Indicates operational status of the VCF card. During IML (power-on/reset), the LED remains solid 'on' for several seconds, then resumes normal functioning. When the LED remains solid 'on' at other times, it indicates the card is fenced and ready for GFR. When the LED is off during normal VTSS operations (its normal condition), it indicates the card is functional.

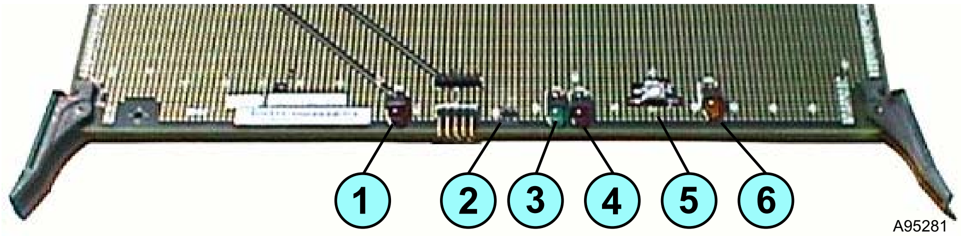
Table A-4. VCF3 Card Link Status LED Blink-Pattern Descriptions

LED Status	Description	Remedial Action
Solid ON (not blinking)	When the LED remains solid ‘on’ other than during IML (power on/reset) or GFR, it is a normal condition indicating: the link to that port is initialized and one or more logical paths have been established, and; the port is capable of performing device-level functions and communicating with devices.	• Not applicable.
1-blink pattern	Not used. To avoid confusion with the Heart-beat LED, the Link Status LED is not de-signed to blink once, pause, then blink again.	• Not applicable.
2-blink pattern	Error condition indicating the SFP is detect-ed, but the ‘module present’ signal is not consistent with the IIC comm. interface.	• Re-seat the SFP. • Replace the SFP. • Replace the VCF3 card.
3-blink pattern	Error condition indicating the SFP is sending its ‘transmit fault’ signal.	• Replace the SFP.
4-blink pattern	Error condition indicating the SFP is sending its ‘loss of signal’ signal. Received power is below fibre channel specifications, and there is a problem in the end-to-end optical path between the two ports. A connection might not be made, may be made wrong, or may be severely impaired.	• Clean / re-insert the fibre cable into SFPs at both ends of link, and re-insert SFPs into connectors. • Check / clean all fibre channel links, end-to-end. • Check connectivity (at patch panel, for example). • Check port administrative settings and operational status end-to-end.
5-blink pattern	Error condition indicating the SFP is receiv-ing power within specification, but the qLogic FICON chipset is indicating a ‘loss of syn-chronization’ condition (qLogic state 004).	• Check status of attached port (director or other). • Clean and re-plug fibre. • Check connectivity (at patch panel, for example). • Isolate problem to fibre(s), SFP(s), connection(s), or FRU(s), and replace those as needed.
6-blink pattern	Error condition indicating the fibre channel link is active and no FLOGI is received (qLogic state 001 or 002).	• Check topology (fabric versus direct connect). • Check director port status and log info (engage the fabric vendor).
7-blink pattern	Error condition indicating: the attached port has failed the QSA (query security attributes) request issued by the VTSS port; a two-byte address is configured for a CH port; and, the VTSS port requires FICON Cascade.	• Check topology (fabric versus direct cnonect) and connectivity (engage the fabric vendor). • Check licensing and / or keys for the High Integrity Fabric feature (vendor-specific). • Check security settings and configuration (ensure security is enabled).
8-blink pattern	Error condition indicating the CU port, or the CH port with all single-byte addresses, has achieved fabric login FLOGI ACC, but not port login PLOGI or PLOGI ACC, and that the CH port with at least one double-byte ad-dress has achieved QSA ACC.	• If RTD attached, verify that the receive buffer size is 2048 (not 2112). • If CH port, check the status in the fabric (director) of the port addresses that are configured. • If CU port, check status of CHIPIDs that are config-ured to this CU port, check IOCDF, verify CU port is attached to correct director port address.
9-blink pattern	Error condition indicating the VTSS port has achieved a port login state (PLOGI or PLOGI ACC) but does not have at least one FICON logical path established.	• Check mainframe and channel configuration and operational status. • Check device configuration / operational status. • Isolate among working and non-working paths.

Note: To indicate various error conditions, the Link Status LED blinks 2 to 9 times in quick succession, followed by a 2-second pause, then repeats the same pattern. Each of these blink patterns is described above.

ISP3A Cards

Figure A-7. ISP3A Card Indicators / Jumpers / Switches



1. Card operational status LED 0 (red) – when LED is off (normal condition), indicates card is operating properly. When LED is continuously on, indicates card operations are halted due to in-progress IML, controlled power-down, operator-initiated or thermal EPO, or card malfunction.
2. IP address jumper pins – connecting these pins causes a reset of the VTSS IP address to its default (129 .80.64.242) during the next IML. This capabillity is used when a detached operator panel cannot communicate with the VTSS because its IP address was changed, was never defined, is unknown, or was removed. See “Resetting the VTSS IP Address Default” for more information on using these jumper pins.
3. IML status / test failure / fatal code error LED 1 (green) – works in conjunction with its counterpart LED (LED 2; see item 4) to indicate the status of card tests during IML, fatal code errors, SCSI processor problems, missing boot drives, and normal card operation. See Table A-5 on page A-144 for more information.
4. IML status / test failure / fatal code error LED 2 (red) – works in conjunction with its counterpart LED (LED 1; see item 3) to indicate the status of card tests during IML, fatal code errors, SCSI processor problems, missing boot drives, and normal card operation. See Table “ISP3A Card LED 1 and LED 2 Status Indications” on page A-144 for more information.
5. Card IML switch – used to initiate card IML. If the A-Hub ‘Functional/VIP’ switch is held in ‘VIP’ position while this switch is pressed, the card comes up in VIP mode; see “A-Hub Card Assembly” on page A-145 and “VIP-Level Screens” on page C-258 for more information about the VIP switch and VIP mode.
6. Power-on FRU validation status / FRU failure LED 3 (amber) – during the VTSS power-on cycle, this LED remains on continuously until the card is validated, then goes off (normal condition). When this LED is continuously on other than during a power-on cycle, indicates the card has failed and requires diagnostic testing and/or replacement using GFR.

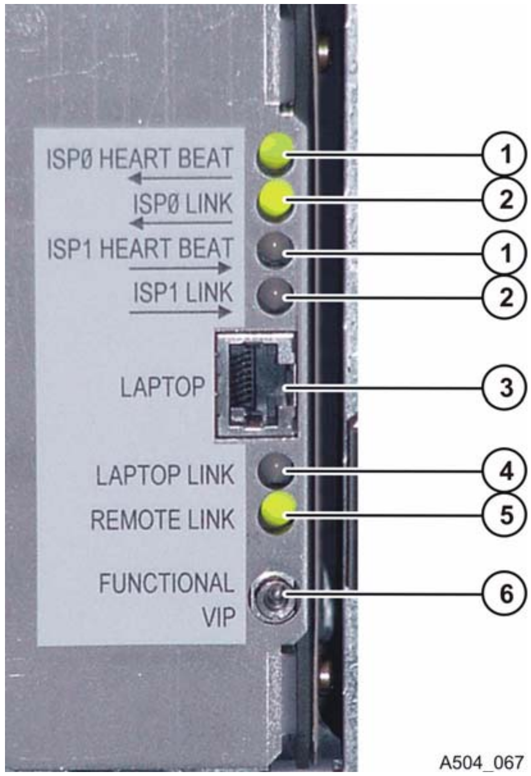
Note: During normal operation of the VTSS, no LEDs are lit on either ISP3A card.

Table A-5. ISP3A Card LED 1 and LED 2 Status Indications

LED 1 (green) Status	LED 2 (red) Status	Meaning / Condition
Status Indications During IML (Power-On/Reset)		
On	On	Microprocessor test in progress
On	Off	RAM test in progress
Off	On	PROM test in progress
Off	Off	IML tests completed; normal operating condition
Status Indications During Normal Operation (Post-IML)		
Off	Off	Normal condition
Flashing	Off	No valid ISP boot drive was found
Flashing	On	Open – contact the Sun Remote Resolution Center
On	Flashing	Open – contact the Sun Remote Resolution Center
Off	Flashing	SCSI processor problem
Flashing	Flashing	If both LEDs flash synchronously, indicates fatal ISP code error; if both flash alternately, indicates fatal error detected by probe software.

■ A-Hub Card Assembly

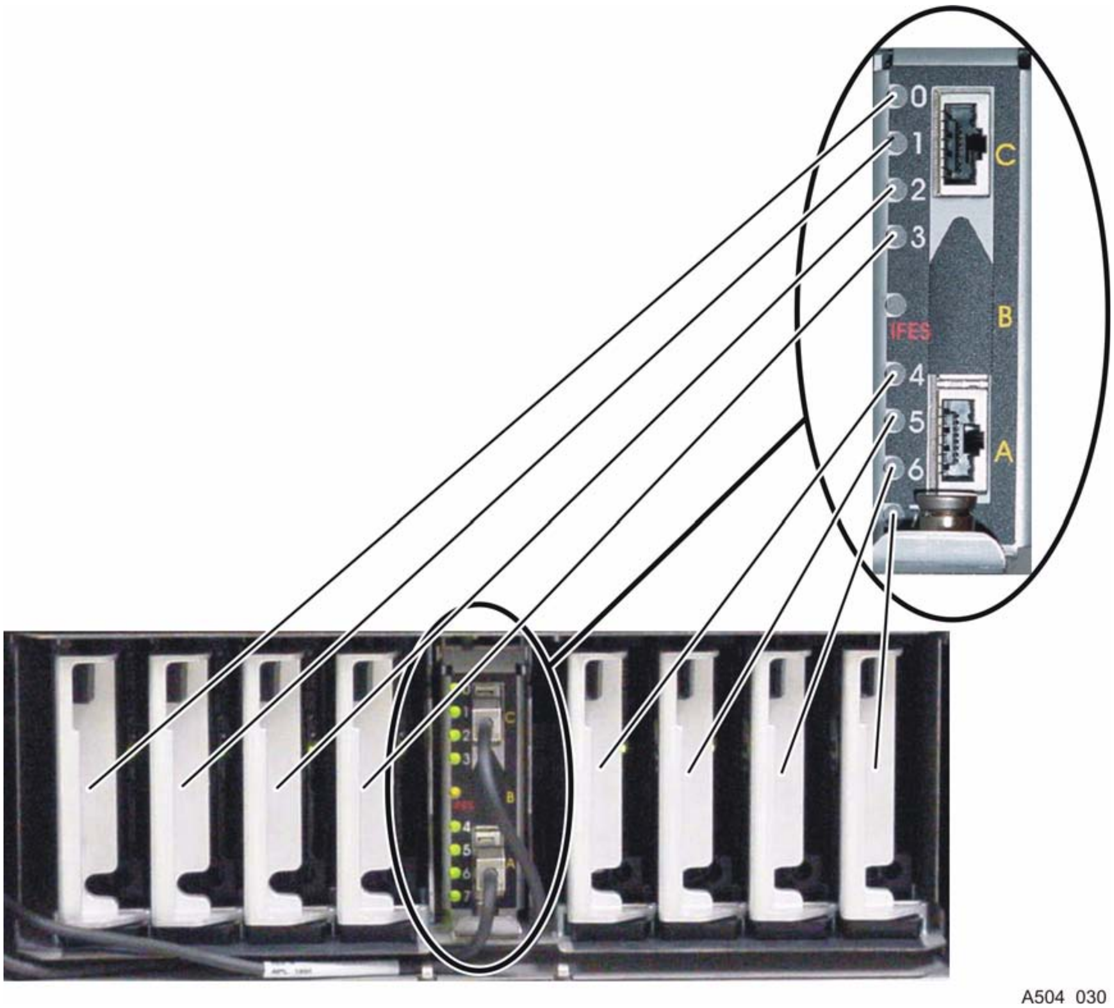
Figure A-8. A-Hub Card Assembly



1. ISP0 / ISP1 Heartbeat LEDs – during IML, these LEDs indicate the condition of ISP3A card LEDs; see "ISP3A Cards" on page A-144. After IML and during normal VTSS operation, the LEDs flash in a two blink-pause-two blink pattern until one ISP card becomes master (primary). After the master ISP is determined: the master ISP card causes the ISP0 LED to flash in a one-blink on-and-off pattern, and the slave (secondary) ISP card causes the ISP1 LED to continue flashing in a 'two blink-pause-two blink' pattern.
2. ISP0 / ISP1 Link LEDs – these LEDs indicate activity on ISP0 and ISP1 links, respectively. Directional arrows under the silkscreen text indicate card cage side where the referenced ISP3A card is located. During normal VTSS operation, these LEDs are not lit. When a service laptop PC or remote maintenance server is connected to the VTSS, these LEDs are lit or flashing.
3. Laptop port – Ethernet port for a service laptop PC to connect to the master ISP card and ISP hard drive
4. Laptop Link LED – when lit continuously or flashing intermittently, indicates data transmission is occuring to or from a service laptop PC.
5. Remote Link LED – when lit continuously or flashing intermittently, indicates data transmission is occuring to/from a Sun StorageTek remote maintenance server.
6. Functional / VIP switch – controls which type of microcode (functional or VIP) loads during system IML. Default (normal) switch position is up, which loads the current system release level (SRL) of functional code. To bring the system up with VIP code, hold the switch in the down (VIP) position at the start of IML. Once the ISP0 and ISP1 heartbeat LEDs indicate which ISP card is master, the switch can be released.

■ IFES Cards

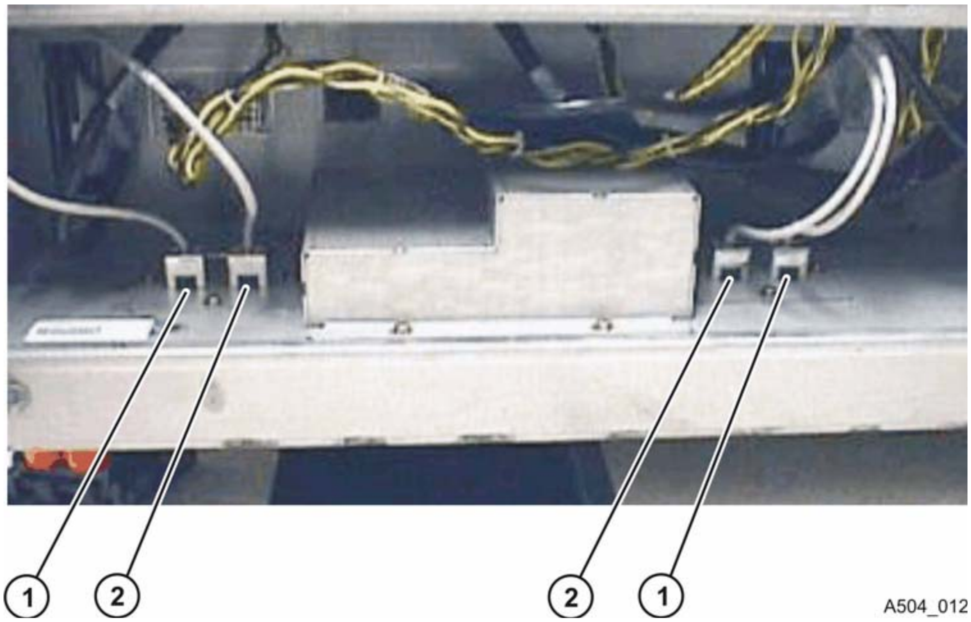
Figure A-9. IFES Card Front Panel



1. Upper LEDs 0-1-2-3 (green / amber) – when illuminated green, indicates I/O activity is occuring on the designated drive; when illuminated amber, indicates a fault on the designated drive.
2. IFES LED (green) – indicates the condition of the IFES assembly; when not illuminated, indicates the card is operating properly; when illuminated amber, indicates a fault condition exists for the card.
3. Lower LEDs 4-5-6-7 (green / amber) – when illuminated green, indicates I/O activity is occuring on the designated drive; when illuminated amber, indicates a fault on the designated drive.

Remote Maintenance Connectors

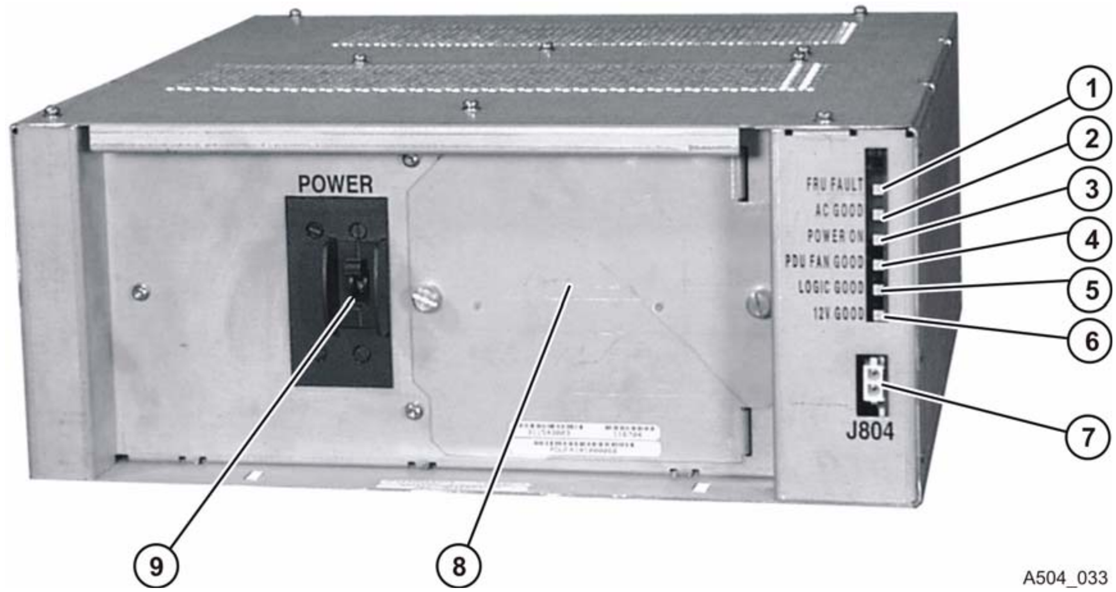
Figure A-10. Remote Maintenance Connection Jack Locations at Rear of VTSS Cabinet



1. Modem ports – 2 total; attachment points for serial modem cables used for ServiceTek+ remote maintenance connection; port **CSRC1** is on the left side, **CSRC0** is on the right.	2. Ethernet ports – 2 total; attachment points for Ethernet cables used for Service Delivery Platform (SDP) remote maintenance connection, and for detached operator panel (DOP) connection from a service laptop PC; port **ETH1** is on the left side, **ETH0** is on the right.

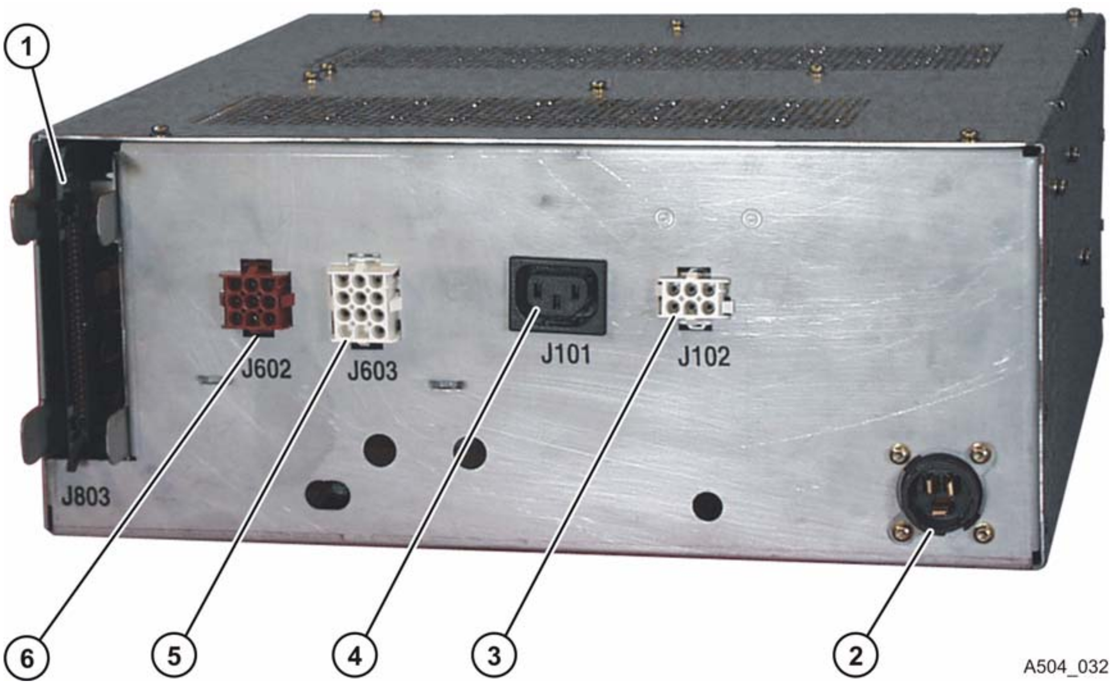
Power Distribution Units

Figure A-11. VTSS Power Distribution Unit Front View



1. FRU FAULT LED (amber) – when not illuminated, indicates PDU is operating normally. When illuminated, indicates internal failure; PDU needs to be replaced.
2. AC GOOD LED (green) – when not illuminated, indicates there is no power to the PDU. When illuminated, indicates PDU has power, though not necessarily within its specified voltage range.
3. POWER ON LED (green) – when not illuminated, indicates the **POWER ENABLE** switch on the power control panel is in the ‘off’ (0) position, i.e., raised from the panel surface. When illuminated, indicates the **POWER ENABLE** switch on the power control panel is in the ‘on’ (1) position, i.e., flush with the panel surface.
4. PDU FAN GOOD LED (green) – when not illuminated, indicates the PDU fan is spinning too slowly or has stopped. When illuminated, indicates the PDU fan is spinning at the correct speed.
5. LOGIC GOOD LED (green) – when not illuminated, indicates the PDU logic is not operating properly. When illuminated, indicates the PDU logic is operating properly.
6. 12V GOOD LED (green) – when not illuminated, indicates the PDU 12V keep-alive power supply is either not operating or is out of specified limits. When illuminated, indicates12V keep-alive power supply is operating normally.
7. J804 connector – hi-pot test connector, for factory use only.
8. Fan cover – removes to provide access to internal PDU fan for servicing.
9. POWER circuit breaker – enables or disables power to PDU outputs

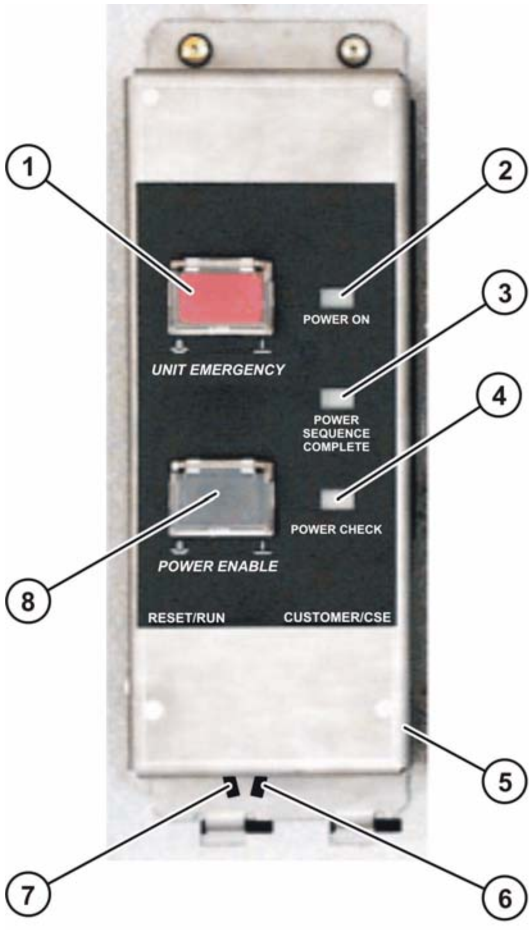
Figure A-12. VTSS Power Distribution Unit Rear View



1. J803 connector – attachment point for a ribbon cable that links the PDU to a PSSIB bus to provide PDU status. 2. Main input power connector (unmarked) – AC input connector to the PDU. 3. J102 connector – attachment point for a cable that provides AC power to array power supplies.	4. J101 connector – attachment point for AC power out cable for the logic power supply attached to this PDU. 5. J603 connector – attachment point for a cable that provides 12V power to the IMPOD motherboard, logic motherboard, and IHP card. 6. J602 connector – attachment point for a cable that provides 12V DC power to impellers and fans.

Power Control Panel

Figure A-13. VTSS Power Control Panel



1. UNIT EMERGENCY (EPO) switch – in the '1' (on) position, instantly disables all VTSS power except NVS battery backup and PDU 'keep-alive' 12V DC power. In the '0' (off) position, allows VTSS power to be enabled if **POWER ENABLE** switch is in the '1' (on) position.
2. POWER ON indicator – lights green if 5V DC is present and within specification at the logic motherboard.
3. POWER SEQUENCE COMPLETE indicator – microcode-controlled; lights green after the VTSS support facility verifies all power checks completed error-free during the 'power on' sequence.
4. POWER CHECK indicator – microcode-controlled; lights amber if VTSS power checks do not complete error-free during the power-on sequence.
5. ISP Drive LED – (on right side of panel, partially hidden); lights green when ISP drives are active. LED is visible only if the VTSS cabinet front doors are open.
6. CUSTOMER / CSE switch – determines who can reset VTSS power after EPO. Switch is set by a CSE at installation and is accessible only if the VTSS cabinet front doors are open.
7. RESET / RUN switch – toggling switch resets the VTSS after a thermal EPO. Switch is accessible only if the VTSS cabinet front doors are open.
8. POWER ENABLE switch – in '0' (off) position, initiates controlled power down (CPD). In '1' (on) position, enables VTSS power. See **UNIT EMERGENCY** switch.

VSM5-VTSS Specifications and Additional Information

B

This appendix provides specifications and additional information for the VTSS for VSM5. Content includes:

Environmental Requirements

Table B-1. VSM5-VTSS Environmental Requirements

Environmental Factor	Shipping Environment Limits*	Storage Environment Limits#	Operating Environment Limits
Temperature	-40º C to +60º C (-40º F to +140º F)	10º C to 40º C (50º F to 104º F)	16º C to 32º C (60º F to 90º F)
Thermal Change (maximum rate/hr)	15º C (27º F)	15º C (27º F)	5º C (9º F)
Humidity‡	10% to 80%	10% to 80%	20% to 80%
Altitude	0 m to 15,240 m (0 ft. to 50,000 ft.)	0 m to 3,050 m (0 ft. to 10,000 ft.)	0 m to 2439 m (0 ft. to 8000 ft.)

Notes:

- Abbreviations key: C = Centigrade; F = Fahrenheit; ft. = foot / feet; m = meter(s)
- * The shipping environment must not exceed the storage environment limits longer than 10 days.
- # The storage environment must not exceed the operating environment limits longer than 60 days.
- ‡ Humidity specifications exclude conditions that may cause condensation on disk drives.

Physical Characteristics

Table B-2. VSM5-VTSS Physical Characteristics

Physical Attribute	Specification
Height	154.94 cm (61.0 in.)
Width (with both side covers attached)	92.1 cm (36.24 in.)
Depth (with front and rear doors attached)	77.1 cm (30.34 in.)
Maximum Weight (with 64 array drives)	445 kg (982 lbs.)
Footprint	7093.7 cm^2 (1099.5 in^2)
Recommended Service Clearance, Front/Rear (door swing radius)	54.1 cm (21.3 in.)
Recommended Left/Right Side Clearance (optional)	6.4 cm (2.5 in.)

Model Numbers / Configurations / Capacities

Table B-3. VSM5-VTSS Model Numbers / Configurations / Capacities

Base Model Number	Disk Arrays Configuration	Data Drives* Total Capacity	Capacity Feature Code	PCap Capacity[#]	Published Effective 4:1 Capacity	Actual Effective 4:1 Capacity[‡]	PCap Utiliza-tion[#]
VSMB-465	2 x 13 + 2 + 1 (32 drives*)	3737.6GB (1:1 uncompressed) --------- 14,950.4GB (4:1 compression)	Base model	330GB	1250GB	1320GB	8.8%
			VC15	660GB	2500GB	2640GB	17.7%
			VC16	1320GB	5000GB	5280GB	35.3%
			VC21	1970GB	7500GB	7880GB	52.7%
			VC18	2890GB	11,000GB	11,560GB	77.3%
			VC19	3551GB	14,000GB	14,203GB	95.0%
VSMC-465	3 x 13 + 2 + 1 (48 drives*)	5606.4GB (1:1 uncompressed) --------- 22,425.5GB (4:1 compression)	Base model	4200GB	16,000GB	16,800GB	74.9%
			VC22	4730GB	18,000GB	18,920GB	84.4%
			VC23	5326GB	21,000GB	21,304GB	95.0%
VSMD-465	4 x 13 + 2 + 1 (64 drives*)	7475.2GB (1:1 uncompressed) --------- 29,900.7GB (4:1 compression)	Base model	6040GB	23,000GB	24,160GB	80.8%
			VC24	6570GB	25,000GB	26,280GB	87.9%
			VC25	7101GB	28,000GB	28,406GB	95.0%

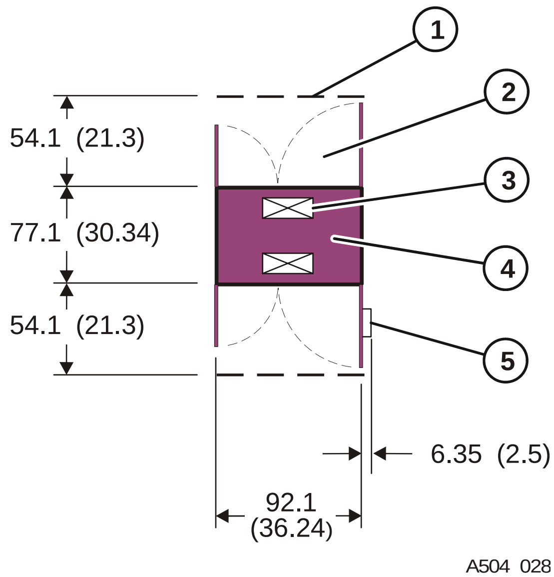
Notes:

- Abbreviations key: GB = gigabyte(s) (10^9 bytes); PCap = Physical Capacity Control feature
- * 32-drive configuration = 26 data drives, 4 parity drives, 2 spare drives, 30 read actuators, and 13 write actuators; 48-drive configuration = 39 data drives, 6 parity drives, 3 spare drives, 45 read actuators, and 13 write actuators; 64-drive configuration = 52 data drives, 8 parity drives, 4 spare drives, 60 read actuators, and 13 write actuators.
- [#] PCap utilization is the sum of PCap capacity divided by the uncompressed capacity of all data drives in a base model. Example: Model VSMB-465 with capacity feature VC15 has a PCap capacity of 660GB and a data drive capacity of 3737.6GB (13 drives), or a 17.7% utilization rate. PCap utilization is capped to a maximum of 95% to ensure at least 5% of data drive space is available for free space collection.
- [‡] Actual effective 4:1 capacity = PCap capacity with 4:1 compression, based on number of data drives per array (13) x number of arrays (2, 3, or 4) x base capacity per drive (143.75GB).

Physical Space Requirements

Figure B-1 below shows suggested minimum front and rear clearances for VSM5-VTSS service access, and shows locations of VTSS cable entry/exit openings.

Figure B-1. VSM5-VTSS Cabinet Dimensions for Physical Space Planning



1. Boundary of recommended service access area 2. Open radius of front and rear doors (4 total) 3. VTSS cabinet	4. Openings for entry / exit of data and power cables 5. Front cover bezel (additional 6.35 cm (2.5 inches) right-side clearance required to open door 90 degrees)

Notes:

- Metric dimensions are shown first (in centimeters), followed by English dimensions (in inches).
- Front and rear doors are shown in the open position to indicated dimensions required for service access.
- The VTSS does not require or provide side access; side covers are permanently attached and should not be removed under normal circumstrances

Floor Loading Specifications and References

Table B-4. VSM5-VTSS Floor Loading Specifications

Basic Floor Load*	Maximum Superimposed Floor Load #
730 kg/m^2 (149 lbs./ft^2)	485 kg/m^2 (99 lbs./ft^2)

Notes:

- * Load over footprint surface area (7093.7 cm^2/1099.5 in^2) of an unpackaged VSM5-VTSS cabinet, with a maximum weight of 445 kg/982 lbs., i.e., a VTSS with 64 array disk drives.
- # Assumes minimum Z+Z axis dimension of 185.3 cm/73.0 in. (i.e., cabinet depth 77.1 cm/30.4 in. + front service clearance of 54.1 cm/21.3 in. + rear service clearance of 54.1 cm/21.3 in.), minimum X+X axis dimension of 104.9 cm/41.2 in. (i.e., cabinet width 92.1 cm/36.3 in. + left clearance of 6.4 cm/2.5 in. + right clearance of 6.4 cm/2.5 in.).

Figure B-2. VSM5-VTSS Cabinet Weight Distribution and Leveler Locations

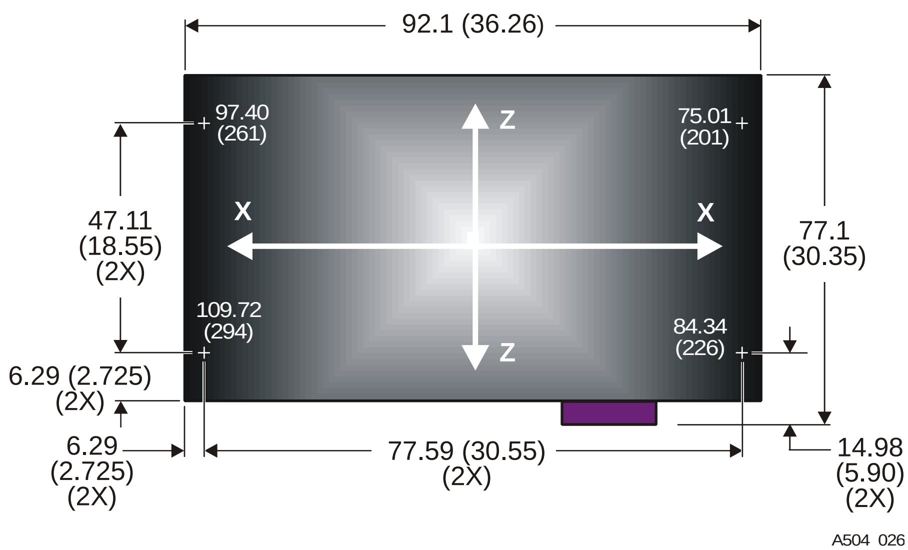


Table B-5. Raised Flooring Horizontal Force Chart

Seismic Risk Zone	Horizontal Force (V) Applied at Top of Pedestal
1	13.5 kg / 29.7 lbs.
2A	20.2 kg / 44.6 lbs.
2B	26.9 kg / 59.4 lbs.
3	40.4 kg / 89.1 lbs.
4	53.9 kg / 118.8 lbs.

Note: Horizontal forces are based on the *1991 Uniform Building Code (UBC) Sections 2336 and 2337*, and assume minimum operating clearances for multiple VTSS cabinets. Installations in areas not covered by the UBC should be engineered to meet seismic code provisions of the local jurisdiction.

Table B-6. VSM5-VTSS Cabinet Superimposed Floor Loading Example

Total Front + Rear Service Clearance (Z+Z) / 2	Total Left + Right Side Clearance (X+X) / 2				
	7.6 cm (3.0 in.)	61.0 cm (24.0 in.)	91.4 cm (36.0 in.)	121.9 cm (48.0 in.)	152.4 cm (60.0 in.)
55.9 cm (22.0 in)	443 kg/m^2 (91 lb./ft^2)	340 k.g/m^2 (70 lb/ft^2)	308 kg/m^2 (63 lb./ft^2)	285 kg/m^2 (58 lb./ft^2)	268 kg/m^2 (55 lb./ft^2)
96.5 cm (38.0 in)	374 kg/m^2 (77 lb./ft^2)	295 k.g/m^2 (60 lb/ft^2)	270 kg/m^2 (55 lb./ft^2)	252 kg/m^2 (52 lb./ft^2)	239 kg/m^2 (49 lb./ft^2)
116.8 cm (46.0 in)	350 kg/m^2 (72 lb./ft^2)	279 kg/m^2 (57 lb./ft^2)	257 kg/m^2 (53 lb./ft^2)	241 kg/m^2 (49 lb./ft^2)	229 kg/m^2 (47 lb./ft^2)
137.2 cm (54.0 in)	331 kg/m^2 (68 lb./ft^2)	267 kg/m^2 (55 lb./ft^2)	247 kg/m^2 (51 lb./ft^2)	232 kg/m^2 (48 lb./ft^2)	222 kg/m^2 (45 lb./ft^2)
157.5 cm (62.0 in)	315 kg/m^2 (64 lb./ft^2)	256 kg/m^2 (52 lb./ft^2)	238 kg/m^2 (49 lb./ft^2)	225 kg/m^2 (46 lb./ft^2)	215 kg/m^2 (44 lb./ft^2)

Notes:

- See Figure B-2 on page B-155 for the location and load of each VTSS cabinet support point.
- Values assume 15 lb./ft^2 (73 kg/m^2) superimposed dead load over entire area for raised floor, cables, etc., and 15 lb./ft^2 (73 kg/m^2) live load for personnel and equipment in clearance areas between units.
- Loading of adjacent floor areas must be considered when evaluating overall floor capacity.
- To evaluate floor loading for other possible configurations, consult a structural engineer.

AC Source Power Specifications and Connectors

Table B-7. VSM5-VTSS AC Source Power Specifications and Connectors

AC Source Power Requirement	Power Specification
Power and Frequency	Single-phase 170-240 VAC 30A @ 47-63 Hz
Heat Dissipation	4.77 minimum kBTU/hr — 7.64 maximum kBTU/hr
kVA	1.42 minimum kVA — 2.29 maximum kVA
Connector Type or Location	**Connector Specification**
Sun-supplied VTSS power cables (from VTSS power strips to AC source connector)	• RussellStoll RS3750DP* (North America only) • No connector (all sites outside North America)
Customer-supplied wall receptacles or connector cables (from AC source connector to VTSS power strips)	• RussellStoll RS 9R33u0W (rigid mount) • RussellStoll RS 9C33U0 (flexible mount)

Notes:
- Abbreviations key: AC = alternating current; Hz = hertz; kVA = kilovolt-amperes; V = volt(s)
- * There is no equivalent Hubbell connector.

DC Power Supply Voltage Ripple Specifications

Table B-8. VSM5-VTSS DC Power Supply Voltage Ripple

DC Power Supply Type	Output Voltage	Maximum Ripple (mV peak-to-peak)
Logic Power Supply	5.1	50
Array Power Supplies	5.1 12 (logic)	50 240

Power Requirements

Table B-9. VSM5-VTSS Power Requirements — Single AC Source Power Cable Operation

Number of 16-Drive Arrays	AC Source Voltage In	AC Source Amps (Current) In	kVA	kW	Power Factor	kBTUs Per Hour
2	264V	10.1A	2.7	2.5	0.95	8.6
	208V	12.4A	2.6	2.5	0.98	8.6
	180V	16.2A	2.9	2.9	0.99	9.9
3	264V	13.0A	3.4	3.3	0.95	11.1
	208V	16.0A	3.3	3.3	0.98	11.1
	180V	18.3A	3.3	3.3	0.99	11.1
4	264V	14.5A	3.8	3.6	0.95	12.4
	208V	17.8A	3.7	3.6	0.98	12.4
	180V	20.3A	3.7	3.6	0.99	12.4

Notes:

- Abbreviations key: A = ampere(s); AC = alternating current; kBTUs = thousand British Thermal Units; kVA = kilovolt-amperes; kW = kilowatts

Table B-10. VSM5-VTSS Power Requirements — Dual AC Source Power Cable Operation

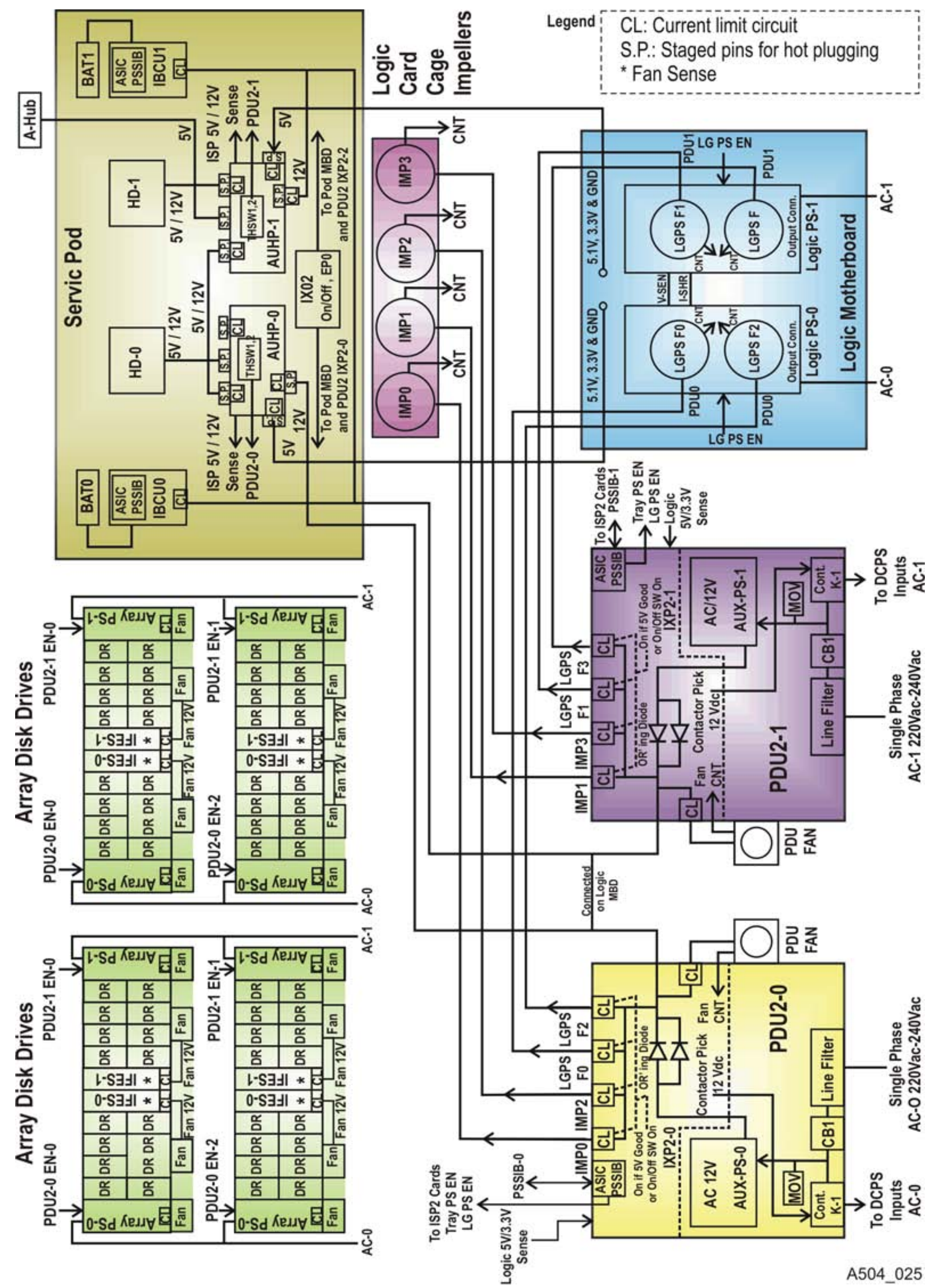
Number of 16-Drive Arrays	AC Source Voltage In	AC Source Amps (Current) In*	kVA	kW	Power Factor	kBTUs Per Hour
2	264V	5.6A	3.0	2.8	0.95	9.6
	208V	6.9A	2.9	2.8	0.98	9.6
	180V	7.9A	2.8	2.8	0.99	9.6
3	264V	6.3A	3.3	3.1	0.95	10.7
	208V	7.7A	3.2	3.1	0.98	10.7
	180V	8.8A	3.2	3.1	0.99	10.7
4	264V	6.9A	3.7	3.5	0.95	11.9
	208V	8.5A	3.5	3.5	0.98	11.9
	180V	9.8A	3.5	3.5	0.99	11.9

Notes:

- * Values are for each line cord; multiply this value by two to obtain the total current for both line cords.
- Abbreviations key: A = ampere(s); AC = alternating current; kBTUs = thousand British Thermal Units; kVA = kilovolt-amperes; kW = kilowatts

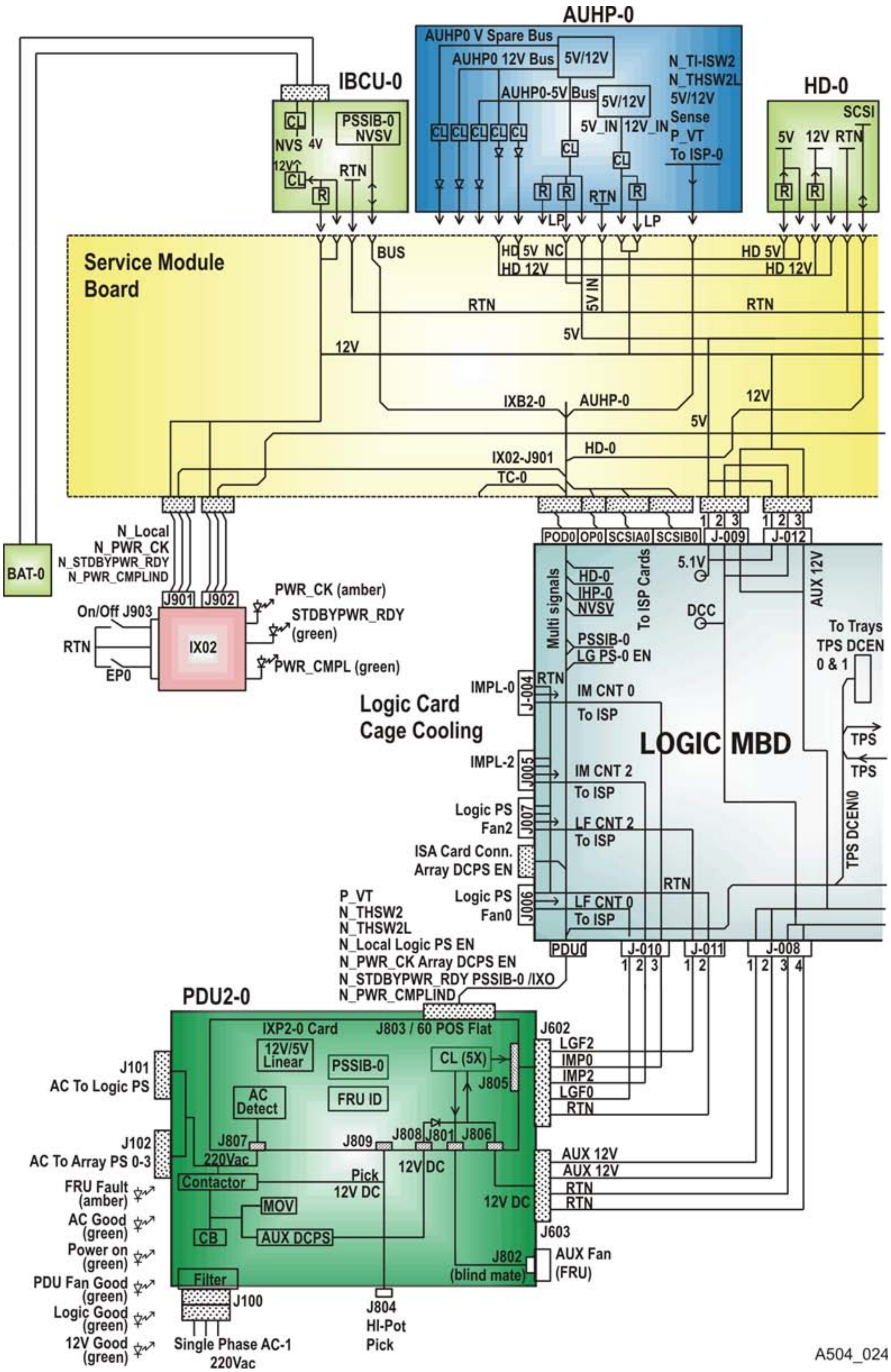
■ Power System Diagram

Figure B-3. VSM5-VTSS Power System Diagram



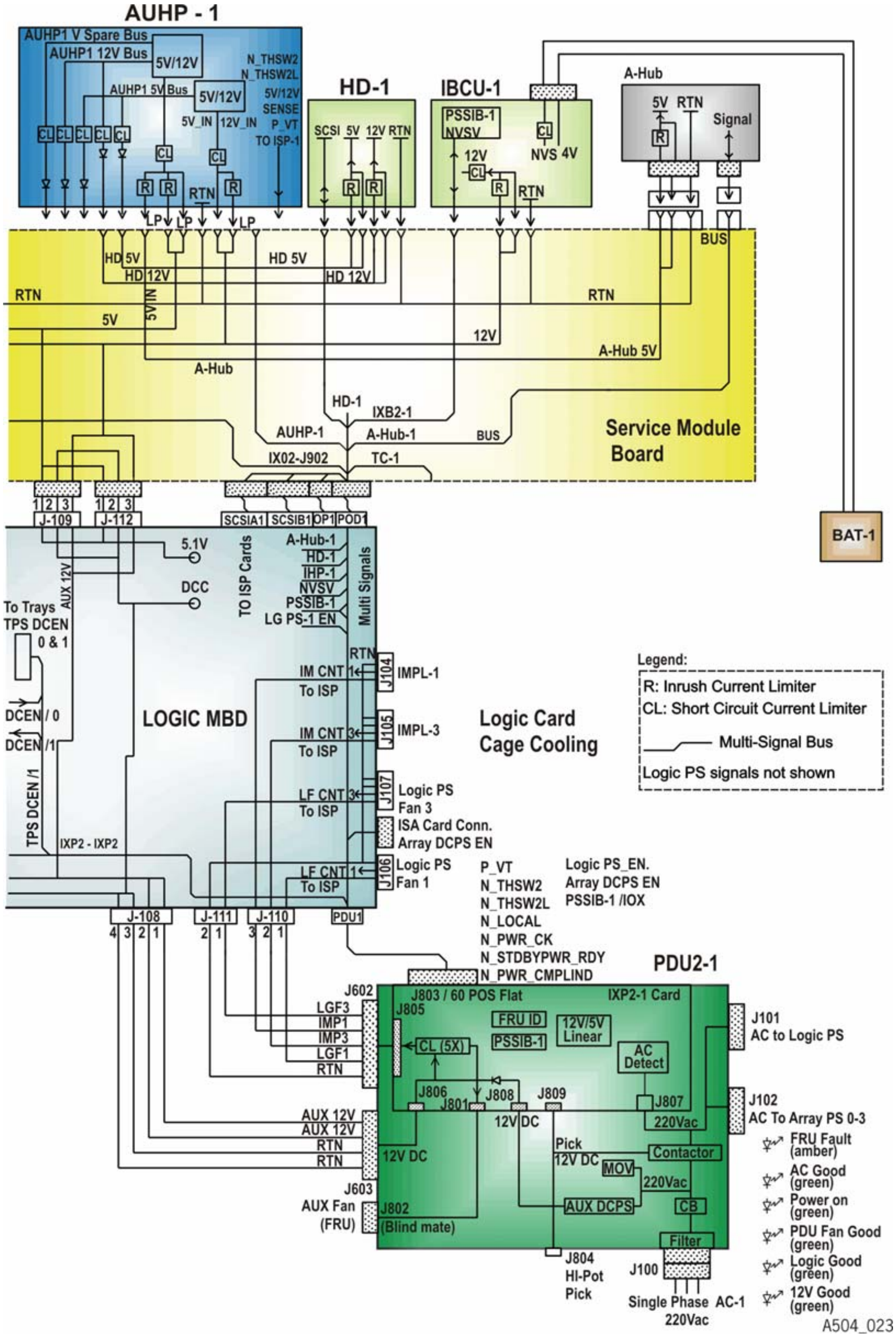
■ Motherboard and FRU Interconnections – Side 0

Figure B-4. VSM5-VTSS Motherboard and FRU Interconnections – Side 0



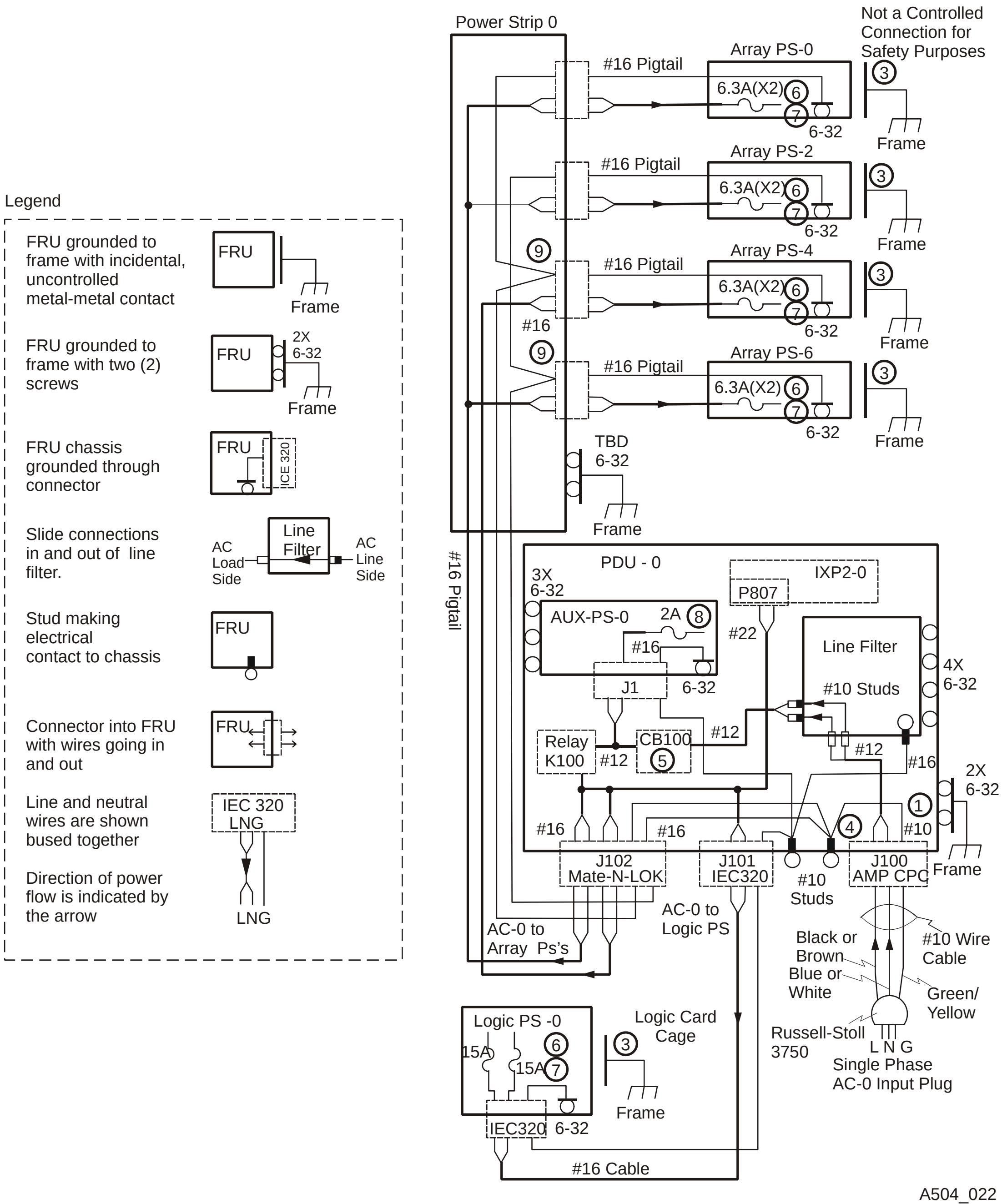
Motherboard and FRU Interconnections – Side 1

Figure B-5. VSM5-VTSS Motherboard and FRU Interconnections – Side 1



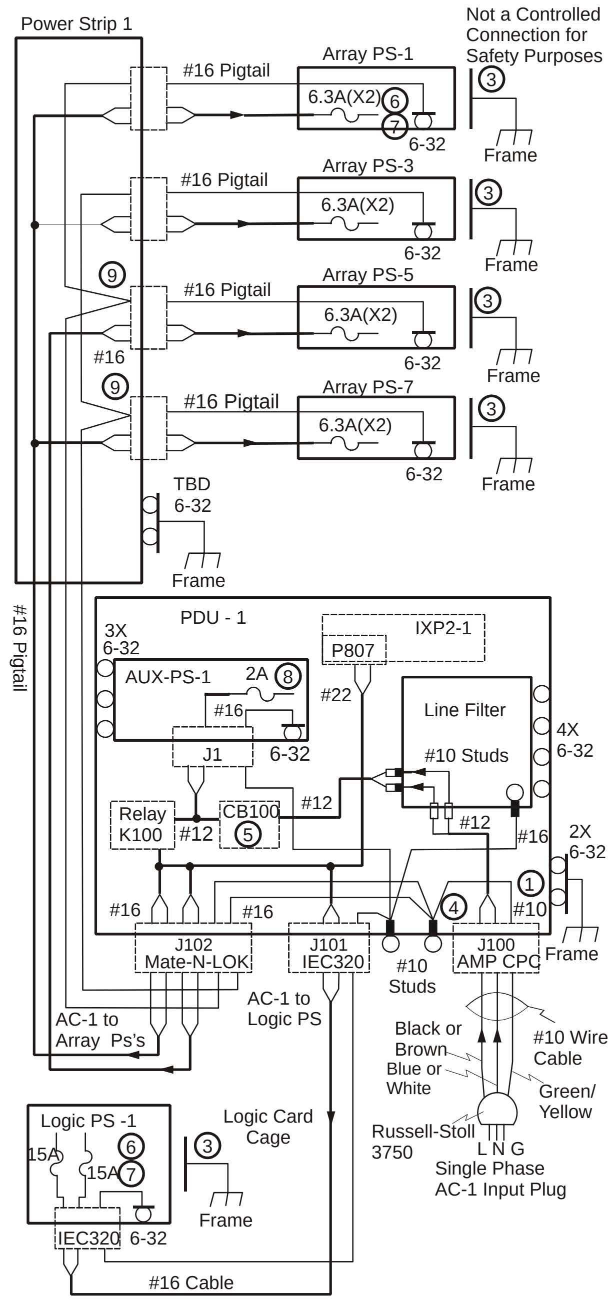
■ Power Safety Grounding Diagram – Side 0

Figure B-6. VSM5-VTSS Power Safety Grounding Diagram – Side 0



Power Safety Grounding Diagram – Side 1

Figure B-7. VSM5-VTSS Power Safety Grounding Diagram – Side 1



Notes

1. The frame connection to the PDU chassis must be made to the same panel that has the grounded stud.
2. The array and logic DPCS's are safety grounded through the input AC connector.
3. There may be metal-metal contact between DCPS chassis and machine frame. Frame which is not controlled and can not serve as a safety ground.
4. On PDU chassis, there is a dedicated nut for incoming ground wire connection to chassis stud.
5. CB100 = 30 rating. TBD delay curve
6. Both phases are fused in logic and array PS's.
7. Logic PS fuse = 3AB, 250V, 15A, standard delay curve
   Array PS fuse = 3AG, 250V, 6.3A, slow-blow delay curve
8. Only one phase is fused in AUX PS.
9. Ground connections to IEC-320 connectors in power strips are double crimped #16 AWG IN 0.250 fast-on tab connectors.

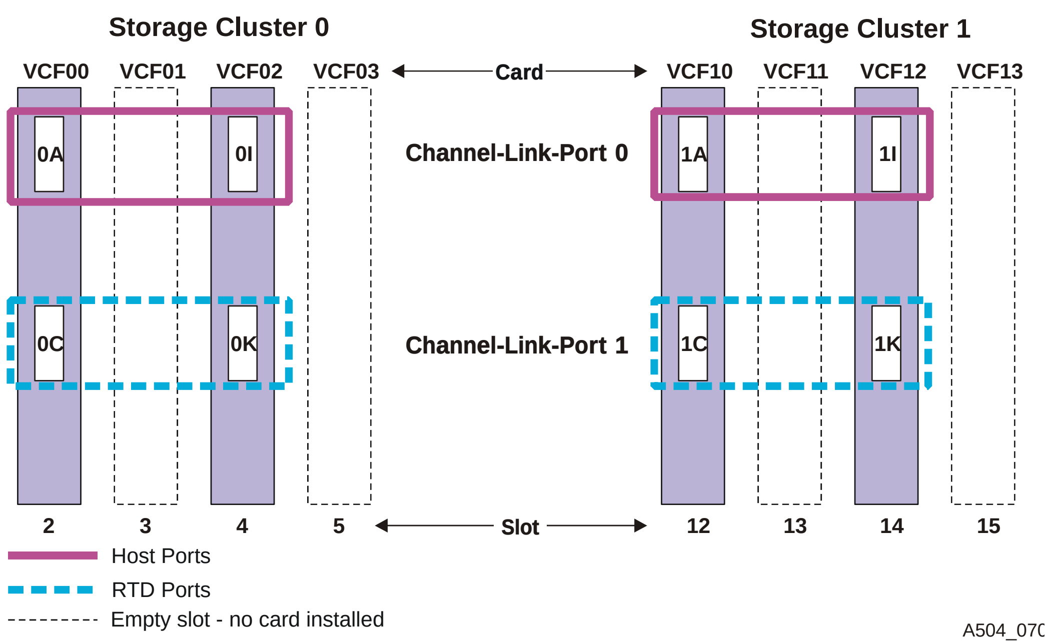
A504_068

VCF3 (FICON) Card Configuration Options

Note: VCF3 (FICON) cards must be installed and removed in pairs. A minimum VSM5-VTSS configuration requires four VCF3 cards. Cards must be removed in reverse order of installation. Although there is no mechanism to restrict or support which slots VCF cards are placed in, configurations other than those shown in Figure B-8 through Figure B-10 will not be supported.

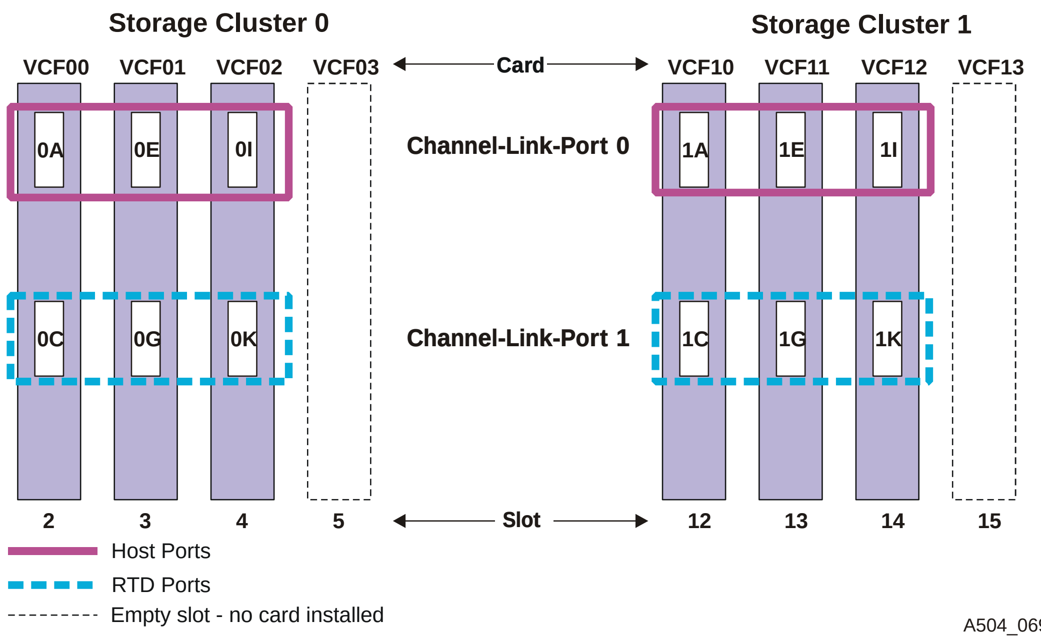
As shown in Figure B-8, the minimum configuration of four VCF cards provides eight physical FICON ports, and each port supports 64 host paths (512 paths total). The first four VCF3 cards must be installed in slots VCF00, VCF02, VCF10, and VCF12.

Figure B-8. FICON Channel Card Configuration – 4 VCF Cards



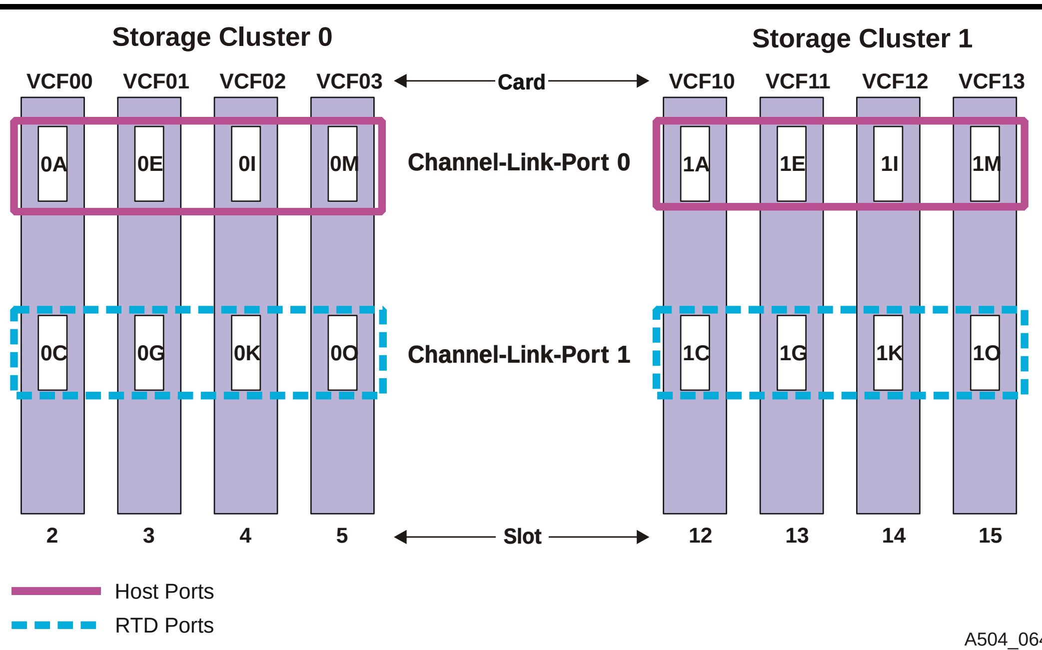
As shown in Figure B-9, six VCF cards provide 12 physical FICON ports, and each port supports 64 host paths (768 paths total). Cards must be installed in the slots shown (i.e., the third VCF3 card pair must be installed in slots VCF01 and VCF11).

Figure B-9. FICON Channel Card Configuration – 6 VCF Cards



As shown in Figure B-10, eight VCF cards provide 16 physical FICON ports, and each port supports 64 host paths (1024 paths total). Cards must be installed in the slots shown (i.e., the third VCF3 card pair must be installed in slots VCF03 and VCF13).

Figure B-10. FICON Channel Card Configuration – 8 VCF Cards



Fibre Channel Cables — Available Lengths

Table B-11. VSM5-VTSS Fibre Channel Cables – Available Lengths

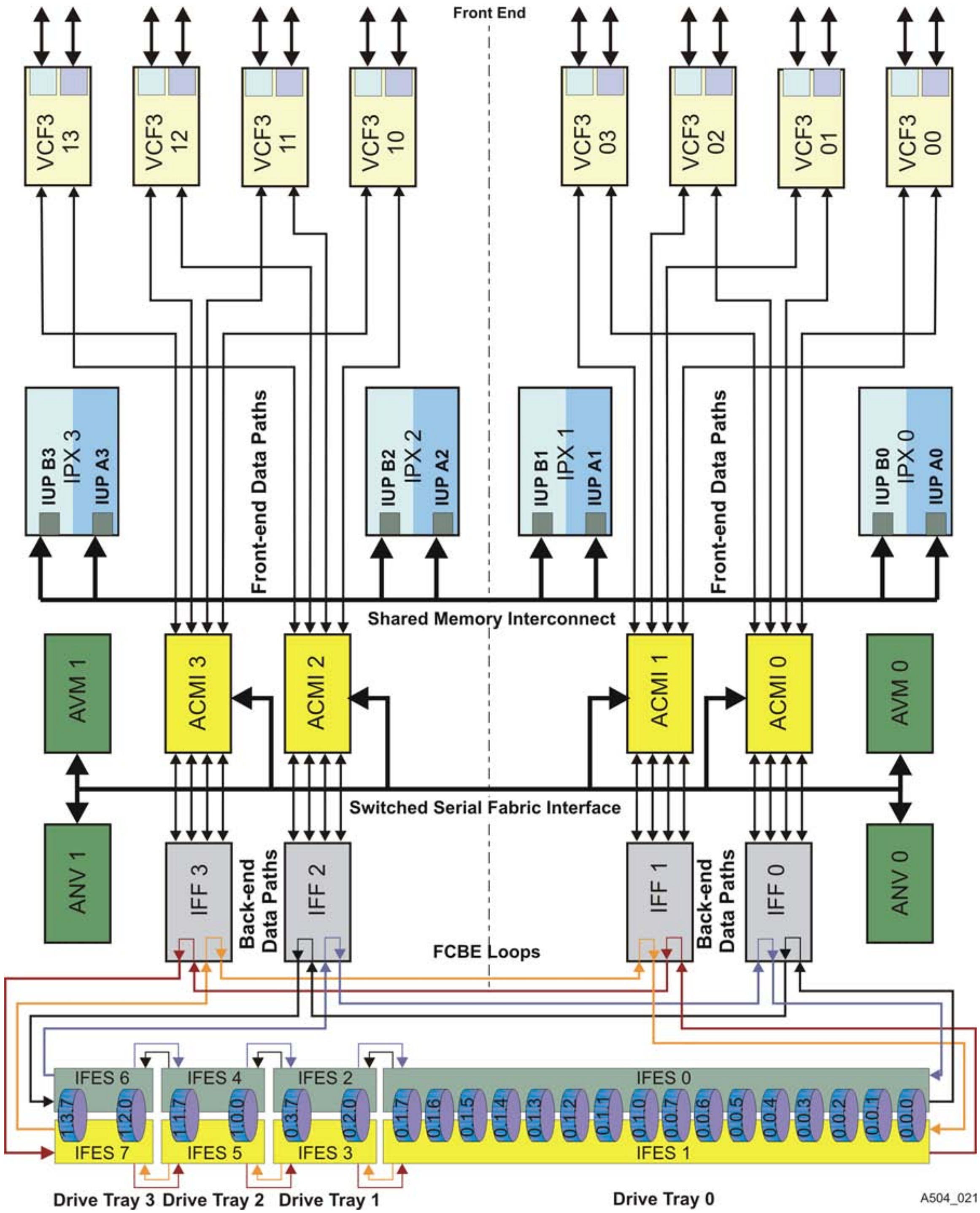
Description / Length	Part Number
LC-LC, 9/125, Duplex, Plenum, 10 meter (32.8 ft.), RoHS-5	10800330
LC-LC, 9/125, Duplex, Riser, 10 meter (32.8 ft.), RoHS-5	10800331
LC-LC, 9/125, Duplex, Plenum, 50 meter (164 ft.), RoHS-5	10800332
LC-LC, 9/125, Duplex, Riser, 50 meter (164 ft.), RoHS-5	10800333
LC-LC, 9/125, Duplex, Plenum, 100 meter (328 ft.), RoHS-5	10800305
LC-LC, 9/125, Duplex, Riser, 100 meter (328 ft.), RoHS-5	10800306
LC-SC, 9/125, Duplex, Plenum, 10 meter (32.8 ft.), RoHS-5	10800334
LC-SC, 9/125, Duplex, Riser, 10 meter (32.8 ft.), RoHS-5	10800335
LC-SC, 9/125, Duplex, Plenum, 50 meter (164 ft.), RoHS-5	10800336
LC-SC, 9/125, Duplex, Riser, 50 meter (164 ft.), RoHS-5	10800337
LC-SC, 9/125, Duplex, Plenum, 100 meter (328 ft.), RoHS-5	10800303
LC-SC, 9/125, Duplex, Riser, 100 meter (328 ft.), RoHS-5	10800304
SC-SC, 50/125, Duplex, Plenum, 10 meter (32.8 ft.), RoHS-5	10800294
SC-SC, 50/125, Duplex, Riser, 10 meter (32.8 ft.), RoHS-5	10800297
SC-SC, 50/125, Duplex, Plenum, 50 meter (164 ft.), RoHS-5	10800295
SC-SC, 50/125, Duplex, Riser, 50 meter (164 ft.), RoHS-5	10800298
SC-SC, 50/125, Duplex, Plenum, 100 meter (328 ft.), RoHS-5	10800296
SC-SC, 50/125, Duplex, Riser, 100 meter (328 ft.), RoHS-5	10800299

Notes:

- Order plenum-rated cables for sites where cables will be routed through HVAC ductwork. Plenum cables have fire-retardant coating to prevent release of toxic gases and smoke in case of fire, so cost more than riser cables.
- Order riser cables for sites where cables will be installed in vertical riser shafts. Riser cables cannot be used in plenum areas unless specifically permitted by local codes. Riser cables provided by Sun are compliant with the standard flame spread test requirements outlined in UL specification 1666.
- When ordering cables, add a ‘service loop’ of at least 4.6 m (15 ft.) of extra cable at each end of the measured VTSS-to-host length to allow the VTSS to be moved as needed for servicing, room reconfigurations, etc. Store extra cabling either on the floor beneath the VTSS or inside the VTSS, but not in an under-floor cable trough. If in doubt as to where locate the loop, contact the data center manager or Sun Technical Support.

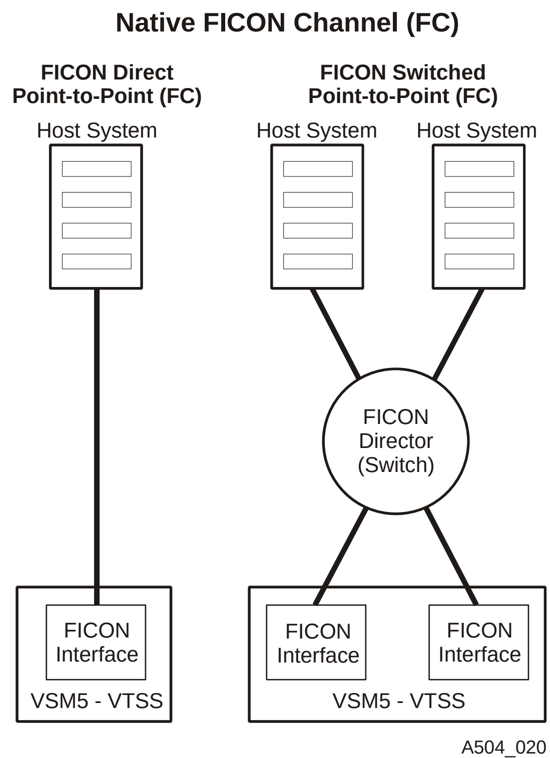
Data Paths and Interfaces

Figure B-11. VSM5-VTSS Data Paths and Interfaces



Native FICON Attachment Options

Figure B-12. Native FICON Attachment Options



Fiber Optic Cable Specifications

Table B-12. Fiber Optic Cable Specifications

Optical Performance	Specification
Attenuation	1.0 dB/km @ 1300 nm
Bandwidth	500 MHz/km @ ≤2 km
Handling Characteristics	**Specification**
Pulling Strength	27.2 kg (60 lbs.)
Crush Resistance	650 Newtons/cm (371 ft-lbs/in^2)
Minimum Bend Radius	96 mm (3.74 in.)
Cable Weight	59.7 kg/100 m (401 lbs./1000 ft.)
Bending Cycles	100 at minimum bend radius
Physical Environment	-16º C to +32º C (3.2º F to 89.6º F)

Note: Abbreviations key: C = centigrade; dB = decibel(s); F = Fahrenheit; ft. = foot / feet; in^2 = inch(es) squared; km = kilometer(s); lb(s). = pound(s); m = meter(s); MHz = megahertz; mm = millimeter(s); nm = nanometer(s)

Sample IOCP Gen for FICON Configuration

Figure B-13. Sample IOCP Gen for FICON Configuration

>> NOTE: The example below shows an IOCP gen for a single MVS host connected to a VSM5 through FICON directors.

```
ESCD4C   CHPID PATH=(20,70), TYPE=FC, SWITCH=4C
ESCD4C   CHPID PATH=(21,71), TYPE=FC, SWITCH=4D
ESCD4C   CHPID PATH=(30,80), TYPE=FC, SWITCH=4E
ESCD4C   CHPID PATH=(31,81), TYPE=FC, SWITCH=4F

CU1      CNTLUNIT CUNUMBER=001
           PATH=(20,21,30,31,70,71,80,81),
           LINK=(D0,D4,D0,D4,D4,D0,D4,D0),
           UNIT=3490,CUADD=0,
           UNITADD=((00,16))

STRING1  IODEVICE ADDRESS=(0500,16),
           CUNUMBER=(001),
           UNIT=3490,
           UNITADD=00,STADET=Y

CU2      CNTLUNIT CUNUMBER=002
           PATH=(20,21,30,31,70,71,80,81),
           LINK=(D0,D4,D0,D4,D4,D0,D4,D0),
           UNIT=3490,CUADD=1,
           UNITADD=((00,16))

STRING2  IODEVICE ADDRESS=(0510,16),
           CUNUMBER=(002),
           UNIT=3490,
           UNITADD=00,STADET=Y

           .
           .
           .

CU15     CNTLUNIT CUNUMBER=015
           PATH=(20,21,30,31,70,71,80,81),
           LINK=(D0,D4,D0,D4,D4,D0,D4,D0),
           UNIT=3490,CUADD=E,
           UNITADD=((00,16))

STRING15 IODEVICE ADDRESS=(05E0,16),
           CUNUMBER=(015),
           UNIT=3490,
           UNITADD=00,STADET=Y

CU16     CNTLUNIT CUNUMBER=016
           PATH=(20,21,30,31,70,71,80,81),
           LINK=(D0,D4,D0,D4,D4,D0,D4,D0),
           UNIT=3490,CUADD=F,
           UNITADD=((00,16))

STRING16 IODEVICE ADDRESS=(05F0,16),
           CUNUMBER=(016),
           UNIT=3490,
           UNITADD=00,STADET=Y
```

Virtual Tape Drive Mapping and Host Addressing

A VSM5-VTSS can be configured with up to 256 virtual tape drives (VTDs). During VTSS installation, all 256 available VTDs are mapped as shown in Table B-13 below. Mapping of all available VTDs is required by VTSS microcode, and applies whether the VTDs are ultimately defined or undefined.

Table B-13. Mapping Parameters for 256 Virtual Tape Drives (VTDs)

Sequential Device Numbers	Parameters	Sequential Device Numbers	Parameters
0 - 15	VCU0 DEV 0-255 FDID 00-0F CUADD=0	128 -143	VCU8 DEV 0-255 FDID 80-8F CUADD=8
16 - 31	VCU1 DEV 0-255 FDID 10-1F CUADD=1	144 -159	VCU9 DEV 0-255 FDID 90-9F CUADD=9
32 - 47	VCU2 DEV 0-255 FDID 20-2F CUADD=2	160 -175	VCUA DEV 0-255 FDID A0-AF CUADD=A
48 - 63	VCU3 DEV 0-255 FDID 30-3F CUADD=3	176 -191	VCUB DEV 0-255 FDID B0-BF CUADD=B
64 -79	VCU4 DEV 0-255 FDID 40-4F CUADD=4	192 -207	VCUC DEV 0-255 FDID C0-CF CUADD=C
80 -95	VCU5 DEV 0-255 FDID 50-5F CUADD=5	208 -223	VCUD DEV 0-255 FDID D0-DF CUADD=D
96 -111	VCU6 DEV 0-255 FDID 60-6F CUADD=6	224 -239	VCUE DEV 0-255 FDID E0-EF CUADD=E
112 -127	VCU7 DEV 0-255 FDID 70-7F CUADD=7	240 -255	VCUF DEV 0-255 FDID F0-FF CUADD=F

VShell Command Reference

Table B-14. VShell Command Reference

Command	Meaning / Description
Status avail	Displays *Subsystem Availability* screen, Figure C-8 on page C-190
Status subsystem	Displays *Subsystem Configuration and Status* screen, Figure C-9 on page C-191
Status cfes	Lists current Composite Failure Events (CFEs)
Status ispdrive	Lists status of ISP hard drives and shown which SRL are preloaded
Status adrives prod	Lists all HDAs assigned in production arrays
Status adrives spares	Lists all HDAs assigned as global spares
Status adrives unavail	Lists all HDAs unavailable for use (including U.B.—unavailable broken)
Status interfaces	Displays *Subsystem Interface Status* screen, Figure C-19 on page C-201
Status channels	Displays *Channel Configuration Status* screen, Figure C-38 on page C-220)
Ecu	Preloads EC upgrade microcode
Hicstat $	Displays and downloads hic_stat.dia file to a selected current drive
Realtime	Lists DOP Status field messages in real time; useful for monitoring system IML
Showsrl	Lists the system release level (SRL) that is currently running on the VTSS
State <*name*>	Downloads the named state save file to a selected current drive
Allstate $	Downloads all state saves and associated files to a selected current drive
Help	Displays online help file for all commands; click [Enter] to close
Help <*command*>	Displays online help file with information about the named command

FRU Identifiers

Table B-15. VSM5-VTSS FRU Identifiers

Physical Location	FRU Common Name	FRU Silkscreen	FRU Number (Hex)	FRU Number (Decimal)	FRU Location ID (Unit.Tray.Slot)
Power Distribution Units					
CU Front Tray 0	Power Distribution Unit 0	PDU2-O	4E	78	CU.0.PDU0
CU Front Tray 0	Power Distribution Unit 1	PDU2-1	4F	79	CU.0.PDU1
Inside PDU0	PDU0 Internal Fan	FAN 0	3C1	961	CU.0.FAN0
Inside PDU1	PDU1 Internal Fan	FAN 1	3C2	962	CU.0.FAN0
Maintenance Pod					
CU MPOD Tray	Battery Charger Unit 0	IBCU-0	4C	76	CU.3.BCU0
CU MPOD Tray	Battery Charger Unit 1	IBCU-1	4D	77	CU.3.BCU1
CU MPOD Tray	ISP Hard Drive 0	HD2-0	384	900	CU.3.HD0
CU MPOD Tray	ISP Hard Drive 1	HD2-1	385	901	CU.3.HD1
CU MPOD Tray	5v/12v Power Supply 0	AUHP-0	388	904	CU.3.AUHP0
CU MPOD Tray	5v/12v Power Supply 0	AUHP-1	389	905	CU.3.AUHP1
CU MPOD Tray	A-Hub Card Faceplate Assembly	??	386	902	CU.3.???
CU MPOD Tray	Battery Pack 0	BAT-0	394	916	CU.3.BAT0
CU MPOD Tray	Battery Pack 1	BAT-1	395	917	CU.3.BAT1
CU Front Tray 3	Power Control Panel	PPNL	387	903	CU.3.PPNL
DC Power Supplies					
CU Rear Tray 1	Logic Power Supply 0	LPS2-0	1A	26	CU.1.LPS0
CU Rear Tray 1	Logic Power Supply 1	LPS2-1	1B	27	CU.1.LPS1
DA Rear Tray 0	Array Power Supply 0	APS-0	94	148	DA.0.APS
DA Rear Tray 1	Array Power Supply 1	APS-1	95	149	DA.1.APS
DA Rear Tray 2	Array Power Supply 2	APS-2	A8	168	DA.2.APS
DA Rear Tray 3	Array Power Supply 3	APS-3	A9	169	DA.3.APS
DA Rear Tray 4	Array Power Supply 4	APS-4	F8	248	DA.4.APS
DA Rear Tray 5	Array Power Supply 5	APS-5	F9	249	DA.5.APS
DA Rear Tray 6	Array Power Supply 6	APS-6	10C	268	DA.6.APS
DA Rear Tray 7	Array Power Supply 7	APS-7	10D	269	DA.7.APS

Table B-15. VSM5-VTSS FRU Identifiers (continued)

Physical Location	FRU Common Name	FRU Silkscreen	FRU Number (Hex)	FRU Number (Decimal)	FRU Location ID (Unit.Tray.Slot)
Logic Motherboard and Cards					
CU Rear	CU Motherboard	ACMB	1C	28	CU.1.ACMB
CU Front Tray1	VCF3 Card 0	VCF00	5	5	CU.1.VCF00
CU Front Tray1	VCF3 Card 1	VCF01	6	6	CU.1.VCF01
CU Front Tray1	VCF3 Card 2	VCF02	8	8	CU.1.VCF02
CU Front Tray1	VCF3 Card 3	VCF03	9	9	CU.1.VCF03
CU Front Tray1	VCF3 Card 4	VCF10	16	22	CU.1.VCF10
CU Front Tray1	VCF3 Card 5	VCF11	15	21	CU.1.VCF11
CU Front Tray1	VCF3 Card 6	VCF12	13	19	CU.1.VCF12
CU Front Tray1	VCF3 Card 7	VCF13	12	18	CU.1.VCF13
CU Front Tray1	IPX5 Card 0	IPX0	1	1	CU.1.IPX0
CU Front Tray1	IPX5 Card 1	IPX1	B	11	CU.1.IPX1
CU Front Tray1	IPX5 Card 2	IPX2	E	14	CU.1.IPX2
CU Front Tray1	IPX5 Card 3	IPX3	18	24	CU.1.IPX3
CU Front Tray1	ISP3A Card 0	ISP0	1F	31	CU.1.ISP0
CU Front Tray1	ISP3A Card 1	ISP1	20	32	CU.1.ISP1
CU Rear Tray 1	ISP Clock Battery	PB-0	398	920	CU.1.PB0
CU Rear Tray 1	ISP Clock Battery	PB-1	399	921	CU.1.PB1
CU Front Tray 2	IFF2 Card 0	IFF0	2B	43	CU.2.IFF0
CU Front Tray 2	IFF2 Card 1	IFF1	29	41	CU.2.IFF1
CU Front Tray 2	IFF2 Card 2	IFF2	36	54	CU.2.IFF2
CU Front Tray 2	IFF2 Card 3	IFF3	34	52	CU.2.IFF3
CU Front Tray 2	ACMI3 Card 0	ACMI0	2C	44	CU.2.ACMI0
CU Front Tray 2	ACMI3 Card 1	ACMI1	28	40	CU.2.ACMI1
CU Front Tray 2	ACMI3 Card 2	ACMI2	37	55	CU.2.ACMI2
CU Front Tray 2	ACMI3 Card 3	ACMI3	33	51	CU.2.ACMI3
CU Front Tray 2	ANV3 Card 0	ANV0	25	37	CU.2.ANV0
CU Front Tray 2	ANV3 Card 1	ANV1	26	38	CU.2.ANV1
CU Front Tray 2	AVM4 or AVM16 Card 0	AVM0	23	35	CU.2.AVM0
CU Front Tray 2	AVM4 or AVM16 Card 1	AVM1	24	36	CU.2.AVM1
CU Rear	CU Frame	FRM	1D	29	CU.1.FRM

Table B-15. VSM5-VTSS FRU Identifiers (continued)

Physical Location	FRU Common Name	FRU Silkscreen	FRU Number (Hex)	FRU Number (Decimal)	FRU Location ID (Unit.Tray.Slot)
Logic Power Supply Fans					
CU Rear Tray 1	LPS0 Fan 0	FAN-0	3BD	957	CU.1.FAN0
CU Rear Tray 1	LPS0 Fan 1	FAN-1	3BE	958	CU.1.FAN1
CU Rear Tray 1	LPS1 Fan 0	FAN-2	3BF	959	CU.1.FAN2
CU Rear Tray 1	LPS1 Fan 1	FAN-3	3C0	960	CU.1.FAN3
Logic Card Cage Impellers					
CU Rear Tray 2	Card Cage Impeller 0	IMP0	38A	906	CU.2.IMP0
CU Rear Tray 2	Card Cage Impeller 1	IMP1	38B	907	CU.2.IMP1
CU Rear Tray 2	Card Cage Impeller 2	IMP2	38C	908	CU.2.IMP2
CU Rear Tray 2	Card Cage Impeller 3	IMP3	38D	909	CU.2.IMP3
Physical Array Disk Drive Tray 0					
DA Rear Physical Drive Tray 0 (Logical Tray DA0.0)	Array Drive Module 0	DRV0	8C	140	DA.0.DRV0
	Array Drive Module 1	DRV1	8D	141	DA.0.DRV1
	Array Drive Module 2	DRV2	8E	142	DA.0.DRV2
	Array Drive Module 3	DRV3	8F	143	DA.0.DRV3
	Array Drive Module 4	DRV4	90	144	DA.0.DRV4
	Array Drive Module 5	DRV5	91	145	DA.0.DRV5
	Array Drive Module 6	DRV6	92	146	DA.0.DRV6
	Array Drive Module 7	DRV7	93	147	DA.0.DRV7
DA Rear Tray 0	Drive Tray 0 Fan	FAN-0	44C	1100	DA.0.FAN
DA Front Tray 0	Tray Interface Monitor	IFES 0	51	81	DA.0.IFES
Physical Array Disk Drive Tray 1					
DA Rear Physical Drive Tray 1 (Logical Tray DA0.1)	Array Drive Module 0	DRV0	96	150	DA.1.DRV0
	Array Drive Module 1	DRV1	97	151	DA.1.DRV1
	Array Drive Module 2	DRV2	98	152	DA.1.DRV2
	Array Drive Module 3	DRV3	99	153	DA.1.DRV3
	Array Drive Module 4	DRV4	9A	154	DA.1.DRV4
	Array Drive Module 5	DRV5	9B	155	DA.1.DRV5
	Array Drive Module 6	DRV6	9C	156	DA.1.DRV6
	Array Drive Module 7	DRV7	9D	157	DA.1.DRV7
DA Rear Tray 1	Drive Tray 1 Fan	FAN-1	44D	1101	DA.1.FAN
DA Front Tray 1	Tray Interface Monitor	IFES 1	52	82	DA.1.IFES

Table B-15. VSM5-VTSS FRU Identifiers (continued)

Physical Location	FRU Common Name	FRU Silkscreen	FRU Number (Hex)	FRU Number (Decimal)	FRU Location ID (Unit.Tray.Slot)
Physical Array Disk Drive Tray 2					
DA Rear Physical Drive Tray 2 (Logical Tray DA0.2)	Array Drive Module 0	DRV0	A0	160	DA.2.DRV0
	Array Drive Module 1	DRV1	A1	161	DA.2.DRV1
	Array Drive Module 2	DRV2	A2	162	DA.2.DRV2
	Array Drive Module 3	DRV3	A3	163	DA.2.DRV3
	Array Drive Module 4	DRV4	A4	164	DA.2.DRV4
	Array Drive Module 5	DRV5	A5	165	DA.2.DRV5
	Array Drive Module 6	DRV6	A6	166	DA.2.DRV6
	Array Drive Module 7	DRV7	A7	167	DA.2.DRV7
DA Rear Tray 2	Drive Tray 2 Fan	FAN-2	44E	1102	DA.2.FAN
DA Front Tray 2	Tray Interface Monitor	IFES 2	55	85	DA.2.IFES
Physical Array Disk Drive Tray 3					
DA Rear Physical Drive Tray 3 (Logical Tray DA0.3)	Array Drive Module 0	DRV0	AA	170	DA.3.DRV0
	Array Drive Module 1	DRV1	AB	171	DA.3.DRV1
	Array Drive Module 2	DRV2	AC	172	DA.3.DRV2
	Array Drive Module 3	DRV3	AD	173	DA.3.DRV3
	Array Drive Module 4	DRV4	AE	174	DA.3.DRV4
	Array Drive Module 5	DRV5	AF	175	DA.3.DRV5
	Array Drive Module 6	DRV6	B0	176	DA.3.DRV6
	Array Drive Module 7	DRV7	B1	177	DA.3.DRV7
DA Rear Tray 3	Drive Tray 3 Fan	FAN-3	44F	1103	DA.3.FAN
DA Front Tray 3	Tray Interface Monitor	IFES 3	56	86	DA.3.IFES
Physical Array Disk Drive Tray 4					
DA Rear Physical Drive Tray 4 (Logical Tray DC0.0)	Array Drive Module 0	DRV0	F0	240	DA.4.DRV0
	Array Drive Module 1	DRV1	F1	241	DA.4.DRV1
	Array Drive Module 2	DRV2	F2	242	DA.4.DRV2
	Array Drive Module 3	DRV3	F3	243	DA.4.DRV3
	Array Drive Module 4	DRV4	F4	244	DA.4.DRV4
	Array Drive Module 5	DRV5	F5	245	DA.4.DRV5
	Array Drive Module 6	DRV6	F6	246	DA.4.DRV6
	Array Drive Module 7	DRV7	F7	247	DA.4.DRV7
DA Rear Tray 4	Drive Tray 4 Fan	FAN-4	450	1104	DA.4.FAN
DA Front Tray 4	Tray Interface Monitor	IFES 4	53	83	DA.4.IFES

Table B-15. VSM5-VTSS FRU Identifiers (continued)

Physical Location	FRU Common Name	FRU Silkscreen	FRU Number (Hex)	FRU Number (Decimal)	FRU Location ID (Unit.Tray.Slot)
Physical Array Disk Drive Tray 5					
DA Rear Physical Drive Tray 5 (Logical Tray DC0.1)	Array Drive Module 0	DRV0	FA	250	DA.5.DRV0
	Array Drive Module 1	DRV1	FB	251	DA.5.DRV1
	Array Drive Module 2	DRV2	FC	252	DA.5.DRV2
	Array Drive Module 3	DRV3	FD	253	DA.5.DRV3
	Array Drive Module 4	DRV4	FE	254	DA.5.DRV4
	Array Drive Module 5	DRV5	FF	255	DA.5.DRV5
	Array Drive Module 6	DRV6	100	256	DA.5.DRV6
	Array Drive Module 7	DRV7	101	257	DA.5.DRV7
DA Rear Tray 5	Drive Tray 5 Fan	FAN-5	451	1105	DA.5.FAN
DA Front Tray 5	Tray Interface Monitor	IFES 5	54	84	DA.5.IFES
Physical Array Disk Drive Tray 6					
DA Rear Physical Drive Tray 6 (Logical Tray DC0.2)	Array Drive Module 0	DRV0	104	260	DA.6.DRV0
	Array Drive Module 1	DRV1	105	261	DA.6.DRV1
	Array Drive Module 2	DRV2	106	262	DA.6.DRV2
	Array Drive Module 3	DRV3	107	263	DA.6.DRV3
	Array Drive Module 4	DRV4	108	264	DA.6.DRV4
	Array Drive Module 5	DRV5	109	265	DA.6.DRV5
	Array Drive Module 6	DRV6	10A	266	DA.6.DRV6
	Array Drive Module 7	DRV7	10B	267	DA.6.DRV7
DA Rear Tray 6	Drive Tray 6 Fan	FAN-6	452	1106	DA.6.FAN
DA Front Tray 6	Tray Interface Monitor	IFES 6	57	87	DA.6.IFES
Physical Array Disk Drive Tray 7					
DA Rear Physical Drive Tray 7 (Logical Tray DC0.3)	Array Drive Module 0	DRV0	10E	270	DA.7.DRV0
	Array Drive Module 1	DRV1	10F	271	DA.7.DRV1
	Array Drive Module 2	DRV2	110	272	DA.7.DRV2
	Array Drive Module 3	DRV3	111	273	DA.7.DRV3
	Array Drive Module 4	DRV4	112	274	DA.7.DRV4
	Array Drive Module 5	DRV5	113	275	DA.7.DRV5
	Array Drive Module 6	DRV6	114	276	DA.7.DRV6
	Array Drive Module 7	DRV7	115	277	DA.7.DRV7
DA Rear Tray 7	Drive Tray 7 Fan	FAN-7	453	1107	DA.7.FAN
DA Front Tray 7	Tray Interface Monitor	IFES 7	58	88	DA.7.IFES

Array Disk Drive Module Status Descriptions

Figure B-14 shows the various array disk drive module states and relationships.The *Disk Drive / Array Status* screen (Figure C-17 on page C-199) displays the status of each VTSS array drive as a two-character code. The first character defines the partition a specific drive is associated with; the second charachter defines the current state of the drive. For example, a status of ‘P.A’ indicates that a drive is in production partition (‘P’) and active (‘A’). The four types of drive partitions are:

- Production Partition (P) – contains drives that are usable for storing and retrieving production data
- Media Acceptance Test Partition (M) – a holding partition; contains drives that can be assigned to the spares partition
- Spares Partition (S) – a holding partition; contains drives that can be used primarily for three functions: array formation; drive reconstruction; and draining an array, an entire array unit, an entire drive tray, or a single drive.
- Unavailable Partition (U) – any slot or drive not under control of the user, including slots that do not have an array drive installed, slots that contain array drives but are not active, and slots that contain broken array drives.

Figure B-14. Array Drive Module States and Relationships

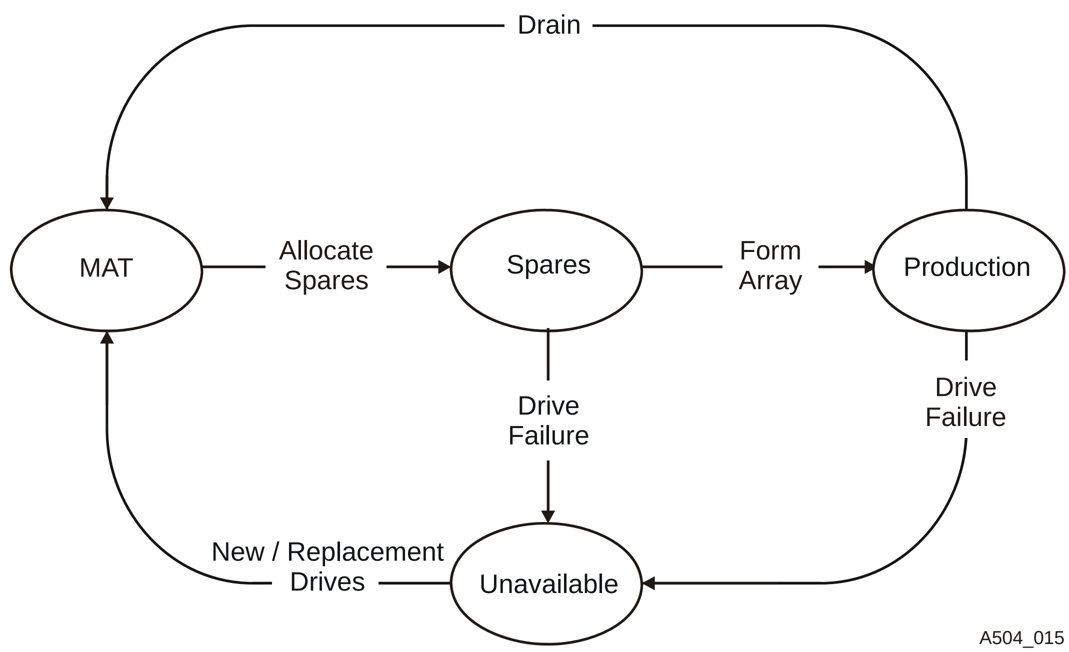


Table B-16. Array Disk Drive Module Status Descriptions

Drive Module Status	Status Code	Meaning/Description
Production Partition		
Production: Active	P.A (PA)	Drive is active.
Production: Broken	P.B (PB)	Drive is inactive and marked as broken. After its data is moved to a spare, broken drive is removed from Production partition and put in ‘Unavailable: Broken’ (U.B) state.
Production: Copy	P.C (PC)	Drive is receiving data from drain of Production drive.
Production: Draining	P.D (PD)	Drive is being drained.
Production: Initialize Array	P.I (PI)	Drive is part of array initialization process.
Production: Pending Drain	P.P (PP)	Drive is awaiting drain, but drain cannot start because: • Broken-to-spare data reconstruction is in progress • Another drive in the array is being drained • The number of spares is inadequate (occurs if number of spares was reduced after drain request was accepted).
Production: Reconstruction	P.R (PR)	Data from broken drive is being reconstructed on spare drive, which moves to ‘P.A’ state when reconstruction finishes.
Production: Unknown Drive State	P.? (P?)	Drive is broken but cause is unknown. Usually means data is being reconstructed to a spare, but may indicate other unknown state. After its data is moved, the broken drive moves from the Production partition to an ‘Unavailable: Broken’ (U.B) state.
Media Acceptance Test (MAT) Partition		
MAT: Active	M.A (MA)	Drive is active and available for allocation as a spare.
MAT: Fenced	M.F (MF)	Drive is fenced because GFR function is in progress.
MAT: Drive Not Ready	M.? (M?)	Drive is not active due to diagnostic error. After failure is isolated, broken drive is removed from MAT partition and put in ‘Unavailable: Broken’ (U.B) state.
Spares Partition		
Spare: Active	S.A (SA)	Drive is available to form arrays, reconstruct data, or receive data from drain operation.
Spare: Fenced	S.F (SF)	Drive is fenced for drive test.
Spare: Pending Drain	S.P (SP)	Drive is awaiting drain pending completion of drive test.
Spare: Drive Failure	S.? (S?)	Drive is not active for unknown reason (possible failure). After failure is isolated, broken drive is removed from Spares partition and put in ‘Unavailable: Broken’ (U.B) state.
Unavailable Partition		
Unavailable: Broken	U.B (UB)	Drive is broken.
Unavailable: Isolated	U.I (UI)	Drive is isolated from the SSA loop configuration.
Unavailable: No Active Drive Module	U.N (UN)	No active drive is sensed in this slot.
Unavailable: Slot Not Installed	U.S (US)	No drive is installed in this slot.

Operator Panel Screens

C

This appendix displays representative sample images of VSM5-VTSS detached operator panel GUI screens in these categories:

- "General Access / System Status Screens" on page C-180
- "Customer-Level Screens" on page C-186
- "CSE-Level Screens" on page C-188
- "VIP-Level Screens" on page C-258.

Certain general access/system status screens, customer-level screens, and VIP-level screens are informationally and functionally equivalent to corresponding CSE-level screens. To avoid duplication of screen images in such instances, only the CSE-level screens will be shown in this appendix, and notations will be made in place of duplicate screens to refer you to those equivalent CSE-level screens.

■ General Access / System Status Screens

General access / system status screens provide access to a range of general VTSS availability, configuration, and status information and—after valid passwords are entered on the *Main Menu / Login* screen, Figure C-2 on page C-181—to additional customer-level, CSE-level, and VIP-level screens and functionality.

SVA / VSM Op-Panel Connect Screen

To access the *SVA / VSM Op-Panel Connect* screen, click the Internet Explorer icon on your desktop, key in the URL localhost in the Address window, then press [Enter].

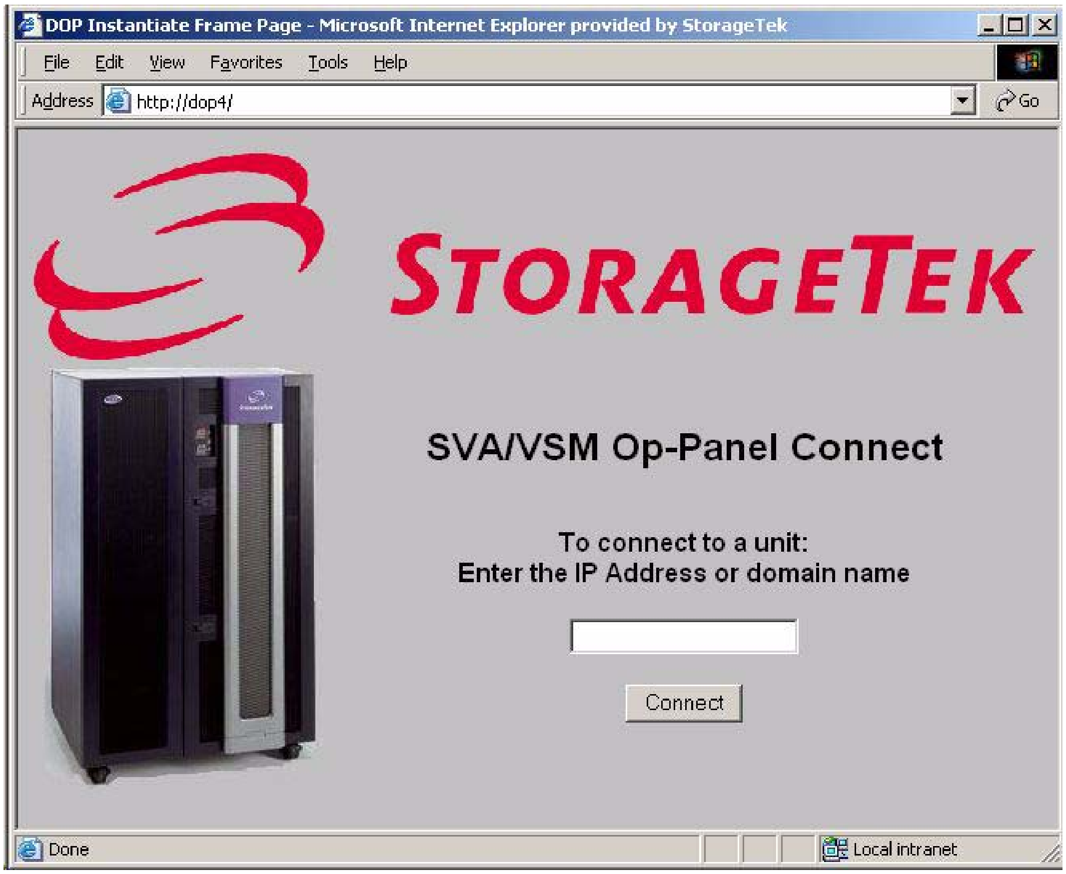


Figure C-1. VSM Operator Panel Connection Screen

Main Menu / Login Screen

To access the *Main Menu / Login* screen, key in the VTSS default IP address (129.80.60.242)[1] into the data entry field of the *SVA / VSM Op-Panel Connect* screen, Figure C-1 on page C-180, then click Connect.

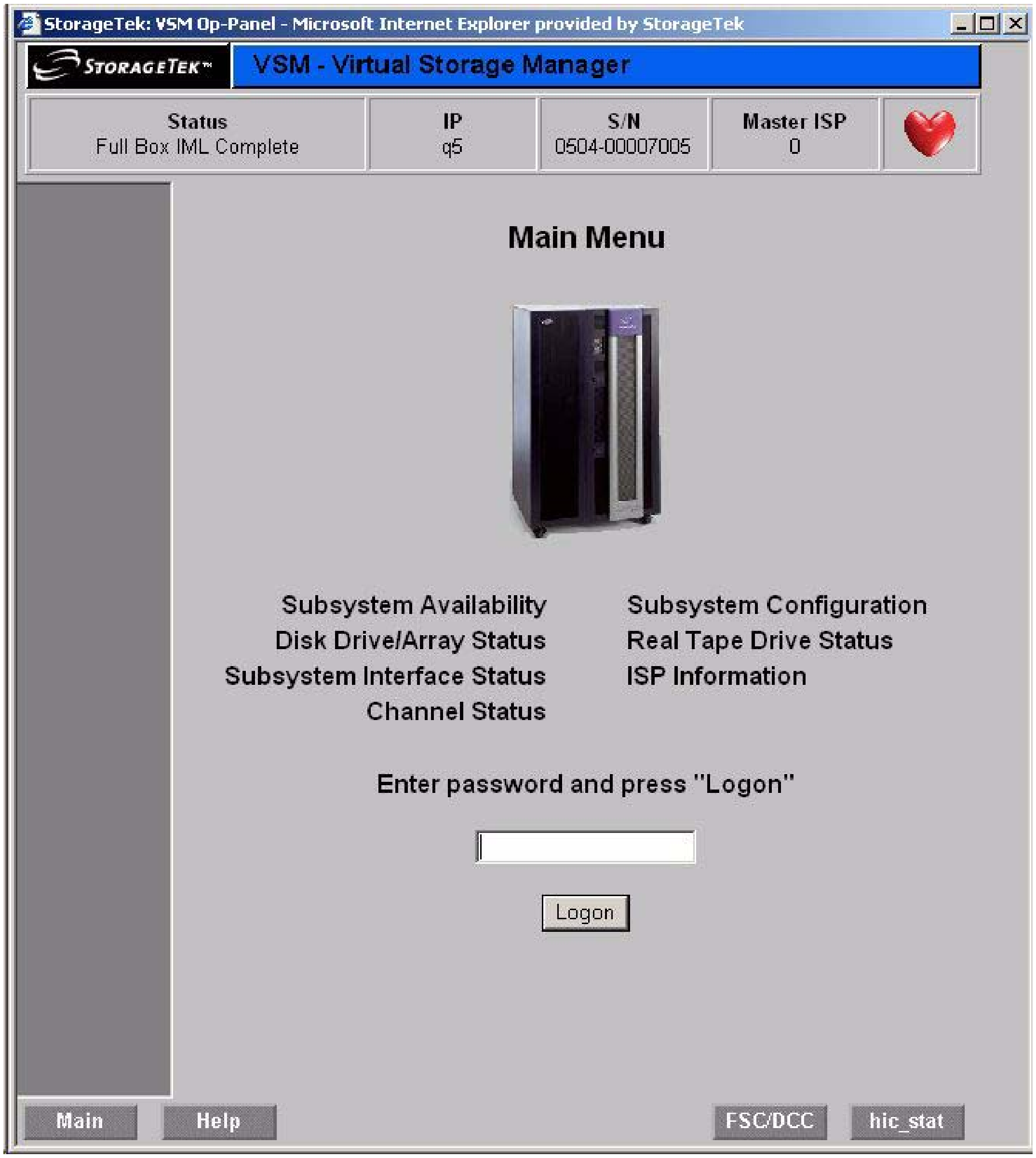


Figure C-2. Main Menu / Login Screen

1. This address can be changed as needed on the *Ethernet Setup* screen, Figure C-33 on page C-215.

At the *Main Menu / Login* screen, type a customer password (A*******; default A0022222) or a CSE password (B*******; default B0022222) in the data entry field, then click Logon to access customer-level or CSE-level screens with additional functionality. Click any of the seven text fields shown onscreen to display the following subscreens, which provide detailed information on subsystem availability, configuration, and status:

- "Subsystem Availability Screen" (below)
- "Subsystem Configuration and Status Screen" (below)
- "Disk Drive / Array Status Screen" (below)
- "Real Tape Drive Status Screen" on page C-183
- "Subsystem Interface Status Screen" on page C-183
- "ISP Information Screen" on page C-183
- "Channel Configuration Status Screen" on page C-183

Subsystem Availability Screen

The general-access *Subsystem Availability* screen is informationally and functionally equivalent to the CSE-level *Subsystem Availability* screen, Figure C-8 on page C-190, so is not depicted in this appendix. To display the general-access *Subsystem Availability* screen, click the active Subsystem Availability text field on the *Main Menu / Login* screen, Figure C-2 on page C-181.

Subsystem Configuration and Status Screen

The general-access *Subsystem Configuration and Status* screen is informationally and functionally equivalent to the CSE-level *Subsystem Configuration and Status* screen, Figure C-9 on page C-191, so is not depicted in this appendix. To display the general-access *Subsystem Configuration and Status* screen, click the active Subsystem Configuration text field on the *Main Menu / Login* screen, Figure C-2 on page C-181.

Disk Drive / Array Status Screen

The general-access *Disk Drive / Array Status* screen is informationally (but not functionally) equivalent to the CSE-level *Disk Drive / Array Status* screen, Figure C-17 on page C-199, so is not depicted in this appendix. The primary difference between the screens is that the CSE-level screen allows you to form disk arrays. To display the general-access *Disk Drive / Array Status* screen, click the active Disk Drive / Array Status text field on the *Main Menu / Login* screen, Figure C-2 on page C-181.

Real Tape Drive Status Screen

The general-access *Real Tape Drive Status* screen is informationally (but not functionally) equivalent to the CSE-level *Real Tape Drive Status* screen, Figure C-40 on page C-222, so is not depicted in this appendix. The primary difference between the screens is that the CSE-level screen provides capability for validating and unconfiguring real tape drives. To display the general-access *Real Tape Drive Status* screen, click the active Real Tape Drive Status text field on the *Main Menu / Login* screen, Figure C-2 on page C-181.

Subsystem Interface Status Screen

The general-access *Subsystem Interface Status* screen is informationally and functionally equivalent to the CSE-level *Subsystem Interface Status* screen, Figure C-19 on page C-201, so is not depicted in this appendix. To display the general-access *Subsystem Interface Status* screen, click the active Subsystem Interface Status text field on the *Main Menu / Login* screen, Figure C-2 on page C-181.

ISP Information Screen

The general-access *ISP Information* screen is informationally and functionally equivalent to the CSE-level *ISP Information* screen, Figure C-41 on page C-223, so is not depicted in this appendix. To display the general-access *ISP Information* screen, click the active ISP Information text field on the *Main Menu / Login* screen, Figure C-2 on page C-181.

Channel Configuration Status Screen

The general-access *Channel Configuration Status* screen is informationally (but not functionally) equivalent to the CSE-level *Channel Configuration Status* screen, Figure C-38 on page C-220, so is not depicted in this appendix. The primary difference between the screens is that the CSE-level screen provides access to the *Channel Configuration* screen, Figure C-39 on page C-221, for configuring data channels. To display the general-access *Channel Configuration Status* screen, click the active Channel Status text field on the *M*

Password Override Screen

The *Password Override* screen displays automatically when another user is already logged into a VTSS, and allows you to override that user to gain access to the VTSS.

Key in a valid customer or CSE password in the active Password window, then key in your name and the reason for the override in the active Name / Explanation window, then click Override to override the current user. Click Return to return to the *Main Menu / Login* screen, Figure C-2 on page C-181.

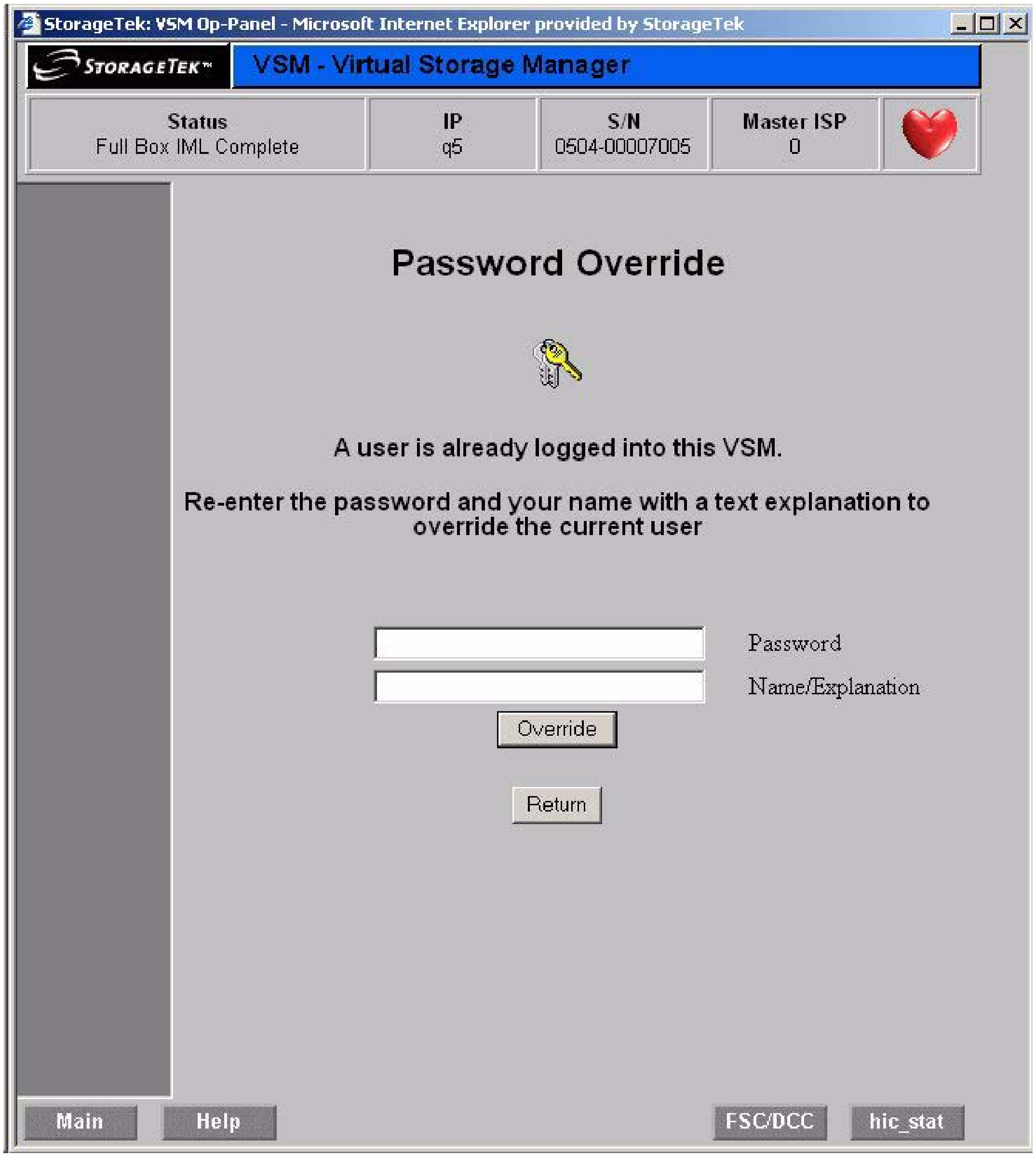


Figure C-3. Password Override Screen

■ FSC / DCC Lookup Screen

To access the *FSC / DCC Lookup* screen, click the FSC/DCC button at any screen.

Select the radio button for either a FSC (fault symptom code) or a DCC (diagnostic completion code) description, key in a valid code into the active window, then click Submit to view the description.

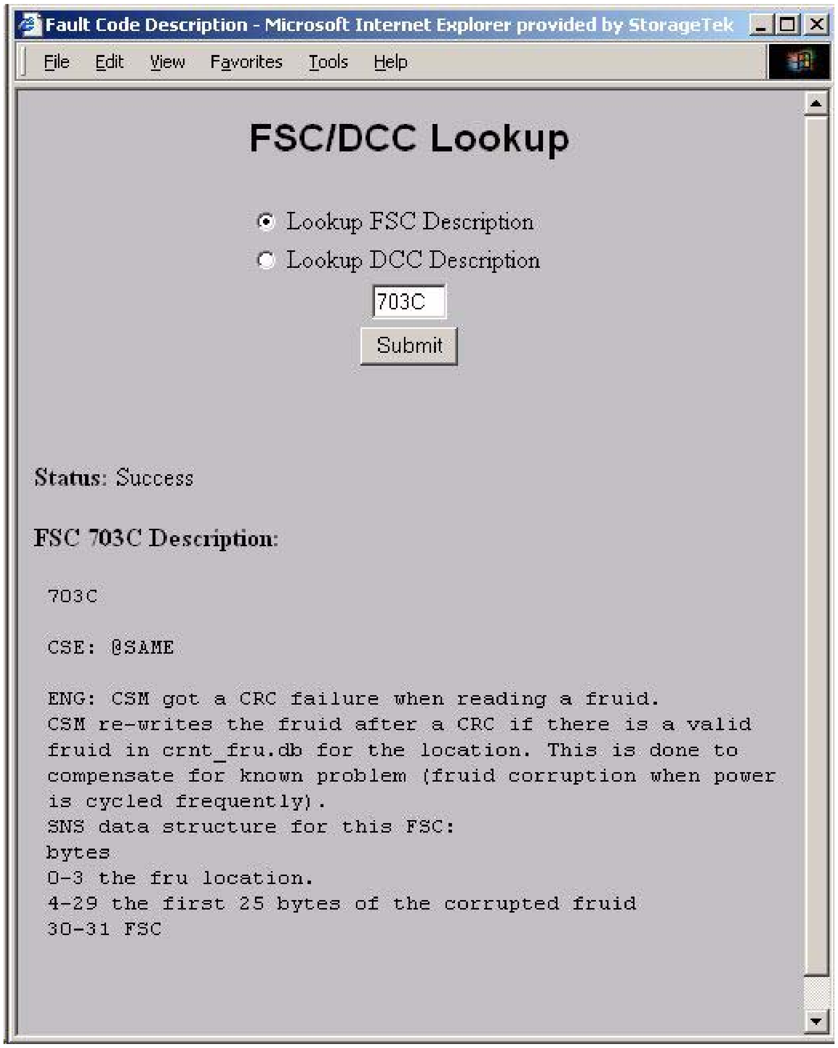


Figure C-4. FSC / DCC Lookup Screen

■ Customer-Level Screens

Customer-level screens provide access to additional screens showing system configuration and status information, and drive-draining functionality.

Customer Main Menu Screen

Note: Customers cannot access grayed-out screens and functionality shown on the *Customer Main Menu* screen, Figure C-5 below, which are available only through CSE-level screens.

To access the *Customer Main Menu* screen, key in a valid customer password (A*******; default A0022222) in the active window of the *Main Menu / Login* screen, Figure C-2 on page C-181, then click Login. At the screen below, click either of the two black (not gray) text fields shown onscreen to display the following linked subscreens that enable you to complete additional tasks:

- "Configuration / Status Menu Screen" on page C-187
- "Drain Drive Screen" on page C-187.

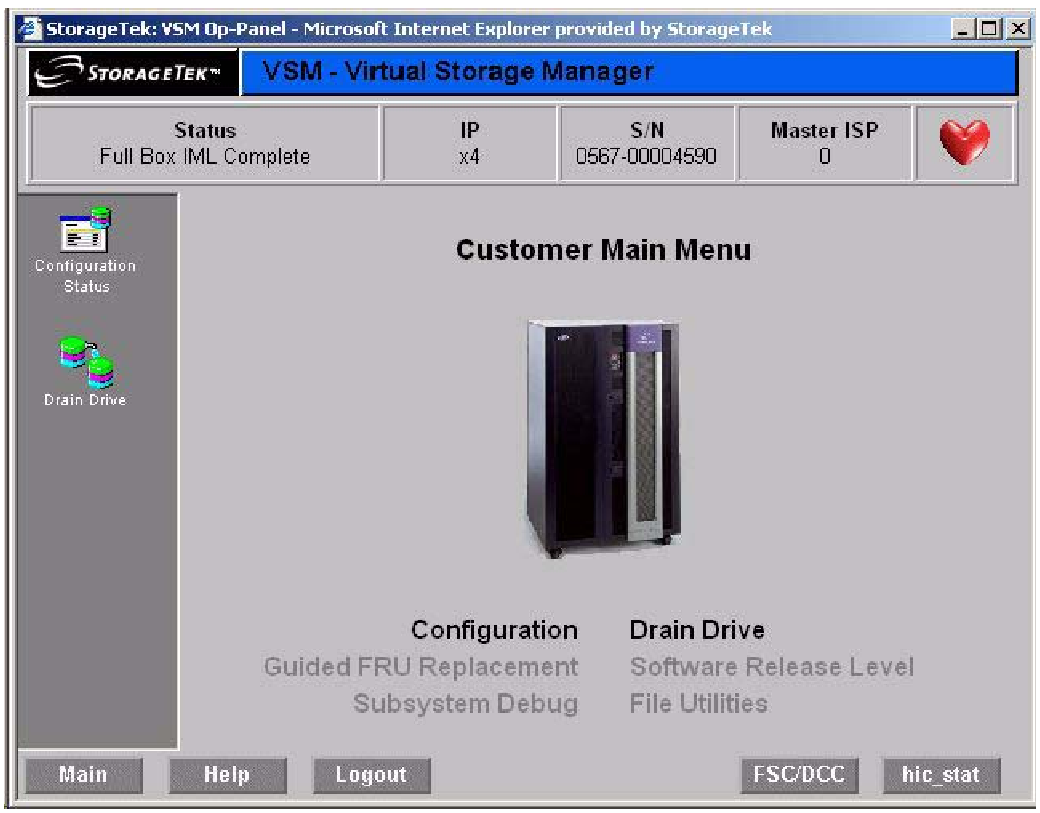


Figure C-5. Customer Main Menu Screen

Configuration / Status Menu Screen

The customer-level *Configuration / Status Menu* screen is informationally and functionally equivalent to the CSE-level *Configuration / Status Menu* screen, Figure C-7 on page C-189, so is not depicted in this appendix. To access the customer-level *Configuration / Status Menu* screen, click the active Configuration text field on the *Customer Main Menu* screen, Figure C-5 on page C-186.

The 11 subscreens linked to the customer-level *Configuration / Status Menu* screen are informationally and functionally equivalent to the 11 subscreens linked to the CSE-level *Configuration / Status Menu* screen, so are not depicted in this appendix. To view the 11 CSE-level subscreen proxies for the customer-level *Subsystem Configuration and Status* screen, see these headings:

- "Subsystem Availability Screen" on page C-190
- "Subsystem Configuration and Status Screen" on page C-191[1]
- "Disk Drive / Array Status Screen (1 of 2)" on page C-199
- "Subsystem Interface Status Screen" on page C-201
- "Access Control Screen" on page C-202
- "Ethernet Setup Screen" on page C-215
- "Channel Configuration Status Screen" on page C-220
- "Real Tape Drive Status Screen" on page C-222
- "ISP Information Screen" on page C-223
- "DAC State Screen" on page C-224
- "FRU Status Screen (1 of 7)" on page C-225.

Drain Drive Screen

The customer-level *Drain Drive* screen is informatioinally and functionally equivalent to the CSE-level *Drain Drive* screen, Figure C-44 on page C-226, so is not depicted here. To access the customer-level *Drain Drive* screen, click the active Drain Drive text field on the *Customer Main Menu* screen, Figure C-5 on page C-186.

1. The customer-level *Subsystem Configuration and Status* screen is informationally (but not functionally) equivalent to the CSE-level *Subsystem Configuration and Status* screen, so is not depicted in this appendix. The primary difference between the screens is that the customer-level screen allows you to change only the VTSS date and time, while the CSE-level screen allows you to enable proprietary 'keys' for VTSS features including maintenance capability, clustered VTSS, cache size, 32 CIP ports, and physical array capacity (PCap); see "Obtaining Keys for VTSS Features and Options" on page 1-32 for additional information.

■ CSE-Level Screens

CSE-level screens provide a greater range of functions than customer-level screens.

CSE Main Menu Screen

To access the *CSE Main Menu* screen, type a valid CSE password (B*******; default B0022222) in the data entry window of the *Main Menu / Login* screen, Figure C-2 on page C-181, then click Login. At the screen below, click any of the six text fields shown on-screen to display the following linked subscreens that enable you to complete additional tasks:

- "Configuration / Status Menu Screen" on page C-189
- "Drain Drive Screen (1 of 2)" on page C-226
- "GFR – Main Menu Screen" on page C-228
- "Select Software Release Level Screen" on page C-247
- "Subsystem Debug Screen" on page C-249
- "Directory Display Screen" on page C-250.

Figure C-6. CSE Main Menu Screen

Configuration / Status Menu Screen

To access the CSE-level *Configuration / Status Menu* screen, click the active Configuration text field on the *CSE Main Menu* screen, Figure C-6 on page C-188.

Figure C-7. Configuration / Status Menu Screen

Subsystem Availability Screen

To access the CSE-level *Subsystem Availability* screen, click the Subsystem Availability text field on the *Configuration / Status Menu* screen, Figure C-7 on page C-189.

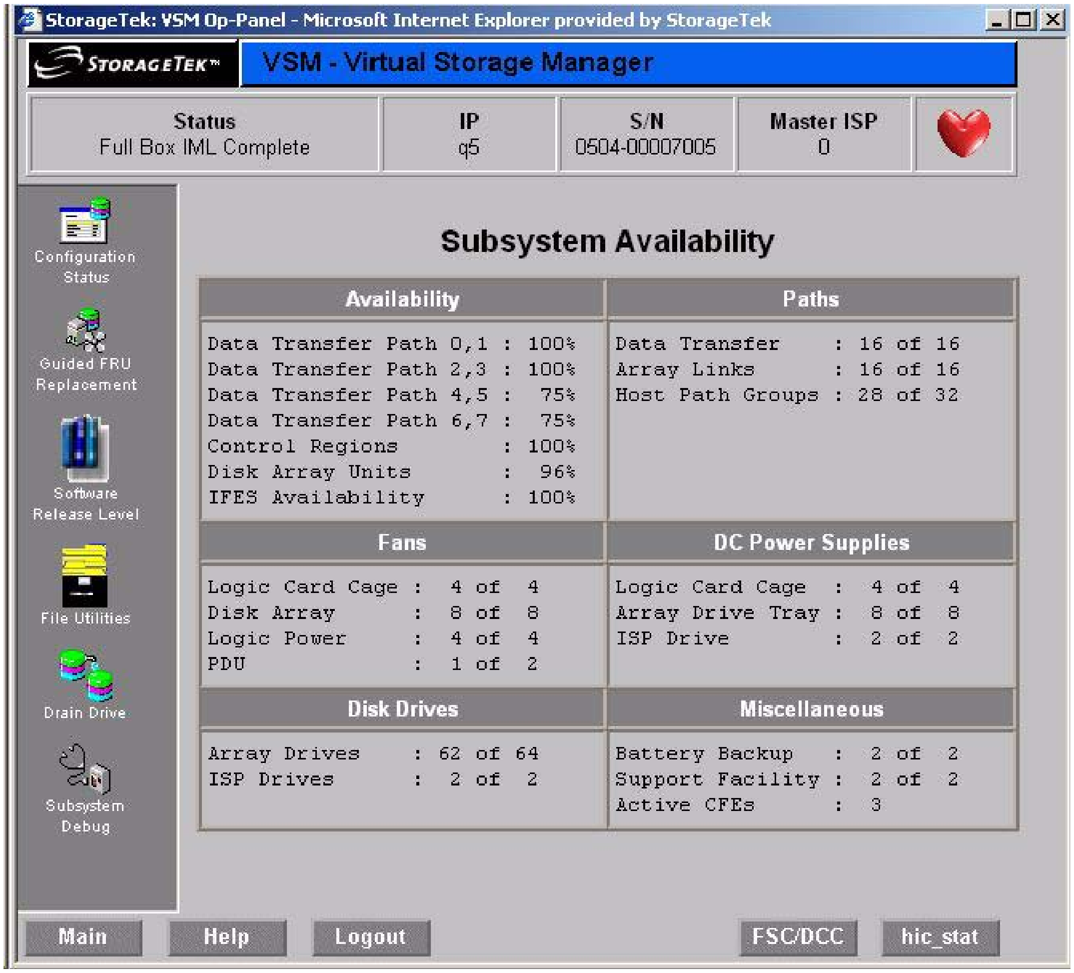


Figure C-8. Subsystem Availability Screen

Subsystem Configuration and Status Screen

To access the CSE-level *Subsystem Configuration and Status* screen, click the Sub-system Configuration text field on the *Configuration / Status Menu* screen, Figure C-7 on page C-189.

At the screen below, click the active fields under the various headings shown onscreen to display the following linked subscreens that enable you to complete additional tasks:

- "Set VSM Subsystem Time Screen" on page C-192
- "Enter Cache (Option) Key Screen" on page C-195
- "Enter PCap (Physical Capacity) Option Key Screen" on page C-197
- "Enter Maintenance Option Key Screen" on page C-193
- "Enter 32 CIP Port Option Key Screen" on page C-196
- "Enter Cluster VTSS Option Key Screen" on page C-194.

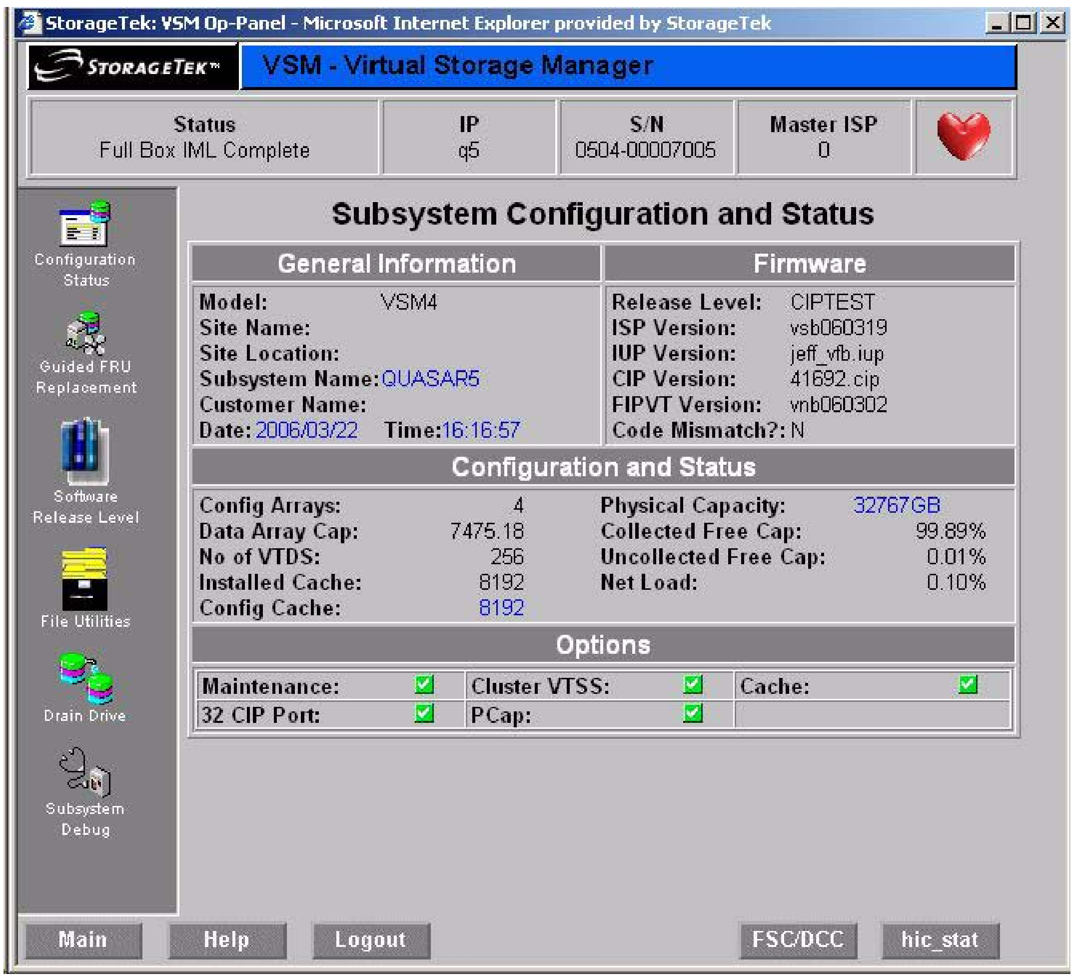


Figure C-9. Subsystem Configuration and Status Screen

Set VSM Subsystem Time Screen

To access the *Set VSM Subsystem Time* screen, click the date or time in the active field next to the Date or Time heading on the *Subsystem Configuration and Status* screen Figure C-9 on page C-191.

When you set the VTSS local date and time using the pull-down lists and click Continue, a subscreen displays with the message **Time was successfully set.** Click Reset to reset the date and time to the default settings (i.e., the date and time at the Sun Remote Resolution Center server). Click Cancel to undo changed settings and return to the *Subsystem Configuration and Status* screen.

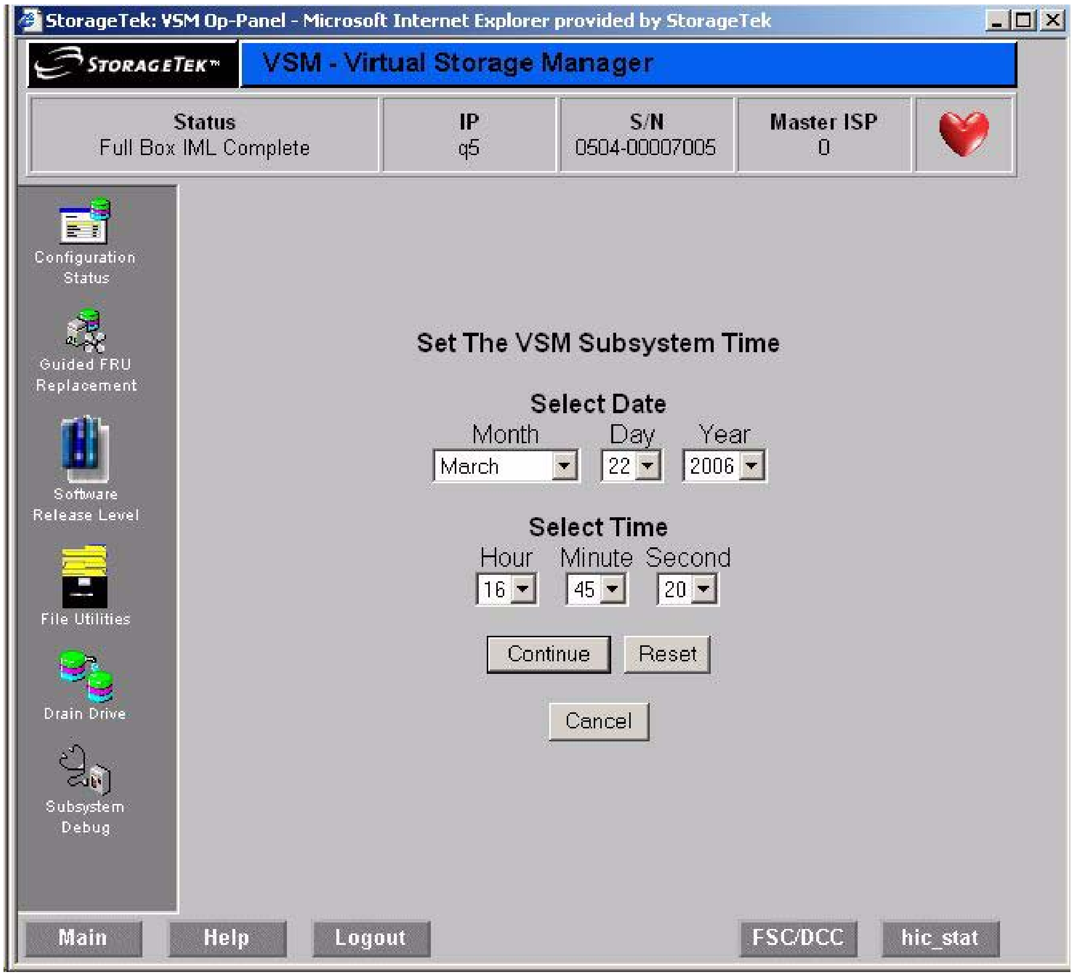


Figure C-10. Set VSM Subsystem Time Screen

Enter Maintenance Option Key Screen

To access the *Enter Maintenance Option Key* screen, click the red ‘X’ or green checkmark next to the Maintenance heading on the *Subsystem Configuration and Status* screen Figure C-9 on page C-191.

When you type in a valid maintenance option key into the data entry field and click Continue, a subscreen displays with the message **Enable Maintenance Option Successful**. Click Cancel to delete keyed text and return to the *Subsystem Configuration and Status* screen.

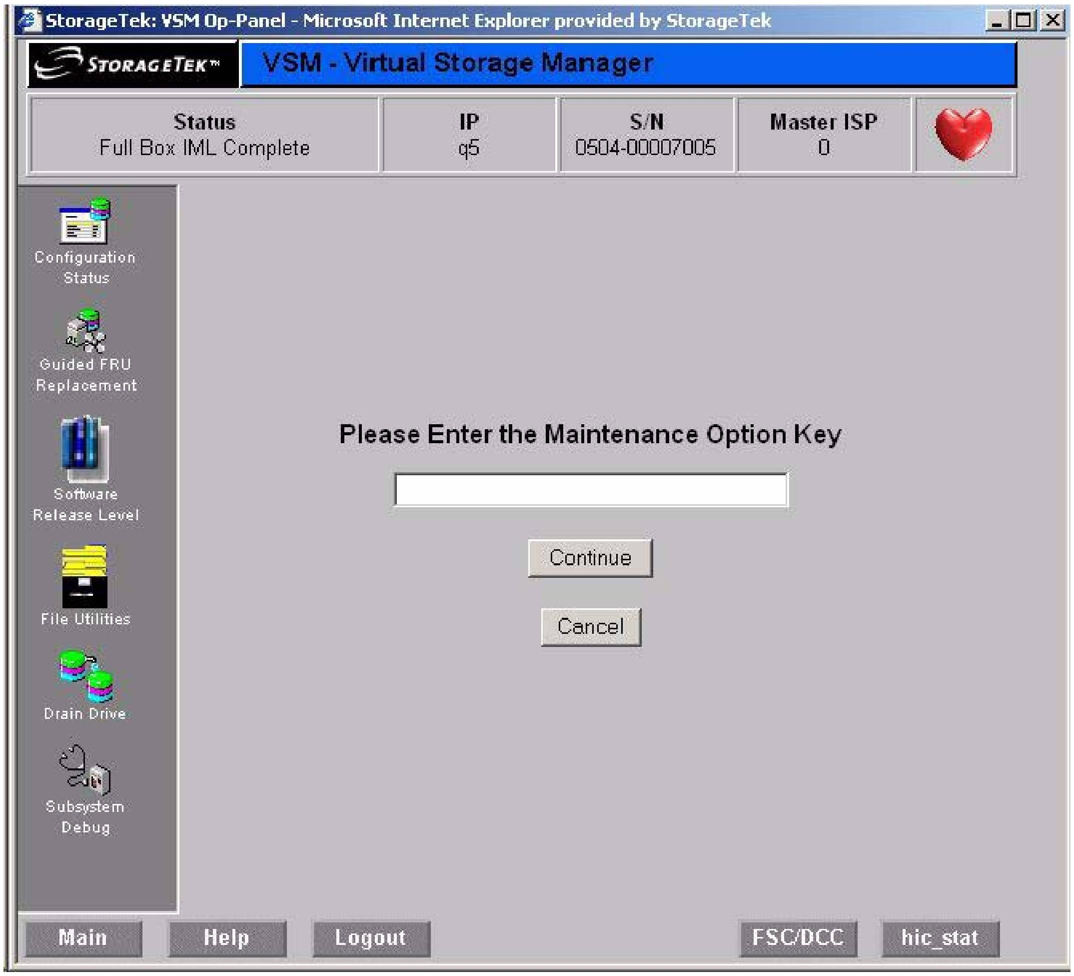


Figure C-11. Enter Maintenance Option Key Screen

Enter Cluster VTSS Option Key Screen

To access the *Enter Cluster VTSS Option Key* screen, click the red ‘X’ or green checkmark next to the Cluster VTSS heading on the *Subsystem Configuration and Status* screen Figure C-9 on page C-191.

When you type in a valid cluster VTSS option key into the data entry field and click Continue, a subscreen displays with the message **Enable Cluster VTSS Option Successful.** Click Cancel to delete keyed text and return to the *Subsystem Configuration and Status* screen.

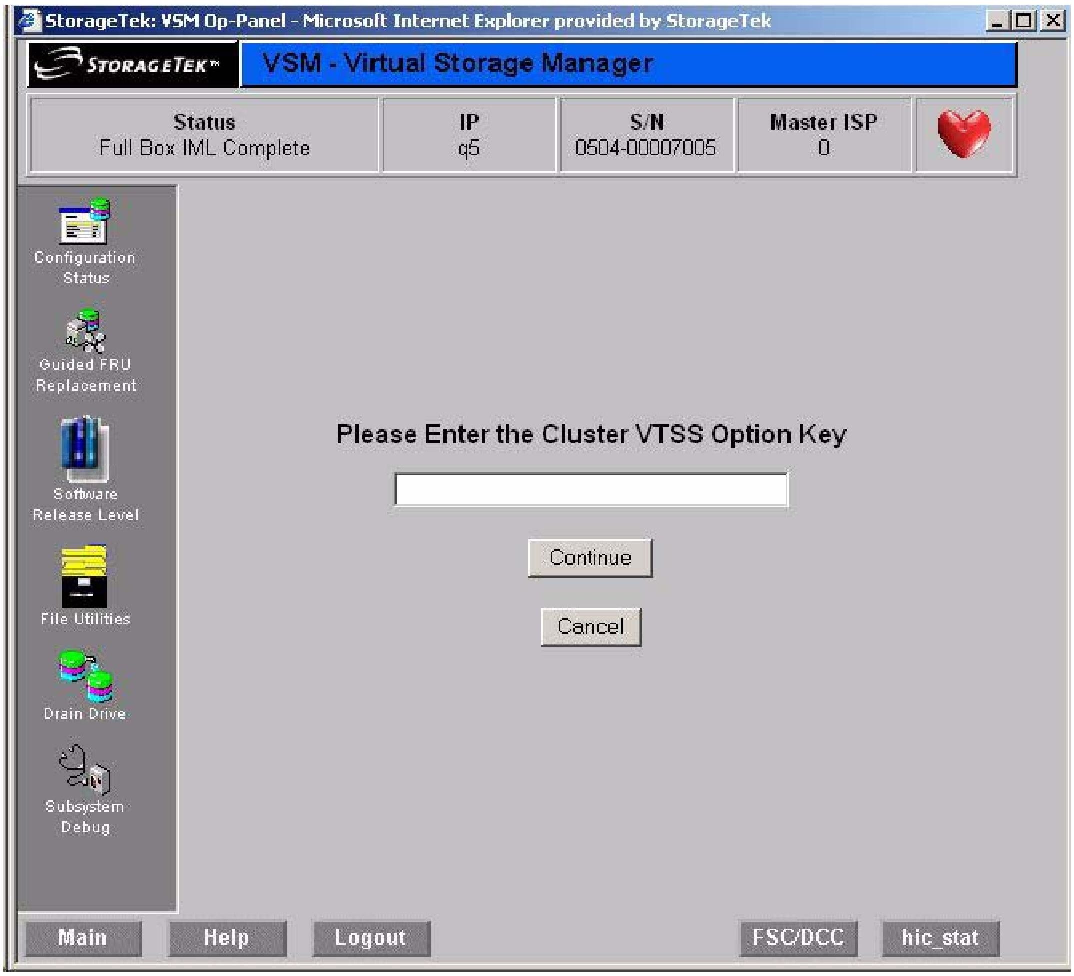


Figure C-12. Enter Cluster VTSS Option Key Screen

Enter Cache (Option) Key Screen

To access the *Enter Cache (Option) Key* screen, click the red 'X' or green checkmark next to the Cache heading on the *Subsystem Configuration and Status* screen Figure C-9 on page C-191.

When you type a valid cache option key into the data entry field and click Continue, a sub-screen displays with the message **Enable Cache Option Successful**. Click Cancel to delete keyed text and return to the *Subsystem Configuration and Status* screen.

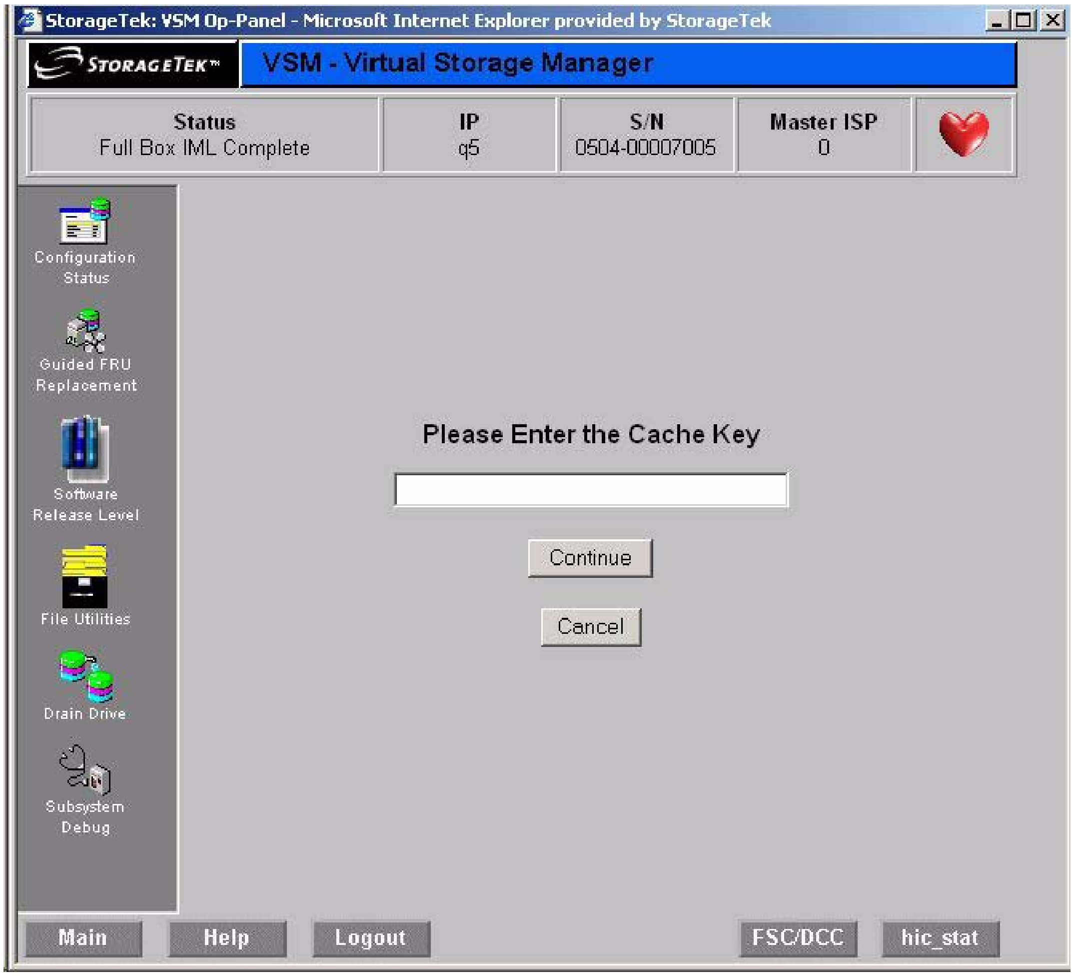


Figure C-13. Enter Cache (Option) Key Screen

Enter 32 CIP Port Option Key Screen

To access the *Enter 32 CIP Port Option Key* screen, click the red ‘X’ or green checkmark next to the 32 CIP Port heading on the *Subsystem Configuration and Status* screen Figure C-9 on page C-191.

When you type a valid 32 CIP Port option key into the data entry field and click Continue, a subscreen displays with the message **Enable 32 CIP Port Option Successful**. Click Cancel to delete keyed text and return to the *Subsystem Configuration and Status* screen.

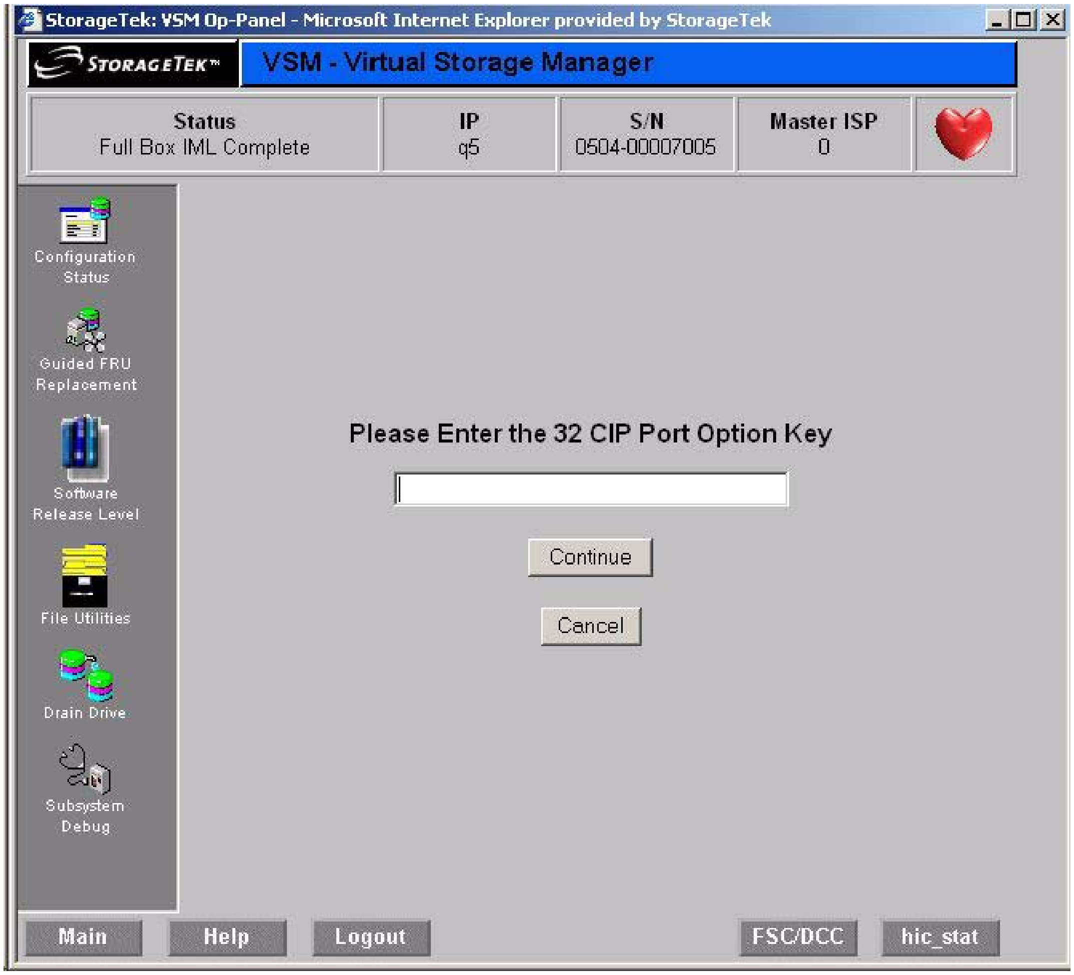


Figure C-14. Enter 32 CIP Port Option Key Screen

Enter PCap (Physical Capacity) Option Key Screen

To access the *Enter PCap (Physical Capacity) Option Key* screen, click the red ‘X’ or green checkmark next to the Cache heading on the *Subsystem Configuration and Status* screen Figure C-9 on page C-191.

When you type a valid PCap option key into the data entry field and click Continue, a sub-screen displays with the message **Enable PCap Option Successful**. Click Cancel to delete keyed text and return to the *Subsystem Configuration and Status* screen.

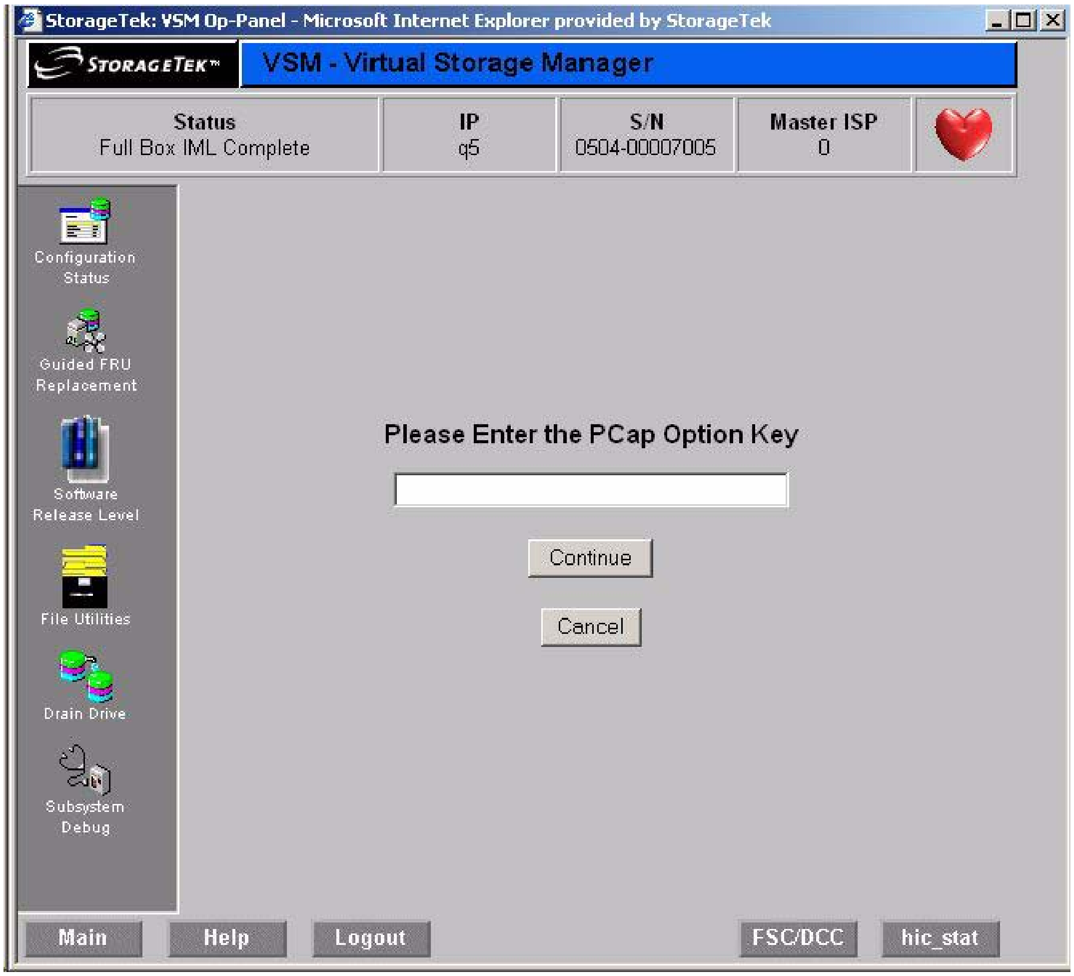


Figure C-15. Enter PCap (Physical Capacity) Option Key Screen

Enter 32 CIP Port Option Key Screen

To access the *Enter 32 CIP Port Option Key* screen, click the red ‘X’ or green checkmark next to the 32 CIP Port heading on the *Subsystem Configuration and Status* screen Figure C-9 on page C-191.

When you type a valid 32 CIP Port option key into the data entry field and click Continue, a subscreen displays with the message **Enable 32 CIP Port Option Successful**. Click Cancel to delete keyed text and return to the *Subsystem Configuration and Status* screen.

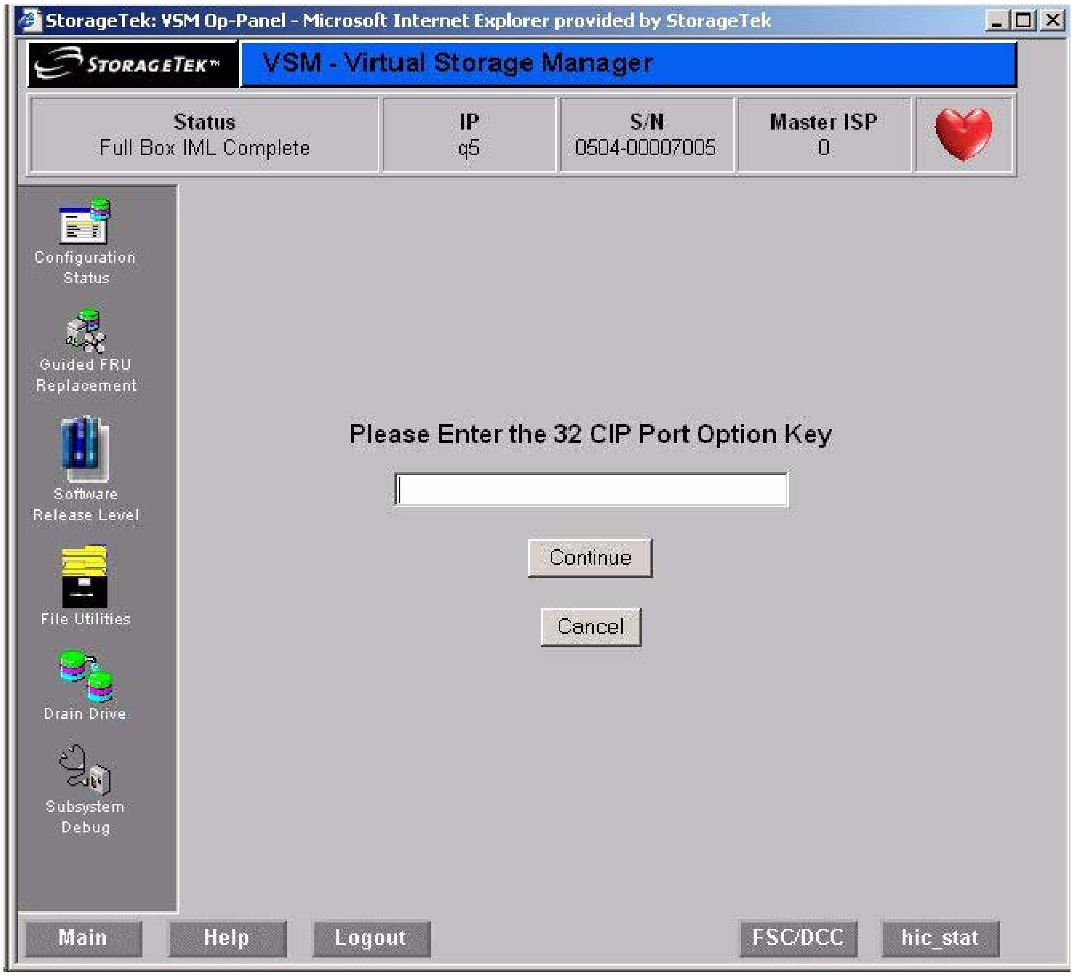


Figure C-16. Enter 32 CIP Port Option Key Screen

Disk Drive / Array Status Screen (1 of 2)

To access the CSE-level *Disk Drive / Array Status* screen, click the Disk Drive / Array Status text field on the *Configuration / Status Menu* screen, Figure C-7 on page C-189.

When you click Form Array at the screen below (the button displays only if at least 16 drives are available to create an array), the VTSS support facility starts creating an array and displays a subscreen with the message **Array Formation has begun**.

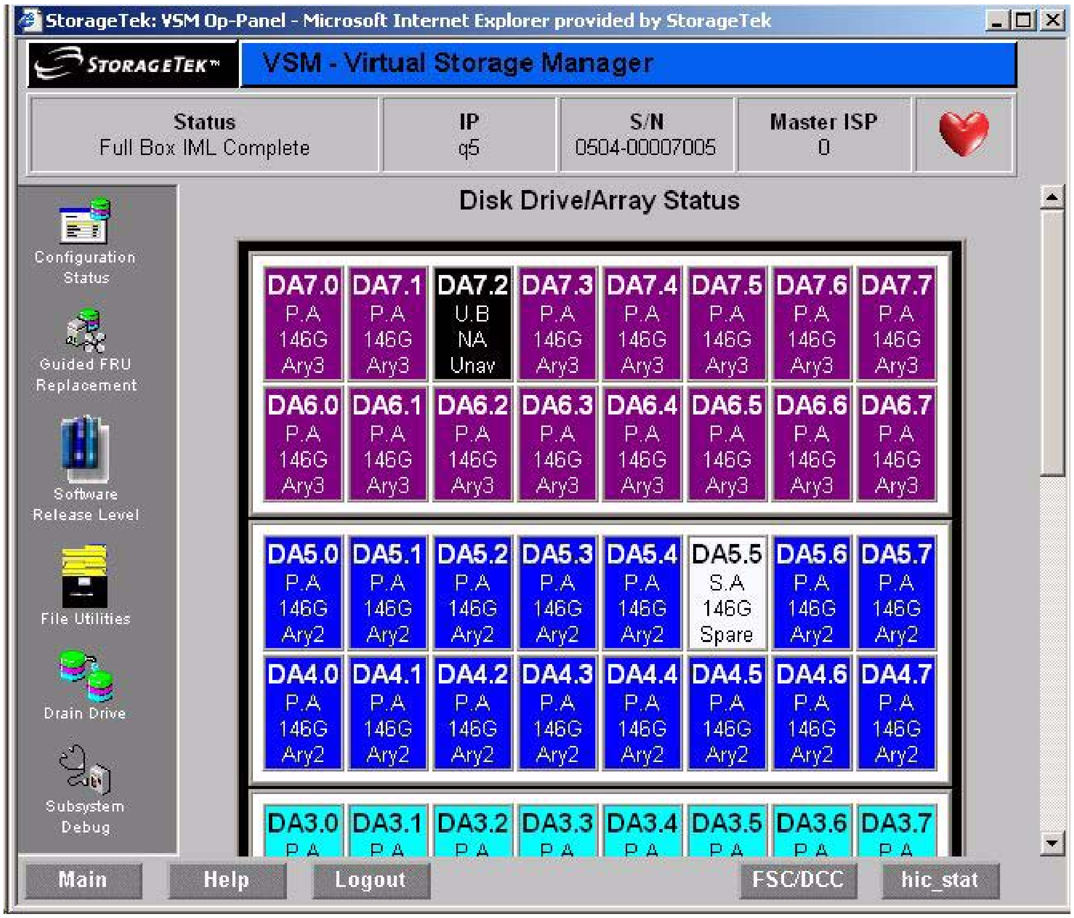


Figure C-17. Disk Drive / Array Status Screen (1 of 2)

Disk Drive / Array Status Screen (2 of 2)

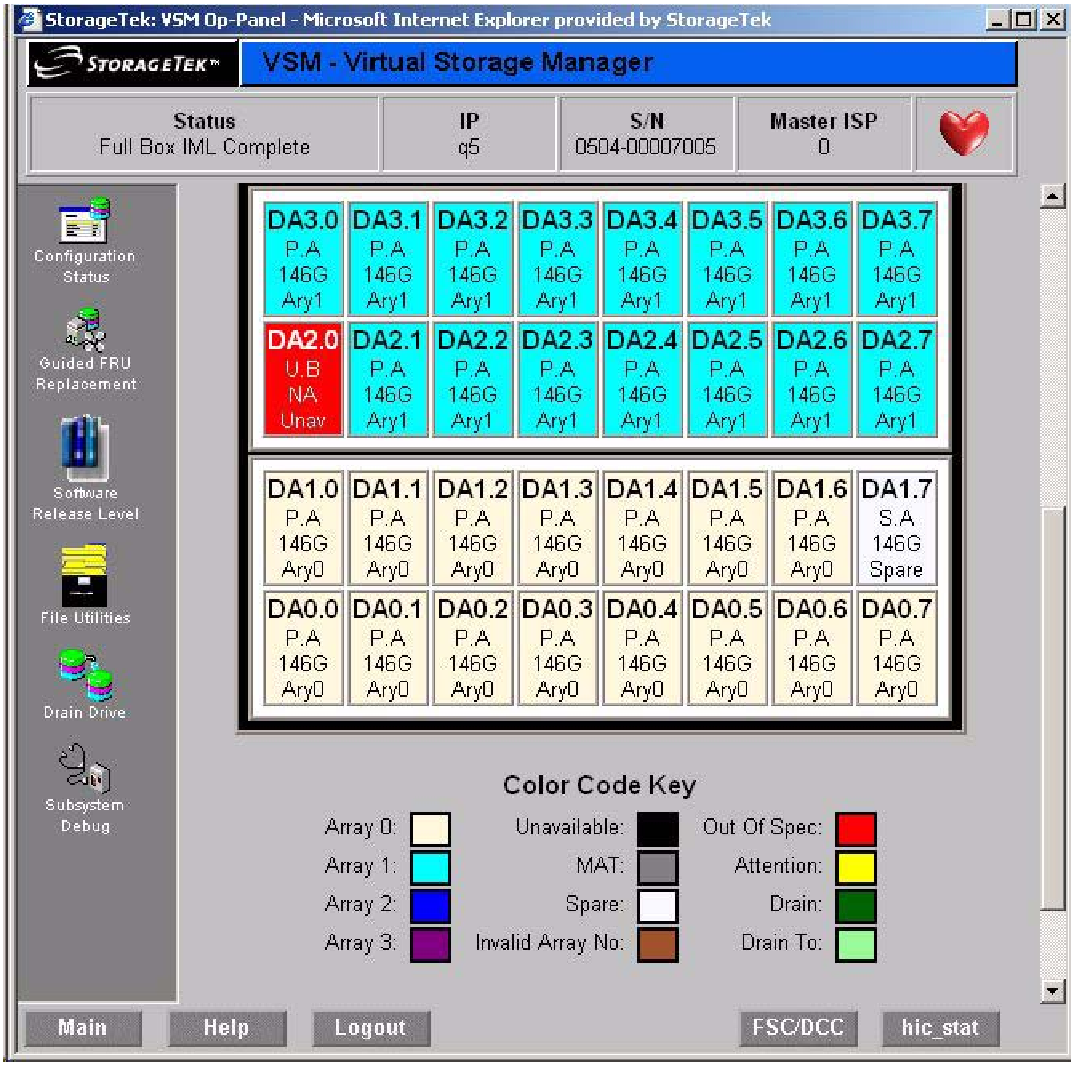


Figure C-18. Disk Drive / Array Status Screen (2 of 2)

Subsystem Interface Status Screen

To access the *Subsystem Interface Status* screen, click the Subsystem Interface Status text field on the *Configuration / Status Menu* screen, Figure C-7 on page C-189.

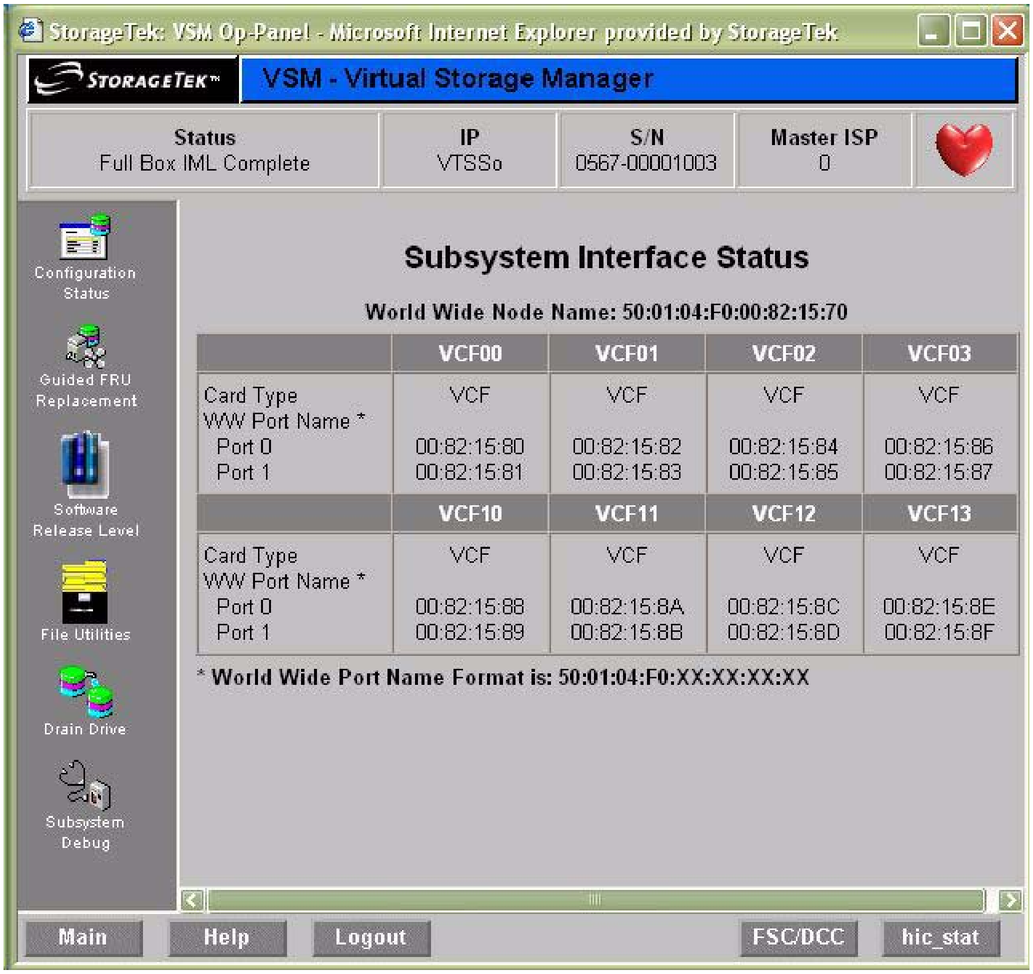


Figure C-19. Subsystem Interface Status Screen

Access Control Screen

To access the *Access Control* screen, click the Access Control text field on the *Configuration / Status Menu* screen, Figure C-7 on page C-189. At the screen below, click active text fields or checkmarks under the various headings onscreen to display the following linked subscreens that enable you to complete additional tasks:

- "Enter (Change) Customer Password Screen" on page C-203
- "Enter (Change) CSE Password Screen" on page C-204
- "Select CSRC Connection Enabled State Screen" on page C-205
- "Select CSRC Baud Rate Screen" on page C-206
- "Enter (Change) CSRC Password Screen" on page C-207
- "Select SIM (Log Interval) Display Level Screen" on page C-208
- "Select SIM (Message) Display Level Screen" on page C-209
- "Select Ethernet MIM Report State Screen" on page C-212
- "Select Check 0 MIM Call State Screen" on page C-211
- "Select MIM Call State Screen" on page C-210
- "Set MIM Test Call Interval Screen" on page C-213
- "Enter Primary Phone Number Screen" on page C-214.

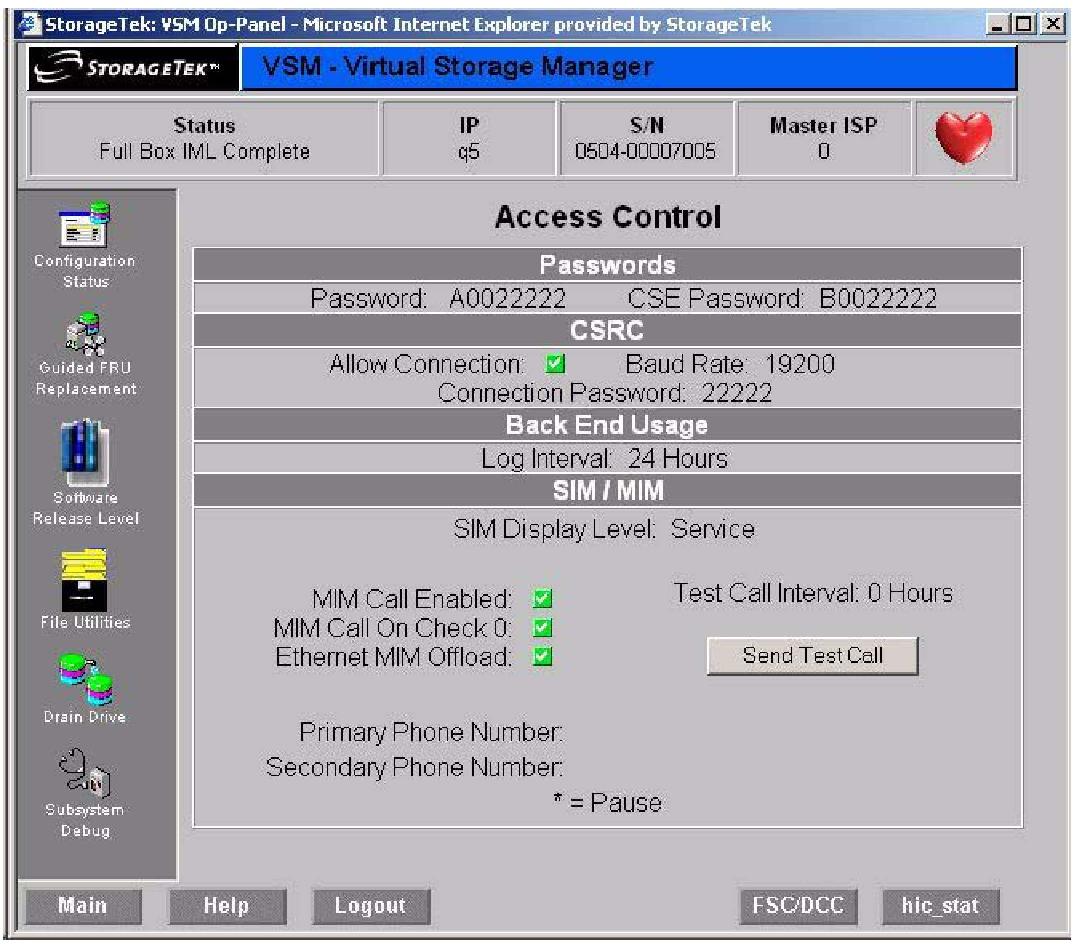


Figure C-20. Access Control Screen

Enter (Change) Customer Password Screen

To access the *Enter (Change) Customer Password* screen, click the active field to the right of the Password text under the Passwords heading on the *Access Control* screen, Figure C-20 on page C-202.

When you type a valid customer password into the data entry field and click Submit, a subscreen displays with the message **Enable Customer Password Successful**. See "Operator Panel Access Passwords" on page 2-60 for customer password details. Click Reset to reset the VTSS to recognize the default customer password (A0022222). Click Cancel to delete keyed text and return to the *Access Control* screen.

Figure C-21. Enter (Change) Customer Password Screen

Enter (Change) CSE Password Screen

To access the *Enter (Change) CSE Password* screen, click the active field to the right of the CSE Password text under the Passwords heading on the *Access Control* screen, Figure C-20 on page C-202.

When you type a valid CSE password in the data entry field and click Submit, a subscreen displays with the message **Enable CSE Password Successful**. See "Operator Panel Access Passwords" on page 2-60 for CSE password details. Click Reset to reset the VTSS to recognize the default CSE password (B0022222). Click Cancel to delete keyed text and return to the *Access Control* screen.

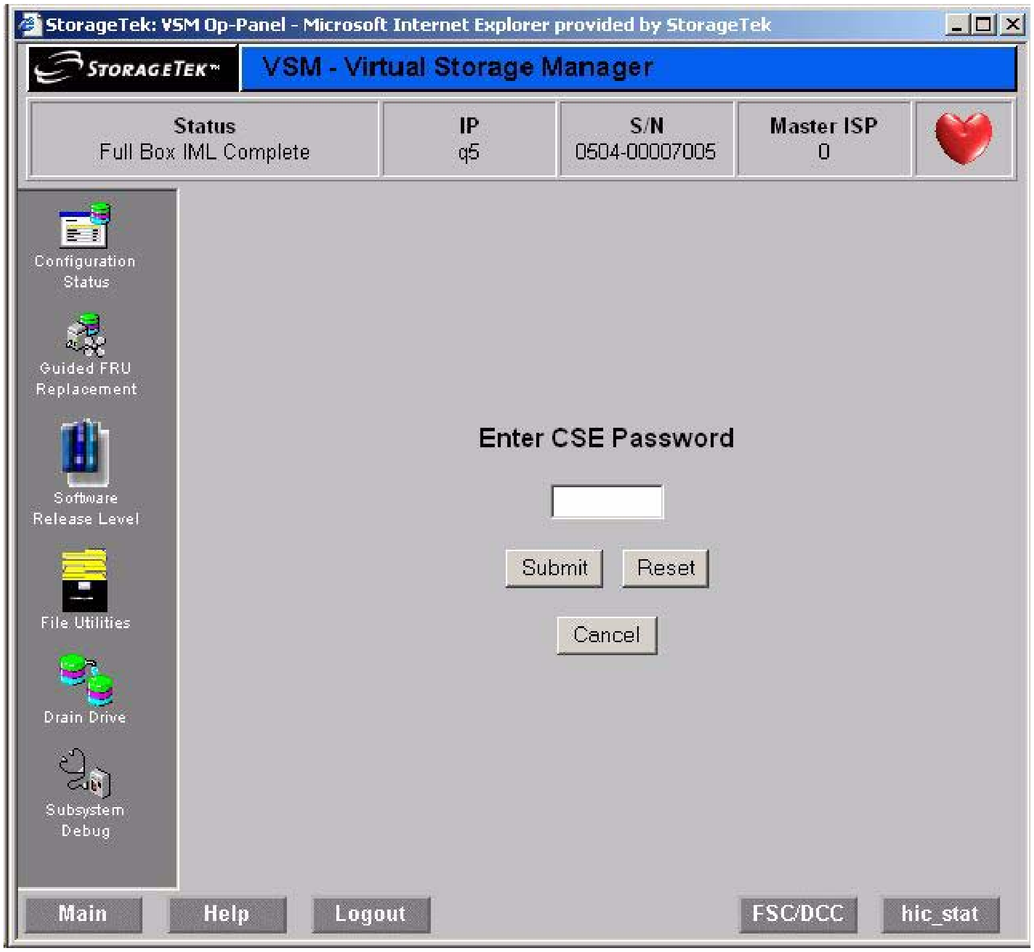


Figure C-22. Enter (Change) CSE Password Screen

Select CSRC Connection Enabled State Screen

To access the *Select CSRC Connection Enabled State* screen, click the red ‘X’ or green checkmark next to the Allow Connection text under the CSRC heading on the *Access Control* screen, Figure C-20 on page C-202.

When you check the Enabled box and click Submit, a subscreen displays with the message **Enable CSRC Connection Successful**. Uncheck the box and click Submit to disable the connection. Click Reset to return to the default CSRC connection setting (disabled). Click Cancel to undo a changed setting and return to the *Access Control* screen.

Figure C-23. Select CSRC Connection Enabled State Screen

Select CSRC Baud Rate Screen

To access the *Select CSRC Baud Rate* screen, click the active field to the right of the Baud Rate text under the CSRC heading on the *Access Control* screen, Figure C-20 on page C-202.

When you select a baud rate from the pull-down list and click Submit, a subscreen displays with the message **Set CSRC Baud Rate Successful**. Click Reset to reset the VTSS to the default CSRC baud rate. Click Cancel to undo a changed setting and return to the *Access Control* screen.

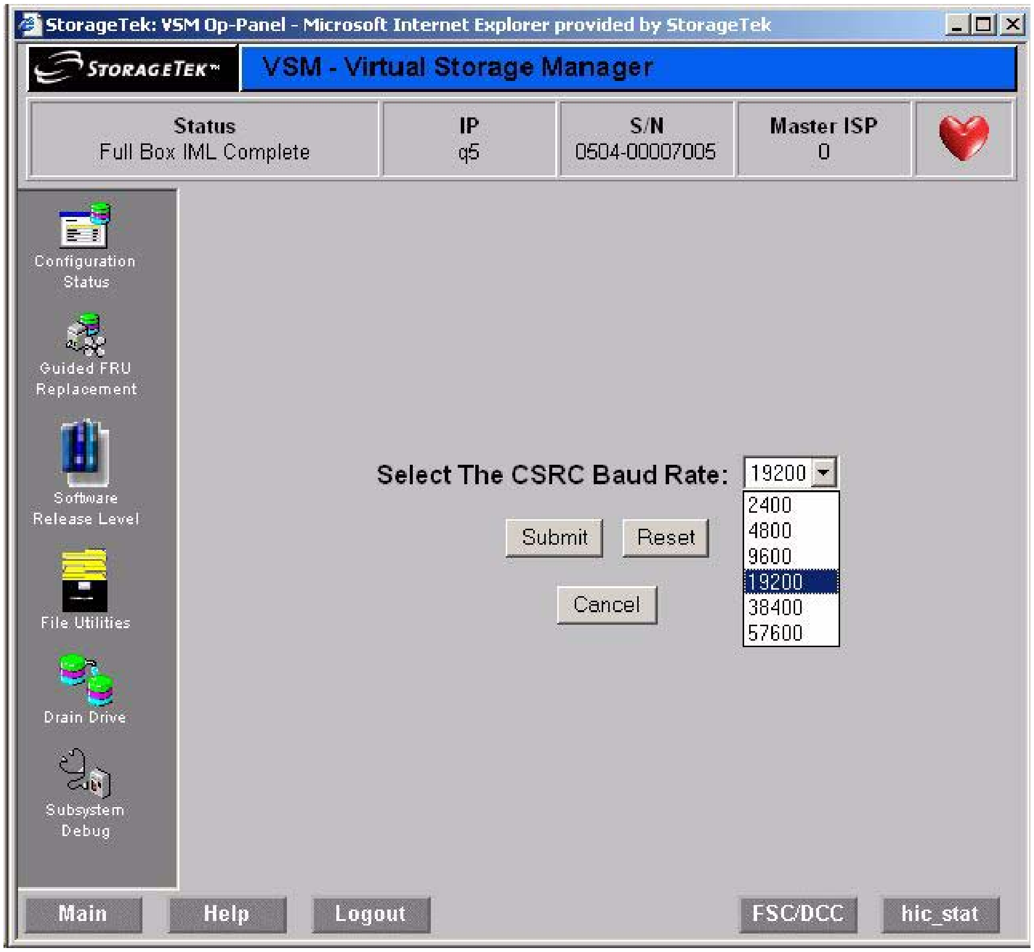


Figure C-24. Select CSRC Baud Rate Screen

Enter (Change) CSRC Password Screen

To access the *Enter (Change) CSRC Password* screen, click the active field to the right of the Connection Password text under the CSRC heading on the *Access Control* screen, Figure C-20 on page C-202.

When you key in a valid CSE password and click Submit, a subscreen displays with the message **Enable CSE Password Successful**. See "Operator Panel Access Passwords" on page 2-60 for CSRC password details. Click Reset to reset the VTSS to recognize the default CSRC password (22222). Click Cancel to delete keyed text and return to the *Access Control* screen.

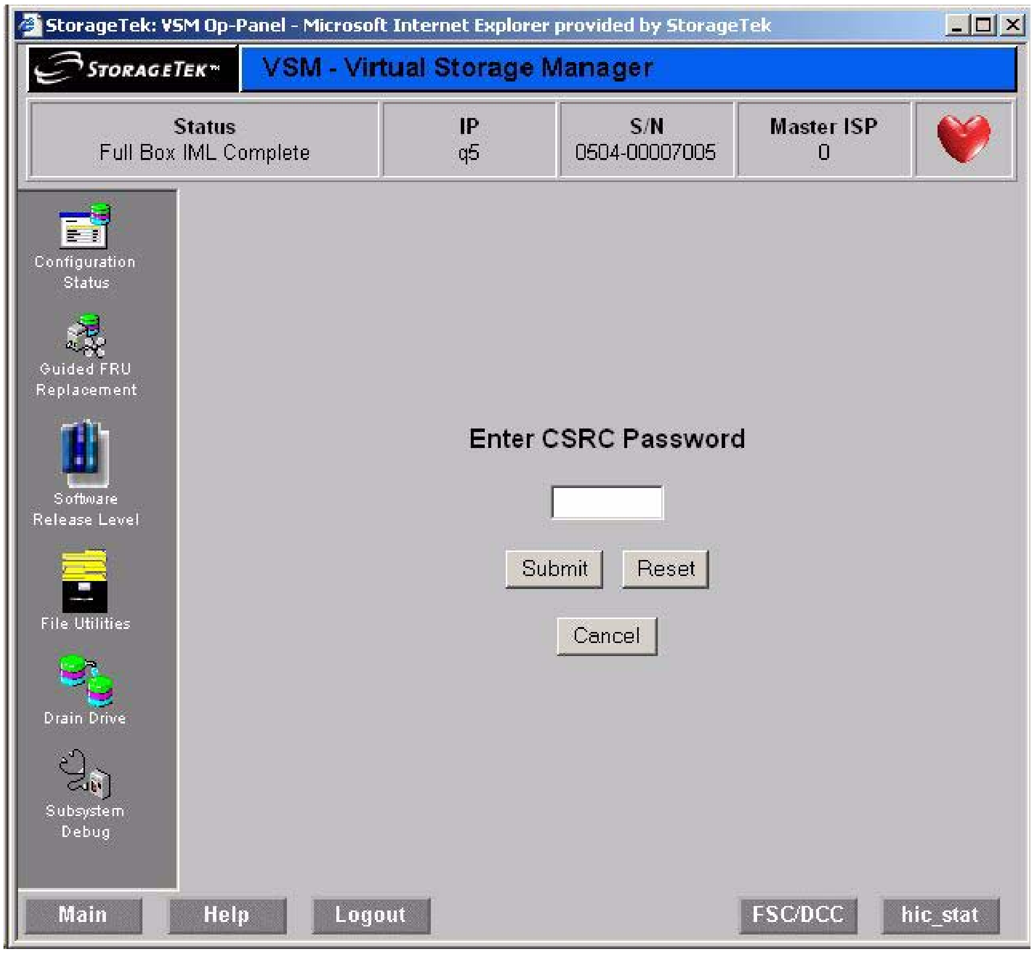


Figure C-25. Enter (Change) CSRC Password Screen

Select SIM (Log Interval) Display Level Screen

To access the *Set SIM (Log Interval) Display Level* screen, click the active field to the right of the Log Interval text under the Back End Usage heading on the *Access Control* screen, Figure C-20 on page C-202.

When you select a setting from the pull-down list and click Submit, a subscreen displays with the message **Set SIM Display Level Successful**. Click Reset to reset the machine to the default SIM display level. Click Cancel to undo a changed setting and return to the *Access Control* screen.

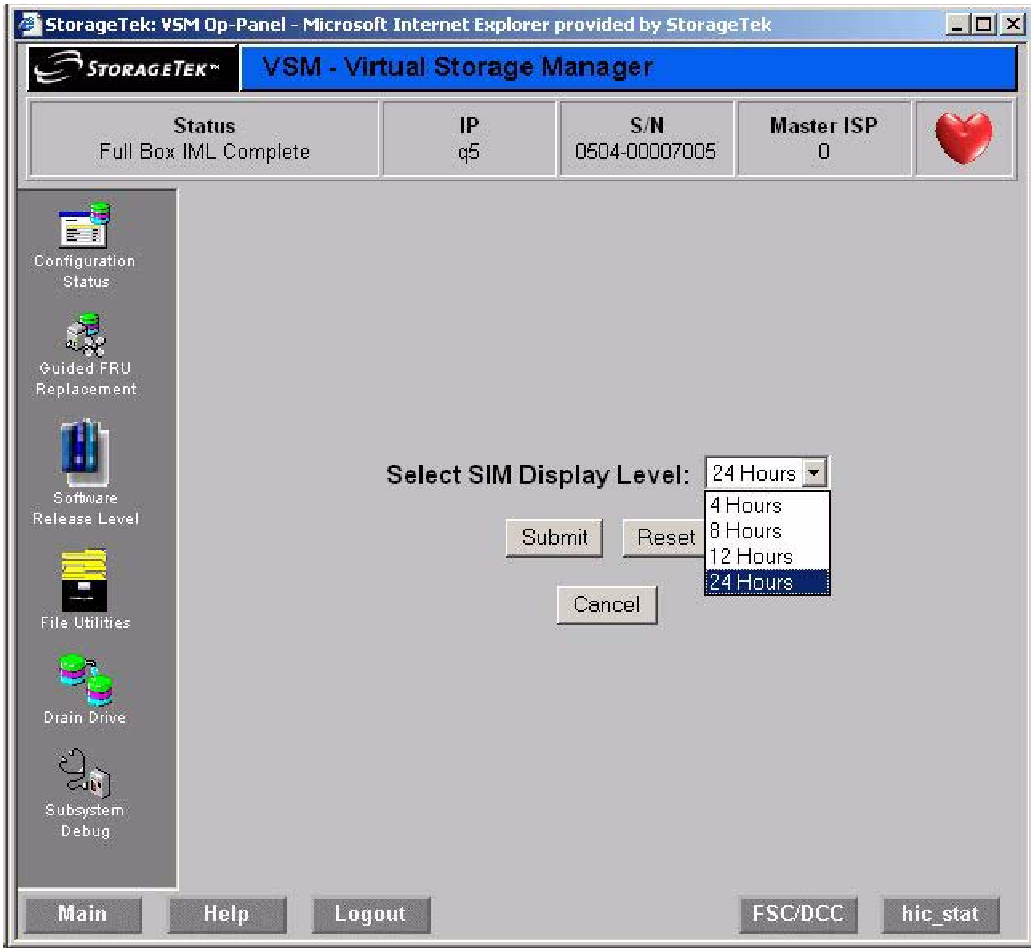


Figure C-26. Select SIM (Log Interval) Display Level Screen

Select SIM (Message) Display Level Screen

To access the *Set SIM (Log Interval) Display Level* screen, click the active field to the right of the SIM Display Level text under the SIM / MIM heading on the *Access Control* screen, Figure C-20 on page C-202.

When you select a setting from the pull-down list and click Submit, a subscreen displays with the message **Set SIM Display Level Successful**. Uncheck the box and click Submit to disable the SIM display level. Click Reset to reset the VTSS to the default SIM display level. Click Cancel to undo a changed setting and return to the *Access Control* screen.

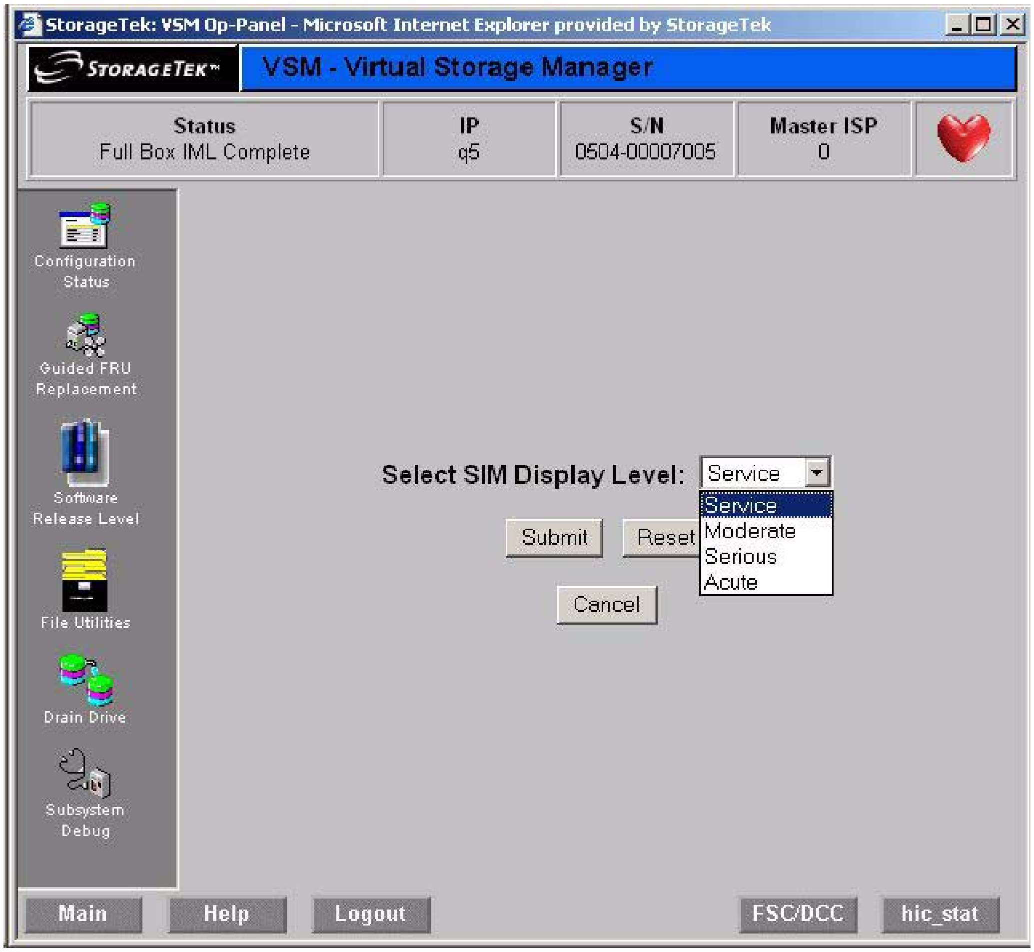


Figure C-27. Select SIM (Message) Display Level Screen

Select MIM Call State Screen

To access the *Select MIM Call State* screen, click the red ‘X’ or green checkmark next to the MIM Call Enabled text under the SIM / MIM heading on the *Access Control* screen, Figure C-20 on page C-202.

When you check the Enabled box and click Submit, a subscreen displays with the message **Enable MIM Call State Successful**. Uncheck the box and click Submit to disable the MIM call state. Click Reset to return to the default MIM call state. Click Cancel to undo a changed setting and return to the *Access Control* screen.

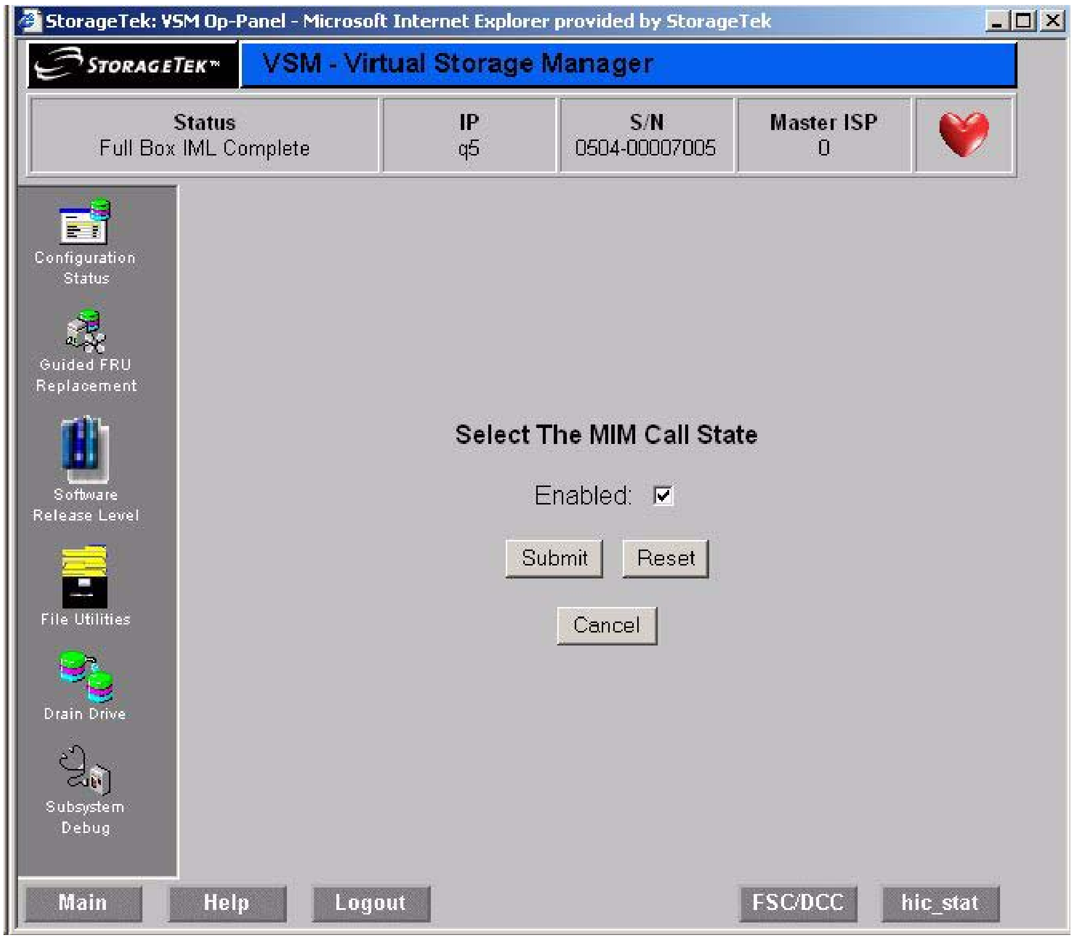


Figure C-28. Select MIM Call State Screen

Select Check 0 MIM Call State Screen

To access the *Select Check 0 MIM Call State* screen, click the red 'X' or green checkmark next to the MIM Call on Check 0 text under the SIM / MIM heading on the *Access Control* screen, Figure C-20 on page C-202.

When you check the Enabled box and click Submit, a subscreen displays with the message **Enable Check 0 MIM Call State Successful**. Uncheck the box and click Submit to disable the Check 0 MIM call state. Click Reset to return to the default Check 0 MIM call state. Click Cancel to undo a changed setting and return to the *Access Control* screen.

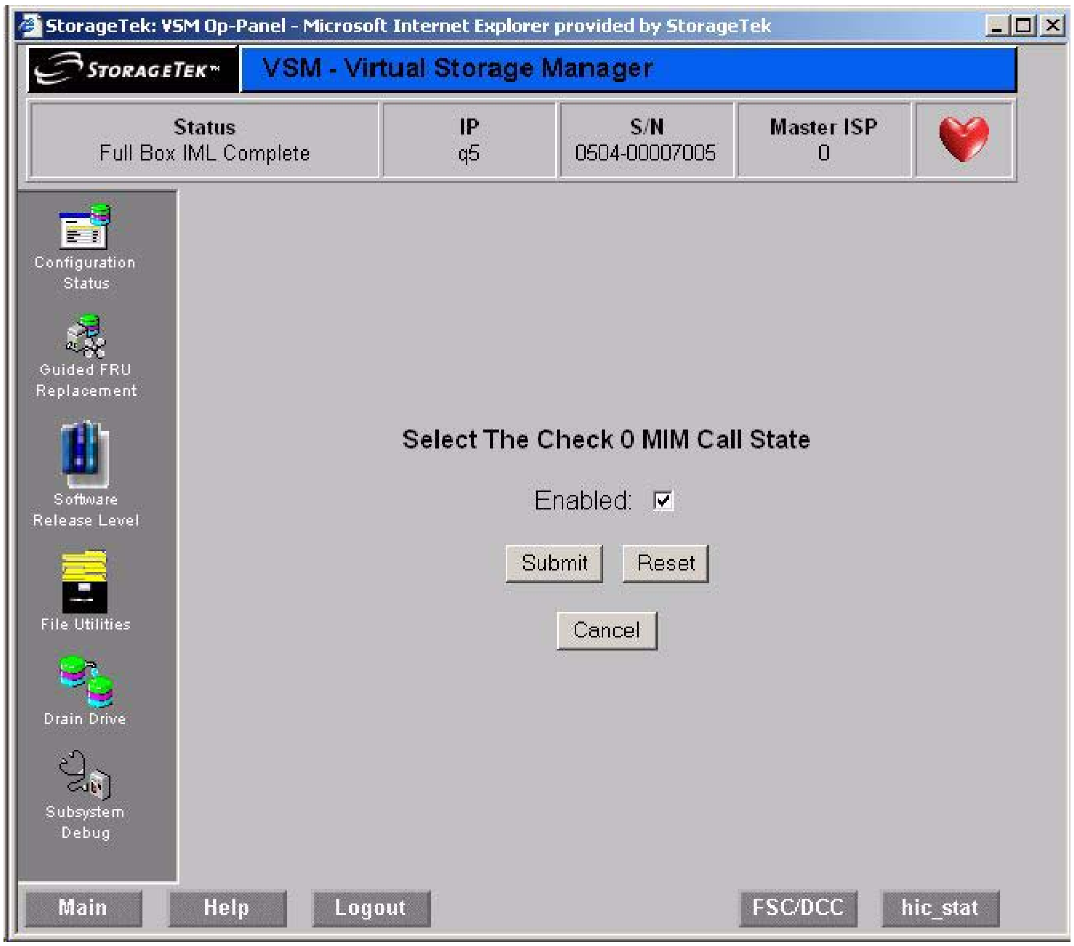


Figure C-29. Select Check 0 MIM Call State Screen

Select Ethernet MIM Report State Screen

To access the *Select Ethernet MIM Report State* screen, click the red ‘X’ or green check-mark next to the Ethernet MIM Offload text under the SIM / MIM heading on the *Access Control* screen, Figure C-20 on page C-202.

When you check the Enabled box and click Submit, a subscreen displays with the message **Enable MIM Call State Successful**. Uncheck the box and click Submit to disable the Ethernet MIM call state. Click Reset to return to the default Ethernet MIM call state. Click Cancel to undo a changed setting and return to the *Access Control* screen.

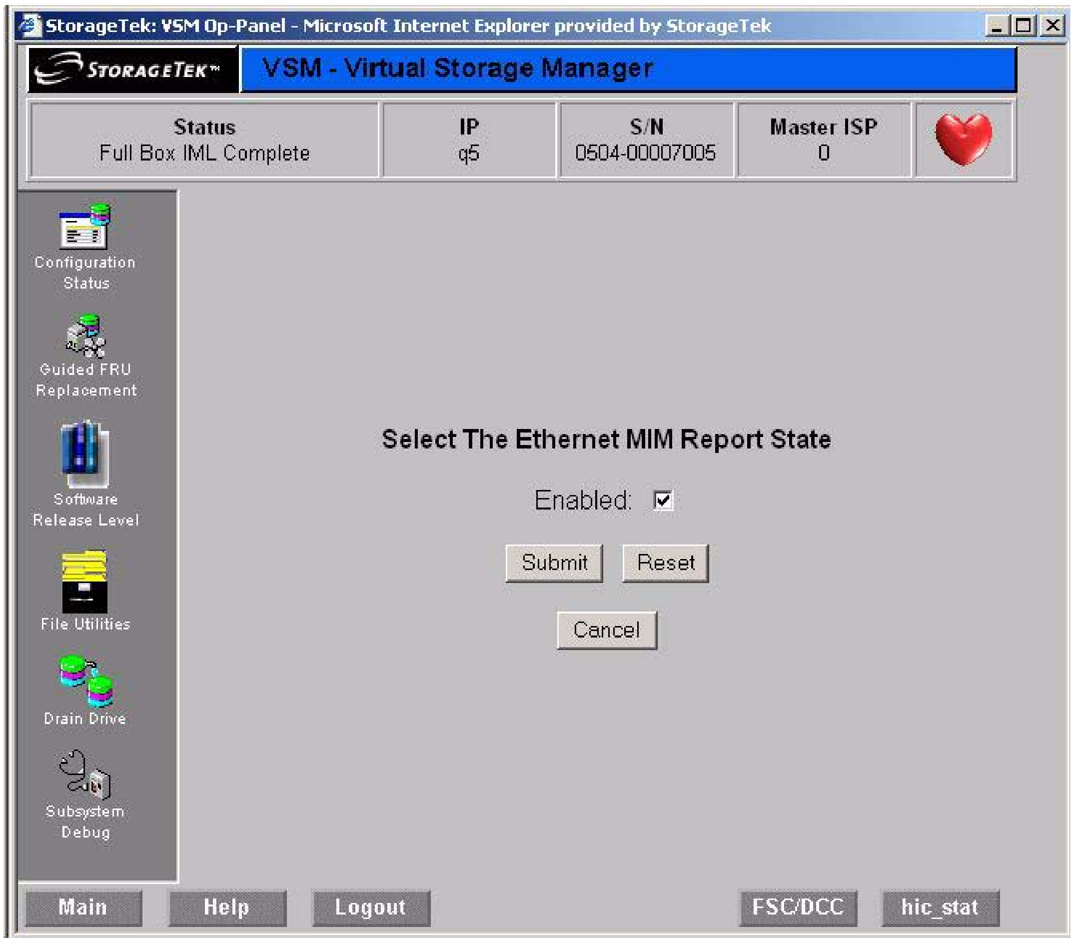


Figure C-30. Select Ethernet MIM Report State Screen

Set MIM Test Call Interval Screen

To access the *Set MIM Test Call Interval* screen, click the active field to the right of the Test Call Interval text under the SIM / MIM heading on the *Access Control* screen, Figure C-20 on page C-202.

When you select settings from the pull-down lists and click Submit, a subscreen displays with the message **Send MIM Test Response Pending**, then another displays with the message **Set MIM Test Call Interval Successful**. Click Reset to return to the default MIM test call state. Click Cancel to undo a changed setting and return to the *Access Control* screen.

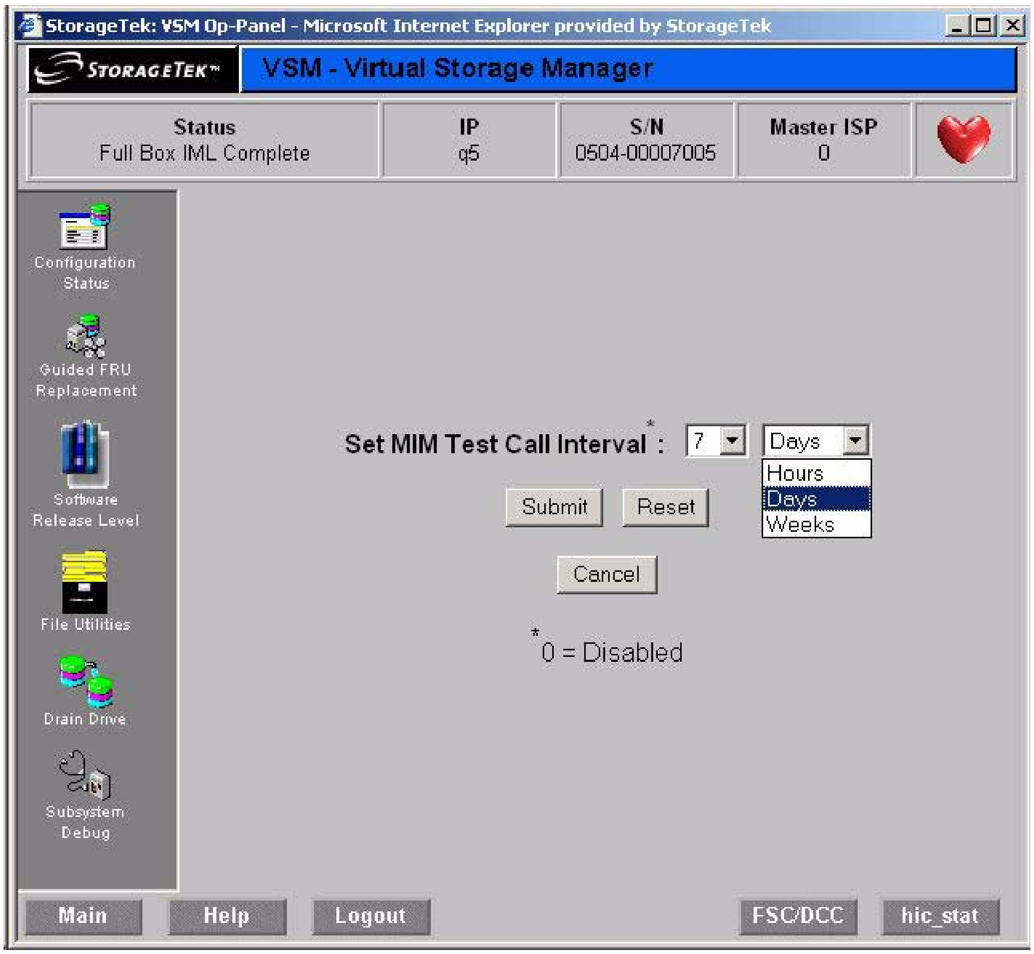


Figure C-31. Set MIM Test Call Interval Screen

Enter Primary Phone Number Screen

To access the *Enter Primary Phone Number* screen, click the active field to the right of the Primary Phone Number text under the SIM / MIM heading on the *Access Control* screen, Figure C-20 on page C-202.

When you select a phone type (tone or pulse), type a valid phone number in the data entry field, and click Submit, a subscreen displays with the message **Set Primary Phone Number Successful**. See "Setting Passwords and Defining ServiceTek+ Parameters" on page 1-51 for details on setting call-home phone numbers. Click Reset to delete keyed text and restore default settings. Click Cancel to delete keyed text and return to the *Access Control* screen.

To access the similar *Enter Secondary Phone Number* screen (not depicted in this appendix), click the active field to the right of the Secondary Phone Number text under the SIM / MIM heading on the *Access Control* screen.

Figure C-32. Enter Primary Phone Number Screen

Ethernet Setup Screen

To access the *Ethernet Setup* screen, click the Ethernet Setup text field on the *Configuration / Status Menu* screen, Figure C-7 on page C-189. Click the appropriate blue hotlink to displayed the following linked subscreens for setting various subsystem addresses:

- "Enter (VSM Private Network) IP Address Screen" on page C-216
- "Enter Subnet Address Screen" on page C-217
- "Enter Gateway Address Screen" on page C-218
- "Enter (Remote Maintenance) Server Address Screen" on page C-219.

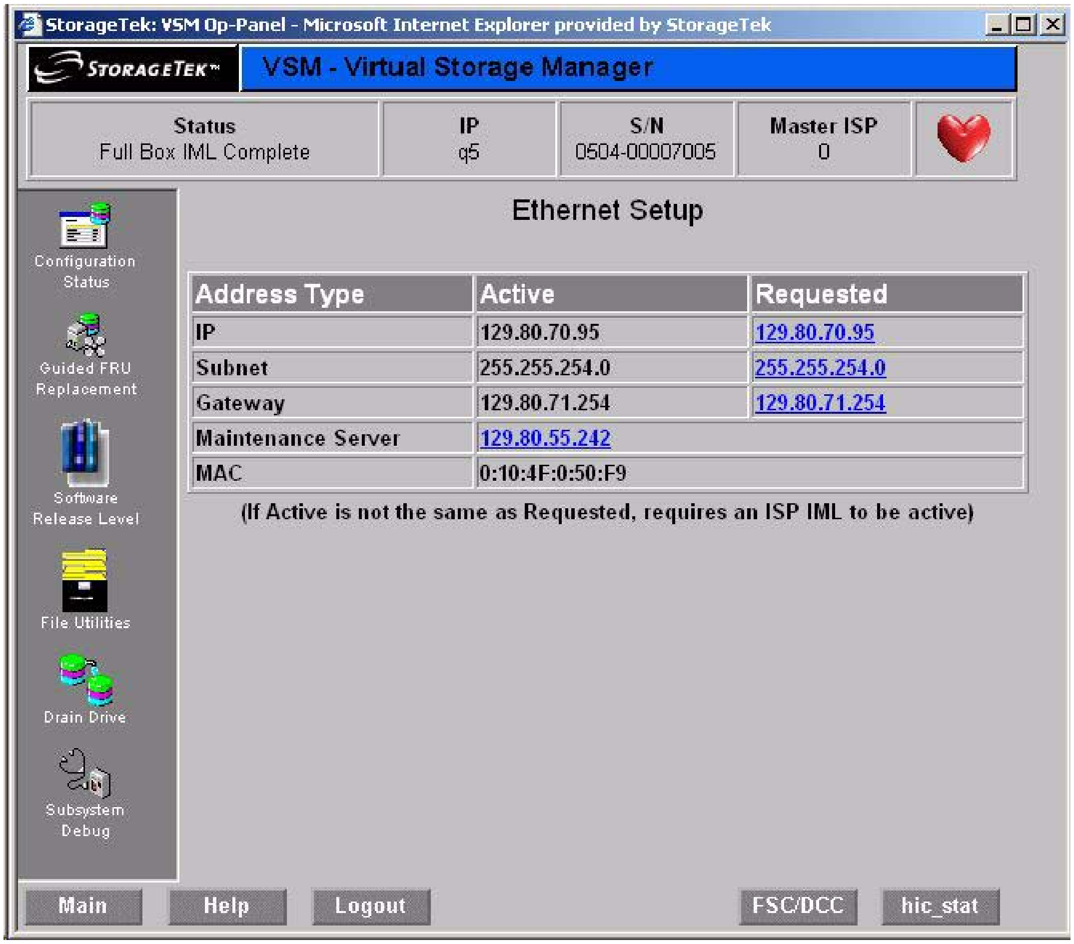


Figure C-33. Ethernet Setup Screen

Enter (VSM Private Network) IP Address Screen

To access the *Enter (VSM Private Network) IP Address* screen, click the blue IP address hotlink under the Requested heading on the *Ethernet Setup* screen, Figure C-33 on page C-215.

When you key in a valid VSM private network IP address and click Submit, a subscreen displays with the message **Set IP Address Successful**. Click Return to delete keyed text and return to the *Ethernet Setup* screen.

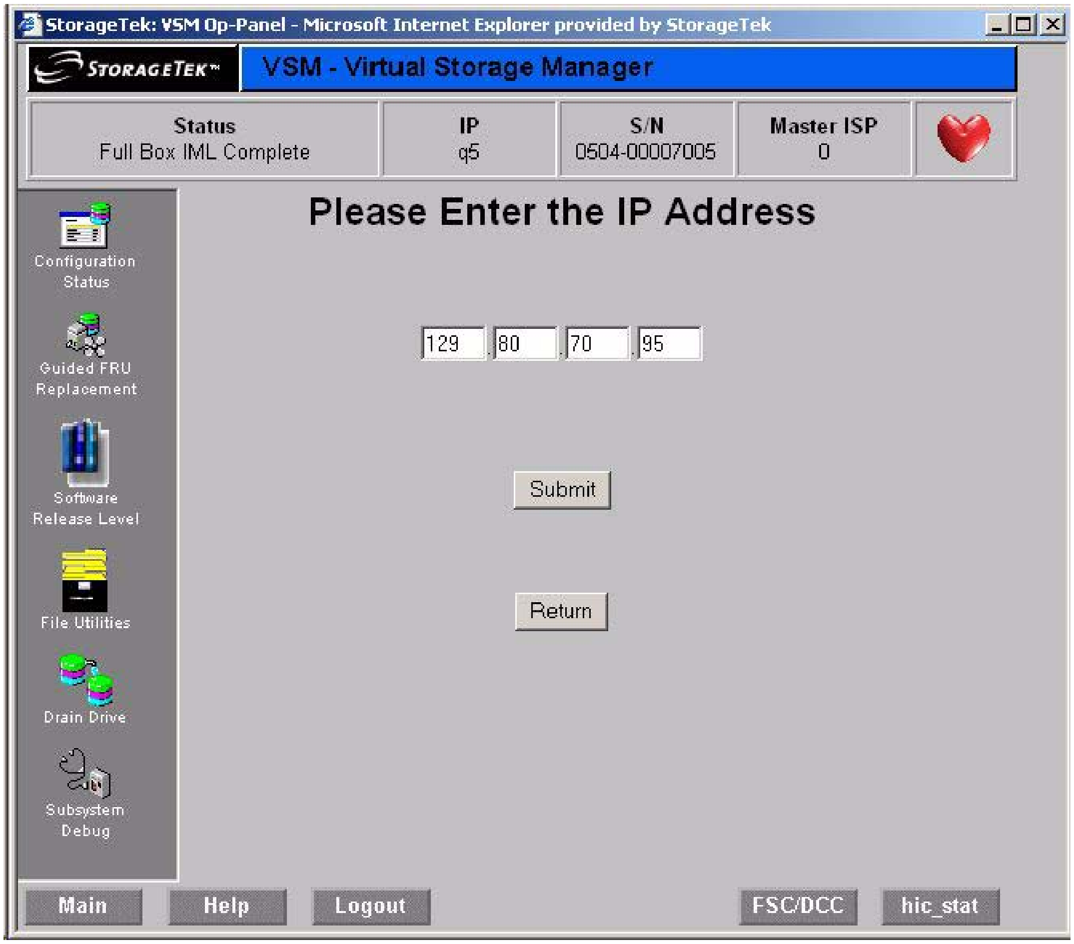


Figure C-34. Enter (VSM Private Network) IP Address Screen

Enter Subnet Address Screen

To access the *Enter Subnet Address* screen, click the blue subnet IP address hotlink under the Requested heading on the *Ethernet Setup* screen, Figure C-33 on page C-215.

When you key in a valid subnet IP address and click Submit, a subscreen displays with the message **Set Subnet Address Successful**. Click Return to delete keyed text and return to the *Ethernet Setup* screen.

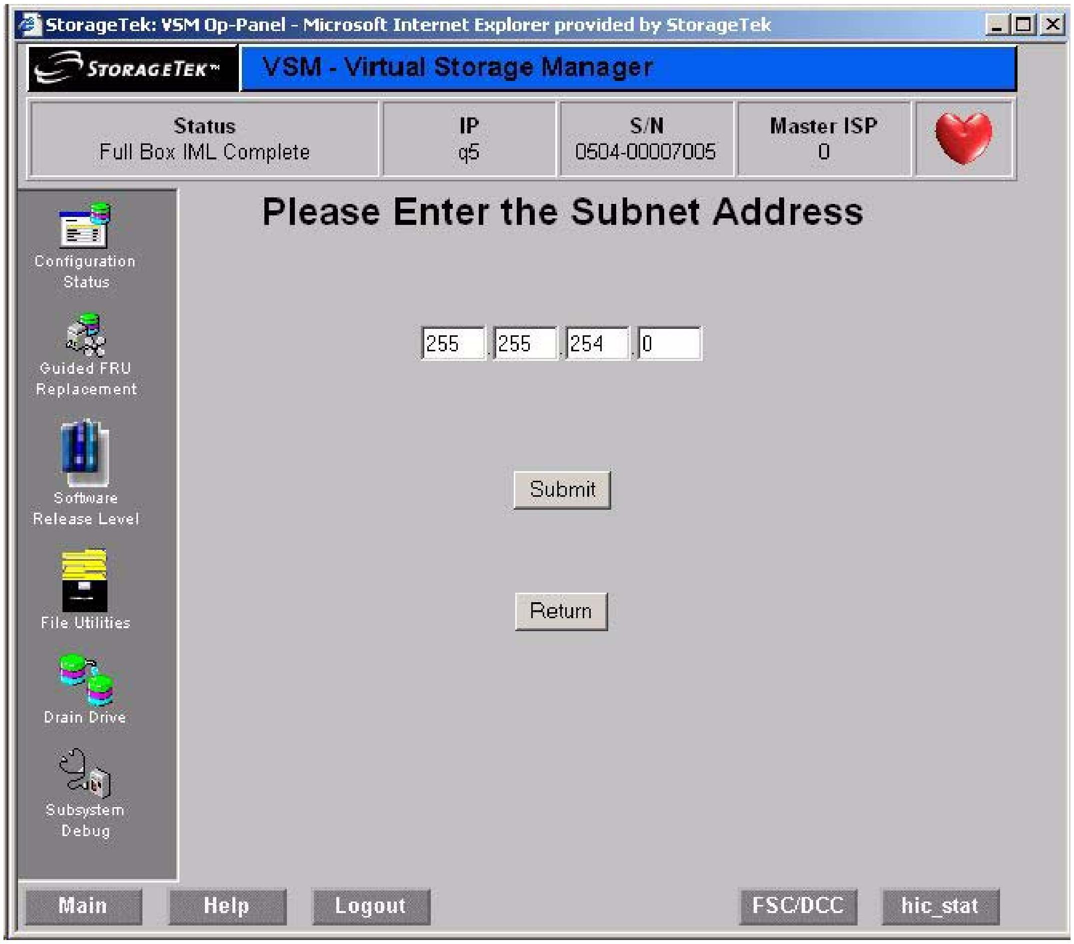


Figure C-35. Enter Subnet Address Screen

Enter Gateway Address Screen

To access the *Enter Gateway Address* screen, click the blue gateway IP address hotlink under the Requested heading on the *Ethernet Setup* screen, Figure C-33 on page C-215.

When you key in a valid gateway IP address and click Submit, a subscreen displays with the message **Set Gateway Address Successful**. Click Return to delete keyed text and return to the *Ethernet Setup* screen.

Figure C-36. Enter Gateway Address Screen

Enter (Remote Maintenance) Server Address Screen

To access the *Enter (Remote Maintenance) Server Address* screen, click the blue maintenance server IP address hotlink under the Requested heading on the *Ethernet Setup* screen, Figure C-33 on page C-215.

When you key in a valid maintenance server address and click Submit, a subscreen displays with the message **Set Server Address Successful**. Click Return to delete keyed text and return to the *Ethernet Setup* screen.

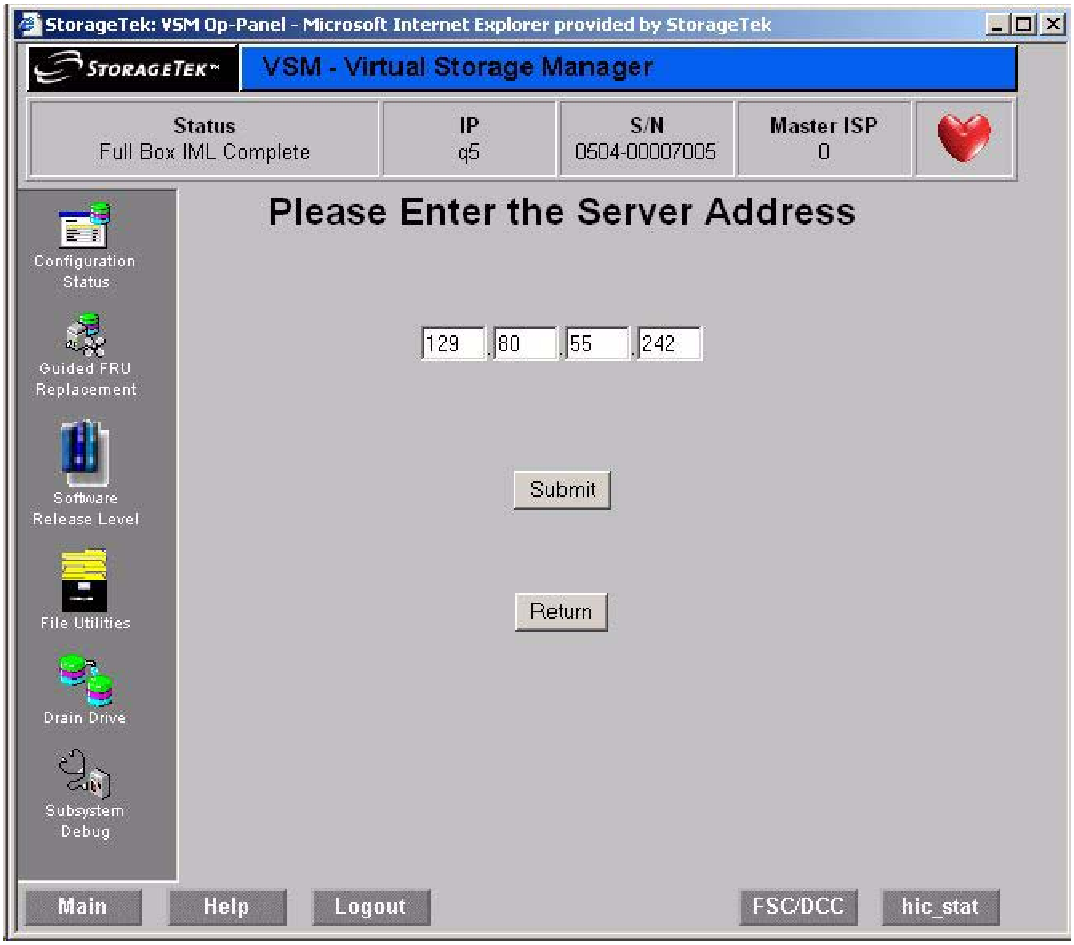
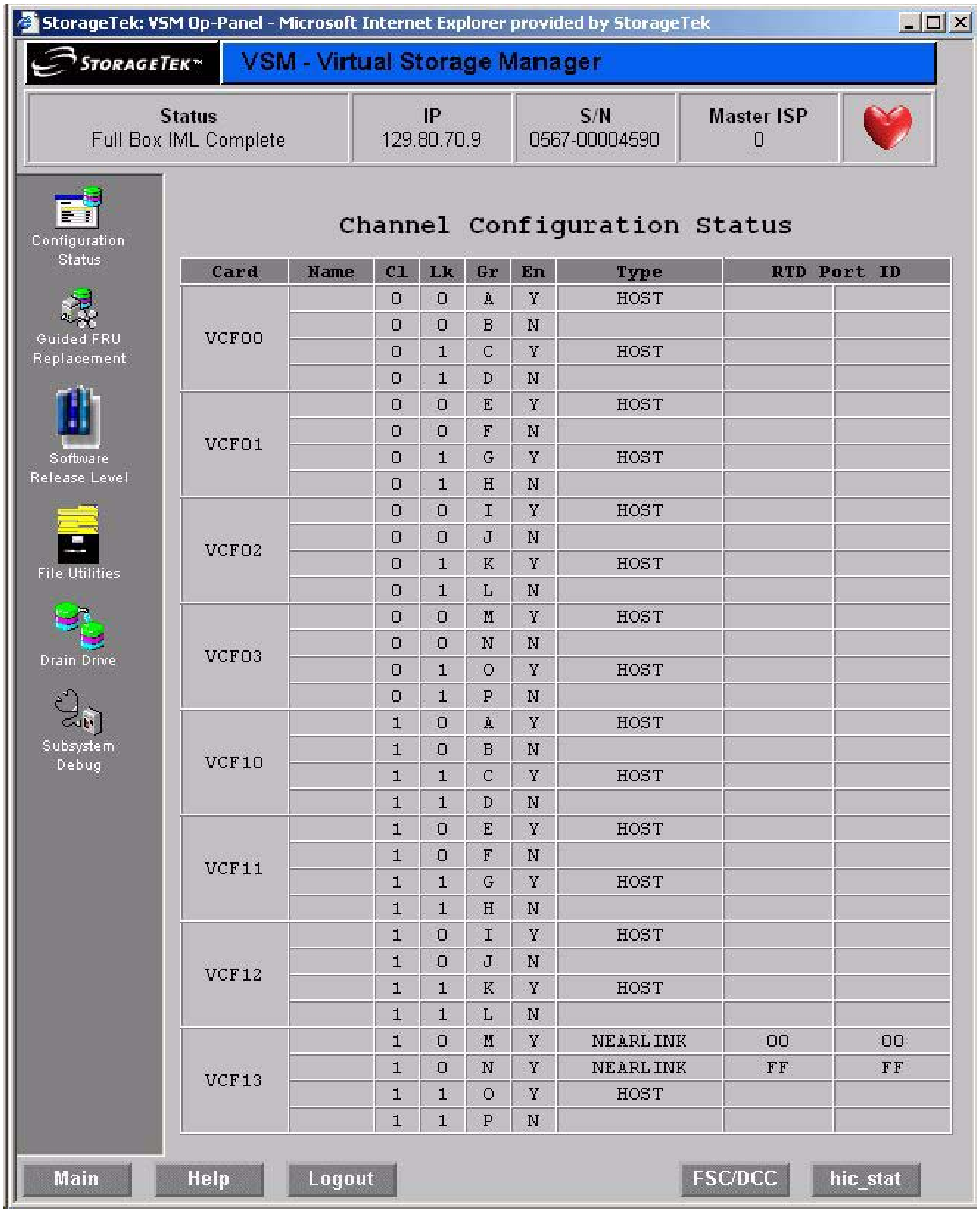


Figure C-37. Enter (Remote Maintenance) Server Address Screen

Channel Configuration Status Screen

To access the *Channel Configuration Status* screen, click the active Channel Status text field on the *Configuration / Status Menu* screen, Figure C-7 on page C-189.



Card	Name	Cl	Lk	Gr	En	Type	RTD Port ID	
VCF00		0	0	A	Y	HOST		
		0	0	B	N			
		0	1	C	Y	HOST		
		0	1	D	N			
VCF01		0	0	E	Y	HOST		
		0	0	F	N			
		0	1	G	Y	HOST		
		0	1	H	N			
VCF02		0	0	I	Y	HOST		
		0	0	J	N			
		0	1	K	Y	HOST		
		0	1	L	N			
VCF03		0	0	M	Y	HOST		
		0	0	N	N			
		0	1	O	Y	HOST		
		0	1	P	N			
VCF10		1	0	A	Y	HOST		
		1	0	B	N			
		1	1	C	Y	HOST		
		1	1	D	N			
VCF11		1	0	E	Y	HOST		
		1	0	F	N			
		1	1	G	Y	HOST		
		1	1	H	N			
VCF12		1	0	I	Y	HOST		
		1	0	J	N			
		1	1	K	Y	HOST		
		1	1	L	N			
VCF13		1	0	M	Y	NEARLINK	00	00
		1	0	N	Y	NEARLINK	FF	FF
		1	1	O	Y	HOST		
		1	1	P	N			

Figure C-38. Channel Configuration Status Screen

Channel Configuration and RTD Path Validation Screen

To access the *Channel Configuration and RTD Path Validation* screen, click on a VCF card shown on the *Channel Configuration Status* screen, Figure C-38 on page C-220.

To set the configuration of a VCF card channel for host or Nearlink use, select the channel (0 or 1) and type from the pull-down lists, then click Continue to display a subscreen with the message **Success**, indicating the configuration change completed successfully. Click Cancel to undo changed settings and return to the *Channel Configuration Status* screen.

To validate a RTD path, select a validation path (primary or secondary) from the pull-down list, then click Validate RTD Path to display a subscreen with the message **Channel path *n* was successfully validated**, indicating the selected RTD path is operational.

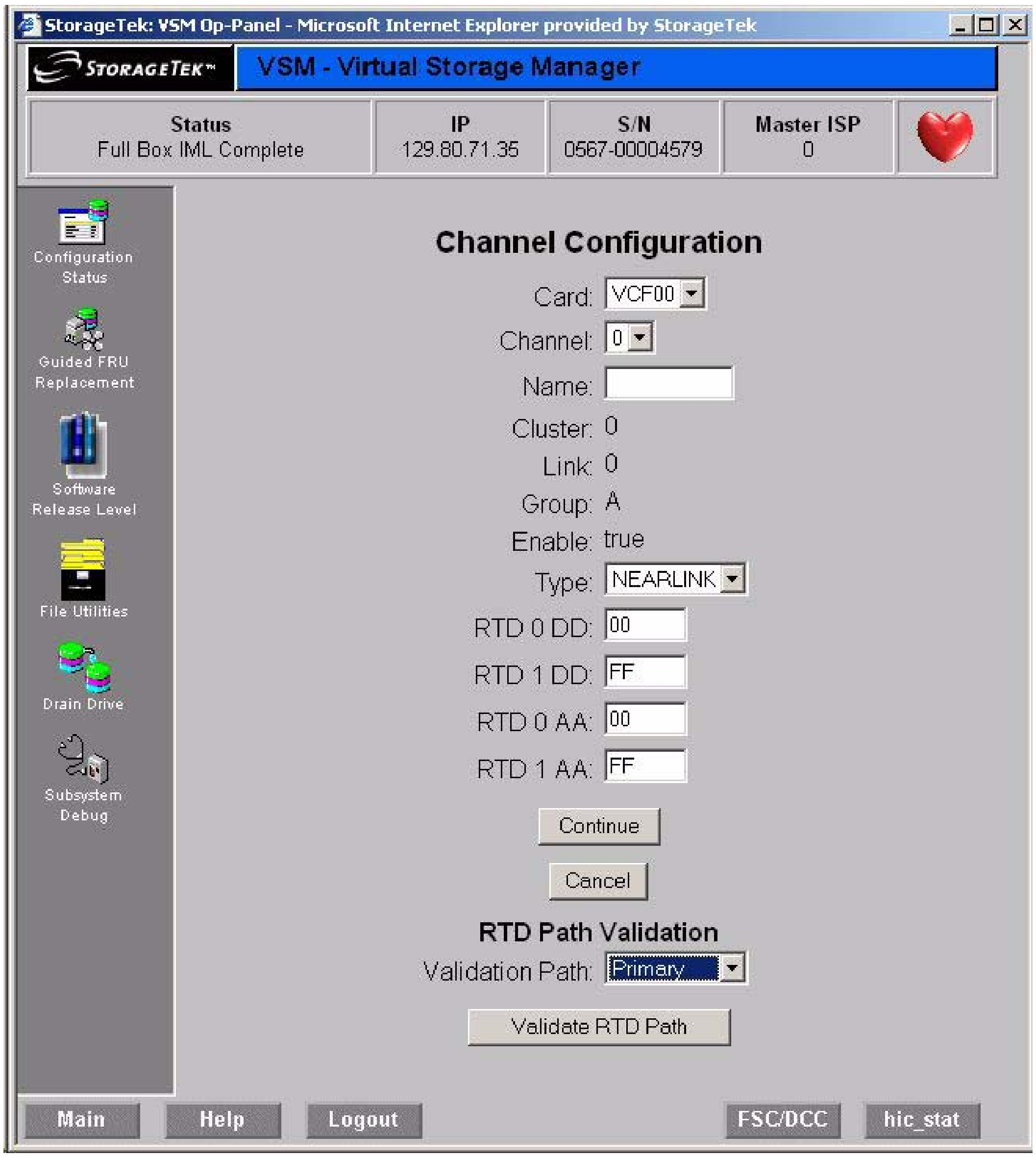


Figure C-39. Channel Configuration and RTD Path Validation Screen

Real Tape Drive Status Screen

To access the *Real Tape Drive Status* screen, click the active Real Tape Drive Status text field on the *Configuration / Status Menu* screen, Figure C-7 on page C-189. To validate a real tape drive (RTD), click the active button in the Valid column for the RTD. The VTSS support facility validates the RTD, then displays a subscreen with the message **RTD *n* was successfully validated. See hic_stat for details.**

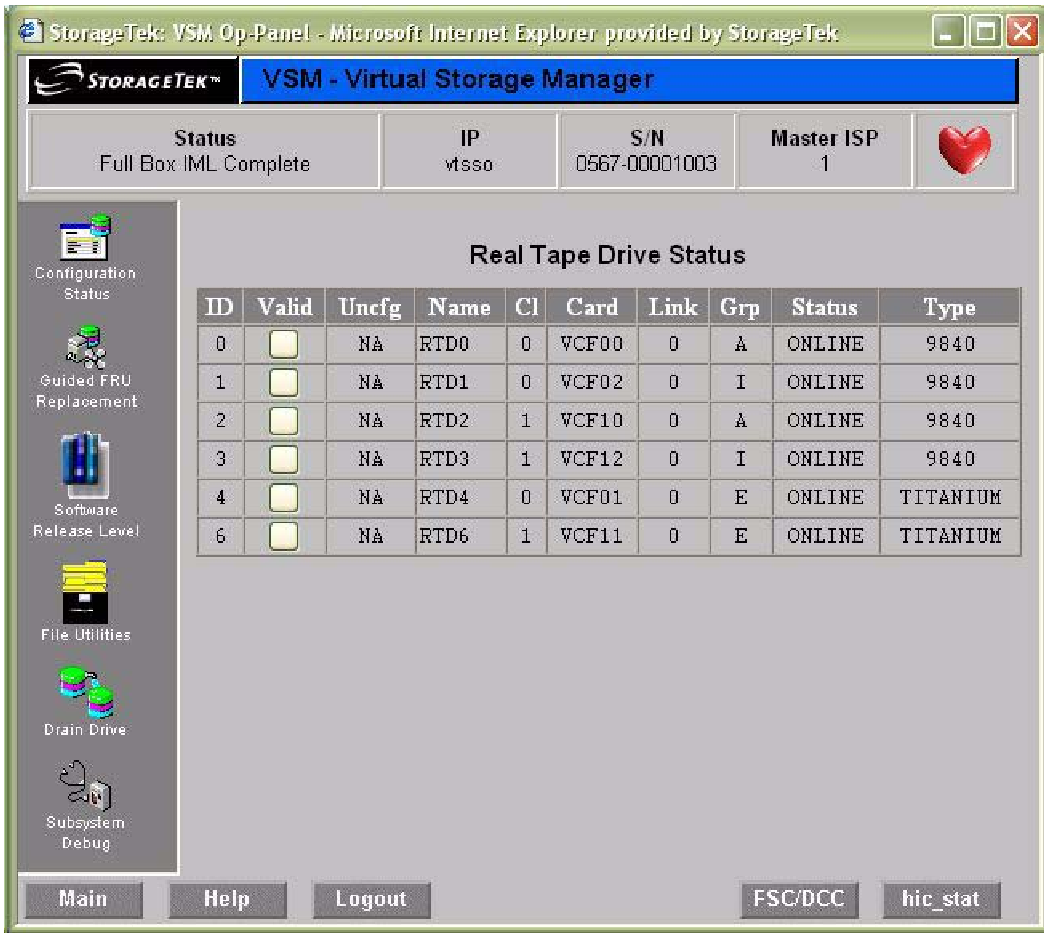


Figure C-40. Real Tape Drive Status Screen

ISP Information Screen

To access the *ISP Information* screen, click the active ISP Information text field on the *Configuration / Status Menu* screen, Figure C-7 on page C-189.

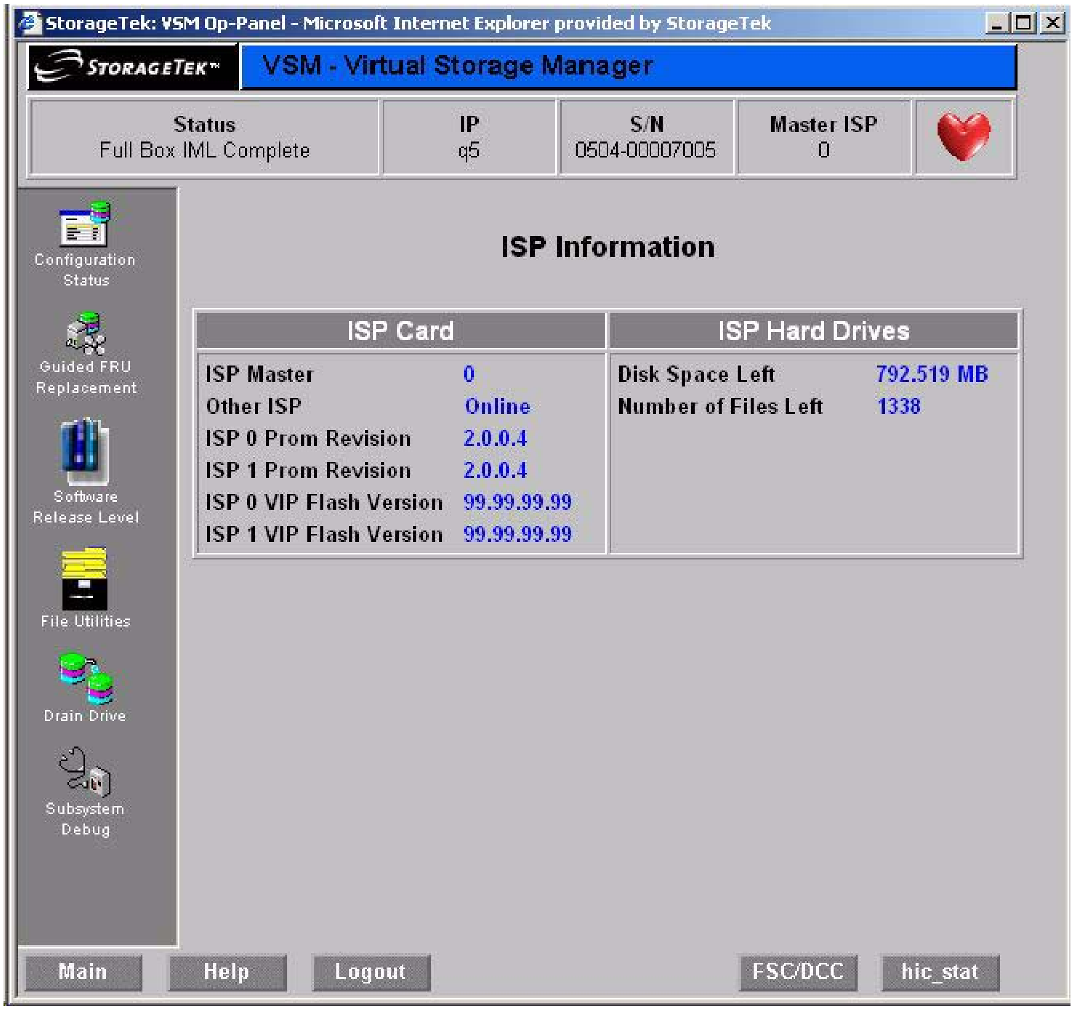


Figure C-41. ISP Information Screen

DAC State Screen

To access the *DAC State* screen, click the active DAC State text field on the *Configuration / Status Menu* screen, Figure C-7 on page C-189.

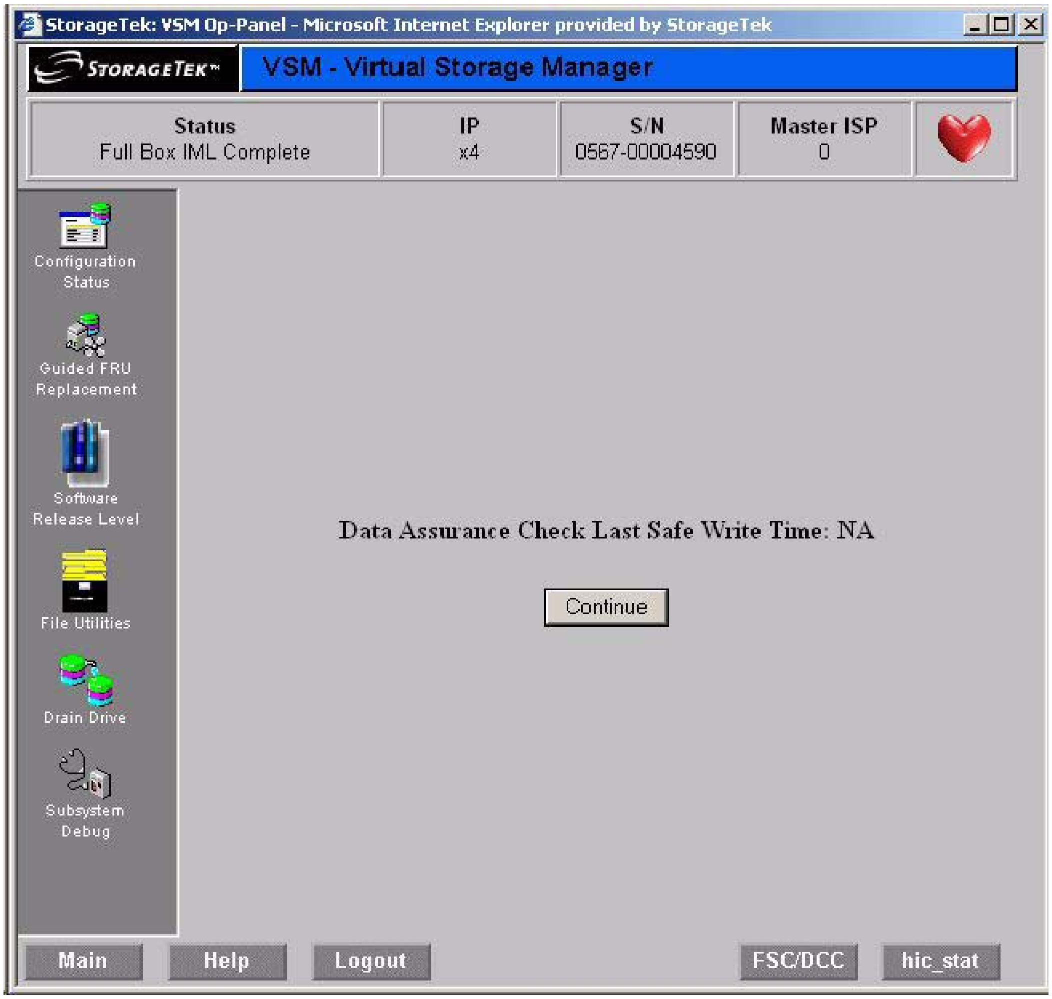


Figure C-42. DAC State Screen

FRU Status Screen (1 of 7)

To access the *FRU Status* screen, click the active FRU Status text field on the *Configuration / Status Menu* screen, Figure C-7 on page C-189. Use the onscreen scroll bar to view additional pages of FRU status information, which are not depicted here. See “FRU Identifiers” on page B-172 for a complete listing of VSM5-VTSS FRUs and FRU IDs.

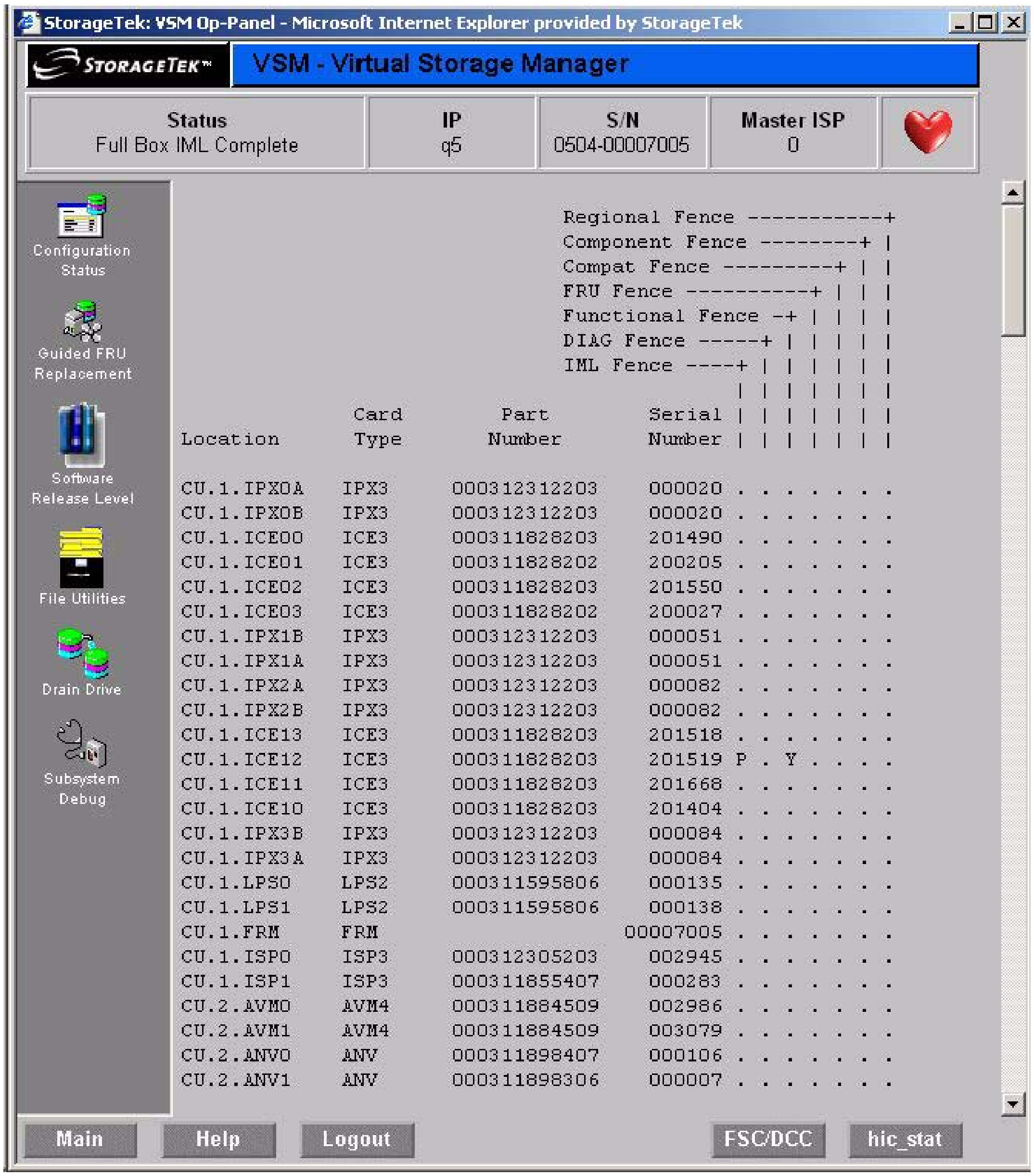


Figure C-43. FRU Status Screen (1 of 7)

Drain Drive Screen (1 of 2)

To access the *Drain Drive* screen, click the active Drain Drive text field on the *CSE Main Menu* screen, Figure C-6 on page C-188. When you select an array to drain and click Submit, a subscreen displays with the message **Drain In Progress**, then another subscreen displays with the message **Drain Completed Successfully.**

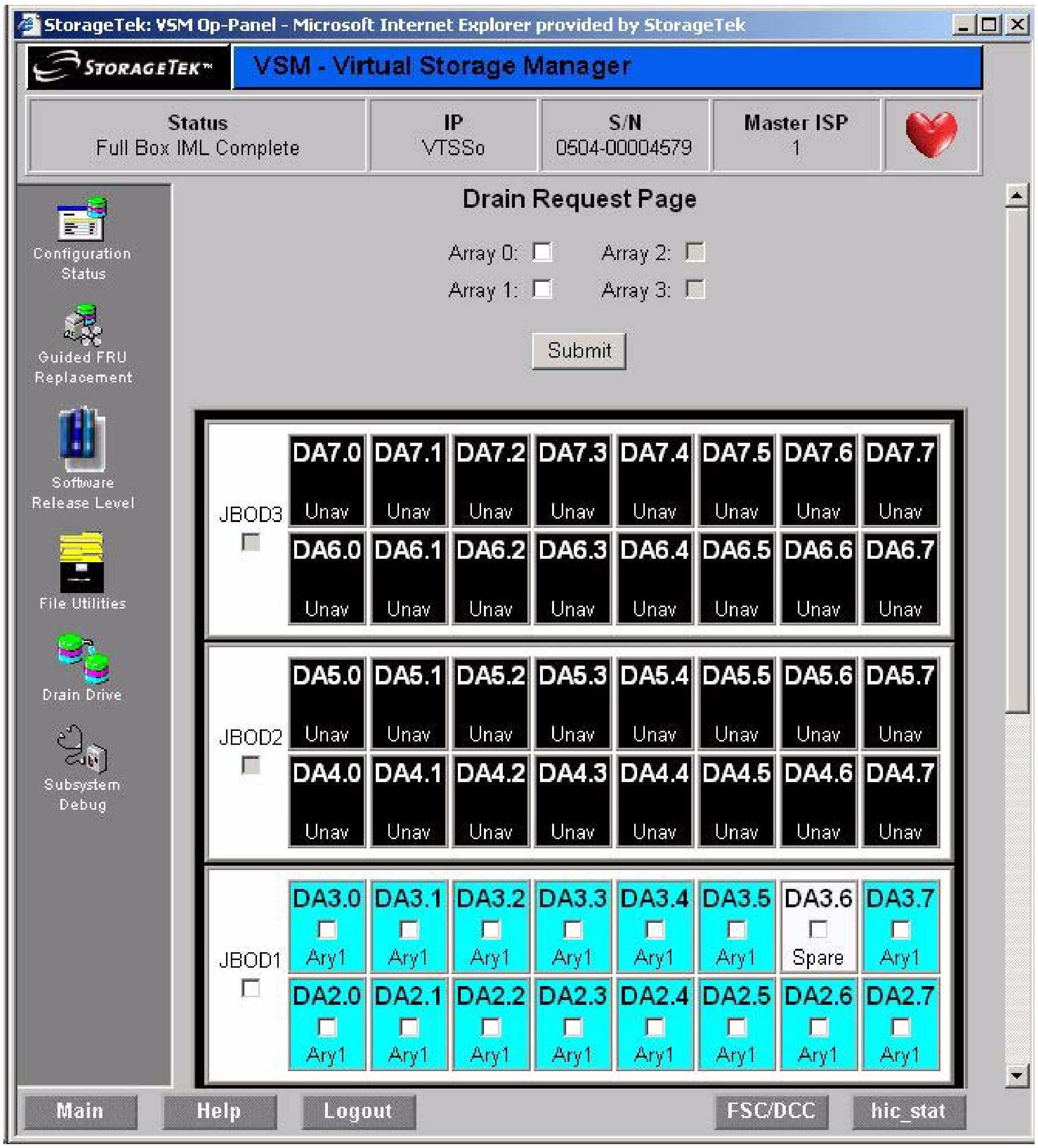


Figure C-44. Drain Drive Screen (1 of 2)

Drain Drive Screen (2 of 2)

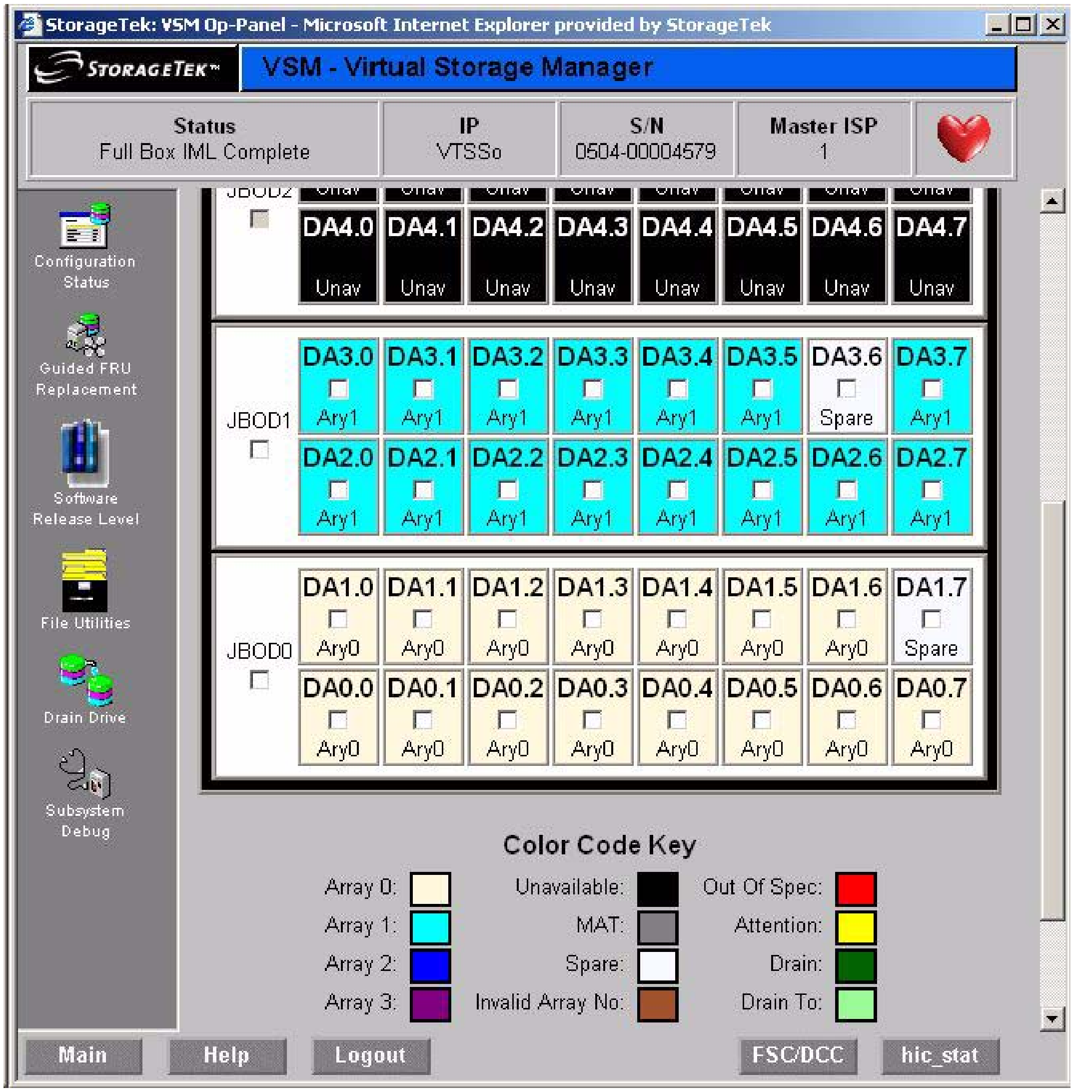


Figure C-45. Drain Drive Screen (2 of 2)

GFR – Main Menu Screen

To access the *GFR - Main Menu* screen, click the Guide FRU Replacement text field on the *CSE Main Menu*, Figure C-6 on page C-188.

At the screen below, click the various text fields shown onscreen to display the following linked subscreens, which enable you to complete additional tasks:

- "GFR – Composite Failure Events Screen" on page C-229
- "GFR – Field Replaceable Units Entry Screen" on page C-230
- "GFR – Run Time Options Screen" on page C-243
- "GFR – Add Drive Tray Units Screen" on page C-244
- "GFR – Remove Drive Tray Units Screen" on page C-245

Figure C-46. GFR – Main Menu Screen

GFR – Composite Failure Events Screen

To access the *GFR - Composite Failure Events* screen, click the List Composite Failure Events (CFE) text field on the *GFR - Main Menu* screen, Figure C-46 on page C-228.

At the screen below, click a CFE to highlight its active field as shown, and to display a list of suspect FRUs on the right side of the screen. Click Delete to delete the highlighted CFE from the VTSS support facility database. Or, click the Rplc radio button next to a suspect FRU to replaces the Delete button with a Submit button, which enables you to access the appropriate GFR screen for replacing the selected FRU.

Figure C-47. GFR – Composite Failure Events Screen

GFR – Field Replaceable Units Entry Screen

To access the *GFR - Field Replaceable Units Entry* screen, click the List Field Replaceable Units (FRU) text field on the *GFR - Main Menu* screen, Figure C-46 on page C-228.

At the screen below, click any control unit or disk array tray shown on the left side of the screen to display the FRUs located in that tray on one of these 11 linked subscreens:

- "GFR – Field Replaceable Units: Control Unit Lower Tray 0 Screen" on page C-231
- "GFR – Field Replaceable Units: Control Unit Cluster Tray 1 Screen" on page C-232
- "GFR – Field Replaceable Units: Control Unit Cache Tray 2 Screen" on page C-233
- "GFR – Field Replaceable Units: Control Unit Upper Tray 3 Screen" on page C-234
- "GFR – Field Replaceable Units: Disk Array Tray 0 Screen" on page C-235
- "GFR – Field Replaceable Units: Disk Array Tray 1 Screen" on page C-236
- "GFR – Field Replaceable Units: Disk Array Tray 2 Screen" on page C-237
- "GFR – Field Replaceable Units: Disk Array Tray 3 Screen" on page C-238
- "GFR – Field Replaceable Units: Disk Array Tray 4 Screen" on page C-239
- "GFR – Field Replaceable Units: Disk Array Tray 5 Screen" on page C-240
- "GFR – Field Replaceable Units: Disk Array Tray 6 Screen" on page C-241
- "GFR – Field Replaceable Units: Disk Array Tray 7 Screen" on page C-242.

Figure C-48. GFR – Field Replaceable Units Entry Screen

GFR – Field Replaceable Units: Control Unit Lower Tray 0 Screen

To access the *GFR - Field Replaceable Units: Control Unit Lower Tray 0* screen, click the Lower Tray 0 text field under the Control Unit heading on the left side of the *GFR - Field Replaceable Units Entry* screen, Figure C-48 on page C-230.

At the screen below, click the radio button in the Replace column for the FRU you want to replace, then click Submit to display a subscreen with replacement instructions for the FRU. See "Replacing FRUs Using the GFR Facility" on page 3-86 for additional information on Guided FRU Replacement (GFR), and for screen captures showing replacement instructions for the FRU types listed below.

Click the radio button in the Diag column for a listed FRU and click Submit to run diagnostics on that FRU. Click the radio button in the Remove column for a listed FRU (if shown) and click Submit to initiate fencing of that FRU (as required) to allow it to be nondisruptively removed from the VTSS. Click the radio button in the Add column for a listed FRU (if shown) to allow a FRU of that type to be nondisruptively installed into the VTSS.

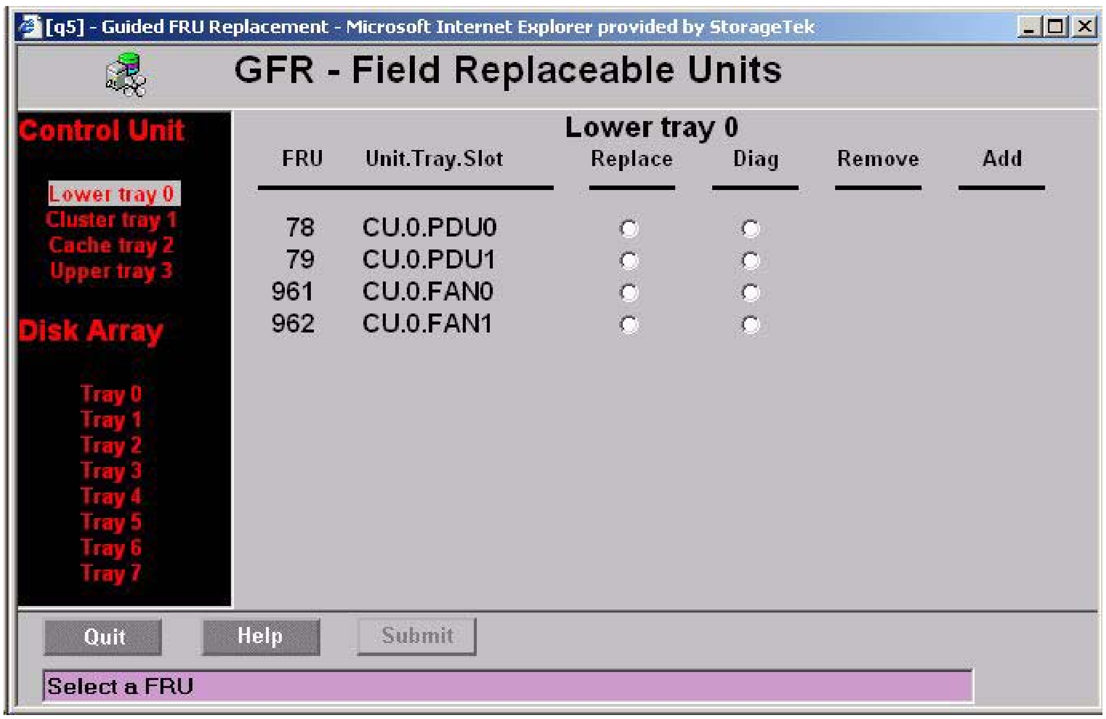


Figure C-49. GFR – Field Replaceable Units: Control Unit Lower Tray 0 Screen

GFR – Field Replaceable Units: Control Unit Cluster Tray 1 Screen

To access the *GFR - Field Replaceable Units: Control Unit Lower Tray 1* screen, click the Cluster Tray 1 text field under the Control Unit heading on the left side of the *GFR - Field Replaceable Units Entry* screen, Figure C-48 on page C-230.

At the screen below, click the radio button in the Replace column for the FRU you want to replace, then click Submit to display a subscreen with replacement instructions for the FRU. See "Replacing FRUs Using the GFR Facility" on page 3-86 for additional information on Guided FRU Replacement (GFR), and for screen captures showing replacement instructions for the FRU types listed below.

Click the radio button in the Diag column for a listed FRU and click Submit to run diagnostics on that FRU. Click the radio button in the Remove column for a listed FRU (if shown) and click Submit to initiate fencing of that FRU (as required) to allow it to be nondisruptively removed from the VTSS. Click the radio button in the Add column for a listed FRU (if shown) to allow a FRU of that type to be nondisruptively installed into the VTSS.

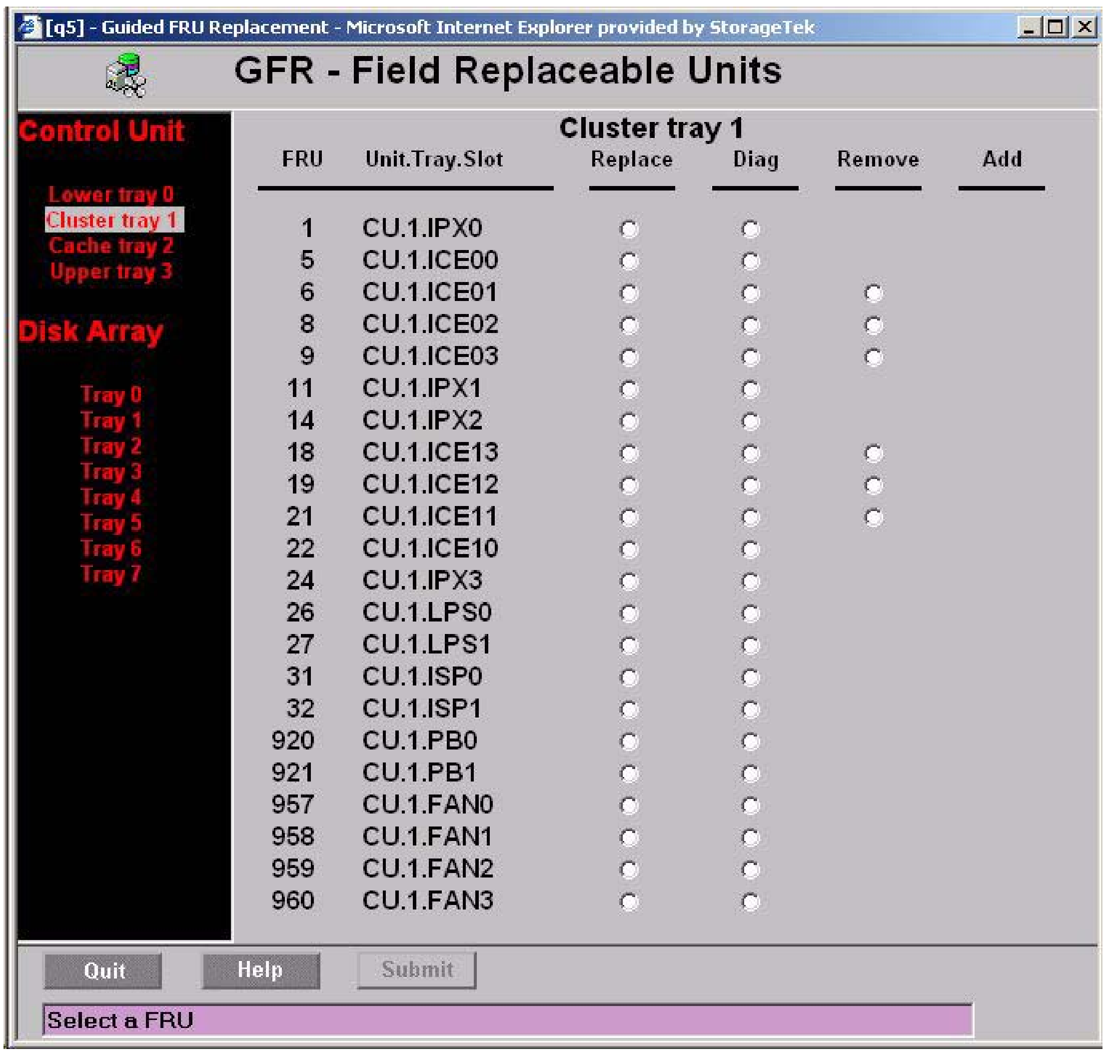


Figure C-50. GFR – Field Replaceable Units: Control Unit Cluster Tray 1 Screen

GFR – Field Replaceable Units: Control Unit Cache Tray 2 Screen

To access the *GFR - Field Replaceable Units: Control Unit Cache Tray 2* screen, click the Cache Tray 2 text field under the Control Unit heading on the left side of the *GFR - Field Replaceable Units Entry* screen, Figure C-48 on page C-230.

At the screen below, click the radio button in the Replace column for the FRU you want to replace, then click Submit to display a subscreen with replacement instructions for the FRU. See "Replacing FRUs Using the GFR Facility" on page 3-86 for additional information on Guided FRU Replacement (GFR), and for screen captures showing replacement instructions for the FRU types listed below.

Click the radio button in the Diag column for a listed FRU and click Submit to run diagnostics on that FRU. Click the radio button in the Remove column for a listed FRU (if shown) and click Submit to initiate fencing of that FRU (as required) to allow it to be nondisruptively removed from the VTSS. Click the radio button in the Add column for a listed FRU (if shown) to allow a FRU of that type to be nondisruptively installed into the VTSS.

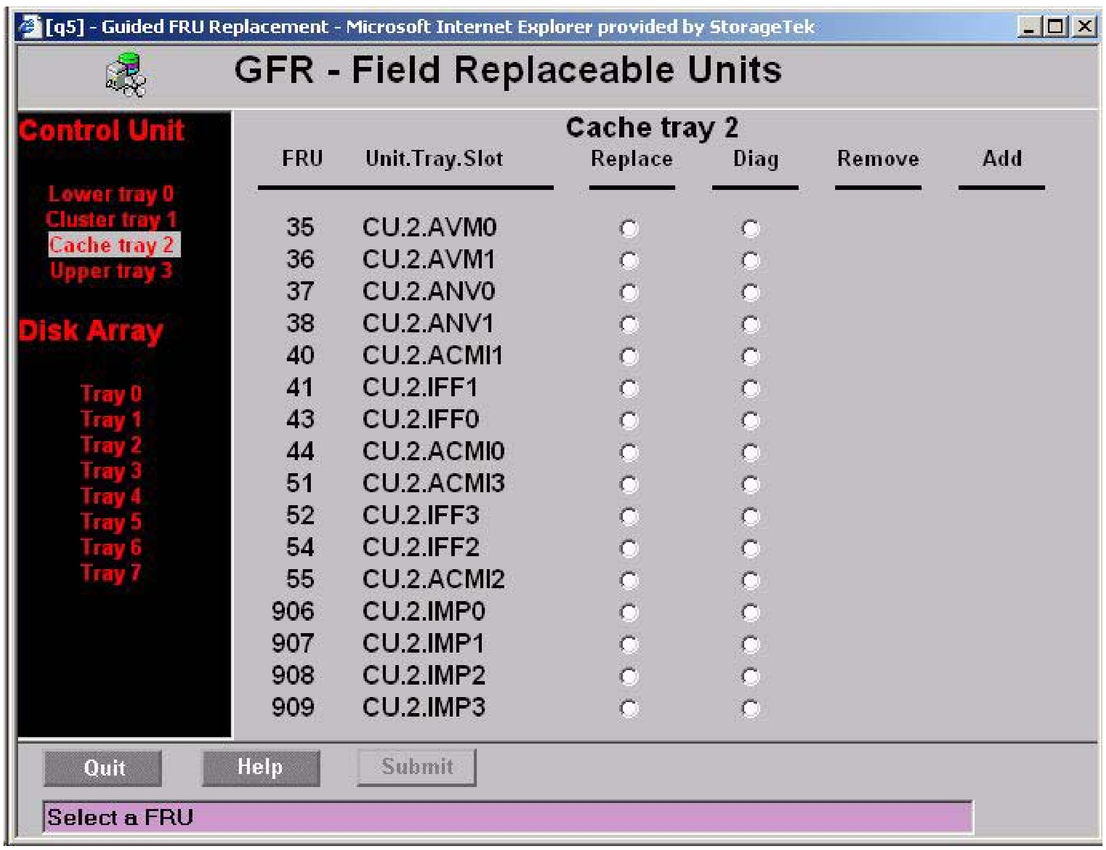


Figure C-51. GFR – Field Replaceable Units: Control Unit Cache Tray 2 Screen

GFR – Field Replaceable Units: Control Unit Upper Tray 3 Screen

To access the *GFR - Field Replaceable Units: Control Unit Upper Tray 3* screen, click the Upper Tray 3 text field under the Control Unit heading on the left side of the *GFR - Field Replaceable Units Entry* screen, Figure C-48 on page C-230.

At the screen below, click the radio button in the Replace column for the FRU you want to replace, then click Submit to display a subscreen with replacement instructions for the FRU. See "Replacing FRUs Using the GFR Facility" on page 3-86 for additional information on Guided FRU Replacement (GFR), and for screen captures showing replacement instructions for the FRU types listed below.

Click the radio button in the Diag column for a listed FRU and click Submit to run diagnostics on that FRU. Click the radio button in the Remove column for a listed FRU (if shown) and click Submit to initiate fencing of that FRU (as required) to allow it to be nondisruptively removed from the VTSS. Click the radio button in the Add column for a listed FRU (if shown) to allow a FRU of that type to be nondisruptively installed into the VTSS.

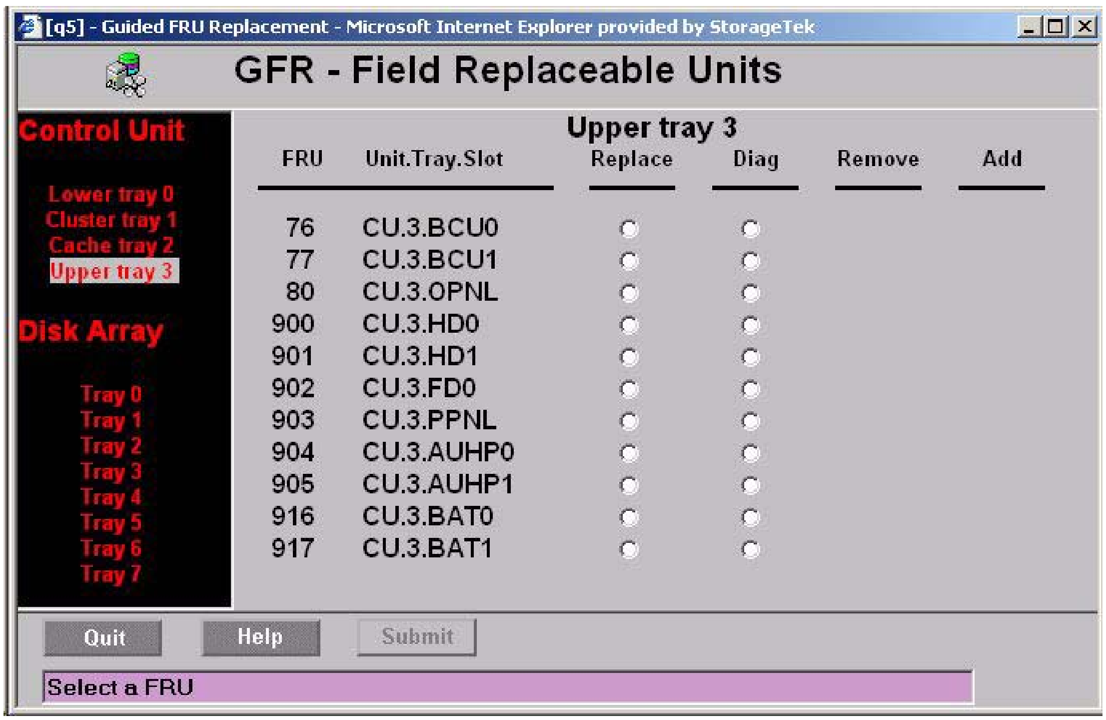


Figure C-52. GFR – Field Replaceable Units: Control Unit Upper Tray 3 Screen

GFR – Field Replaceable Units: Disk Array Tray 0 Screen

To access the *GFR - Field Replaceable Units: Disk Array Tray 0* screen, click the Tray 0 text field under the Disk Array heading on the left side of the *GFR - Field Replaceable Units Entry* screen, Figure C-48 on page C-230.

At the screen below, click the radio button in the Replace column for the FRU you want to replace, then click Submit to display a subscreen with replacement instructions for the FRU. See "Replacing FRUs Using the GFR Facility" on page 3-86 for additional information on Guided FRU Replacement (GFR), and for screen captures showing replacement instructions for the FRU types listed below.

Click the radio button in the Diag column for a listed FRU and click Submit to run diagnostics on that FRU. Click the radio button in the Remove column for a listed FRU (if shown) and click Submit to initiate fencing of that FRU (as required) to allow it to be nondisruptively removed from the VTSS. Click the radio button in the Add column for a listed FRU (if shown) to allow a FRU of that type to be nondisruptively installed into the VTSS.

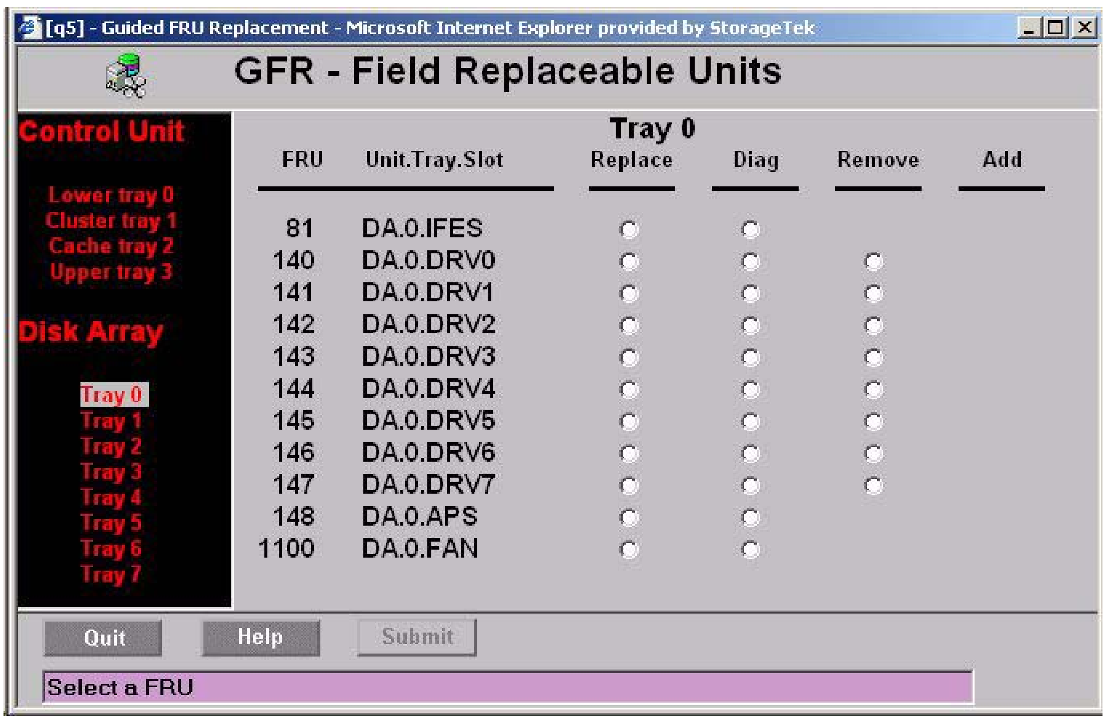


Figure C-53. GFR – Field Replaceable Units: Disk Array Tray 0 Screen

GFR – Field Replaceable Units: Disk Array Tray 1 Screen

To access the *GFR - Field Replaceable Units: Disk Array Tray 1* screen, click the Tray 1 text field under the Disk Array heading on the left side of the *GFR - Field Replaceable Units Entry* screen, Figure C-48 on page C-230.

At the screen below, click the radio button in the Replace column for the FRU you want to replace, then click Submit to display a subscreen with replacement instructions for the FRU. See "Replacing FRUs Using the GFR Facility" on page 3-86 for additional information on Guided FRU Replacement (GFR), and for screen captures showing replacement instructions for the FRU types listed below.

Click the radio button in the Diag column for a listed FRU and click Submit to run diagnostics on that FRU. Click the radio button in the Remove column for a listed FRU (if shown) and click Submit to initiate fencing of that FRU (as required) to allow it to be nondisruptively removed from the VTSS. Click the radio button in the Add column for a listed FRU (if shown) to allow a FRU of that type to be nondisruptively installed into the VTSS.

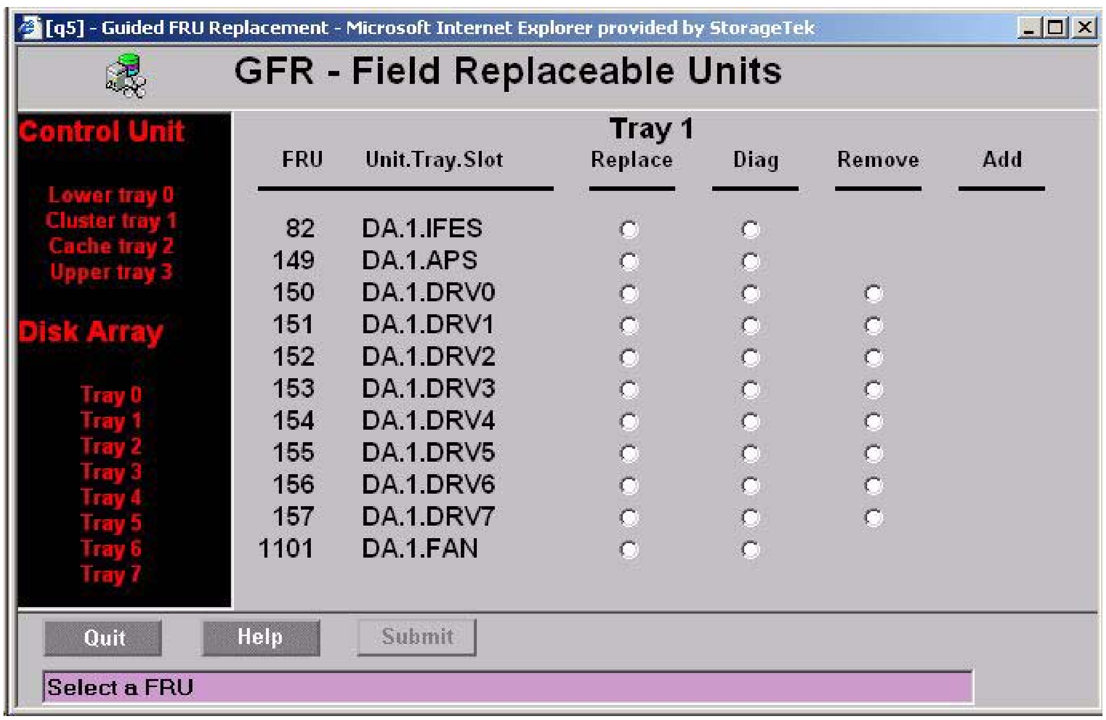


Figure C-54. GFR – Field Replaceable Units: Disk Array Tray 1 Screen

GFR – Field Replaceable Units: Disk Array Tray 2 Screen

To access the *GFR - Field Replaceable Units: Disk Array Tray 2* screen, click the Tray 2 text field under the Disk Array heading on the left side of the *GFR - Field Replaceable Units Entry* screen, Figure C-48 on page C-230.

At the screen below, click the radio button in the Replace column for the FRU you want to replace, then click Submit to display a subscreen with replacement instructions for the FRU. See "Replacing FRUs Using the GFR Facility" on page 3-86 for additional information on Guided FRU Replacement (GFR), and for screen captures showing replacement instructions for the FRU types listed below.

Click the radio button in the Diag column for a listed FRU and click Submit to run diagnostics on that FRU. Click the radio button in the Remove column for a listed FRU (if shown) and click Submit to initiate fencing of that FRU (as required) to allow it to be nondisruptively removed from the VTSS. Click the radio button in the Add column for a listed FRU (if shown) to allow a FRU of that type to be nondisruptively installed into the VTSS.

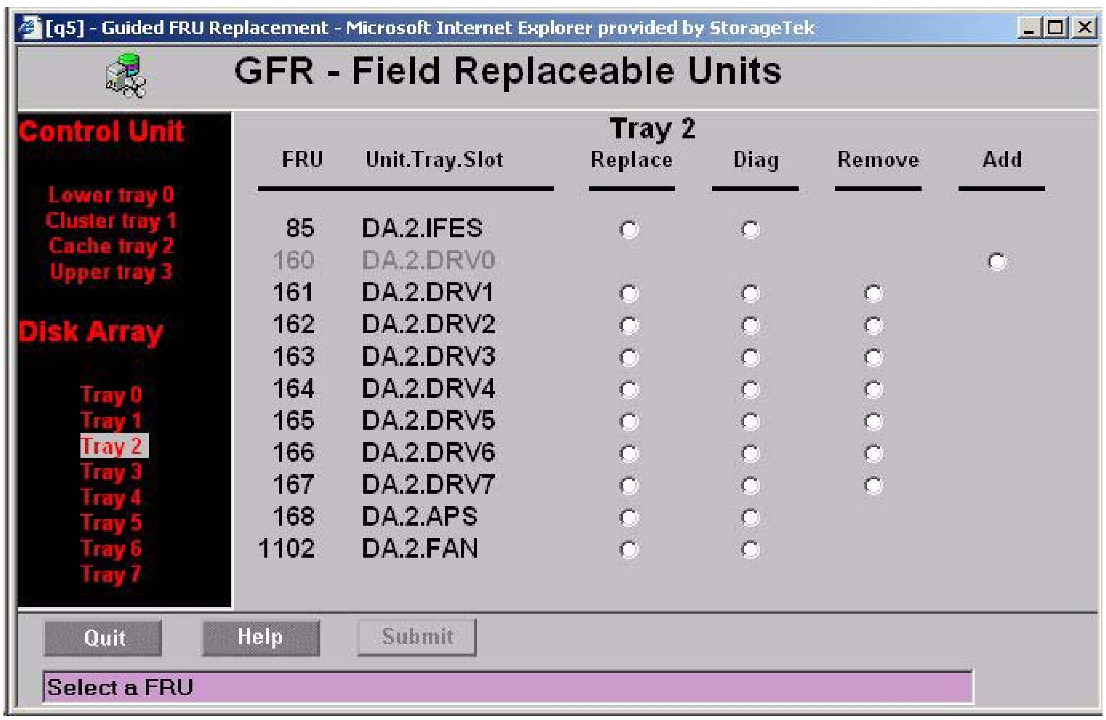


Figure C-55. GFR – Field Replaceable Units: Disk Array Tray 2 Screen

GFR – Field Replaceable Units: Disk Array Tray 3 Screen

To access the *GFR - Field Replaceable Units: Disk Array Tray 3* screen, click the Tray 3 text field under the Disk Array heading on the left side of the *GFR - Field Replaceable Units Entry* screen, Figure C-48 on page C-230.

At the screen below, click the radio button in the Replace column for the FRU you want to replace, then click Submit to display a subscreen with replacement instructions for the FRU. See "Replacing FRUs Using the GFR Facility" on page 3-86 for additional information on Guided FRU Replacement (GFR), and for screen captures showing replacement instructions for the FRU types listed below.

Click the radio button in the Diag column for a listed FRU and click Submit to run diagnostics on that FRU. Click the radio button in the Remove column for a listed FRU (if shown) and click Submit to initiate fencing of that FRU (as required) to allow it to be nondisruptively removed from the VTSS. Click the radio button in the Add column for a listed FRU (if shown) to allow a FRU of that type to be nondisruptively installed into the VTSS.

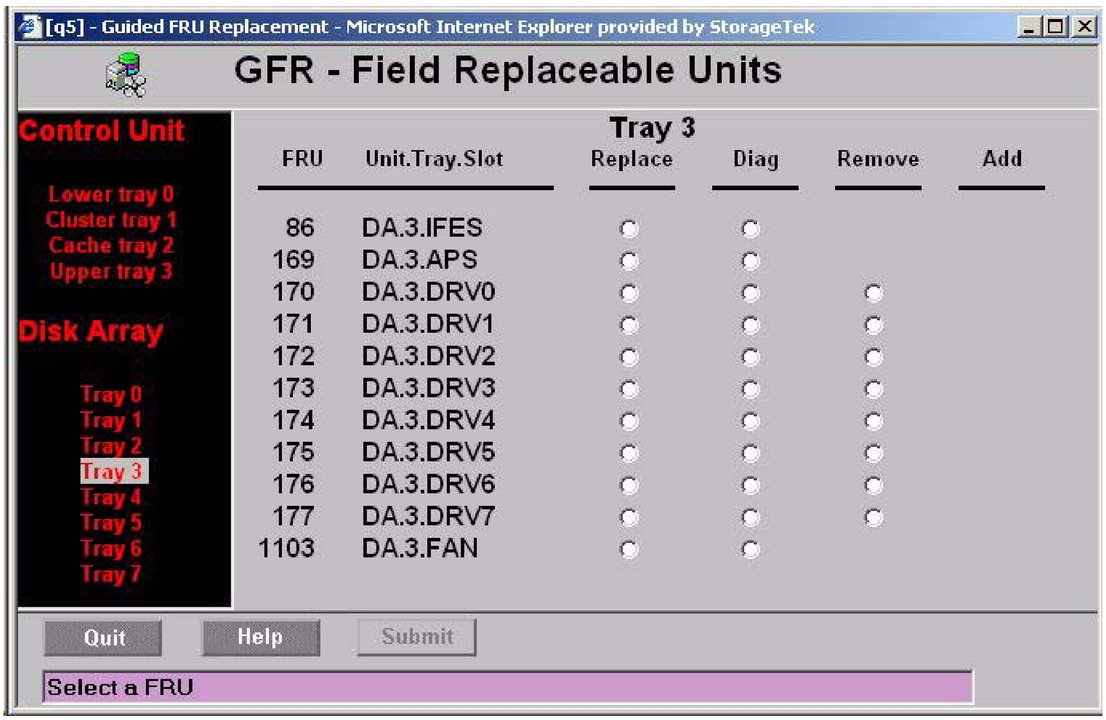


Figure C-56. GFR – Field Replaceable Units: Disk Array Tray 3 Screen

GFR – Field Replaceable Units: Disk Array Tray 4 Screen

To access the *GFR - Field Replaceable Units: Disk Array Tray 4* screen, click the Tray 4 text field under the Disk Array heading on the left side of the *GFR - Field Replaceable Units Entry* screen, Figure C-48 on page C-230.

At the screen below, click the radio button in the Replace column for the FRU you want to replace, then click Submit to display a subscreen with replacement instructions for the FRU. See "Replacing FRUs Using the GFR Facility" on page 3-86 for additional information on Guided FRU Replacement (GFR), and for screen captures showing replacement instructions for the FRU types listed below.

Click the radio button in the Diag column for a listed FRU and click Submit to run diagnostics on that FRU. Click the radio button in the Remove column for a listed FRU (if shown) and click Submit to initiate fencing of that FRU (as required) to allow it to be nondisruptively removed from the VTSS. Click the radio button in the Add column for a listed FRU (if shown) to allow a FRU of that type to be nondisruptively installed into the VTSS.

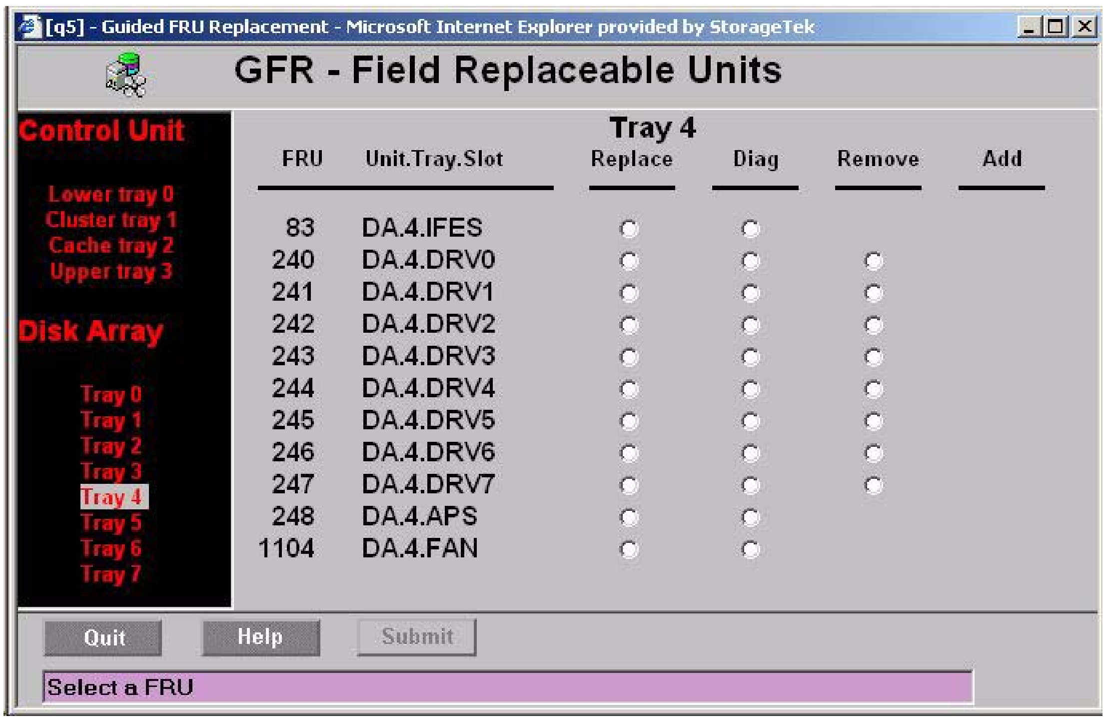


Figure C-57. GFR – Field Replaceable Units: Disk Array Tray 4 Screen

GFR – Field Replaceable Units: Disk Array Tray 5 Screen

To access the *GFR - Field Replaceable Units: Disk Array Tray 5* screen, click the Tray 5 text field under the Disk Array heading on the left side of the *GFR - Field Replaceable Units Entry* screen, Figure C-48 on page C-230.

At the screen below, click the radio button in the Replace column for the FRU you want to replace, then click Submit to display a subscreen with replacement instructions for the FRU. See "Replacing FRUs Using the GFR Facility" on page 3-86 for additional information on Guided FRU Replacement (GFR), and for screen captures showing replacement instructions for the FRU types listed below.

Click the radio button in the Diag column for a listed FRU and click Submit to run diagnostics on that FRU. Click the radio button in the Remove column for a listed FRU (if shown) and click Submit to initiate fencing of that FRU (as required) to allow it to be nondisruptively removed from the VTSS. Click the radio button in the Add column for a listed FRU (if shown) to allow a FRU of that type to be nondisruptively installed into the VTSS.

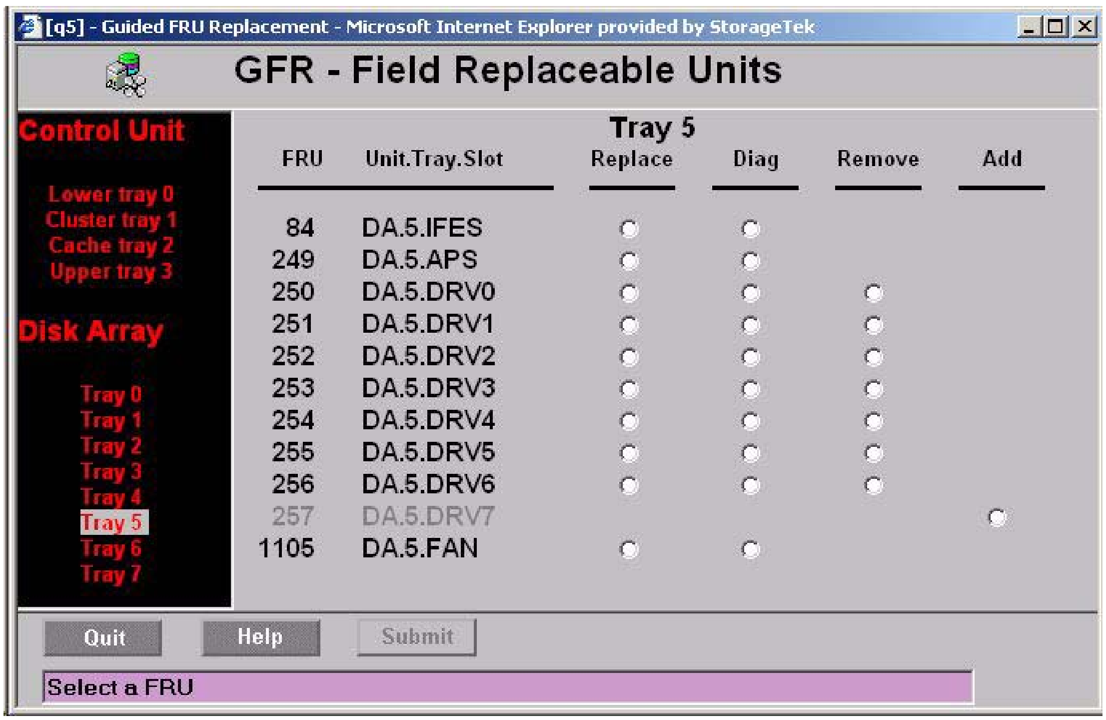


Figure C-58. GFR – Field Replaceable Units: Disk Array Tray 5 Screen

GFR – Field Replaceable Units: Disk Array Tray 6 Screen

To access the *GFR - Field Replaceable Units: Disk Array Tray 6* screen, click the Tray 6 text field under the Disk Array heading on the left side of the *GFR - Field Replaceable Units Entry* screen, Figure C-48 on page C-230.

At the screen below, click the radio button in the Replace column for the FRU you want to replace, then click Submit to display a subscreen with replacement instructions for the FRU. See "Replacing FRUs Using the GFR Facility" on page 3-86 for additional information on Guided FRU Replacement (GFR), and for screen captures showing replacement instructions for the FRU types listed below.

Click the radio button in the Diag column for a listed FRU and click Submit to run diagnostics on that FRU. Click the radio button in the Remove column for a listed FRU (if shown) and click Submit to initiate fencing of that FRU (as required) to allow it to be nondisruptively removed from the VTSS. Click the radio button in the Add column for a listed FRU (if shown) to allow a FRU of that type to be nondisruptively installed into the VTSS.

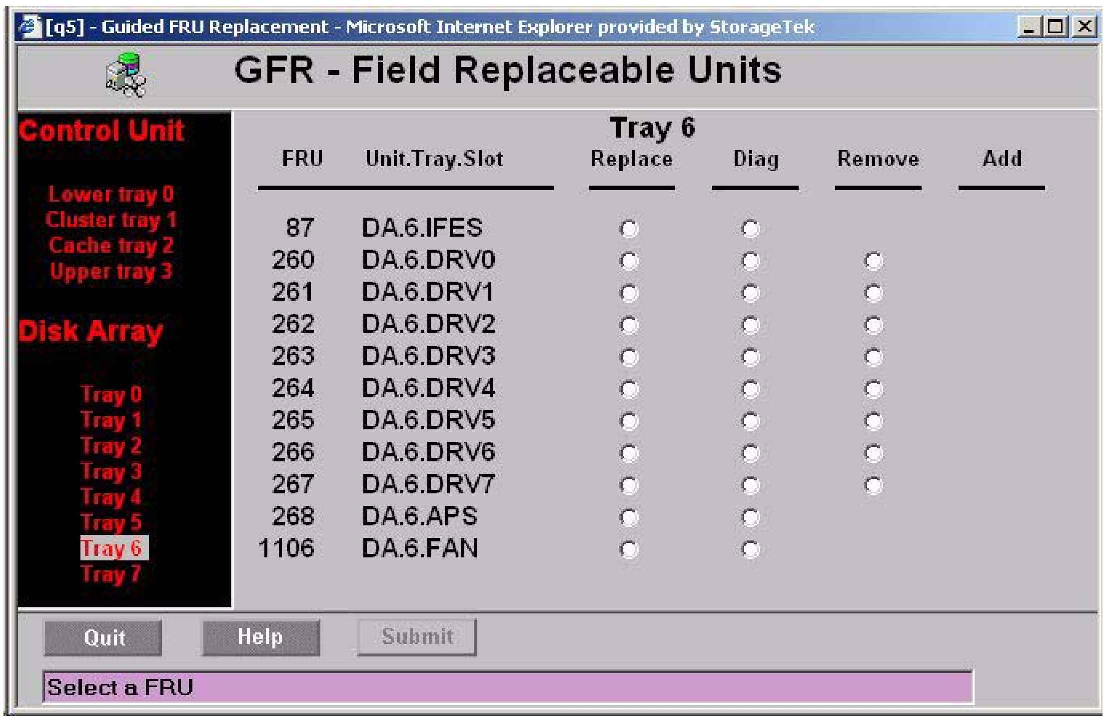


Figure C-59. GFR – Field Replaceable Units: Disk Array Tray 6 Screen

GFR – Field Replaceable Units: Disk Array Tray 7 Screen

To access the *GFR - Field Replaceable Units: Disk Array Tray 7* screen, click the Tray 7 text field under the Disk Array heading on the left side of the *GFR - Field Replaceable Units Entry* screen, Figure C-48 on page C-230.

At the screen below, click the radio button in the Replace column for the FRU you want to replace, then click Submit to display a subscreen with replacement instructions for the FRU. See “Replacing FRUs Using the GFR Facility” on page 3-86 for additional information on Guided FRU Replacement (GFR), and for screen captures showing replacement instructions for the FRU types listed below.

Click the radio button in the Diag column for a listed FRU and click Submit to run diagnostics on that FRU. Click the radio button in the Remove column for a listed FRU (if shown) and click Submit to initiate fencing of that FRU (as required) to allow it to be nondisruptively removed from the VTSS. Click the radio button in the Add column for a listed FRU (if shown) to allow a FRU of that type to be nondisruptively installed into the VTSS.

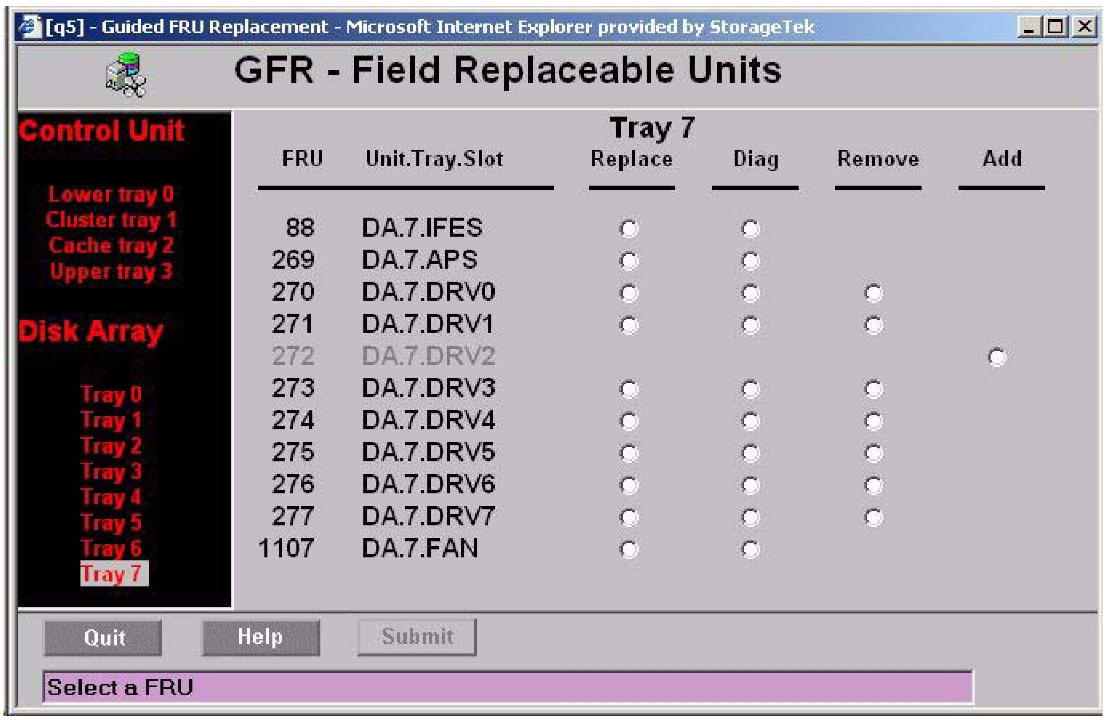


Figure C-60. GFR – Field Replaceable Units: Disk Array Tray 7 Screen

GFR – Run Time Options Screen

To access the *GFR - Run Time Options* screen, click the GFR Run Time Options text field on the *GFR - Main Menu* screen, Figure C-46 on page C-228.

At the screen below, check the box(es) for the run time option(s) you want enabled, then click Save to retain those rules in the VTSS support facility database.

Figure C-61. GFR – Run Time Options Screen

GFR – Add Drive Tray Units Screen

To access the *GFR - Add Drive Tray Units* screen, click the Add Drive Tray Units text field on the *GFR - Main Menu* screen, Figure C-46 on page C-228.

At the screen below, click Submit to initiate the validation process for adding the next set of drive trays to a VTSS.

Note: Prior to validating a set of drive trays for use at the *GFR - Add Drive Tray Units* screen, you must physically install the drives in the correct trays. If the needed drives have not been installed and the Submit button is clicked, as subscreen displays with the message **The machine is not ready. Try again later.**. Drive trays must be added two at a time (16 drives per tray; 32 drives total) in a VTSS, from bottom to top in a cabinet (Tray 7 first, Tray 6 next, etc. continuing up to Tray 0 at the top of the VTSS cabinet). The two bottom trays (6 and 7) should already be installed as the minimum allowable configuration in a VTSS.

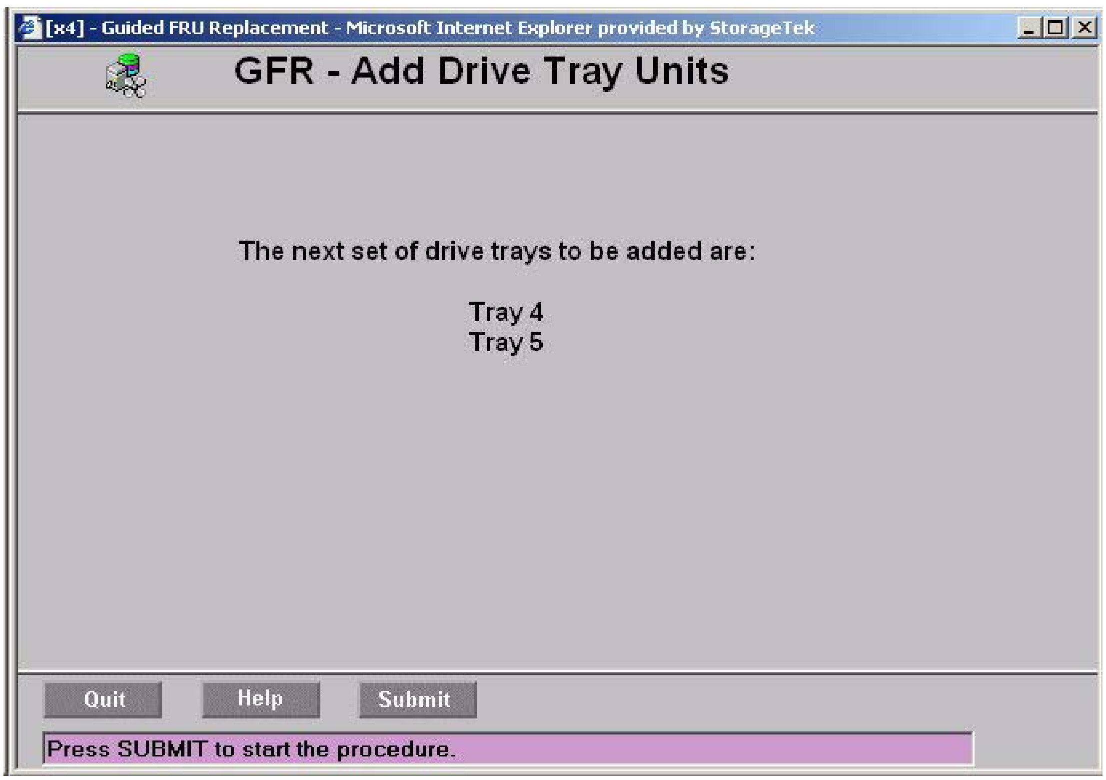


Figure C-62. GFR – Add Drive Tray Units Screen

GFR – Remove Drive Tray Units Screen

To access the *GFR - Remove Drive Tray Units* screen, click the Remove Drive Tray Units text field on the *GFR - Main Menu* screen, Figure C-46 on page C-228.

At the screen below, click Submit to initiate the process for fencing and draining the next set of drive trays (to allow the drives in those trays to be nondisruptively removed from the VTSS cabinet), and to display the *GFR - Remove Capacity – JBOD* nnnn screen, Figure C-64 on page C-246.

Note: After to validating a set of drive trays for removal at the *GFR - Remove Drive Tray Units* screen, you must physically remove the drives from the selected trays. Drive trays must be removed two at a time (16 drives per tray; 32 drives total) in a VTSS, from top to bottom in a cabinet (Tray 0 first, Tray 1 second, etc., continuing down to Tray 7 at the bottom of the VTSS cabinet).

Figure C-63. GFR – Remove Drive Tray Units Screen

GFR – Remove Capacity – JBOD *nnnn* Screen

To access the *GFR - Remove Capacity – JBOD* nnnn screen, click Submit on the *GFR - Remove Drive Tray Units* screen, Figure C-63 on page C-245, which initiates the processes for fencing and draining the selected set of drive trays, which will in turn allow the drives in those trays to be nondisruptively removed from the VTSS cabinet.

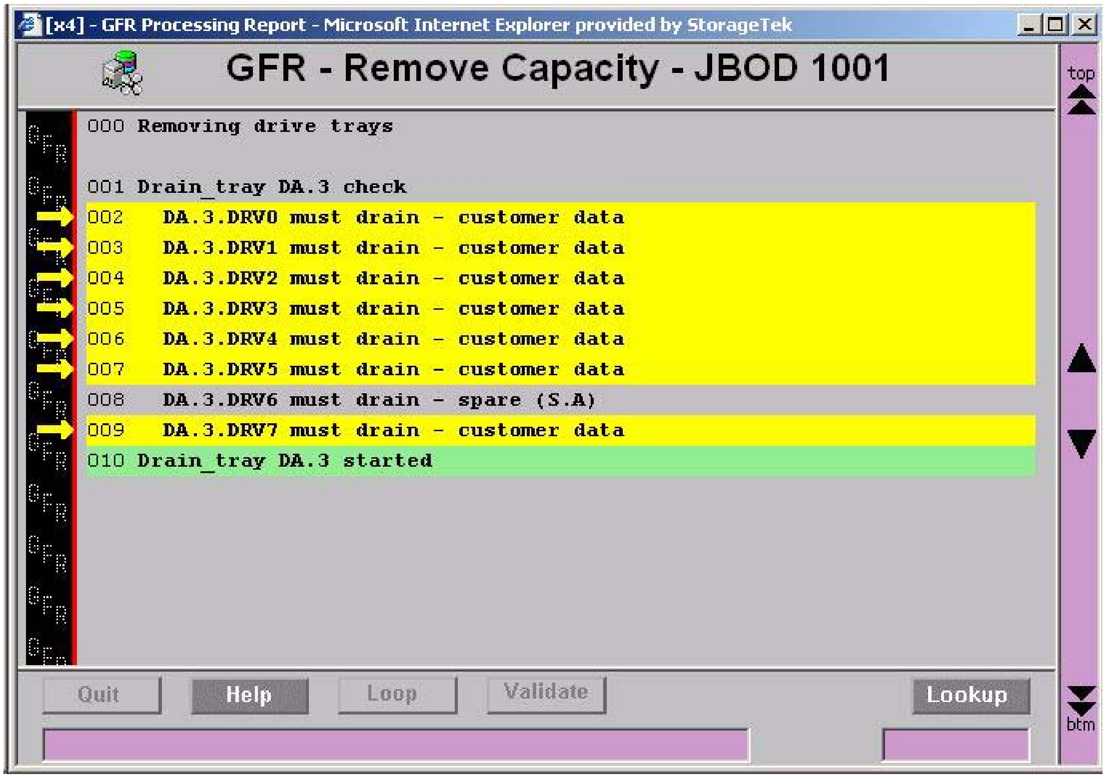


Figure C-64. GFR – Remove Capacity – JBOD *nnnn* Screen

Select Software Release Level Screen

To access the *Select Software Release Level* screen, click the Software Release Level text field from the *CSE Main Menu*, Figure C-6 on page C-188. The screen below lists the current SRL running in the VTSS. Click the button next to any task listed onscreen to display linked subscreens that enable you to complete these tasks:

- Delete Event Logs – Click Delete Event Logs to display a subscreen with the message **Warning: Clicking continue will delete event logs from SRL <*SRL name*>.**
- Delete a SRL – Click Delete Selected SRL to display a subscreen with the message **Warning: Clicking continue will delete SRL <*SRL name*>.**
- Install an EC Upgrade – Click EC Upgrade to display the *EC Upgrade* screen, Figure C-66 on page C-248, where you enter a source path from which to install an EC upgrade.
- Perform Non-Disruptive Code Load – Click NDCL to display a subscreen with the message **Warning: Clicking continue will trigger a Non-Disruptive Code Load to SRL <*SRL name*>.**
- Perform Disruptive Code Load – Click Disruptive Code Load to display a subscreen with the message **Warning: Clicking continue will trigger a Disruptive Code Load to SRL <*SRL name*>.**

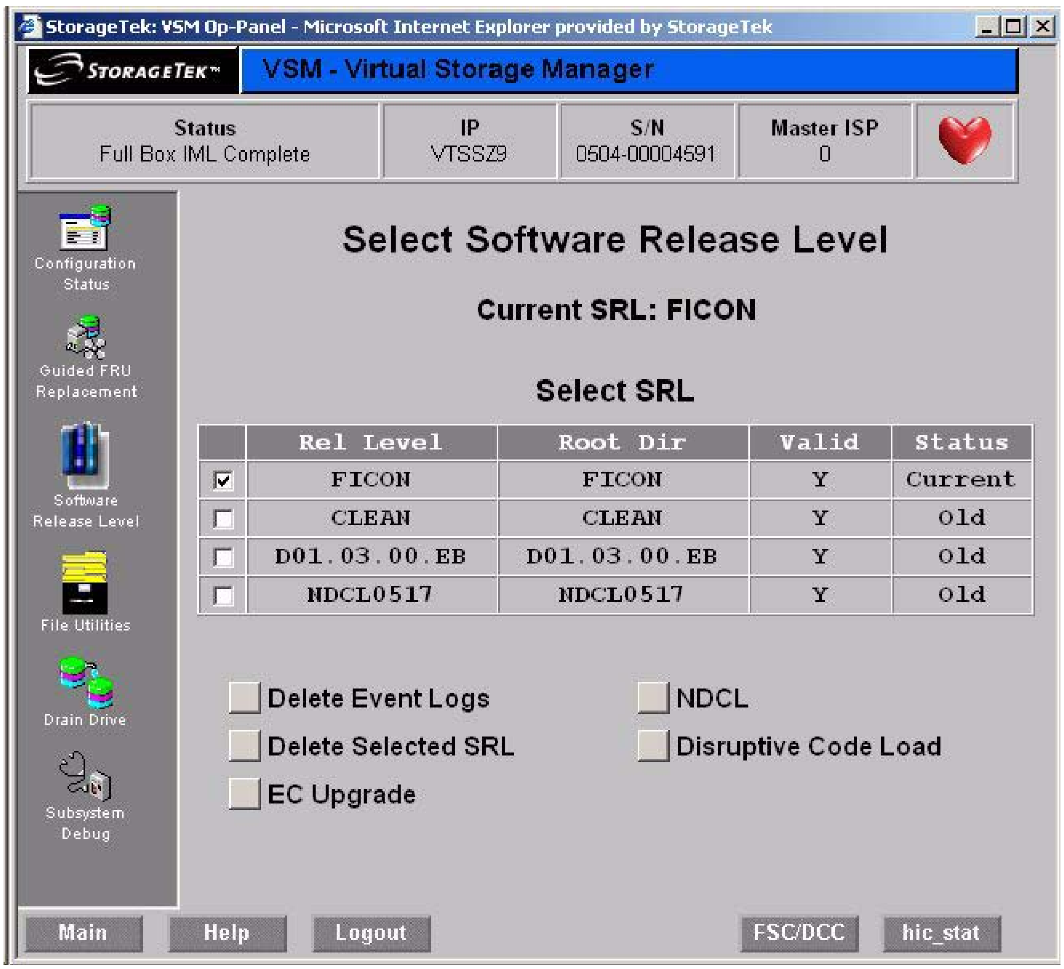


Figure C-65. Select Software Release Level Screen

EC Upgrade Screen

To access the *EC Upgrade* screen, click the button next to the EC Upgrade listing on the *Select Software Release Level* screen, Figure C-65 on page C-247. Key in a valid source path to either a remote Sun network server or to the hard drive of your service laptop PC (e.g., C:\Download\All to G01.05.00.00), then click Continue. Once a valid source path is entered, a subscreen displays with the message **Status: Ready to ECU files from "C:\Download\All" to SRL "G01.05.00.00"**. Click Continue to begin the file transfer, or Cancel to void the upgrade request.

If an invalid source path is entered, a subscreen displays with the message **ECU Aborted. "G:\Download_EC" is not a valid ECU source path**.

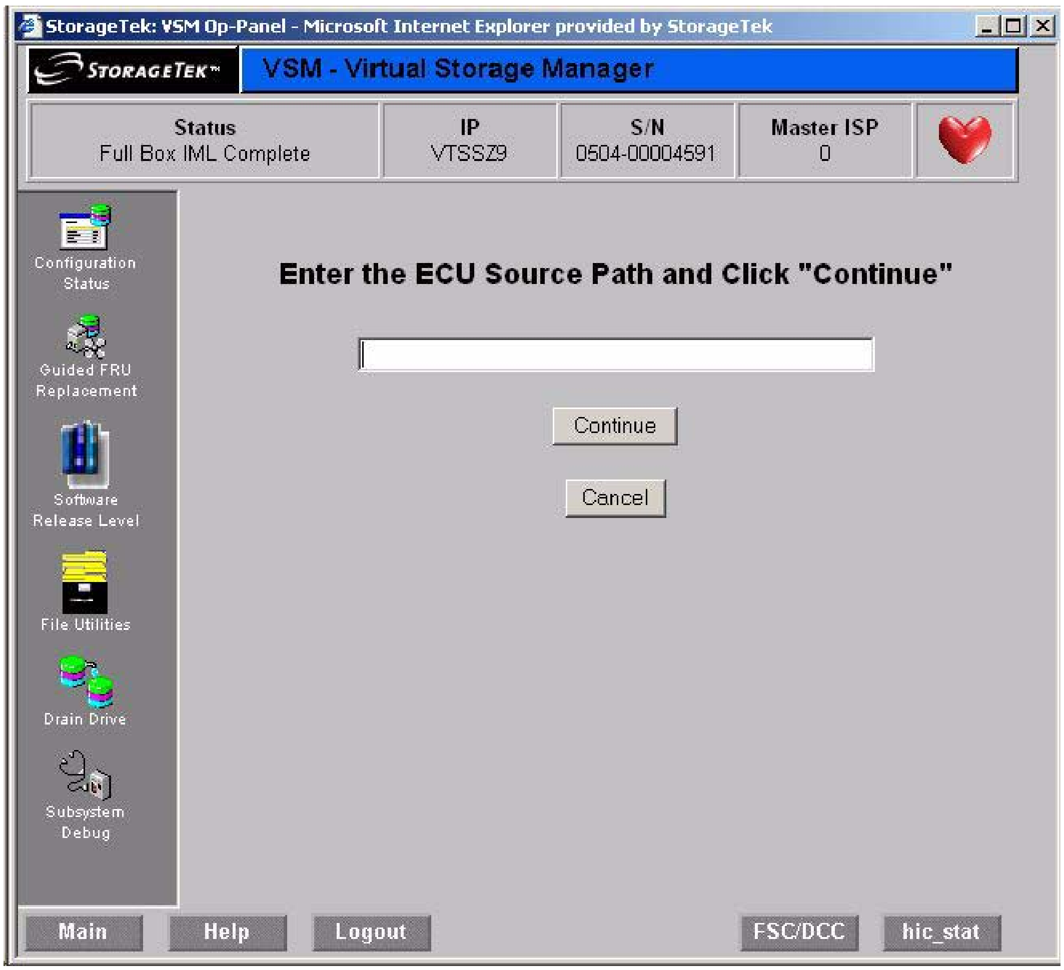


Figure C-66. EC Upgrade Screen

Subsystem Debug Screen

To access the *Subsystem Debug* screen, click the Subsystem Debug text field on the *CSE Main Menu* screen, Figure C-6 on page C-188. Click the button next to any task listed on-screen to display linked subscreens that enable you to complete these tasks:

- Switch the ISP Master – Click Switch ISP Master to display a subscreen with the message **Warning: Clicking "Continue" will switch ISP masters**.
- IML Both ISPs – Click IML Both ISPs to display a subscreen with the message **Warning: Clicking "Continue" will re-IML both ISPs**.
- ISP State Save – Click ISP State Save to display a subscreen with the message **Warning: Clicking "Continue" will induce an ISP Proc-Copy**.
- Set an IUP Trap – Click Set IUP Trap to display a subscreen with the message **Enter the Key to Enable IUP Trap Code**; from there, type in a valid key and click Continue.
- Do a Nondisruptive IUP State Save – Click IUP NDSS to display a subscreen with the message **IUP Debug Data command in progress: see hic_stat for details**.
- Do an IUP-IFF Check0 State Save – Click IUP&IFF Check-0 State Save to display a subscreen with the message **Warning: Clicking "Continue" will induce a Check-0**.
- Enable FSC Logging – Click Enable FSC0XXX to display a subscreen with the message **Warning: Clicking "Continue" will enable FSC0XXX Logging**.

Figure C-67. Subsystem Debug Screen

Directory Display Screen

To access the *Directory Display* screen, click the active File Utilities text field on the *CSE Main Menu* screen, Figure C-6 on page C-188. At the screen below, click any of the 6 active text fields shown to display these linked subscreens:

- "Executable Directory Screen" on page C-251
- "Diagnostic Directory Screen" on page C-252
- "State Save Directory Screen" on page C-253
- "Configuration Directory Screen" on page C-254
- "Database Directory Screen" on page C-255
- "General Delivery Directory Screen" on page C-256.

Figure C-68. Directory Display Screen

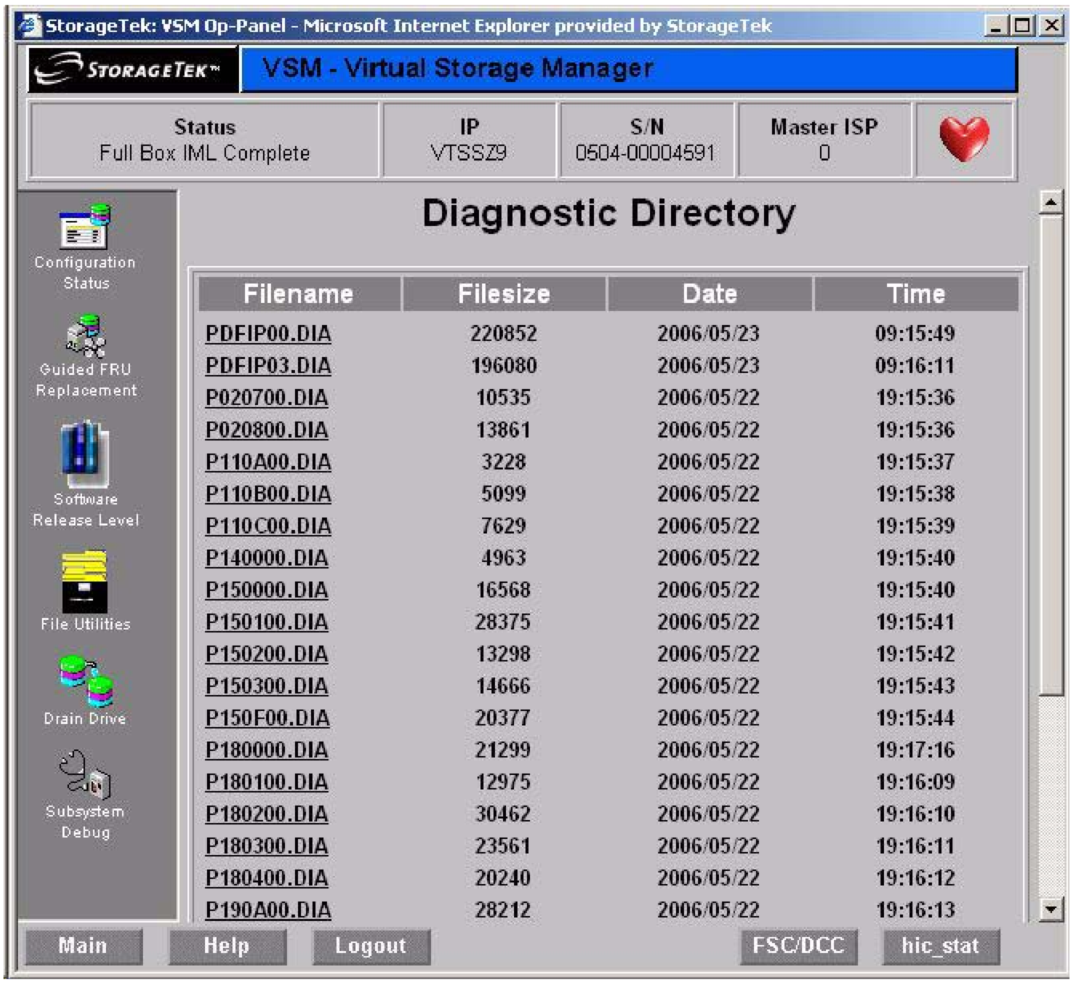
Executable Directory Screen

To access the *Executable Directory* screen, click the active Display Executable Directory text field on the *Directory Display* screen, Figure C-68 on page C-250. At the screen below, click any file under the Filename heading to initiate the process for downloading the file to a storage device.

Figure C-69. Executable Directory Screen

Diagnostic Directory Screen

To access the *Diagnostic Directory* screen, click the active Display Diagnostic Directory text field on the *Directory Display* screen, Figure C-68 on page C-250. At the screen below, click any file under the Filename heading to initiate the process for downloading the file to a storage device.



Filename	Filesize	Date	Time
PDFIP00.DIA	220852	2006/05/23	09:15:49
PDFIP03.DIA	196080	2006/05/23	09:16:11
P020700.DIA	10535	2006/05/22	19:15:36
P020800.DIA	13861	2006/05/22	19:15:36
P110A00.DIA	3228	2006/05/22	19:15:37
P110B00.DIA	5099	2006/05/22	19:15:38
P110C00.DIA	7629	2006/05/22	19:15:39
P140000.DIA	4963	2006/05/22	19:15:40
P150000.DIA	16568	2006/05/22	19:15:40
P150100.DIA	28375	2006/05/22	19:15:41
P150200.DIA	13298	2006/05/22	19:15:42
P150300.DIA	14666	2006/05/22	19:15:43
P150F00.DIA	20377	2006/05/22	19:15:44
P180000.DIA	21299	2006/05/22	19:17:16
P180100.DIA	12975	2006/05/22	19:16:09
P180200.DIA	30462	2006/05/22	19:16:10
P180300.DIA	23561	2006/05/22	19:16:11
P180400.DIA	20240	2006/05/22	19:16:12
P190A00.DIA	28212	2006/05/22	19:16:13

Figure C-70. Diagnostic Directory Screen

State Save Directory Screen

To access the *State Save Directory* screen, click the active Display State Save Directory text field on the *Directory Display* screen, Figure C-68 on page C-250. At the screen below, click any file under the Filename heading to initiate the process for downloading the file to a storage device.

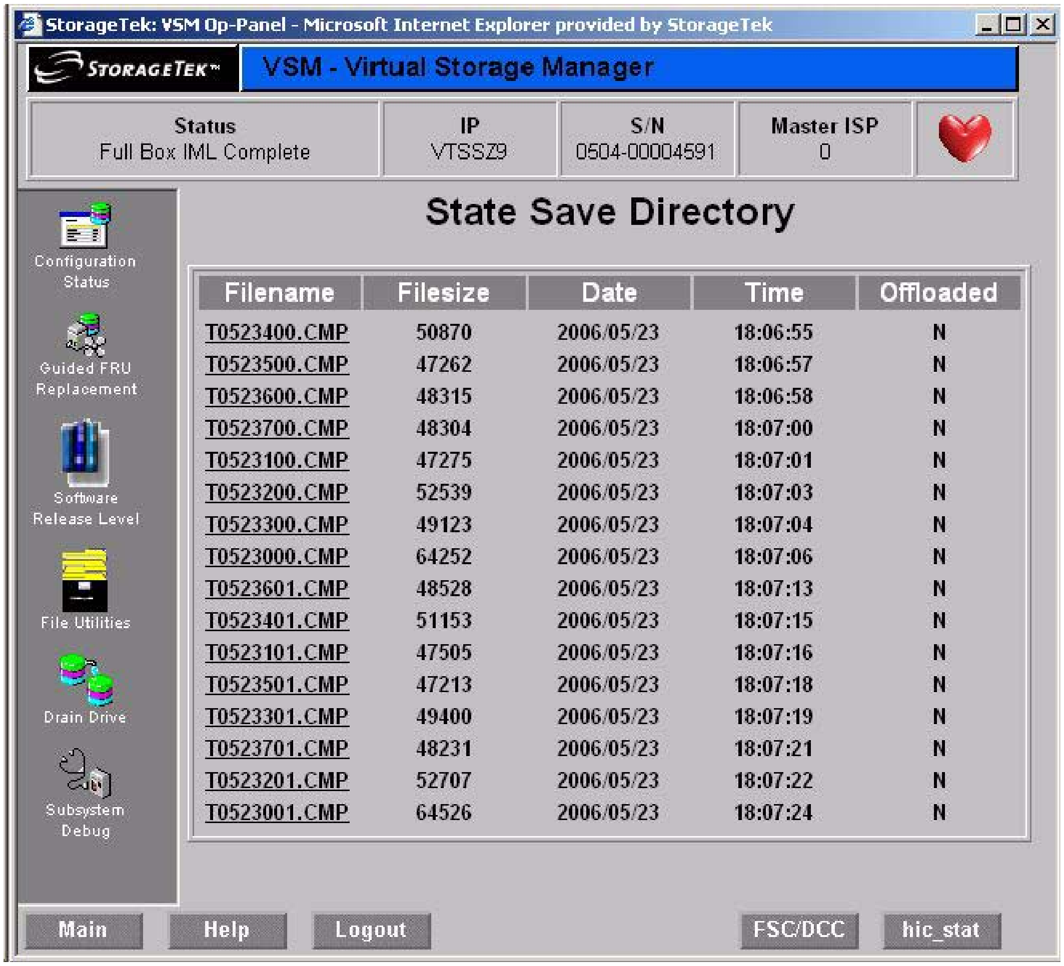


Figure C-71. State Save Directory Screen

Configuration Directory Screen

To access the *Configuration Directory* screen, click the active Display Config Directory text field on the *Directory Display* screen, Figure C-68 on page C-250. At the screen below, click any file under the Filename heading to initiate the process for downloading the file to a storage device.

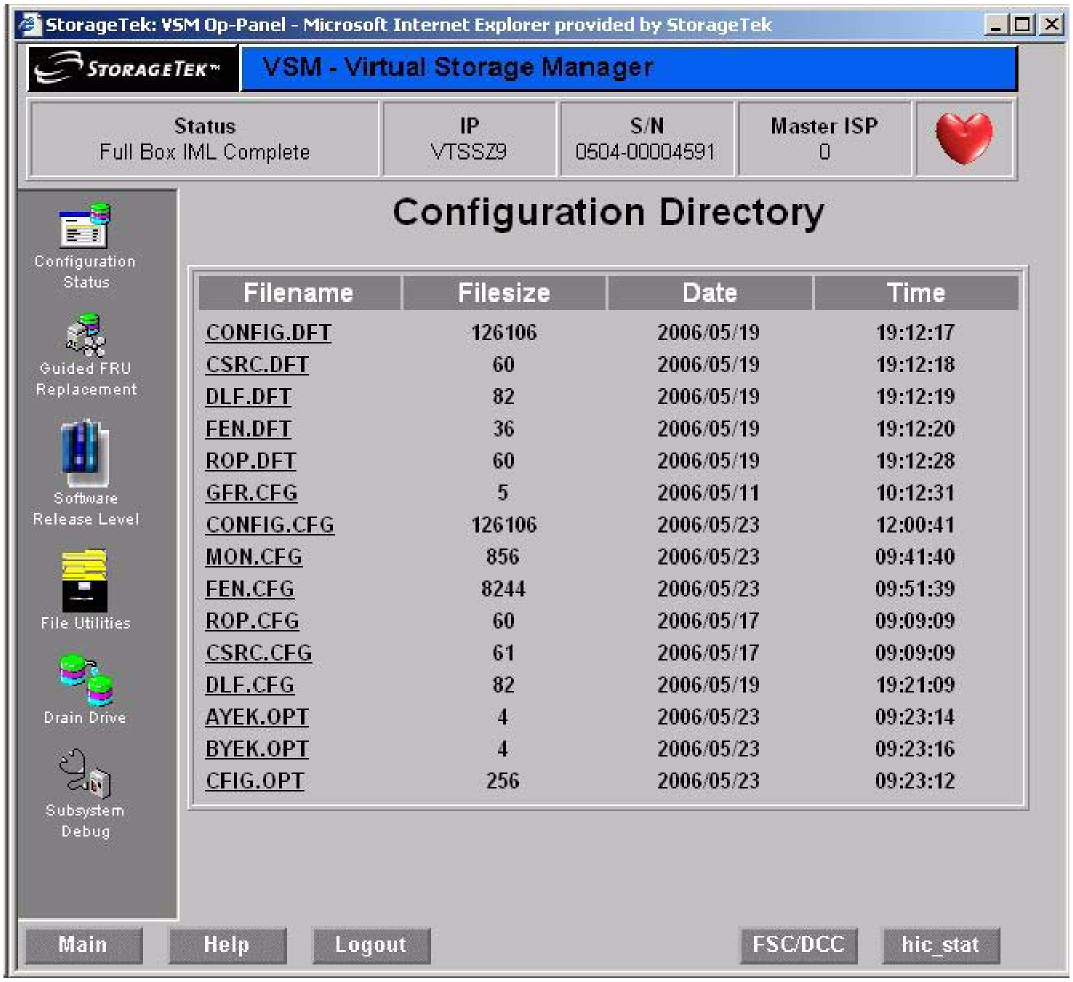


Figure C-72. Configuration Directory Screen

Database Directory Screen

To access the *Database Directory* screen, click the active Display Database Directory text field on the *Directory Display* screen, Figure C-68 on page C-250. At the screen below, click any file under the Filename heading to initiate the process for downloading the file to a storage device.

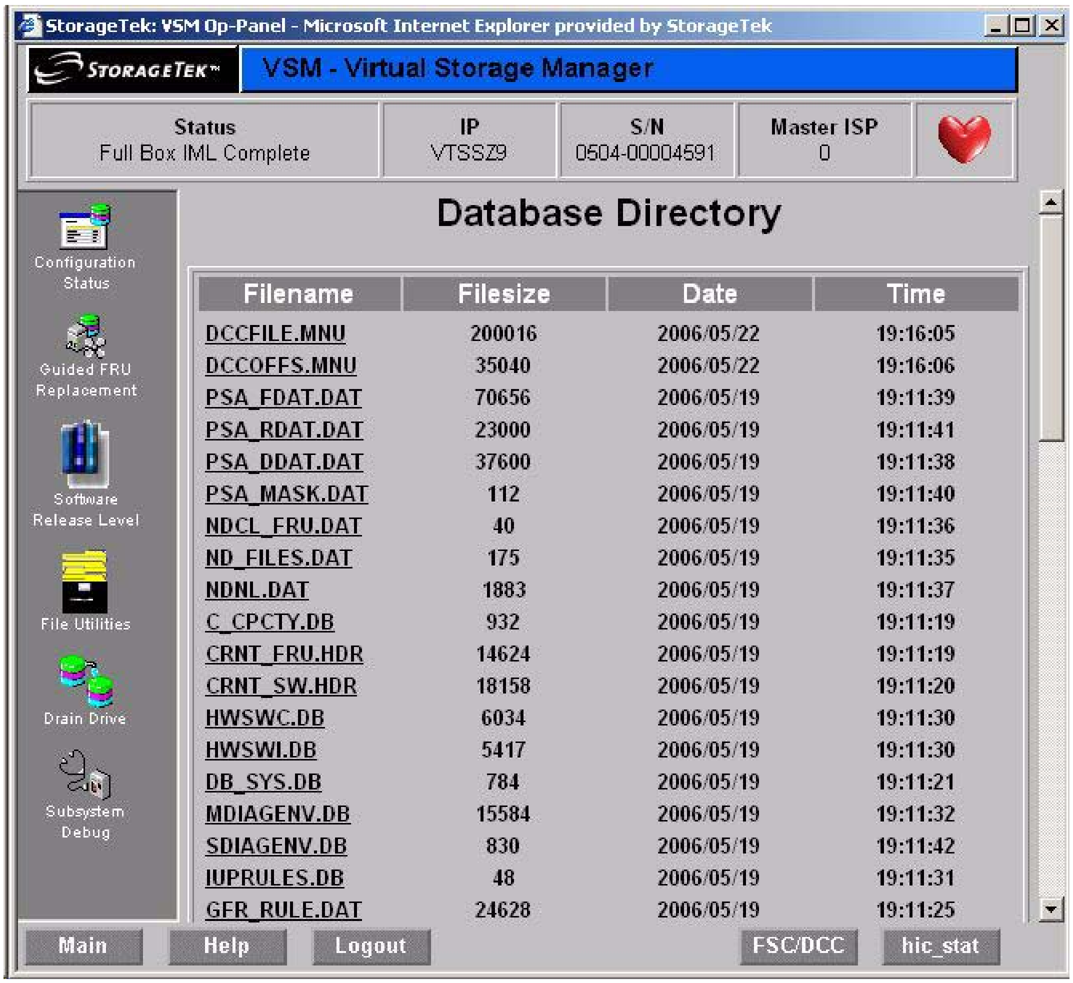


Figure C-73. Database Directory Screen

General Delivery Directory Screen

To access the *General Delivery Directory* screen, click the active Display General Delivery Directory text field on the *Directory Display* screen, Figure C-68 on page C-250. At the screen below, click any file under the Filename heading to initiate the process for downloading the file to a storage device.

Figure C-74. General Delivery Directory Screen

VIP Screens Menu Tree

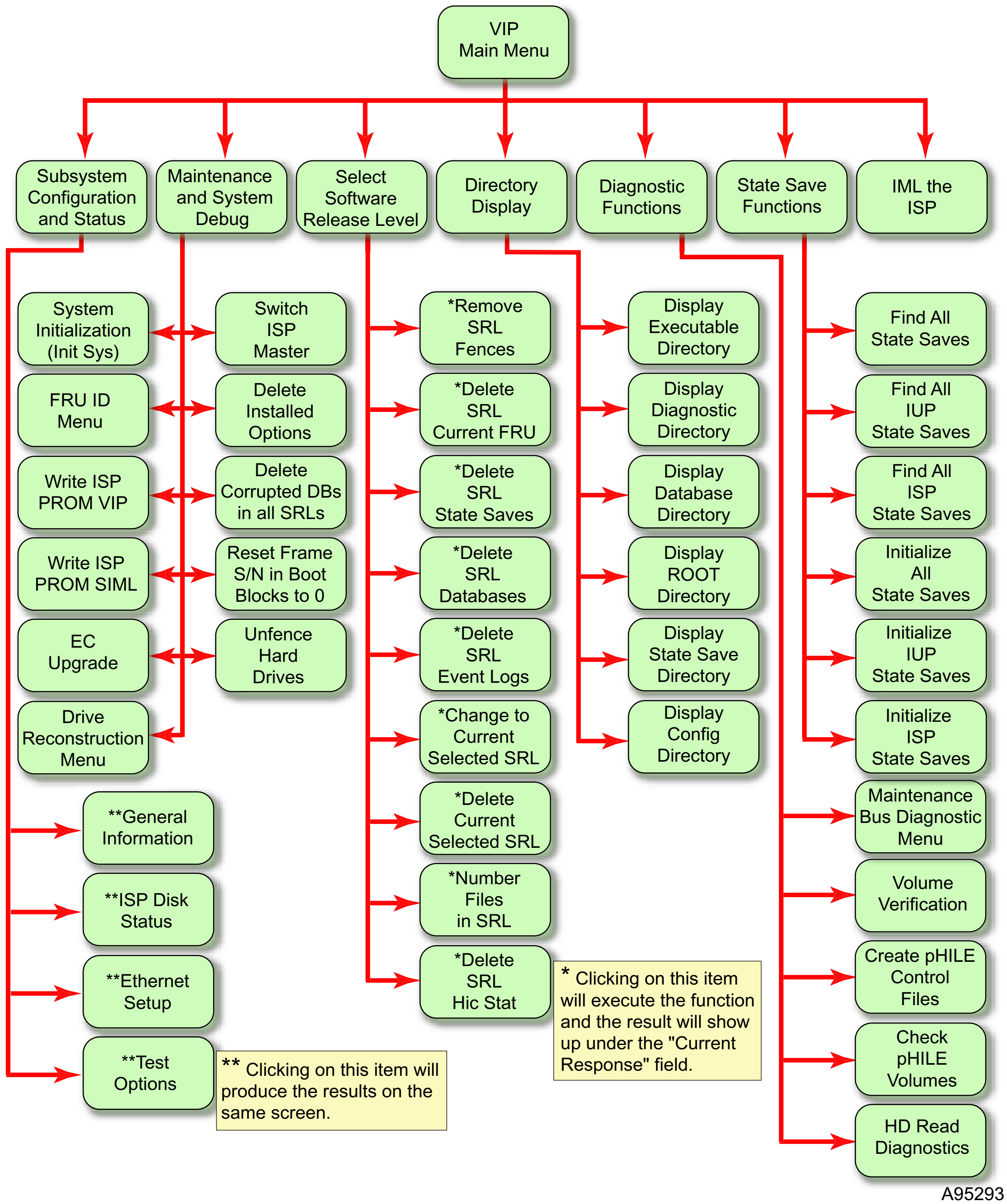


Figure C-75. VIP Screens Menu Tree

■ VIP-Level Screens

The Virtual Initialization Program (VIP) is a standalone utility comprised of a subset of the ISP3a card support processor functional microcode. It allows low-level support processor file system access to perform basic support processor functions. The VIP runs on only one ISP3a card processor and has functional access to the ISP hard drives and file system as well as the machine FRU bus. The VIP contains the NFTP server and supports the external Vshell client under the ISP Ethernet interface.

To access VIP screens, the VTSS must be rebooted in VIP mode at the A-Hub assembly, a disruptive process that makes the VTSS temporarily unavailable to the host. Generally, VIP mode should be used only when the VTSS is encountering significant problems, and it is recommended that only qualified and trained persons use the VIP utility.

Certain VIP-level screens are informationally and functionally equivalent to corresponding CSE-level screens. To avoid duplication of screen images in such instances, only the CSE-level screen will be shown in this appendix, and notations will be made in place of du

VIP Main Menu Screen

Figure C-76. VIP Main Menu Screen

VIP Subsystem Configuration and Status Screen

To access the *VIP Subsystem and Configuration Status* screen, click the active Configuration & Status text field on the *VIP Main Menu*, Figure C-76 on page C-258.

The five subscreens for the *VIP Subsystem Configuration and Status* screen are informationally and functionally equivalent to the five subscreens for the CSE-level *Subsystem Configuration and Status* screen, Figure C-9 on page C-191, so are not depicted here. CSE-level proxies for the five *VIP Subsystem Configuration and Status* subscreens are:

- "Set VSM Subsystem Time Screen" on page C-192
- "Enter (VSM Private Network) IP Address Screen" on page C-216
- "Enter Subnet Address Screen" on page C-217
- "Enter Gateway Address Screen" on page C-218
- "Enter (Remote Maintenance) Server Address Screen" on page C-219.

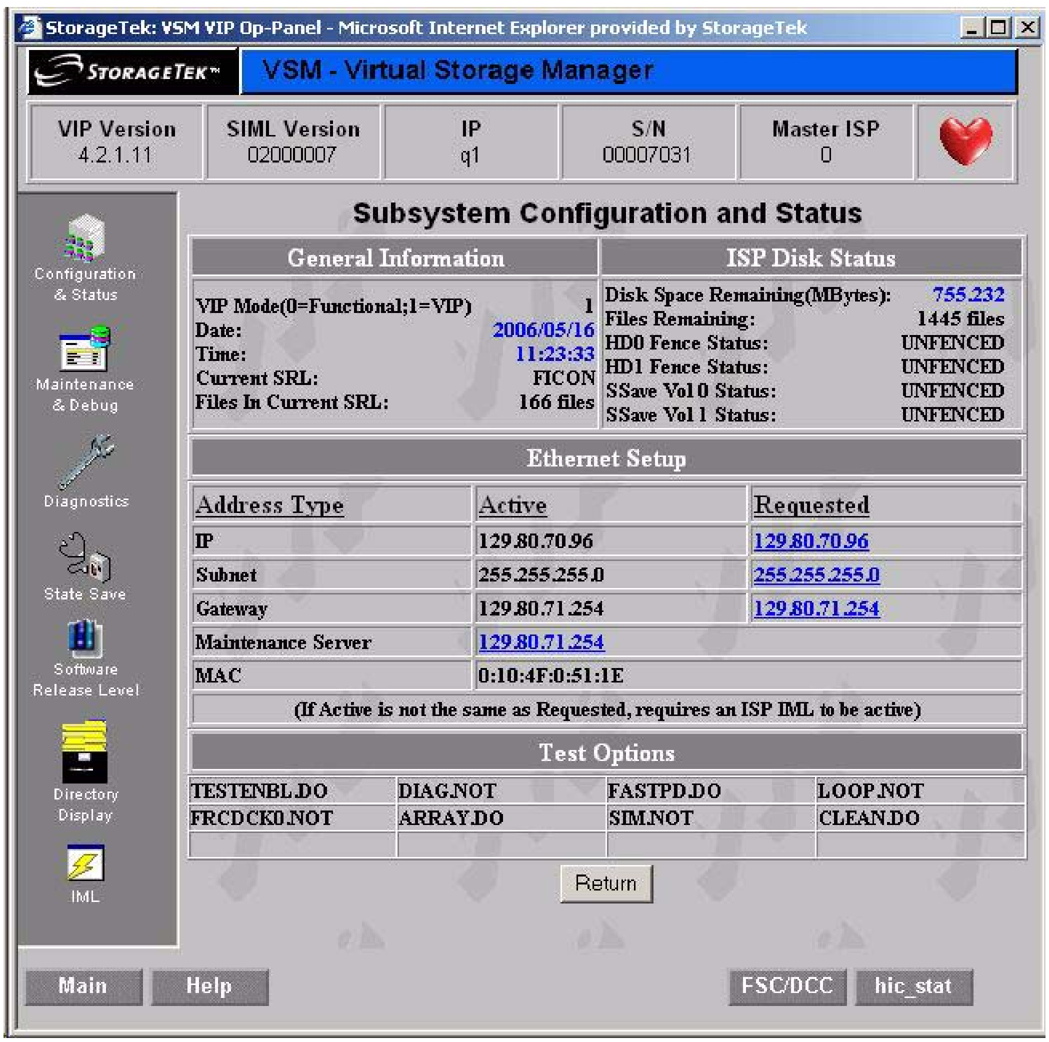


Figure C-77. VIP Subsystem Configuration and Status Screen

VIP Maintenance and Debug Menu Screen

To access the *Maintenance and Debug Menu* screen, click the active Maintenance & Debug text field on the *VIP Main Menu* screen, Figure C-76 on page C-258. At the screen below, click any of the 11 active text fields shown to display these linked subscreens:

- "VIP System Initialization Screen" on page C-261
- "VIP FRU ID Menu Screen" on page C-262
- "VIP Write ISP PROM VIP Screen" on page C-264
- "VIP Write ISP PROM SIML Screen" on page C-265
- "VIP EC Upgrade Screen" on page C-265
- "VIP ISP Hard Drive Reconstruction Screen" on page C-266
- "VIP Switch ISP Master Screen" on page C-267
- "VIP Delete Installed Options Screen" on page C-268
- "VIP Delete Corrupted Databases for All SRLs Screen" on page C-269
- "VIP Reset Frame Root Block Serial Number to 0 Screen" on page C-270
- "VIP Unfence ISP Hard Drives Screen" on page C-271.

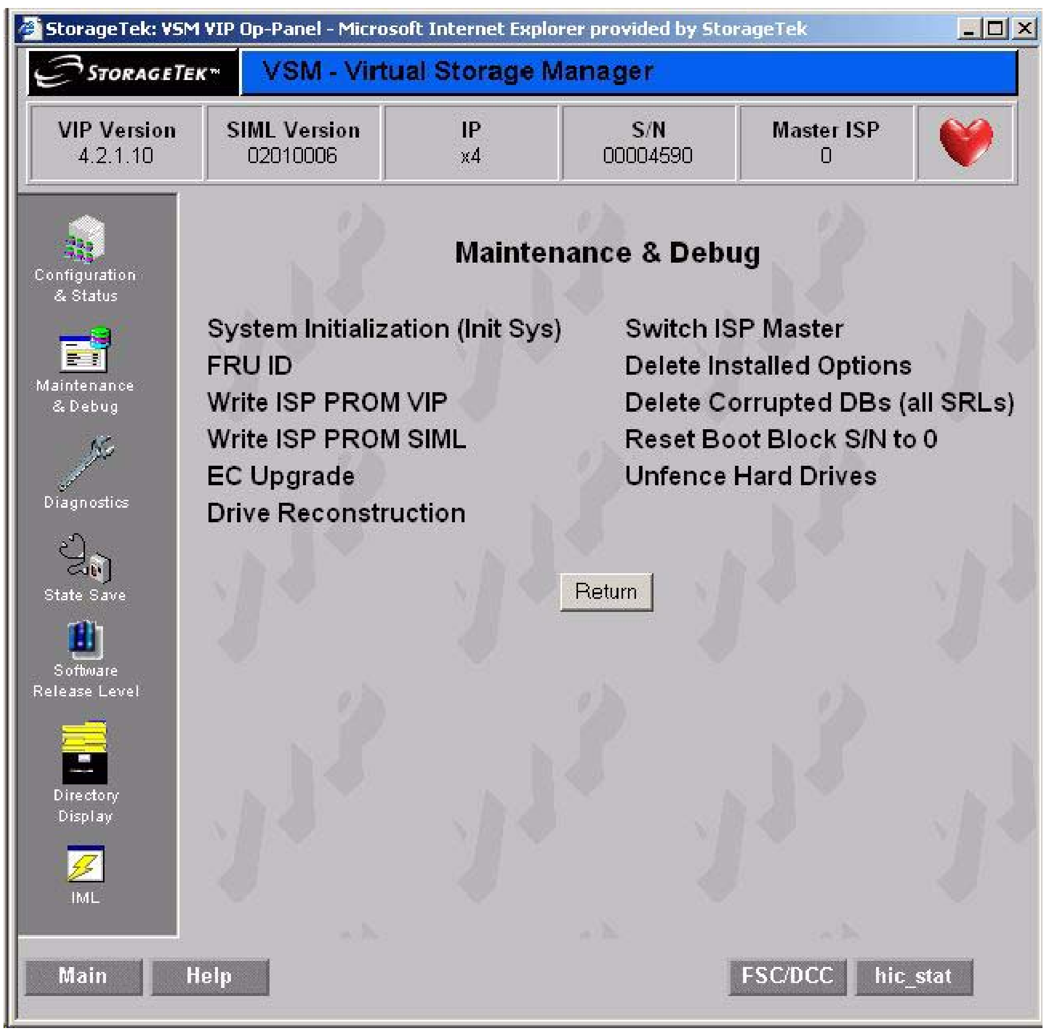


Figure C-78. VIP Maintenance and Debug Menu Screen

VIP System Initialization Screen

To access the *VIP System Initialization* screen, click the active System Initialization (Init Sys) text field on the *VIP Maintenance and Debug Menu* screen, Figure C-78 on page C-260. Click Initialize System to display a subscreen with the message **You are about to initialize the system. Continue?**

At the subscreen, verify that the VTSS IP address shown is correct; if it is missing or incorrect, go to the *Enter (VSM Private Network) IP Address* screen, Figure C-34 on page C-216, and key in a correct address before initializing the VTSS. Otherwise, click Initialize System to display the message **Initializing system, please wait...**, followed by the message **Initialize System Successful! Original IP Addresses have been restored**, indicating the initialization has completed successfully. Click Return to exit the subscreen, then click Return again to return to the *VIP Maintenance and Debug Menu* screen.

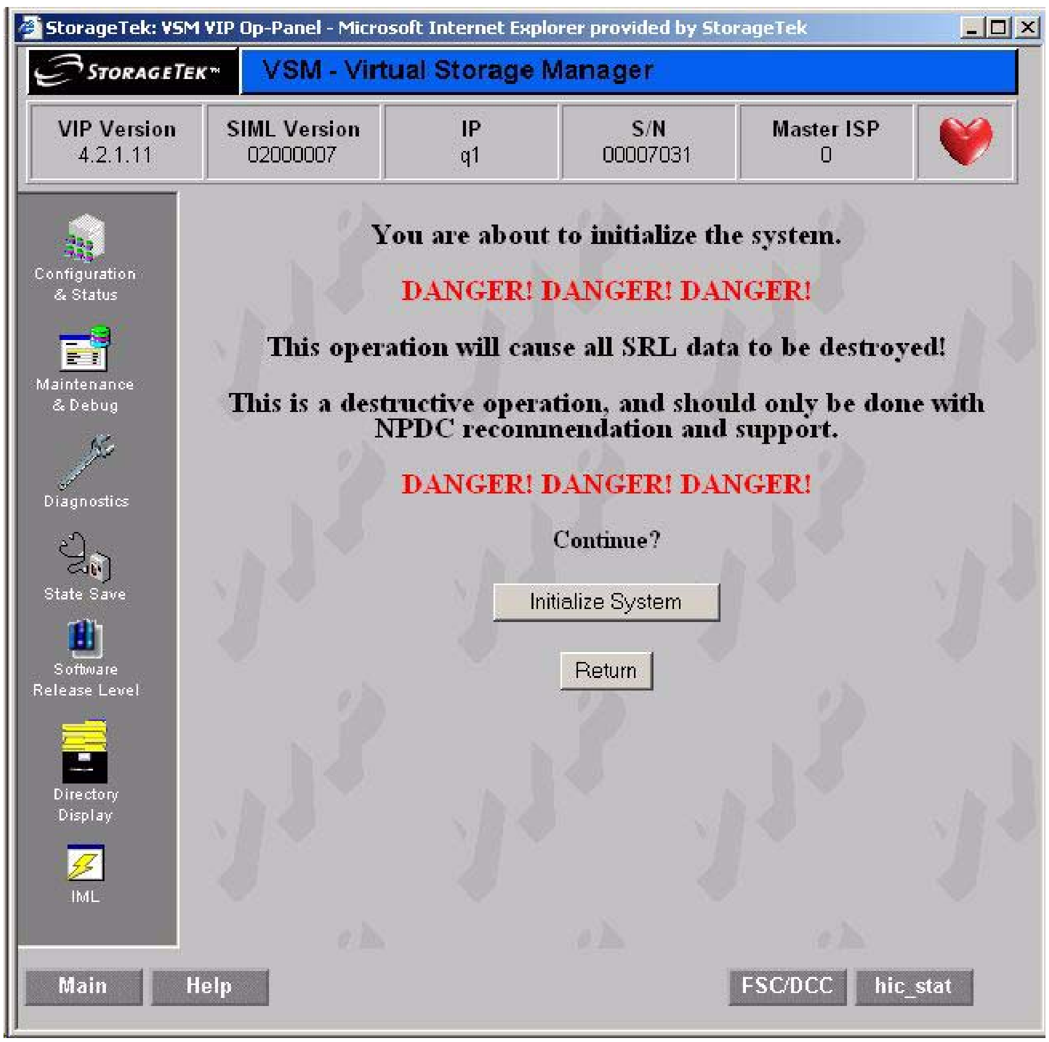


Figure C-79. VIP System Initialization Screen

VIP FRU ID Menu Screen

To access the *FRU ID Menu* screen, click the active FRU ID text field on the *VIP Maintenance and Debug Menu* screen, Figure C-78 on page C-260. Click on any listed FRU to display its corresponding *VIP FRU ID Status Menu* screen, Figure C-81 on page C-263, which provides detailed information about the selected FRU.

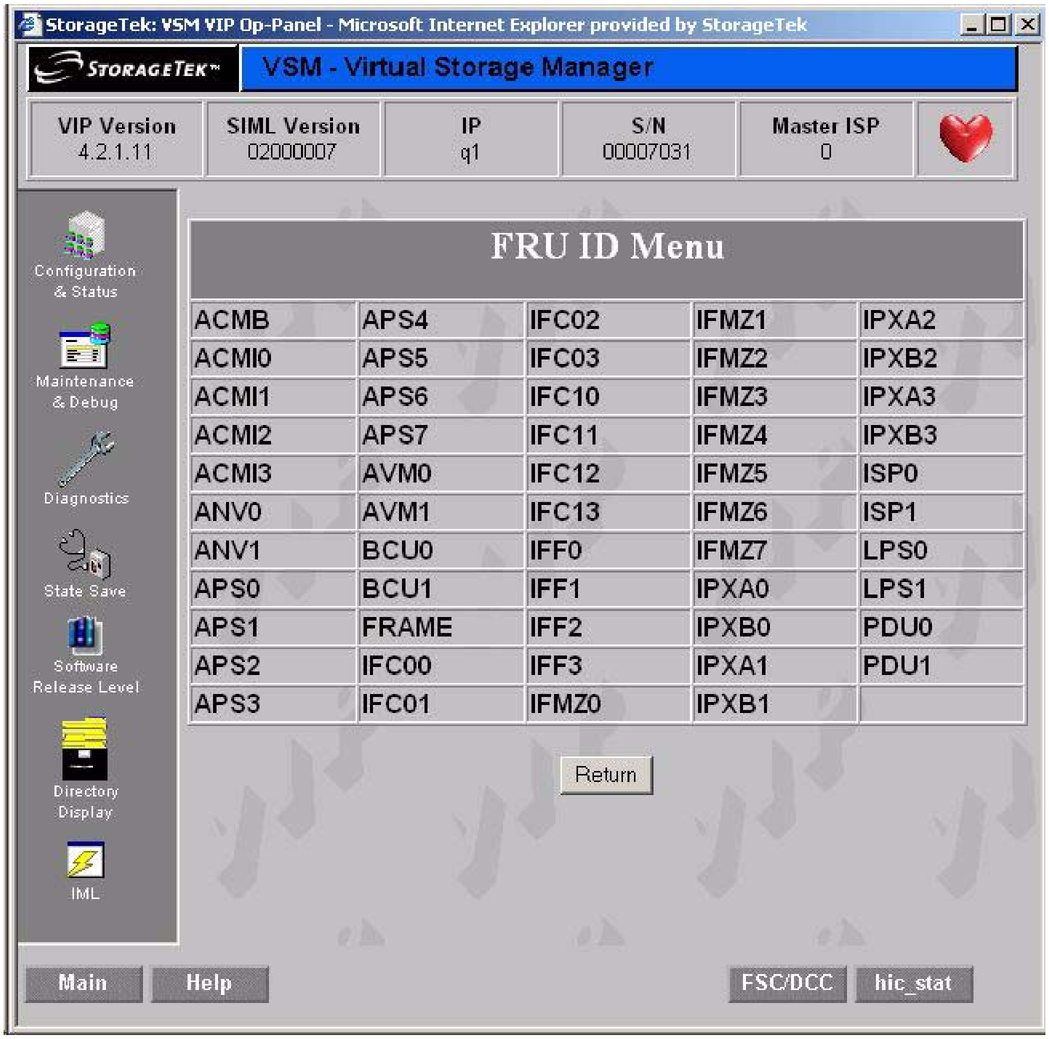


Figure C-80. VIP FRU ID Menu Screen

VIP FRU ID Status Menu Screen

To access the *VIP FRU ID Status Menu* screen, click any active FRU ID field on the *VIP FRU ID Menu* screen, Figure C-80 on page C-262. The example below shows FRU ID data for PDU0 as defined by its internal circuit card, and includes the FRU part number, serial number, EC level, and worldwide name. Similar information screens for all other VTSS FRUs are viewable by clicking the applicable FRU on the *VIP FRU ID Menu* screen.

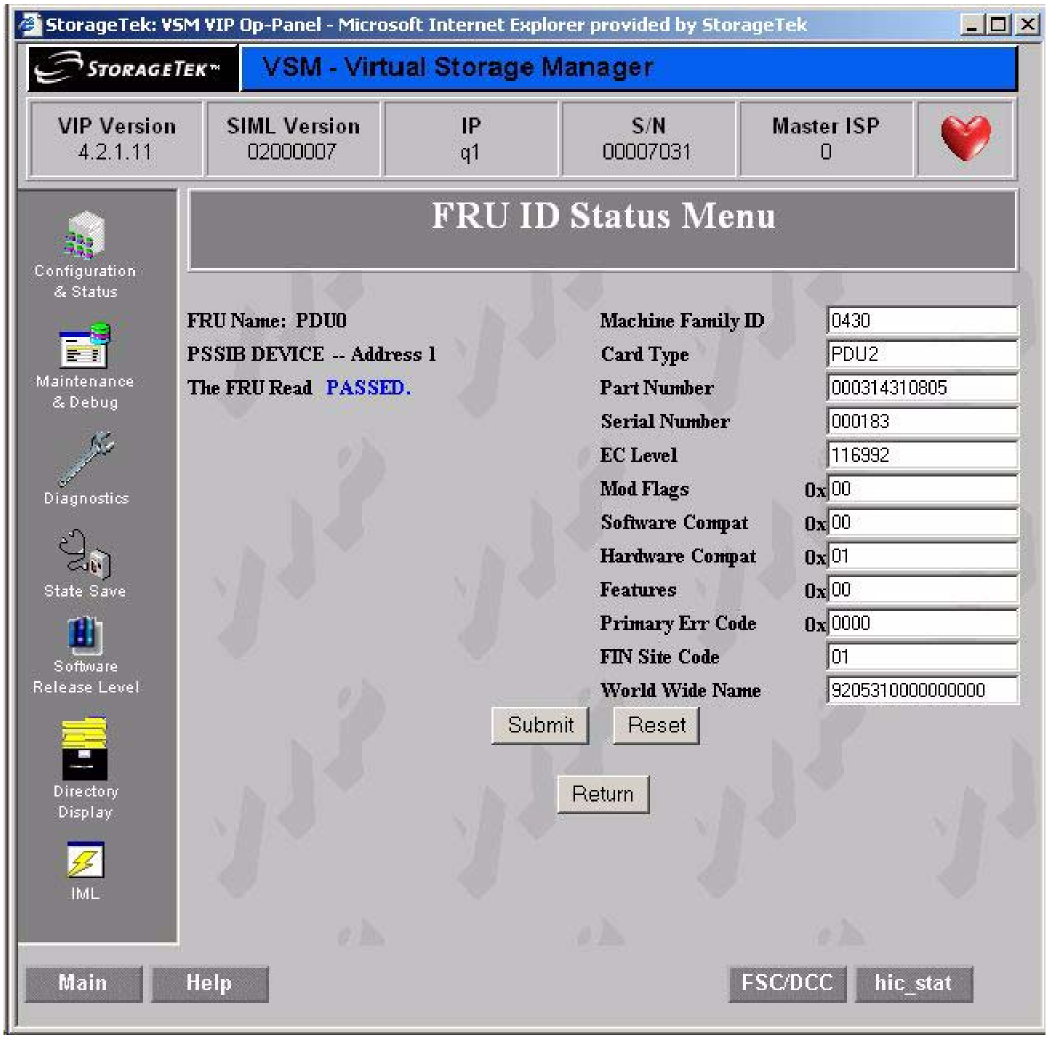


Figure C-81. VIP FRU ID Status Menu Screen

VIP Write ISP PROM VIP Screen

To access the *Write ISP PROM VIP* screen, click the active Write ISP PROM VIP text field on the *VIP Maintenance and Debug Menu* screen, Figure C-78 on page C-260. Click Program VIP to display the message **Programming VIP, please wait... Successful!** onscreen. If the request fails, the message **Programming VIP, please wait... Failed! Failed! Error 0x7403 Programming VIP into PROM** displays onscreen, as shown in the example below. Click Return to return to the *VIP Maintenance and Debug* screen.

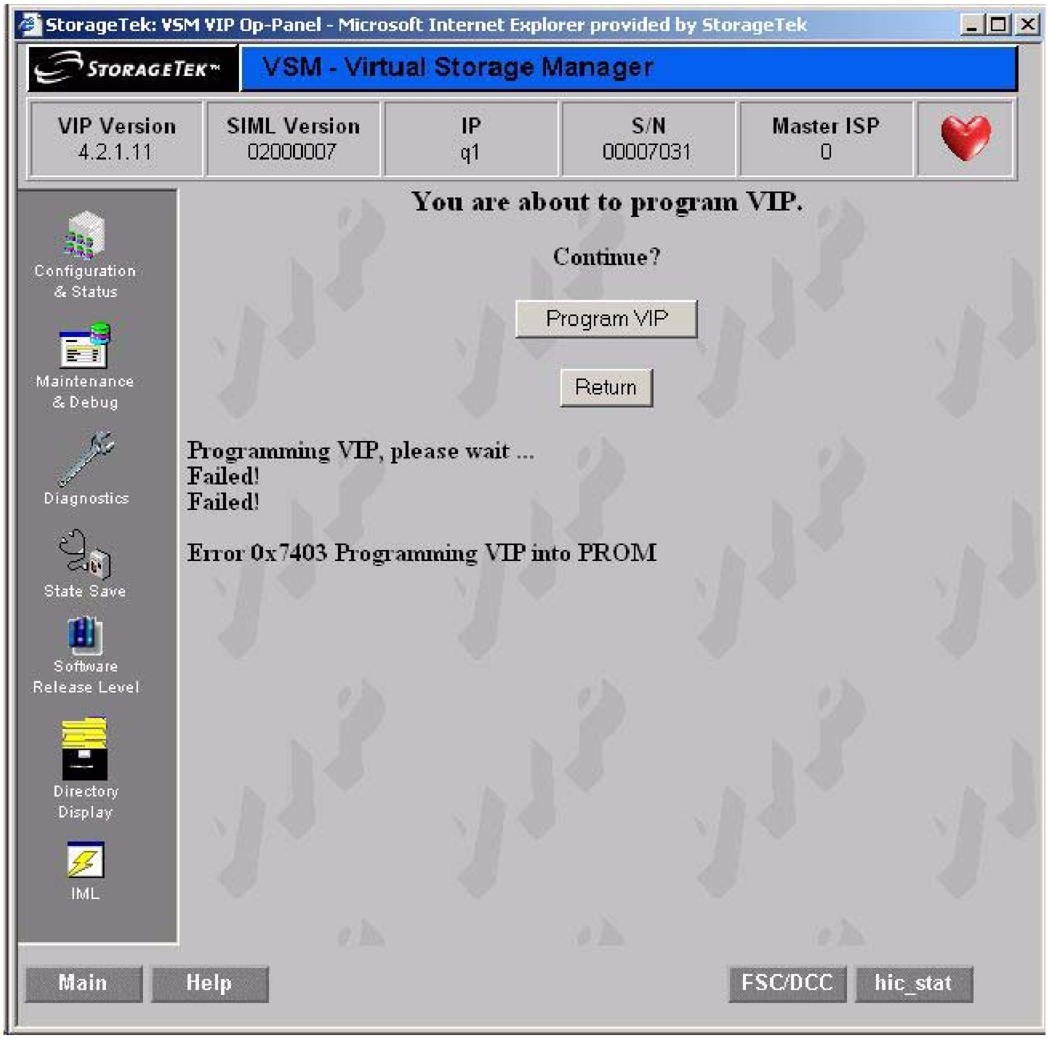


Figure C-82. VIP Write ISP PROM VIP Screen

VIP Write ISP PROM SIML Screen

To access the *VIP Write ISP PROM SIML* screen, click the active Write ISP PROM SIML text field on the *VIP Maintenance and Debug Menu* screen, Figure C-78 on page C-260. Click Program IML to display the message **Programming SIML, please wait... Successful!** onscreen. Click Return to return to the *VIP Maintenance and Debug* screen.

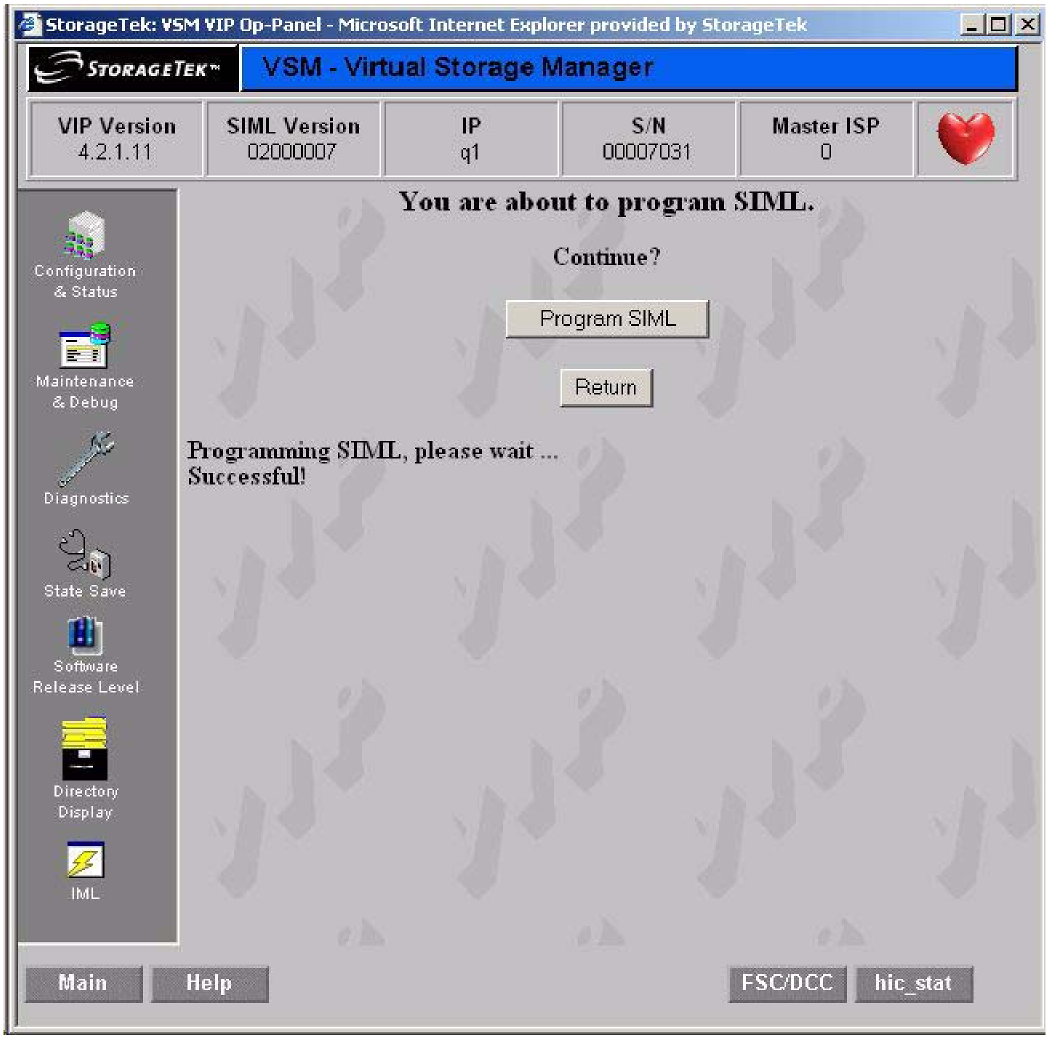


Figure C-83. VIP Write ISP PROM SIML Screen

VIP EC Upgrade Screen

To access the *VIP EC Upgrade* screen, click the active EC Upgrade text field on the *VIP Maintenance and Debug Menu* screen, Figure C-78 on page C-260, or from the *VIP Select Software Release Level* screen, Figure C-95 on page C-277. This VIP-level screen is informationally and functionally equivalent to the CSE-level *EC Upgrade* screen, Figure C-66 on page C-248, so is not depicted here.

VIP ISP Hard Drive Reconstruction Screen

To access the *VIP ISP Hard Drive Reconstruction* screen, click the active Drive Reconstruction text field on the *VIP Maintenance and Debug Menu* screen, Figure C-78 on page C-260. Select the drive you want to reconstruct and click Reconstruct Drive to initiate the request and display the message **ISP HD *n* Fenced!** onscreen. Once drive reconstruction completes, the message **Drive Reconstruction Successful** displays. Click Return to return to the *VIP Maintenance and Debug* screen.

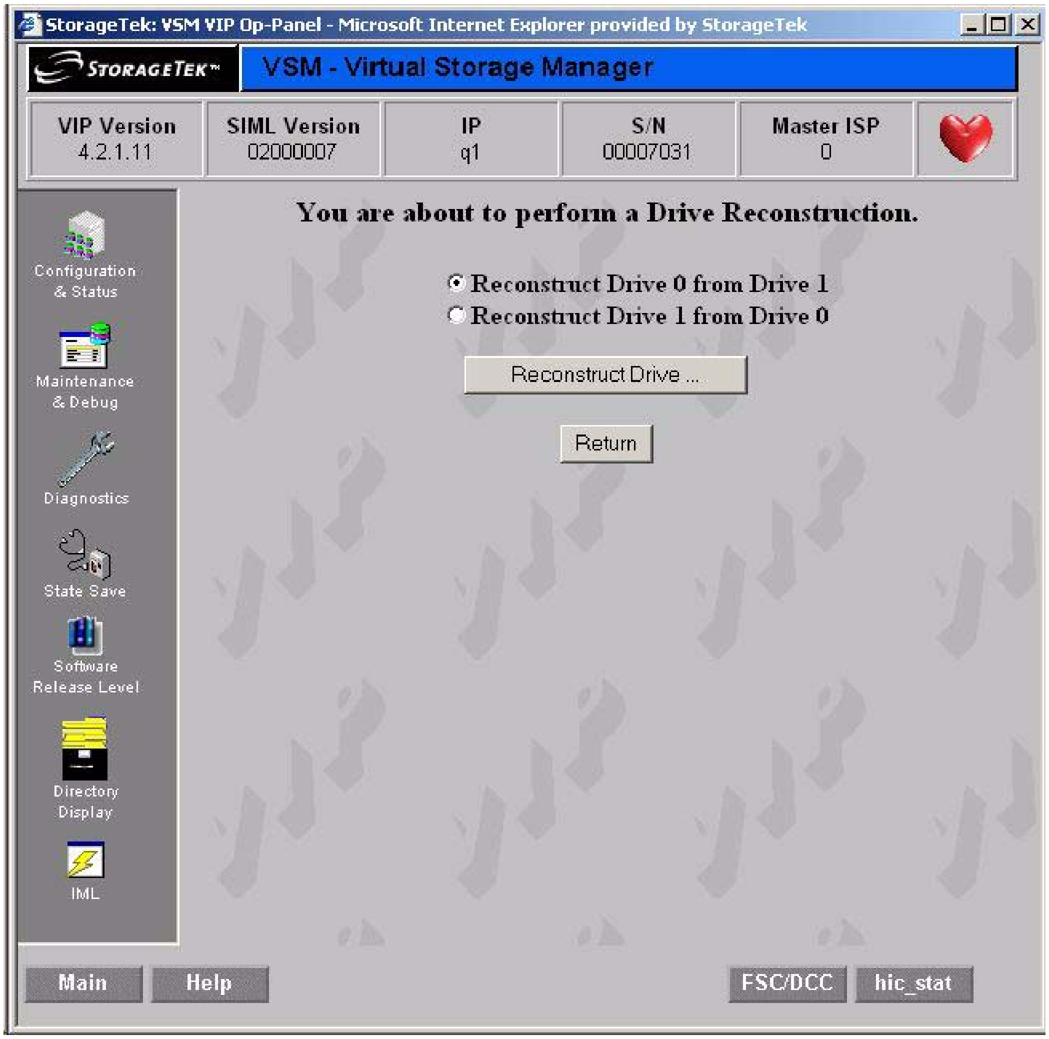


Figure C-84. VIP ISP Hard Drive Reconstruction Screen

VIP Switch ISP Master Screen

To access the *VIP Switch ISP Master* screen, click the active Switch ISP Master text field on the *VIP Maintenance and Debug Menu* screen, Figure C-78 on page C-260. Click Switch the ISP Master to initiate the request and display the massage **Switch ISP master, please wait... Successful!** onscreen. Click Return to return to the *VIP Maintenance and Debug Menu* screen.

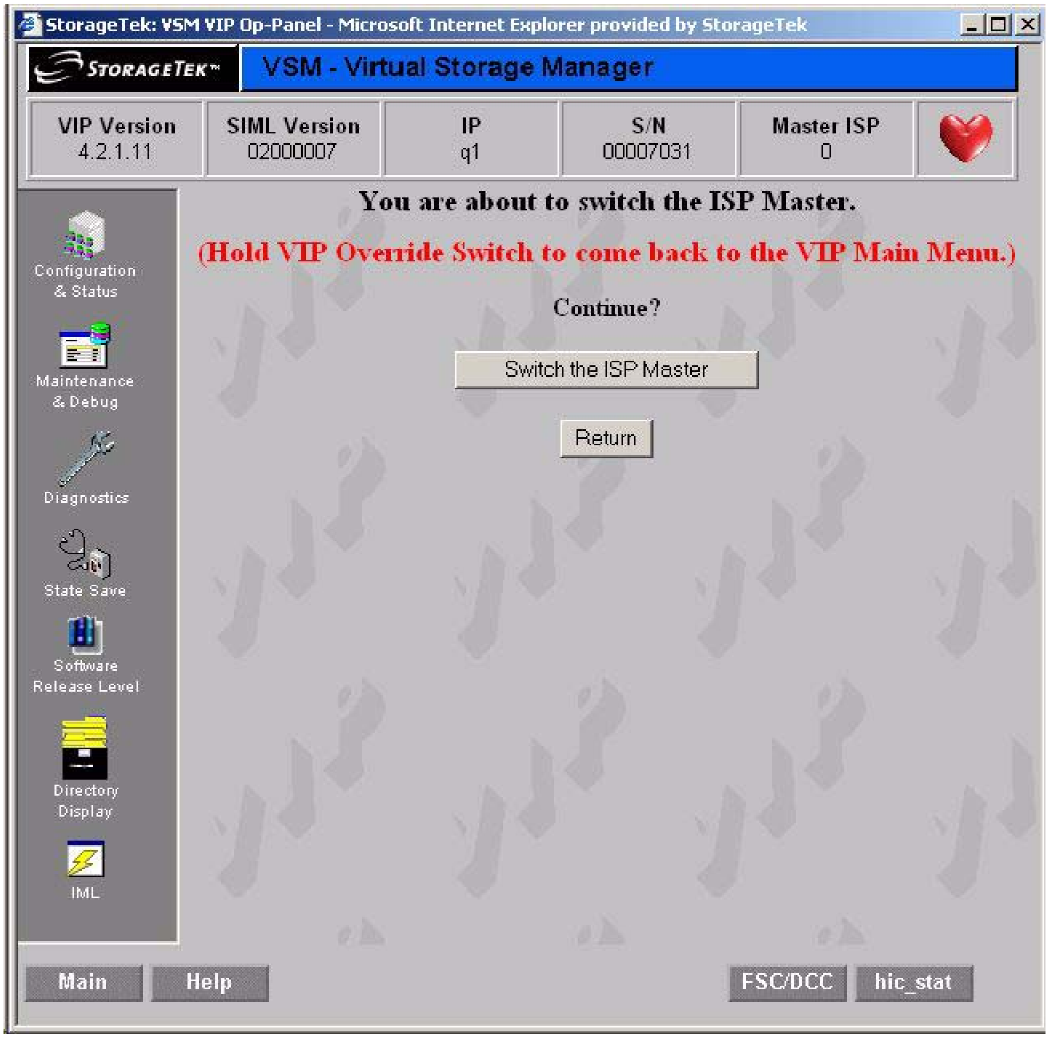


Figure C-85. VIP Switch ISP Master Screen

VIP Delete Installed Options Screen

To access the *VIP Delete Installed Options* screen, click the active Delete Installed Option text field on the *VIP Maintenance and Debug Menu* screen Figure C-78 on page C-260. Click Delete Installed Options to initiate the request and display the message **Delete installed options, please wait... Successful!** onscreen. Click Return to return to the *VIP Maintenance and Debug Menu* screen.

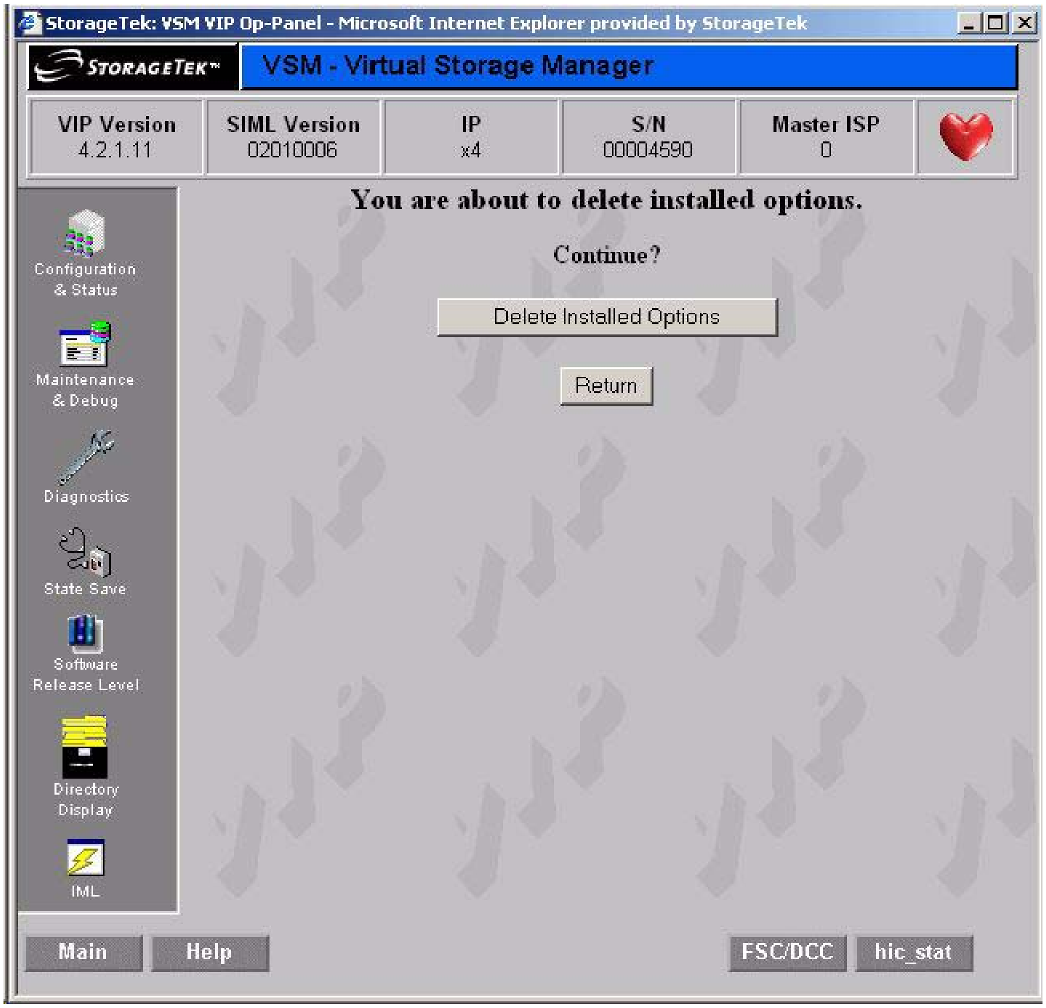


Figure C-86. VIP Delete Installed Options

VIP Delete Corrupted Databases for All SRLs Screen

To access the *VIP Delete Corrupted Databases for All SRLs* screen, click the active text field Delete Corrupted DBs (all SRLs) on the *VIP Maintenance and Debug Menu* screen, Figure C-78 on page C-260. Click Delete Corrupted Databases to initiate the request and display the message **Deleting corrupted databases (all SRLs), please wait... Successful!** onscreen. Click Return to return to the *VIP Maintenance and Debug Menu* screen.

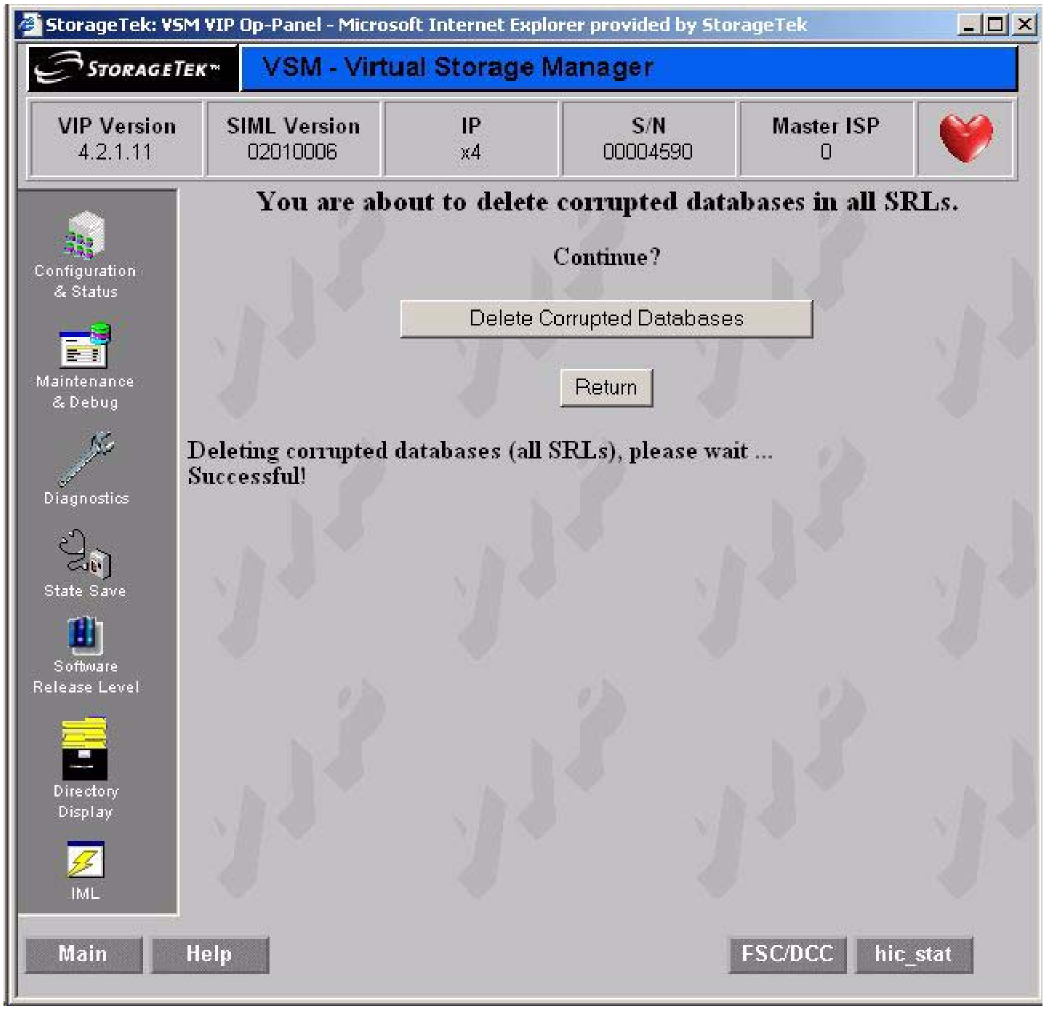


Figure C-87. VIP Delete Corrupted Databases for All SRLs Screen

VIP Reset Frame Root Block Serial Number to 0 Screen

To access the *VIP Reset Frame Root Block Serial Number to 0* screen, click the active Delete Boot Block S/N to 0 text field on the *VIP Maintenance and Debug Menu* screen, Figure C-78 on page C-260. Click Reset the Frame S/N on ISP hard drives to initiate the reset request and display the message **Deleting corrupted databases (all SRLs), please wait... Successful!** onscreen. Click Return to return to the *VIP Maintenance and Debug Menu* screen.

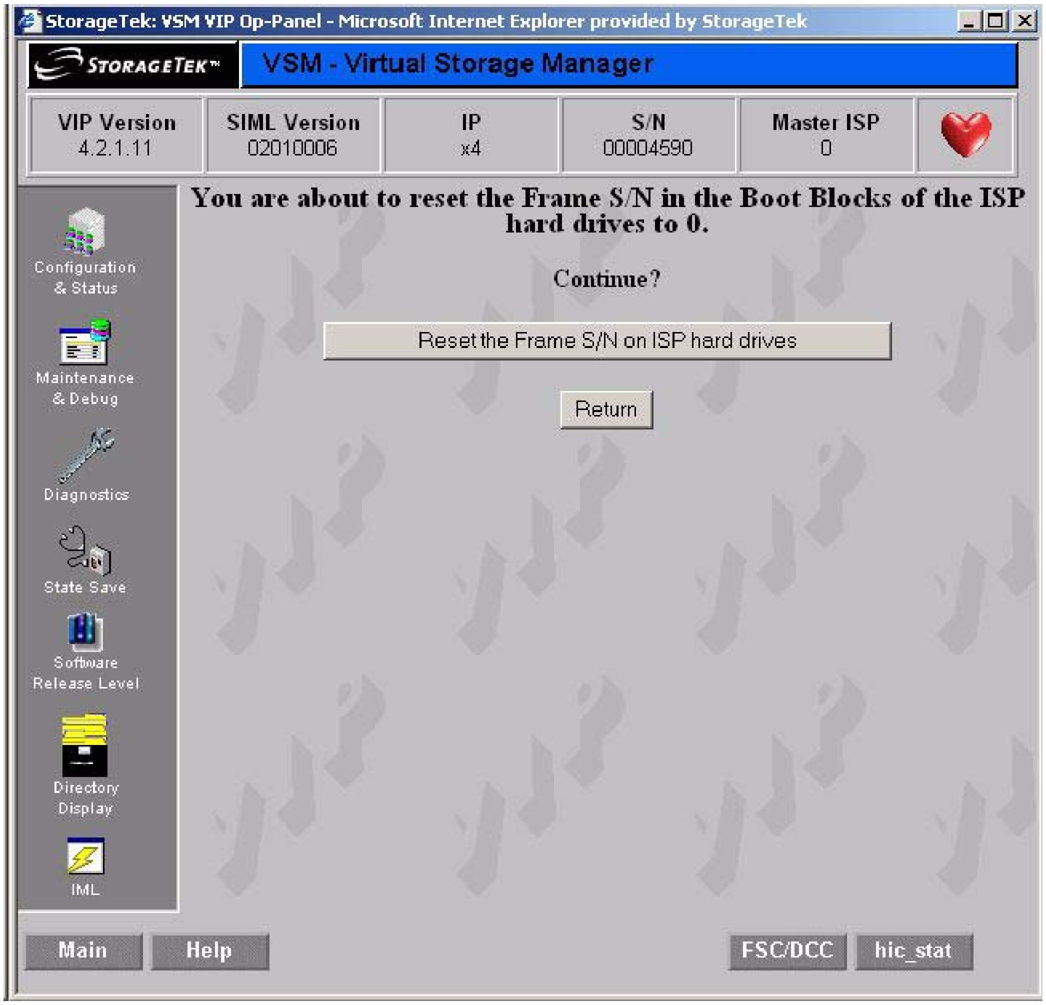


Figure C-88. VIP Reset Frame Root Block Serial Number to 0 Screen

VIP Unfence ISP Hard Drives Screen

To access the *VIP Unfence ISP Hard Drives* screen, click the active Unfence Hard Drives text field on the *VIP Maintenance and Debug Menu* screen, Figure C-78 on page C-260. Click Unfence Hard Drives to initiate the request and the display the message **Unfencing ISP hard drives, please wait... Successful!** onscreen. Click Return to return to the *VIP Maintenance and Debug* screen.

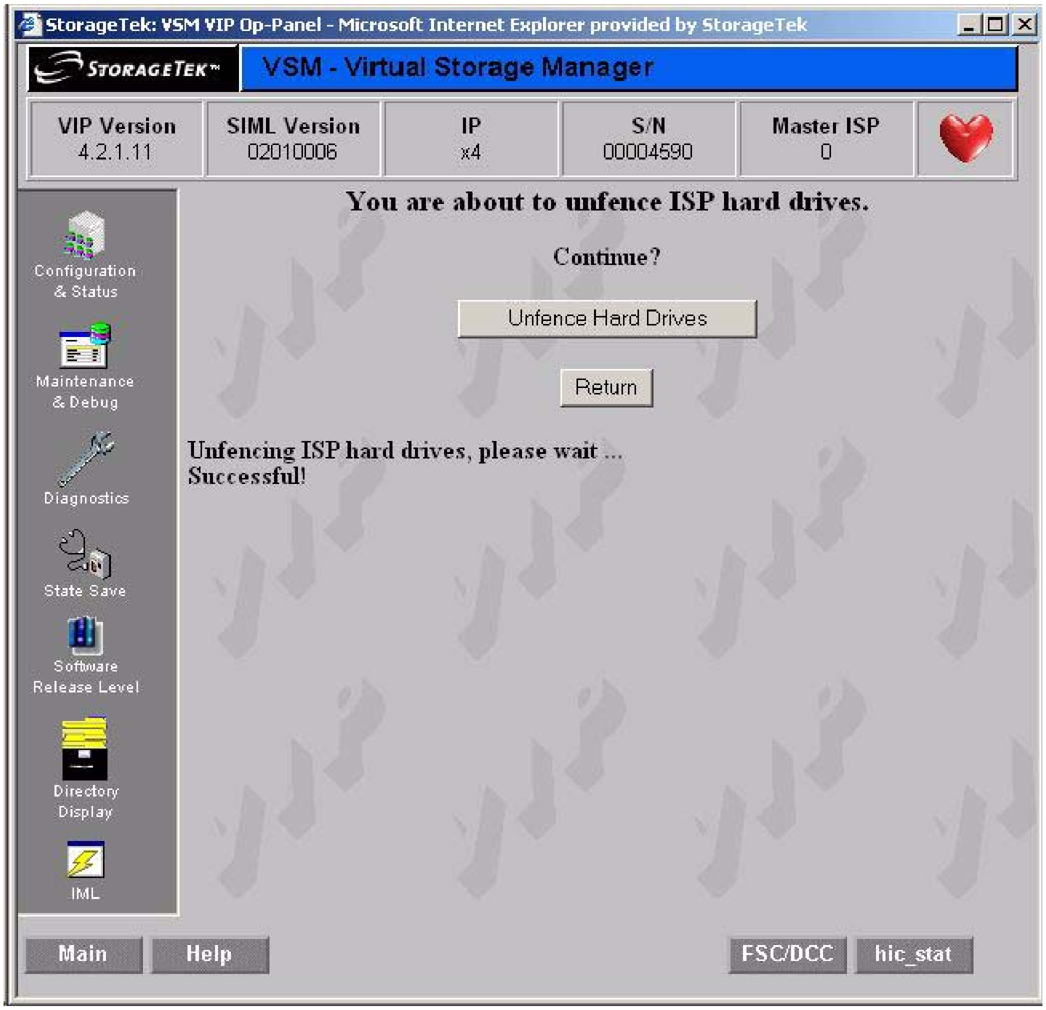


Figure C-89. VIP Unfence ISP Hard Drives Screen

VIP Diagnostic Functions Screen

To access the *VIP Diagnostic Functions* screen, click the active Diagnostics text field at the *VIP Main Menu* screen, Figure C-76 on page C-258. At the screen below, click the Volume Verification Menu text field to display the "VIP Volume Verification Menu Screen (1 of 2)" on page C-273; click the Maintenance Bus Diagnostics Menu text field to display the "VIP Maintenance Bus Diagnostics Menu Screen" on page C-275. You also can perform these three diagnostics functions by clicking on these other text fields shown onscreen:

- Click the active Create pHILE Control Files text field to initiate that request and display the message **Successful!** next to that text field.
- Click the active Check pHILE Volumes text field to initiate that request and display the message **Successful!** next to that text field.
- Click the active HD Read Diagnostics text field to perform read diagnostics on the ISP hard drives and display the message **Successful!** next to that text field.

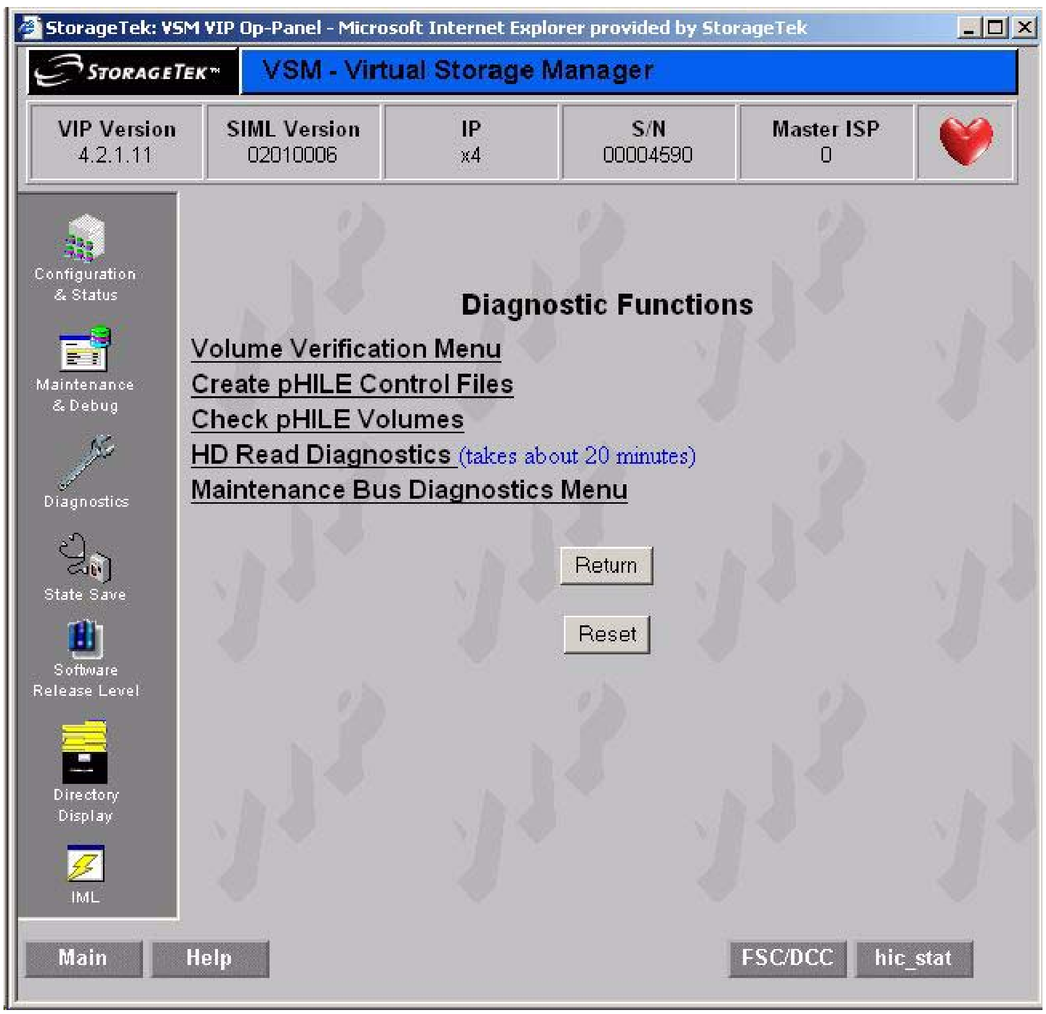


Figure C-90. VIP Diagnostic Functions Screen

VIP Volume Verification Menu Screen (1 of 2)

To access the *VIP Volume Verification Menu* screen, click the active Volume Verification Menu text field on the *VIP Diagnostic Functions* screen, Figure C-90 on page C-272. At the screen below, check the box and click Perform Volume Verification to initiate the request and send volume verification diagnostic test results to the file PVERIFY.OUT; or, leave the box unchecked and click Perform Volume Verification to initiate the request and display test results on the *VIP Volume Verification Menu* screen (2 of 2), Figure C-92 on page C-274.

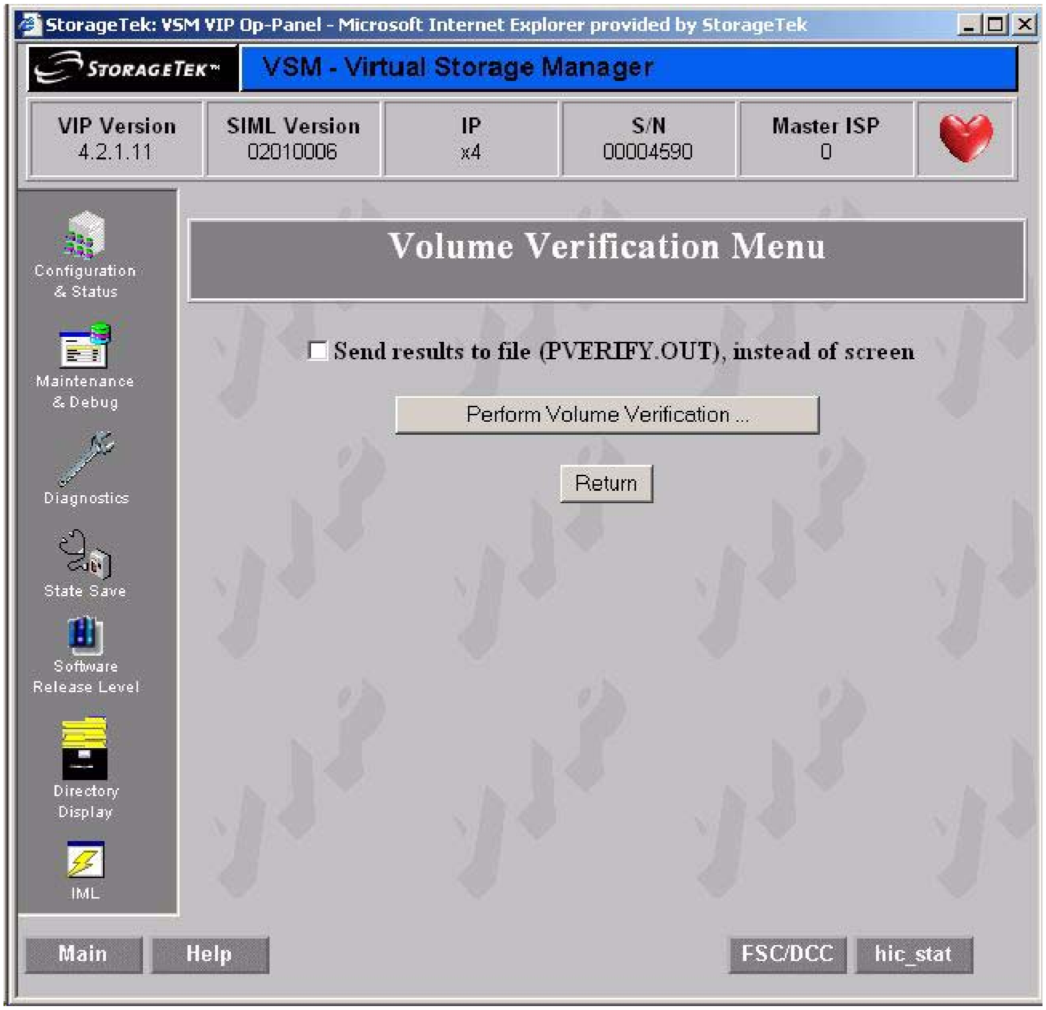


Figure C-91. VIP Volume Verification Menu Screen (1 of 2)

VIP Volume Verification Menu Screen (2 of 2)

To access the *VIP Volume Verification Menu* screen, leave the box unchecked on the *VIP Volume Verification Menu* screen (1 of 2), Figure C-91 on page C-273, then click Perform Volume Verification on that screen. The screen below displays a record of all fault symptom codes (FSC) logged against system volumes.

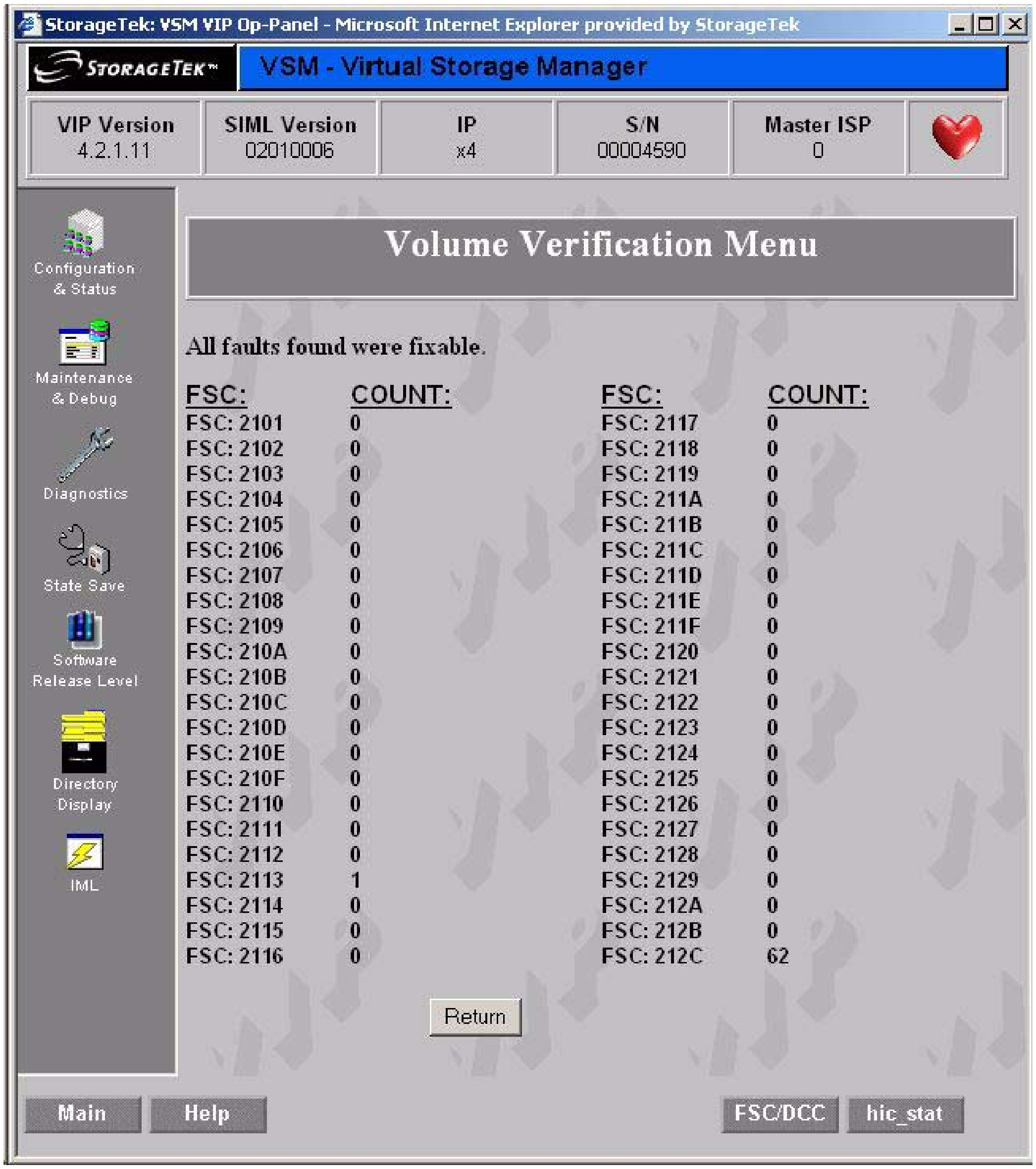


Figure C-92. VIP Volume Verification Menu Screen (2 of 2)

VIP Maintenance Bus Diagnostics Menu Screen

To access the *VIP Maintenance Bus Diagnostics Menu* screen, click the active Maintenance Bus Diagnostics Menu text field on the *VIP Diagnostic Functions* screen, Figure C-90 on page C-272. At the screen below, select a test duration and click Execute to initiate a maintenance bus test. Click Return to return to the *VIP Diagnostics Functions* screen.

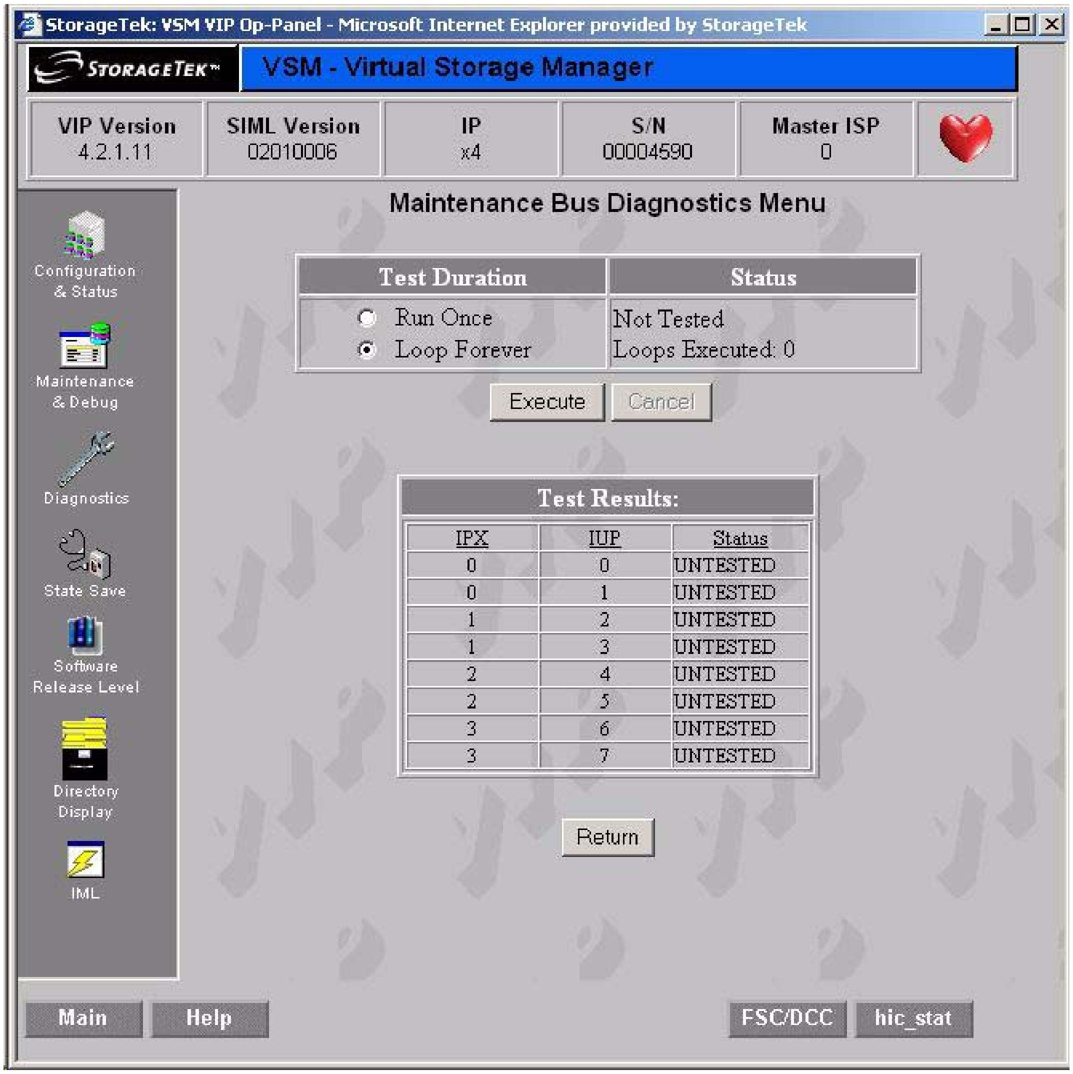


Figure C-93. VIP Maintenance Bus Diagnostics Menu Screen

VIP State Save Functions Screen

To access the *VIP State Save Functions* screen, click the active State Save text field on the *VIP Main Menu* screen, Figure C-76 on page C-258. At the screen below, click the appropriate hotlink to find uncompressed IUP and/or ISP state saves, or to initialize IUP and/or ISP state save volumes.

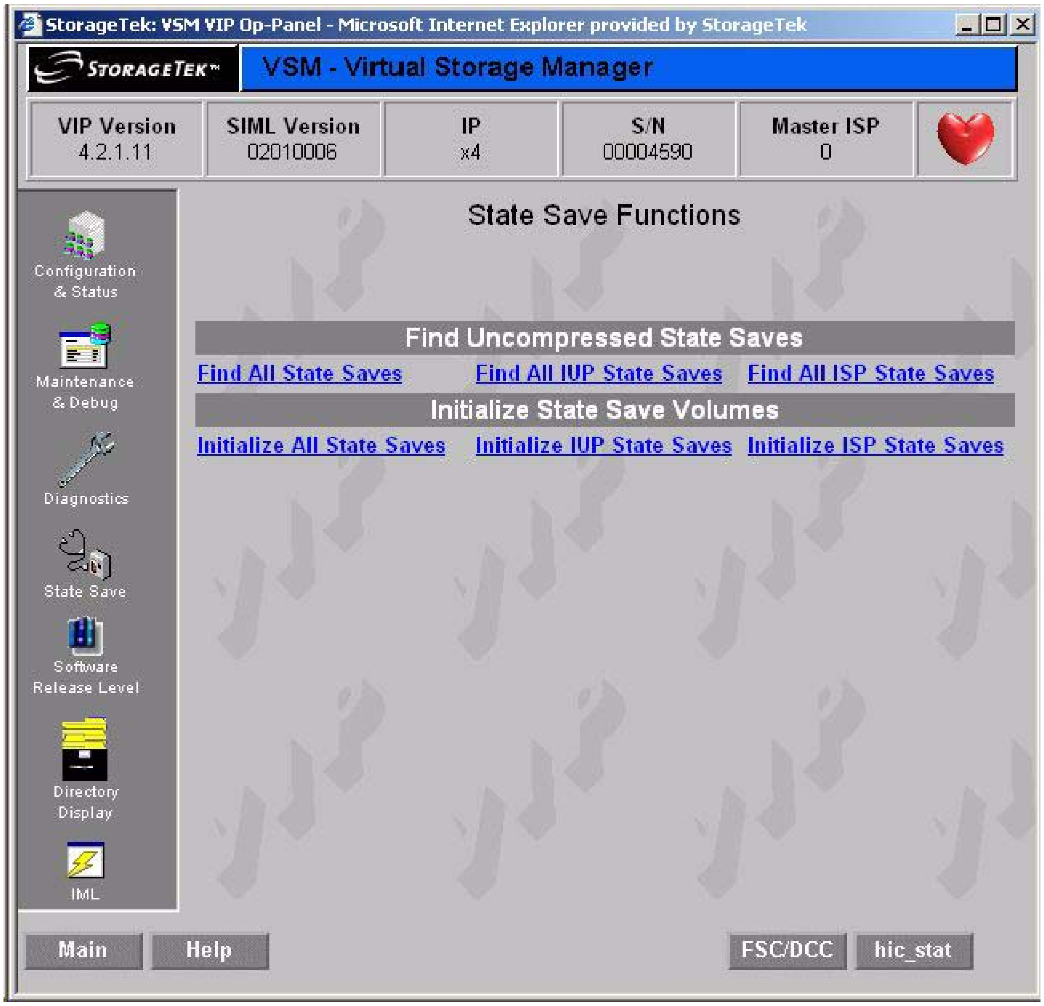


Figure C-94. VIP State Save Functions Screen

VIP Select Software Release Level Screen

To access the *VIP Select Software Release Level* screen, click the Software Release Level text field on the *VIP Main Menu* screen, Figure C-76 on page C-258. The screen below lists the current SRL running in the VTSS. Click the button next to any task listed onscreen to display linked subscreens that enable you to complete these tasks:

- Change the IML SRL – Select a SRL, then click Change the IML SRL to display a screen with the message **IML SRL changed to FICON**. The selected SRL will begin running on the VTSS at the next IML (power on/reset).
- Delete a Specific SRL – Select a SRL, then click Delete Selected SRL to display a screen with the message **Warning: Clicking continue will delete SRL <*SRL name*>**.
- Install an EC Upgrade – Click EC Upgrade to display the *VIP EC Upgrade* screen (not depicted in this appendix; see equivalent CSE-level screen, Figure C-66 on page C-248), where you must enter a valid source path to install an EC upgrade.
- Delete Datafile Components From a Specific SRL – Select a SRL, then select one or more datafile components to delete (fences, current FRU, state saves, databases, event logs, and/or hic_stat file), then click Delete From Selected SRL to display a screen with the message **Warning: Clicking continue will delete <*components*> from SRL <*SRL name*>**. Click Continue to delete selected components. Click Cancel to void the request.

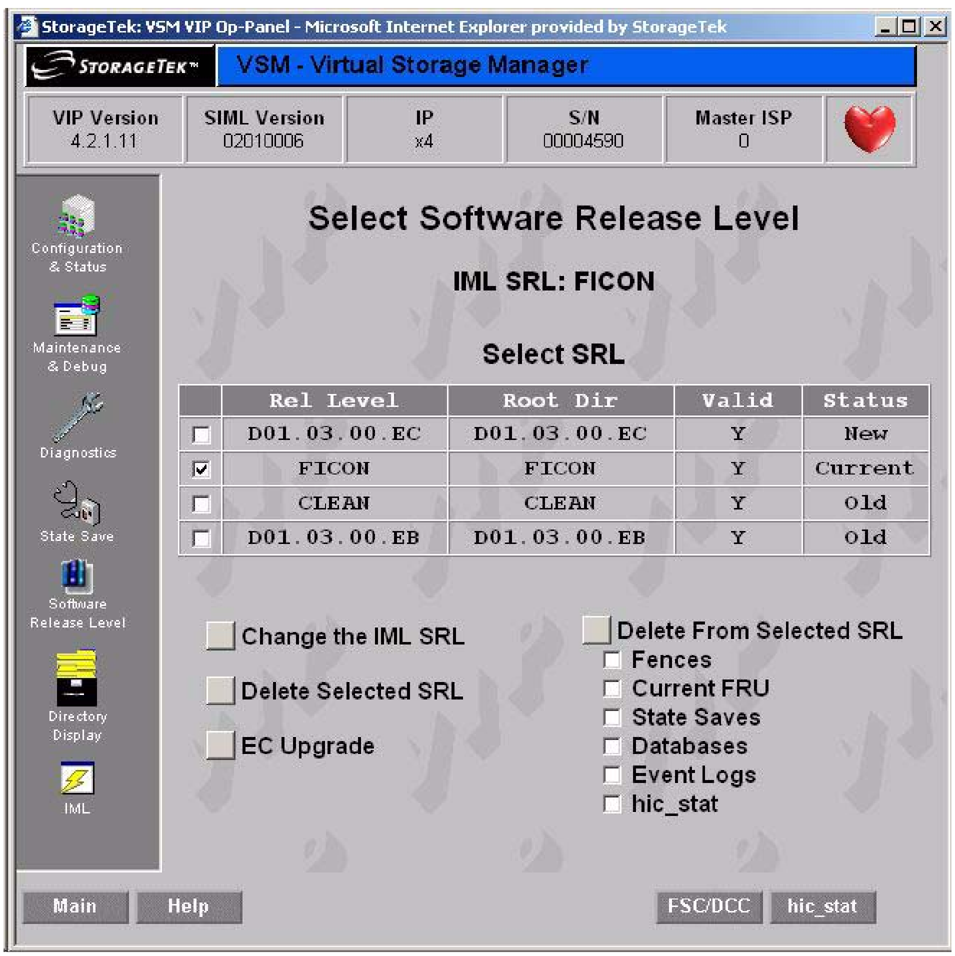


Figure C-95. VIP Select Software Release Level Screen

VIP Directory Display Screen

To access the *Directory Display* screen, click the Directory Display text field on the *VIP Main Menu* screen, Figure C-76 on page C-258.

Five of six subscreens for the screen below are informationally and functionally equivalent to the five subscreens for the CSE-level *Directory Display* screen, Figure C-68 on page C-250, so are not depicted here. The one subscreen for the *Directory Display* screen that does not have a CSE-level equivalent is the *VIP ROOT Directory* screen, Figure C-97 on page C-279. CSE-level proxies for the five *VIP Directory Display* subscreens are:

- "Executable Directory Screen" on page C-251
- "Diagnostic Directory Screen" on page C-252
- "State Save Directory Screen" on page C-253
- "Configuration Directory Screen" on page C-254
- "Database Directory Screen" on page C-255.

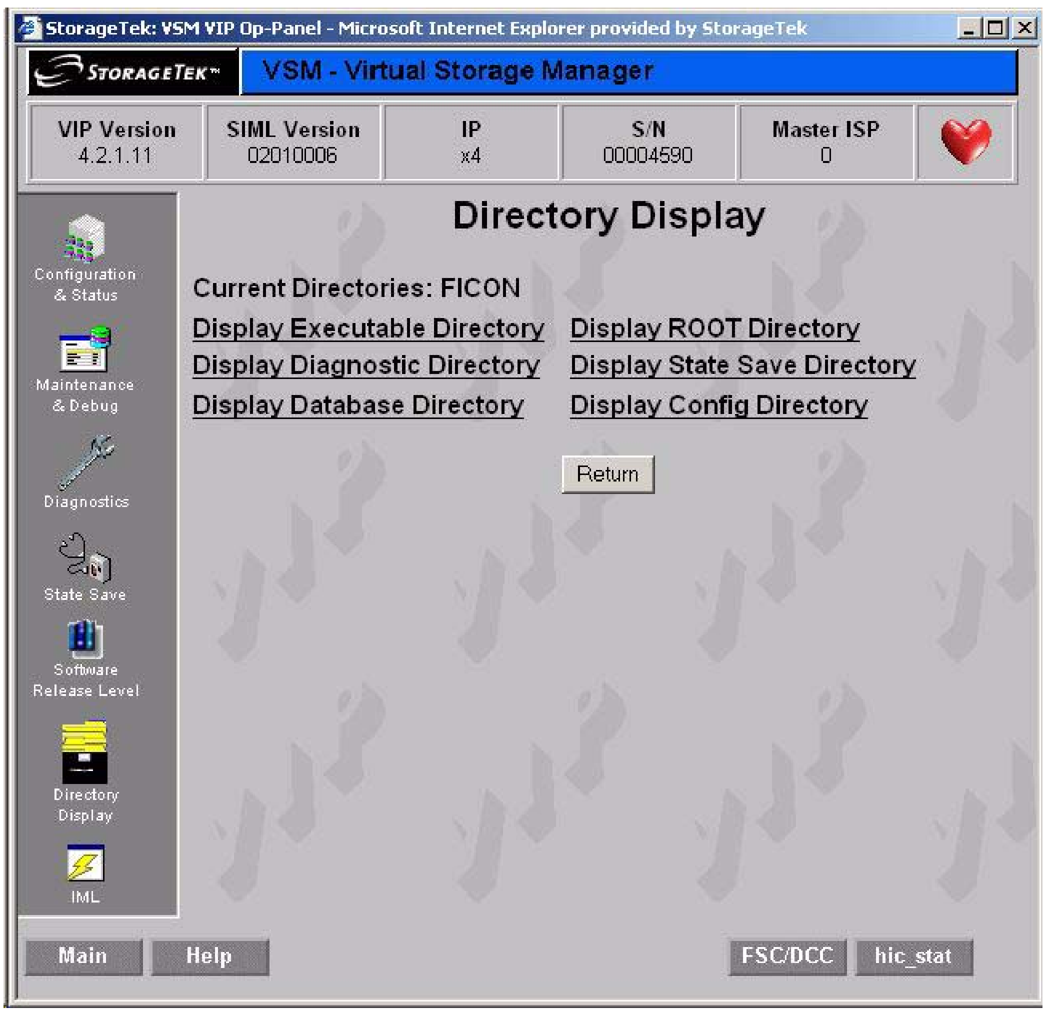


Figure C-96. VIP Directory Display Screen

VIP ROOT Directory Screen

To access the *VIP ROOT Directory* screen, click the Display ROOT Directory text field on the *VIP Directory Display* screen, Figure C-96 on page C-278.

At the screen below, click any listed file to download it to your service laptop PC or to a remote maintenance server.

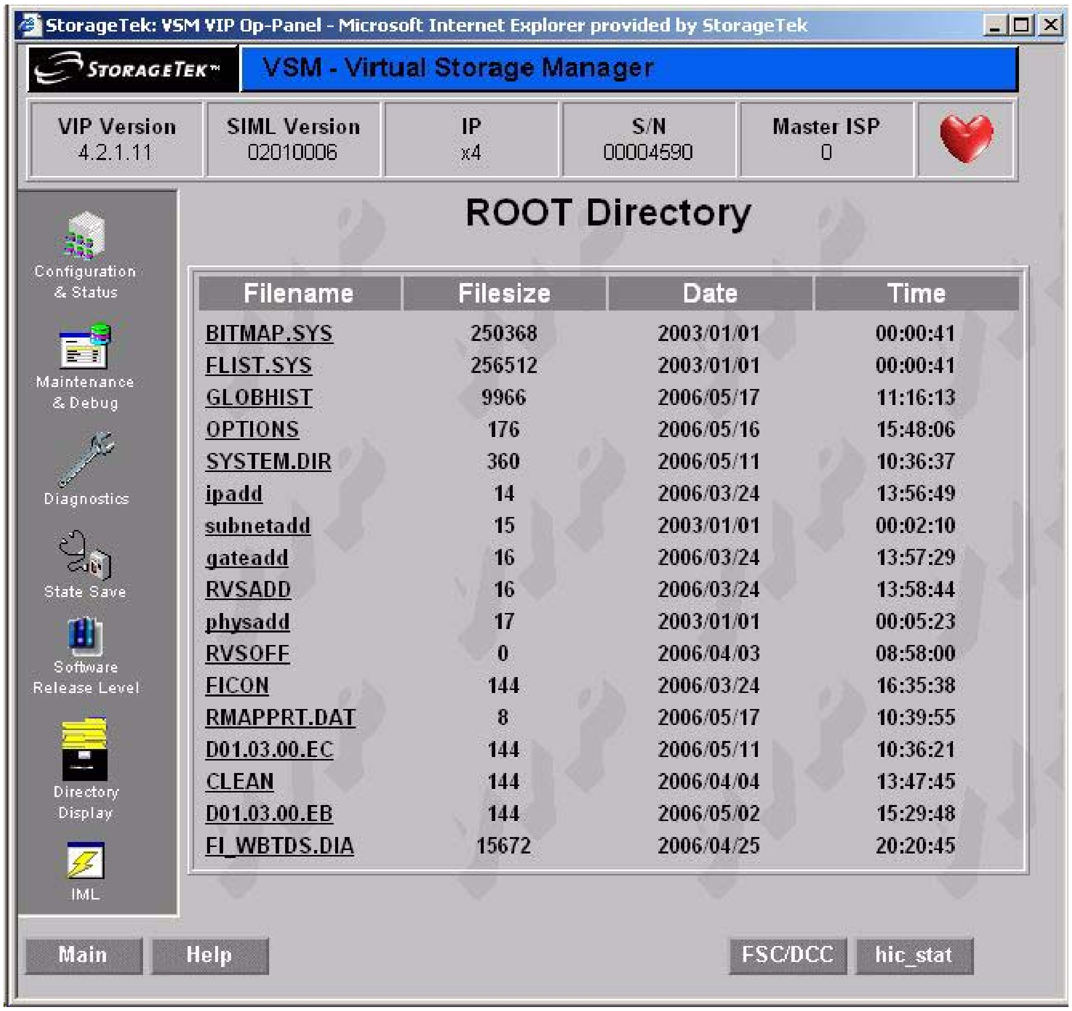


Figure C-97. VIP ROOT Directory Screen

VIP IML the VSM Screen

To access the *VIP IML the VSM* screen, click the IML text field on the *VIP Main Menu* screen, Figure C-76 on page C-258.

At the screen below, click Submit to exit VIP mode and IML the VTSS in 'normal' mode. To IML the VTSS in VIP mode, check the IML in VIP mode (VIP Switch Override) box and hold the A-Hub assembly toggle switch in VIP position while the cabinet is powering on; see "A-Hub Card Assembly" on page A-145 for details on the A-Hub assembly. Click Return to return to the *VIP Main Menu* screen.

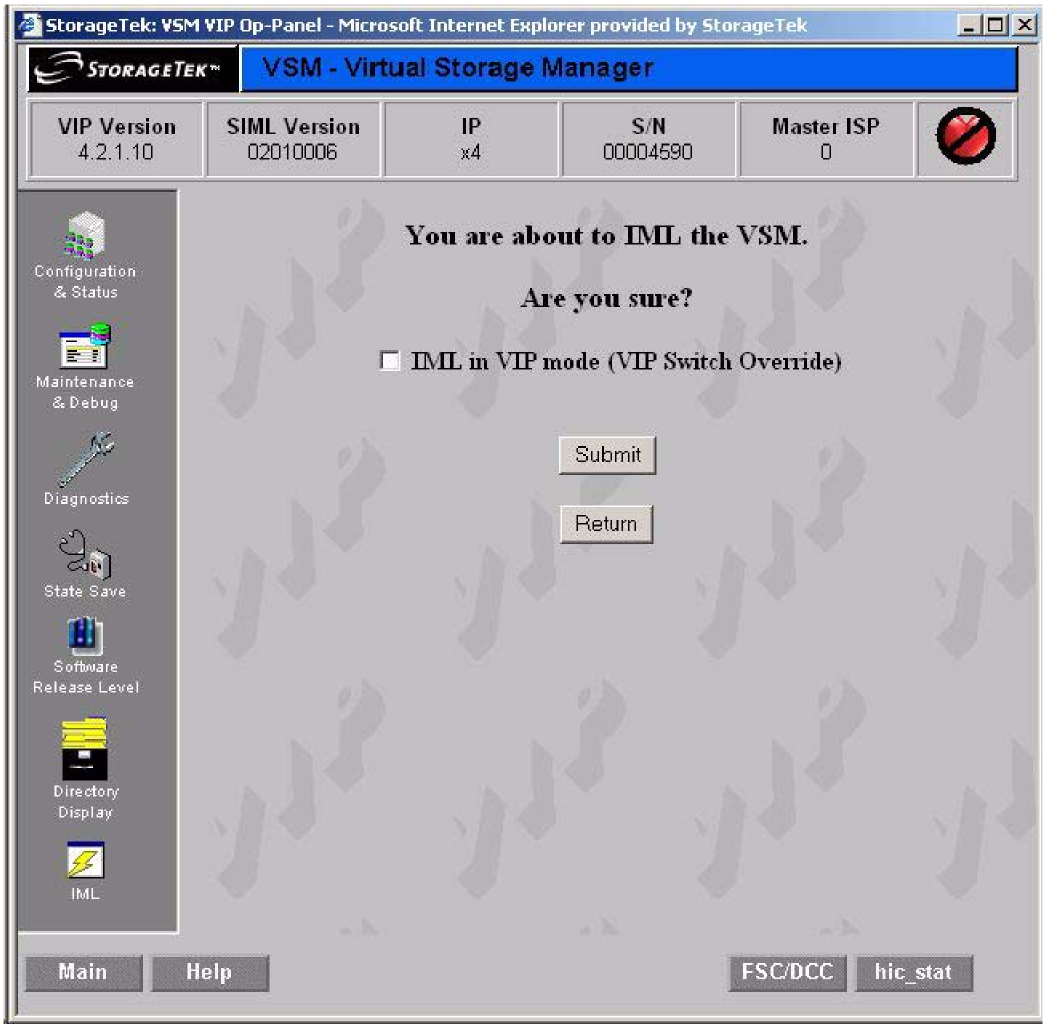


Figure C-98. VIP IML the VSM Screen

VSM5-VTSS Parts Catalog

D

■ How to Use This Information

This section describes how to use this VSM5-VTSS parts catalog.

General

Note: Illustrations always precede their parts list, and when possible, appear on the facing page.

The first number in each Descriptive Parts List (DPL) identifies the figure in which the listed parts are shown (Arrow 1). The index numbers (Arrow 2) key the parts in the figures to the related information in the list. On subsequent pages of the same list, the first line repeats the figure number and the next line gives the index number of the next item listed (Arrow 3).

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4
3 - BKD	306386607	DRAWER ASSEMBLY
		(SEE FIGURE 2-19 FOR NHA)
- 1	306386201	• VIBRATION MOUNTS
- 2	306386802	• DRAWER SEAL
- 3	10421230	• BALL STUD 1/4" HEX, 6-32 STUD

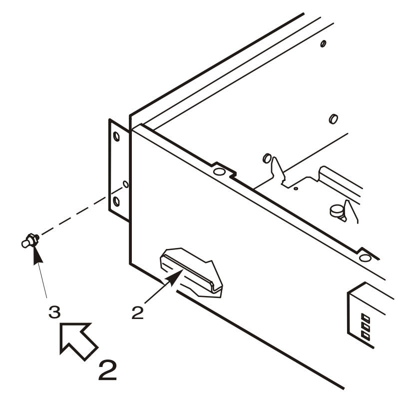


FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4
3 - 52	306389201	• SLIDE DRAWER SECTION
- 53	10310468	• SCREW, TXPH, 1/4" C/SEMS, ZP, 10-32 x 3/8

Figure numbers and assemblies follow a logical sequence of breakdown. Any assembly that is broken down into its component parts is identified with a BKD (breakdown) designation in place of an index number (Arrow 4). The first assembly listed in each DPL will always carry the BKD designation. If an assembly is broken down (detailed in another figure in this catalog), that figure is referenced in the description column (Arrow 5).

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4	USABLE ON CODE	QTY PER ASM
4 - BKD	306387902	ENCLOSURE ASSEMBLY		1
		(SEE FIGURE 1-10 FOR NHA)		
- 1	306388703	• COVER ASSEMBLY REAR		1
		(SEE FIGURE 5 FOR BREAKDOWN)		
- 2	10421323	• SPRING CATCH, ZINC PLATED		6
- 3	10310529	• SCREW, TXPH C/SEMS, ZP, 4-40 x 3/8		12
- 4	10096650	• LEVELER, LEG, 1/2-13, 1.5 FOOT, ZP		4
- 5	306388001	• CASTER		4

Detailed figures refer back to the next higher overall view or next higher assembly (NHA) (Arrow 6). Assemblies that are not detailed can be ordered only as complete assemblies.

A detail part may be unlisted for several reasons: it is part of a matched set, part of an assembly that is purchased as a unit, or part of a welded or bonded assembly. If you need an unlisted part, you must order the assembly that contains it, and not the detailed part.

Level of Assembly

The indented parts list indicates the subordination of major assemblies, subassemblies, and detail parts. Attaching hardware normally follows the detail part. The top assembly in each parts list is level 1 (Arrow 7). Descriptions preceded by a single bullet (.) (Arrow 8) are second level assemblies or parts that are subordinate to those not preceded by a bullet. Descriptions for level 3 are preceded by two bullets (..), and are subordinate to level 2 (Arrow 9).

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4	USABLE ON CODE	QTY PER ASM
2 - BKD	309456401	SYSTEM UNIT DRAWER ASSEMBLY	A	1
	309456501	EXPANSION UNIT DRAWER ASSEMBLY	B	1
		(SEE FIGURE 1-3 AND 1-4 FOR NHA)		
- 1	100090203	• 5.25, 1.3GB, DISK DRV, SCSI, - FRU	A	4
	100090203	• 5.25, 1.3GB, DISK DRV, SCSI, - FRU	B	3
- 2	306386506	• COVER ASSEMBLY		1
- 3	306387502	• FAN ASSEMBLY - FRU		3
- 4	10076341	• SW, ASM, 2P, 1T, 6A, 250V, AC INLET	A	1
- 5	10076180	• SW, TH, 1P, 1T, 10A, 250V, 105F CLS	B	1
- 6	10080003	• FUSE, 3AG, 6.0A, 250V, FAST - FRU		2
-BKD	309407603	• DC POWER ASSEMBLY - FRU	B	1
- 7	10124005	• • ASTEC POWER SUPPLY - FRU	B	1
-8	306371802	• • CABLE ASSEMBLY, LINE TO POWER SUPPLY - FRU	B	1
-BKD	309456901	• PROCESSOR ASSEMBLY - FRU	A	1
-9	309457301	• • DIFFERENTIAL CARD	A	1
-10	309457001	• • PROCESSOR CARD	A	1
-11	306390701	• • MEMORY CARD	A	1
-12	306389701	• • SUPPORT PLATE	A	4
-13	309457101	• • SU COVER ASSEMBLY	A	1
-14	306390801	• EU COVER ASSEMBLY	B	1

Usable On Code

Usable On Code identify all related parts (Arrow 10). The codes characterize differences in like assemblies listed in the description column. In the example shown, two drawer assemblies are identified for use on the machine. The first occurrence of a code (A, B, etc.) in the Usable On Code column identifies such assemblies (for example, the two versions of the drawer assemblies are coded A and B). Subsequent occurrences of these codes identify which of the coded assemblies of a particular part is used on (Arrow 11). If there is no code identified, the part is used on all listed codes.

There are occasions when the same part is used on more than one coded assembly and the only difference is the "QTY PER ASM" (Quantity Per Assembly) (Arrow 12).

Numerical Index

The numerical index lists all part numbers in numerical order. The part number is cross referenced to each figure and index number where the part can be found in the catalog.

For example (Arrow 13): Part No. 10097447 can be found on Figure D-2, Index No. 18.

NUMERICAL INDEX

	PART NUMBER	FIGURE & INDEX NUMBER	PART NUMBER	FIGURE & INDEX NUMBER	PART NUMBER	FIGURE & INDEX NUMBER
	10080003	2-5	100090203	1-6	306370201	2-17
	10076180	2-6	100090203	2-1	306371802	2-8
	10076341	2-4	306369001	1-11	306385207	3-9
13	10096650	4-4	306369101	1-11	306385905	1-1
	10097447	2-18	306369201	1-5	306386005	1-2
	10124005	2-7	306369901	1-12	306386201	3-1

Change Bars

A change bar (Arrow 14) indicates the latest EC revisions to a parts list. These are changes that have occurred since the last issue date of the parts catalog.

- 2	306386802	• DRAWER SEAL		1	14
- 3	306389001	• VIBRATION STRIP		2	
- 4	306389102	• SEAL GROUNDING,3.85"		2	I
- 5	306389101	• SEAL GROUNDING,7.75"		4	
- 6	306389201	• SLIDE DRAWER SECTION		2	
- 7	10310468	• SCREW, TXPH, 1/4" C/SEMS, ZP, 10-32 x 3/8		8	
-8	10421230	• BALL STUD, 1/4" HEX, 6-32 STUD		2	
-9	306385207	• DRAWER WELDMENT		1	

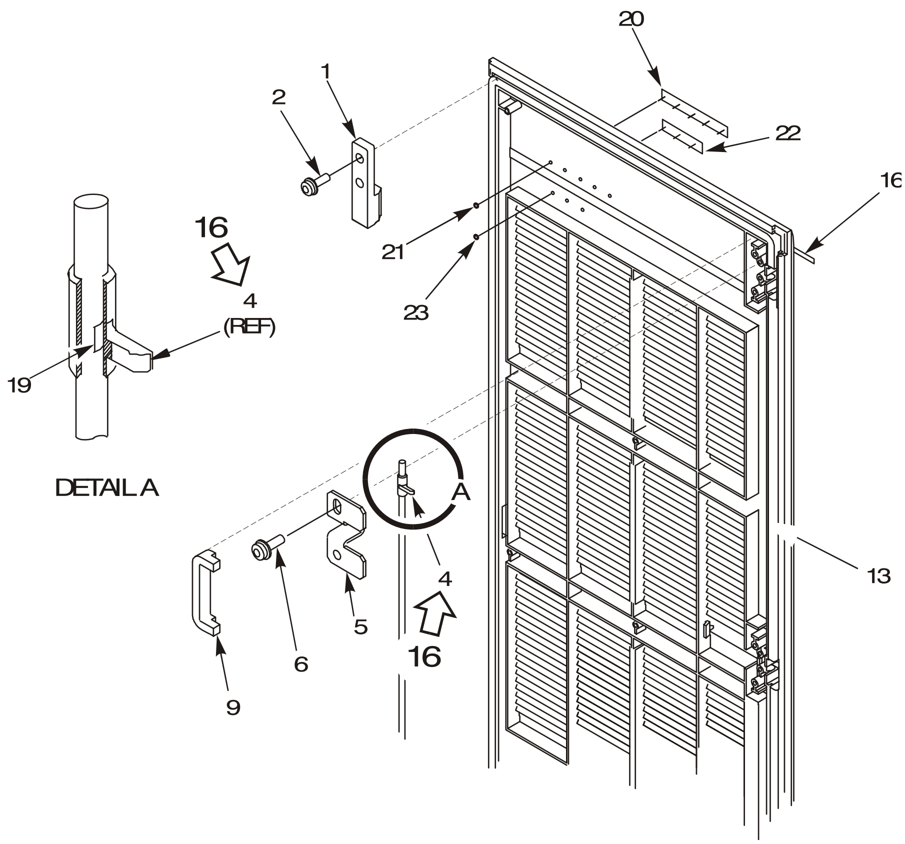
Part Number Compatibility List

Whenever (PNCOMP) (Arrow 15) appears in the part number column, refer to the machine part number compatibility list for the latest part number.

	- 3	306389001	• VIBRATION STRIP		2
		306389102	• SEAL GROUNDING,3.85"		4
15		306389101	• SEAL GROUNDING,7.75"		2
	- 6	(PN COMP)	• PWA, TKE		1
	- 7	10310468	• SCREW, TXPH, 1/4" C/SEMS, ZP, 10-32 x 3/8		4

Reference Designations

A reference (REF) designation after an index number on an illustration indicates that the part or assembly is shown elsewhere in the same figure (Arrow 16).



Parts Catalog Structure

The parts catalog is structured using the most current parts from the assembly parts lists (APLs), configuration control documents (CCDs), and top level assemblies (TLAs) produced by various engineering groups. The descriptive parts lists (DPLs) in the catalog list parts and assemblies followed by their attaching hardware. Whenever possible, parts and assemblies are listed in order either in a clockwise or counterclockwise direction around the assembly. At times the numbering sequence appears to be discontinuous on the art, due to locations of the attaching hardware, or due to views or details included in the figure.

Any part number on the DPL that is followed by an asterisk (*) indicates that the part appears on APL(s) or documents other than the ones listed on that DPL. An assembly and its attaching hardware may be included in a DPL even though neither appears on the APL(s) being listed in the DPL. This is done because the assembly may not be listed on a higher APL; for example, it may come directly from a CCD or TLA. Therefore, the assembly is shown in a figure where it would logically appear. For example, an operator panel assembly may be included in a frame assembly DPL (and its figure) since it is attached to the frame. In this case, the part numbers for the assembly and its attaching hardware are followed by an asterisk. If the assembly in question is also broken down in the DPL, the individual pats in the assembly are assumed to have asterisks following their part numbers.

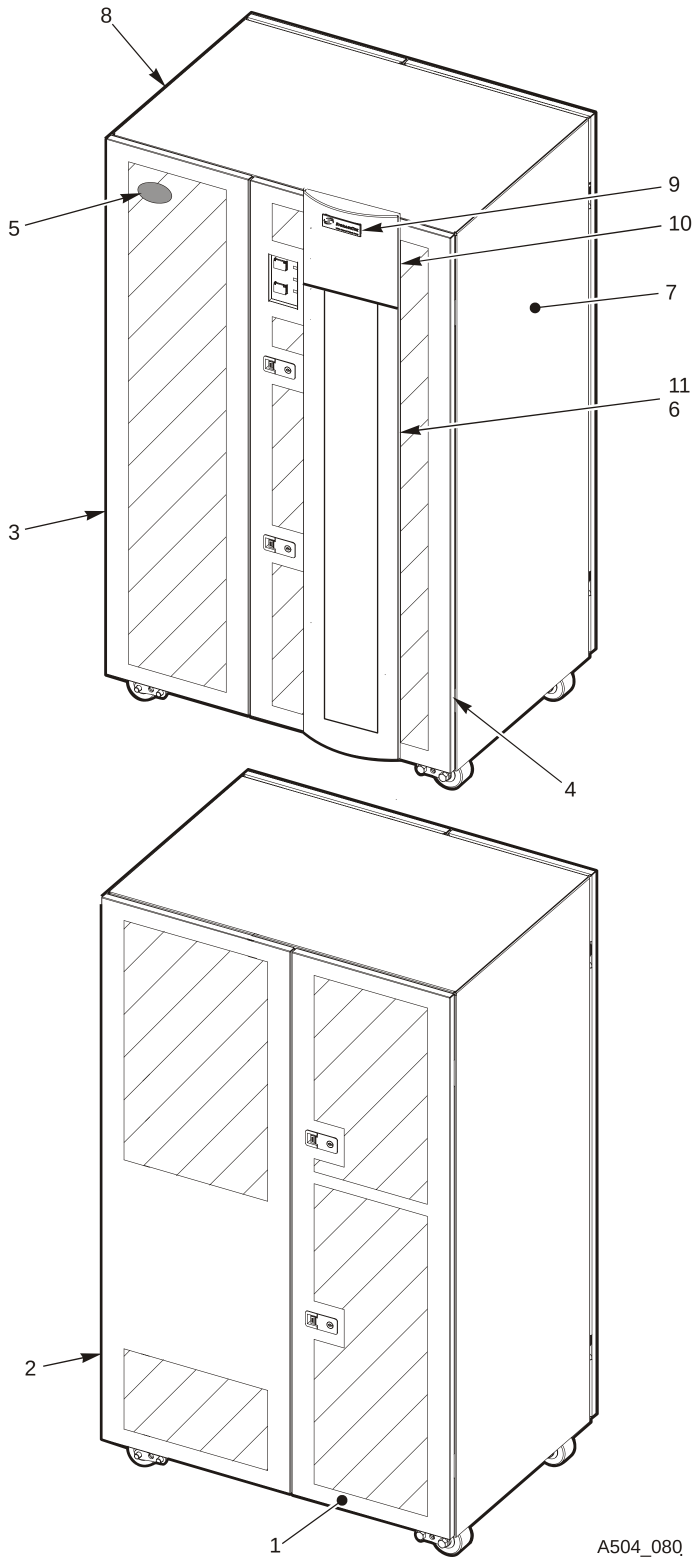


Figure D-1. VSM5-VTSS External Doors and Covers

FIGURE INDEX NUMBER	PART NUMBER	1 2 3 4 DESCRIPTION	USABLE ON CODE	QTY PER ASM
D-1 - BKD	315226601*	COVER SET, VSM5		
- 1	315505902*	• DOOR ASSEMBLY, SMALL REAR *(see Figure D-2 for breakdown)*		1
- 2	315506102*	• DOOR ASSEMBLY, LARGE, REAR *(see Figure D-3 for breakdown)*		1
- 3	315509301*	• DOOR ASSEMBLY, SMALL FRONT *(see Figure D-4 for breakdown)*		1
- 4	315509501*	• DOOR ASSEMBLY, LARGE FRONT *(see Figure D-5 for breakdown)*		1
- 5	3152263001	• BADGE ASSEMBLY, VSM5		1
- 6	315503601*	• SCREW, SHOULDER		10
- 7	315504601*	• COVER, ASSEMBLY, SIDE		2
- 8	315507301*	• COVER ASSEMBLY, TOP		1
-9	313752301	• BADGE LOGO UNIVERSAL		1
- 10	312323001	• CAP, DECORATIVE, CABINET		1
- 11	312323301	• DECORATIVE BEZEL ASSEMBLY		1
		(RoHS-compliant)*		

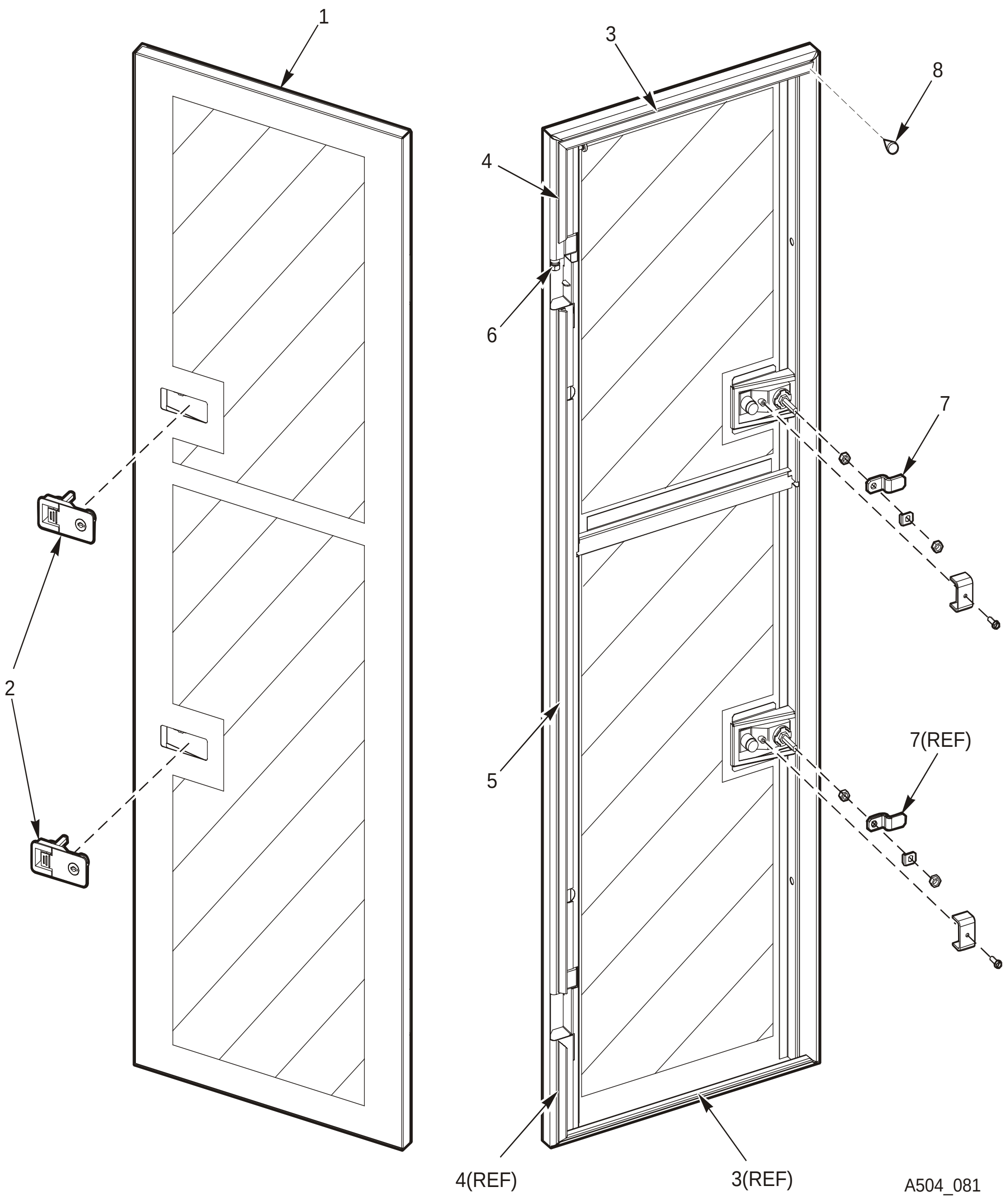


Figure D-2. VSM5-VTSS Rear Right-Side Door Assembly

FIGURE INDEX NUMBER	PART NUMBER	1 2 3 4 DESCRIPTION	USABLE ON CODE	QTY PER ASM
D-2 - BKD	315505901*	DOOR ASSEMBLY, SMALL REAR		
		(see Figure D-1, item 1, for NHA)		
- 1	315506001	• DOOR, SMALL, REAR		1
- 2	315511101	• LATCH, DOOR LOCKING		2
- 3	311812401	• GASKET, DOOR, 9500		2
- 4	311812101	• GASKET, DOOR, SMALL, HINGE		2
- 5	311812301	• GASKET, DOOR, MIDDLE, HINGE		1
- 6	315507001	• BOLT, SELF LOCKING, SPECIAL		1
- 7	315505801	• PAWL, DOOR, FRONT		2
- 8	10501078	• BUMPER, .375 DIA X .187, RUB BLK		2
		(RoHS-compliant)*		

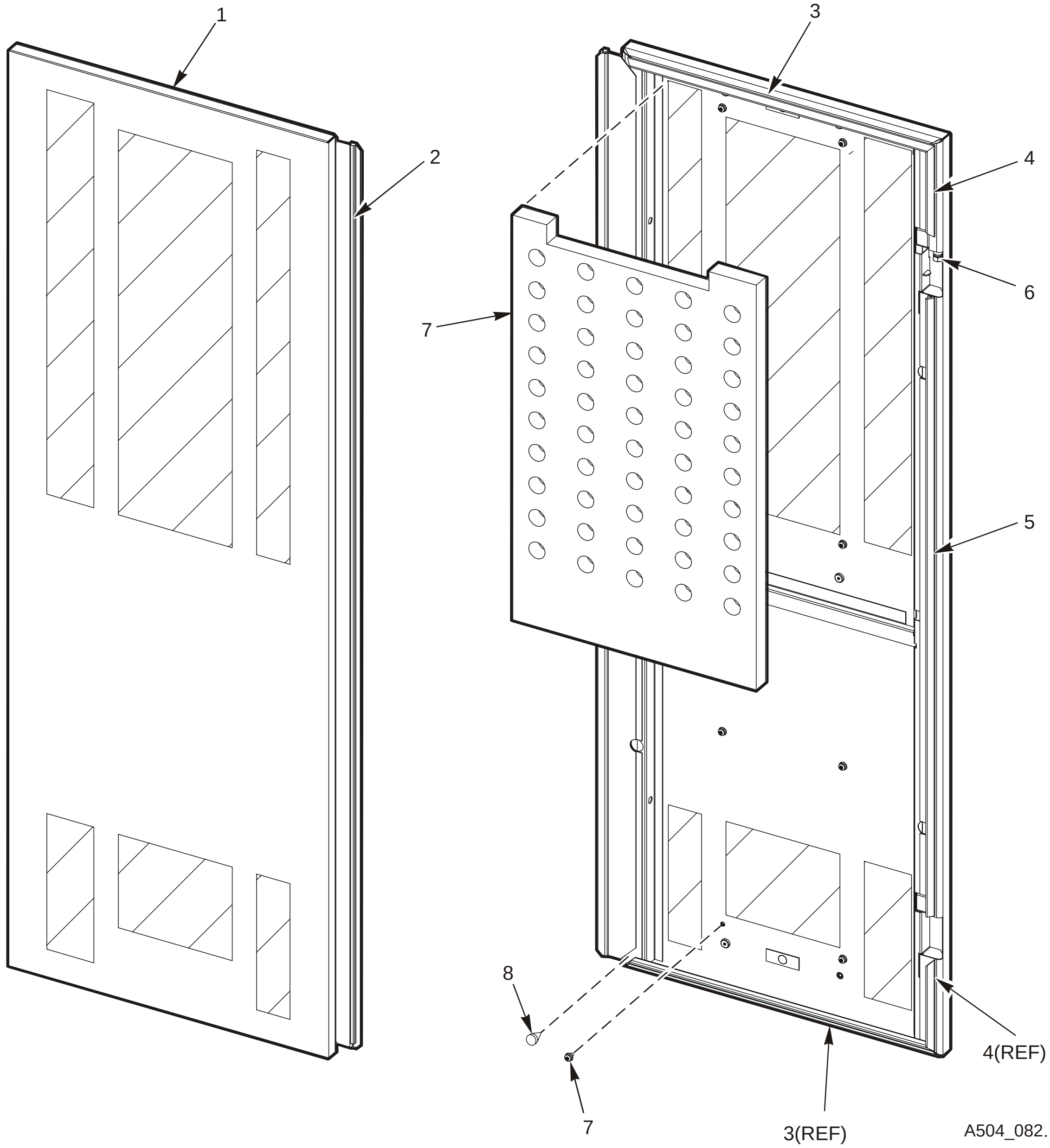


Figure D-3. VSM5-VTSS Rear Left-Side Door Assembly

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4	USABLE ON CODE	QTY PER ASM
D-3 - BKD	315506101*	DOOR ASSEMBLY, LARGE, REAR *(see Figure D-1, item 2, for NHA)*		
- 1	315506201	• DOOR, LARGE, REAR		1
- 2	311812502	• GASKET, DOOR, 9500		1
- 3	311812001	• GASKET, DOOR, LARGE TOP/BOTTOM		2
- 4	311812101	• GASKET, DOOR, SMALL, HINGE		2
- 5	311812301	• GASKET, DOOR, MIDDLE, HINGE		1
- 6	315507001	• BOLT, SELF LOCKING, SPECIAL		1
- 7	311826903	• FOAM LARGE, REAR, DOOR		1
- 8	10501078	• BUMPER, .375 DIA X .187, RUB BLK		2
		(RoHS-compliant)*		

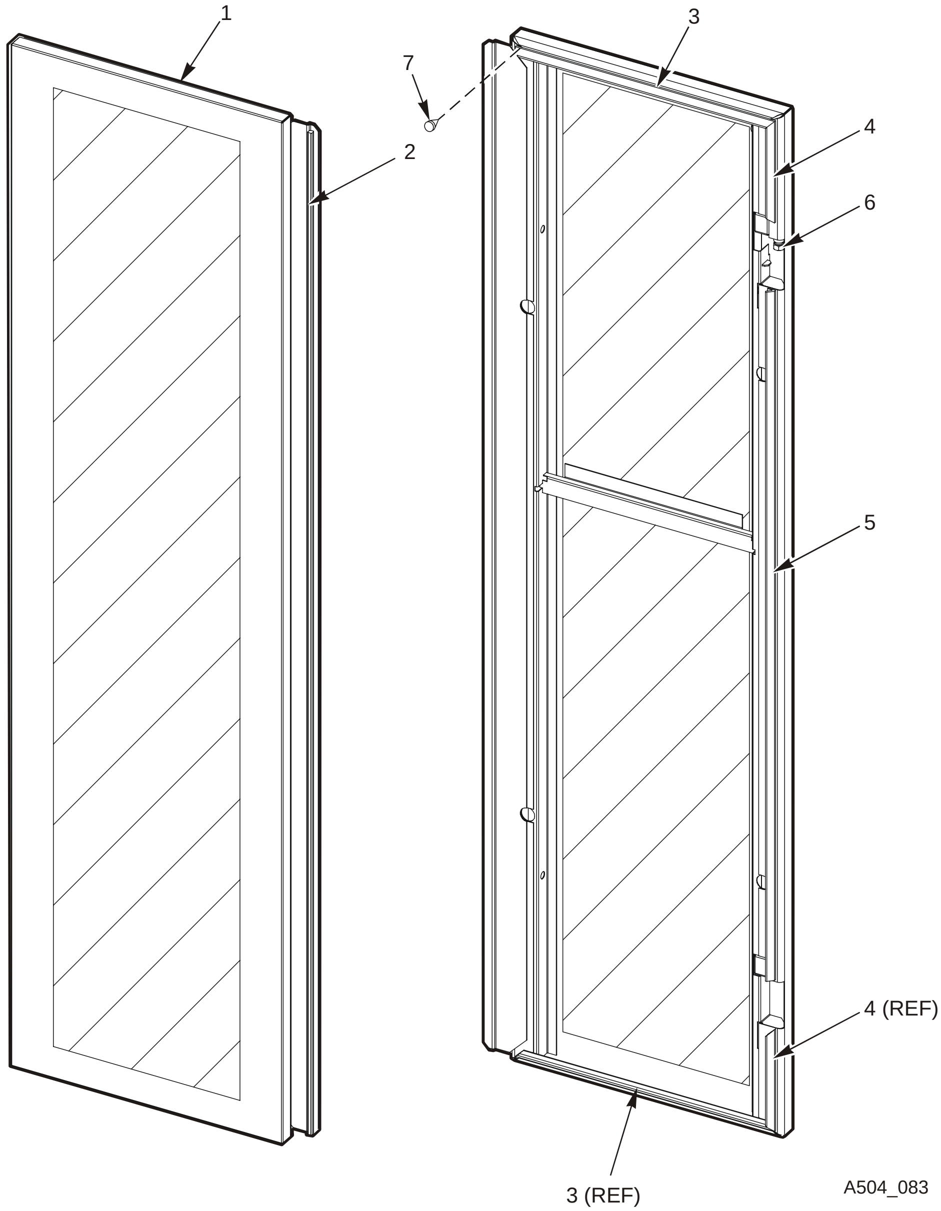


Figure D-4. VSM5-VTSS Front Left-Side Door Assembly

FIGURE INDEX NUMBER	PART NUMBER	1 2 3 4 DESCRIPTION	USABLE ON CODE	QTY PER ASM
D-4 - BKD	315509301*	DOOR ASSEMBLY, SMALL FRONT *(see Figure D-1, item 3, for NHA)*		
- 1	315509201*	• DOOR, SMALL, FRONT LEFT		1
- 2	311812502	• GASKET, DOOR, 9500		1
- 3	311812702	• GASKET, DOOR, SMALL TOP/BOTTOM, FRONT		2
- 4	311812101	• GASKET, DOOR, SMALL, HINGE		2
- 5	311812301	• GASKET, DOOR, MIDDLE, HINGE		1
- 6	315507001*	• BOLT, SELF LOCKING SPECIAL		1
- 7	10501078	• BUMPER, .375 DIA X .187, RUB BLK		2
		(RoHS-compliant)*		

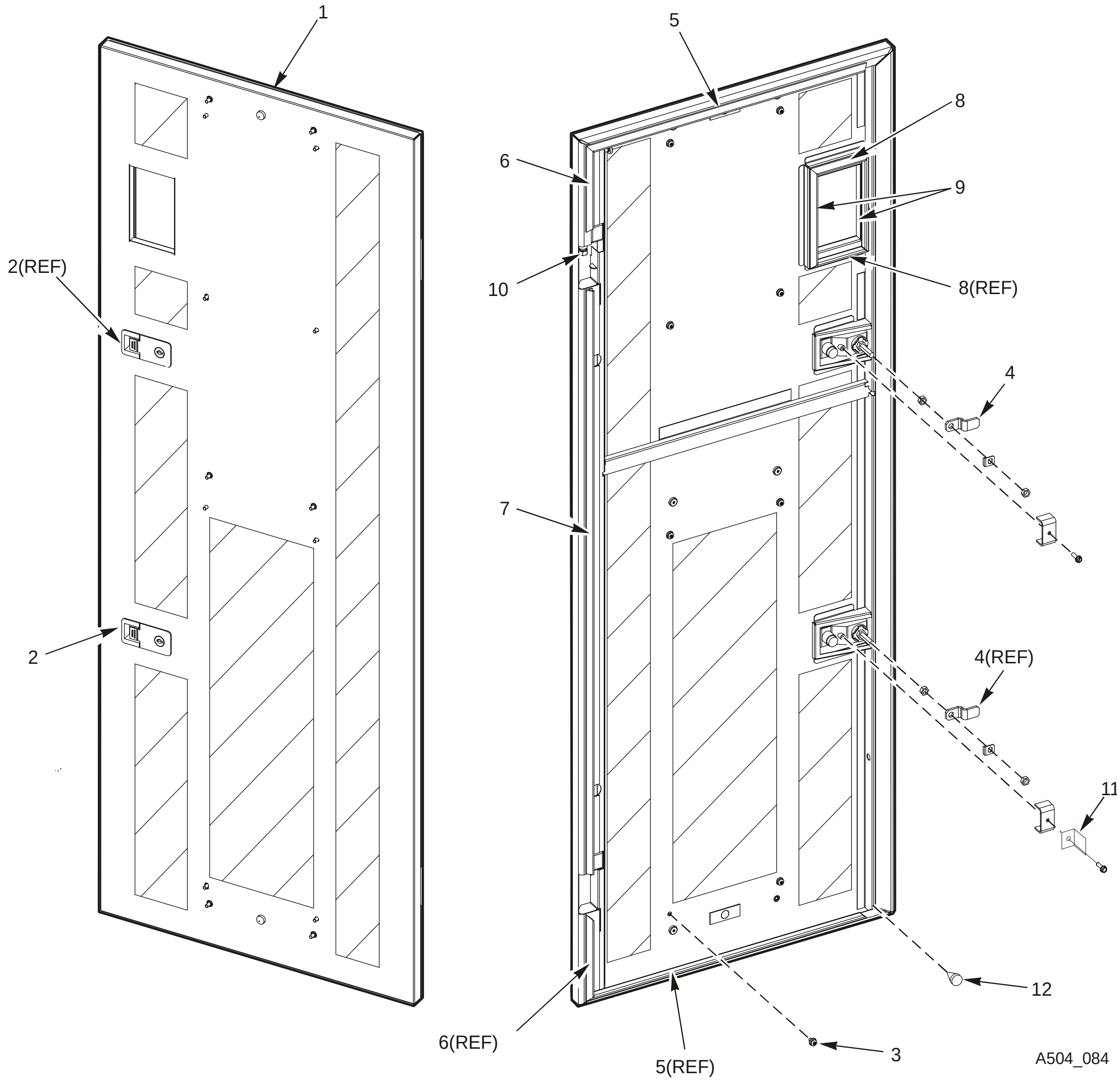


Figure D-5. VSM5-VTSS Front Right-Side Door Assembly

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4	USABLE ON CODE	QTY PER ASM
D-5 - BKD	315509501*	DOOR ASSEMBLY, LARGE FRONT *(see Figure D-1, item 4, for NHA)*		
- 1	315509401*	• DOOR, FRONT, RIGHT		1
- 2	315511101*	• LATCH, DOOR LOCKING		2
- 3	10207119*	• SCREW, MACH, TXPH/C, 10-32X3/8		7
- 4	315505801*	• PAWL, DOOR, FRONT		2
- 5	311812001	• GASKET, DOOR, LARGE TOP/BOTTOM		2
- 6	311812101	• GASKET, DOOR, SMALL, HINGE		2
- 7	311812301	• GASKET, DOOR, MIDDLE, HINGE		1
- 8	311812601	• GASKET, DOOR, LARGE TOP/BOTTOM		2
- 9	311812201	• GASKET, DOOR		2
-10	315507001*	• BOLT, SELF LOCKING, SPECIAL		1
- 11	315508901*	• STOP, PAWL		1
- 12	10501078	• BUMPER, .375 DIA X .187, RUB BLK		2
		(RoHS-compliant)*		

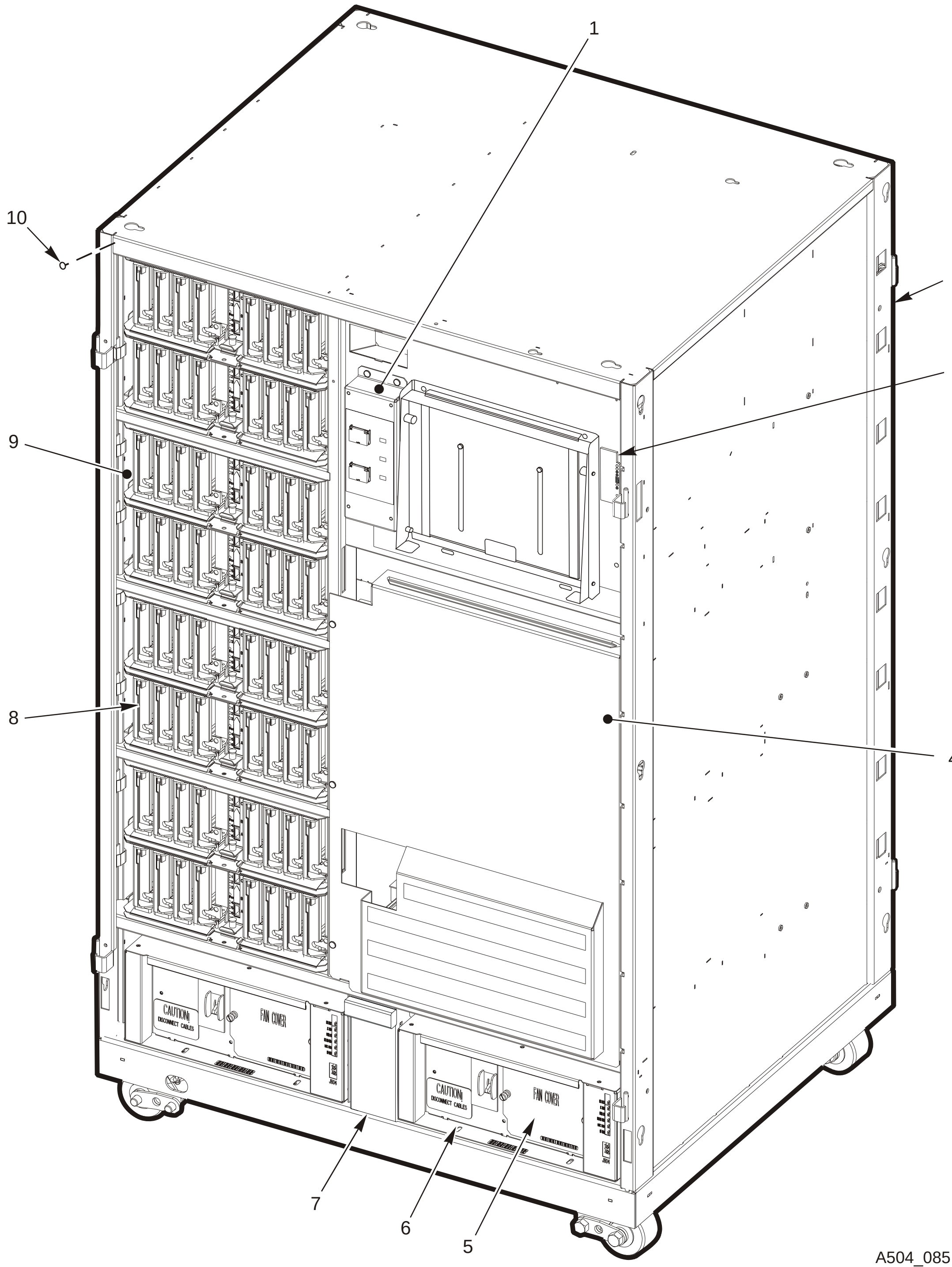


Figure D-6. VSM5-VTSS Front Internal Assembly (With FRUs and Covers)

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4	USABLE ON CODE	QTY PER ASM
D-6- BKD	315224401*	BASIC ASSEMBLY, VSM5	A	
	315201901	FRU LIST COMPAT MASTER	B	
- 1	315504101*	EPO, ASSEMBLY		1
		(see Figure D-8 for breakdown)		
- 2	315503802*	FRAME ASSEMBLY, 9500		2
		(see Figure D-9 for breakdown)		
- 3	315510501*	FACEPLATE ASSEMBLY, AHUB		2
		(see Figure D-10 for breakdown)		
- 4	315504801	COVER ASSEMBLY, LOGIC CARD CAGE		1
- 5	314337002*	POWER DISTRIBUTION UNIT ASSEMBLY PSAC 220V ***- FRU***	B	2
-6	314329101*	FAN ASSEMBLY PDU ***- FRU***		1
- 7	315224901*	COVER, FIBER OPTIC		1
- 8	315510703*	ARRAY DRIVE ASSEMBLY, 146GB ***- FRU***	B	1
		(see Figure D-14 for breakdown)		
- 9	311887801	TRAY GROUP SET		
- 10	315501201	CABLE, STOP, DOOR		
		(RoHS-compliant)*		

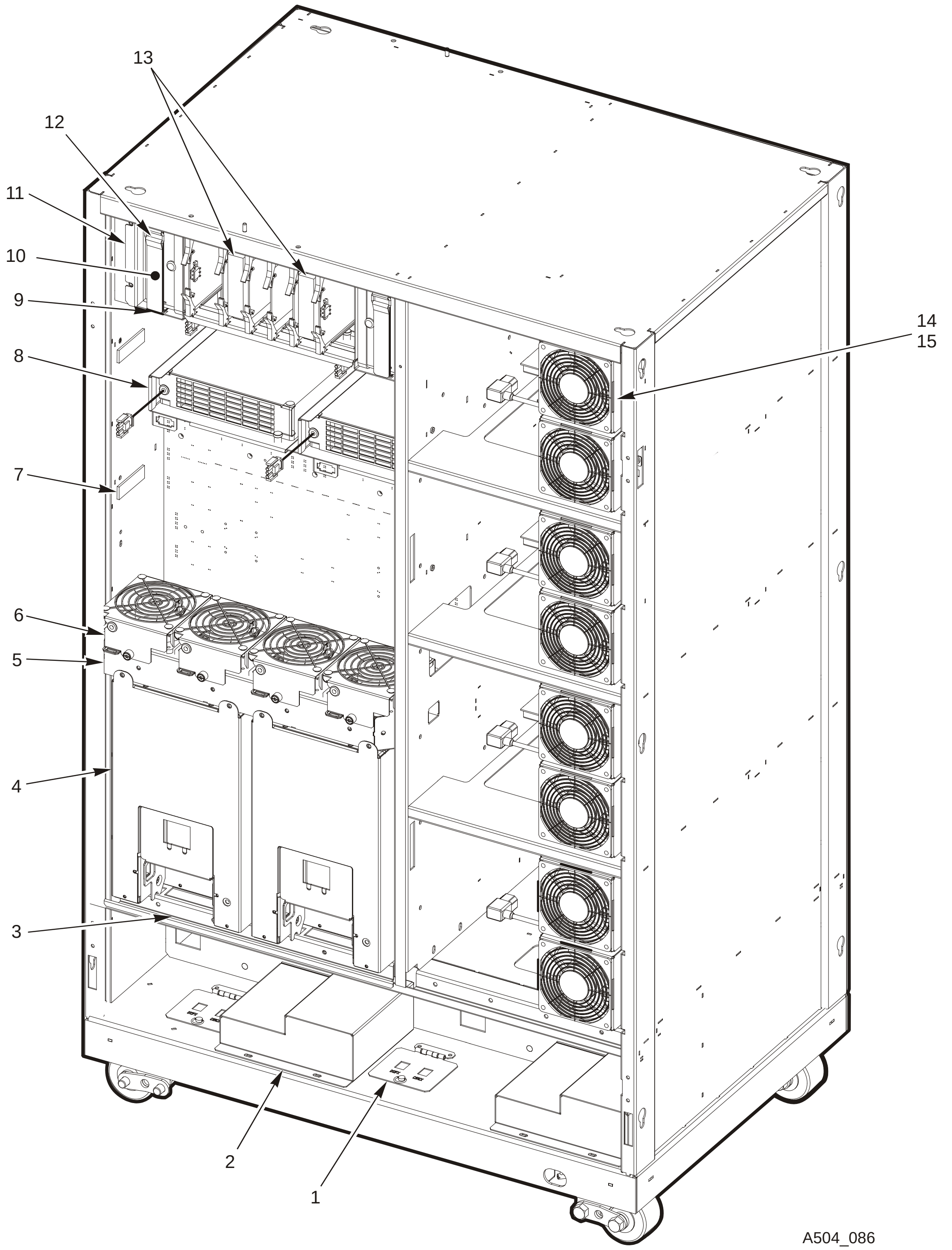


Figure D-7. VSM5-VTSS Rear Internal Assembly (With FRUs and Covers)

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4	USABLE ON CODE	QTY PER ASM
D-7 - BKD	315224401*	BASIC ASSEMBLY, VSM5	A	
	315201901	FRU LIST COMPAT MASTER	B	
- 1	315506901*	• COVER, RDC CONNECTORS		1
- 2	315506801	• TAILGATE ASSEMBLY, LEFT		2
- 3	315509001*	• LOGIC PS SUPPORT ASSEMBLY		1
- 4	314337101*	• PS ASSEMBLY, DCPS, LPS2 ***- FRU***		2
- 5	315505001	• PLENUM ASSEMBLY, LOGIC SUPPLY		4
- 6	315505501*	• FAN ASSEMBLY, LOGIC POWER ***- FRU*** *(see Figure D-11 for breakdown)*	B	4
- 7	315507701*	• CLAMP ASSEMBLY, CABLE		4
- 8	315505301*	• IMPELLER, ASSEMBLY ***- FRU*** *(see Figure D-12 for breakdown)*	B	1
- 9	315510901*	• PAD, SERVICE MODULE		4
- 10	307645701	• STRAP, VELCRO, BATTERY		2
- 11	315506301*	• CARD CAGE, SERVICE MODULE		1
- 12	307645801	• BATTERY ***- FRU***	B	2
- 13	315509103*	• HARD DRIVE ASSEMBLY IHDRZ, 16GB ***- FRU*** *(see Figure D-13 for breakdown)*	B	2
-BKD	314337202	• POWER SUPPLY, ARRAY, AC/DC, +5.1V, +12.0V, 426W ***- FRU***	B	
-14	107907202	• PS, AC/DC, +5.1V, +12.0V, 426W		1
-15	314329002	• FAN ASSEMBLY, ARRAY ***- FRU***		1
		(RoHS-compliant)*		

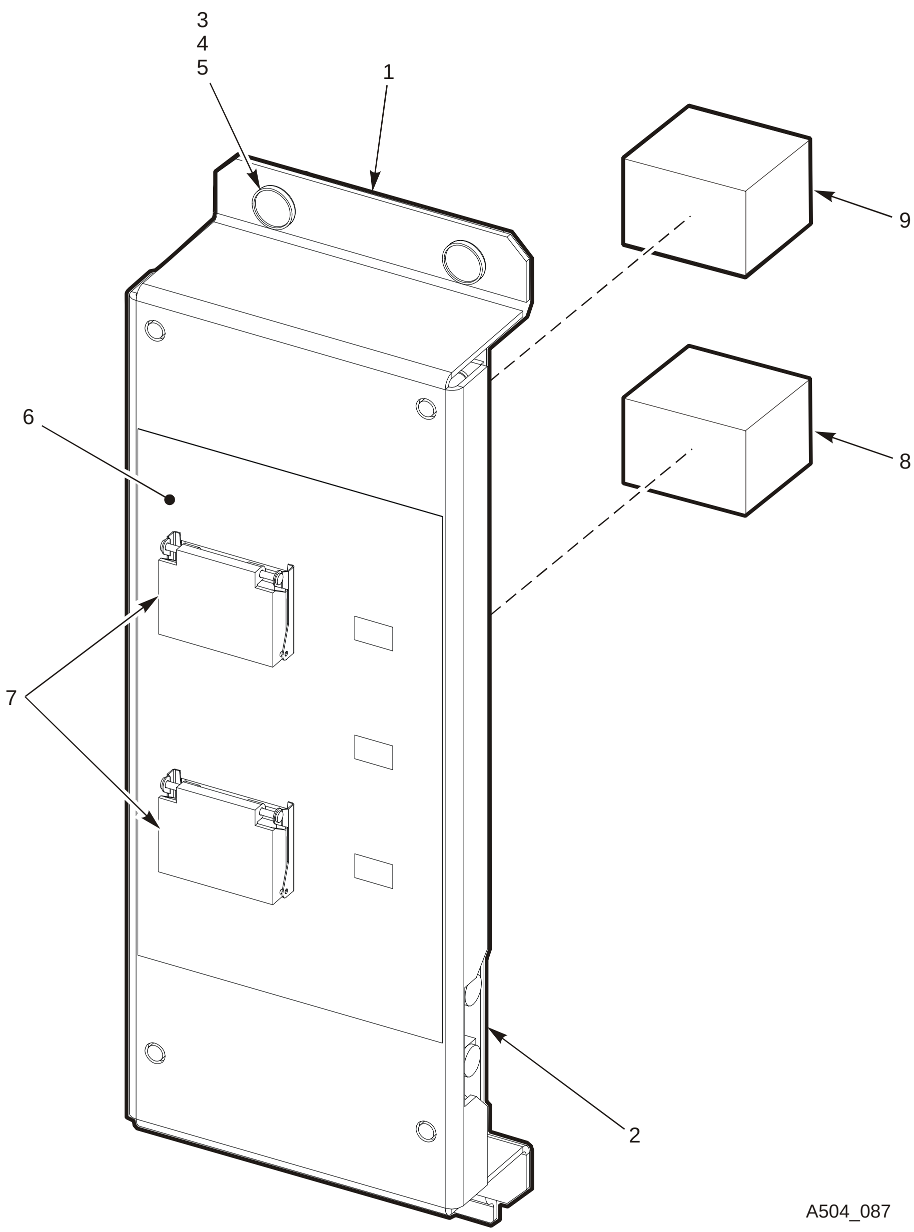


Figure D-8. VSM5-VTSS Power Control Panel

FIGURE INDEX NUMBER	PART NUMBER	1 2 3 4 DESCRIPTION	USABLE ON CODE	QTY PER ASM
D-8 - BKD	315504101*	EPO ASSEMBLY (POWER CONTROL PANEL) ***- FRU***		
		(see Figure D-6, item 1, for NHA)		
- 1	315504001	• BRACKET, EPO		1
- 2	(PN COMP)	• PWA, IXO2		1
- 3	10109781	• STUD, 1/4 TURN,.270-.289,TOR X8 2		2
- 4	10109749	• WASH, WEAR, CUPPED,.250ID,NY		2
- 5	10109747	• RET, 1/4 TURN,.203ID,.410OD,NY		2
- 6	307642803	• OVERLAY, EPO		1
- 7	107600130	• SWITCH, GUARD, RECTANGULAR		2
- 8	107600136	• SW, PBA, 1P,2T, .1A, 24V, SR/PO, RT		1
- 9	107600012	• SW, PB, LENS, RECT.,RED		1
		(RoHS-compliant)*		

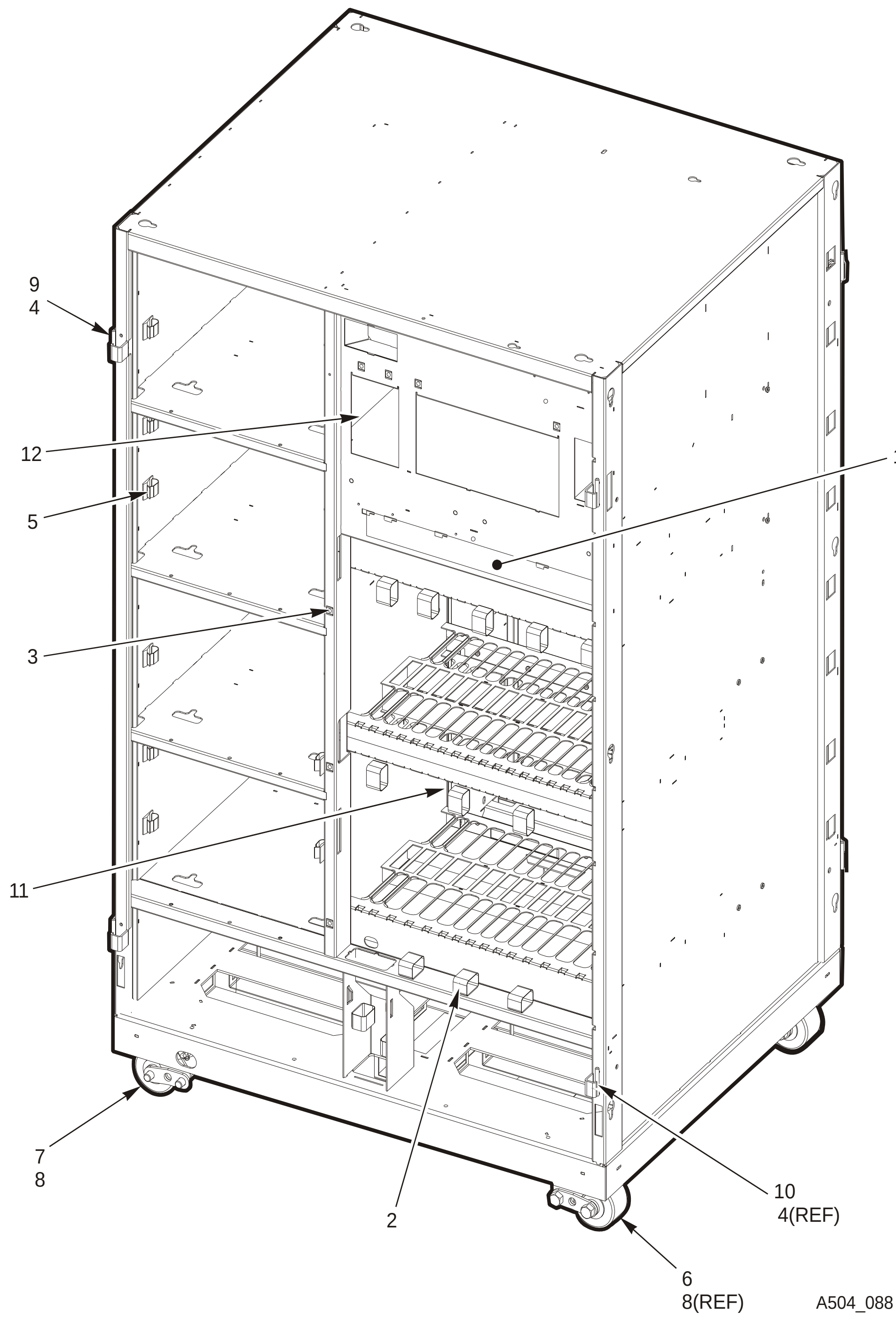


Figure D-9. VSM5-VTSS Frame Assembly

FIGURE INDEX NUMBER	PART NUMBER	1 2 3 4 DESCRIPTION	USABLE ON CODE	QTY PER ASM
D-9 - BKD	315503802*	FRAME ASSEMBLY, 9500		
		(see Figure D-6, item 2, for NHA)		
- 1	315503901	• WELDMENT, FRAME, 9500		1
- 2	10075236	• CABLE RET, 1.00x1.5x.84, LATCH CLIP ADH		5
- 3	10109843	• RCPT, SNAP-IN, 1/4TRN, .469 HOLE		7
- 4	10029601	• NUT, HEX, FLNG, W/LK, LCST, 10-32		20
- 5	411206703	• CABLE GUIDE, STRAIGHT, FIELD		9
- 6	10096805	• SHOCK ABS CASTER, LOCKED, 250#		2
- 7	10096804	• CASTER, SHOCK ABS, 250 LBS, 3" DIA		2
- 8	10028131	• NUT, LOCK, 5/16-18, ZP STEEL		16
- 9	315506601	• HINGE, LEFT		4
- 10	315506701	• HINGE, RIGHT		4
- 11	311826301	• GASKET, CARD CAGE, LOGIC		2
- 12	10501063	• GROM, STRIP, FOR .060-.074 MAT		AR
		(RoHS-compliant)*		

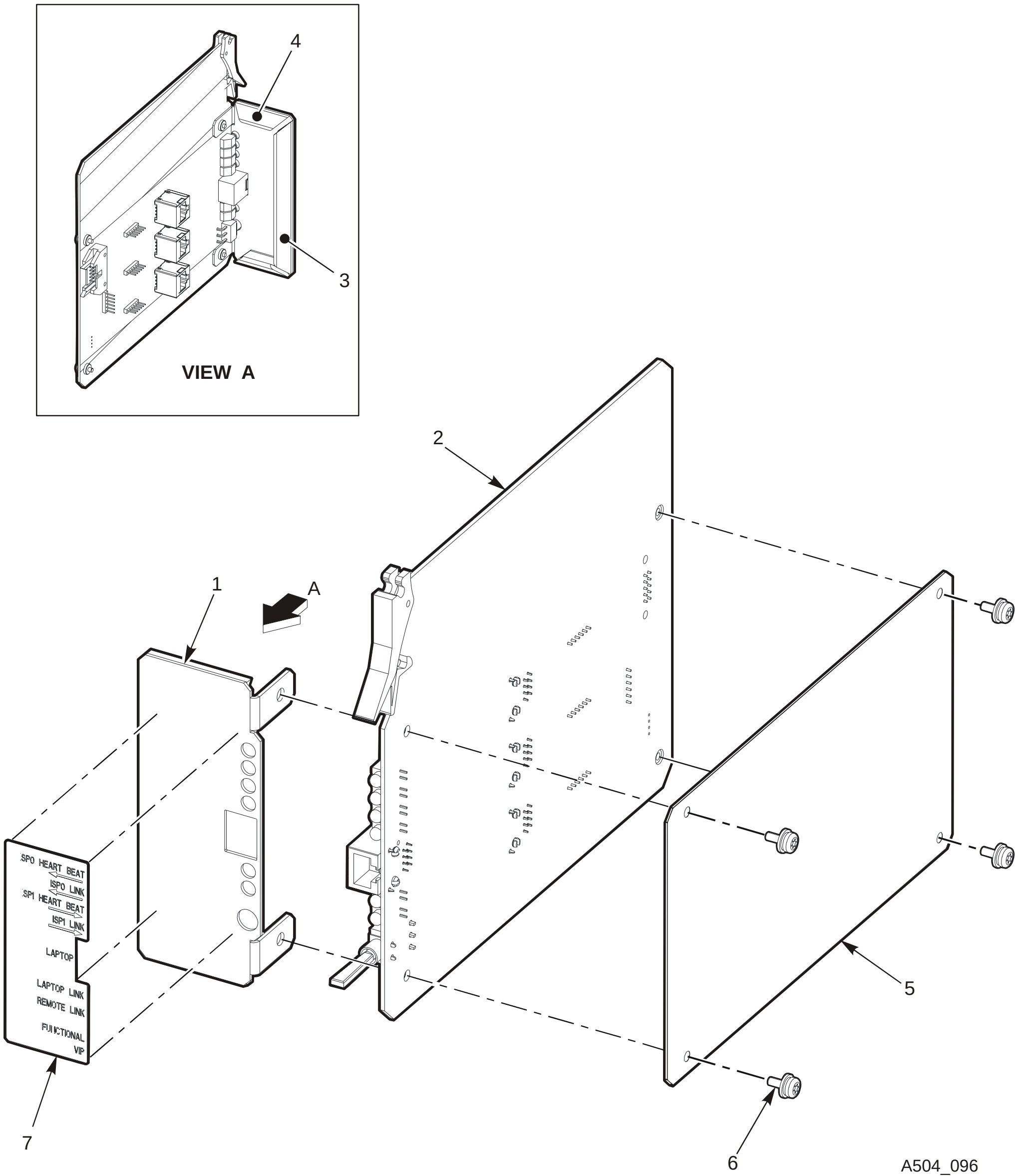


Figure D-10. VSM5-VTSS A-Hub Assembly

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4	USABLE ON CODE	QTY PER ASM
D-10 - BKD	315510501*	FACEPLATE ASSEMBLY, AHUB ***- FRU*** *(see Figure D-6, item 3, for NHA)*		
- 1	315510401*	• FACEPLATE, AHUB CARD		1
- 2	(PN COMP)	• PWA, AHUB		1
- 3	312353501*	• GASKET, FACEPLATE, LONG		1
- 4	31233601*	• GASKET, FACEPLATE, SHORT		2
- 5	312351901*	• INSULTOR, AHUB CARD		1
- 6	10207118*	• SCREW, MACH, 8-32 X .312, TX+PH/C, Z/C		4
- 7	312353401*	• LABEL, AHUB FACEPLATE		1
		(RoHS-compliant)*		

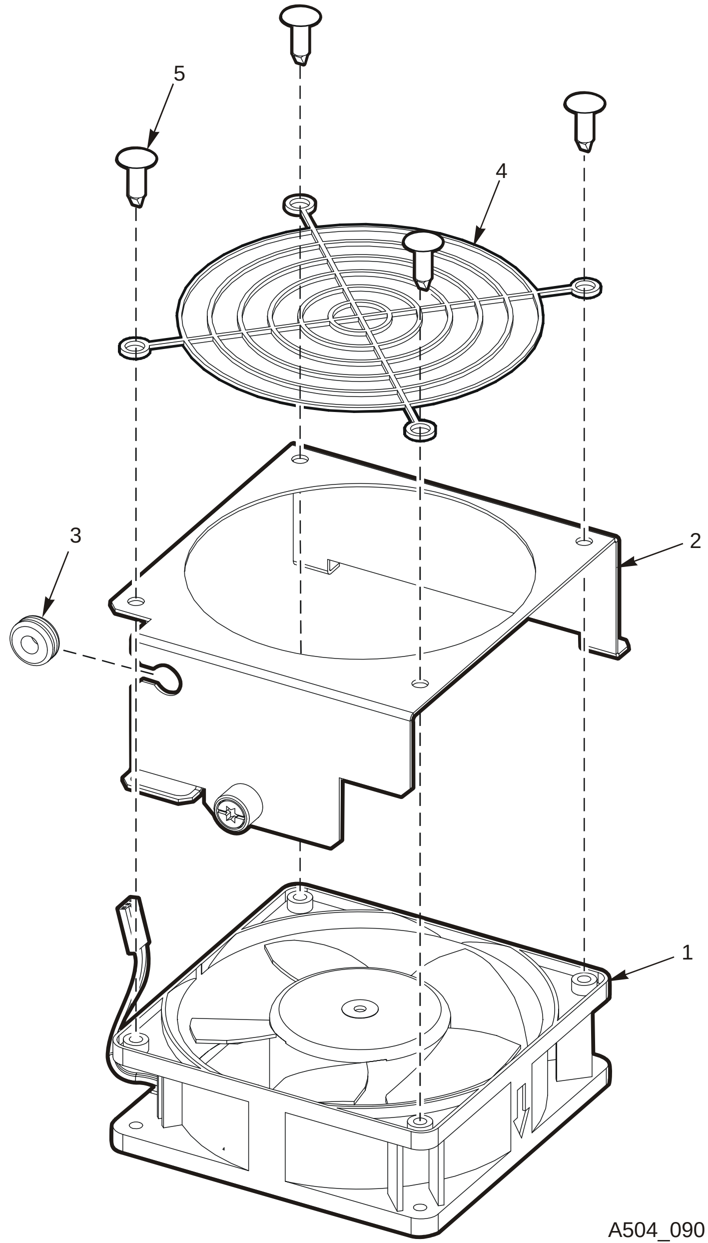


Figure D-11. VSM5-VTSS Logic Power Supply Fan Assembly

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4	USABLE ON CODE	QTY PER ASM
D-11 - BKD	315505501*	FAN ASSEMBLY, LOGIC POWER ***- FRU***		
		(see Figure D-7, item 6, for NHA)		
- 1	156503501	• ASM, FAN, CABLE & CONNECTOR		1
- 2	315505401*	• BRACKET, FAN, LOGIC SUPPLY		1
- 3	10501040	• GROM, .313ID, .563OD, .313T, .06G		1
- 4	24017456	• FINGER GRD, FAN, 4.6IN		1
- 5	10092119	• FASTENER, PLANEL, SNAP-IN, NYLON		4
		(RoHS-compliant)*		

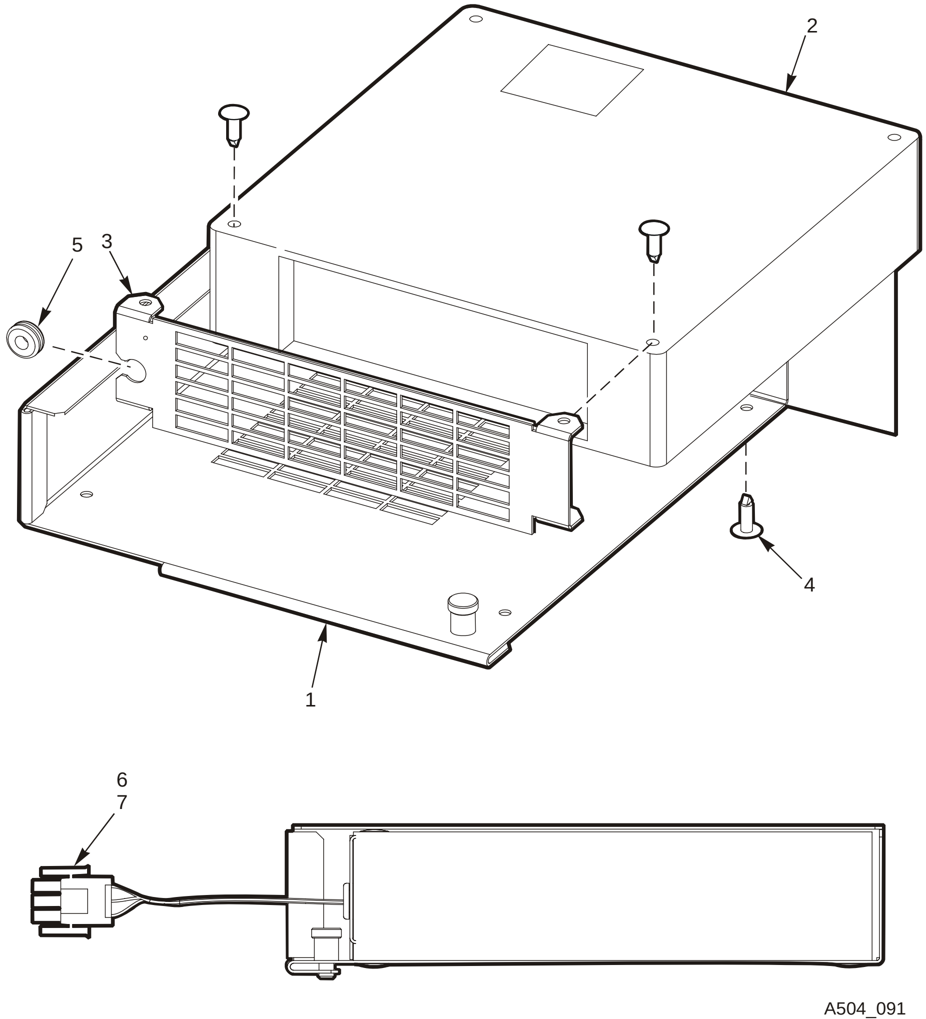


Figure D-12. VSM5-VTSS Impeller Assembly

FIGURE INDEX NUMBER	PART NUMBER	1 2 3 4 DESCRIPTION	USABLE ON CODE	QTY PER ASM
D-12 - BKD	315505301*	IMPELLER ASSEMBLY ***- FRU***		
		(see Figure D-7, item 8, for NHA)		
- 1	315505201*	• BRACKET, IMPELLER		1
- 2	10037266	• BLWR, RAD, 12VDC, 8.7 INSQ, 123CFM		1
- 3	315506501*	• GUARD, FINGER, IMPELLER		1
- 4	10092119	• FASTENER, PANEL, SNAP-IN, NYLON		6
- 5	10501040	• GROM, .313ID, .563OD, .313T, .06G		1
-6	10410747	• CONN, RE, PWR, M, 3,C, .250, HS		1
- 7	10601176	• CONT, RND, F, 18-24AWG, .084, TIN		3
		(RoHS-compliant)*		

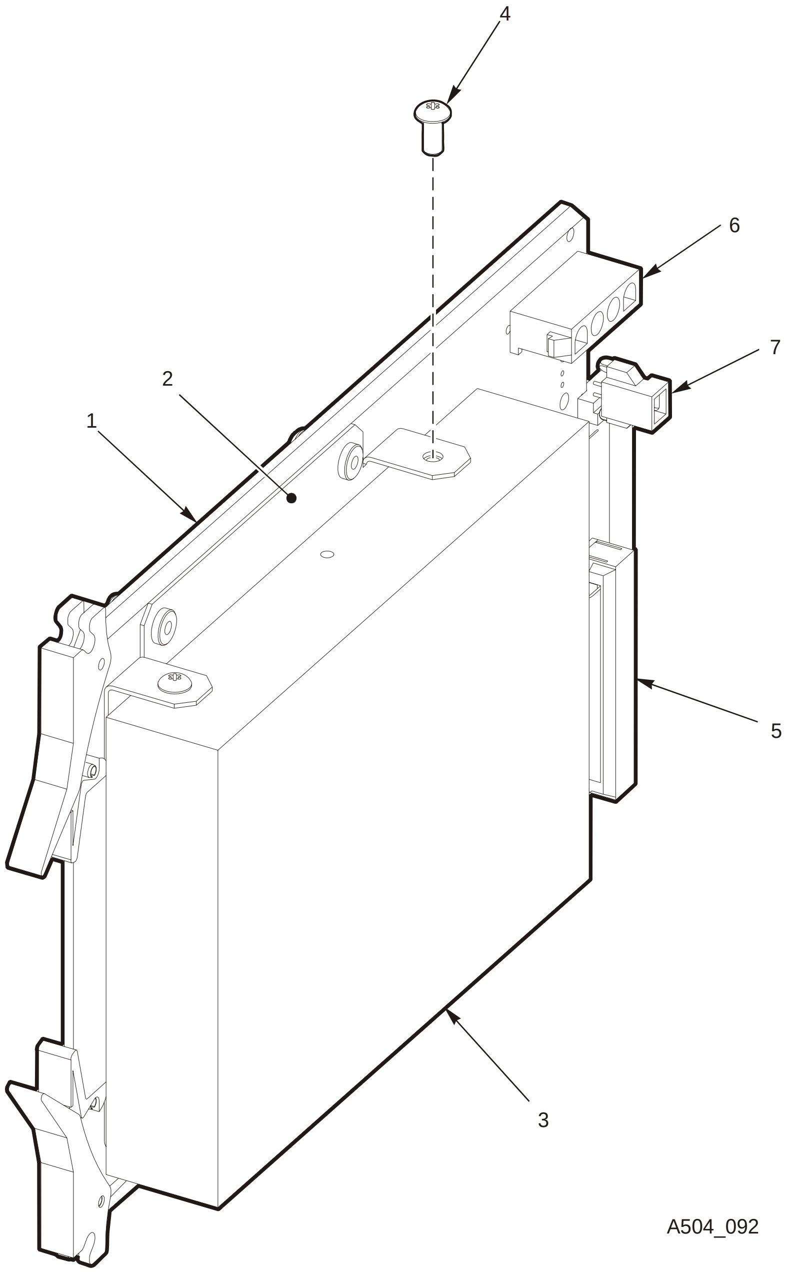


Figure D-13. VSM5-VTSS Support Processor (ISP) Hard Drive Assembly

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4	USABLE ON CODE	QTY PER ASM
D-13 - BKD	315509103*	HARD DRIVE ASSEMBLY ISP ***- FRU***		
		(see Figure D-7, item 13, for NHA)		
- 1	(PN COMP)	• PWA, IHDR2		1
- 2	315505601*	• BRACKET, ISP HARD DRIVE		1
- 3	110091701*	• DSK DRV, 16GB, 3.5 IN, SCSI-LW		1
- 4	10207118*	• SCR, MH, 8-32 X .312,TX+PH, Z/C		8
- 5	315502401*	• RIBBON CABLE ASSEMBLY HARD		1
-6	315500101*	• HARNESS ASSEMBLY, HD POWER		1
- 7	315502501*	• CABLE, IHDR, LED		1
		(RoHS-compliant)*		

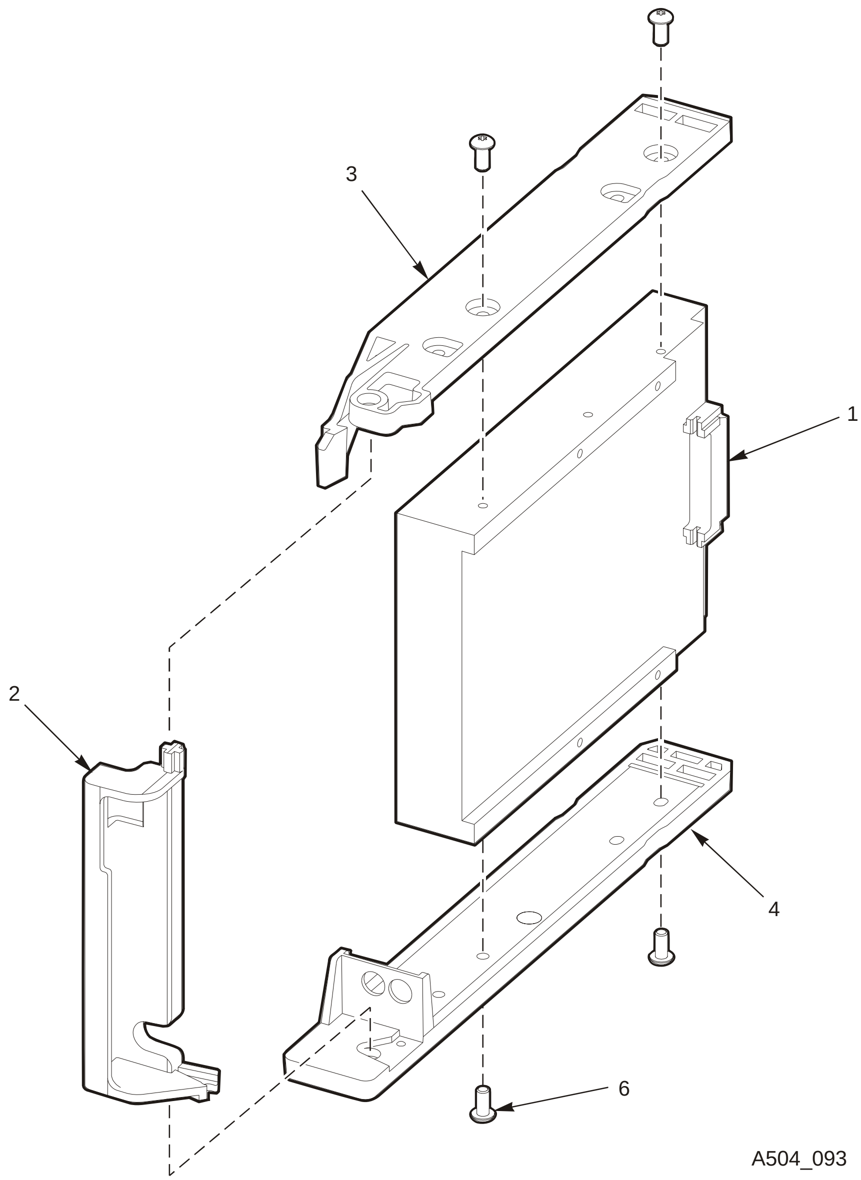


Figure D-14. VSM5-VTSS 146GB Array Disk Drive Module Assembly

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4	USABLE ON CODE	QTY PER ASM
14 - BKD	315510703*	ARRAY DRIVE ASSEMBLY, 146GB ***- FRU*** *(see Figure D-6, item 8, for NHA)*		
- 1	110091305*	• DSKDRV, 146GBLP, 15 KRPM, 4FC		1
- 2	315503501*	• HANDLE, DRIVE		8
- 3	312398301*	• TOP RAIL ASSEMBLY, INSERT MOLD		1
-4	312398201*	• BOTTOM RAIL ASSEMBLY, INSERT MOLD		1
- 5	10207562*	• SCR, 6-32X5/16,TXBH, LOCT		1
		(RoHS-compliant)*		

Cable Part Numbers

INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4	USABLE ON CODE	QTY PER ASM
- BKD	315225001*	BASIC ASSEMBLY VSM5/V2X 2GB		
-1	315502701*	• CABLE KIT MACHINE,V2X/V2X2		
- 2	315500301*	• CABLE ASSEMBLY IXO TO IMPOD		1
-3	315500401*	• CABLE ASSEMBLY, POWER ZONE1, AIR MOVERS		1
-4	315500501*	• CABLE,C3MB TO IMPOD OP/IXO/FLPY		2
-5	315500601*	• CABLE,C3MB TO IMPOD SCSI		2
-6	315500701*	• CABLE OP SIGNAL TO IMPOD		2
-7	315500801*	• CABLE PDU TOCSMB SIGNAL (60 PIN)		2
-8	315500901*	• CABLE C3MB TO IMPOD DC POWER		4
-9	315501101*	• CABLE AC DRIVE ARRAY		2
-10	315501401*	• CABLE ASSEMBLY, ROP		2
-11	315501601*	• CABLE ASSEMBLY, POWER ZONE 0,AIR MOVERS		1
-12	315501001*	• CABLE OP POWER TO IMPOD		1
-13	311860501	CABLE CPMB TO ITCC		2
-14	315502301*	FIBRE CABLE, IFESC TO IFESA		6
-15	315502201*	FIBRE CABLE, IFF2 TO IFES0B		1
-16	315502101*	FIBRE CABLE, IFF3 TO IFES1B		1
-17	315501801*	FIBRE CABLE, IFPB0 TO IFPB0A		1
-18	315501701*	FIBRE CABLE, IFF1 TO IFPB1A		1
-19	315501901*	CABLE, ITCC2 TO IPMB		2
-20	10187068*	CORD, POWER, C19/C20,14 AWG		2
-21	315502601*	CABLE ASSEMBLY, TOOL BOX		2
-22	315502001*	CABLE, ITCC2 TO ITCC2, SIGNAL		6
		*(*RoHS-compliant)*		

Parts Index

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FICON Channel Extension Guidelines

E

This appendix provides information about FICON channel extensions for the VSM system. Content includes:

Note: Always consult your selected vendor's release documentation for their extension products, and guidelines for proper application of those products.

Definition of Terms

The following terms are used in this appendix:

- Front-end – any equipment between a host and a VTSS
- Back-end – any equipment between a VTSS and RTD
- Channel extension – a configuration of equipment that exceeds the maximum distance allowed by native FICON protocol, implemented by adding a pair of channel extenders.
- Channel extender – a piece of equipment that can lengthen the maximum distance allowed between two pieces of FICON-capable equipment. Channel extenders are used in pairs, usually with a WAN network between them. Some channel extenders have
  FICON director/switch capabilities, and hence are also labeled as FICON switches.
- FICON director or FICON switch – a piece of equipment that is capable of acting like an electronic ‘patch panel’. Directors are used to reduce the number of cables required to achieve connectivity between multiple pieces of equipment. Note that some vendors sell FICON directors/switches that also can function as channel extenders (when appropriate cards have been added).
- Cascading switches – a hardware configuration which includes at least one FICON director/switch connected to another FICON director/switch. In the IBM native FICON protocol, cascading can involve no more than two switches; however, most switch vendors allow more than two switches in a cascaded configuration.
- ISL – inter-switch sink; a link between two switches. ISLs can be channel-extended.
- Direct attach – any connection between two pieces of equipment that does not go through a FICON director/switch. The connection could, however, still include channel extenders (which are invisible to the FICON protocol).
- RTD – Real Tape Drive; a physical tape drive linked to a VTSS box, as opposed to a host. Note that if a FICON director/switch is used between the tape drive and VTSS, the drive could function as a RTD at one point in time, and as a conventional tape drive at another time; this would require varying the drive offline from VTCS and online to MVS.
- Conventional tape drive – a tape drive linked to a host, as opposed to a VTSS box. Note that if a FICON director/switch is used between the tape drive and VTSS, the drive could function as a conventional tape drive at one point in time, and as a RTD at another time; this would require varying the drive offline from MVS and online to VTCS.
- Cluster – a pair of VTSS boxes connected by one or more CLINKs. Depending on the direction of the CLINKs, a cluster can be uni-directional or bi-directional. Clustering is used to provide hardware fallback in case one of the VTSS boxes becomes inoperative. VTVs can be replicated between the two VTSS boxes in normal mode (over the CLINKs), allowing one box to take over from the other in case of an outage.
- CLINK – Cluster LINK; a connection between two VTSS boxes in a cluster. Each CLINK allows data to flow in only one direction. For bi-directional clustering, at least one CLINK in each direction must be used. A CLINK connection between two VTSS boxes can include FICON directors/switches and channel extenders.
- VTD – Virtual Tape Drive; a virtual (as opposed to physical) tape drive that exists within a VTSS, as defined by the VTCS (Virtual Tape Control System) host software. A VTD is a transport in a VTSS that emulates a physical 3490E tape drive to a MVS system. Data that are ‘written’ to a VTD actually are written to the disk buffer (VTSS). A VTSS has 64 VTDs that perform virtual mounts of VTVs.

General Channel Extension Considerations

Understand Channel Extension Performance Limitations

Channel extension usually involves using a WAN (wide-area network), which possibly operates at slower-than-FICON speeds. At the very least, the addition of channel extenders will cause additional overhead, and will slow down tape I/O processing.

Channel Extenders Are Invisible to Other Devices

By its nature, channel extension must look to end devices (hosts, switches, VTSSs, and/or RTDs) as if those were connected to each other without channel extenders; hence, channel extenders are invisible to FICON devices. Neither software on the host (HSC/VTCS) nor microcode in a VTSS or RTD can sense the existence of a channel extender.

Channel Extenders Can Cause Timing Problems

Since channel extenders can cause delays, adding channel extenders to a configuration that works may cause I/O timeouts or other I/O problems. If channel extenders are used for both tape and disk I/O, the disk I/O can cause further delays for tape I/O, for example.

Channel Extenders Can Insert Fake I/O Errors

Some channel extension products attempt to streamline tape I/O in various ways, including simulating responses from tape drives or VTSSs. On occasion, a channel extender will encounter a problem, which must be reported back to the issuer of the tape I/O. Since a channel extender is invisible to end devices, it has no way to report errors itself; instead, a channel extender will report a fake I/O error coming from a RTD or VTSS, when the channel extender was actually the source of the problem. These types of errors can be very difficult to diagnose, and may require personnel from multiple vendors for resolution.

Avoid RECLAIMs and DRAINs on Channel-Extended RTDs

Most current channel extension products will attempt to streamline tape write I/O but not read I/O. This means users should avoid long operations that require large amounts of read I/O over channel extenders. There are many different back-end and front-end scenarios to consider, but one that should definitely be avoided is doing DRAIN and RECLAIM operations over channel extenders. DRAINs and RECLAIMs tend to perform many tape read I/Os on input MVC cartridges (as well as tape wirtes to output MVC cartridges).

Avoid RECALLs on Channel-Extended RTDs

Most current channel extension products will attempt to streamline tape write I/O but not read I/O. This means users should avoid long operations that require large amounts of read I/O over channel extenders. RECALL operations cause data to be copied from a MVC cartridge mounted on a RTD back into a VTSS box. If the path between a VTSS and RTD includes channel extenders, such a recall may be very slow. Automatic recalls (which are triggered by a job on the mainframe needing data not available in a VTSS) especially can hold up critical work on the mainframe.

Avoid Syncsort Apps That Use Long Chains on Channel-Extended VTDs

Some Syncsort applications that use long chains (specifically when using sort work files allocated to virtual tape) will not run when using channel extenders between the host and the VTSS (i.e., a remote VTSS), due to protocol timeouts that can occur from WAN delays. The application should be evaluated, and dedicated conventional tape drives should be considered for Syncsort applications. If VSM is required, consider running the Syncsort application on local VTSS, rather than a remote (channel-extended) VTSS. Alternatively, if possible, the best option is to configure shorter chains.

FICON Topologies

See "Placement of Extension Equipment" below to determine proper placement of extension equipment for the following FICON topologies:

1. Host-to-VTSS (front-end link to VTDs)
   a. direct-attach connection
   b. single FICON director/switch connection
   c. cascaded directors/switches connection
2. VTSS-to-RTD (back-end link to RTDs)
   a. direct-attach connection
   b. single FICON director/switch connection
   c. cascaded directors/switches connection
3. VTSS-to-VTSS (CLINKs)
   a. direct-attach connection
   b. single FICON director/switch connection
   c. cascaded directors/switches connection
4. Host-to-conventional tape drive (no VTSS nor VSM involved)
   a. direct-attach connection
   b. single FICON director/switch connection
   c. cascaded directors/switches connection

Placement of Extension Equipment

VSM allows many different ways of connecting hosts with VTSS boxes and RTDs, with or without FICON directors/switches. The number of combinatons and permutations is too large to list here. Use the sample configurations shown on the following pages as a guideline for where to place channel extension equipment.

Interoperability Testing

Supported directors and configurations for VSM-VTSS systems with channel extensions are listed in the Interop Tool on the Sun Sales Support website at https://extranet.stortek.com/interop/interop.

The Interop Tool provides connectivity information for all currently supported products sold through Sun, regardless of whether the product is Sun branded or third-party branded. While the tool does validate compatibility, it does not validate the final configuration, the system, or whether the configuration will perform in the end user's environment. Consult with Sun support personnel to validate all configurations before ordering equipment.

FICON Channel Extension – Sample Configurations

Figure E-1. Host-to-VTSS Channel Extension – Direct Attachment

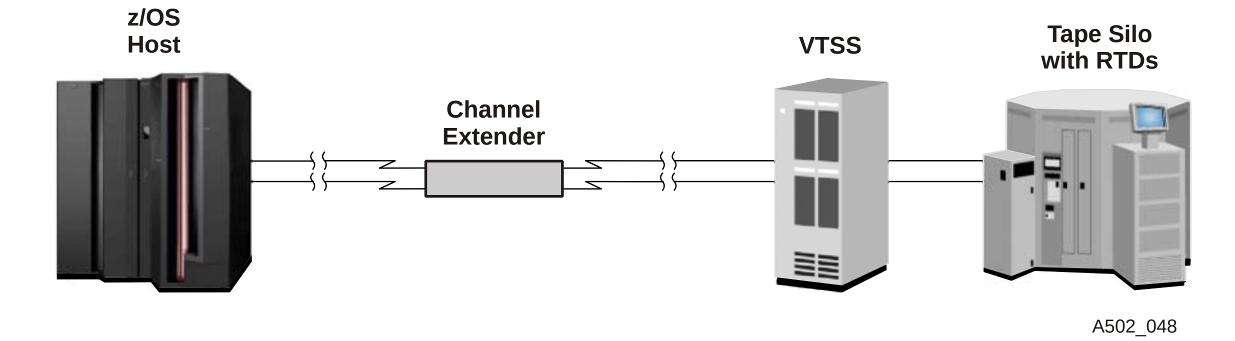


Figure E-2. Host-to-VTSS Channel Extension – Behind Single FICON Switch / Director

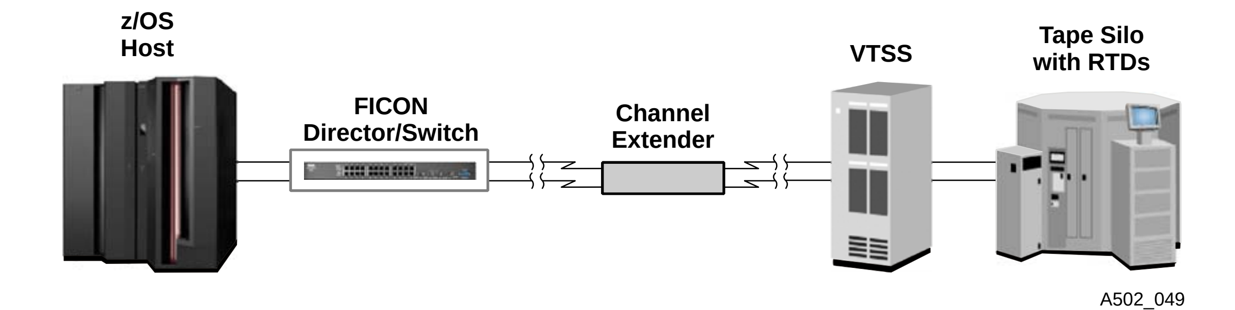


Figure E-3. Host-to-VTSS Channel Extension – Between Cascaded FICON Switches / Directors

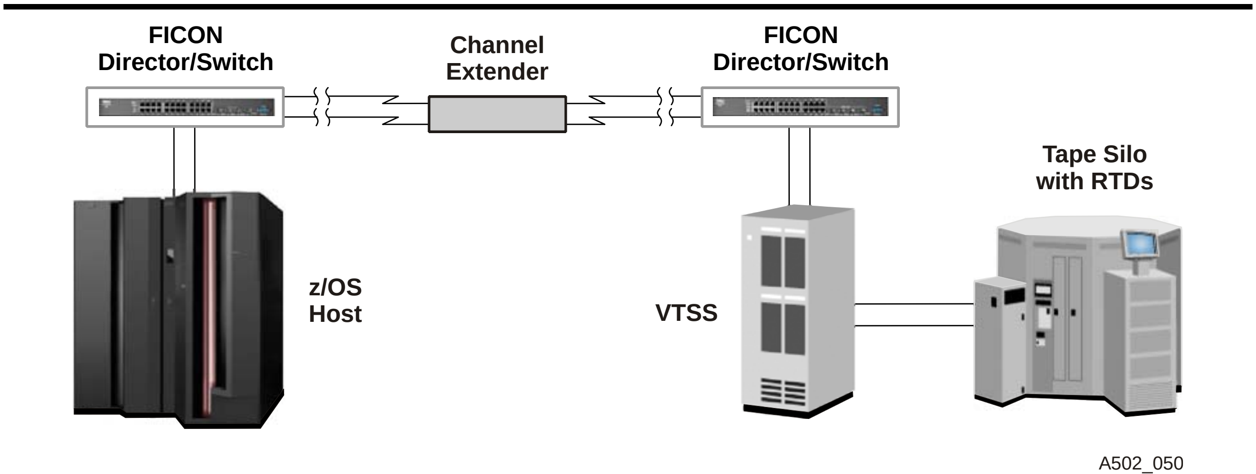


Figure E-4. VTSS-to-RTD Channel Extension – Direct Attachment

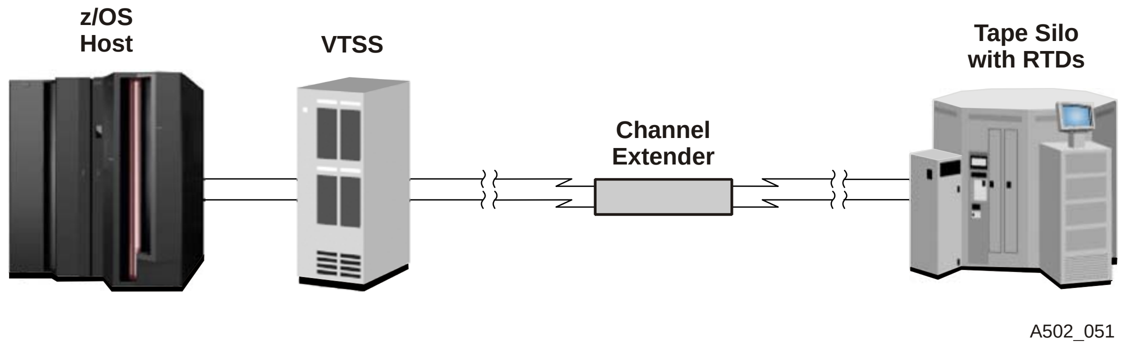


Figure E-5. VTSS-to-RTD Channel Extension – Between Cascaded FICON Switches / Directors

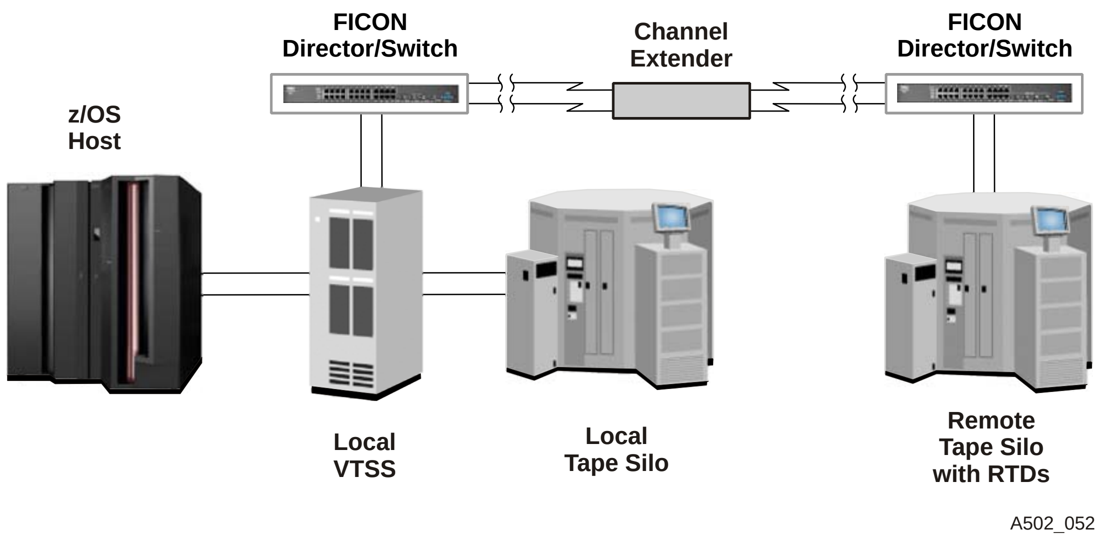
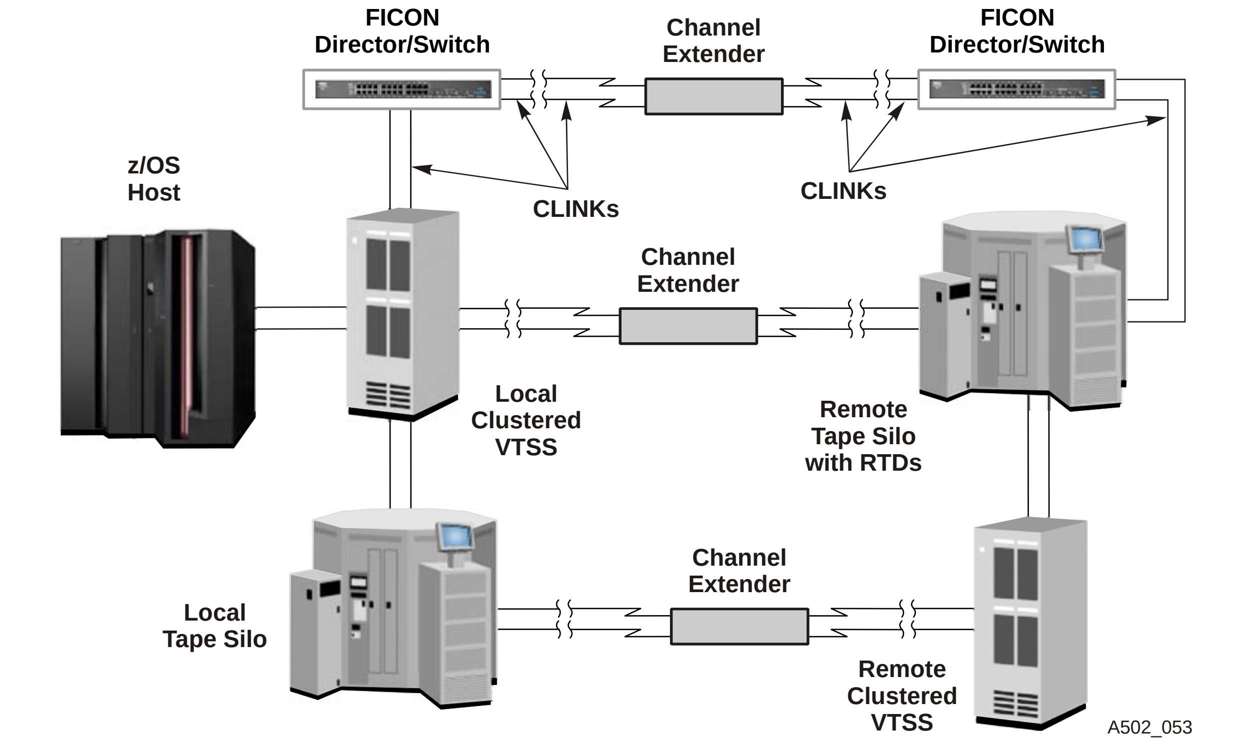


Figure E-6. VTSS-to-VTSS Channel Extension – Between Cascaded FICON Switches / Directors



McData/CNT Channel Extension Interoperability

The following interoperability and configuration information and guidelines apply when using McData/CNT USD-X and Edge3000 channel extenders with a VSM-VTSS.

Set Buffer-to-Buffer Credits at Director Ports

In FICON fabric topology, configure buffer-to-buffer (BB) credits on all director ports that are part of all channel-extended end-to-end paths to 'extended distance', i.e., ≥ 60 BB credits. This includes host ports, CU ports, and ISL[1] ports that carry I/O on a channel-extended path, regardless of which link is physically extended. For example, consider a single director configuration with three CHPIDs configured to perform I/O with two CU ports, where one CU port is channel-extended. In this case, four director ports should have their BB credits set to 'extended distance': Each of the three F_Ports attached to the three hosts, and the F_Port attached to the extension equipment that extends to the CU port.

Set Extension-Attached Director Ports to Fixed Speeds

When channel extension is added to a FICON link, the result is two FICON links which are coupled by the two channel extension chassis through a WAN. The link speed setting on at least one side of the pair of FICON links must be set to a fixed speed to avoid exposure to an issue where the link may not initialize once a fibre/SFP[2] cable is attached, or where the link may not reinitialize after a loss of synchronization during operations.

1. Inter-switch link; the fibre channel link providing connectivity between two switches
2. Short form factor pluggable connectors

The FICON directors on the supported list provide a port configuration option for link speed. The VSM port runs in auto-speed mode (currently unconfigurable). The recommendation is to set all FICON director ports attached to extension equipment to a fixed speed, and to set the attached extension ports to a fixed speed, as follows:

- Set the FICON director port to ‘1Gbps-ONLY’ for attachment to the USD-X channel extender. Also set the speed of the attached USDX port to ‘1Gbps-ONLY’.
- Set the FICON director port to ‘2Gbps-ONLY’ for attachment to the Edge3000 channel extender. Also set the speed of the attached Edge3000 port to ‘2Gbps-Only’.

Note: Setting the FICON director port to ‘1Gbps-ONLY’ for the Edge3000 channel extender attachment is also valid when the WAN link in 1Gbps Ethernet. In this configuration, also set the attached Edge3000 port to ‘1Gbps-ONLY’.

Set Extension Ports to Fixed Speeds When Extending a VTSS-to-VTSS Channel Link (CLINK) or a VTSS-to-RTD Link

When channel extension is added to a FICON link, the result is two FICON links which are coupled by the two channel extension chassis through a WAN. The link speed setting on at least one side of the pair of FICON links must be set to a fixed speed to avoid exposure to an issue where the link may not initialize once a fibre/SFP cable is attached, or where the link may not reinitialize after a loss of synchronization during operations.

McData channel extension equipment on the supported list provides a port configuration option for link speed, which defaults to auto-speed. McData service personnel may perform this configuration change to a fixed speed.

The recommendation is to set a least one attached extension port per extended link to a fixed speed, as follows:

- Set the speed of the attached USD-X chanel extender port to ‘1Gbps-Only’.
- Set the speed of the attached Edge3000 channel extender port to ‘2Gbps-Only’.

Note: Setting the attached Edge3000 port to ‘1Gbps-Only’ is also valid when the WAN link in 1Gbps Ethernet.

ISL Failover Is Supported Only in Shuttle Mode

McData does not support ISL failover when the extension equipment is configured for FICON emulation. If extension equipment is configured in FICON shuttle mode, then ISL failover can be used. Due to distance limitations, shuttle mode is seldom used.

Avoiding Host Protocol Timeouts

Host protocol timeouts may occur due to WAN delays that increase the time for the VTSS to process multiple outstanding ‘CU busy’ signals. To avoid these timeouts:

- Vary on no more than 16 devices over a channel-extended path to a single VTSS port
- Configure the USD-X or Edge3000 channel extender to support 32 simultaneous emulations by setting the number of emulation control blocks (ECBs) to 32.

Performance Considerations

Consult McData recommendations regarding performance considerations and modes of operation (i.e., emulation versus shuttle). McData channel extenders emulate write commands, and use shuttle mode (WAN ‘pass-through’) for read commands. When planning for channel extension, consider the job mix (specifically, the read workload) in combination with performance requirements, as performance may be significantly affected with the shuttle mode over certain distances.

Cisco Systems Channel Extension Interoperability

The following interoperability and configuration information and guidelines apply when using Cisco Systems channel extension equipment with a VSM-VTSS.

Note: This qualification is for distances up to 200km without any performance penalty. Cisco is planning a performance improvement beyond the current 200km limit, which will be tested by Sun once that code level is delivered. No timeline has been established for completion of the >200km distance qualification.

Note: These guidelines apply to VSM4-VTSS models VSMA-734, VSMB-734, VSMC-734, and VSMD-734. Tests are pending to ensure the guidelines are applicable for model VSME-734 (VSM4 ‘lite’), and for VSM5-VTSS models VSMB-465, VSMC-465, and VSMD-465.

- Supported Cisco channel extenders:
  - MDS 9506 (up to 200km)
  - MDS 9509 (up to 200km)
- Mandatory code base levels:
  - MDS 9506/9509 – 2.1.2b
  - VSM4 – D01.02.02.04 or higher

Customers should consult fabric vendor guidelines and DWDM[1] vendor guidelines to assure valid configurations (i.e., distances, fibre and SFP cable types, settings, etc.).

1. Dense wavelength division multiplexer, e.g. the McData FSP 2000

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Glossary

A

AC. Alternating current. Current in which the direction is reversed, or alternated, 60 times per second (50 times per second in some countries). Contrast with direct current.

acceptance test. A formal test done by a system end-user to determine if a system works according to specifications and should be accepted.

access density. A measure of I/O activity; the number of I/O operations per gigabyte of functional capacity per second.

access privileges. The extent to which a user may operate a system resource on a host, network, or file server. In many cases, permission to access a host, network, or file server, view its contents, and modify or create files is limited by a system administrator to maintain security.

ACMI. VSM-VTSS cache memory interface card.

AC power redundancy (ACPR). An AC power system that provides dual AC power sources to prevent power interruptions and loss of access to data. If one power source fails, the other (redundant) source supplies all power to a subsystem until the failed unit is replaced.

ACS. Automated Cartridge System. Also library or tape library. A system that automatically mounts cartridges in tape drives in response to requests from host software.

ACSLS. Automated Cartridge System Library Software; Automated Cartridge System Library (UNIX) Server.

actuator-level buffer (ALB). Solid-state memory associated with an actuator in a storage device. In VSM, ALBs minimize rotational latency in disk drives and allow non-synchronous data transfer between the front-end cache and back-end disk array drives.

address. (1) A hexadecimal number that represents an identifying location for a device or an area of storage; for example, a memory register, disk sector, or network node. (2) An identifier for a communication port. (3) The act of communicating with a storage device.

ADC. Analog-to-digital converter.

ADT. Automatic data transfer.

AFO. Americas Field Operations. Acronym for all Sun StorageTek U.S./Canada field operations.

AIX. Advanced Interactive eXecutive. The IBM version of UNIX.

ALB. See actuator-level buffer.

algorithm. A detailed, ordered set of instructions for solving a problem. When used in computer programming, term refers to instructions given to a computer.

allocated array cylinder. An array cylinder that contains current or non-current user data.

alphanumeric. A system of notation which utilizes alphabetic letters, numbers, and special characters.

AME. Advanced Manufacturing Engineering. At Sun StorageTek, an engineering group that manufactures product prototype machines, typically through the EPE phase of a product development cycle.

AMT. Automatic migration threshold. User-defined percentage values that determine when virtual tape volume migration begins and ends. VTV migration begins when the VTSS buffer reaches the high AMT and ends when the buffer reaches or falls below the low AMT. These thresholds apply to all VTSSs.

analog. A means of representing data in continuously variable physical quantities, in contrast to digital representation of data in discrete units (binary digits 1 and 0). Analog systems handle information that is represented by continuous change and flow, such as voltage or current. Contrast with digital.

ANSI. American National Standards Institute. An organization that establishes procedures by which accredited organizations create and maintain voluntary industry standards in the U.S., including those for the computer industry. ANSI is the U.S. member of the International Electrotechnical Commission (IEC) and the International Organization for Standardization (ISO).

ANV. VSM-VTSS nonvolatile memory storage card.

APL. Assembly parts list.

application. A software program designed to perform a specific task or group of tasks, such as word processing, communications, or database management.

array. A group of storage devices controlled in such a way as to provide higher data transfer rates, higher data availability, and data redundancy. An array is typically treated as a single volume by a host operating system.

array architecture. A class of magnetic disk architecture in which several physical devices emulate (typically) fewer virtual devices of (typically) higher capacity and performance.

array cylinder. A collection of all physical cylinders in a dual-redundancy array with the same physical address (CC, **). VSM allocates back-end space in units of array cylinders, which are either free or allocated.

array track. A collection of all physical tracks in a dual-redundancy array that have the same physical track address (CC, HH).

ASAL. Alternate Sector Assignment List.

ASCII. American Standard Code for Information Interchange. A protocol for displaying characters and transferring data between computers and associated equipment. ASCII codes are numbers from 0 to 255. Numbers 0 to 32 are non-printing control codes; 33 to 127 are for letters and punctuation; 128 to 255, called extended characters, can be used for a variety of purposes, but are most commonly used for accented letters, graphics, and other special characters.

ASIC. Application-specific integrated circuit. A customized microchip designed for use on a particular circuit board, or for a specific application.

ASM. Application Storage Manager. A Sun StorageTek high-performance file system with hierarchical storage management (HSM) functionality, available for Solaris and NT platforms.

ASU. Advanced Site Unit. Hardware component of the Sun StorageTek Service Delivery Platform (SDP) remote support software.

asynchronous. Not synchronized; not occurring at regular, predetermined intervals. Asynchronous transmissions send one data character at a time, at irregular intervals, rather than in one steady stream; a start bit and a stop bit notify the receiver when the transmission begins and ends. Contrast with synchronous.

ATA. Advanced Technology Attachment. Official name for the disk drive interface standard commonly known as Integrated Drive Electronics (IDE).

ATM. Asynchronous transfer mode. A networked technology based on transferring data cells or packets of a fixed size.

attenuation. (1) The tendency for a signal to become weaker and more distorted as its transmission distance increases. (2) The loss or reduction of signal magnitude, normally measured in decibels (dB).

AVM*n*. VTSS volatile memory storage cards; AVM4 cards have 4 MB capacity; AVM16 cards 16 MB.

B

back-end storage. The data storage portion of a storage subsystem. In VTSS, the disk arrays.

background. A mode of operation where tasks are performed on a low-priority basis to minimize the impact on overall system performance. Contrast with foreground.

backup. The process of producing a copy of a data set for purposes of possible future recovery. Although tape is the most common storage medium for backups, disk is equally usable, although more expensive.

bandwidth. The amount of data that can be sent through a network connection, measured in bits per second (bps). High bandwidth allows fast transmission or high-volume transmission.

base memory. Solid state memory in a controller that stores the functional track directory (FTD) and other internal tables required for subsystem operations. Base memory is not part of user-available cache.

battery backup unit (BBU). A system of batteries that automatically supplies power to nonvolatile storage if AC power is disrupted, to protect nonvolatile cache data. A VTSS battery backup system has redundant batteries that provide at least 72 hours of backup power.

battery charger unit (BCU). A VTSS device that continuously charge a battery used to provide backup power.

baud rate. The transmission rate of a serial data stream over communications lines, most often (but not always) measured in bits per second (bps). Baud is a measure of the number of signal-state changes per second; for example, voltage or frequency changes.

BBU. See battery backup unit.

BCU. See battery charger unit.

BER. Bit error rate.

beta test. The second test phase for new software (after Alpha testing), wherein software is made available to users who evaluate it in what is expected to be typical operating conditions.

binary. A numbering system which has 2 as its base and uses 0s and 1s for its notation. Binary code is used by computers because it works well with digital electronics and Boolean algebra. In binary (base 2) numbering, the number one is written as 1, the number two is written as 10, and the numbers three to ten are written as 11, 100, 101, 110, 111, 1000, 1001, 1010, etc.

bit. A binary digit of 0 or 1; a unit of computer information equivalent to the result of a choice between two alternatives (yes/no, on/off, etc.). Contrast with gigabit, kilobit, megabit.

block. Also called a packet. (1) A contiguous section of bits considered as a whole, especially in memory. On a disk, a block is the data in one sector; in a modem data transfer, a block is the bits between checksums. (2) A group of bits transmitted as a unit and treated as a unit of information; usually consists of its own starting and ending control delimiter, a header, text to be transmitted, and check characters at the end used for error correction. Block sizes are usually a multiple of 512 bytes.

BOM. Bill of material.

bps. Bits per second. The number of bits of data that can be transmitted in one second.

Bps. Bytes per second. The number of bytes of data that can be transmitted in one second.

browser. A text- or graphic-based client program, such as Netscape Navigator or Microsoft Internet Explorer, that allows users to read hypertext documents on the World Wide Web, and navigate between them.

buffered subsystem. A storage subsystem that provides separation between front- and back-end operations so data transfer synchronization is not required.

bus. A parallel electrical pathway, usually part of a circuit board, that both connects and is shared by the parts of a computer system (CPU, support circuitry, memory, cards, etc.). Typically, the lines in a bus are dedicated to specific functions, such as control, addressing, and data transfer.

byte. A group of adjacent binary digits (bits) that a computer processes as a single unit, or ‘word.’ Frequently written as an eight-digit binary number or two-digit hexadecimal number. One letter of the alphabet in ASCII code takes one byte. Contrast with gigabyte, kilobyte, megabyte.

C

CAB. Customer Advisory Board. At Sun StorageTek, a group of customers who advise a corporate design team about the features and functionality they would like to have engineered into upcoming products.

cache. A block of memory that temporarily collects and retains data before it is sent to a host or destaged to back-end disk arrays, allowing quicker retrieval of frequently-used data to improve overall system performance. In VSM, all data is accessed through cache.

cache fast write (CFW). In VTSS, a write command function wherein host data is written directly to volatile cache memory without using nonvolatile storage (NVS), and then is subsequently scheduled for destaging to back-end disk arrays.

CAM. Central Archive Manager.

CAP. Cartridge access port of a Sun StorageTek library unit.

CBT. Computer-based training.

CCR. Channel command retry. A channel procedure, initiated by a controller, that causes a channel command to be repeated without breaking the command chain.

CCW. Channel command word.

CD-R. Compact Disc-Recordable.

CD-ROM. Compact Disc Read-Only Memory. An optical disc that may contain computer data, audio data, graphics, and other information, and is interchangeable between different types of computers. Storage capacity is typically about 680 MB per disc.

CDS. Control data set. An HSC database containing all configuration and volume information, used by host software to control functions of automated libraries.

CEI. Configured end item.

CFE. Composite Failure Event. In VTSS, a structure formed for each discrete failure domain.

CFT. Controlled field test.

change journal. In VSM, the record of changes to the functional track directory (FTD) that is kept in nonvolatile storage (NVS) and is then written to the disk arrays (VTSS). VSM uses the change journal to reconstruct the FTD in the event of a failure.

channel. (1) A point-to-point link whose primary task is to transport data from one point to another. (2) A path for transfer of data and control information between a disk drive and array controller. (3) A device that connects a host and main storage with the I/O control units.

channel image. A software image that logically presents itself as a single physical channel, regardless of how the physical connection is made. Each channel image appears to be an independent single physical channel, although all channel images on a specific I/O interface share the same facilities and physical paths. A VSM-VTSS presents up to 16 control unit images to each of 1 to 28 host systems.

channel interface. Controller circuitry that attaches host channels.

check0. An error condition detected within a VTSS processor card that affects the integrity of the processor. If a second check 0 is detected within the same processor during recovery, the processor hard-stops (a 'double check 0' condition), making the operation or condition unrecoverable by the failing processor.

check1. An error condition that affects a control bus or shared memory bus but leaves processor cards functional. Check1 may affect all processors on a bus, since the bus is locked until the condition is cleared.

check2. An error condition detected in the non-processor logic cards.

checksum. A value that accompanies data transferred between points to ensure the data is transferred correctly. Checksum is computed by adding up the bytes or words of a data block. On the receiving end, checksum is computed based on the data received and compared with the value that was sent with the data. If the two numbers match, the data is considered to be correct.

CHPID. Channel-path identifier. A value assigned to an installed channel path that provides for its discrete recognition by a VTSS.

circuit breaker. A switch that automatically interrupts an electrical circuit when there is an overload of current or other abnormal condition.

CKD. See count-key data.

client. A system which is able to operate independently but has some degree of dependence on another system. Frequently refers to computers on a LAN. A client is a recipient of services in a client/server application. Clients can be workstations, PCs, or other servers.

client/server. A system architecture in which one or more programs (clients) request computing or data services, such as data storage, processing, or transmission, from another program (server).

clink. An ESCON port used to link a master and slave VTSS in a clustered configuration.

clock speed. In storage systems, the frequency at which the system clock oscillates, as measured in MHz. The faster the clock, the more quickly the system can transmit information.

clustering. (1) In VSM, the process of writing a virtual tape volume (VTV) onto two discrete VTSSs. (2) A technique for configuring two or more servers as a single processing system using software and hardware to allow sharing of storage, processing, and other resources under a single management domain, thereby providing greater data accessibility and higher reliability.

CM. Configuration Management. (1) Identification and management of physical product configurations through documentation, records, and data. (2) An organization within Sun responsible for applying these disciplines through a formal EC process.

cold boot. The act of switching a computer, storage system, etc. Completely off, then switching it back on again. Contrast with warm boot.

cold swap. To remove and replace a system component (typically one such as a logic board that has no redundant backup) after system operations have been stopped and power has been disabled. Contrast with hot swap.

collected free space. Array cylinders that are collected and completely free of user data.

collocation. A process that attempts to keep all data belonging to a single client node on a minimal number of sequential-access media volumes within a storage pool. Used to minimize the number of volumes that must be accessed when a large amount of data must be restored.

command line interface. A user interface in which commands are keyed onto a command line instead of through a Graphical User Interface. Contrast with GUI.

compaction. The elimination of inter-record gaps normally associated with count-key data DASD that allows less disk storage space to be used, reducing net capacity load in VTSS units.

compression. The process of encoding data using algorithms so that it uses less storage space and/or increases the rate, or speed, of data transmission.

Configuration Control Document (CCD). A Sun document which defines model numbers, family ID codes, feature codes, part numbers, etc. for a specific product, and which identifies the configured end items (CEIs) available for use in the product.

Configuration Status Monitor (CSM). In VTSS, a part of the Failure Management System (FMS) that monitors FRU configurations in the controller, performs FRU validation, and coordinates diagnostic fencing.

controlled power-down (CPD). An orderly sequence of steps that shuts off AC power to a system without jeopardizing customer data.

controller. A system control module or storage control unit. Also called a control module or control unit. See also disk array controller.

control region. VTSS data path control. Hardware in a multipath controller that is associated with a data path and which transfers data between the cache and disk arrays and between cache and host channel(s).

control unit address. The base channel address to which a control unit can respond.

conversion. A process that changes the basic capability of a unit in a system and may be a disruptive, requiring a customer to turn over use of the unit to a CSE. Conversions may require special tools and higher-level skills of a technical specialist. Contrast with upgrade.

count-key data (CKD). A recording format that writes variable-length records. Contrast with fixed-block architecture.

CPAT. Corporate Product Acceptance Testing.

CPD. Central parts depot.

CPD. See controlled power-down.

CRC. See Customer Resource Center.

CRU. Customer-replaceable unit. Any item, module, or unit on a system that a customer can replace without assistance from a CSE.

CSA. Canadian Standards Association. A group serving industry, government, and consumers which develops product testing and certification standards and codes. The Canadian counterpart of Underwriters Laboratories.

CSE. See Customer Service Engineer.

CSL. Cartridge scratch loader; cartridge stacker/loader.

CSL. See Customer Services Logistics.

CSM. See Configuration Status Monitor.

CSR. Control Status Register.

CSRC. A Sun StorageTek internal tool managed by the NPDC that allows remote connection, operator panel access, and remote file download capability for virtual disk systems including VTSS.

CTR. Cache track recovery.

CTS. Corporate Technical Standard(s).

Customer Resource Center (CRC). A Sun StorageTek website (www.support.stortek.com) that provides resources including product documentation, tools and services, and customer training information.

Customer Service Engineer (CSE). A technical engineer who interacts with the end-user customers and is responsible for fixing product problems and maintaining product performance in customer accounts.

Customer Service Manager (CSM). A member of the Sun StorageTek management team with first-line technical management responsibility for addressing problems in customer accounts.

Customer Services Logistics (CSL). An organization within Sun StorageTek responsible for coordinating delivery of spare parts to field depots worldwide.

cyclic redundancy check (CRC). A check performed on data to see if an error has occurred in the transmitting, reading, or writing of data.

D

DAC. See disk array controller.

DACD. Disk array controller display. FRU designation for a VTSS local operator panel.

DASD. Direct-access storage device. (1) A storage device (typically a magnetic disk) in which data access times are effectively independent of the location of the data on the device. Conversely, in a serial-access storage device (e.g., a magnetic tape), data must be accessed serially, such that data at the end of the tape spool take much longer to access than data on the tape which is passing immediately over the read/write head. (2) A device in which the media is always available to the read/write head without requiring mounting by an external agent.

data compression. See compression.

data striping. The process of writing large blocks of data across multiple drives and array groups to enhance data protection capabilities.

data transfer rate. The speed at which data can be transferred. Measured in bits per second (bps) for a modem, and in megabytes per second (MBps) for a hard drive or fiber channel.

database. A collection of data arranged for ease and speed of retrieval.

dB. Decibel.

DBU. Disk buffer utilization. The ratio of used to total VTSS buffer capacity.

DC. Direct current. An electric current flowing in one direction only. Contrast with alternating current.

DCN. Document Change Notice.

DDR. Defect discovery rate.

DDR. Dynamic device reconfiguration.

DDSR. Deleted Data Space Release. A VTSS ExPR software function that informs a controller when functional volume datasets or minidisks are deleted, so that physical disk space occupied by deleted data can immediately become free space, thereby reducing DBU.

decibel (dB). In data transmission terms, a unit that measures the ratio of the difference in power between two electric signals.

decompress. To restore a compressed file to its original size.

dedicated connection. In an ESCD, a connection between two ports that is not affected by information in link frames. A dedicated connection restricts the ports from communicating with other ports, and appears as one continuous link.

deinstallation. Physically disconnecting a subsystem with the intent of removing it from a customer site. Contrast with relocation.

destage. In VSM, the non-synchronous write of new or updated data from cache or nonvolatile storage (NVS) to the VTSS disk arrays.

Detailed Manufacturing Instruction. A document containing a step-by-step description of the correct way to assemble an item, including illustrations if necessary.

device. A single physical HDA.

device reconstruction. A VTSS automatic background function that recreates and rewrites data from a failed device to a spare device using the functional track recovery (FTR) facility.

DFE. Distributed Fabric Element.

DFT. Direct field transfer.

Diagnostic Manager (DMGR). In VTSS, a facility that administers, controls, and coordinates all diagnostic activity within the VTSS environment through the diagnostic submonitors (DSMs).

digital. Information stored in binary form that a computer recognizes. For computing use, text, graphics, and sound are stored as digital bits represented by a 0 or 1. Contrast with analog.

dimmed text. Dimmed or grayed-out text that displays on a GUI menu and indicates an option is unavailable because the system is not in the mode to use that function, or because software for that function is not installed. Available options are typically displayed in undimmed black text.

director. A logical entity that interfaces host channels to a disk device. See also multipath storage director.

disk array. See dual-redundancy disk array.

disk array capacity. Formatted physical capacity of an array, exclusive of capacity on redundancy/parity drives or spare drives.

disk array controller. In VTSS, a control unit that implements storage management functions and provides interface intelligence between hosts or network devices and VTSS arrays.

disk drive. An electromagnetic mechanical device that provides physical data storage on magnetic disk media.

DLF. See Download Facility.

DLT. Digital Linear Tape.

DMA. Direct Memory Access.

DMGR. See Diagnostic Manager.

DNS. Domain Name Server.

download. To receive files or data from one storage device or computer to another. Contrast with upload.

Download Facility (DLF). A VTSS facility that formats event log data and connects to a RRC PC to offload event log and MIM information as directed by the VTSS PSA facility and subsystem internal timers.

drain. A process that gradually moves data stored from an individual drive, drive array, or entire array unit to allow for eventual nondisruptive deinstallation of the drive(s) or unit.

drive reconstruction. See device reconstruction.

driver. A software routine that controls or regulates a hardware device.

DSP. Digital signal processor.

dual copy. A function of VTSS nonvolatile storage that maintains two functionally identical copies of designated disk volumes in a logical subsystem, and automatically updates both copies each time a write operation is issued to a logical volume.

dual-redundancy disk array. In VSM, a logical grouping of physical disk storage devices on a VTSS. In an array five disk drives are reserved for user data, and two are used for redundancy/parity data. Dual-redundancy arrays allow for real time automatic recovery of data on up to two failed devices within an array.

duplex. Bidirectional; a two-fiber or two-element cable that provides two-way data transmission, i.e., it can simultaneously send and receive data. Contrast with simplex.

duplexing. In VSM, the process of writing a virtual tape volume (VTV) on two discrete multi-volume cartridges (MVCs).

Dynamic Configuration. A VTSS feature that allows channel interfaces and up to 1024 functional volumes to be defined and/or altered. Allows the functional configuration of a VTSS to be determined by user requirements rather than by available physical devices.

Dynamic Director. A VTSS feature that allows dynamic switching of ESCON director links between the VTSS and RTDs for optimum system performance.

dynamic mapping. A VTSS mapping technique that dynamically alters the correspondence between a functional track and its location on physical devices, thereby avoiding ‘update-in-place’, a major performance bottleneck in conventional RAID architectures. See also mapping. Contrast with fixed mapping.

E

earth grounding. An electrical connection to the earth that is used to drain electrostatic charge from personnel and equipment.

EC. Engineering Change.

ECA. ESCON channel adapter.

ECAM. Extended Control and Monitoring. A VTSS communications protocol that permits communication between ExPR and the VTSS.

ECAM device. A functional host device number over which ExPR-based communication takes place between a controller and host CPU(s).

ECAMT. Extended Control and Monitoring for Tape.

ECAMT device. A functional device over which VTCS communication between the VTSS disk array controller and the host CPU(s) takes place.

ECC. See error correction code.

ECN. Engineering change notice.

EDAC. Error detection and correction. A system that detects and corrects errors during data transfers.

EEPROM. Electronically Erasable Programmable Read-Only Memory.

electromagnetic interference (EMI). Leakage of radiation from a high-frequency energy transmission source that can cause interference to equipment or radio services. National and international regulatory agencies set limits for EMI emissions. Class A limits apply to equipment for industrial use; Class B limits apply to equipment for non-commercial residential use.

EPO. Emergency Power Off. A safety switch on a machine or in a data center that allows a user to immediately power down a machine or a data center power supply by cutting off the external source power.

EMI. See electromagnetic interference.

EMIF. ESCON Multiple Image Facility

enterprise. A large-scale, organization-wide computer network that may include web-based, client-server, and mainframe computing technologies.

Enterprise Systems Connection (ESCON). (1) A set of fiber optic-based products and services developed by IBM that allows devices within a storage environment to be dynamically configured. (2) A channel-to-control unit I/O interface that uses optical cables as a transmission medium.

environmental stress screening (ESS). A method of causing weak components in a machine to fail by applying environmental stresses much greater than normal product environmental specifications, including temperature extremes, temperature shock, and vibration.

EPE. Early/External Product Evaluation

ERP. See error recovery procedure.

error correction code (ECC). One or more bytes containing sufficient information about a given amount of data to permit reconstruction of a predefined number of (lost) bits of that data. A code that detects and corrects error bursts by using check bytes.

error log. An accumulation of data by a unit under test for transmission to a RRC PC for analysis and problem determination.

error recovery procedure (ERP). One of a set of standard procedures used by a host system I/O supervisor to handle errors that are sent with a unit check status by a control unit, and are described by sense data.

ESA. Enterprise Systems Architecture.

ESCD. See ESCON Director.

ESCON. See Enterprise Systems Connection.

ESCON channel. A fiber optic device that connects a host and main storage with the I/O control units.

ESCON Director (ESCD). A device that provides connectivity capability and control for attaching any two ESCON links to each other.

ESD. Electrostatic discharge.

ESS. See environmental stress screening.

event log. Data collected and stored in a machine log by a subsystem.

event record. One of six record types in an event log file. The record is logged out at the time of a device failure or other event, and contains all data to reconstruct an event for failure analysis.

EVT. Engineering Validation Test. At Sun StorageTek, a testing phase where a debugged system is validated for functionality and compliance to specification.

ExLM. Expert Library Manager

ExOM. Expert Online Manager

ExPR. Expert Performance Reporter. A VTSS host software product that collects performance data and generates reports about Sun StorageTek Nearline ACSs and VTSS status and performance.

Extended Capacity. A VTSS feature that allows users to define subsystem functional capacity in excess of its physical capacity.

extended operator panel. An ExPR facility that allows operator interaction with and control of a VTSS through a host operator console in lieu of a local operator panel.

extent. Also called logical disks. A set of contiguously addressed blocks in a storage entity (physical disk drive, virtual disk drive, array, etc.). A storage entity may have one or more extents of varying sizes. Multiple, possibly non-adjacent, extents may be part of the same mapping scheme in a virtual disk system.

external storage. Storage devices that are not embedded inside a server. Typically, a host bus adapter (HBA) is used to connect a RAID subsystem to a server.

F

F-Port. Fabric Port. The access point of fabric where an N-Port is physically connected. See also fabric, N-Port.

fabric. (1) In Fibre Channel (FC), a structure that allows addressing of ports on a FC network to be done independently of the physical location or address of a target port. Fabric switches are responsible for passing packets of data to the target port regardless of which FC loop or switch the port physically resides on. Multiple fabric switches can be connected to create large networks with up to 224 addressable ports. In a FC fabric architecture, both physical and logical communication channels (threads) are interwoven from port to port (end to end) within a storage system. A fabric of linked switches on a network allow any port on any switch to provide full-speed access to any other port on the network (subject to bandwidth availability). (2) The facility that connects multiple N-Ports. See also F-Port.

FACT. File ACtivities Task.

Fault Symptom Code (FSC). A machine-specific alphanumeric code representing a unique state, condition, or error type associated with an operational event. FSCs are generated by a system support facility to indicate an area or component that is the most likely cause of a problem.

fault tolerance. The ability of a system to keep working in the event of hardware or software faults, usually achieved by duplicating key components of the system.

FBA. See fixed-block architecture.

FC. See Fibre Channel.

FC-AL. Fibre Channel-Arbitrated Loop. One of the possible physical topologies of Fibre Channel used to simplify configurations and reduce costs. In a FC-AL, the Fibre Channel is connected in a loop with devices all connecting to the loop. A FC-AL allows for up to 126 nodes in a loop, allocates bus bandwidth evenly among all nodes, and substantially reduces I/O latency by dedicating a loop’s capacity during data transmissions.

FCBE. Fibre channel back end.

FCC. Federal Communications Commission. A U.S. government regulatory agency that defines electronic emissions standards for electronic equipment.

FDID. Functional device identifier.

FDT. Functional device table.

fence. The separation of a logical path or physical component from the remaining operating portion of a subsystem, supporting continuous operation and deferred nondisruptive servicing.

fiber optics. A means of transmitting data digitally through ultrathin glass or silica fibers using pulses of laser light.

fiber-optic cable. A cable made of ultrathin glass or silica fibers which can transmit data using pulses of laser light. Fiber-optic cables have several advantages over copper cables: they have much less signal loss; they allow information to be transmitted at higher speeds and over longer distances; they are not affected by external electrical noise; and they are better for transmissions which require security.

fiber-optic connector. One of several types of devices used to join pairs of optical fibers together. Some types are: ST connectors, SMA connectors, MIC connectors, and SC connectors.

Fibre Channel (FC). An ANSI-standard serial interface used to provide high-speed data transfers between workstations, servers, desktop computers, peripherals and, more recently, as a channel for attachment of storage devices. FC allows concurrent communication between connected elements. FC topologies include Fibre Channel-Arbitrated Loop (FC-AL), point-to-point, and switched fabric.

FICON. FIbre CONnection. An IBM S/390-based channel architecture that provides up to 256 channels in a single connection, each having a capacity of 100 MB per second.

file. A set of related records treated as a unit.

fixed-block architecture (FBA) device. A disk storage device that stores data in blocks of fixed size; these blocks are addressed by block number relative to the beginning of the particular file. Contrast with count-key data device.

fixed mapping. A mapping technique where the location of a mapped object is a fixed, computable function of the identity of the mapped object and a description of the mapping scheme. See also mapping. Contrast with dynamic mapping.

foreground. A mode of operation where tasks are performed on a high-priority basis as soon as possible, depending on available resources. Contrast with background.

F_Port. Fabric port. Also written as F_PORT.

FLOGIN. Fabric login.

FL_Port. Fabric port with loop capability.

free space. Back-end disk array storage space that does not contain user data.

free space collection. In VSM, an automatic background task that relocates data from fragmented VTSS disk cylinders and collects the resulting free space into empty cylinders, making write operations more efficient.

free space directory. In VSM, an internal microcode structure that contains the free space list and free cylinder list.

front end. The portion of a VTSS controller data path that passes data between channels and cache.

FRU. Field-replaceable unit. The smallest self-contained part or component in a system that can be individually replaced during a service or repair action.

FSC. See Fault Symptom Code.

FTD. See Functional Track Directory.

FTR. See Functional Track Recovery.

full-duplex. A communications channel that transmits data in both directions at once. Contrast with half-duplex.

functional. In VTSS, a view or description of stored data encompassing physical and/or logical elements. Contrast with logical, physical.

functional allocated space. A user-allocated portion of functional volume space; i.e., datasets as defined in a VTOC, or minidisks as defined in a VM directory.

functional capacity. The amount of data that can be stored on a VTSS, as viewed by a host.

functional device. See functional volume.

functional device identifier (FDID). A unique numeric identifier (an integer from 1 to 1023) for a functional volume image as known to a VTSS.

functional device ID mapping. The correlation between the FDID and the host system identification for a specific functional volume image. See also mapping.

functional free space. The unallocated and/or unused portion of the space on a functional volume as defined in the VTOC or VM directory.

functional stored space. The used portion of functional allocated space for a specific functional volume.

functional-to-logical mapping. The relationship between functional devices and logical devices. See mapping. See also fixed mapping, dynamic mapping.

functional track record. A record stored on contiguous sectors in an allocated array cylinder.

Functional Track Directory (FTD). A VTSS internal mapping table that contains one entry for each functional track associated with the functional volumes currently defined by the user.

functional track recovery (FTR). In VSM, an automatic process of recovering data from a physical track in a VTSS disk drive that is unreadable due to a media defect or failed device, accomplished by reading and processing data and redundancy information at corresponding physical track locations on remaining devices in an array.

functional volume. A logical object in a data storage pool that is used to store data; a data carrier that is mounted or demounted as a unit; a volume image that a host system receives when the ‘read device characteristics’ channel command word is issued.

G

GA. General Availability. A Sun StorageTek term indicating a date after which a product is generally available to any customer that wants to buy it.

Gb. Gigabit. A unit of data capacity equal to one billion (1,000,000,000 or 10^9) bits. One gigabit is equal to one thousand megabits or one million kilobits. Also abbreviated gbit or Gbit. Contrast with bit, kilobit, megabit.

GB. Gigabyte. A unit of data capacity roughly equal to one billion (1,000,000,000 or 10^9) bytes. One gigabyte is equal to one thousand megabytes or one million kilobytes. Also abbreviated as gbyte, Gbyte. Contrast with byte, kilobyte, megabyte, petabyte, terabyte.

Gbps. Gigabits per second (billion bits per second).

GBps. Gigabytes per second (billion bytes per second).

GFI. Guided Fault Isolation.

GFR. Guided FRU Replacement. A utility in the VTSS support facility that defines and coordinates FRU replacement, and manages FRU isolation and FRU swaps.

ground. A conducting connection, whether intentional or accidental, between an electrical circuit or equipment and the earth. The position or portion of an electrical circuit at zero potential with respect to the earth. A conducting connection to such a position or to the earth. A large conducting body used as a return for electrical currents and as an arbitrary zero of potential.

GUI. Graphical user interface. A generic name for any computer interface that substitutes graphics for characters on a computer screen or console, and which usually works with a navigational device such as a mouse or trackball. Contrast with command line interface.

H

half-duplex. A communications channel that transmits data in either direction, but only one direction at a time. Contrast with full-duplex.

handshake. (1) A signal exchanged between two software components that uses characters inserted into a data stream to indicate when to start or stop sending data. (2) A voltage or pulse signal exchanged between two hardware components to establish a valid connection between two computers.

HBA. Host bus adapter. A printed circuit board that acts as an interface between a host microprocessor and disk controller to relieve the host of data storage and retrieval tasks, to improve data throughput performance.

HDA. Head disk assembly. A sealed enclosure containing the mechanical parts of a disk drive, including read/write heads, disk platters, and other non-electronic components.

HDI. Head disk interference.

head crash. Mechanical interference that causes a disk head and platter to make physical contact with each other in a way that disables, or 'crashes,' the head and HDA. Head crashes can be caused by rough handling, sudden power loss, and particulates or other contaminants on the surface of a disk.

hexadecimal. A base of 16 counting method (0 to 9, A to F) for the first position.

HIC. Human interface controller.

host path. In VSM, a communication path with four logical paths between a host and VTSS logical devices.

hot-pluggable. In VSM, capability that allows a CSE to remove and replace FRUs while power to the FRU is maintained. This feature allows hardware maintenance actions and hardware upgrades to proceed without disrupting subsystem availability. See also hot swap.

hot swap. To remove and replace a system component (typically one with a redundant backup) while system power remains on and system operations continue. See also hot-pluggable. Contrast with cold swap.

HSC. Host Software Component. The portion of the Sun StorageTek Automated Cartridge System (ACS) that serves as an interface between the host operating system(s) and the rest of the automated library.

HSM. Hierarchical Storage Manager.

HSSDC. High Speed Serial Data Connector.

HTTP. Hyper Text Transfer Protocol, Hyper Text Transport Protocol. The protocol most often used to transfer information from World Wide Web servers to browsers.

Hz. Hertz. The number of cycles per second in an electromagnetic wave; one hertz equals one cycle.

I

ICE*n*. Iceberg Channel ESCON card used in VSM4-VTSS and earlier units.

IEC. International Electrotechnical Commission. An organization in Geneva, Switzerland that sets international standards for the electrical and electronics fields. IEC created the Joint Technical Committee for information technology with ISO.

IEEE. Institute of Electrical and Electronic Engineers. A worldwide professional organization that sets standards for telecommunications and computing applications.

IFCMB. VTSS Iceberg Fibre Channel Motherboard

IFES. VTSS Iceberg Fibre-channel Enclosure Services card.

IFF. VTSS Iceberg Fibre-channel Freezer card used

IFMZ. Iceberg Fiber-channel Mezzanine card; sub-component of IFES card.

IFPB. Iceberg Fiber-channel Port Bypass card; sub-component of IFES card.

IML. Initial microcode load, a.k.a. initial microprogram load. The loading of an operating instruction set, typically from external media such as a floppy diskette, into the microprocessor control store of a machine.

impedance. (1) The combined effect of resistance, inductance, and capacitance on a signal at a given frequency. (2) The total opposition (resistance or reactance) that a circuit offers to the flow of alternating current (AC), using ohms (Ω) as the unit of measure. A lower ohm value indicates a better-quality conductor.

interface. (1) A shared boundary where two or more systems meet. (2) The means by which communication is achieved at this shared boundary. An interface can be between hardware and hardware (such as sockets and plugs, or electrical signals), hardware and software, software and software, human and computer (such as a mouse or keyboard and display screen).

interoperability. Ability to communicate, execute programs, and transfer data across a variety of hardware and software platforms from different manufacturers.

interrupt. A temporary suspension of a process. Two main sources of interrupts are: a signal from outside the computer, such as someone touching the keyboard or mouse (hardware interrupt); or a machine instruction such as a request for input or output (software interrupt).

intranet. A local-area network that functions like the Internet, using web browser software to access and process information for employees, and which is located on computers within a company. An intranet may or may not be connected to the Internet through web servers.

I/O. Input/output. The movement of data between a host system and another device.

IPL. Initial program load. See initial microcode load.

IPX*n*. Power PC functional microprocessor card.

IS. Information systems; information services.

ISO. International Organization for Standardization. A voluntary organization comprised of the national standards organizations of many countries which is responsible for creating international standards in many areas, including computers and communications. ANSI (American National Standards Institute) is the U.S. member of ISO. ISO produced OSI (Open Systems Interconnection), a seven-layer model for network architecture.

ISP*n*. Iceberg Support Processor card.

IT. Information technology.

ITCC. Iceberg Tray Cable Crossover.

J

jack. A connector into which a plug is inserted.

JBOD. Just a Bunch of Disks. A term used to describe a data storage cabinet that contains only disk storage devices, without an internal control unit. A JBOD typically attaches to a host system, which provides control functions and intelligence.

journal. A log (stored in a dataset) that contains a record of completed work and changes to the control dataset since the last backup was done.

K

Kb. Kilobit. A unit of data capacity equivalent to 1024 (10^3) bits.

KB. Kilobyte. A unit of data capacity equal to 1024 (10^3) bytes. Also abbreviated kbyte, Kbyte.

Kbps. Kilobits per second (thousand bits per second).

KBps. Kilobytes per second (thousand bytes per second).

kg. Kilogram. A unit of weight equal to one thousand grams (2.2 pounds).

kHz. Kilohertz. A unit of frequency equal to 1000 cycles per second.

km. Kilometer. A unit of distance equal to one thousand meters (0.62 mile).

L

LAN. Local area network. A grouping of two or more computers connected by cable which use an operating system and application software to allow direct sharing of hard disks, printers, files, etc.

LBA. See logical block address.

LCD. Liquid crystal diode. Also called liquid crystal display. A display technology that uses rod-shaped molecules (liquid crystals) that flow like liquid and bend light.

LED. Light-emitting diode. A semiconductor chip that emits visible or infrared light when activated.

link. (1) A point-to-point pair of conductors (optical fibers) that physically interconnects a control unit and a channel, a channel and a dynamic switch (e.g., a director), a control unit and a dynamic switch, or, in some cases, a dynamic switch and another dynamic switch. (2) In an ESCON environment, the physical connection and transmission medium used between an optical transmitter and optical receiver. A link consists of two conductor paths, one for sending and the other for receiving, providing a duplex communication path.

link address. An address assigned during IML that identifies a channel or control unit and allows it to send and receive frames, and to perform I/O operations.

LMS. Library Management Software.

LMU. Library Management Unit.

load. In VSM, the average percentage of VTSS disk array cylinder space that must be relocated to create empty array cylinders in the subsystem.

logical. In VTSS, a view or description of storage components (cylinders, devices, tracks, volumes, etc.) that is dynamic and independent of the physical location of those components. Contrast with functional, physical.

logical array. A grouping of devices into an array independent of physical device locations.

logical block address (LBA). A four-byte number used to identify a logical block on a SCSI drive. The address range is 0 to *n*, where *n* equals the number of blocks on a drive.

logical path. (1) A logical connection between a channel image and a control unit image. Every logical path has an associated physical path, but a physical path may 'contain' multiple logical paths. VSM-VTSS can have up to 512 logical paths to 1 to 28 host systems. (2) A relationship between a channel and control unit that designates the physical path to be used for device-level communication between each entity, defined by a link address assigned to each entity.

LOGREC. Logical record. A data set maintained by a host system containing records of usage and errors encountered for various system components, primarily peripheral devices.

logical-to-physical mapping. The defined relationship between logical devices and specific physical devices. See mapping. See also fixed mapping, dynamic mapping.

logical sector recovery. A process of reading remaining (*n* - 1) physical sectors at a location within a parity group and combining these sectors, using parity generation, to produce the otherwise unreadable content of the *n*th physical sector, thereby allowing recovery of the logical sector involved. See also functional track recovery.

L_Port. Loop port. Also written as L_PORT.

LSF. Log-Structured File.

LTO. Linear Tape-Open.

LUN. Logical unit. The basic structure created in a RAID subsystem to retrieve and store data, comprised of an array of physical drive modules. The operating system views a LUN as a single drive rather than as the group of drives that comprise the array.

LPAR. Logical partition.

LSM. Library Storage Module.

M

machine address. An address that is permanently assigned to a specific storage location in a computer, by the maker of the machine.

mainframe. A large computer with ability to support hundreds or thousands of users simultaneously.

mapping. The way in which locations of functional, logical, and physical objects are related to one another. There are two types of mapping: functional-to-logical, and logical-to-physical; each can be either dynamic or fixed. See also dynamic mapping, fixed mapping.

MAT. See media acceptance test.

Mb. Megabit. A unit of data capacity equal to one million (1,000,000 or 10^6) bits. One megabit is equal to one thousand kilobytes.

MB. Megabyte. A unit of data capacity equal to one million (1,000,000 or 10^6) bytes. One megabyte is equal to one thousand kilobytes. Contrast with byte, gigabyte, kilobyte, petabyte, terabyte.

Mbps. Megabits per second.

MBps. Megabytes (million bytes) per second. A measure of the data transmission rate through a data path.

mean time between failures (MTBF). A figure that gives an estimate of equipment reliability. The higher the MTBF, the longer a piece of equipment should last. For example, if MTBF is 10,000 hours, the equipment should run, on average, for 10,000 hours before failing.

mean time to repair (MTTR). Average time from the beginning of troubleshooting activities (when a CSE starts work on a unit) until a subsystem (or part of it) is returned to full functionality and total customer control. Includes time used to verify fixes, but not logistics delays.

media acceptance test (MAT) partition. In VSM, a holding partition that contains VTSS disk array drives that can be assigned to the spares partition. Contrast with production partition, spares partition, unavailable partition.

megahertz (MHz). Mega Hertz. A unit of frequency equal to one million (1,000,000 or 10^6) Hertz, used to measure the clock speed of a computer processor.

migration. Movement of data from a VTSS to a RTD where VTVs are stacked onto MVCs. Migration is initiated by VSM when high AMT levels are reached. VTVs are selected for migration based on use and size, i.e. the least-recently used and largest VTVs are selected first. VSM provides ability to migrate VTVs on demand and to migrate multiple copies of a VTV.

MIM. Machine-initiated maintenance. A machine-detected error or condition that initiates a call-home sequence from the supported machine to the associated support center host. Error event and log data is available to the support representative for analysis. See also Service Delivery Platform, ServiceTek Plus.

MLC. Machine-Level Control.

modem. A modulator-demodulator, or device that allows a computer to receive and transmit data over standard telephone lines. A modem takes digital data and converts it to analog data, and the modem at the other end takes analog data and converts it back to digital.

motherboard. The main circuit board inside a computer, which contains a central processing unit, bus, memory sockets, expansion slots, and other components.

MPSD. MultiPath Storage Director. A logical entity that interfaces host computer channels to a disk device. In VTSS, the MPSD has two storage paths (control regions) capable of concurrent operation; both respond to the same channel addresses.

MRF. Machine-readable FRU. A FRU that contains a 256-bit (or greater) serial EEPROM that allows the FRU to be recognized and identified by the support facility.

MTBF. See Mean Time Between Failures.

MTTR. See Mean Time To Repair.

MVC. Multi-volume cartridge. A physical cartridge in a LSM that contains one or more VTVs (or none), but has been identified as a volume that can be selected for VTV stacking. This data is stored in the CDS.

MVS. Multiple Virtual Storage. The most commonly-used operating system for IBM mainframes; another common operating system is VM.

N

N-Port. Node port. In Fibre Channel, a hardware connection port in a point-to-point connection topology. An F-Port provides a physical connection point for an N-Port. See also F-Port.

NA. Not available.

N/A. Not applicable.

NAS. Network-attached storage.

NCKD device. A subsystem in which both virtual and real devices are native count-key data type.

NCKD. Native count-key data.

NCL. See net capacity load.

NCS. Nearline Control Solution.

Nearlink. In VSM, microcode used to give a CIP a ‘channel’ personality as opposed to a control unit personality so that the CIP port can be used to drive an RTD or clink. See real tape drive, clink.

net capacity load (NCL). The amount of physical back-end disk array storage space used by a VTSS to store the defined functional capacity.

NiCad. Nickel-cadmium; a type of compact long-life battery used in various applications.

node. In a data network, a point where one or more functional units interconnect data transmission lines.

Non-Disruptive Code Load (NDCL). A VTSS feature that allows microcode changes to be implemented without interrupting subsystem operations or affecting data availability.

nondisruptive installation. The physical installation of additional components or capabilities to a unit while normal operations continue without interruption.

nondisruptive removal. Physical removal of components or capabilities from a unit while normal operations continue without interruption.

nonvolatile storage (NVS). In VSM, a redundant solid-state repository in a VTSS disk array controller that retains its data when AC power is removed, achieved by switching to a battery-backup DC power system when its primary power source fails. In VTSS, NVS is used to temporarily store host data before it is destaged to the back-end disk arrays. Contrast with volatile memory.

NPDC. New Product Development Center.

N_Port. Node Port.

NLOGIN. Node Login.

NL_Port. Node Port on Loop.

NOS. Network Operating System.

NVS. See nonvolatile storage.

O

ODLI/ODL-I. Optical data link interface. In VSM, a fiber-optic interface between a VTSS front end and back end.

OFC. Open Fibre Control.

ohmmeter. A test instrument used to measure the resistance of a material, using ohms (Ω) as the unit of measurement.

open systems. Products designed to operate in a multi-platform computing environment.

operating system (OS). A program responsible for management of system resources.

outlet. A wall receptacle that is connected to a power supply and equipped with an electrical socket designed to accept a compatible plug.

P

packet. A unit of data formatted for transmission on a network. Each packet has a header containing its source and destination, a block of data content, and an error-checking code. The data packets for a specific message may take different routes to a destination, and the packets are reassembled on arrival.

PAD. Packet assembly/disassembly. See packet.

PAL. Programmable Array Logic.

parallel. Side by side. A parallel interface transmits eight bits (one byte) of data at a time, over eight parallel lines, while a serial interface transmits only one bit at a time. A parallel cable can use eight channels to transmit one eight-bit byte at a time, or may transmit more than one byte at a time. Some of the eight channels may be used to transmit control signals instead of data. Contrast with serial.

parity bit. A binary check digit inserted in an array of binary digits to make the arithmetic sum of all digits, including the check digit, always odd or even (as was predetermined).

parity checking. A method of verifying the integrity of data when it is transferred between entities (within a subsystem, between a subsystem and host, etc.).

parity generation. Application of a mathematical algorithm to ensure integrity of data transfers. Parity data is generated and sent along with the original data to be interpreted at the receiving end, validating the integrity of the data.

partition. Logical separation of devices, arrays, or groups of arrays within a VTSS to allow different functionality (media acceptance test, production, spares, and unavailable).

path. See storage path.

PCAP. Physical Capacity Control.

PCI. Peripheral Component Interconnect.

PCM. Power control module; plug-compatible manufacturer.

PDU. Power distribution unit.

physical. In VTSS, a view or description of actual hardware or fixed locations, as opposed to conceptual or dynamic subsystem elements (functional tracks, logical paths, virtual volumes). Contrast with functional, logical.

P/N. Part number.

preventive maintenance (PM). Routine, scheduled action to prevent a machine from failing due to normal wear and tear.

privileged ECAM device. A device type used by ExPR to send messages to a VTSS to request a change in the subsystem state. At least one privileged ECAM device must be defined per subsystem; however, all functional volumes can be defined as privileged ECAM devices.

production partition. In VSM, a partition state of VTSS array drives used for storage of user data. Contrast with media acceptance test partition, spares partition, unavailable partition.

PSA. Predictive Service Analysis. A VTSS Failure Management System function that receives failure reports from the support facility, performs problem analysis, and issues a suspect FRU list.

Program Configuration Document (PCD). A Sun StorageTek document that provides a description of architectural elements that comprise the internal structure of a product. A PCD includes, among other things, a listing of all available product configurations, including feature codes and part numbers used for ordering.

protocol. In command sequencing, the required commands in the proper order and timing to invoke a desired response. In data communication packets, a defined sequence of data patterns that follow a defined set of rules for data exchange and error correction.

PSSIB. Power system serial interface bus.

PTF. Program Temporary Fix. An interim patch, or ‘fix’, applied to a known defect in software or microcode.

Q

query. A request for data from a file or database, based on specified conditions.

queue. (1) A line or list of commands waiting to be processed. (2) A list constructed and maintained so that the next data element to be retrieved is the one stored first.

quiesce. To end a process by allowing operations to complete normally.

R

rack. A free-standing framework that holds equipment. The VSM-VTSS uses an industry-standard 19-inch rack for mounting array drives and related components.

random access. A method of storing and retrieving information randomly, as on magnetic disk media. Any file or piece of information stored in a random-access format can be selected and accessed immediately in any order. Contrast with serial access.

RAID. Redundant Arrays of Independent Disks.

RCSE. See remote customer service engineer.

read. To acquire or interpret data from a storage device, a data medium, or another source.

read hit. An instance wherein data requested by a read operation is found in cache.

read miss. An instance wherein data requested by a read operation is not found in cache.

real tape drive (RTD). Physical transports (TimberLine 9490, RedWood SD-3, T9840*x*, T9940*x*, T10000) controlled by VSM. The transport has a data path to a VTSS and may optionally have a data path to MVS or to another VTSS.

recall. Movement of VTVs back to a VTSS from a MVC. VSM provides ability to recall VTVs on demand.

reclaim. A space-reclamation function performed by a MVC. VTCS uses the amount of fragmented free space on a MVC and the amount of VTV data that would have to be moved to determine if space reclamation is justified. VSM provides ability to reclaim MVCs on demand.

reconstruction. See device reconstruction.

redundancy group. A logical grouping of devices that are protected against data loss from device failures by the use of redundancy information that is stored across the entire group of devices. VTSS dual-redundancy arrays are redundancy groups that provide data protection against two simultaneous device failures.

relative humidity. The amount of moisture in the air, as compared with the maximum amount of humidity that the air could contain at the same temperature; expressed as a percentage.

relocation. The process of physically moving VTSS units within a same site or immediate area without the use of packing materials. Contrast with deinstallation.

remote customer service engineer (RCSE). A Global Services RRC person who receives customer and CSE calls, performs preliminary diagnostic tasks, evaluates failure situations, and dispatches CSEs to customer sites for repairs and maintenance.

remote diagnostics. See Service Delivery Platform.

remote maintenance. See Service Delivery Platform.

Remote Resolution Center (RRC). A Sun StorageTek Global Services group that is available 24 x 7 x 365 to handle customer requests for service and to provide technical support and remote problem resolution. Comprised of Tier 1, Tier 2, Tier 3 (subject-matter experts), critical-situation (CRITSIT) management, and out-of-cycle or performance management organizations.

resistance. (1) The property of an electrical conductor that specifies the ability of an electrical current to flow through it, using ohms (Ω) as the unit of measurement. (2) The parameter describing the current-limiting property of an object. (3) The ratio between potential difference applied across an object, and the resulting current through the object.

RRC. See Remote Resolution Center.

RTD. See real tape drive.

S

SAN. Storage area network. A storage networking configuration that optimizes communications between various hosts, applications, and disk or tape storage systems.

SAP. Systems Applications and Products.

scalability. An ability to easily change in size or configuration to suit changing conditions.

SCSI. Small Computer System Interface. A high-speed interface that can connect to computer devices (hard drives, CD-ROM drives, tape drives, scanners, printers, etc.). SCSI can connect up to seven devices; each one is given an identification number from zero (0) to seven (7), which is set with a manual switch. Newer versions of SCSI can connect up to 15 devices.The SCSI cable transfers eight bits at a time, in parallel.

SDP. See Service Delivery Platform.

SE. See systems engineer.

serial. One at a time. A serial interface transmits one bit of data at a time over one line. Contrast with parallel.

serial access. A method of storing and retrieving information in sequence, as on magnetic tape media. To access file or piece of information, magnetic tape must be wound or unwound to the point where the data is stored. Contrast with random access.

server. Computer hardware and software that is attached to a network and which automatically stores, processes, and transmits data or information that is generally accessed by many people using client programs. See also client/server.

Service Delivery Platform (SDP). A Sun StorageTek maintenance and reporting system that allows field machines to connect, via LAN/Ethernet over the Internet, or via modem over a telephone line, to a call-handling machine at the RRC. SDP automatically notifies the RRC of machine failures, trends, and status, and whether a machine is inoperable, degraded, subject to potential failure, or ready to offload event data. SDP also allows remote personnel to perform maintenance and diagnostic tasks on a linked machine, thereby reducing on-site service requirements.

severity code. A code that classifies the seriousness of an error condition.

SFL. Suspect FRU list.

SFP. Small form-factor packaged. A small-form connector type.

Siebel. A software tool used by Sun StorageTek that standardizes and automates certain tasks in the sales and ordering process, and which tracks customer orders in a centralized database.

SIM. Service Information Message. In VSM, a message generated by a host system console after it has received sense information from a VTSS indicating a need for service, repair, or customer action, or for the purpose of communicating status information.

simplex. Unidirectional; a single-fiber or single-element cable that provides one-way data transmission. Contrast with duplex.

slot. Part of the physical location designator for each FRU in a unit. See unit.tray.slot.

SMS. System-Managed Storage.

SN. Serial number.

SNMP. Simple Network Management Protocol. The Internet standard protocol for network management software. Using SNMP, programs called agents monitor devices on a network (hubs, routers, bridges, etc.). Another program collects the data from the monitoring operations into a database called a management information base (MIB). This data is used to check if all devices on the network are operating properly.

Solaris. A UNIX-based operating system and window system for Sun SPARC computers, formerly called SunOS. It includes Open Look and Motif GUIs, OpenWindows (the Sun version of X Windows), DOS and Windows emulation, and ONC networking, and is often used for server operating systems.

spare. A VTSS device physically located in the VTSS but not logically associated with an array. Spares are used to automatically reconstruct and logically replace failed devices.

spares partition. A partition state for extra (spare) VTSS disk array devices that are not used to store user data, nor included in a redundancy group, but that are available for automatic reconstruction of failed devices in redundancy groups. Contrast with media acceptance test partition, production partition, unavailable partition.

SSA. Serial Storage Architecture.

SSID. Subsystem identifier.

storage cluster. A VTSS functional partition that exists on a cluster motherboard, comprised of a multipath storage director, shared memory, and a support facility.

storage path. Also called a control region. Hardware within a controller that transfers data between the channels and disk storage devices. See multipath storage director.

support facility. VTSS functionality provided by ISP cards and support facility software that enables human interface with a VTSS for monitoring, communication, and testing.

synchronous. (1) Synchronized by a common timing signal. (2) Occurring with a regular or predictable time relationship. Synchronous transmissions send strings of data characters at regular intervals without the need for start and stop bits required for asynchronous transmissions, making them faster than asynchronous transmissions. Contrast with asynchronous.

system engineer (SE). A person who works with customers and marketing representatives to provide system solutions to customer needs and requirements.

T

tape drive.An electromagnetic mechanical device that provides physical data storage on magnetic tape media.

TB. See terabyte.

terabyte (TB). A unit of data capacity equal to 1000 gigabytes or 1,000,000 megabytes.

TMS. Tape Management System.

track. A channel where information is stored on magnetic or optical media. On magnetic disk media, tracks are defined in concentric rings. A combination of two or more sectors on a single disk media track makes a cluster or block, the minimum unit used to store information. On magnetic tape media, tracks run parallel to the length of the tape, or diagonally for helical scan tracks.

tray. A part of the physical location designator for each FRU in a unit. See unit.tray.slot.

TUV. Technischer Ueberwachungsverein (TUV). A German regulatory association.

U

UL. Underwriters Laboratory. A U.S. non-government lab that certifies electrical product safety.

unavailable partition. In VSM, a partition state of VTSS disk devices that are unavailable for storage of user data because the devices are not installed or have failed. Contrast with media acceptance test partition, production partition, spares partition.

unidirectional. In only one direction; referring to a data channel that only transmits one way.

uninstall. To remove installed software or hardware from a system and restore modifications made to files.

unit. A part of the physical location designator for each FRU in a unit. See unit.tray.slot.

unit.tray.slot (U.T.S). In VTSS, an abbreviated label that designates the precise physical location of a FRU.

UNIX. A multi-user, multitasking operating system written in C programming language and used on mainframes and workstations. There are multiple versions of Unix for use on different platforms. See also AIX, Linux.

upgrade. A nondisruptive addition of function or capacity to a VTSS. Contrast with conversion.

upload. To transmit files or data from one storage device or computer to another. Contrast with download.

UPS. Uninterruptible Power Supply. A device that supplies auxiliary power to a system to ensure continuity of operation in case the primary power supply (typically provided by a local utility company) is interrupted. Having a UPS as a backup power source allows time to save files and shut down systems in an orderly manner as needed, thereby avoiding the possible data loss that can result from a rapid and unanticipated loss of power.

URL. Uniform Resource Locator, a.k.a. Internet address or Web address.The standardized addressing or naming system used for locating web sites over the Internet.

user programming interface. In VTSS, a software interface between a user application program and ExPR.

UTC. Universal Time Coordinated, a.k.a. Greenwich Mean Time (GMT). The mean solar time of the meridian of Greenwich, England, used as the basis for calculating standard time throughout the world.

U.T.S. See unit.tray.slot.

V

VAC. Volts AC.

VCF*n*. Iceberg Channel FICON card.

VCU. See Virtual Control Unit.

VDE. Verband Deutscher Elektrotechniker. The German counterpart of Underwriters Laboratory (UL).

VIP. Virtual Initialization Program. In VSM, a proprietary software program contained on a floppy disk that enables the installation of approved system release level (SRL) microcode.

virtual address. A memory location in a system that uses virtual memory; when an application program needs the data at that location, it is paged in and accessed by means of an address in physical memory.

virtual control unit. In VSM, a software image that logically presents itself as a physical control unit. Each virtual control unit appears to be an independent physical control unit, although all virtual control units common to a single physical control unit share the same facilities and physical paths. VSM-VTSS presents up to 16 virtual control unit images to 1 to 28 host systems.

virtualization. Software capability in a storage subsystem that presents the storage capacity of multiple physical devices to a host operating system as a single 'virtual' storage device, enabling the host to use that storage more efficiently.

VM. Virtual machine. (1) A computer or storage system that does not exist as a separate physical device, but is instead simulated by another computer or system. (2) A virtual data processing system in which multiple operating systems and programs can be run by a computer at the same time. Each user appears to have an independent computer with its own input and output devices.

VSM. Virtual Storage Manager. A storage system developed by Sun StorageTek that virtualizes tape volumes and transports in a disk buffer to improve capacity-utilization rates of tape media and tape transports, and to improve data retrieval speeds. VSM hardware includes VTSS(s) and RTDs; VSM software includes: VTCS and VTSS microcode. By providing an image of a single, consolidated pool of tape storage to a host, VSM provides performance and data-management advantages over physical tape products, without requiring application changes.

VSMAT. Virtual Storage Manager Administration Tool.

VSMRL. Virtual Storage Manager Remote Library.

VTCS. Virtual Tape Control System. In VSM, primary host software that controls activity and coordinates operations between the host operating system and the VTSSs, VTVs, RTDs, and MVCs, as represented in front-end tape drives or libraries and back-end disk arrays. VTCS software operates in the same address space as the HSC, and communicates closely with it.

VTD. Virtual Tape Drive. A transport in a VTSS that emulates a physical 3490E tape drive to a MVS system. Data that are 'written' to a VTD actually are written to the disk buffer (VTSS). A VTSS has 64 VTDs that perform virtual mounts of VTVs.

VTSS. Virtual Tape Storage Subsystem. In VSM, a back-end disk array storage device (buffer) containing virtual tape volumes and transports. VTSS is a RAID 6+ hardware device with microcode that enables emulation of 256 transports. The RAID device can read and write 'tape' data from/to disk, and can read and write the data from/to a RTD. Using data compression algorithms and other proprietary techniques, a VTSS presents its physical storage capacity as a much larger pool of 'virtual' capacity (typically, a 4:1 ratio) to a tape storage device or host.

volatile memory. A repository that does not retain data when AC power is turned off. In VTSS, volatile memory temporarily stores data being sent from back-end disk arrays to a host. Contrast with nonvolatile storage.

VOLSER. VOLume SERial (number). A six-character alphanumeric name that identifies a disk volume to a host system.

volume. See functional volume.

VTOC. Volume table of contents. A table on a disk volume that describes each data set on the volume.

VTV. Virtual Tape Volume. A 'tape cartridge' image whose volume number is known to an MVS catalog and TMS (Tape Management System) as a tape data set.

W

warm boot. Also called warm start. The act of restarting a computer, storage system, etc. Without turning the power off. Contrast with cold boot.

work mat. A nonpermanent, removable island of material, typically made of conductive or dissipative layers or composite materials, which is placed over a floor to drain static charges that are generated by groundable personnel or objects. See also wrist strap.

wrist strap. A device consisting of a grounding cord and conductive band that connects to a grounding outlet on a machine and makes electrical contact with the wearer's skin to drain static charges from the wearer to earth ground. See also work mat.

write. To make record data permanently or transitorily in a storage device or on a data medium.

write hit. An instance where data to be updated by a write operation is in cache. Contrast with read hit.

write miss. An instance where data to be updated by a write operation is not in cache. Contrast with read miss.

write operation. An output operation that sends a processed record to an output device or output file.

write-protect tab. A sliding device placed over a write-protect notch on a floppy disk to prevent recording of data over existing pre-recorded data on the disk.

WWTS. Worldwide Technical Support.

X

x-axis. The horizontal axis, representing width, in a two-dimensional (x-y) or three-dimensional (x-y-z) coordinate system. Contrast with y-axis, z-axis.

XOR. Exclusive OR. A method used to calculate parity information in RAID configurations.

XSA. Extended Storage Architecture.

Y

y-axis. The vertical axis, representing height, in a two-dimensional (x-y) or three-dimensional (x-y-z) coordinate system. Contrast with x-axis, z-axis.

Z

z-axis. The third dimension, representing depth, in a three-dimensional (x-y-z) coordinate system. Contrast with x-axis, y-axis.

Forms and Reference Notes

G

This appendix provides electronic forms and worksheets for recording information related to installation and servicing tasks and activities for a VSM5-VTSS at a specific customer location, including:

- Customer site details
- Customer personnel contact details
- Sun StorageTek and QSP[1] personnel contact details
- System software reference information
- System hardware installation and servicing reference notes

Note: Forms in this appendix are designed for electronic text entry using a service laptop or desktop PC, and can be revised and printed as needed.

Note: Forms and worksheets containing much of the information listed above should already be filled out for this customer account and site in the VSM5-VTSS *Planning and System Assurance Guide*, and can be copied from that PDF file into the same forms in this appendix as needed.

1. Qualified Service Provider; a third-party contractor certified and authorized b ySun to work with systems and equipment described in this guide.

Account Information

> [electronic form] <

Account (Company) Name	
Site Number	
Street Address	
City / State / Province / Region	
Zip or Postal Code / Country	
Other Account Details	

Host System Configuration Information

> [electronic form] <

Host Name	
Host Address	
Other Host Configuration Details	

VTSS Configuration Information

> [electronic form] <

VTSS Name	
License Key	
Time Zone Setting	
Other VTSS Configuration Details	

Customer Personnel Contacts

> [electronic form] <

Account

Data Center Manager (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Network Administrator (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Site Engineer (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Facilities Manager (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Data Center Operator (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Delivery Dock Manager (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Other Contact (name / job role)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Other Contact (name / job role)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Other Contact (name / job role)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	

Sun StorageTek / QSP Personnel Contacts

> [electronic form] <

Account ______________________

Account Representative (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
System Engineer (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
System Support Specialist (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Technical Support Specialist (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Professional Services Mgr. (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Customer Service Manager (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Customer Service Engineer (name)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Other Contact (name / job role)	
Phone Numbers (office / cell)	
E-Mail Address(es)	
Other Contact Information	
Other Contact (name / job role)	
Phone Numbers office / cell)	
E-Mail Address(es)	
Other Contact Information	

Software Information

> [electronic form] <

Account

Use this electronic form to record key information (product names, versions, release levels, serial numbers, etc.) for all software[1] used with this VSM solution configuration, as a quick reference when reporting problems, validating service entitlements, etc.

1. Including: VSM application software (VTCS, NCS, HSC), library software (ACSLS, Library Station), and MVS host system software.

Hardware Information – Tape Devices

> [electronic form] <

Account

Use this electronic form to record key information (product names, model numbers, serial numbers, etc.) for all tape device hardware[1] used with this VSM solution configuration, as a quick reference when reporting problems, validating service entitlements, etc.

NOTE:
To ensure accurate notations, identify tape devices by product name and type (e.g., 9940B tape drive, SL8500 tape library, etc.) and by the unique designation used for the device within the VSM solution configuration (Tape Drive 1, Tape Library 1, etc.).

1. May include: T9840B-C, T9940B, and T10000 tape drives; Timberline 9490 and 9490-M44 cartridge subsystems; SL8500, Nearline 4410, PowderHorn 9310, WolfCreek 9360, and Timberwolf 9740 tape libraries.

Hardware Information – Switches / Routers

> [electronic form] <

Account

Use this electronic form to record key information (product names, model numbers, serial numbers, etc.) for all external switches, routers, or other hardware used with this VSM solution configuration, as a quick reference when reporting problems, validating service entitlements, etc.

Hardware Information – SDP and Modem Devices

> [electronic form] <

Account

Use this electronic form to record key information (product names, model numbers, serial numbers, etc.) for all Service Delivery Platform (SDP) and remote service modem hardware used with this VSM solution configuration, as a quick reference when reporting problems, validating service entitlements, etc.

Notes / Additional Information

> [electronic form] <

Account

Notes / Additional Information

> [electronic form] <

Account

Notes / Additional Information

> [electronic form] <

Account

Notes / Additional Information

> [electronic form] <

Account ______________________

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