IBM TotalStorage SAN Volume Controller

IBM

Service Guide

Version 2.1.0

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Fourth Edition (February 2005)

Before using this information and the product it supports, read the information in "Safety and environmental notices" and "Notices."

Contents

Figures

Tables

About this guide

This guide describes how to service the IBM® TotalStorage™ SAN Volume Controller.

The chapters that follow introduce you to the SAN Volume Controller and the uninterruptible power supply (UPS) and describe how you can install and maintain the software for the SAN Volume Controller. The vital product data (VPD) topic provides information about the VPD that uniquely defines each hardware and microcode element that is in the SAN Volume Controller.

You can also learn how to configure and check the status of one SAN Volume Controller or a cluster of SAN Volume Controllers through the front panel, as well as to diagnose problems using the SAN Volume Controller, the UPS, and the master console.

The maintenance analysis procedures (MAPs) can help you to analyze failures that occur in a SAN Volume Controller. With the MAPs, you can isolate the field replaceable units (FRUs) of the SAN Volume Controller that fails. Begin all problem determination and repair procedures from MAP 5000: Start.

You are also provided with step-by-step procedures to remove and replace parts for the SAN Volume Controller and the UPS. The parts are outlined for you in our parts catalog.

Related tasks

"MAP 5000: Start" on page 130
MAP 5000: Start is the entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

Related reference

Chapter 1, "Overview of the SAN Volume Controller," on page 1
The IBM TotalStorage SAN Volume Controller is a rack-mounted unit that you can install in a standard Electrical Industries Association (EIA) 19-inch rack.

Chapter 2, "Overview of the uninterruptible power supply," on page 29
External uninterruptible power supply (UPS) units provide power to the SAN Volume Controllers.

Chapter 3, "Installing and maintaining the software for the SAN Volume Controller," on page 43
The software for the SAN Volume Controller is preinstalled on all nodes.

Chapter 4, "Introducing the vital product data," on page 49
Vital product data (VPD) is information that uniquely defines each element in the SAN Volume Controller.

Chapter 5, "Using the front panel of the SAN Volume Controller," on page 55
The front panel of the SAN Volume Controller displays indicators and switches that are useful when servicing your SAN Volume Controller.

Chapter 6, "Diagnosing problems with the SAN Volume Controller, the uninterruptible power supply, and the master console," on page 67
You can diagnose problems with SAN Volume Controller, the uninterruptible power supply, and the master console using either the command-line interface (CLI) or the SAN Volume Controller Console.

Chapter 7, "Maintenance analysis procedures (MAPs)," on page 129
The maintenance analysis procedures (MAPs) tell you how to analyze a failure that occurs in a SAN Volume Controller.

Chapter 8, "Removing and replacing parts," on page 157
You can remove and replace field replaceable units (FRUs) from the SAN
Volume Controller and uninterruptible power supply.

"Accessibility" on page 219
Accessibility features help a user who has a physical disability, such as
restricted mobility or limited vision, to use software products successfully.

Related information

Appendix A, "Parts catalog," on page 233
Part numbers for the different parts and FRUs of the SAN Volume Controller
and the uninterruptible power supply are available.

Who should use this guide

This guide should be read by the IBM Customer Engineer who is responsible for
the service of the IBM® TotalStorage™ SAN Volume Controller, the uninterruptible
power supply, and the master console.

Summary of changes

This summary of changes describes new functions that have been added to this
release.

This document contains terminology, maintenance, and editorial changes. Technical
changes or additions to the text and illustrations are indicated by a vertical line to
the left of the change.

Summary of changes for SC26-7542-03 SAN Volume Controller Service Guide Release 2.1.0

Listed below are changes to this guide since the previous edition (SC26-7542-02).

New information

This edition includes the following new information:

- A new appendix was added which explains how to enable WebSphere and the
  Common Information Model (CIM) logging.
- The SAN Volume Controller can be used with a Powerware 5115 uninterruptible
  power supply (UPS). This release includes documentation on the UPS 5115 as
  well as the UPS 5125.

  Note: If text is referring to the "UPS" or to the "uninterruptible power supply,"
  then it is referring to a generic UPS and can be referring to either UPS.
  When the UPS is referred to as the "UPS 5115" or the "UPS 5125," then
  the specific UPS is designated.

  – The following new topics were added for the UPS 5115:
    - Power-on indicator
    - On/off button
    - Overload indicator
    - On-battery indicator
    - Service indicator
    - Load segment 1 indicator
    - Load segment 2 indicator

- Hardware for the uninterruptible power supply 5115
- MAP 5200: Uninterruptible power supply 5115
- MAP 5300: Uninterruptible power supply 5115 repair verification
- Removing the power cable from the uninterruptible power supply 5115
- Removing the uninterruptible power supply 5115
- Removing the uninterruptible power supply 5115 electronics
- Removing the uninterruptible power supply 5115 battery
- Replacing the uninterruptible power supply 5115
- Installing the support rails for the uninterruptible power supply 5115
- Removing the support rails for the uninterruptible power supply 5115
- Assembly 2: Uninterruptible power supply 5115
- New error codes were added to the cluster error codes:
  - 1136
  - 1141
  - 1146
  - 1151
  - 1161
  - 1166
  - 1171
  - 1181
  - 1186
  - 1191
- New error codes were added to the boot error codes:
  - 181
  - 186
  - 191
  - 196
  - 206
  - 211
  - 216
  - 221
  - 226
  - 231
  - 236
  - 241

Changed information

This section lists the updates that were made in this document.
- Synchronous peer-to-peer remote copy (PPRC) is now known as IBM TotalStorage Metro Mirror for SAN Volume Controller (Metro Mirror).
- The "Default menu sequence" graphic in the "SAN Volume Controller menu options" topic was altered to include Recover cluster? as a secondary option.

Removed Information

This section lists the topics that were removed from this book.

The following topics were removed and placed in the *IBM TotalStorage Master Console Installation and User's Guide*:

- Using the SAN Volume Controller Console application on the master console
- Viewing the error log using the SAN Volume Controller Console application on the master console
- Starting maintenance using the SAN Volume Controller Console application on the master console
- Viewing the node status using the SAN Volume Controller Console application on the master console
- Deleting a node using the SAN Volume Controller Console application on the master console
- Adding a node to a cluster using the SAN Volume Controller Console application on the master console
- Viewing the vdisk status
- Viewing the mdisk status
- Viewing the vital product data
- Listing and saving dump data
- Marking errors as fixed
- Validating the truststore certificate expiration
- Accessing the command-line interface from the master console
- Preparing your master console environment
- Maintaining the master console
- Performing software recovery
- Recovering from a master console disk drive failure
- Replacing the fibre-channel cable or GBICs
- Viewing error information on the master console

Summary of changes for SC26-7542-02 SAN Volume Controller Service Guide Release 1.2.1

Listed below are changes to this guide since the previous edition (SC26-7542-01).

New information

This edition includes the following new information:
- Added the following new topic:
  - Validating the truststore certificate expiration

Changed information

This section lists the updates that were made in this document.
- Support for 4-node configurations has been updated to support 8-node.
- Increased the number of supported VDisks per I/O group to 1024.
- Increased the number of supported VDisks per cluster to 4096.

SAN Volume Controller library and related publications

A list of other publications that are related to this product are provided to you for your reference.

The tables in this section list and describe the following publications:
- The publications that make up the library for the IBM TotalStorage SAN Volume Controller
- Other IBM publications that relate to the SAN Volume Controller

SAN Volume Controller library

The following table lists and describes the publications that make up the SAN Volume Controller library. Unless otherwise noted, these publications are available in Adobe portable document format (PDF) on a compact disc (CD) that comes with the SAN Volume Controller. If you need additional copies of this CD, the order number is SK2T-8811. These publications are also available as PDF files from the following Web site:

http://www-1.ibm.com/servers/storage/support/virtual/2145.html

Title	Description	Order number
IBM TotalStorage SAN Volume Controller: CIM Agent Developer's Reference	This reference guide describes the objects and classes in a Common Information Model (CIM) environment.	SC26-7590
IBM TotalStorage SAN Volume Controller: Command-Line Interface User's Guide	This guide describes the commands that you can use from the SAN Volume Controller command-line interface (CLI).	SC26-7544
IBM TotalStorage SAN Volume Controller: Configuration Guide	This guide provides guidelines for configuring your SAN Volume Controller.	SC26-7543
IBM TotalStorage SAN Volume Controller: Host Attachment Guide	This guide provides guidelines for attaching the SAN Volume Controller to your host system.	SC26-7575
IBM TotalStorage SAN Volume Controller: Installation Guide	This guide includes the instructions the service representative uses to install the SAN Volume Controller.	SC26-7541
IBM TotalStorage SAN Volume Controller: Planning Guide	This guide introduces the SAN Volume Controller and lists the features you can order. It also provides guidelines for planning the installation and configuration of the SAN Volume Controller.	GA22-1052

Title	Description	Order number
IBM TotalStorage SAN Volume Controller: Service Guide	This guide includes the instructions the service representative uses to service the SAN Volume Controller.	SC26-7542
IBM TotalStorage SAN Volume Controller: Translated Safety Notices	This guide contains the danger and caution notices for the SAN Volume Controller. The notices are shown in English and in numerous other languages.	SC26-7577
IBM TotalStorage Master Console Installation and User's Guide	This guide includes the instructions on how to install and use the SAN Volume Controller Console	

Other IBM publications

The following table lists and describes other IBM publications that contain additional information related to the SAN Volume Controller.

Title	Description	Order number
IBM TotalStorage Enterprise Storage Server, IBM TotalStorage SAN Volume Controller, IBM TotalStorage SAN Volume Controller for Cisco MDS 9000, IBM TotalStorage Multipath Subsystem Device Driver: User's Guide	This guide describes the IBM TotalStorage Multipath Subsystem Device Driver Version 1.5 for TotalStorage Products and how to use it with the SAN Volume Controller. This publication is referred to as the *IBM TotalStorage Multipath Subsystem Device Driver: User's Guide*.	SC26-7608

Related reference

"How to order IBM publications" on page xix
The publications center is a worldwide central repository for IBM product publications and marketing material.

Related information

"How to send your comments" on page xix

Related Web sites

The following Web sites provide information about the SAN Volume Controller or related products or technologies.

Type of information	Web site
SAN Volume Controller support	http://www-1.ibm.com/servers/storage/support/virtual/2145.html
Technical support for IBM storage products	http://www.ibm.com/storage/support/

How to order IBM publications

The publications center is a worldwide central repository for IBM product publications and marketing material.

The IBM publications center

The IBM publications center offers customized search functions to help you find the publications that you need. Some publications are available for you to view or download free of charge. You can also order publications. The publications center displays prices in your local currency. You can access the IBM publications center through the following Web site:

www.ibm.com/shop/publications/order/

Publications notification system

The IBM publications center Web site offers you a notification system for IBM publications. Register and you can create your own profile of publications that interest you. The publications notification system sends you a daily e-mail that contains information about new or revised publications that are based on your profile.

If you want to subscribe, you can access the publications notification system from the IBM publications center at the following Web site:

www.ibm.com/shop/publications/order/

Related reference

"SAN Volume Controller library and related publications" on page xvii
A list of other publications that are related to this product are provided to you for your reference.

How to send your comments

Your feedback is important to help us provide the highest quality information. If you have any comments about this book or any other documentation, you can submit them in one of the following ways:

- e-mail

  Submit your comments electronically to the following e-mail address:

  starpubs@us.ibm.com

  Be sure to include the name and order number of the book and, if applicable, the specific location of the text you are commenting on, such as a page number or table number.

- Mail

  Fill out the Readers' Comments form (RCF) at the back of this book. If the RCF has been removed, you can address your comments to:

  International Business Machines Corporation
  RCF Processing Department
  Department 61C
  9032 South Rita Road
  Tucson, Arizona 85775-4401
  U.S.A.

  Related reference

"SAN Volume Controller library and related publications" on page xvii
A list of other publications that are related to this product are provided to you for your reference.

Safety and environmental notices

Safety should be a concern for anyone using the SAN Volume Controller or an uninterruptible power supply (UPS).

This topic describes the information about the following topics:
- Definition of the danger, caution and attention notices used in this guide
- Danger notices for the UPS
- Danger notices for the SAN Volume Controller
- Caution notices for the UPS
- Caution notices for the SAN Volume Controller
- Safety inspection checklist for the SAN Volume Controller
- Checking the grounding of the SAN Volume Controller and UPS
- Safety inspection checklist for the UPS
- Labels for the outside of the UPS
- Labels for the battery unit of the UPS
- Labels for the SAN Volume Controller
- Environmental notices and statements
- Handling static sensitive devices

Definitions of notices

Ensure that you understand the typographic conventions that are used in this publication to indicate special notices.

The following notices are used throughout this library to convey the following specific meanings:

Note: These notices provide important tips, guidance, or advice.

Attention: These notices indicate possible damage to programs, devices, or data. An attention notice appears before the instruction or situation in which damage could occur.

CAUTION:
These notices indicate situations that can be potentially hazardous to you. A caution notice precedes the description of a potentially hazardous procedural step or situation.

DANGER

> **These notices indicate situations that can be potentially lethal or extremely hazardous to you. A danger notice precedes the description of a potentially lethal or extremely hazardous procedural step or situation.**

Danger notices for the uninterruptible power supply

Ensure that you understand the danger notices for the uninterruptible power supply (UPS).

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice. For the translation of the danger, caution, attention notices, and the translation of the safety labels, see the *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*.

DANGER

> **An electrical outlet that is not correctly wired could place a hazardous voltage on the metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (1)**

DANGER

> **To prevent possible electrical shock during an electrical storm, do not connect or disconnect cables or station protectors for communications lines, display stations, printers, or telephones. (2)**

DANGER

> **Do not attempt to open the covers of the power supply. Power supplies are not serviceable and are replaced as a unit. (3)**

DANGER

> **To prevent a possible electrical shock when installing the device, ensure that the power cord for that device is unplugged before installing signal cables. (4)**

DANGER

> **The UPS contains lethal voltages. All repairs and service should be performed by an authorized service support representative only. There are no user serviceable parts inside the UPS. (5)**

Related reference

"Caution notices for the uninterruptible power supply" on page xxiii
Ensure that you understand the caution notices for the uninterruptible power supply (UPS).

Danger notices for the SAN Volume Controller

Ensure that you are familiar with the danger notices on the SAN Volume Controller.

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice. For the translation of the danger, caution, attention notices, and the translation of the safety labels, see the *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*.

DANGER

> Do not try to open the covers of the power supply assembly (32).

Caution notices for the uninterruptible power supply

Ensure that you understand the caution notices for the uninterruptible power supply (UPS).

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice. For the translation of the danger, caution, attention notices, and the translation of the safety labels, see the *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*.

CAUTION:
The UPS contains its own energy source (batteries). The output receptacles might carry live voltage even when the UPS is not connected to an AC supply. (11)

CAUTION:
Do not remove or unplug the input cord when the UPS is turned on. This removes the safety ground from the UPS and the equipment connected to the UPS. (12)

CAUTION:
To reduce the risk of fire or electric shock, install the UPS in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% maximum). (13)

CAUTION:
To comply with international standards and wiring regulations, the total equipment connected to the output of the UPS 5125 must not have an earth leakage current greater than 2.5 milliamperes and for the UPS 5115 it must not be greater than 3.5 milliamperes. (14)

CAUTION:
To avoid any hazard from the rack tipping forward when boxes are installed, observe all safety precautions for the rack into which you are installing the device.

The UPS 5125 weighs 39 kg (86 lb) with the electronics assembly and the battery assembly installed:
- **Do not attempt to lift the UPS 5125 by yourself. Ask another service representative for assistance.**
- **Remove the battery assembly from the UPS 5125 before removing the UPS from the shipping carton.**
- **Do not attempt to install the UPS 5125 into the rack unless the electronics assembly and the battery assembly have been removed.**

CAUTION:
The electronics assembly for the UPS 5125 weighs 6.4 kg (14 lb). Take care when you remove it from the UPS 5125. (16)

CAUTION:
The UPS 5125 battery unit weighs 21 kg (45 lb). Do not attempt to lift the UPS 5125 battery unit by yourself. Ask another service representative for aid. (18)

CAUTION:
Do not dispose of the battery in a fire. The battery might explode. Correct disposal of the battery is required. Refer to your local regulations for disposal requirements. (20)

Related reference

"Danger notices for the uninterruptible power supply" on page xxi
Ensure that you understand the danger notices for the uninterruptible power supply (UPS).

Caution notices for the SAN Volume Controller

Ensure that you understand the caution notices for the SAN Volume Controller.

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice. For the translation of the danger, caution, attention notices, and the translation of the safety labels, see the *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*.

CAUTION:
This product contains a registered/certified class 1 laser that complies with the FDA radiation performance standards and is in compliance with the IEC/EN 60825-1 standards. (21)

CAUTION:
A lithium battery can cause fire, explosion, or a severe burn. Do not recharge, disassemble, heat above 100°C (212°F), solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace only with the part number specified for your system. Use of another battery might present a risk of fire or explosion. The battery connector is polarized; do not attempt to reverse the polarity. Dispose of the battery according to local regulations. (22)

Related reference

"Danger notices for the SAN Volume Controller" on page xxii
Ensure that you are familiar with the danger notices on the SAN Volume Controller.

Inspecting the SAN Volume Controller for unsafe conditions

Be cautious of potential safety hazards that are not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

Consider the following conditions and the safety hazards they present:

Electrical hazards (especially primary power)
Primary voltage on the frame can cause serious or lethal electrical shock.

Explosive hazards
A bulging capacitor can cause serious injury.

Mechanical hazards
> Loose or missing items (for example, nuts and screws) can cause serious injury.

Using the following inspection checklist as a guide, inspect the IBM® TotalStorage® SAN Volume Controller for unsafe conditions. If necessary, see any suitable safety publications.

1. Turn off the SAN Volume Controller.
2. Check the frame for damage (loose, broken, or sharp edges).
3. Check the power cables and ensure the following conditions:
   a. The third-wire ground connector is in good condition. Use a meter to check that the third-wire ground continuity is 0.1 ohm or less between the external ground pin and the frame ground.
   b. The insulation is not worn or damaged.
4. Check for any obvious nonstandard changes. Use good judgment about the safety of any such changes.
5. Check inside the SAN Volume Controller for any obvious unsafe conditions, such as metal particles, water or other fluids, or marks of overheating, fire, or smoke damage.
6. Check for worn, damaged, or pinched cables.
7. Ensure that the voltage that is specified on the product-information label matches the specified voltage of the electrical power outlet. If necessary, verify the voltage.
8. Inspect the power supply assemblies and check that the fasteners (screws or rivets) in the cover of the power-supply unit have not been removed or disturbed.
9. Before connecting the SAN Volume Controller to the SAN, check the grounding.

Related tasks

"Checking the grounding of the SAN Volume Controller and the uninterruptible power supply 5115" on page xxvi
Ensure that you understand how to check the grounding.

"Checking the grounding of the SAN Volume Controller and the uninterruptible power supply 5125" on page xxviii
Ensure that you understand how to check the grounding.

"Removing the power cable from the SAN Volume Controller" on page 157
If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

External machine checks

Ensure that you perform an external machine check on the SAN Volume Controller.

Perform the following external machine checks before you install the SAN Volume Controller:

1. Verify that all external covers are present and are not damaged.
2. Ensure that all latches and hinges are in the correct operating condition.
3. If the SAN Volume Controller is not installed in a rack cabinet, check for loose or broken feet.
4. Check the power cord for damage.
5. Check the external signal cable for damage.

6. Check the cover for sharp edges, damage, or alterations that expose the internal parts of the device.
7. Correct any problems that you find.

Related tasks

"Inspecting the SAN Volume Controller for unsafe conditions" on page xxiv
Be cautious of potential safety hazards that are not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

Internal machine checks

Ensure that you perform an internal machine check before installing the SAN Volume Controller.

Perform the following internal machine checks before you install the SAN Volume Controller:

1. Check for any non-IBM changes that might have been made to the machine. If any are present, obtain the ″Non-IBM Alteration Attachment Survey″ form number R009, from the IBM branch office. Complete the form and return it to the branch office.
2. Check the condition of the inside of the machine for any metal or other contaminants, or any indications of water, other fluid, fire, or smoke damage.
3. Check for any obvious mechanical problems, such as loose components.
4. Check any exposed cables and connectors for wear, cracks, or pinching.

Related tasks

"Inspecting the SAN Volume Controller for unsafe conditions" on page xxiv
Be cautious of potential safety hazards that are not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

"External machine checks" on page xxv
Ensure that you perform an external machine check on the SAN Volume Controller.

Checking the grounding of the SAN Volume Controller and the uninterruptible power supply 5115

Ensure that you understand how to check the grounding.

Figure 1 on page xxvii shows the connectors for the SAN Volume Controller and the uninterruptible power supply (UPS) 5115.

Perform the following steps to ensure that the SAN Volume Controller is properly grounded:

1. Ensure that all power is removed.

2. Ensure that the power cable **1** is plugged in to the UPS 5115's load segment receptacle. Also ensure that the other end of the power cable is connected from the UPS 5115 to the distribution point in the rack. See Figure 1 on page xxvii.
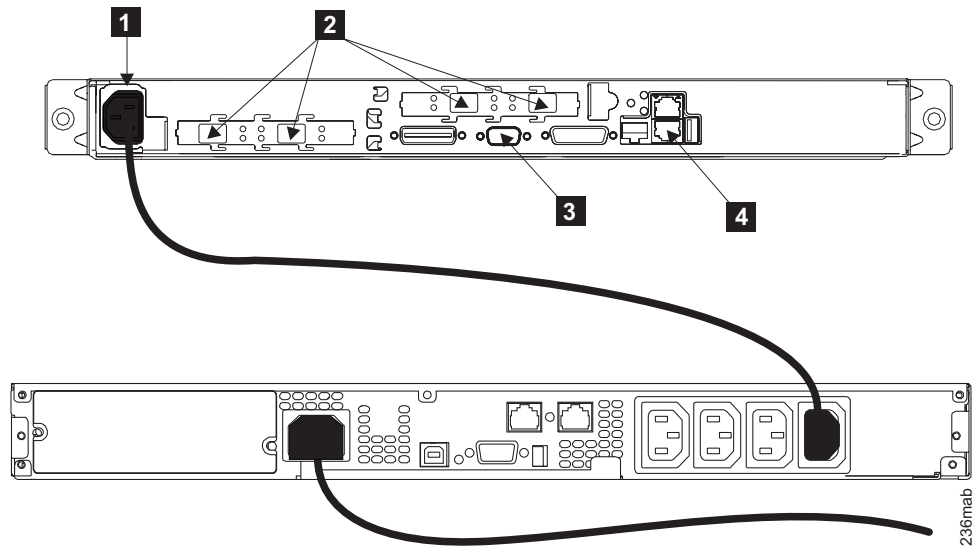
Figure 1. Power cable and signal sockets

> **Attention:** Some electrical circuits could be damaged if the external signal cables are present at the SAN Volume Controller while the grounding check is being done.

3. Ensure that no external cables are present at connectors **2** and **3** .

4. Disconnect and remove the Ethernet cable from connector **4** .

5. Follow your local procedures and check the grounding of the SAN Volume Controller. Any test equipment must be connected to the frame of the SAN Volume Controller.

   If the grounding is correct, go no further with these instructions.

   If the grounding is *not* correct, unplug the power cable **1** from the UPS 5115 in the SAN Volume Controller.

6. Check for continuity between the frame of the SAN Volume Controller and the ground pin (**1** in Figure 2) of each main power connector.
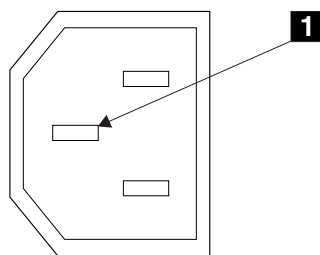
Figure 2. Ground pin

7. If the UPS 5115 has no continuity, exchange it for a new one. Then perform a complete grounding check again.

   If the UPS 5115 has continuity, you might have a problem with the power cable or with the grounding of the host system.

8. Check the power cable for continuity.

   If the power cable does not have continuity, exchange it for a new one, and then perform step 1 on page xxvi through step 5 again.

Checking the grounding of the SAN Volume Controller and the uninterruptible power supply 5125

Ensure that you understand how to check the grounding.

Figure 3 shows the connectors for the SAN Volume Controller and the uninterruptible power supply (UPS) 5125.

Perform the following steps to ensure that the SAN Volume Controller is properly grounded:

1. Ensure that all power is removed.
2. Ensure that the power cable is plugged in to the UPS 5125. Also ensure that the other end of the power cable is connected from the UPS 5125 to the distribution point in the rack. See Figure 3.
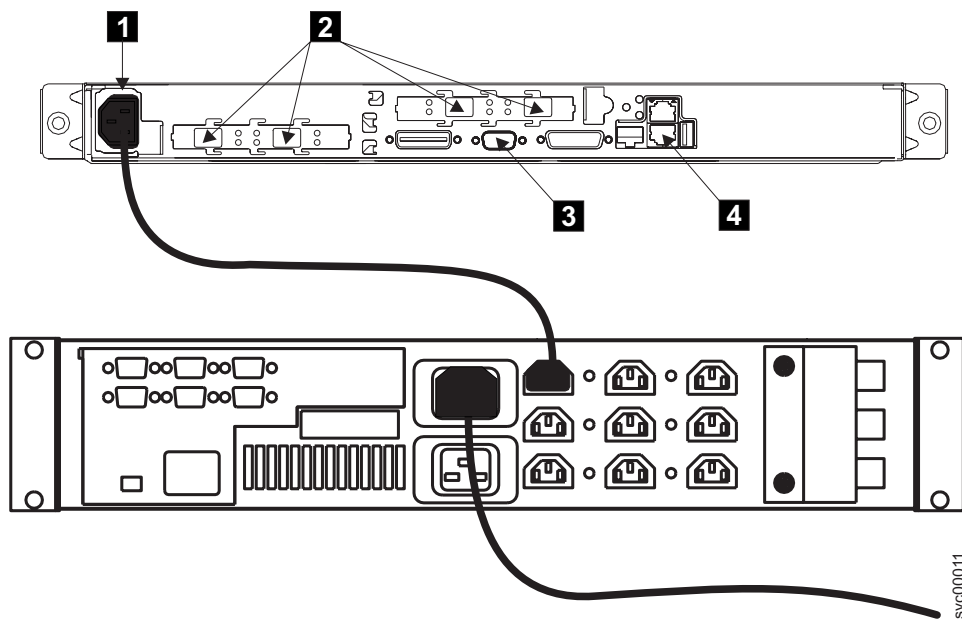
Figure 3. Power cable and signal sockets

> **Attention:** Some electrical circuits could be damaged if the external signal cables are present at the SAN Volume Controller while the grounding check is being done.

3. Ensure that no external cables are present at connectors **2** and **3** .
4. Disconnect and remove the Ethernet cable from connector **4** .
5. Follow your local procedures and check the grounding of the SAN Volume Controller. Any test equipment must be connected to the frame of the SAN Volume Controller.

   If the grounding is correct, go no further with these instructions.

   If the grounding is *not* correct, unplug the power cable **1** from the UPS 5125 in the SAN Volume Controller.
6. Check for continuity between the frame of the SAN Volume Controller and the ground pin (**1** in Figure 4 on page xxix) of each main power connector.
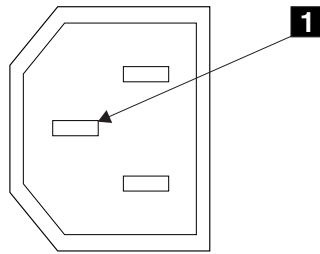
Figure 4. Ground pin

7. If the UPS 5125 has no continuity, exchange it for a new one. Then perform a complete grounding check again.

   If the UPS 5125 has continuity, you might have a problem with the power cable or with the grounding of the host system.

8. Check the power cable for continuity.

   If the power cable does not have continuity, exchange it for a new one, and then perform step 1 on page xxviii through step 5 on page xxviii again.

Inspecting the uninterruptible power supply for unsafe conditions

Ensure that you take the time to inspect the uninterruptible power supply (UPS) for unsafe conditions.

Consider the following conditions and the safety hazards they present:

Electrical hazards (especially primary power)
Primary voltage on the frame can cause serious or lethal electrical shock.

Explosive hazards
A bulging capacitor can cause serious injury.

Mechanical hazards
Loose or missing items (for example, nuts and screws) can cause serious injury.

Be cautious of potential safety hazards that are not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

Using the following inspection checklist as a guide, inspect the UPS for unsafe conditions. If necessary, see any suitable safety publications.

1. If any equipment has been damaged during the shipment, keep the shipping cartons and packing materials.
2. File a claim for shipping damage within fifteen days of receipt of the equipment.

Uninterruptible power supply requirements

Ensure that you comply with the uninterruptible power supplies (UPSs) requirements.

The following list describes requirements for the UPS 5125:

- Each UPS must be connected to a separate branch circuit.
- A UL listed 15 A circuit breaker must be installed in each branch circuit that supplies power to the UPS.

- The voltage supplied to the UPS must be 200–240 V single phase.
- The frequency supplied must be between 50 and 60 Hz.

The following list describes requirements for the UPS 5115:
- The voltage supplied to the UPS 5115 must be 220-240 V single phase.
- The frequency supplied must be between 50 and 60 Hz.

Note that the UPS 5115 has an integrated circuit breaker and does not have external protection.

Note: If the UPS is cascaded from another UPS, the source UPS must have at least 3 times the capacity per phase and the total harmonic distortion must be less than 5% with any single harmonic being less than 1%. The UPS also must have input voltage capture that has a slew rate faster than 3 Hz per second and 1 msec glitch rejection.

Emergency power-off event

The SAN Volume Controller and uninterruptible power supplies (UPSs) will occasionally undergo an emergency power-off (EPO) shutdown.

In the event of a room EPO shutdown, the UPS 5115 will automatically shut down within 5 minutes of the input power being removed. When the UPS 5125 detects a loss of input power, this is reported to the SAN Volume Controller which completes the process of shutting down the output from the UPS 5125 within 5 minutes.

Attention: If an EPO event occurs and the UPS 5125 is not connected to at least one operational SAN Volume Controller, you must unplug the output cables of the UPS 5125 to remove output power from the UPS.

Checking the safety labels on the SAN Volume Controller

Ensure that you check and understand the safety labels on the SAN Volume Controller.

The following steps describe how to check the labels on the SAN Volume Controller.

Perform the following label checks:
1. Agency/ratings label. See Figure 5.
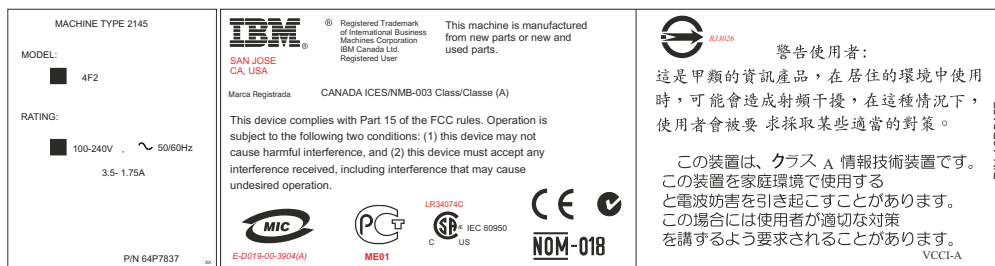
Figure 5. Agency/ratings label for the SAN Volume Controller

2. No user access label. See Figure 6 on page xxxi.

Figure 6. No user access label for the SAN Volume Controller

3. Class 1 laser label. See Figure 7.

 Class 1 Laser	This product contains a registered/certified Class I laser device that complies with the FDA radiation performance standards and is in compliance with the ICE/EN60825-1 standards.
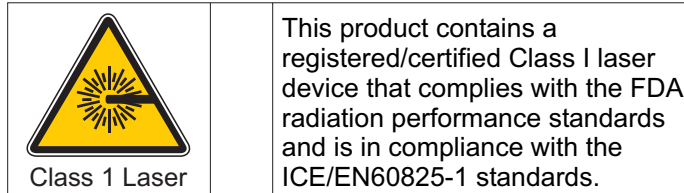
Figure 7. Class 1 laser label

Checking the labels on the outside of the uninterruptible power supply

You need to understand and check the labels on the outside of the uninterruptible power supply (UPS).

Checking the UPS 5115 labels

Perform the following safety label checks for the UPS 5115:

1. Agency label.

EC: E28808
IBM Model: 2145UPS-1U
P27H0683
SNYM1000YMDXXX[4.4]
Inputt~ :
  220/230/240V, 50/60Hz
  4.1/4/3.7A, 1 Ø
Output ~ :
  220/230/240V, 50/60Hz
  3.4/3.3/3.1A, 1 Ø
  750VA/520W

Made in China - U4604

c ⓊL US
LISTED
UPS
SC30
E12662

N 869

svc00047
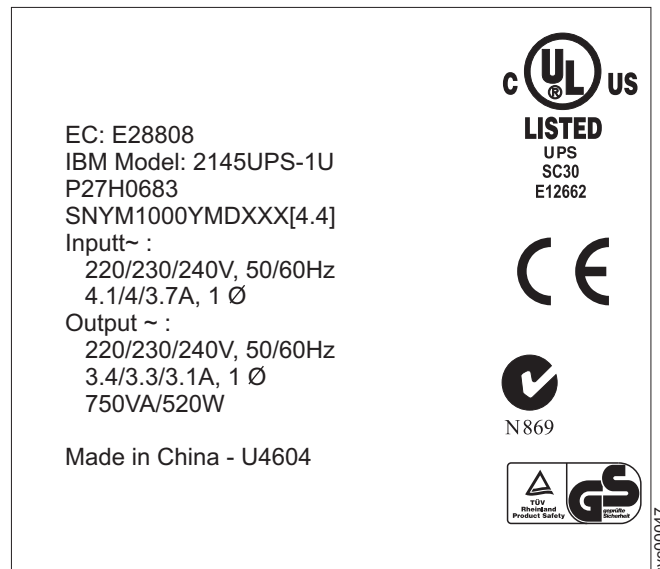
2. IT compatible label.

```
┌──────────────┐
│      IT      │
│  COMPATIBLE  │
└──────────────┘
```

3. Do not discard the UPS or the UPS batteries in the trash. The UPS may contain
    sealed, lead-acid batteries, which must be recycled.

Checking the UPS 5125 labels

Perform the following safety label checks for the UPS 5125:

1. Agency label.

EC: H63317
IBM Model: 2145UPS
P18P5864
SNYM1000YMDXXX [4.4]
Input ~ :
    200-240V, 50/60Hz
    16A MAX
Input $=\!\!=\!\!=$: DC 120V, 30A
Output ~ :
    200-240V, 50/60Hz
    15A MAX
    3000VA/2700W

    Assembled in Mexico - TWWYY [4.7]

2. Rear panel configuration. This label is installed on the cover of the power supply
    of the SAN Volume Controller.

3. Three-man lift.

32 – 55 kg (70.5 – 121.2 lbs.)

4. Weight label.

39 kg
86 lbs

5. IT compatible label.

THIS UNIT IS SUITABLE
FOR AN "IT-POWER
SYSTEM" CONNECTION
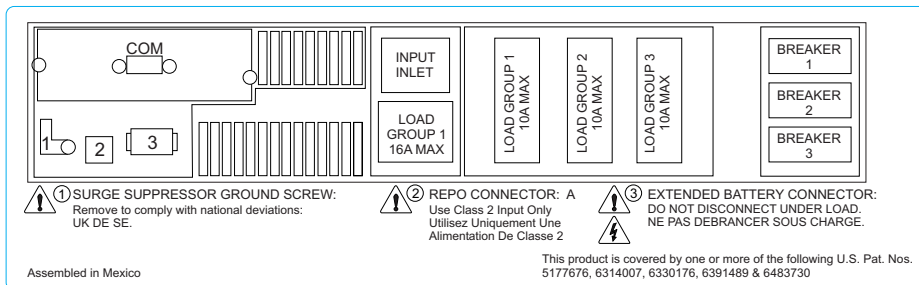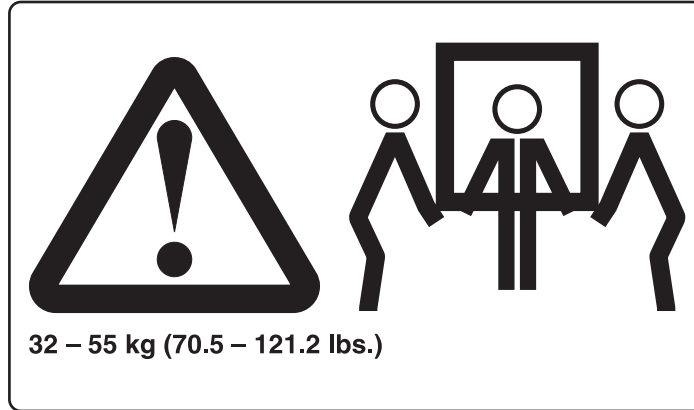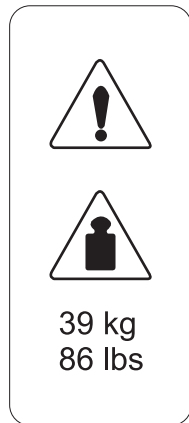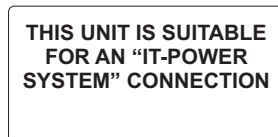
6. No user access label.

Checking the labels on the battery of the uninterruptible power supply

Ensure that you understand how to check the labels on the battery of the
uninterruptible power supply (UPS).

Checking the battery labels of the UPS 5115

Do not discard the UPS 5115 or the UPS 5115 batteries in the trash. The UPS may contain sealed, lead-acid batteries, which must be recycled.

Checking the battery labels of the UPS 5125

- Two-man lift label.

18 – 32 kg (39.7 – 70.5 lbs.)

- Battery recycle label.

Pb
Unit contains lead-acid batteries. Do not burn. Recycle or discard the batteries as instructed.

- Weight label.

21 kg
45 lbs
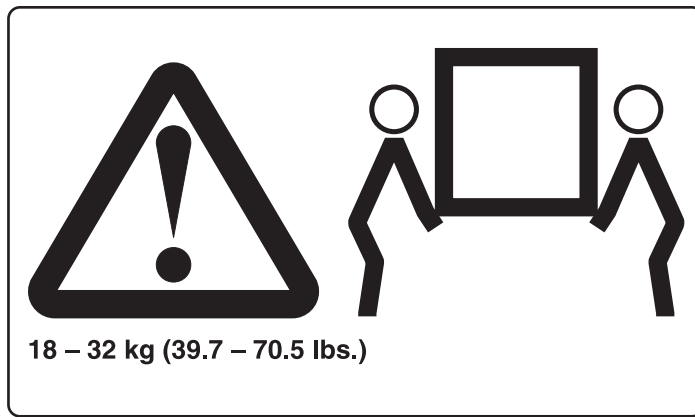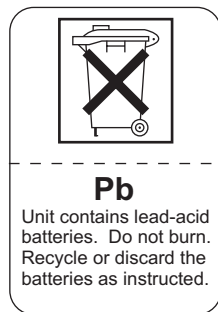
- Power ratings label.

Rating === :120V, 30A

- Battery faceplate label.

Note: You must remove the front panel to see the faceplate.

Environmental notices and statements

Ensure that you are familiar with the environmental notices and statements.

The following topics describe the environmental notices and statements that are applicable to this product.

Product recycling

Ensure you are aware of the materials of the product that can be recycled.

This unit contains recyclable materials. These materials should be recycled where processing sites are available and according to local regulations. In some areas, IBM provides a product take-back program that ensures proper handling of the product. Contact your IBM representative for more information.

Product disposal

Ensure that you are aware of the proper disposal for certain parts on the SAN Volume Controller.

This unit might contain batteries. Remove and discard these batteries, or recycle them, according to local regulations.

Battery disposal

Ensure that you understand the precautions you need to take when disposing of batteries.

CAUTION:
A lithium battery can cause fire, explosion, or a severe burn. Do not recharge, disassemble, heat above 100°C (212°F), solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace only with the part number specified for your system. Use of another battery might present a risk of fire or explosion. The battery connector is polarized; do not attempt to reverse the polarity. Dispose of the battery according to local regulations. (51)

> **Related concepts**
>
> "Definitions of notices" on page xxi
> Ensure that you understand the typographic conventions that are used in this publication to indicate special notices.

Handling static-sensitive devices

Ensure that you understand how to handle devices that are sensitive to static electricity.

Attention: Static electricity can damage electronic devices and your system. To avoid damage, keep static-sensitive devices in their static protective bags until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its anti-static bag, touch it to an unpainted metal part of the system unit for at least 2 seconds. (This action removes static electricity from the package and from your body.)
- Remove the device from its package and install it directly into your SAN Volume Controller, without putting it down. If it is necessary to put the device down, place it onto its static-protective bag. (If your device is an adapter, place it component side up.) Do not place the device onto the cover of the SAN Volume Controller or onto a metal table.
- Take additional care when you handle devices during cold weather because heating reduces indoor humidity and increases static electricity.

Chapter 1. Overview of the SAN Volume Controller

The IBM TotalStorage SAN Volume Controller is a rack-mounted unit that you can install in a standard Electrical Industries Association (EIA) 19-inch rack.

Figure 8 provides an illustration of the SAN Volume Controller.
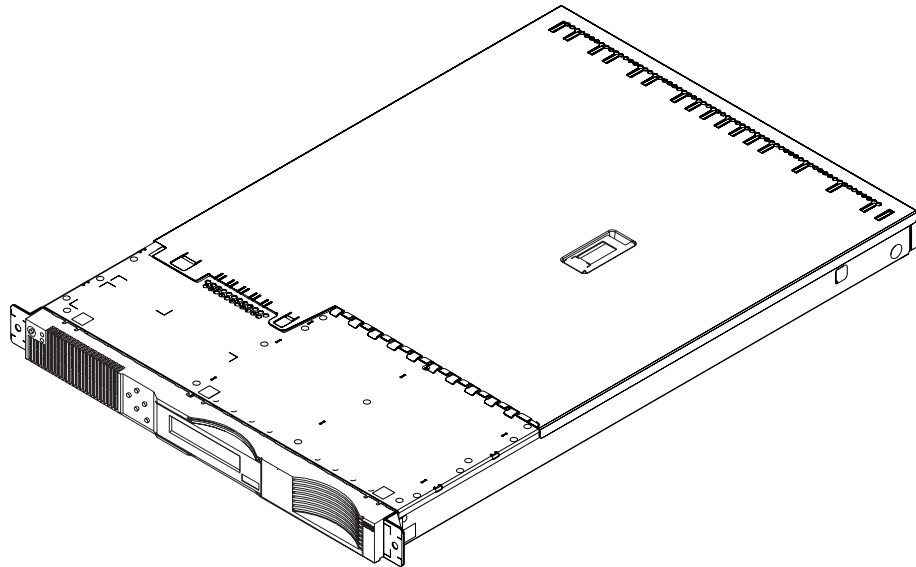
Figure 8. The SAN Volume Controller Node

A Storage Area Network (SAN) is a high-speed fibre-channel network that connects host systems and storage devices. It allows a host system to be connected to a storage device across the network. The connections are made through units such as routers, gateways, and hubs, and switches. The area of the network that contains these units is known as the fabric of the network. For more information about Storage Area Networks, see *IBM Storage Networking Virtualization: What's it all about?* and *IBM TotalStorage SAN Volume Controller: What is it and how to use it*.

Each SAN Volume Controller is a *node*; that is, it is an end point of a link, or it is a junction that is common to two or more links of the SAN. Nodes are grouped into clusters of up to eight nodes. The cluster is managed as a set, and provides a single point of control for the user for configuration and service activities. For I/O operations, the nodes are grouped into pairs. Each pair performs I/O on a *particular* virtual disk. If one SAN Volume Controller of a pair fails or is removed, failover occurs to the other SAN Volume Controller. The clusters are attached to the SAN fabric. RAID controllers and host systems are also attached to the fabric.

You can remove and replace all field replaceable units (FRUs) while the host system is running.

The fabric contains two distinct zones: a host zone and a disk zone. In the host zone, the host systems can see and address the nodes. In the disk zone, the nodes can see the disk drives. Host systems are not allowed to operate on the disk drives directly; all data transfer occurs through the nodes. Figure 9 on page 2 shows an example of a storage system that is using a SAN Volume Controller. Several host systems are connected to a SAN fabric. A cluster of SAN Volume Controller is

1

connected to the same fabric and presents virtual disks to the host systems. These virtual disks are created from disks that are presented by the RAID controllers.

Note: You might have more than one host zone in the SAN fabric. For example, you might have a SAN that contains a host that runs on an AIX operating system and another host that runs on a Windows operating system.
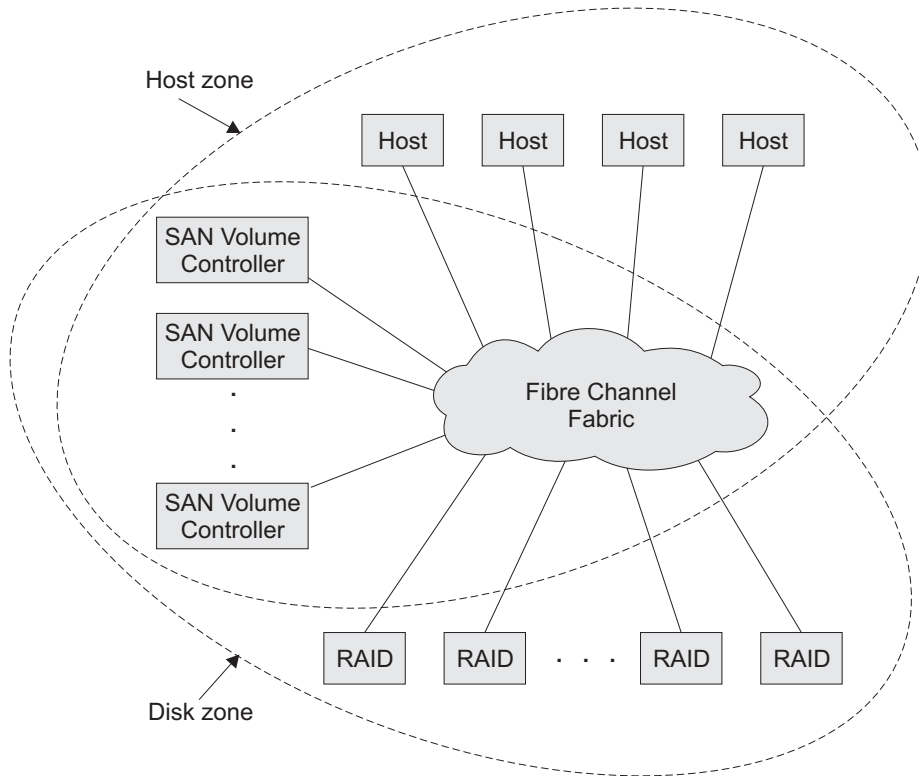
Figure 9. Example of a SAN Volume Controller in a network

You can remove one node in each I/O group from a cluster. After you remove the node, you can replace the field replaceable units (FRUs) in the node. All disk drive communication and communication between nodes is performed through the SAN. All SAN Volume Controller configuration and service commands are sent to the cluster through the Ethernet network.

Each FRU contains its own vital product data (VPD). Each cluster contains vital product data that is common to all the nodes on the cluster. Any host system connected to the Ethernet network can access this VPD.

Enclosure configuration information is stored on every node that is in the cluster to allow concurrent replacement of FRUs. An example of this information might be information that is displayed on the menu screen of the SAN Volume Controller. When a new FRU is installed, and when the node is added back into the cluster, configuration information that is required by that node is read from other nodes in the cluster.

Note: To ensure that the configuration is not corrupted or changed, always exchange FRUs one at a time.

For more detailed information about installing, maintaining, and troubleshooting the master console, see the documentation for your specific master console.

Related reference

"Controls and indicators for the SAN Volume Controller" on page 10
Controls and indicators are located on the front panel of the SAN Volume Controller.

"SAN Volume Controller hardware" on page 15
The SAN Volume Controller hardware is identified in the chart and shown in the graphic below.

"SAN Volume Controller connectors" on page 17
The external connectors for the SAN Volume Controller can be located easily.

"Preparing your SAN Volume Controller environment" on page 18
Before installing the SAN Volume Controller, prepare the physical environment.

Checking the status of the node

You can check the status of the node by using the SAN Volume Controller user interface or by using the command-line interface.

The example below shows what is displayed when you type the following command:

```
svcinfo lsnode -delim :
```

```
1:node1:10L3ANP:5005076801000013:online:0:io_grp0:yes:202378101C0D17A0
2:node2:10L3BNZ:5005076801000184:online:0:io_grp0:no:202378101C0D27AA
```

The characteristics for each node are listed one line per node. In the example, you can see a node status of online. Other statuses that you might see for the node are offline, adding, and deleting. For more information about what commands you can use, see the *IBM TotalStorage SAN Volume Controller: Configuration Guide*.

Checking the status of the node ports

You can check the status of the node ports by using the SAN Volume Controller user interface or by using the command-line interface.

The figure below shows what is displayed when you type the following command:

```
svcinfo lsnode -delim : nodename
```

```
id:1
name:node1
UPS_serial_number:10L3ANP
WWNN:5005676801000013
status:online
IO group id:0
IO group name:io_grp0
partner node id:2
partner node name:node2
config node:yes
UPS_unique_id:202378101C0D17A0
port id:5005676801100013
port status:active
port id:5005676801200013
port status:active
port id:5005676801300013
port status:active
port id:5005676801400013
port status:active
```

The example above shows information for the named node on line two. You can
see the port ID and the status of the port in the last eight lines of the example. In
this example, the last eight lines show a port status of active. Other status that you
might see include not installed, failed, or inactive.

For more information about using the command-line interface, see *IBM TotalStorage
SAN Volume Controller: Command-Line Interface User's Guide*.

Deleting a node from the cluster using the CLI

You can delete a node from the cluster using the CLI.

1. Type the following command on the command-line interface to list the cluster
   nodes:

   svcinfo lsnode

   The following is an example of what you might see when you use the svcinfo
   lsnode command.

```
id name    UPS_serial_number WWNN               status  IO_group_id IO_group_name config_node UPS_unique_id
1  node1   10L3ANP           50050768010000F6 online  0           io_grp0       yes         202378101C0D17A0
2  node2   10L3BNZ           5005076801000184 online  0           io_grp0       no          202378101C0D27AA
3  node3   10L3BNZ           0000000000000000 offline 1           io_grp1       no          202378101C0D27AA
4  node4   10L3ANP           5005076801000147 online  1           io_grp1       no          202378101C0D17A0
5  node5   10L3CNP           50050776020000F8 online  2           io_grp2       no          202278101C0D17AB
6  node6   10L3CNZ           5005076801000197 online  2           io_grp2       no          202378202C0D27AA
7  node7   10L3DNZ           0000000000000000 online  3           io_grp3       no          202379011C0D27AA
8  node8   10L3DNP           5005076801000258 online  3           io_grp3       no          202378101C0D16A0
```

Make a note of the Name and the I/O Group Name of the offline node. In the
example, node3 is offline and is assigned to io_grp1. You will need this
information when you add a node back into the cluster.

Attention: If more than one SAN Volume Controller in this or in other clusters
on the same SAN is offline, make a note of that now because you must take
special precautions when you add the node back into the cluster.

2. You must use the following command to remove the offline node from the
   cluster:

   svcservicetask rmnode *node*, where *node* is the name of the offline node noted
   in step 1.

In this example the command is:

```
svcservicetask rmnode node3
```

No output is displayed.

Related tasks

"Adding a node to the cluster using the CLI"
You can add a node that has been either removed or rejected by a cluster, into the cluster.

Adding a node to the cluster using the CLI

You can add a node that has been either removed or rejected by a cluster, into the cluster.

Attention: Before you add a node to a cluster, make sure that you configure the switch zoning such that the node being added is in the same zone as all other nodes in the cluster. In particular, if you are replacing a node and the switch is zoned by worldwide port name (WWPN) rather than by switch port, you must update the switch configuration.

Use the command line to list node candidates:

1. Type the following command on the command-line interface to list the node candidates:

   ```
   svcinfo lsnodecandidate
   ```

   The following example shows what you might see when you use the `svcinfo lsnodecandidate` command.

   ```
   id              panel_name    UPS_serial_number   UPS_unique_id
   5005076801000101 000279        10L3BNZ             202378101C0D27AA
   ```

   You can add the node to the cluster by using the `addnode` command.

2. Type the following command:

   ```
   svcservicetask addnode -panelname panel_name -name new_name_arg
   -iogrp iogroup_name
   ```
   , where *panel_name* is the name noted in step 1 (in this example that is 000279). This is the number that is printed on the front panel of the node that you are adding back into the cluster; *new_name_arg* is the name of the node noted when the previous node was deleted from the cluster; *iogroup_name* is the iogroup that was noted when the previous node was deleted from the cluster

   The following example shows the command that you might use:

   ```
   svcservicetask addnode -panelname 000279 -name node3 -iogrp io_grp1
   ```

   This following example shows the output that you might see:

   ```
   Node, id [5005076801000101], successfully added
   ```

Attention: If more than one candidate node exists, ensure that the node that you add into an I/O group is the same node that was deleted from that I/O group. Failure to do so might result in data corruption. If you are uncertain about which candidate node belongs to the each I/O group, you will need to shutdown all host systems accessing this cluster before you can proceed and then reboot each system when all the nodes have been added back into the cluster.

3. To check whether you added the node successfully, type the following command:

`svcinfo lsnode`

The following example shows what you might see when you use the `svcinfo lsnode` command.

```
id name  UPS_serial_number WWNN           status IO_group_id IO_group_name config_node UPS_unique_id
1  node1 10L3ANP           50050768010000F6 online 0          io_grp0       yes         202378101C0D17A0
2  node2 10L3BNZ           5005076801000184 online 0          io_grp0       no          202378101C0D27AA
5  node3 10L3BNZ           5005076801000101 online 1          io_grp1       no          202378101C0D27AA
4  node4 10L3ANP           5005076801000147 online 1          io_grp1       no          202378101C0D17A0
5  node5 10L3CNP           50050776020000F8 online 2          io_grp2       no          202278101C0D17AB
6  node6 10L3CNZ           5005076801000197 online 2          io_grp2       no          202378202C0D27AA
7  node7 10L3DNZ           5005076801000458 online 3          io_grp3       no          202379011C0D27AA
8  node8 10L3DNP           5005076801000258 online 3          io_grp3       no          202378101C0D16A0
```

All nodes are now online.

Related tasks

"Deleting a node from the cluster using the CLI" on page 4
You can delete a node from the cluster using the CLI.

Listing managed disks

You can list the managed disks by using the SAN Volume Controller console or the command-line interface.

Enter the following command to see information about several managed disks as shown in the example below:

`svcinfo lsmdisk –delim :`

```
id: name:    status: mode:       mdisk_grp_id:  mdisk_grp_name     capacity:ctrl_LUN_#:  controller_name:UID
0:  mdisk0:  online: unmanaged::: 68.4GB:        0000000000000000:  controller0           *
1:  mdisk1:  online: unmanaged::: 68.4GB:        0000000000000000:  controller1           +
2:  mdisk2:  online: unmanaged::: 68.4GB:        0000000000000000:  controller2           ++
3:  mdisk3:  online: unmanaged::: 68.4GB:        0000000000000000:  controller3           §
4:  mdisk4:  online: unmanaged::: 68.4GB:        0000000000000000:  controller4           #
5:  mdisk5:  online: unmanaged::: 68.4GB:        0000000000000000:  controller5           **

*600a0b80000f4c920000000b3ef6c3d0000000000000000000000000000000000 (This number represents the controller_name:UID)
+0080e52122fa800000000000000000000000000000000000000000000000000000 (This number represents the controller_name:UID)
++600a0b80000c5ae4000000093eca105c0000000000000000000000000000000000 (This number represents the controller_name:UID)
§0080a0b80000f6432000000043ef6b4ff0000000000000000000000000000000000 (This number represents the controller_name:UID)
#600a0b80000f4c920000000b3ef6c3d0000000000000000000000000000000000 (This number represents the controller_name:UID)
**600a0b80000f6c920000000d3er1a7d0000000000000000000000000000000000 (This number represents the controller_name:UID)
```

The example above shows a list of managed disks. To determine the status of the managed disk, see column three for `status`. The example shows that all managed disks have a status of `online`. The following list shows possible statuses for a managed disk:

- Online
- Offline
- Excluded
- Degraded

To determine the mode of the disk, see column four of the example above for `mode`. The example shows that the mode is `unmanaged`. The following list shows possible modes for a managed disk.

- Managed
- Unmanaged
- Image

You can also list more detailed information about one managed disk. Enter the following command to see detailed information about one managed disk with an ID of 3, as shown in the example below:

```
svcinfo lsmdisk -delim : 3
```

```
id:3
name:mdisk3
status:online
mode:managed
mdisk_grp_id:0
mdisk_grp_name:mdiskgrp0
capacity:68.4GB
quorum_index:
block_size:512
controller_name:controller3
ctrl_type:4
ctrl_WWNN:20000004CF1FD7A0
controller_id:3
path_count:1
max_path_count:1
ctrl_LUN_#:0000000000000000
UID:600a0b80000f6432000000043ef6b4ff00000000000000000000000000000000
```

Including managed disks

You can include an excluded or degraded managed disk by using the SAN Volume Controller Console or the command-line interface.

Commands

Type the following command to list the managed disks:

```
svcinfo lsmdisk -nohdr -delim :
```

The example below shows what is displayed when you list the managed disks.

```
0:mdisk0:online:managed:0:Group0:67.8GB:0000000000000000:controller0*
1:mdisk1:excluded:managed:0:Group0:205.0GB:0000000000000000:controller1+
2:mdisk2:online:managed:0:Group0:273.3GB:0000000000000000:controller1#
3:mdisk3:online:managed:0:Group0:546.6GB:0000000000000000:controller1§

* 0080e52122fa800000000000000000000000000000000000000000000000 is appended to this line.
+ 600a0b80000c5ae4000000093eca105c0000000000000000000000000000 is appended to this line.
# 600a0b80000f6432000000043ef6b4ff0000000000000000000000000000 is appended to this line.
§ 600a0b80000f4c920000000b3ef6c3d00000000000000000000000000000 is appended to this line.
```

Line number two shows the number of an excluded disk. Type the following command, specifying the number of the excluded or degraded managed disk, to include the excluded or degraded managed disk.

svcservicetask includemdisk *mdisk_number* (or svctask includemdisk *mdisk_number* if you are using any software version lower than 2.1.0.0)

Rescanning the fibre-channel network for new managed disks

The fibre-channel network can be manually rescanned for any new managed disks that might have been added either by using the SAN Volume Controller Console or the command-line interface.

Cluster discovery commands

Enter the svcservicetask detectmdisk command to rescan the fibre-channel network for any new managed disks (If you are using any software version lower than 2.1.0.0, this is a customer task and is only available to users who are logged on using the admin ID and password. If this is applicable, enter the svctask detectmdisk command).

This command does not produce any output.

Checking managed disk group status

You can check the status of a managed disk group by using the SAN Volume Controller user interface or the command-line interface.

Type the following command to check the status of a managed disk group:

svcinfo lsmdiskgrp -nohdr -delim :

You get what is displayed in the example below:

```
0:Group0:online:4:4:2.1GB:16:1.9GB
```

The characteristics for each managed disk group is listed one line per group. The status of the managed disk group is shown by the third item. In the example above, Group0 status is online. Managed disk group status can be offline, online, or degraded.

Checking disk controller status

You can check the status of the disk controllers by using the SAN Volume Controller user interface or the command-line interface.

Type the following command to see what is displayed in the example output:

```
svcinfo lscontroller -delim :
```

```
id:controller_name:ctrl_s/n:vendor_id:product_id_low:product_id_high
7:controller7:3EK0J5Y8:SEAGATE :ST373405:FC
8:controller8:3EK0J6CR:SEAGATE :ST373405:FC
9:controller9:3EK0J4YN:SEAGATE :ST373405:FC
10:controller10:3EK0GKGH:SEAGATE :ST373405:FC
11:controller11:3EK0J85C:SEAGATE :ST373405:FC
12:controller12:3EK0JBR2:SEAGATE :ST373405:FC
13:controller13:3EKYNJF8:SEAGATE :ST373405:FC
14:controller14:3EK0HVTM:SEAGATE :ST373405:FC
```

You can also check the status of a specific disk controller by using the SAN Volume Controller user interface or by using the command-line interface. Type the following command to see what is displayed in the output when you check the status of a specific disk controller:

```
svcinfo lscontroller -delim = controller_id
```

```
id=7
controller_name=controller7
WWNN=20000004CF2412AC
mdisk_link_count=1
max_mdisk_link_count=1
degraded=no
vendor_id=SEAGATE
product_id_low=ST373405
product_id_high=FC
product_revision=0003
ctrl_s/n=3EK0J5Y8
WWPN=22000004CF2412AC
path_count=1
max_path_count=1
WWPN=21000004CF2412AC
path_count=0
max_path_count=0
```

You can see the status of a specific disk controller (id=7) in the sixth line of the example above. When you see a status of `degraded = no`, the status is good. When you see a status of `degraded = yes`, the status is bad.

Determining the failing enclosure or disk controller

You can determine the failing enclosure or disk controller by using the SAN Volume Controller user interface or the command-line interface.

Type the following command to list all the mdisks:

```
svcinfo lsmdisk —nohdr —delim :
```

Type the `svcinfo lsmdisk –nohdr –delim :` command to see what might display in the following example:

```
0:mdisk0:online:managed:0:mdiskgrp0:273.3GB:0000000000000001:controller0:*
1:mdisk1:excluded:managed:0:mdiskgrp0:546.6GB:0000000000000002:controller0:+

* 600a0b80000c5ae4000000093eca105c0000000000000000000000000000000 is appended to this line.
+ 600a0b80000f6432000000043ef6b4ff0000000000000000000000000000000 is appended to this line.
```

The mdisks are listed in the object ID order. The first item is the object ID, the third item is the status, and the ninth item is the disk or controller name. In the example above, mdisk1 has an object ID of 1, is failing with the status excluded, and is part of a disk controller named controller0.

To obtain the detailed data for the named enclosure or disk controller, type the following command:

`svcinfo lscontroller –delim : name`

where *name* is the enclosure disk controller name.

To obtain detailed data for controller0, type the following command:

`svcinfo lscontroller –delim : controller0`

The following detailed data is displayed:

```
id:0
controller_name:controller0
WWNN:200200A0B80F5E2C
mdisk_link_count:30
max_mdisk_link_count:30
degraded:no
vendor_id:IBM
product_id_low:1722–600
product_id_high:
product_revision:0520
ctrl_s/n:
WWPN:200200A0B80F5E2D
path_count:30
max_path_count:30
WWPN:200300A0B80F5E2D
path_count:30
max_path_count:30
```

Controls and indicators for the SAN Volume Controller

Controls and indicators are located on the front panel of the SAN Volume Controller.

All the controls for the SAN Volume Controller are located on the front panel.
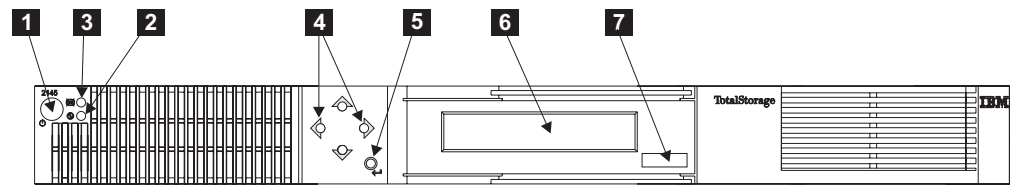
1 Power button

2 Power LED

3 Check LED

4 Navigation buttons

5 Select button

6 Front panel display

7 Label

Related reference

"Power button"
The power button switches the main power to the SAN Volume Controller on or off.

"Power LED" on page 12
The green power LED indicates the power status of the SAN Volume Controller:

"Check LED" on page 12
This is an amber LED used to indicate critical failures on the service controller.

"Navigation buttons" on page 12
Use the navigation buttons to move through menus.

"Select button" on page 13
Use the select button to select an item from a menu.

"Front panel display" on page 13
The front panel display shows service, configuration, and navigation information.

"Node identification label" on page 13
The node identification label on the front panel displays a six-digit node identification number.

Power button

The power button switches the main power to the SAN Volume Controller on or off.

To turn on the power, press and release the power button.

To turn off the power, press and release the power button.

Attention: If a SAN Volume Controller is powered off for more than five minutes and it is the only SAN Volume Controller that is connected to an uninterruptible power supply (UPS) 5125, the UPS 5125 also powers off. To power on the SAN Volume Controller, you must first power on the UPS 5125 to which it is connected.

Note: The UPS 5115 will not power off when the SAN Volume Controller is shut down from the power button.

Related reference

"Controls and indicators for the SAN Volume Controller" on page 10
Controls and indicators are located on the front panel of the SAN Volume
Controller.

Power LED

The green power LED indicates the power status of the SAN Volume Controller:

The properties of the green power LED are as follows:

Off
- One or more output voltages from the power supply are not present.

On
- All the output voltages from the power supply are present.

Blinking
- The service controller, which provides the graphics and text for the front panel
  display, is in standby mode. (The rate of blinking is 0.5 seconds on, 0.5 seconds
  off.)

  Related reference

  "Controls and indicators for the SAN Volume Controller" on page 10
  Controls and indicators are located on the front panel of the SAN Volume
  Controller.

Check LED

This is an amber LED used to indicate critical failures on the service controller.

If the check LED is off and the power LED is on, the service controller is working
correctly.

If the check LED is on, a critical service controller failure has been detected.

The check LED is also on while the service controller code is being reprogrammed.
For example, when the SAN Volume Controller cluster code is being upgraded, the
check LED will be on. It is normal for the check LED to be on at this time.

  Related reference

  "Controls and indicators for the SAN Volume Controller" on page 10
  Controls and indicators are located on the front panel of the SAN Volume
  Controller.

Navigation buttons

Use the navigation buttons to move through menus.

There are four navigational buttons that you can use to move throughout a menu:
up, down, right and left.

Each button corresponds to the direction that you can move in a menu. For
example, to move right in a menu, press the navigation button that is located on the
right side. If you want to move down in a menu, press the navigation button that is
located on the bottom.

  Related reference

"Controls and indicators for the SAN Volume Controller" on page 10
Controls and indicators are located on the front panel of the SAN Volume
Controller.

Select button

Use the select button to select an item from a menu.

The select button is located on the front panel of the SAN Volume Controller, near
the navigation buttons.

Related reference

"Controls and indicators for the SAN Volume Controller" on page 10
Controls and indicators are located on the front panel of the SAN Volume
Controller.

Front panel display

The front panel display shows service, configuration, and navigation information.

Information on the front panel display is available in several national languages.
The display can show both alphanumeric information and graphical information
(progress bars).

The front panel displays configuration and service information about the SAN
Volume Controller and the SAN Volume Controller cluster including the following
items:
- Hardware boot
- Node rescue request
- Boot progress
- Boot failed
- Powering off
- Restarting
- Shutting down
- Power failure
- Error codes

Related reference

"Controls and indicators for the SAN Volume Controller" on page 10
Controls and indicators are located on the front panel of the SAN Volume
Controller.

Node identification label

The node identification label on the front panel displays a six-digit node
identification number.

The node identification label is the same as the six-digit number used in the
`addnode` command. It is readable by system software and is used by configuration
and service software as a node identifier. The node identifier can also be displayed
on the front panel display when node is selected from the menu.

If the front panel is replaced, the configuration and service software displays the
number that is printed on the front of the replacement panel. Future error reports
will also contain the new number. No cluster reconfiguration is necessary when the
front panel is replaced.

The node also contains a SAN Volume Controller product serial number that is imbedded on the system board hardware. This number is used for warranty and service entitlement checking and is included in the data sent with error reports. It is essential that this number is not changed during the life of the product. If the system board is replaced, you must follow the system board replacement instructions carefully and rewrite the serial number on the system board.

Related reference

"Controls and indicators for the SAN Volume Controller" on page 10
Controls and indicators are located on the front panel of the SAN Volume Controller.

SAN Volume Controller rear panel indicators

The controls and indicators for the SAN Volume Controller are contained on the front and back panel assembly.

The following figure shows the location of the controls and indicators:
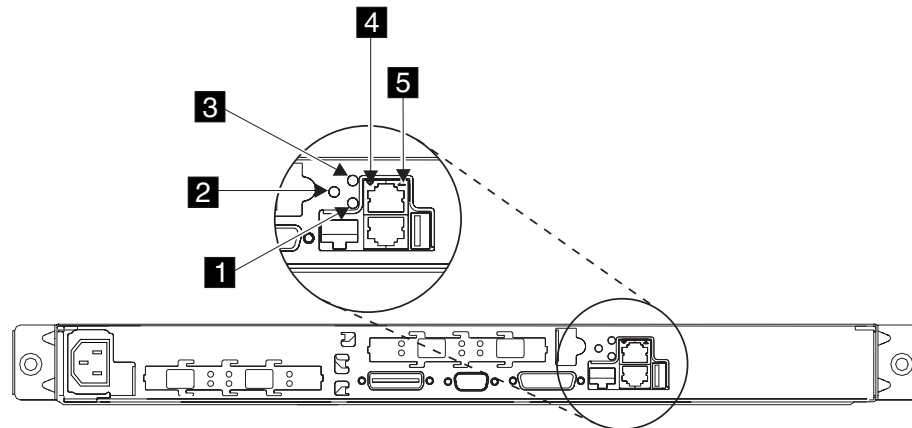
1 System board power LED

2 System board fault LED

3 Monitor LED (not used)

4 Lower Ethernet connection LED

5 Upper Ethernet connection LED

Related reference

"System board power LED" on page 15
The system board power LED indicates the power supply status that is detected by the system board.

"System board fault LED" on page 15
The amber system board fault LED indicates that the system board has detected a critical failure.

"Monitor LED" on page 15
The green monitor LED is not used on the SAN Volume Controller.

"Lower Ethernet connection LED" on page 15
The lower Ethernet connection LED indicates the operational status of Ethernet

port 1. This LED is illuminated when a good Ethernet connection exists between the SAN Volume Controller and the Ethernet network.

"Upper Ethernet connection LED"
The upper Ethernet connection LED indicates the operational status of Ethernet port 2. Ethernet port 2 is not used on the SAN Volume Controller except during Ethernet problem determination.

System board power LED

The system board power LED indicates the power supply status that is detected by the system board.

Attention: If a SAN Volume Controller is powered off for more than five minutes and it is the only SAN Volume Controller connected to an uninterruptible power supply (UPS) 5125, the UPS 5125 will also power off. To power on the SAN Volume Controller, you must first power on its UPS 5125 to which it is connected.

Note: The UPS 5115 will not power off when the SAN Volume Controller is shut down from the power button.

System board fault LED

The amber system board fault LED indicates that the system board has detected a critical failure.

You can view the system board fault LED in "SAN Volume Controller rear panel indicators."

Monitor LED

The green monitor LED is not used on the SAN Volume Controller.

You can view the monitor LED in "SAN Volume Controller rear panel indicators."

Lower Ethernet connection LED

The lower Ethernet connection LED indicates the operational status of Ethernet port 1. This LED is illuminated when a good Ethernet connection exists between the SAN Volume Controller and the Ethernet network.

You can view the lower Ethernet connection LED in "SAN Volume Controller rear panel indicators."

Upper Ethernet connection LED

The upper Ethernet connection LED indicates the operational status of Ethernet port 2. Ethernet port 2 is not used on the SAN Volume Controller except during Ethernet problem determination.

You can view the upper Ethernet connection LED in "SAN Volume Controller rear panel indicators."

SAN Volume Controller hardware

The SAN Volume Controller hardware is identified in the chart and shown in the graphic below.

The following figure displays a breakout view for the parts to the SAN Volume Controller. Use the reference keys below the figure to match the reference keys in the example.
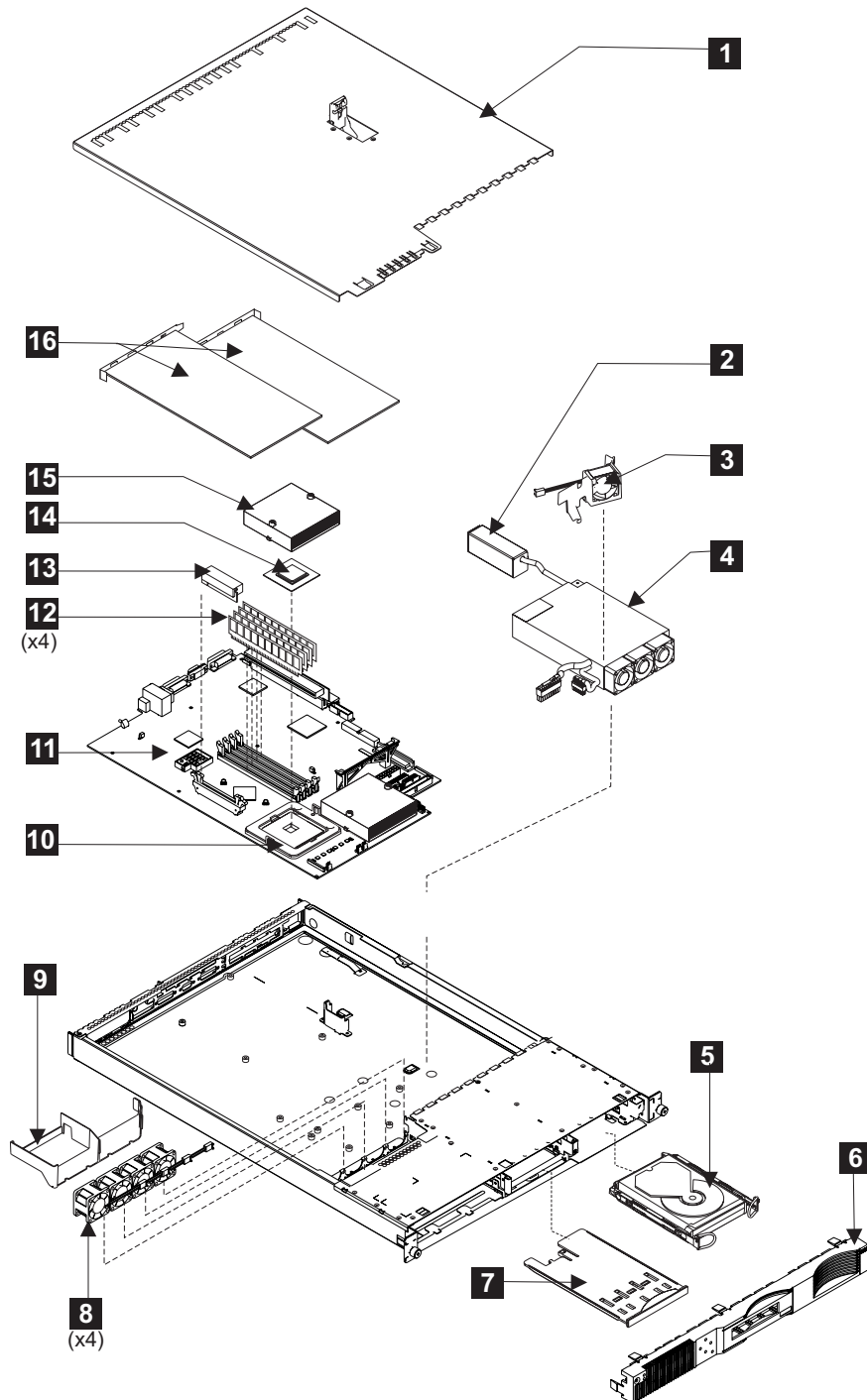
1 Top cover

2 Power supply connector

3 Fan with baffle

4 Power supply assembly

5 Hard disk drive

6 Front panel

7 Service controller card

8 Fan assembly (4)

9 Air baffle

10 Microprocessor heat sink retention module

11 System board

12 DIMM modules (4)

13 Microprocessor Voltage Regulator

14 Microprocessor

15 Microprocessor heat sink

16 Fibre-channel adapters (2)

SAN Volume Controller connectors

The external connectors for the SAN Volume Controller can be located easily.
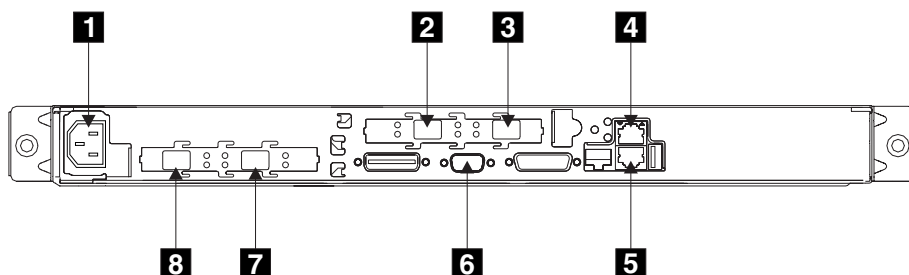
Use the reference keys below to cross reference the reference keys in the example above:

1 Power connector indicator

2 Fibre-channel port 3

3 Fibre-channel port 4

4 Ethernet port 2 *(not used on the SAN Volume Controller)*

5 Ethernet port 1

6 Serial connector

7 Fibre-channel port 2

8 Fibre-channel port 1

The following figure shows the type of connector located on the power supply assembly. The connector allows you to connect the SAN Volume Controller to the power source from the uninterruptible power supply.

```
                              Neutral
                              Ground


                              Live
```
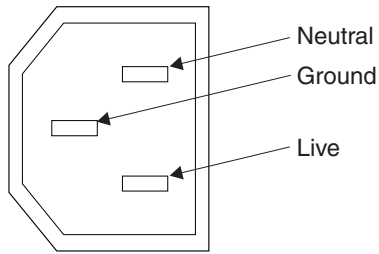
Preparing your SAN Volume Controller environment

Before installing the SAN Volume Controller, prepare the physical environment.

Dimensions and weight

The following tables list the physical dimensions and weight of the SAN Volume Controller, as well as other environmental requirements that you must consider before you install your SAN Volume Controller:

Height	Width	Depth	Maximum Weight
43 mm (1.7 in.)	440 mm (17.3 in.)	660 mm (26 in.)	12.7 kg (28 lb.)

Additional space requirements

Location	Additional Space Required	Reason
Left and right sides	50 mm (2 in.)	Cooling air flow
Back	minimum: 100 mm (4 in.)	Cable exit

AC input-voltage requirements

Power Supply Assembly Type	Voltage	Frequency
200 to 240 V	88 to 264 V ac	50 to 60 Hz

Environment

Environment	Temperature	Altitude	Relative Humidity	Maximum Wet Bulb Temperature
Operating in Lower Altitudes	10°C to 35°C (50°F to 95°F)	0 to 914 m (0 to 2998 ft.)	8% to 80% noncondensing	23°C (74°F)
Operating in Higher Altitudes	10°C to 32°C (50°F to 88°F)	914 to 2133 m (2998 to 6988 ft.)	8% to 80% noncondensing	23°C (74°F)
Powered Off	10°C to 43°C (50°F to 110°F)	–	8% to 80% noncondensing	27°C (81°F)

Environment	Temperature	Altitude	Relative Humidity	Maximum Wet Bulb Temperature
Storing	1°C to 60°C (34°F to 140°F)	0 to 2133 m (0 to 6988 ft.)	5% to 80% noncondensing	29°C (84°F)
Shipping	-20°C to 60°C (-4°F to 140°F)	0 to 10668 m (0 to 34991 ft.)	5% to 100% condensing, but no precipitation	29°C (84°F)

Heat output (maximum)

350 watts (1195 Btu per hour)

Related reference

"Preparing your uninterruptible power supply environment" on page 40
Ensure that your physical site meets the installation requirements for the
uninterruptible power supply (UPS).

Using the power control for the SAN Volume Controller

SAN Volume Controllers are powered by an uninterruptible power supply (UPS)
located in the same rack as the SAN Volume Controller.

The power state of the SAN Volume Controller is displayed by a power indicator on
the front panel. If the UPS battery is not sufficiently charged to enable the SAN
Volume Controller to become fully operational, its charge state is displayed on the
front panel display of the SAN Volume Controller.

The power to a SAN Volume Controller is controlled by the power button on the
front panel of the SAN Volume Controller or by commands sent by the Ethernet
interface. For normal service operations, the SAN Volume Controller can be turned
off by pressing the front panel power button. The SAN Volume Controller should
never be turned off by removing the power cable from the rear of the SAN Volume
Controller because you might lose data.

If the SAN Volume Controller software is running and you press the front panel
power button, a signal is sent to the software that a power off request has been
made. The SAN Volume Controller starts its power off processing. During this time,
it indicates the progress of the power-off operation on the SAN Volume Controller
front panel display. Once the power-off processing is complete, the front panel is
blank and the front panel power light is extinguished. It is safe for you to remove
the power cable from the rear of the SAN Volume Controller. If the power button on
the front panel is pressed during power-off processing, the front panel display
changes to indicate that the SAN Volume Controller is being restarted, but the
power-off process completes before the restart is performed.

If the SAN Volume Controller software is not running when the front panel power
button is pressed, the SAN Volume Controller immediately powers off.

If the SAN Volume Controller is powered off and it is the only SAN Volume
Controller connected to the UPS 5125, the UPS 5125 will also power off within five
minutes. The power on button on the UPS 5125 must be pressed before the SAN
Volume Controller can be powered on.

Note: The UPS 5115 will not power off when the SAN Volume Controller is shut down from the power button.

Turning off a SAN Volume Controller using the power button or by a command puts the SAN Volume Controller into a power-off state. The SAN Volume Controller remains in this state until the power cable is connected to the rear of the SAN Volume Controller and the power button is pressed.

During the SAN Volume Controller startup sequence, the SAN Volume Controller attempts to detect the status of the UPS through the UPS signal cable. If an UPS is not detected, the SAN Volume Controller pauses and an error is shown on the front panel display. If the UPS is detected, the software monitors the operational state of the UPS. If no UPS errors are reported and the UPS battery is sufficiently charged, the SAN Volume Controller becomes operational. If the UPS battery is not sufficiently charged, the charge state is indicated by a progress bar on the front panel display. The first time that a UPS is turned on, it might take up to three hours before the battery is sufficiently charged for the SAN Volume Controller to become operational.

If input power to the UPS is lost, the SAN Volume Controller immediately stops all I/O operations and saves the contents of its DRAM to the internal disk drive. While data is being saved to the disk drive, a `Power Failure` message is shown on the front panel and is accompanied by a descending progress bar that indicates the quantity of data that remains to be saved. Once all the data is saved, the SAN Volume Controller is turned off and the power light on the front panel is extinguished.

Note: The SAN Volume Controller is now in standby state. If the input power to the UPS unit is restored, the SAN Volume Controller restarts. If the UPS battery was fully discharged `Charging` is displayed and the boot process waits for the battery to charge. When the battery is sufficiently charged `Booting` is displayed, the node is tested, and the software is loaded. When the boot process is complete, `Recovering` is displayed while the UPS finalizes its charge. While Recovering is displayed, the cluster can function normally. However, when the power is restored after a second power failure, there is a delay (with Charging displayed) before the node can complete its boot process.

Related concepts

"Powering off" on page 56
The progress bar on the display shows the progress of the power-off operation.

Using directed maintenance procedures

You can use directed maintenance procedures to diagnose and resolve problems with the SAN Volume Controller.

For example, to repair a SAN Volume Controller cluster, you might perform the following tasks:

- Analyze the error log.
- Replace failed components.
- Verify the status of a repaired device.
- Restore a device to an operational state in the cluster.
- Mark the error as fixed in the error log.

Directed maintenance simplifies these procedures by automating as many of the tasks as possible.

To start the directed maintenance procedure to repair a SAN Volume Controller cluster, see "MAP 5000: Start" and start the repair action.

The following procedures and panels show an example of what you might see when you use the directed maintenance procedures. The specific directed maintenance procedures and panels you see depend on the procedure you select.

You can use either the directed maintenance procedures through the SAN Volume Controller Web interface to perform these tasks or use the command-line interface. Using the web interface is preferable since the online procedures automatically check for correct status and also mark the error as fixed if the repair is successful.

Perform the following steps to start the directed maintenance procedure to repair a SAN Volume Controller cluster using the Web interface.

Note: The following procedures and graphics are an example of what you might see when you use the directed maintenance procedures. The directed maintenance procedures and graphics that you see depend on the procedure that you select.

1. When directed maintenance procedures start, you will see the window below:
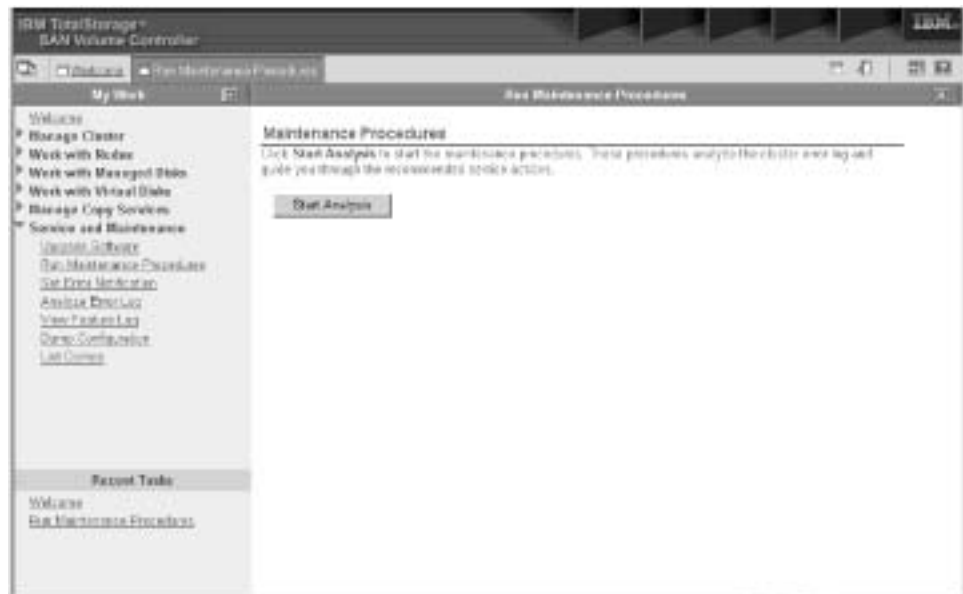
2. From the panel for Maintenance Procedures, click `Start analysis` to display what is shown in the window below:
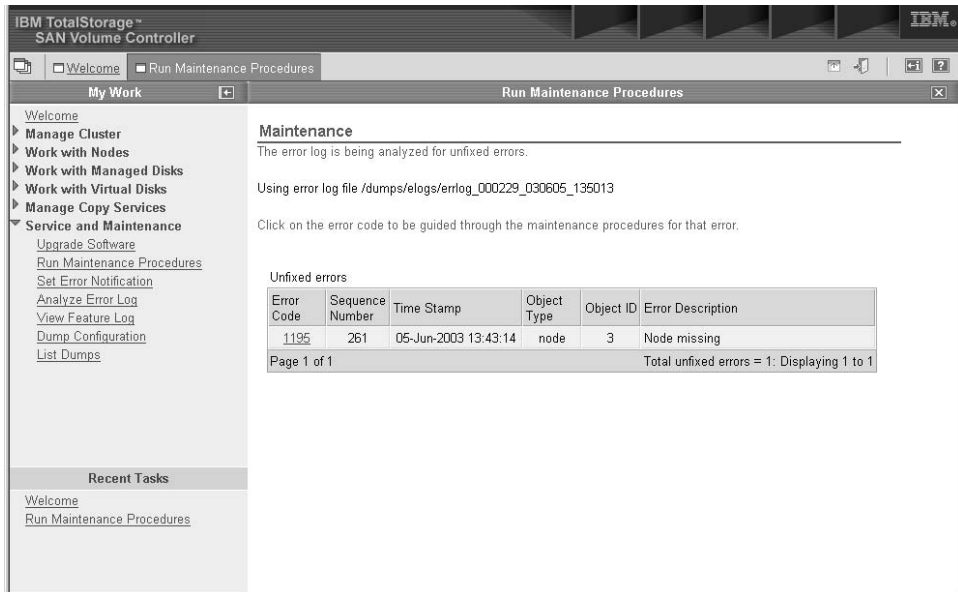
The window above shows a list of unfixed errors. This example shows that only one error needs to be repaired. The list might contain any number of errors that need to be repaired. The error at the top of the list has the highest priority and must always be fixed first. If you do not fix the higher priority errors first, you might not be able to fix the lower priority errors.

3. Click the hyperlink for the number for the error code at the top of the list to display what is shown in the window below:
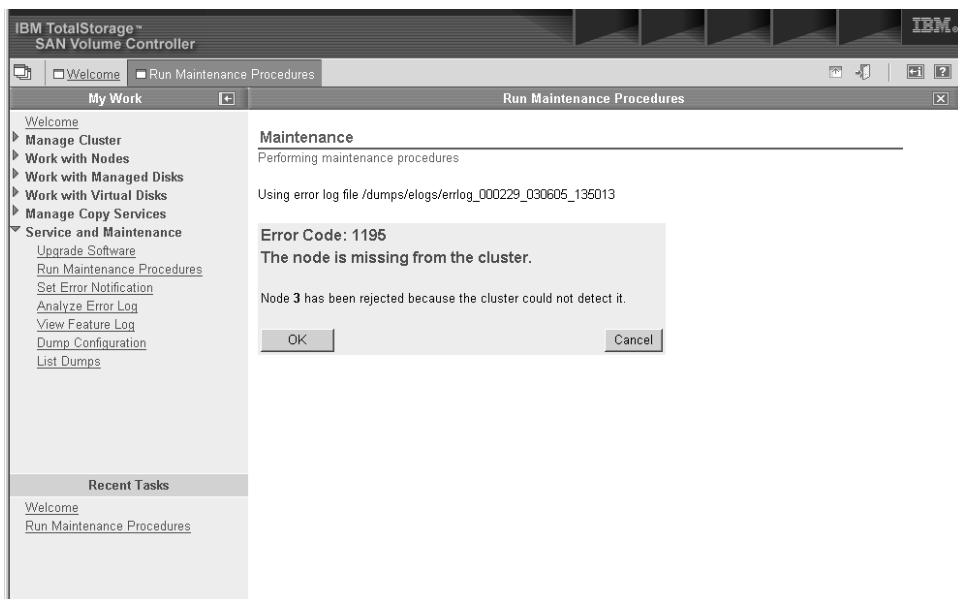
The window above shows the error code and provides a description of the error condition.

4. Click OK to display the window below:
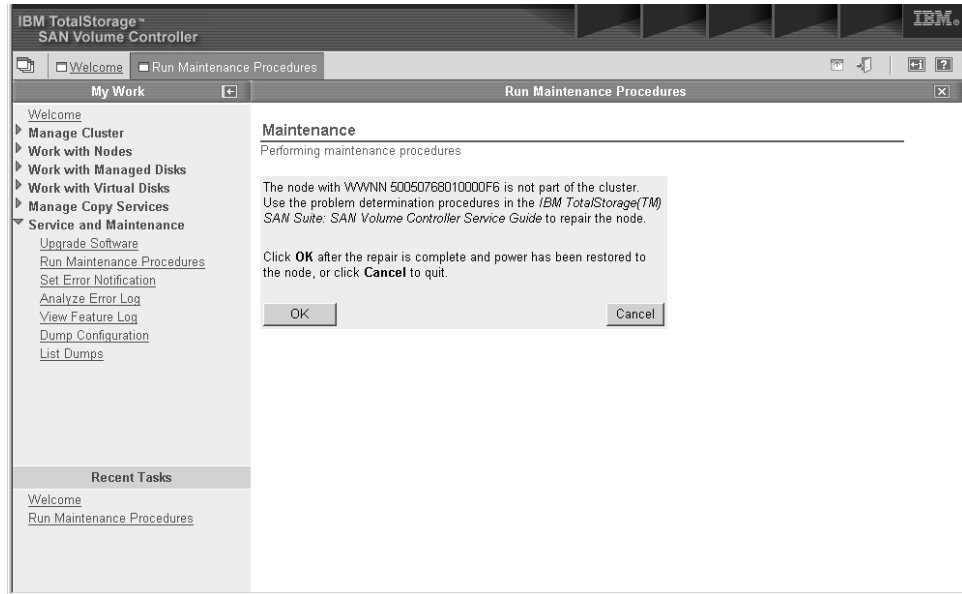
5. One or more panels might now be displayed instructing you to replace parts or perform other repair activity. If you are not able to complete the actions at this time, you can click Cancel. When you return to the directed maintenance procedures, the repair can be restarted from the beginning. When the actions that you are instructed to perform are complete, click OK. When the last repair action is completed, the directed maintenance procedures might attempt to restore failed devices to the cluster. The graphic below shows an example of what might be displayed:
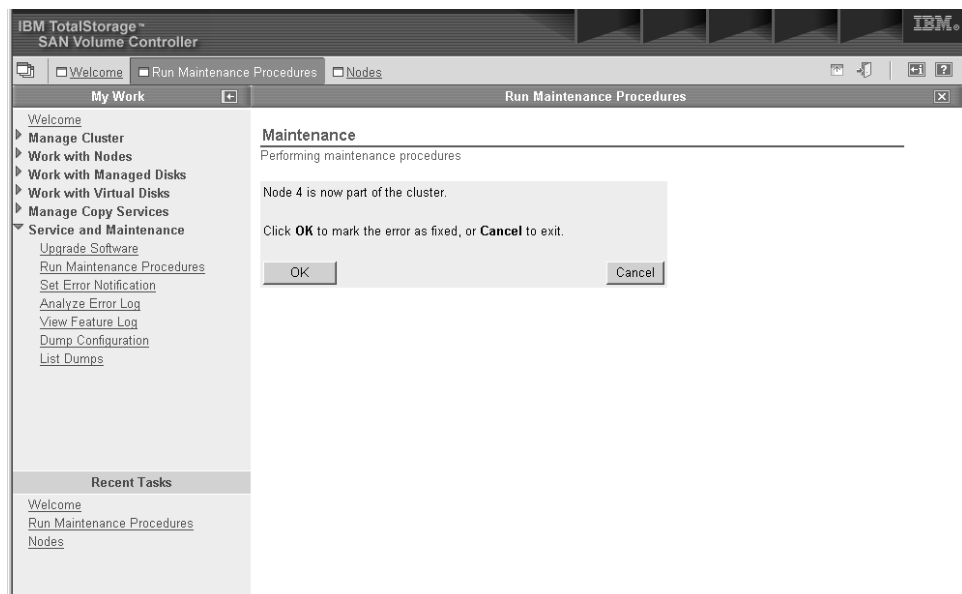
6. Click OK to mark the error as fixed in the error log to prevent this instance of the error from being listed again. This action displays message similar to that shown in the window below, which indicates that the repair has been completed.
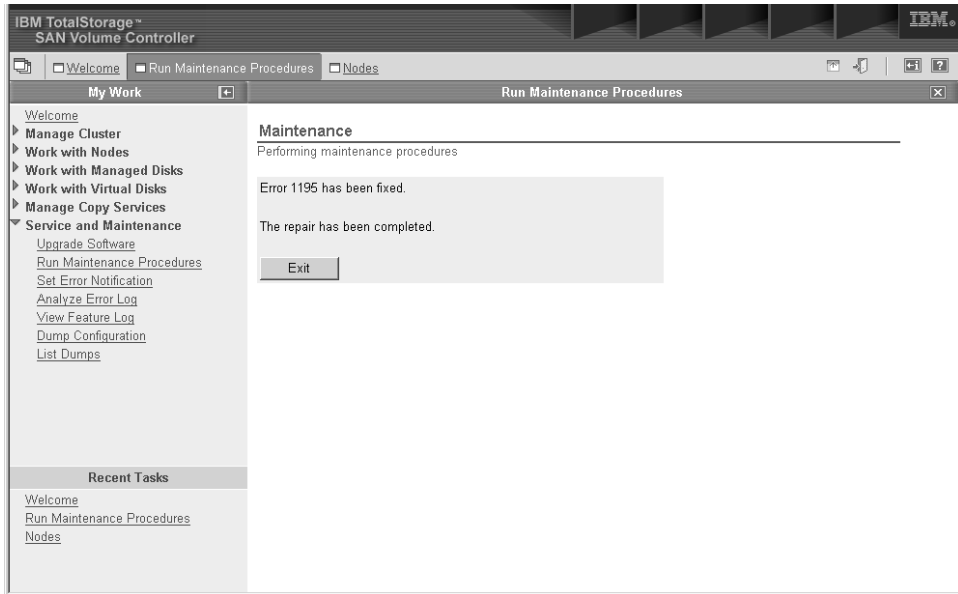
7. Click `Exit`. If other errors need to be fixed, these errors are displayed now and the directed maintenance procedures will continue. If no errors remain, you will see what is displayed in the window below:
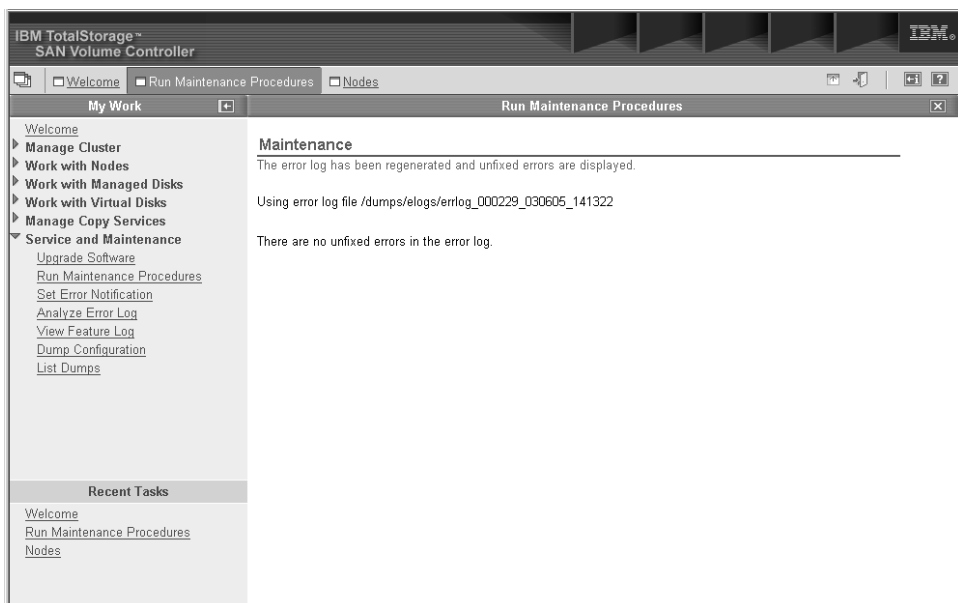
This panel indicates that no further repair procedures are necessary. Verify the repair using the Repair verification MAP.

Related tasks

"MAP 5000: Start" on page 130
MAP 5000: Start is the entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 155
MAP 5700: Repair verification helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Power-on self-tests (POSTs)

When you turn on the SAN Volume Controller, the system board performs self tests. During the initial tests, the hardware boot symbol is displayed.

Overview of POSTs

If a critical failure is detected during the tests, the SAN Volume Controller software is not loaded and no additional fault information is provided. When the SAN Volume Controller software is loaded, additional testing is performed. This testing ensures that all the required hardware and software components are installed and functioning correctly. During this portion of the testing, the word `Booting` displays on the front panel along with a boot progress code and a progress bar.

If a test fails, the word `Failed` displays on the front panel. You can use the progress code to isolate the cause of the problem. If the `Booting` progress bar fails to move to the right for two minutes, the test process is hung. Use the boot progress code to isolate the failure.

The service controller performs internal checks. The service controller is vital to the operation of the SAN Volume Controller. When an internal check fails, the SAN Volume Controller does not operate. Ignore other front panel indicators when you see that the Check LED is illuminated.

Note: Because the check LED stays lit when you program the microcode on the service controller, it is not an indication that there is a problem.

The uninterruptible power supply (UPS) also performs internal tests. If the UPS is capable of reporting the failure condition, the SAN Volume Controller displays critical failure information on the front panel display or sends noncritical failure information to the SAN Volume Controller cluster error log. If the SAN Volume Controller cannot communicate with the UPS, it displays a boot failure error message on the front panel display. Further problem determination information might also be displayed on the front panel of the UPS.

Shutting down the cluster in the SAN Volume Controller

If all input power to a SAN Volume Controller cluster is to be removed, you must shut down the cluster before the power is removed. If you do not shut down the cluster before turning off input power to the uninterruptible power supply (UPS), the SAN Volume Controller will detect the loss of power and continue to run on battery power until all data held in memory is saved to the internal disk drive. This will increase the time required to make the cluster operational when input power is restored and will severely increase the time required to recover from an unexpected loss of power that might occur before the UPS batteries have fully recharged.

A cluster can be shut down by stopping I/O activity and either pressing the power buttons on the front of each node or by issuing a shutdown command to the cluster.

When input power is restored, it will be necessary to press the power button on the UPS units before pressing the power buttons on the SAN Volume Controller.

Fibre-channel network speed

You can change the speed of the fibre-channel ports on a SAN Volume Controller through the front panel on the SAN Volume Controller node or by a command sent to a SAN Volume Controller cluster using the Ethernet interface.

All fibre-channel ports and nodes on a SAN Volume Controller must operate at the same speed. The default for the port speed is 2 GB per second. If the fibre-channel fabric is using fibre-channel switches that are unable to operate at 2 GB per second, set the SAN Volume Controller fibre-channel port speed to 1 GB per second during the installation procedure. If you must replace a 2 GB per second fibre-channel switch with a 1 GB fibre-channel switch, you must manually switch the SAN Volume Controller fibre-channel port speed before you can use the SAN Volume Controller at 1 GB per second.

If a new SAN Volume Controller node is being added to an existing SAN Volume Controller configuration, you must change the speed setting if the switch is only capable of running at 1 GB per second. If the SAN Volume Controller internal disk drive fails, the fibre-channel speed setting is lost, but the Node Rescue Procedure that you use to restore the SAN Volume Controller software automatically selects the correct speed. If a 1 GB per second fibre-channel switch is being replaced by a 2 GB per second fibre-channel switch, the existing SAN Volume Controller clusters operate at 1 GB per second. You can switch to 2 GB per second any time using the command-line interface.

Determining the fibre-channel port speed

You must determine the fibre-channel port speed for several actions.

The following procedure describes how you can determine the fibre-channel port speed:
1. Select any fibre-channel port from the front panel.
2. To display the fibre-channel speed, press and hold `Down`, then press and release `Select`, and then release `Down`.
3. Press `Select` again to cancel the text display or wait 60 seconds and the text display will cancel by itself.

If the node is in a cluster that is operational, you can also determine the fibre-channel port speed from the cluster VPD by using the following command:

`svcinfo lscluster`*`clustername`*

The port speed is also displayed in the console under Cluster Properties.

Changing the fibre-channel port speed for a node not in a cluster

You must occasionally change the fibre-channel port speed for a node that is not in a cluster.

The following task describes how to change the fibre-channel port speed for a node that is not in a cluster:
1. From the front panel, select any fibre channel port.
2. Press and hold `Down`.
3. Press and release `Select`.
4. release `Down`.

5. Press `Up` or `Down` until the required speed is displayed.
6. Press `Select` to activate the new speed.

Changing the fibre-channel port speed for a node in a cluster

The fibre channel port speed of all nodes in the cluster can be changed by using the `svctask chcluster` command.

This is a customer task and is only available to users who are logged on using the admin ID and password.

Note: Changing the fibre-channel port speed causes all nodes in the cluster to simultaneously perform a warmstart. This causes any I/O activity through the cluster to fail and consequently might cause applications running on hosts to fail.

Cluster identification

A SAN Volume Controller cluster is identified by its IP address.

This address is used to access the cluster when using the SAN Volume Controller graphical user interface or the command-line interface. When a node has been assigned to a cluster, display the cluster IP address on the front panel display by selecting `Cluster` from the menu.

Service mode overview

The service mode allows you to access vital product data (VPD), logs, and dump data on the node. It also provides you with a method of forcing the installation of a different version of software.

A SAN Volume Controller is assigned two IP addresses. The first address is the cluster IP address that is used for all normal configuration and service activity. The second address is not normally active; you can activate the second address for a single SAN Volume Controller by setting it into service mode.

The cluster can only be accessed through its IP address when the SAN Volume Controller nodes have formed into a cluster. If not enough cluster nodes can access each other through the fibre channel fabric or the node is not currently a member of a cluster, the node will be inaccessible through the cluster IP address. The normal repair procedure for cluster access problems is to repair any faults on the fibre channel fabric and repair any nodes that are indicating failure conditions on their front panel displays. If, after performing these repair actions, it is still not possible to access the cluster, it may be necessary to enable service mode to help isolate or repair the problem.

Note: Use service mode only under the direction of your support center. Setting service mode for a node that is in an active cluster might cause data to be lost.

Service mode can only be reset through the web browser or by turning the power to the node off and on.

Related reference

"Recover cluster navigation" on page 62
The Recover cluster menu is accessed through the SAN Volume Controller default menu.

Chapter 2. Overview of the uninterruptible power supply

External uninterruptible power supply (UPS) units provide power to the SAN Volume Controllers.

Unlike the traditional UPS that enables continued operation of the devices that they supply when power is lost, these UPS units are used exclusively to maintain data that is held in the SAN Volume Controller DRAM in the event of an unexpected loss of external power. The UPS units are required to power the SAN Volume Controllers even if the input power source is itself uninterruptible.

Note: The UPS is intended to maintain power on a single SAN Volume Controller until data can be saved to the local hard disk drive. Only SAN Volume Controller nodes can be plugged in to the UPS or the SAN Volume Controller cluster malfunctions. You can only attach one SAN Volume Controller node to the UPS 5115, or two SAN Volume Controller nodes to a UPS 5125, and nothing else. Each SAN Volume Controller cluster requires at least two UPSs in order to function correctly.

Each UPS is connected to the SAN Volume Controllers with a power cable and a signal cable. To avoid the possibility of power and signal cables being connected to different UPS units, these cables are wrapped together and supplied as a single field replaceable unit. The signal cables enable the SAN Volume Controllers to read status and identification information from the UPS.

Each SAN Volume Controller monitors the operational state of the UPS to which it is attached. If the UPS reports a loss of input power, the SAN Volume Controller stops all I/O operations and transfers the contents of its DRAM to the internal disk drive. When input power to the UPS is restored, the SAN Volume Controllers restart and restore the original contents of the DRAM from the data saved on the disk drive.

A SAN Volume Controller is not fully operational until the UPS charge state indicates that it has sufficient capacity to power the SAN Volume Controller long enough to permit it to save all its memory to the disk drive in the event of a power loss. The UPS has sufficient capacity to save all the data on the SAN Volume Controller at least twice. For a fully charged UPS even after battery capacity has been used to power the SAN Volume Controllers while they save DRAM data, sufficient battery capacity remains to enable the SAN Volume Controllers to become fully operational as soon as input power is restored.

Figure 10 on page 30 shows the UPS 5115, while Figure 11 on page 30 shows the UPS 5125. Either or both of these may be installed in your SAN Volume Controller system:
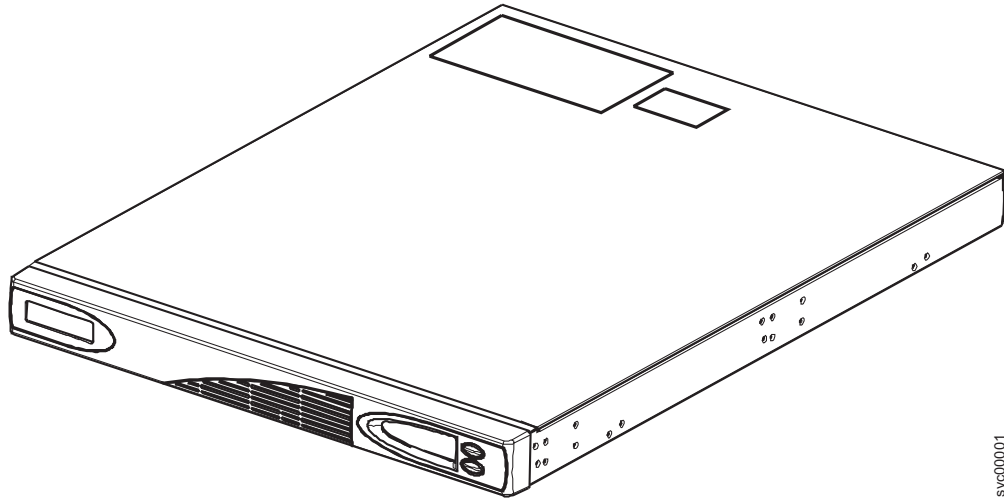
svc00001

Figure 10. Uninterruptible power supply 5115
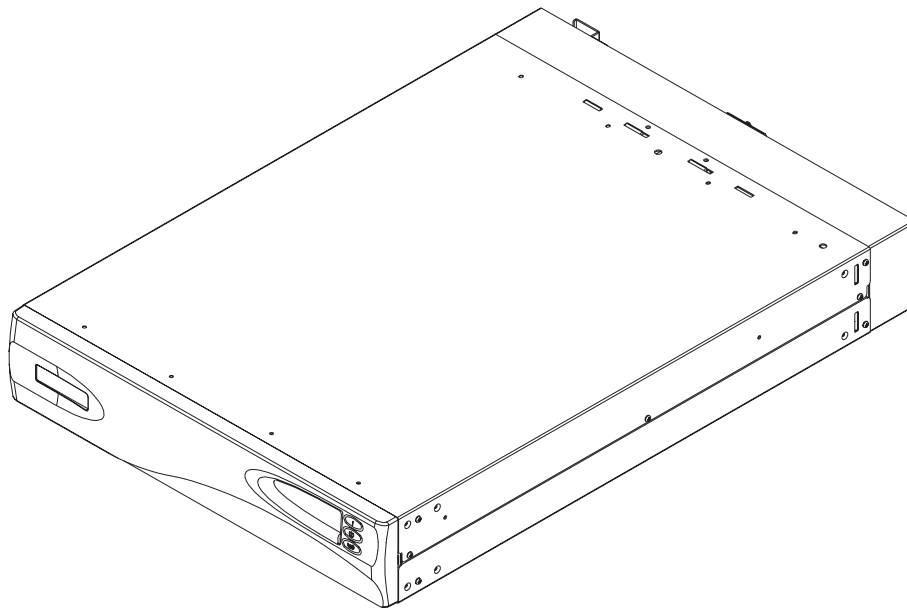
Figure 11. Uninterruptible power supply 5125

Note: The SAN Volume Controller UPS is an integral part of the SAN Volume Controller solution and maintains continuous, SAN Volume Controller-specific communications with its attached SAN Volume Controller nodes. The SAN Volume Controller UPS must be used in accordance with documented guidelines and procedures and must not be used for any other purpose.

Related reference

"Connecting the uninterruptible power supply to the SAN Volume Controller" on page 31
To provide redundancy and concurrent maintenance, you can install the SAN Volume Controllers in pairs.

Connecting the uninterruptible power supply to the SAN Volume Controller

To provide redundancy and concurrent maintenance, you can install the SAN Volume Controllers in pairs.

For connection to the UPS 5115, each SAN Volume Controller of a pair must be connected to only one UPS 5115. You must have one UPS 5115 per SAN Volume Controller.

Note: A cluster can contain no more than eight SAN Volume Controllers. The UPS 5115 must be attached to a source which is:
- Single-phase
- 220-240 V

The UPS 5115 has an integrated circuit breaker and does not need external protection.

For connection to the UPS 5125, each SAN Volume Controller of a pair must be connected to a different uninterruptible power supply (UPS). Each UPS can support two SAN Volume Controllers.

Note: You must have two UPS 5125s per cluster. A cluster can contain no more than eight SAN Volume Controllers. Also, each UPS of a pair must be connected to a separate electrical input power source (if possible) to reduce the chance of input power failure at both UPSs.

The UPS 5125 requires a dedicated branch circuit that meets the following specifications:
- A 15 A circuit breaker must be installed in each branch circuit that supplies the power to a UPS.
- Single-phase.
- 200 - 240 V.

The SAN Volume Controller software determines whether the input voltage to the UPS is within range and sets an appropriate voltage alarm range on the UPS. The software continues to recheck the input voltage every few minutes. If it changes substantially but remains within the permitted range, the alarm limits are readjusted.

Controls and indicators for the uninterruptible power supply 5115

All controls for the uninterruptible power supply 5115 are located on the front panel assembly.
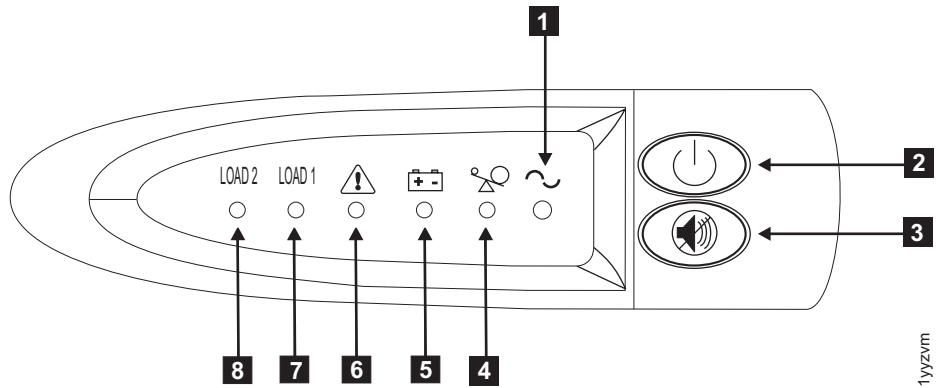
1	Power-on indicator
2	On/off button
3	Test and alarm reset button
4	Overload indicator
5	On-battery indicator
6	Service indicator
7	Load segment 1 indicator
8	Load segment 2 indicator

Related reference

"Power-on indicator" on page 33
The power-on indicator shows when the uninterruptible power supply (UPS)
5115 is functioning.

"On/off button" on page 33
The on/off button turns the power on or off to the uninterruptible power supply
(UPS) 5115.

"Test and alarm reset button" on page 33
Use the test and alarm reset button to start the self-test.

"Overload indicator" on page 33
The overload indicator beeps when the capacity of the uninterruptible power
supply (UPS) 5115 is exceeded.

"On-battery indicator" on page 34
The on-battery indicator glows yellow when the uninterruptible power supply
(UPS) 5115 is powered by the battery. This indicates that the main power source
has failed.

"Service indicator" on page 34
If the service indicator on the uninterruptible power supply (UPS) 5115 is
flashing red, maintenance is required.

"Load segment 1 indicator" on page 34
The load segment 1 indicator on the uninterruptible power supply (UPS) 5115 is
lit (yellow) when power is available to load segment 1.

"Load segment 2 indicator" on page 34
The load segment 2 indicator on the uninterruptible power supply (UPS) 5115 is
lit (green) when power is available to load segment 2.

Power-on indicator

The power-on indicator shows when the uninterruptible power supply (UPS) 5115 is functioning.

When the power-on indicator is a steady green, the UPS 5115 is active.

Related reference

"Controls and indicators for the uninterruptible power supply 5115" on page 31
All controls for the uninterruptible power supply 5115 are located on the front panel assembly.

On/off button

The on/off button turns the power on or off to the uninterruptible power supply (UPS) 5115.

Turning on the uninterruptible power supply 5115

After connecting the UPS 5115 to the outlet, it will be in "standby" mode until you turn it on. Press and hold the on/off button until a beep sounds (approximately two seconds). This indicates that the UPS 5115 is powered on and a self-test is initiated. The UPS 5115 then reverts to "normal" mode.

Turning off the uninterruptible power supply 5115

Press and hold the on/off button for two seconds. This will place the UPS 5115 in "standby" mode. You must then unplug the UPS 5115 to power-off the unit.

Related reference

"Controls and indicators for the uninterruptible power supply 5115" on page 31
All controls for the uninterruptible power supply 5115 are located on the front panel assembly.

Test and alarm reset button

Use the test and alarm reset button to start the self-test.

To start the self-test, press and hold the test and alarm reset button for three seconds. This button also resets the alarm.

Note: This button is applicable to both the uninterruptible power supply (UPS) 5115 and the UPS 5125.

Related reference

"Controls and indicators for the uninterruptible power supply 5115" on page 31
All controls for the uninterruptible power supply 5115 are located on the front panel assembly.

Overload indicator

The overload indicator beeps when the capacity of the uninterruptible power supply (UPS) 5115 is exceeded.

If the overload indicator is on, go to MAP 5200: Uninterruptible Power Supply 5115 to resolve the problem.

Related reference

"Controls and indicators for the uninterruptible power supply 5115" on page 31
All controls for the uninterruptible power supply 5115 are located on the front
panel assembly.

On-battery indicator

The on-battery indicator glows yellow when the uninterruptible power supply (UPS)
5115 is powered by the battery. This indicates that the main power source has
failed.

If the on-battery indicator is on, go to MAP 5200: Uninterruptible Power Supply 5115
to resolve the problem.

Related reference

"Controls and indicators for the uninterruptible power supply 5115" on page 31
All controls for the uninterruptible power supply 5115 are located on the front
panel assembly.

Service indicator

If the service indicator on the uninterruptible power supply (UPS) 5115 is flashing
red, maintenance is required.

If the service indicator is on, go to MAP 5200: Uninterruptible Power Supply 5115 to
resolve the problem.

Related reference

"Controls and indicators for the uninterruptible power supply 5115" on page 31
All controls for the uninterruptible power supply 5115 are located on the front
panel assembly.

Load segment 1 indicator

The load segment 1 indicator on the uninterruptible power supply (UPS) 5115 is lit
(yellow) when power is available to load segment 1.

Note: Load segment 1 is unused by the SAN Volume Controller. When the UPS
5115 is configured by the SAN Volume Controller, this load segment is
disabled. During normal operation, the load segment 1 indicator will be off.

Related reference

"Controls and indicators for the uninterruptible power supply 5115" on page 31
All controls for the uninterruptible power supply 5115 are located on the front
panel assembly.

"Hardware for the uninterruptible power supply 5115" on page 38
Diagrams of the hardware for the uninterruptible power supply (UPS) 5115 are
shown below:

Load segment 2 indicator

The load segment 2 indicator on the uninterruptible power supply (UPS) 5115 is lit
(green) when power is available to load segment 2.

When the load segment 2 indicator is green, the UPS 5115 is running normally and
power is available to this segment.

See "Hardware for the uninterruptible power supply 5115" for the location of the
power outlets for this segment.

Related reference

All controls for the uninterruptible power supply 5115 are located on the front panel assembly.

Diagrams of the hardware for the uninterruptible power supply (UPS) 5115 are shown below:

Controls and indicators for the uninterruptible power supply 5125

All controls for the uninterruptible power supply 5125 are located on the front panel assembly.
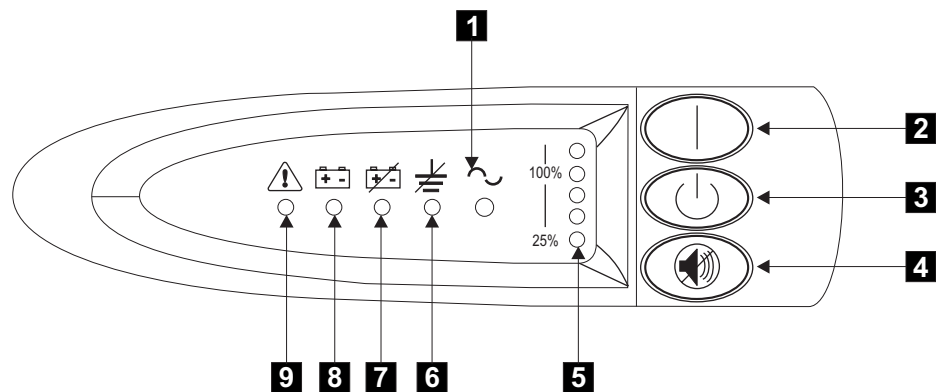
1 Mode indicator

2 On button

3 Off button

4 Test and alarm reset button

5 Load-level indicators

6 Site wiring fault indicators

7 Battery service indicator

8 Battery mode indicator

9 General alarm indicator

Related reference

"Mode indicator" on page 36
The mode indicator provides status information on the uninterruptible power supply (UPS) 5125.

"On button" on page 36
The on button turns on the main power to the uninterruptible power supply (UPS) 5125.

"Off button" on page 36
The off button turns off the main power to the uninterruptible power supply (UPS) 5125.

"Load-level indicators" on page 37
The load-level indicators show the percentage of uninterruptible power supply (UPS) 5125 capacity that the SAN Volume Controller is using.

The site wiring fault indicator on the uninterruptible power supply (UPS) 5125 shows that either a ground wire connection does not exist or the live and neutral wires are reversed in the input power connection.

The battery service indicator shows that the charge in the battery has become low while the uninterruptible power supply (UPS) 5125 is in battery mode.

The battery mode indicator shows that the uninterruptible power supply (UPS) 5125 is operating on batteries.

The general alarm indicator on the uninterruptible power supply (UPS) 5125 turns on when a power or temperature problem occurs.

Mode indicator

The mode indicator provides status information on the uninterruptible power supply (UPS) 5125.

The mode indicator is located on the front panel of the UPS 5125.

When the mode indicator is steady green, the UPS 5125 is in normal mode. The UPS 5125 checks and charges its battery as necessary.

When the mode indicator is flashing green, the UPS 5125 is in standby mode. Standby mode means that the UPS 5125 is turned off, but is still connected to the main power source. No power is available from the UPS 5125 output sockets but the UPS 5125 monitors and charges its battery as necessary.

When the mode indicator is steady red, the UPS 5125 is in bypass mode because of one of the following conditions:
- The UPS 5125 has overheated
- The UPS 5125 has an overload condition of 103% through 110% for 30 seconds
- The UPS 5125 detects a fault in the battery or in the UPS 5125 electronics assembly

When the mode indicator is flashing red and the alarm is sounding, the voltage range setting might not be correct. When a SAN Volume Controller is connected to the UPS 5125, the SAN Volume Controller automatically adjusts the voltage range setting. Take no action for this alarm condition unless it persists for more than five minutes after a SAN Volume Controller has been connected to this UPS 5125 and powered on.

On button

The on button turns on the main power to the uninterruptible power supply (UPS) 5125.

To turn on the power, press and hold the on button until you hear a beep (approximately one second). The mode indicator stops flashing, and the load-level indicators display the percentage of load that is being applied to the UPS 5125.

Off button

The off button turns off the main power to the uninterruptible power supply (UPS) 5125.

Attention: Never use the off button unless you are specifically directed to in the instructions that are given in the publications for the SAN Volume Controller. If you press it at any other time, you might lose data in the cluster if the other UPS 5125 fails.

To turn off the power, press and hold the off button until the long beep stops (approximately five seconds). The mode indicator starts to flash, and the UPS 5125 remains in standby mode until you disconnect the UPS 5125 from the main power outlet.

Load-level indicators

The load-level indicators show the percentage of uninterruptible power supply (UPS) 5125 capacity that the SAN Volume Controller is using.

When all the indicators are lit, the power requirements of the SAN Volume Controller have exceeded the capacity of the UPS 5125.

Site wiring fault indicators

The site wiring fault indicator on the uninterruptible power supply (UPS) 5125 shows that either a ground wire connection does not exist or the live and neutral wires are reversed in the input power connection.

The site wiring fault indicator is located on the front panel of the UPS 5125.

Battery service indicator

The battery service indicator shows that the charge in the battery has become low while the uninterruptible power supply (UPS) 5125 is in battery mode.

The battery service indicator is located on the front panel of the UPS 5125. The alarm continues to beep once every five seconds. The application programs immediately complete and save the work to prevent loss of data. If the UPS 5125 shuts down, it automatically restarts when the main power returns.

Battery mode indicator

The battery mode indicator shows that the uninterruptible power supply (UPS) 5125 is operating on batteries.

The battery mode indicator comes on when the main power source fails and the UPS 5125 is running on battery power. The alarm beeps once every five seconds. When main power returns, the UPS 5125 returns to normal mode, and the battery recharges. The battery mode indicator goes out, and the alarm stops.

General alarm indicator

The general alarm indicator on the uninterruptible power supply (UPS) 5125 turns on when a power or temperature problem occurs.

When the general alarm indicator is accompanied by the audio alarm beeping every 5 seconds, the battery is low. If the audio alarm is continuous, the internal temperature of the UPS 5125 is too high, or there has been a momentary output overload.

Hardware for the uninterruptible power supply 5115

Diagrams of the hardware for the uninterruptible power supply (UPS) 5115 are shown below:

Locations for the uninterruptible power supply 5115 connectors
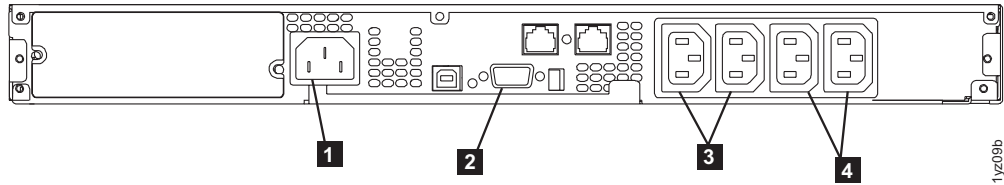
1 Main power connectors

2 Communication port

3 Load segment 1 receptacles

4 Load segment 2 receptacles

Hardware locations for the uninterruptible power supply 5115
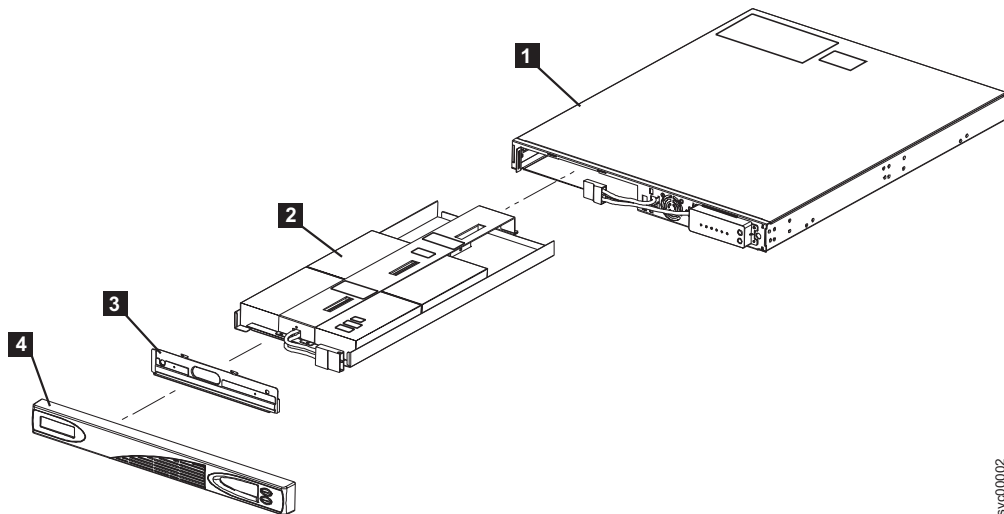
1 Frame assembly

2 Battery pack assembly

3 Battery plate

4 Front panel assembly

Uninterruptible power supply power connector
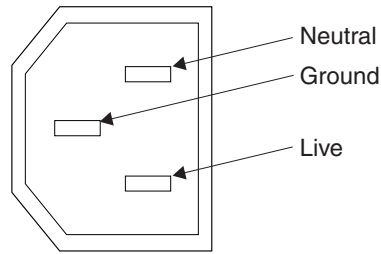
Neutral
Ground
Live

| Part numbers for the different parts and FRUs of the SAN Volume Controller
| and the uninterruptible power supply are available.

Hardware for the uninterruptible power supply 5125

Diagrams of the hardware for the uninterruptible power supply (UPS) 5125 are
shown below:

**Locations for the uninterruptible power supply 5125 connectors and circuit
breakers**
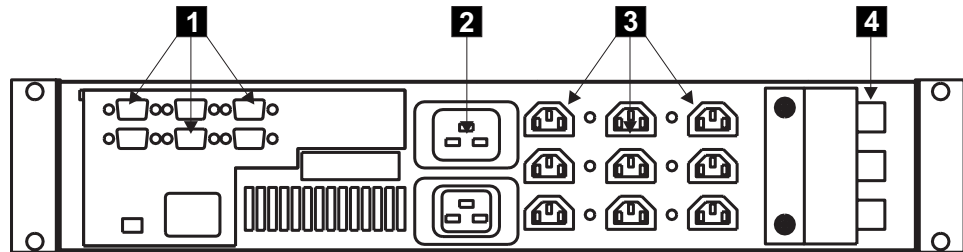
1 Signal cable connectors

2 Main power connector

3 Output connectors

4 Circuit breakers

Hardware locations for the uninterruptible power supply 5125
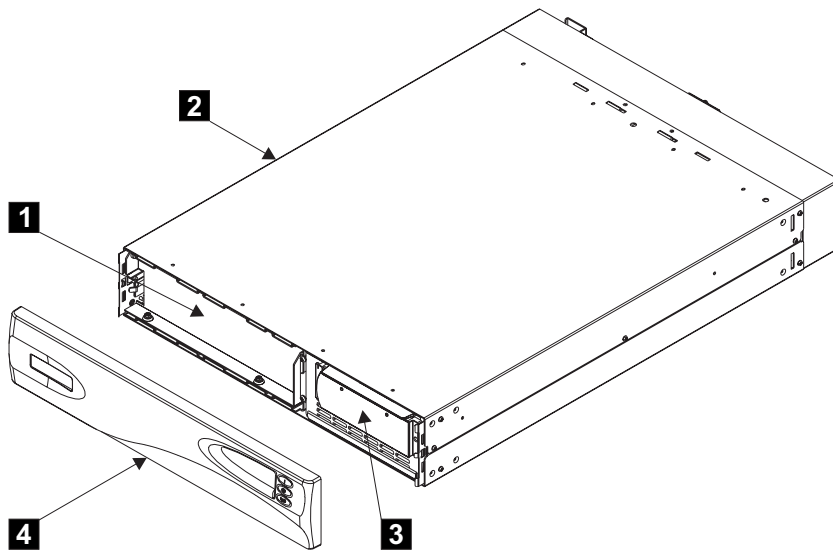
> **1** Battery assembly
>
> **2** Frame assembly
>
> **3** Electronics assembly
>
> **4** Front panel assembly

Uninterruptible power supply connector
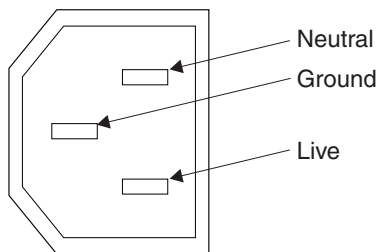
Related information

Appendix A, "Parts catalog," on page 233

Part numbers for the different parts and FRUs of the SAN Volume Controller and the uninterruptible power supply are available.

Preparing your uninterruptible power supply environment

Ensure that your physical site meets the installation requirements for the uninterruptible power supply (UPS).

Use the following considerations when you configure the UPS 5115:

- The voltage that is supplied to the UPS 5115 must be 220 – 240 V, single phase (note that the UPS 5115 has an integrated circuit breaker and does not require external protection).

Use the following considerations when configuring the UPS 5125:

- Each UPS 5125 must be connected to a separate branch circuit.

- A UL listed 15 A circuit breaker must be installed in each branch circuit that supplies power to the UPS 5125.
- The voltage that is supplied to the UPS 5125 must be 200 – 240 V, single phase.
- The frequency supplied must be between 50 and 60 Hz.

Attention: Ensure that you comply with the following requirements for uninterruptible power supplies.

Note: If the UPS is cascaded from another UPS, the source UPS must have at least three times the capacity per phase, and the total harmonic distortion must be less than 5% with any single harmonic being less than 1%. The UPS must also have input voltage capture that has a slew rate faster than 3 Hz per second and 1 msec glitch rejection.

Uninterruptible Power Supply 5115 Dimensions and Weight

Height	Width	Depth	Maximum weight
44 mm (1.73 in.)	439 mm (17.3 in.)	579 mm (22.8 in.)	18.8 kg (41.4 lb.) Packaged

Uninterruptible Power Supply 5125 Dimensions and Weight

Height	Width	Depth	Maximum weight
89 mm (3.5 in.)	483 mm (19 in.)	622 mm 24.5 in.)	37 kg (84 lb.)

AC Input-Voltage Requirements

	UPS 5115	UPS 5125
Power Rating	750 VA/520 W	3000 VA/2700 W
Voltage	220/230/240 V	200 – 240 V
Frequency	50 – 60 Hz	50 – 60 Hz

Environment

	Operating Environment	Non-operating Environment	Storing Environment	Shipping Environment
Air Temperature	0°C – 40°C (32°F – 104°F)	0°C – 40°C (32°F – 104°F)	0°C – 25°C (32°F – 77°F)	−25°C – 55°C (−13°F – 131°F)
Relative Humidity	5% – 95% non-condensing	5% – 95% non-condensing	5% – 95% non-condensing	5% – 95% non-condensing

Altitude

	Operating Environment	Non-operating Environment	Storing Environment	Shipping Environment
Altitude (from sea level)	0 – 2000 m (0 – 6560 ft.)	0 – 2000 m (0 – 6560 ft.)	0 – 2000 m (0 – 6560 ft.)	0 – 15 000 m (0 – 49212 ft.)

Heat output (maximum)

142 watts (485 Btu per hour) during normal operation.

553 watts (1887 Btu per hour) when power has failed and the UPS is supplying power to the nodes of the SAN Volume Controller.

Related reference

"Preparing your SAN Volume Controller environment" on page 18
Before installing the SAN Volume Controller, prepare the physical environment.

Chapter 3. Installing and maintaining the software for the SAN Volume Controller

The software for the SAN Volume Controller is preinstalled on all nodes.

This software includes the following items:
- Operating system
- Application software

Introduction

Because the software is preinstalled, it is not normally necessary to replace the software on a node. However, if the software is lost for some reason (for example, if the hard disk drive in the node fails), it is possible to copy all the software from another node that is connected to the same fibre-channel fabric. This process is known as *node rescue*.

To allow nodes to operate as a cluster, you must run all nodes at the same version of software. This rule is enforced by the cluster software itself. When you attempt to add a node to a cluster its software version is examined, and if it is not running the same version of the software as the other nodes in the cluster, the software revisions are automatically copied from one of the other nodes in the cluster before the add operation is completed. If for some reason it is not possible to update the software on the node that you are adding, the operation fails and the cluster logs an error to explain the cause of the failure.

If the SAN Volume Controller detects software errors, an error code is generated. The additional data logged with the error will indicate the source of the software error. The additional data might look like this:

Assert File /build/lodestone/030129_nd/src/user/vg/vgagentevt.c Line 1234

To view the additional data, you must access the SAN Volume Controller web pages and select the Analyze error log option for the software error that you are investigating. Report the error code and the additional data to your IBM Product Support Center.

If this problem is known for your version of software, the customer will be advised to upgrade to the latest software level. If the problem is not known to the Support Center, you might be asked to provide additional information for this error. In most cases a dump will automatically be taken when the software error is detected.

You can use the command-line interface to list and save dump data. If more than one dump file exists, select the dump file with a time stamp closest to the time stamp on the software error report and save this file for use by the Support Center. You can list dumps using the following commands:
- **svcinfo lserrlogdumps**
- **svcinfo lsconfigdumps**
- **svcinfo lsiostatsdumps**
- **svcinfo lsiotracedumps**
- **svcinfo lsfeaturedumps**
- **svcinfo ls2145dumps**

Secure copy can be used to copy a dump file to the master console.

Related tasks

"Obtaining the software packages"
You can obtain revised software packages from the SAN Volume Controller Web site. Before you request the software package, determine the type of packs and format that you need.

"Determining the version of the software" on page 46
There are two methods you can use to determine the version of the software installed on your SAN Volume Controller.

"Recovering from software installation failures" on page 47
During the automatic software installation process, the installation process is automatically stopped if certain conditions occur. If any node failure is detected or if there is a loss of power to the cluster, the installation process is automatically stopped. After the cluster is fully operational again, an automatic cleanup process is started that returns the cluster software to the state that it was in before the installation process started.

Obtaining the software packages

You can obtain revised software packages from the SAN Volume Controller Web site. Before you request the software package, determine the type of packs and format that you need.

The software packages are available as full packages and as upgrade packages in TAR format and in compact disc image format. The upgrade package contains only the software components that have been replaced since the previous software version. The full package contains all the software packages for that software version.

It might be necessary to replace the operating system software, as well as the SAN Volume Controller application software, for some upgrades. When both packages have to be installed, they are supplied separately. Both packages must be copied to the SAN Volume Controller before the application software is applied.

The TAR files can be installed directly on the SAN Volume Controller. The compact disc image format is suitable for creating a standard ISO format compact disc if it is necessary to deliver a compact disc to the customer site. Software upgrades can only be performed in a strict order. The rules for upgrading from any given version to the latest version are also provided on the Web site.

Perform the following steps to obtain a revised software package:

1. Open your browser and enter the following to access the SAN Volume Controller web site: `www.ibm.com/storage/support/2145`

2. Download the type of software package you need.

Related tasks

"Determining the version of the software" on page 46
There are two methods you can use to determine the version of the software installed on your SAN Volume Controller.

"Recovering from software installation failures" on page 47
During the automatic software installation process, the installation process is automatically stopped if certain conditions occur. If any node failure is detected or if there is a loss of power to the cluster, the installation process is automatically stopped. After the cluster is fully operational again, an automatic

cleanup process is started that returns the cluster software to the state that it was in before the installation process started.

Related reference

The software for the SAN Volume Controller is preinstalled on all nodes.

Installing the software

The software is delivered to you as a single package.

Software package

Cluster software versions comprise a number of software components that are delivered as a single package. Cluster software versions comprise a number of software components that are delivered as a single package. The size of the software update package depends on the number of components that are being replaced by that upgrade package. The software installation procedure involves copying the new software version to the cluster and then starting an automatic installation process. This installation process might take up to an hour to complete and during the process each of the nodes is restarted in turn. Once all the nodes in the cluster have been successfully restarted with the new software the new software version is automatically committed. While each node is being restarted, there might be some degradation in the maximum input/output rate that can be sustained by the cluster.

Installation operation

The installation operation can normally be performed concurrently with normal user I/O operations. If any restrictions apply to the operations that can be performed during the upgrade, then these restrictions will be documented on the SAN Volume Controller web site from where the upgrade package was obtained. During the upgrade operation, only the following SAN Volume Controller commands will be operational from the time the install process starts to the time that the new software is committed or until the process has been backed-out. All other commands will fail with a message indicating that a software upgrade is in progress. In the following commands, xxxx is the object type.

- **svcinfo lsxxxx**
- **svcinfo lsxxxxcandidate**
- **svcinfo lsxxxxprogress**
- **svcinfo lsxxxxmember**
- **svcinfo lsxxxxextent**
- **svcinfo lsxxxxdumps**
- **svcinfo caterrlog**
- **svcinfo lserrlogbyxxxx**
- **svcinfo caterrlogbyseqnum**
- **svctask rmnode**
- **svcservicetask rmnode**

Because of the operational limitations that occur during the upgrade process, the software installation is a customer task.

Related tasks

"Obtaining the software packages" on page 44
You can obtain revised software packages from the SAN Volume Controller Web site. Before you request the software package, determine the type of packs and format that you need.

"Determining the version of the software"
There are two methods you can use to determine the version of the software installed on your SAN Volume Controller.

"Recovering from software installation failures" on page 47
During the automatic software installation process, the installation process is automatically stopped if certain conditions occur. If any node failure is detected or if there is a loss of power to the cluster, the installation process is automatically stopped. After the cluster is fully operational again, an automatic cleanup process is started that returns the cluster software to the state that it was in before the installation process started.

Related reference

Chapter 3, "Installing and maintaining the software for the SAN Volume Controller," on page 43
The software for the SAN Volume Controller is preinstalled on all nodes.

Determining the version of the software

There are two methods you can use to determine the version of the software installed on your SAN Volume Controller.

The software version number is in the format *x.y.z* where *x* is a version release number, *y* is a major number, and *z* is a minor number. For example, version number 1.2.3 has a major number of 2 and a minor number of 3. The significance of this number is that it indicates whether software versions can or cannot be backed-off to the previous version. It is not possible to back-off a version of software to a version that has a lower major number. For example, if version 1.2.3 is running on the cluster it can be replaced with version 1.2.2 or 1.2.1 but it cannot be replaced with version 1.1.6.

During a software upgrade, the version number of each node is updated when the software has been installed and that node has been restarted. The cluster software version number is updated when the new version of software is committed.

The current software version can be obtained from the node or cluster vital product data (VPD).

Perform the following step to determine the version of the software installed using the command-line interface:

Enter the following command on the command-line interface to determine the version of the software that is currently running on the cluster:

```
svcinfo lscluster <cluster_name>
```

where *<cluster_name>* is the name of the cluster. The cluster code level is listed in the code level field. In the following example, cluster rc-cluster-8 is running at code level 1.1.1.0, for example:

```
IBM_2145:admin>svcinfo lscluster rc-cluster-8
id 000002006160EDCC
name rc-cluster-8
```

```
location  local
partnership
bandwidth
cluster_IP_address  9.20.168.48
cluster_service_IP_address  0.0.0.0
total_mdisk_capacity  9.1GB
space_in_mdisk_grps  0
space_allocated_to_vdisks  0
total_free_space  9.1GB
statistics_status  off
statistics_frequency  15
required_memory  4096
cluster_locale  en_US
SNMP_setting  none
SNMP_community
SNMP_server_IP_address  0.0.0.0
subnet_mask  255.255.255.0
default_gateway  9.20.168.1
time_zone  522  UTC
email_setting  none
email_id
code_level  1.1.1.0  (build  0.28.0310210000)
FC_port_speed  2Gb
console_IP  9.20.247.77:9080
id_alias  000002005FC0EDCC
```

Related tasks

"Recovering from software installation failures"
During the automatic software installation process, the installation process is automatically stopped if certain conditions occur. If any node failure is detected or if there is a loss of power to the cluster, the installation process is automatically stopped. After the cluster is fully operational again, an automatic cleanup process is started that returns the cluster software to the state that it was in before the installation process started.

Related reference

Chapter 3, "Installing and maintaining the software for the SAN Volume Controller," on page 43
The software for the SAN Volume Controller is preinstalled on all nodes.

Recovering from software installation failures

During the automatic software installation process, the installation process is automatically stopped if certain conditions occur. If any node failure is detected or if there is a loss of power to the cluster, the installation process is automatically stopped. After the cluster is fully operational again, an automatic cleanup process is started that returns the cluster software to the state that it was in before the installation process started.

The cluster automatically ends the upgrade process if any of the nodes fail to upgrade to the new software level. In this case, any nodes that have already upgraded to the new software level will downgrade back to the original code level. Check the error log to determine the reason for the failure before you attempt to upgrade the cluster again.

Perform the following steps to recover from software installation failures:
1. Resolve any hardware errors in the cluster.

2. Wait for the cleanup process to complete, which is signalled by a message in the event log.
3. Restart the software installation.

Related tasks

"Determining the version of the software" on page 46
There are two methods you can use to determine the version of the software installed on your SAN Volume Controller.

Related reference

Chapter 3, "Installing and maintaining the software for the SAN Volume Controller," on page 43
The software for the SAN Volume Controller is preinstalled on all nodes.

Removing a version of the software

In some cases, you might need to remove a version of software before you can replace the current version of your software with a previous version.

You can only replace versions of software by previous versions if the major number in the software version has not changed. If the major number in the software version has changed, you must remove the current version of the software before you can replace it.

Perform the following steps to replace the current version of your software with a previous version:

1. Determine the current level of the software.
2. Determine whether the major number in the current level of the software has changed.
3. If the major number in the current level of the software has not changed, you can replace it with a previous version of the software using the normal software upgrade procedures.
4. If the major number in the current level of the software has changed (has a lower major number), contact your IBM support center.

Related tasks

"Obtaining the software packages" on page 44
You can obtain revised software packages from the SAN Volume Controller Web site. Before you request the software package, determine the type of packs and format that you need.

"Determining the version of the software" on page 46
There are two methods you can use to determine the version of the software installed on your SAN Volume Controller.

"Recovering from software installation failures" on page 47
During the automatic software installation process, the installation process is automatically stopped if certain conditions occur. If any node failure is detected or if there is a loss of power to the cluster, the installation process is automatically stopped. After the cluster is fully operational again, an automatic cleanup process is started that returns the cluster software to the state that it was in before the installation process started.

Related reference

Chapter 3, "Installing and maintaining the software for the SAN Volume Controller," on page 43
The software for the SAN Volume Controller is preinstalled on all nodes.

Chapter 4. Introducing the vital product data

Vital product data (VPD) is information that uniquely defines each element in the SAN Volume Controller.

Prerequisites

The VPD for the SAN Volume Controller is maintained at the cluster level. For each SAN Volume Controller node, the VPD includes the following items:
- Installed software version
- Details of the hardware configuration
- Levels of the hardware
- FRU part numbers
- FRU microcode levels
- Firmware and software component levels
- VPD for the uninterruptible power supply that is powering the node
- Committed software level
- Details of the cluster configuration

You can view the VPD through the SAN Volume Controller graphical user interface or command-line interface. VPD is updated when a cluster is initialized (powered on), a new node is added to the cluster, or a missing node is reconfigured into the cluster.

See "Understanding the fields for the node VPD" for information about the fields for the system board, processor, processor cache, memory module, fibre-channel adapter card, SCSI and IDE devices, software, front panel assembly, and uninterruptible power supply. See "Understanding the fields for the cluster VPD" on page 52 for information about the fields for the cluster.

Displaying the VPD

You can use the command-line interface to display the SAN Volume Controller cluster or node vital product data (VPD).

Use the following command-line interface commands to display the VPD:

svcinfo lsnodevpd *nodename*

svcinfo lscluster *clustername*

For more information about the commands, see the *IBM TotalStorage SAN Volume Controller: Command-Line Interface User's Guide*.

Understanding the fields for the node VPD

The fields for the node vital product data are listed below.

Table 1 shows the fields you see for the system board.

Table 1. Fields for the system board

Item	Field name
System board	Part number
	System serial number
	Number of processors
	Number of memory slots
	Number of fans
	Number of fibre-channel cards
	Number of SCSI or IDE devices **Note:** The service controller is an IDE device.
	BIOS manufacturer
	BIOS version
	BIOS release date
	System manufacturer
	System product
	Planar manufacturer
	Power supply part number
	CMOS battery part number
	Power cable assembly part number
	Service processor FW

Table 2 shows the fields you see for each processor that is installed.

Table 2. Fields for the processors

Item	Field name
Processor	Processor location
	Number of caches
	Manufacturer
	Version
	Speed
	Status

Table 3 shows the fields that are repeated for each cache installed on each processor.

Table 3. Fields that are repeated for cache installed on each processor

Item	Field name
Processor cache	Type of cache
	Size of cache (KB)

Table 4 shows the fields that you see for each fan that is installed.

Table 4. Fields for the fans

Item	Field name
Fan	Part Number
	Location

Table 5 shows the fields that are repeated for each installed memory module.

Table 5. Fields that are repeated for each installed memory module

Item	Field name
Memory module	Part number
	Device location
	Bank location
	Size (MB)

Table 6 shows the fields that are repeated for each installed fibre-channel adapter card.

Table 6. Fields that are repeated for each fibre-channel adapter card that is installed

Item	Field name
Fibre adapter card	Part number
	Port numbers
	Device serial number
	Manufacturer
	Device

Table 7 shows the fields that are repeated for each SCSI and IDE device that is installed.

Table 7. Fields that are repeated for each SCSI and IDE device that is installed

Item	Field name
Device	Part number
	Bus
	Device
	Device vendor **Note:** Not provided for the service controller.
	Model
	Revision
	Serial number
	Approximate capacity

Table 8 shows the fields that are specific to the node software.

Table 8. Fields that are specific to the node software

Item	Field name
Software	Code level
	Node name
	Ethernet status
	Worldwide Node Name
	ID

Table 9 shows the fields that are provided for the front panel.

Table 9. Fields that are provided for the front panel

Item	Field name
Front panel	Part number
	Front panel ID
	Front panel locale

Table 10 shows the fields that are provided for the uninterruptible power supply (UPS) assembly that is powering the node.

Table 10. Fields that are provided for the uninterruptible power supply assembly that is powering the node

Item	Field name
UPS	Electronics assembly part number
	Battery part number
	UPS assembly part number
	Input power cable part number
	UPS serial number
	UPS type
	UPS internal part number
	UPS unique ID
	UPS main firmware
	UPS communications firmware

Related reference
"Understanding the fields for the cluster VPD"
The fields for the cluster vital product data (VPD) are listed below.

Understanding the fields for the cluster VPD

The fields for the cluster vital product data (VPD) are listed below.

Table 11 shows the fields that are provided for the cluster.

Table 11. Fields that are provided for the cluster

Item	Field name
Cluster	ID **Note:** This is the unique identifier for the cluster.
	Name
	Location
	Partnership
	Bandwidth
	Cluster IP address
	Cluster service IP address
	Total mdisk capacity
	Space in mdisk_grps
	Space allocated to VDisks
	Total free space
	Statistics status
	Statistics frequency
	Required memory
	Cluster locale
	SNMP setting
	SNMP community
	SNMP service IP address
	Subnet mask
	Default gateway
	Time zone
	Email Setting
	Email ID
	Code level
	Fibre-channel port speed
	Console IP
	ID Alias

Related reference

"Understanding the fields for the node VPD" on page 49
The fields for the node vital product data are listed below.

Chapter 5. Using the front panel of the SAN Volume Controller

The front panel of the SAN Volume Controller displays indicators and switches that are useful when servicing your SAN Volume Controller.

Descriptions for the front panel of the SAN Volume Controller

The front panel displays configuration and service information about the SAN Volume Controller and the SAN Volume Controller cluster.

The information you see can be one of the following items:
- Hardware boot
- Node rescue request
- Boot progress
- Boot failed
- Powering off
- Restarting
- Shutting down
- Power failure
- Error codes

Hardware boot

The hardware boot display shows system data when power is first applied to the node as the node searches for a disk drive to boot.

If this display remains active for longer than 3 minutes, there might be a problem.

Node rescue request

If software is lost, you can use the node rescue process to copy all software from another node.

Figure 12 on page 56 shows that a request has been made to exchange the software on this node. The SAN Volume Controller software is preinstalled on all SAN Volume Controller nodes. This software includes the operating system, the application software, and the SAN Volume Controller publications. It is not normally necessary to replace the software on a node, but if the software is lost for some reason, for example if the hard disk drive in the node fails, it is possible to copy all the software from another node connected to the same fibre channel fabric. This process is known as node rescue.

Figure 12. Node-rescue-request display

Boot progress indicator

Boot progress is displayed on the front panel of the SAN Volume Controller.

Figure 13 shows that the node is starting.

Booting   130

Figure 13. Boot progress display

During the boot operation, boot progress codes are displayed and the progress bar moves to the right while the boot operation proceeds.

Boot failed

If the boot operation fails, a boot code is displayed.

Failed   180

See "Understanding the boot codes" of the *IBM TotalStorage SAN Volume Controller: Service Guide* for the boot codes, a description of the failure, and the appropriate steps you must perform to correct the failure.

Powering off

The progress bar on the display shows the progress of the power-off operation.

Figure 14 shows that the power button has been pressed and the node is powering off. Powering off may take several minutes.

Powering Off

Figure 14. Powering-off display

The progress bar moves backward when the power is removed.

Restarting

The front panel indicates when the software on a node is restarting.

```
Restarting
   ▬▬▬▬▬▬▬▬▬    ▬▬▬▬▬
```

The software is restarting for one of the following reasons:
- An internal error was detected
- A power-off operation was ended when the power button was pressed again while the node was powering off

If a power-off operation was ended, the progress bar continues to move backward until the node finishes saving its data. After the data is saved, the progress bar moves forward during the restart operation.

Shutting down

The front panel indicator tracks shutdown operations.

Figure 15 is an example of what the front panel indicator shows when you issue a shutdown command to a SAN Volume Controller cluster or a SAN Volume Controller node. The progress bar continues to move left until it is safe to be powered off. When the shutdown operation is complete, all power will be removed from the node. When power has been removed from the last node that is connected to the uninterruptible power supply (UPS), the UPS also will be shut down.

```
Shutting Down
   ▬▬▬▬▬▬▬▬▬    ▬▬▬▬▬
```

Figure 15. Shutting down display

Power failure

The SAN Volume Controller runs on battery power when main power is lost.

Figure 16 on page 58 shows that the SAN Volume Controller is running on battery power because main power has been lost. All I/O operations have stopped. The node is saving cluster metadata and the node cache data to the internal disk drive. When the progress bar reaches zero, the node will power off.

Note: When input power is restored to the uninterruptible power supply, the SAN Volume Controller is turned on without the front panel power button being pressed.

Figure 16. Power failure display

Error codes

If more than one error occurs during an operation, the highest priority error code displays on the front panel.

The lower the number for the error code, the higher the priority. For example cluster error code 1020 has a higher priority than cluster error code 1370.

Related reference

"Understanding the error codes" on page 74
Error codes are generated for the SAN Volume Controller by the system error-log analysis and system configuration code.

Related information

"Understanding the node error codes" on page 119
Node error codes are displayed on the display screen by node software.

SAN Volume Controller menu options

During normal node operation, the default menu sequence is operational. This menu sequence enables you to review the operational status of the cluster, the node, and the external interfaces. It also provides access to the tools that you need to install and service the node.

Menu sequence

Figure 17 shows the default menu sequence. Only one field at a time can be displayed on the menu screen.
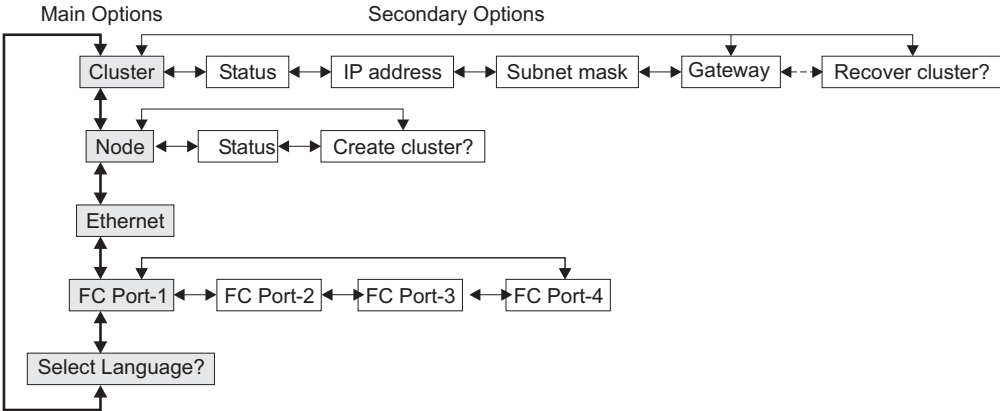
Figure 17. Default menu sequence

Use the Up and Down buttons to navigate through the main fields in this menu:
• Cluster
• Node
• Ethernet

- Fibre-channel port-1
- Select language

Use the Left and Right buttons to navigate through the secondary fields that are associated with some of the main fields.

Note: Sometimes a message might not display fully on the screen. You might see a right angle bracket (>) in the right side of the display screen. If you see a right angle bracket, press the `right` arrow button to scroll through the display. This action displays the rest of the text. Press `left` arrow button to scroll back. When there is no more text to display, you can move to the next item in the menu by pressing the `right` arrow button.

Related tasks

"Navigating through the change language menu" on page 66
The Change language menu is accessed through the SAN Volume Controller default menu.

Related reference

"Cluster"
The cluster field contains the cluster name that the user has assigned.

"Node" on page 60
This field contains the identification number of the SAN Volume Controller or the name of the SAN Volume Controller if the user has assigned a name.

"Ethernet option" on page 61
The Ethernet option displays the operational states of the Ethernet port.

"Fibre channel port-1 through 4 option" on page 61
The FC port-1 through 4 options display the operational status of the fibre channel ports.

"Selecting the Language" on page 61
The field for `Select Language?` allows you to use the select language feature to install an alternative national language onto the front panel.

"Create cluster menu navigation" on page 63
The Create cluster menu is accessed through the SAN Volume Controller default menu.

Cluster

The cluster field contains the cluster name that the user has assigned.

Status

This field is blank if this SAN Volume Controller is not a member of a cluster. If this SAN Volume Controller is a member of a cluster, the field indicates the operational status of the cluster, as follows:

Active Indicates that this SAN Volume Controller is an active member of the cluster.

Inactive
Indicates that the SAN Volume Controller is a member of a cluster, but is not now operational. It is not operational either because the other SAN Volume Controllers that are in the cluster cannot be accessed, or because this SAN Volume Controller has been excluded from the cluster.

Degraded
Indicates that the cluster is operational, but one or more of the member SAN Volume Controllers are missing or have failed.

IP Address

This field contains the existing Ethernet IP address of the cluster. You use this address to access the cluster from the command line tools or from a web browser. If this SAN Volume Controller is not a member of a cluster, this field is blank.

Subnet Mask

This field contains the existing Ethernet IP address of the cluster. You use this address to access the cluster from the command line tools or from a web browser. If this SAN Volume Controller is not a member of a cluster, this field is blank.

Gateway

This field is set during the create-cluster operation.

Recover Cluster

This field allows you to select two cluster recovery options. One is to recover from a lost administrator password and the other is to make the node accessible via the service password. Press `select` to go to the Recover cluster menu.

Related reference

"Recover cluster navigation" on page 62
The Recover cluster menu is accessed through the SAN Volume Controller default menu.

Node

This field contains the identification number of the SAN Volume Controller or the name of the SAN Volume Controller if the user has assigned a name.

See ″Node identification″ and ″Cluster identification.″

Status

This field helps you to isolate failures that cause a cluster to be unavailable. It indicates the operational state of the node, as follows:

Active	The SAN Volume Controller is operational and assigned to a cluster. It has access to the fibre-channel fabric.
Inactive	The SAN Volume Controller is operational and assigned to a cluster. It does not have access to the fibre-channel fabric.
Free	The SAN Volume Controller is operational, but has not been assigned to any cluster. It has access to the fibre-channel fabric.
Disconnected	The SAN Volume Controller is operational, but has not been assigned to any cluster. It has no access to the fibre-channel fabric.
Failed	The SAN Volume Controller is not operational. A hardware fault is preventing the SAN Volume Controller from being part of a cluster.

Create Cluster

This field allows you to create a new SAN Volume Controller cluster. Press `select` to go to the create cluster menu. See "Hardware boot."

Related reference

A SAN Volume Controller cluster is identified by its IP address.

The node identification label on the front panel displays a six-digit node identification number.

The Create cluster menu is accessed through the SAN Volume Controller default menu.

Ethernet option

The Ethernet option displays the operational states of the Ethernet port.

When a cluster is created, only one node's Ethernet port becomes active for cluster configuration. If the node which has the active port fails, then another node in the cluster will open its Ethernet port and gain configuration access to that cluster.

Active	The cluster is accessible through this port.
Inactive	The port is operational, but it cannot access the cluster. This port can be used to access the cluster if the cluster's active port fails.
Failed	The port is not operational.

Fibre channel port-1 through 4 option

The FC port-1 through 4 options display the operational status of the fibre channel ports.

Active	The port is operational and can access the fibre channel fabric.
Inactive	The port is operational, but cannot access the fibre channel fabric. One of the following conditions exists: • The fibre channel cable has failed. • The fibre channel cable is not installed. • The device that is at the other end of the cable has failed.
Failed	The port is not operational because of a hardware failure.
Not installed	This port is not installed.

To display the current fibre-channel port speed, press and hold the down button, then press the select button, and release the down button. This action also allows you to change the fibre-channel port speed.

Selecting the Language

The field for `Select Language?` allows you to use the select language feature to install an alternative national language onto the front panel.

Press `Select` to go to the `Change language` menu.

Related tasks

The Change language menu is accessed through the SAN Volume Controller default menu.

Recover cluster navigation

The Recover cluster menu is accessed through the SAN Volume Controller default menu.

Use the recover cluster option (see Figure 18) if the user has lost the administrator password or if the user is unable to access the cluster. If it is permitted by the user's password security policy, use this selection to reset the administrator password. Alternatively, use this selection to set the node into service mode. This makes the node available through the service IP address.

Select `Service Access` by pressing the select button after you access the Recover Cluster? menu (refer to SAN Volume Controller menu options).

```
┌──────────────────┐
│ Recover Cluster? │
└──────────────────┘
   │
   │ Select
   │
┌────────────────┐
│ Service Access │
└────────────────┘
```
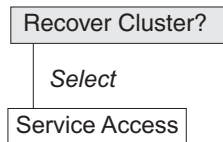
Figure 18. Recover cluster navigation

Resetting the password

To reset the administrator password on the cluster, complete the following steps from the Service Access? menu:
1. Press and hold the up button.
2. Press and release the select button.
3. Release the up button.

If your password security policy permits password recovery and if the node is currently a member of a cluster, the administrator password is reset and a new password is displayed for 60 seconds. If your password security policy does not permit password recovery or the node is not a member of a cluster, completing these steps has no effect.

Setting service mode
1. This function is capable of degrading the operation of a working cluster. Use it only to recover from a problem that is making the cluster inaccessible.
2. All SAN Volume Controllers share the same Service IP address. Set only one SAN Volume Controller at a time on the LAN in service mode. Setting more than one SAN Volume Controller in service mode might result in a LAN failure.

To set service mode, complete the following steps from the Service Access? menu:
1. Press and hold the down button.
2. Press and release the select button.
3. Release the down button.

The node restarts and service mode is enabled. The service IP address is displayed and the node can be accessed using this address. All other buttons on the front panel are disabled while service mode is active. The service address continues to be displayed on the front panel until service mode is reset by a command sent to the service IP address, or until the power to the node is turned off and on.

Note: If you are using the service mode, you need only do this on one node at a time. Be sure to disable service mode before continuing on to other nodes.

Service IP address

You can access the service mode with the SAN Volume Controller application using the following Web address, where *serviceipaddress* is the IP address on the front panel display:

```
https://serviceipaddress
```

The service IP address displays while service access is enabled. All other buttons on the front panel are disabled. You can disable service access through the Web browser, or by power cycling the node.

Create cluster menu navigation

The Create cluster menu is accessed through the SAN Volume Controller default menu.

Figure 19 shows the create cluster menu sequence. Only one field at a time can be displayed on the menu screen. The arrows show the sequences that wrap automatically.
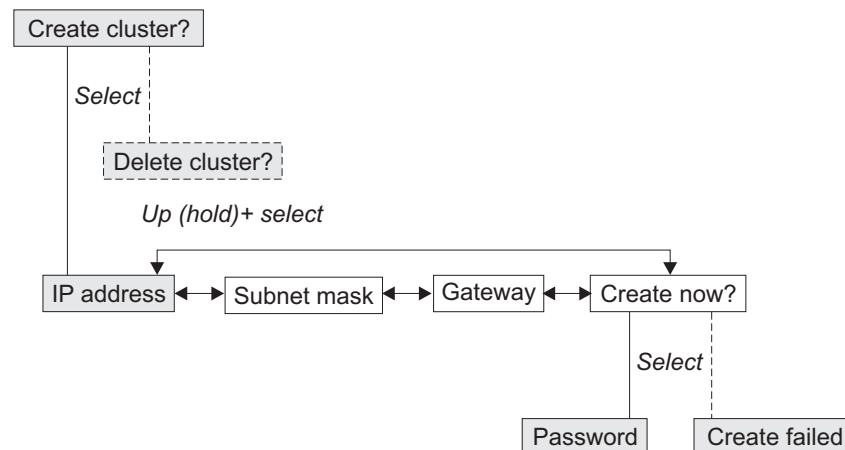
Figure 19. Create-cluster navigation menu sequence

Use the Left and Right buttons to navigate through the secondary fields that are associated with some of the main fields.

Related reference

"SAN Volume Controller menu options" on page 58
During normal node operation, the default menu sequence is operational. This menu sequence enables you to review the operational status of the cluster, the node, and the external interfaces. It also provides access to the tools that you need to install and service the node.

Deleting the cluster

The field for `Delete Cluster` is displayed only if you select `Create Cluster?` on a SAN Volume Controller that is already a member of a cluster.

Normally, you use the command line or the graphical user interface to delete a cluster. However, if you cannot use the command line or graphical user interface, you can use `Delete Cluster` to force the deletion of a node from a cluster. To delete the node from the cluster, press and hold `Up`, press and release `Select`, and then release `Up`. The SAN Volume Controller is deleted from the cluster, and the node is restarted. The display will then return to the default menu. The create cluster option must be selected again to start the create option.

Use the Up and Down buttons to return to the Default menu

IP address

You can display and change the IP address of the cluster during the initial process that creates the cluster.

Perform the following steps to set the IP address of the new cluster, during the initial cluster creation process:

1. Press the Select button. The first IP address number field is highlighted. You have reached this position because you are following the Create cluster menu navigation steps. At this stage, you are presented with a panel that allows you to set the cluster IP address.

2. Use the `Up` Button if you want to increase the value that is displayed in the highlighted field. Use the `Down` button if you want to decrease that value. Press and hold the `Up` or `Down` buttons if you want a fast increase or decrease of the value.

3. Use the `Right` and `Left` buttons to move to the number field that you want to update.

4. Repeat steps 2 and 3 for each number field that you want to update.

5. Press the Select button to complete the change.

You can now use the **Left** and **Right** buttons to navigate between the other fields.

Subnet mask
If you must change the subnet mask, ensure that you type the correct mask. Otherwise, you cannot access the cluster from the Web interface or the command line.

Perform the following steps to change the subnet mask:

1. Press the Select button. The first subnet mask number field is highlighted.

2. Use the Up button if you want to increase the value that is displayed in the highlighted field. Use the Down button if you want to decrease that value. Press and hold the `Up` or `Down` buttons if you want a fast increase or decrease of the value.

3. Use the Right and Left buttons to move to the number field that you want to update.

4. Repeat steps 2 and 3 for each number field that you want to update.

5. Press the Select button to complete the change.

   Related tasks

   "Gateway" on page 65
   If you must change the gateway address, ensure that you type the correct address. Otherwise, you cannot access the cluster from the Web interface or command line.

   Related reference

"Create now"
Create Now allows you start an operation to create a cluster.

Gateway

If you must change the gateway address, ensure that you type the correct address. Otherwise, you cannot access the cluster from the Web interface or command line.

Perform the following steps to change the gateway address:

1. Press the Select button. The first gateway address number field is highlighted.
2. Use the Up button if you want to increase the value that is displayed in the highlighted field. Use the Down button if you want to decrease that value. Press and hold the Up or Down buttons if you want a fast increase or decrease of the value.
3. Use the Right and Left buttons to move to the number field that you want to update.
4. Repeat steps 2 and 3 for each number field that you want to update.
5. Press the Select button to complete the change.

   Related tasks

   "Subnet mask" on page 64
   If you must change the subnet mask, ensure that you type the correct mask. Otherwise, you cannot access the cluster from the Web interface or the command line.

Create now

Create Now allows you start an operation to create a cluster.

Press Select to start the operation. Use the Up and Down buttons to return to the Default menu.

Password

If the create operation is successful, **Password** is displayed in line 1 of the menu screen. The password that you can use to access the cluster is displayed in line 2.

Note: Record the password because you will need the password when you access the cluster through the Web browser. You cannot access the cluster through the Web browser while the password is being displayed.

Create Failed

If the create operation fails, **Create Failed** is displayed in line 1 of the menu screen. An error code is displayed in line 2.

   Related tasks

   "Subnet mask" on page 64
   If you must change the subnet mask, ensure that you type the correct mask. Otherwise, you cannot access the cluster from the Web interface or the command line.

   "Gateway"
   If you must change the gateway address, ensure that you type the correct address. Otherwise, you cannot access the cluster from the Web interface or command line.

Password

The password is displayed for only 60 seconds, or until you select the up, down, left, or right arrow button. You will need this password when you first attempt to access the cluster.

Create failed

If the create operation fails, Line 2 of the menu screen will contain an error code that you can use to isolate the cause of the failure.

Navigating through the change language menu

The Change language menu is accessed through the SAN Volume Controller default menu.

Use the Left and Right buttons to select the national language that you want. When the required language is displayed, press the Select button. Figure 20 shows an illustration of what is displayed on the front panel when you want to select a language.

Figure 20. Change language navigation sequence

The following languages are available:
- English
- French
- German
- Italian
- Japanese
- Korean
- Brazilian Portuguese
- Spanish
- Chinese (simplified)
- Chinese (traditional)

If you do not understand the language that is displayed on the menu screen, wait for at least 60 seconds until the default menu is displayed. Perform the following steps to select the required language:

1. Press the Up button once.
2. Press the Select button once. If the display changes go to step 5.
3. Press the Up button once.
4. Press the Select button once.
5. Press the Right button until your selected language displays.
6. Press Select.

Chapter 6. Diagnosing problems with the SAN Volume Controller, the uninterruptible power supply, and the master console

You can diagnose problems with SAN Volume Controller, the uninterruptible power supply, and the master console using either the command-line interface (CLI) or the SAN Volume Controller Console.

Error logs

By understanding the error log, you can do the following:
- Manage the error log
- View the error log
- Describe the fields in the error log

Error codes

By understanding the error codes, you can do the following:
- Use the error code tables
- Define the FRU names
- Understand the cluster error codes
- Determine a hardware boot failure
- Understand the boot error codes
- Perform the node rescue
- Understand the node rescue error codes
- Understand the create cluster error codes
- Check the status of the node
- Mark errors as fixed
- Check the status of the node port
- List managed disks
- Understand managed disk status
- Include managed disks
- Understand managed disks mode
- Perform cluster discovery
- Understand managed disk group status
- Determine disk controller status
  Related tasks
  "MAP 5000: Start" on page 130
  MAP 5000: Start is the entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

Understanding the error log

The SAN Volume Controller contains both error and event data.

Error data

Error data is logged when a failure condition has been detected. When error data is logged, an error log analysis is performed to determine if the user should be notified of the condition.

Event data

Event data is logged when a configuration event has occurred.

Managing the error log

The error log has a limited size and once it is full, newer entries replace the oldest entries. If the old entry has not been fixed, it will not be replaced by newer entries.

To avoid the possibility of an error condition causing the log to be flooded by a single error, some errors of the same type are recorded in the same space in the error log. When error log entries are coalesced in this way, the time stamp of the first occurrence and the last occurrence of the problem is saved in the log entry. A count of the number of times the error condition has occurred is also saved in the log entry. If a new entry is the same as the type that you made more than 25 hours after the first entry, then a new error record is opened.

Related tasks
"MAP 5000: Start" on page 130
MAP 5000: Start is the entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

Viewing the error log

You can view the error log by using the SAN Volume Controller command-line interface or the SAN Volume Controller Console.

To view the full contents of each error log entry, perform the following steps:

1. Use the `svctask dumperrlog` command to create dump file that contains the current error log data.
2. Use `svcinfo lserrlogdumps` to determine the name of the dump file that you have just created.
3. Use `Secure copy` to copy the dump file to the master console.

The file can then be displayed with a text viewer.

Figure 21 on page 69 shows an example of an error log entry that might be displayed:

```
Error Log Entry 21
  Node Identifier       : node3
  Object Type           : adaptor
  Object ID             : 1
  Sequence Number       : 174
  Root Sequence Number  : 174
  First Error Timestamp : Tue Apr 22 16:02:18 2003
                        : Epoch + 1051027338
  Last Error Timestamp  : Tue Apr 22 16:02:18 2003
                        : Epoch + 1051027338
  Error Count           : 1
  Error ID              : 73003 : More/Less fibre channel ports operational
  Error Code            : 1060 : Fibre Channel ports not operational
  Status Flag           : UNFIXED
  Type Flag             : ERROR CAT 1

02 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

Figure 21. Example of an error log entry when you use the command-line interface

Figure 22 on page 70 shows an example of an error log summary that is displayed when you select the type of information that you want.
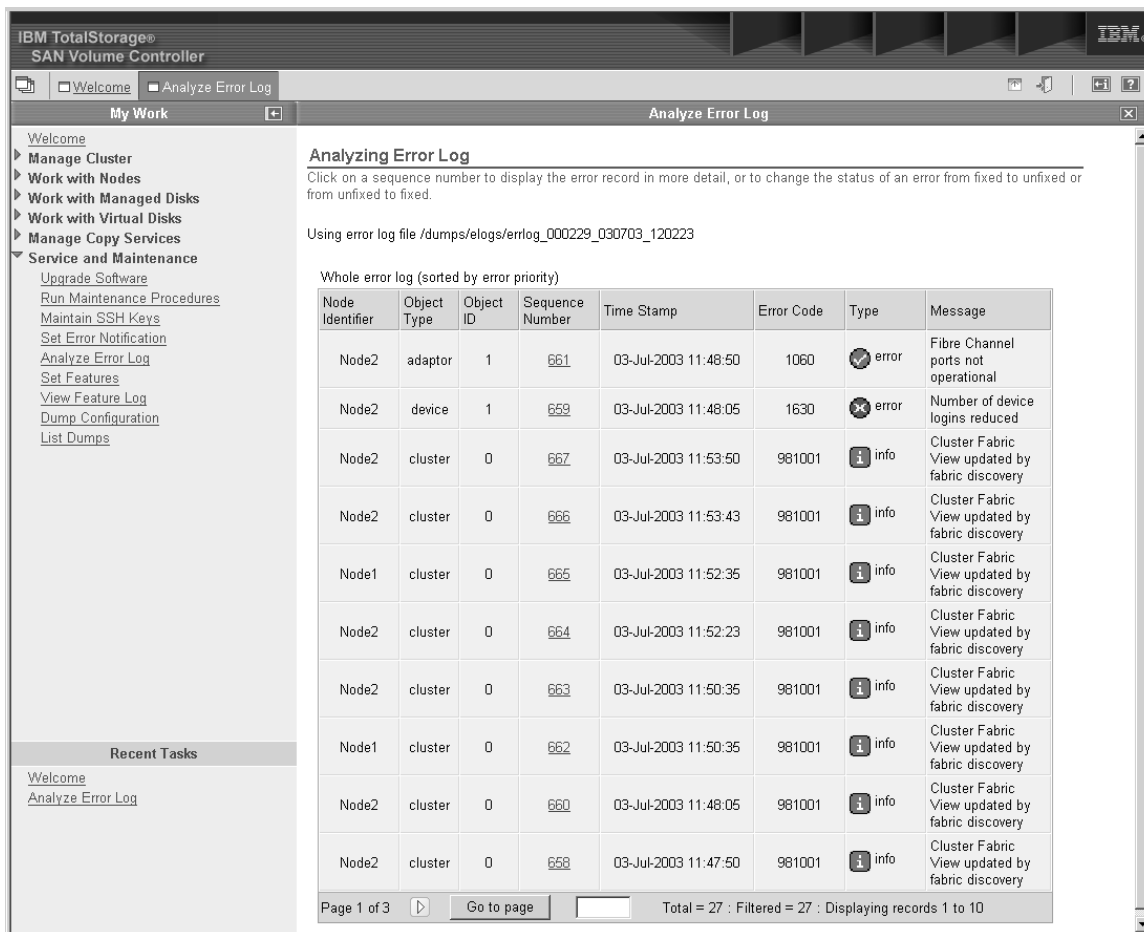
Figure 22. Example of an Error Log Summary

Details of each listed error can be displayed by clicking on the sequence number of any record. The Type field contains an icon and a text message to indicate the cause of the log entry. Table 12 describes the meaning of the information in the type field.

Table 12. Descriptions of Log Entry Icons

Icon	Description
	The Error icon indicates that this log entry requires service activity. Select Run Maintenance Procedures from the Service and Maintenance menu to start the repair activity,
	The Fixed icon indicates that a problem existed but has now been resolved. It might have been resolved as a result of service activity or it might have been resolved as a result of some other action, for example powering on a missing node.

Table 12. Descriptions of Log Entry Icons (continued)

Icon	Description
⚠	The Warn icon indicates that some condition has occurred that might have been caused by a temporary problem or by a problem that is external to the SAN Volume Controller, such as an error in a RAID controller. If a specified number of these events occurs in 25 hours, the warning converts to an error. No service action is required on the SAN Volume Controller for this log entry.
ℹ	The Info icon indicates that the log entry provides information about a configuration change or the state of a command. In some cases, the SAN Volume Controller user might need to take some action based on this information.

Describing the fields in the error log

The error log includes fields with information you can use to diagnose problems.

Table 13 describes the fields you see in the figures in ″Viewing the error log.″

Table 13. Description of data fields for the error log

Data field	Description
Node identifier	The name of the node that created the error report.
Object type	The object type to which the error log relates. See Table 14 on page 72.
Object ID	A number that uniquely identifies the object on this node.
Sequence number	A sequentially assigned number that can be used to provide a cross reference to sense data returned to host systems.
Root sequence number	The sequence number of another log entry that enables all errors that have a single source to be marked as fixed by a single action.
First error timestamp	The time when the first instance of this error code was reported by this object type in the last 25 hours.
Last error timestamp	The time when the last instance of this error code was reported by this object type in the last 25 hours.
Error count	The number of times that this error code has been reported by this object in the last 25 hours.
Error ID	This number is a unique identifier for the error or event.
Error code	This number is used as the starting point for service procedures.
Status flag	For details of the status flag. See Table 15 on page 72.
Type flag	For details of the type flag. See Table 17 on page 73.
Additional sense data	Data specific to this error or event code. This is a binary data record. When the error log is viewed using the command line tools, this data is shown in hex. When the data is viewed using the Web interface, this data is translated to ASCII characters on the right side of the page. You are not normally required to interpret this data as part of the service procedures. However, any procedures that do refer to the this data will describe the ASCII format.

Table 14 describes the types of error log objects.

Table 14. Description of object types and object IDs for the error log

Object type	Object ID
Node	The six character node ID
Fcgrp	Flash Copy consistency group number
Rcgrp	Metro Mirror consistency group number
Fcmap	Flash Copy map number
Rcmap	Metro Mirror map number
Cluster	Cluster name as displayed on the front panel.
Device	Device number
Mdisk	Managed disk number
Mdiskgrp	Managed disk group number
Uninterruptible power supply	Uninterruptible power supply serial number

Table 15 shows the types of error log flags.

Note: Configuration Events have nothing in the flag field. Information Events only have the SNMP trap-raised flag on when configured to do so.

Table 15. Description of flags for the error log

Flag	Description
Unfixed	This log entry requires a service action.
Fixed	This entry has been marked as fixed. It will remain in the error log until it becomes the oldest record in the log, at which point it will be overwritten by the next log entry.
Expired	The error log entry is over 25 hours old. Any new log entries of this error/event code for this object type will produce a new log entry.
SNMP trap raised	An SNMP trap has been raised. SNMP traps are raised for unfixed errors and for information events.

Table 16 shows the various combinations of flags that might be logged and the resulting status that is reported by the user interfaces.

Note: SNMP_TRAP_RAISED is independent of the other flags.

Table 16. Reported status for combinations of error-log status flags

UNFIXED	ERROR_FIXED	ERROR_EXPIRED	Reported Status
0	0	0	BELOW_THRESHOLD
0	0	1	EXPIRED
0	1	0	FIXED
0	1	1	*not possible*
1	0	0	UNFIXED
1	0	1	*not possible*
1	1	0	FIXED
1	1	1	*not possible*

Table 17 shows the types of error log flags.

Table 17. Description of types of error log flags

Flag	Description
Unknown error	This flag should never be seen. This flag can only result from a software defect.
Error Cat 1	These errors require a service action. A FRU or list of FRUs will be included with the trap data or e-mail sent with the error record.
Error Cat 2	These errors require a service action but more analysis is required before the service action or FRU can be identified.
Related error	These are errors that have a root cause that has been reported in another log entry. Marking the source error as fixed will also mark this error as fixed.
Transient error	Errors flagged as transient have been recovered by an error recovery procedure.
Configuration event	This entry is from the Configuration Event log. This flag is useful when displaying both logs in a seamless display as an aid to relating logged error conditions to configuration events.
Information	This entry indicates that the log entry is an Information Event. Information events can be used to warn the user about an unexpected configuration result or prompt a user to initiate further configuration actions. This type of log entry will cause an SNMP trap to be raised if requested by the user.

Related tasks

"Viewing the error log" on page 68
You can view the error log by using the SAN Volume Controller command-line interface or the SAN Volume Controller Console.

Error reporting

Errors detected by the SAN Volume Controller are saved in an error log. As soon as an entry is made in this error log, the error condition is analyzed. If any service activity is required, the user is notified of the error.

Error reporting process

You can use the following methods to notify the user and IBM service:

- An SNMP trap is sent to an SNMP manager that is configured by the customer.

  This might be IBM Director on the master console or the SNMP manager that was selected by the customer.

  Note: If Call Home is required, SNMP reports must be enabled. You can send the reports to the IP address of the IBM director configured to manage Call Home.

- The most serious cluster code is displayed on the front panel of each node in the cluster.
- If you enabled call home, critical faults are reported directly to IBM and a PMH report will be raised in RETAIN. In the PMH report, the ClusterName is the name of the cluster where you start the problem determination.

  Related tasks

  "Using directed maintenance procedures" on page 20
  You can use directed maintenance procedures to diagnose and resolve problems with the SAN Volume Controller.

Related information

"Defining cluster error codes" on page 76
Every cluster error code includes an error code number, a description, action, and possible FRUs.

Understanding the error codes

Error codes are generated for the SAN Volume Controller by the system error-log analysis and system configuration code.

Error codes

Error codes help you to identify the cause of a problem, the failing field-replaceable units (FRUs), and the service actions that might be needed to solve the problem.

Note: If more than one error occurs during an operation, the highest priority error code displays on the front panel. The lower the number for the error code, the higher the priority. For example, cluster error code 1020 has a higher priority than cluster error code 1370.

Using the error code tables

The error code tables list the various error codes and describe the actions that you should take.

Perform the following steps to use the error code tables:

1. Locate the error code in one of the tables. If you cannot find a particular code in any table, call your support center for assistance.
2. Read carefully the action you must do for the problem. Do not exchange FRUs unless you are instructed to do so.
3. Normally exchange only one FRU at a time, starting from the top of the FRU list for that error code.

Related tasks

"MAP 5000: Start" on page 130
MAP 5000: Start is the entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 155
MAP 5700: Repair verification helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

Chapter 8, "Removing and replacing parts," on page 157
You can remove and replace field replaceable units (FRUs) from the SAN Volume Controller and uninterruptible power supply.

Definitions of the FRU names for the SAN Volume Controller

The glossary below provides FRU names for the SAN Volume Controller.

See Table 18 for a glossary for the FRU names.

Table 18. Glossary of FRU names for the SAN Volume Controller

Name of FRU	Definition
Frame assembly	The frame of the SAN Volume Controller and the cables that it contains.
Disk drive assembly	The disk drive of the SAN Volume Controller.
Disk drive cables	The SCSI and power cable, which connect the disk drive to the SAN Volume Controller system board.
Fibre channel cable	A cable that connects the SAN Volume Controller to a fibre-channel network.
Ethernet cable	A cable that connects the SAN Volume Controller to an Ethernet network.
Power supply assembly	An assembly that provides dc power to the SAN Volume Controller. It also contains three fans.
Power cable assembly	The power cable and signal cable that connect the SAN Volume Controller to the uninterruptible power supply. This FRU consists of a power cable and a signal cable.
Fan assembly	An assembly that contains a dc cooling fan. The SAN Volume Controller has two types of fan assemblies, excluding those that are in the power supply assembly.
System board assembly	This FRU consists of the system board, two processors, VRM, riser card, voltage regulator, and CMOS battery.
Fibre channel adapter assembly	The means by which the SAN Volume Controller is connected to the fibre-channel fabric.
Service controller	The FRU that provides the service functions of the SAN Volume Controller. This FRU consists of an electronics card, the flash module, and three connecting cables.
CMOS battery	The battery that maintains power to backup the system BIOS settings for time and date.
Front panel assembly	The front cover of the SAN Volume Controller. This FRU includes the front panel, controls, and display.

Related reference

"Definitions of the FRU names for the uninterruptible power supply"
The following glossary provides the FRU names for the uninterruptible power supply (UPS):

Definitions of the FRU names for the uninterruptible power supply

The following glossary provides the FRU names for the uninterruptible power supply (UPS):

Name of FRU	Description
UPS battery assembly	The battery that provides backup power to the SAN Volume Controller if a power failure occurs. This FRU is part of the UPS.
UPS electronics assembly	The unit that controls the functions of the UPS. This FRU is part of the UPS.
UPS	This FRU includes the frame of the UPS and all the FRUs contained within that frame.

Related reference

"Definitions of the FRU names for the SAN Volume Controller" on page 74
The glossary below provides FRU names for the SAN Volume Controller.

Defining cluster error codes

Every cluster error code includes an error code number, a description, action, and possible FRUs.

1002
Explanation

Error log full.

Action

To fix the errors in the error log, go to the start map.

Possible Cause-FRUs or other:
• Unfixed errors in the log.

1010
Explanation

A fibre-channel adapter was reported missing.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
3. Go to repair verification map.

Possible Cause-FRUs or other:
• Fibre-channel adapter assembly (90%).
• System board assembly (10%).

1012
Explanation

A fibre-channel adapter reported PCI bus errors.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
3. Go to repair verification map.

Possible Cause-FRUs or other:

- Fibre-channel adapter assembly (90%).
- System board assembly (10%).

1020
Explanation

The SAN Volume Controller system board is failing.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
3. Go to repair verification map.

Possible Cause-FRUs or other:

- System board assembly (100%).

1040
Explanation

A flash module error has occurred after a successful boot of a SAN Volume Controller.

Action

1. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
3. Go to repair verification map.

Possible Cause-FRUs or other:

- Service controller (100%).

1044
Explanation

A service controller read failure occurred.

Action
1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
3. Go to repair verification map.

Possible Cause-FRUs or other:
- Service controller (100%).

1050
Explanation

A SAN Volume Controller fibre-channel adapter has failed a loop back, or similar, test.

Action
1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
3. Go to repair verification map.

Possible Cause-FRUs or other:
- Fibre-channel adapter assembly (90%).
- System board assembly (10%).

1060
Explanation

One or more fibre-channel ports on the SAN Volume Controller are not operational.

Action

Go to MAP 5600: Fibre-channel.

Possible Cause-FRUs or other:
- Fibre-channel cable (80%).
- Fibre-channel adapter assembly (10%).

Other:
- Fibre-channel network fabric (10%).

1070
Explanation

One of the four fan assemblies that cool the processors has returned a status of Failed status through the service processor.

Action
1. Check the error log and verify which fan failed.
2. In the sequence shown, exchange the FRUs for new FRUs. See "Possible Cause-FRUs or other" after the last action in this section.
3. Check node status (refer to "Checking the status of the node"). If all nodes show a status of "online," mark the error that you have just repaired "fixed." If any nodes do not show a status of "online," go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
4. Go to repair verification map.

Possible Cause-FRUs or other:
- Fan assembly (90%).
- System board assembly (10%).

1071
Explanation

The fan assembly that cools the disk drive assembly has returned a Failed status using the service processor.

Action
1. In the sequence shown, exchange the FRUs for new FRUs. See "Possible Cause-FRUs or other" after the last action in this section.
2. Check node status (refer to "Checking the status of the node"). If all nodes show a status of "online," mark the error that you have just repaired "fixed." If any nodes do not show a status of "online," go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
3. Go to repair verification map.

Possible Cause-FRUs or other:
- Fan assembly (90%).
- System board assembly (10%).

1075
Explanation

The ambient temperature threshold of the SAN Volume Controller has been exceeded.

Action
1. Check that the room temperature is within the limits allowed.
2. Check for obstructions in the air flow.
3. Mark the error that you have just repaired, "fixed."
4. Go to repair verification map.

Possible Cause-FRUs or other:

• None.

Other:

• System environment (100%).

1076
Explanation

The internal temperature sensor of the SAN Volume Controller has reported that the temperature warning threshold has been exceeded.

Action

1. Check whether the internal airflow of the SAN Volume Controller has been obstructed. Clear any obstructions. If you cannot find an obstruction, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
3. Go to repair verification map.

Possible Cause-FRUs or other:

• System board assembly (100%).

1077
Explanation

The temperature soft or hard shutdown threshold of the SAN Volume Controller has been exceeded. The SAN Volume Controller has powered off automatically.

Action

1. In the sequence shown, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
3. Go to repair verification map.

Possible Cause-FRUs or other:

• System board assembly (100%).

1080
Explanation

One of the voltages that is monitored on the system board, but generated elsewhere, is outside the set thresholds.

Action

1. In the sequence shown, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
3. Go to repair verification map.

Possible Cause-FRUs or other:
*   Power supply assembly (98%).
*   System board assembly (2%).

1081
Explanation

One of the voltages that is generated and monitored on the system board is outside the set thresholds.

Action

1. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
3. Go to repair verification map.

Possible Cause-FRUs or other:
*   System board assembly (100%).

1135
Explanation

The uninterruptible power supply has reported an ambient over temperature. The uninterruptible power supply switches to Bypass mode to allow the uninterruptible power supply to cool.

Action

1. Power off the nodes attached to the uninterruptible power supply.
2. Turn off the uninterruptible power supply, and then unplug the uninterruptible power supply from the main power source.
3. Ensure that the air vents of the uninterruptible power supply are not obstructed.
4. Ensure that the air flow around the uninterruptible power supply is not restricted.
5. Wait for at least five minutes, and then restart the uninterruptible power supply. If the problem remains, check the ambient temperature. Correct the problem. Otherwise, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
6. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If

any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.

7. Go to repair verification map.

Possible Cause-FRUs or other:

- Uninterruptible power supply electronics unit (50%).

Other:

- The system ambient temperature is outside the specification (50%).

1136
Explanation

The uninterruptible power supply has reported an ambient over temperature.

Action

1. Power off the node attached to the uninterruptible power supply.
2. Turn off the uninterruptible power supply, and then unplug the uninterruptible power supply from the main power source.
3. Ensure that the air vents of the uninterruptible power supply are not obstructed.
4. Ensure that the air flow around the uninterruptible power supply is not restricted.
5. Wait for at least five minutes, then restart the uninterruptible power supply. If the problem remains, check the ambient temperature. Correct the problem. Otherwise, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
6. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.
7. Go to repair verification map.

Possible Cause-FRUs or other:

- Uninterruptible power supply (50%).

Other:

- The system ambient temperature is outside the specification (50%).

1140
Explanation

The uninterruptible power supply has reported that it has a problem with the input AC power.

Action

1. The power supply to this uninterruptible power supply is faulty or not connected correctly. Ask the customer to check the site power connection to this uninterruptible power supply. If the input power connection is OK, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If

any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.

3. Go to repair verification map.

Possible Cause-FRUs or other:

- Uninterruptible power supply input power cable (20%).

Other:

- The input AC power is missing (40%).
- The input AC power is not in specification (40%).

1141
Explanation

The uninterruptible power supply has reported that it has a problem with the input AC power.

Action

1. The power supply to this uninterruptible power supply is missing or not in specification. Ask the customer to check the site power connection to this uninterruptible power supply. If the input power connection is OK, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification map.

Possible Cause-FRUs or other:

- Uninterruptible power supply input power cable (20%).

Other:

- The input AC power is missing (40%).
- The input AC power is not in specification (40%).

1145
Explanation

The signal connection between a SAN Volume Controller and its uninterruptible power supply is failing.

Action

1. If other SAN Volume Controllers that are using this uninterruptible power supply are reporting this error, exchange the uninterruptible power supply electronics unit for a new one.
2. If only this SAN Volume Controller is reporting the problem, check that the signal cable, which is part of the power cable assembly, is secure at both ends. If the signal cable is secure, exchange the FRUs for new FRUs in the sequence shown. See ″Possible Cause-FRUs or other″ after the last action in this section.

3. Check node status (refer to "Checking the status of the node"). If all nodes show a status of "online," mark the error that you have just repaired "fixed." If any nodes do not show a status of "online," go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.

4. Go to repair verification map.

Possible Cause-FRUs or other:
- Power cable assembly (60%).
- Uninterruptible power supply electronics unit (20%).
- System board assembly (20%).

1146
Explanation

The signal connection between a SAN Volume Controller and its uninterruptible power supply is failing.

Action

1. Check that the signal cable, which is part of the power cable assembly, is secure at both ends. If the signal cable is secure, exchange the FRUs for new FRUs in the sequence shown. See "Possible Cause-FRU or other" after the last action in this section.

2. Check node status (refer to "Checking the status of the node"). If all nodes show a status of "online," mark the error that you have just repaired "fixed." If any nodes do not show a status of "online," go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.

3. Go to repair verification map.

Possible Cause-FRUs or other:
- Power cable assembly (60%).
- Uninterruptible power supply electronics unit (20%).
- System board assembly (20%).

1150
Explanation

Data that the SAN Volume Controller has received from the uninterruptible power supply suggests the uninterruptible power supply power cable, the signal cable, or both, are not connected correctly.

Action

1. Connect the cables correctly. See the "IBM TotalStorage SAN Volume Controller: Installation Guide."

2. Check node status (refer to "Checking the status of the node"). If all nodes show a status of "online," mark the error that you have just repaired "fixed." If any nodes do not show a status of "online," go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.

3. Go to repair verification map.

Possible Cause-FRUs or other:

- None.

Other:
- Configuration error.

1151
Explanation

Data that the SAN Volume Controller has received from the uninterruptible power supply suggests the uninterruptible power supply power cable, the signal cable, or both, are not connected correctly.

Action
1. Connect the cables correctly. See the "IBM TotalStorage SAN Volume Controller: Installation Guide."
2. Check node status (refer to "Checking the status of the node"). If all nodes show a status of "online," mark the error that you have just repaired "fixed." If any nodes do not show a status of "online," go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Configuration error.

1155
Explanation

A power domain error has occurred. Both SAN Volume Controllers of a pair are powered by the same uninterruptible power supply.

Action
1. Display the node VPD. (see "Viewing the vital product data") Note the I/O group and uninterruptible power supply serial number of each node in the cluster.
2. Nodes in the same I/O group must be connected to different uninterruptible power supply assemblies. Reconnect the uninterruptible power supply assemblies as necessary.
3. Mark the error that you have just repaired, "fixed."
4. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Configuration error.

1160
Explanation

A problem with too much load current has occurred in the uninterruptible power supply (reported by uninterruptible power supply alarm bits).

Action
1. Ensure that only SAN Volume Controllers are receiving power from the uninterruptible power supply. Ensure that there are no switches or disk controllers that are connected to the uninterruptible power supply.
2. Disconnect the SAN Volume Controllers one at a time from the uninterruptible power supply until the problem with too much load current is removed; that is, you have disconnected the SAN Volume Controller that is causing too much load current. On that SAN Volume Controller, exchange in the sequence shown, the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
3. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.
4. Go to repair verification map.

Possible Cause-FRUs or other:
- FRU: SAN Volume Controller power cable assembly (50%).
- FRU: Power supply assembly (50%).

1161
Explanation

A problem with too much load current has occurred in the uninterruptible power supply (reported by uninterruptible power supply alarm bits).

Action
1. Check that the uninterruptible power supply Overload Indicator on the uninterruptible power supply front panel is illuminated in red. If the Overload Indicator is not illuminated, go to Step 4.
2. Ensure that only one SAN Volume Controller is receiving power from the uninterruptible power supply. Also ensure that no other devices are connected to the uninterruptible power supply.
3. Disconnect the SAN Volume Controller from the uninterruptible power supply. If the Overload Indicator is now off, the disconnected SAN Volume Controller was causing too much load current. Exchange, in the sequence shown, the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section. If the Overload Indicator is still illuminated with all outputs disconnected, replace the uninterruptible power supply.
4. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.
5. Go to repair verification map.

Possible Cause-FRUs or other:
- FRU: SAN Volume Controller power cable assembly (45%).
- FRU: SAN Volume Controller power supply assembly (45%).
- Uninterruptible power supply (10%).

1165
Explanation

The uninterruptible power supply output load is unexpectedly high. The uninterruptible power supply output is possibly connected to an extra non-SAN Volume Controller load.

Action

1. Ensure that only SAN Volume Controllers are receiving power from the uninterruptible power supply. Ensure that there are no switches or disk controllers that are connected to the uninterruptible power supply.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Configuration error.

1166
Explanation

The uninterruptible power supply output load is unexpectedly high. The uninterruptible power supply output is possibly connected to an extra non-SAN Volume Controller load.

Action

1. Ensure that only one SAN Volume Controller is receiving power from the uninterruptible power supply. Also ensure that there are no other devices that are connected to the uninterruptible power supply. If output power connection is correct, exchange the FRU for a new FRU. See ″Possible Cause-FRU or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification map.

Possible Cause-FRUs or other:
- Uninterruptible power supply (5%).

Other:

- Configuration error (95%).

1170
Explanation

A problem has occurred with the uninterruptible power supply electronics (reported by uninterruptible power supply alarm bits).

Action
1. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification map.

Possible Cause-FRUs or other:
- Uninterruptible power supply electronics assembly (100%).

1171
Explanation

A problem has occurred with the uninterruptible power supply electronics (reported by uninterruptible power supply alarm bits).

Action
1. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification map.

Possible Cause-FRUs or other:
- Uninterruptible power supply electronics assembly (100%).

1175
Explanation

A problem has occurred with the uninterruptible power supply (reported by uninterruptible power supply alarm bits).

Action
1. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.

3. Go to repair verification map.

Possible Cause-FRUs or other:
* Uninterruptible power supply (100%).

1180
Explanation

A problem has occurred with the uninterruptible power supply battery (reported by uninterruptible power supply alarm bits).

Action
1. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification map.

Possible Cause-FRUs or other:
* Uninterruptible power supply battery assembly (100%).

1181
Explanation

A problem has occurred with the uninterruptible power supply battery (reported by uninterruptible power supply alarm bits).

Action
1. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification map.

Possible Cause-FRUs or other:
* Uninterruptible power supply battery assembly (100%).

1185
Explanation

A problem has occurred in the uninterruptible power supply (reported by uninterruptible power supply alarm bits). No specific FRU has been identified.

Action
1. In the sequence shown, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.

2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.

3. Go to repair verification map.

Possible Cause-FRUs or other:
- Uninterruptible power supply electronics assembly (60%).
- Uninterruptible power supply battery assembly (20%).
- Uninterruptible power supply (20%).

1186
Explanation

A problem has occurred in the uninterruptible power supply (reported by uninterruptible power supply alarm bits). No specific FRU has been identified.

Action

1. In the sequence shown, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.

2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.

3. Go to repair verification map.

Possible Cause-FRUs or other:
- Uninterruptible power supply (100%).

1190
Explanation

The uninterruptible power supply battery has reached its end of life. (The maximum available capacity can no longer support four SAN Volume Controllers.

Action

1. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.

2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.

3. Go to repair verification map.

Possible Cause-FRUs or other:
- Uninterruptible power supply battery assembly (100%).

1191

Explanation

The uninterruptible power supply battery has reached its end of life. (The maximum available capacity can no longer support one SAN Volume Controller.)

Action

1. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification map.

Possible Cause-FRUs or other:
- Uninterruptible power supply (100%).

1195

Explanation

A SAN Volume Controller is missing from the cluster. You can resolve this problem by repairing the failure on the missing SAN Volume Controller.

Action

1. If it is not obvious which node in the cluster has failed, check the status of the nodes and find the SAN Volume Controller with a status of offline.
2. Go to the Start MAP and perform the repair on the failing node.
3. When the repair has been completed, this error will automatically be marked as fixed.
4. Check node status (refer to ″Checking the status of the node″). If all nodes show a status of ″online,″ but the error in the log has not been marked as fixed, manually mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.
5. Go to repair verification map.

Possible Cause-FRUs or other:
- Node failure.

1200

Explanation

The configuration is not valid. Too many devices have been presented to the cluster or SAN Volume Controller.

Action

1. Remove unwanted devices from the fibre-channel network fabric.
2. Start a cluster discovery operation to find devices.
3. List all connected managed disks. Check with the customer that the configuration is as expected. mark the error that you have just repaired fixed.

4. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Fibre-channel network fabric (100%).

1210
Explanation

A local fibre-channel port has been excluded.

Action

Go to MAP 5600: Fibre-channel.

Possible Cause-FRUs or other:
- Fibre-channel cable (80%).
- Fibre-channel adapter assembly (10%)

Other:
- Fibre-channel network fabric (10%).

1220
Explanation

A remote fibre-channel port has been excluded.

Action
1. View the error log. Note the MDisk ID associated with the error code.
2. Using the MDisk ID, determine the failing disk controller.
3. Refer to the service documentation for the disk enclosure or disk controller and the fibre-channel network fabric to resolve the reported problem.
4. After the disk drive is repaired, start a cluster discovery operation to recover the excluded fibre-channel port.
5. To restore MDisk online status, include the managed disk that you noted in step 1 (refer to ″Including managed disks″).
6. Check the status of the disk controller (refer to ″Viewing general details for controllers″ for the user interface or ″Disk controller status″ for the command line interface). If all disk controllers show a ″good″ status, mark the error that you have just repaired, ″fixed.″
7. If all disk controllers do not show a good status, contact the IBM support center to resolve the problem with the disk controller.
8. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Disk drive enclosure, or disk controller, that is connected to the SAN Volume Controller (50%).

- Fibre-channel network fabric (50%).

1230
Explanation

Login has been excluded.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Start a cluster discovery operation to recover the login.
3. Check the status of the disk controller (refer to ″Viewing general details for controllers″ for the user interface or ″Disk controller status″ for the command line interface). If all disk controllers show a ″good″ status, mark the error that you have just repaired, ″fixed.″ If any disk controllers do not show ″good″ status, go to start map. If you return to this step, contact the IBM support center to resolve the problem with the disk controller.
4. Go to repair verification map.

Possible Cause-FRUs or other:
- Fibre Channel cable, switch to remote port, (50%).
- Fibre Channel cable, local port to switch (50%).

1310
Explanation

A managed disk is reporting excessive errors.

Action

1. Repair the enclosure or disk controller.
2. Check the managed disk status. If all managed disks show a status of ″online,″ mark the error that you have just repaired as ″fixed.″ If any managed disks show a status of ″excluded,″ include the excluded managed disks and then mark the error as ″fixed.″
3. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Disk drive enclosure, or disk controller, that is connected to the SAN Volume Controller (100%).

1320
Explanation

A disk I/O medium error has occurred.

Action

1. Ask the customer to rewrite the bad data to the block LBA that is reported in the host systems SCSI sense data. If this error has occurred during a migration, the host system will not notice the error until the target device is accessed.

2. Check managed disk status. If all managed disks show a status of ″online,″ mark the error that you have just repaired as ″fixed.″ If any managed disks do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the disk controller.
3. Go to repair verification map.

Possible Cause-FRUs or other:
• None.

Other:
• Disk drive enclosure, or disk controller, that is connected to the SAN Volume Controller (100%).

1330
Explanation

No managed disk (MDisk) is suitable for use as a quorum disk. When a cluster is created three disks are automatically selected as quorum disks. A quorum disk is needed to enable a tie-break when some cluster members are missing. To become a quorum disk:
• The MDisk must be accessible by all nodes in the cluster.
• The MDisk must have free extents

This error code is produced when at least one quorum disk is not accessible by all nodes in the cluster.

A quorum disk might not be available because of a fibre-channel network failure or because of a fibre-channel switch zoning problem.

Action
1. Resolve any known fibre-channel network problems.
2. Ask the customer to confirm that Mdisks have been created and that those MDisks have free extents. If at least one managed disk shows a mode of managed, mark the error that you have just repaired as ″fixed.″
3. If the customer is unable to make the appropriate changes, ask IBM Software Support for assistance.
4. Go to repair verification map.

Possible Cause-FRUs or other:
• None.

Other:
• Configuration error (100%).

1335
Explanation

Quorum disk not available.

Action
1. View the error log entry to identify the managed disk, being used as a quorum disk, that is no longer available.

2. Perform the disk controller problem determination and repair procedures for the MDisk identified in step 1.

3. To restore MDisk online status, include the managed disk that you noted in step 1 (refer to ″Including managed disks″).

4. Check the managed disk status. If the managed disk identified in step 1 shows a status of ″online,″ mark the error that you have just repaired as ″fixed.″ If the managed disk does not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the disk controller.

5. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Disk drive enclosure, or disk controller, that is connected to the SAN Volume Controller (100%).

1340
Explanation

A managed disk has timed out. This error was reported because a large number of disk timeout conditions have been detected. The problem is probably caused by a failure of some other component on the SAN.

Action

1. Repair problems on all disk controllers and switches on the same SAN as this SAN Volume Controller cluster.

2. If problems are found, mark this error as ″fixed.″

3. If no switch or disk controller failures can be found, take an error log dump and call your hardware support center.

Possible Cause-FRUs or other:
- None.

Other:
- Disk controller.
- Fibre-channel switch.

1370
Explanation

A managed disk error recovery procedure (ERP) has occurred. This error was reported because a large number of disk error recovery procedures have been performed by the disk controller. The problem is probably caused by a failure of some other component on the SAN.

Action

1. View the error log entry and determine the managed disk that was being accessed when the problem was detected.

2. Perform the disk controller problem determination and repair procedures for the MDisk determined in step 1.

3. Perform problem determination and repair procedures for the fibre channel switches connected to the SAN Volume Controller, the disk controller that is managing the MDisk, and the fibre channel path between those switches.

4. If any problems are found and resolved in steps 2 and 3, mark this error as ″fixed.″

5. If no switch or disk controller failures were found in steps 2 and 3, take an error log dump. Call your hardware support center.

6. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Disk controller.
- Fibre-channel switch.

1400
Explanation

The SAN Volume Controller cannot detect the Ethernet connection.

Action

Go to ″MAP 5500: Ethernet.″

Possible Cause-FRUs or other:
- Ethernet cable (25%)
- SAN Volume Controller system board assembly (25%)

Other:
- Ethernet cable is disconnected (25%).
- Ethernet hub (25%).

1550
Explanation

A cluster path has failed. One of the SAN Volume Controller fibre-channel ports is unable to communicate with all the other SAN Volume Controllers in the cluster.

Action

1. Repair the fibre-channel network fabric.

2. Check the status of the node ports (refer to ″Checking the status of the node ports″ for the command line interface). If the status of the node ports shows as active, mark the error that you have just repaired as ″fixed.″ If any node ports do not show a status of active, go to start map. If you return to this step contact the IBM support center to resolve the problem with the SAN Volume Controller.

3. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:

- Fibre-channel network fabric (100%).

1610
Explanation

Media errors on backend managed disk.

Action
1. Repair the enclosure or disk controller.
2. To restore MDisk online status, include the managed disk into the cluster (refer to ″Including managed disks″).
3. Check managed disk status. If all managed disks show a status of ″online,″ mark the error that you have just repaired as ″fixed.″ If any managed disks do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the disk controller.
4. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Disk drive enclosure, or disk controller, that is connected to the SAN Volume Controller (100%).

1620
Explanation

An Mdisk group is offline.

Action
1. Repair the enclosure or disk controller.
2. Start a cluster discovery operation.
3. Check managed disk status. If all managed disks show a status of ″online,″ mark the error that you have just repaired as ″fixed.″ If any managed disks do not show a status of ″online,″ go to start map. If you return to this step, contact the IBM support center to resolve the problem with the disk controller.
4. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Fibre-channel network fabric (50%).
- Disk drive enclosure, or disk controller, that is connected to the SAN Volume Controller (50%).

1625
Explanation

Incorrect disk controller configuration.

Action

1. Using service documentation for the disk controller, check that the correct configuration is set up for the disk controller. See also the SAN Volume Controller.
2. Mark the error that you have just repaired as ″fixed.″
3. Start a cluster discovery operation.
4. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Disk drive enclosure, or disk controller, that is connected to the SAN Volume Controller.

1630
Explanation

The number of device logins was reduced. One possible cause is that the user intentionally reconfigured the system. Note that upgrading the code on a storage controller may cause one or more of its data paths to be taken off-line temporarily. As a result, this error code is generated.

Action

1. Check the error in the cluster error log to identify the object ID associated with the error.
2. Check the availability of the failing device using the following command line: svcinfo lscontroller object_ID. If the command fails with the message ″CMMVC6014E The command failed because the requested object is either unavailable or does not exist,″ ask the customer if this device was removed from the system.
   - If ″yes,″ mark the error as fixed in the cluster error log and continue with the repair verification map
   - If ″no″ or if the command lists details of the failing controller, continue with step the next step.
3. Check whether the device has regained connectivity. If it has not, check the cable connection to the remote-device port.
4. If all attempts to log in to a remote-device port have failed and you cannot solve the problem by changing cables, check the condition of the remote-device port and the condition of the remote device.
5. Start a cluster discovery operation.
6. Check the status of the disk controller (refer to ″Viewing general details for controllers″ for the user interface or Disk controller status for the command line interface). If all disk controllers show a ″good″ status, mark the error that you have just repaired as ″fixed.″ If any disk controllers do not show ″good″ status, go to start map. If you return to this step, contact the IBM support center to resolve the problem with the disk controller.
7. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Fibre-channel network fabric (50%).
- Disk drive enclosure, or disk controller, that is connected to the SAN Volume Controller (50%).

1660

Explanation

The initialization of the managed disk has failed.

Action

1. View the error log entry to identify the managed disk that was being accessed when the problem was detected.
2. Perform the disk controller problem determination and repair procedures for the MDisk identified in step 1.
3. To restore MDisk online status, include the managed disk that you noted in step 1 (refer to "Including managed disks").
4. Check the managed disk status. If all managed disks show a status of "online," mark the error that you have just repaired as "fixed." If any managed disks do not show a status of "online," go to the start MAP. If you return to this step, contact the IBM support center to resolve the problem with the disk controller.
5. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Disk drive enclosure, or disk controller, that is connected to the SAN Volume Controller (100%).

1670

Explanation

The CMOS battery on the SAN Volume Controller system board failed.

Action

1. Exchange the FRU for a new FRU. See "Possible Cause-FRUs or other" after the last action in this section.
2. Mark the error that you have just repaired as "fixed."
3. Go to repair verification map.

Possible Cause-FRUs or other:
- CMOS battery (100%)

1720

Explanation

In a Metro Mirror operation, the relationship has stopped and lost synchronization, for a reason other than a continuous I/O error.

Action

1. Correct higher priority errors, and then restart the Metro Mirror.
2. Mark the error that you have just repaired as ″fixed.″
3. Go to repair verification map.

Possible Cause-FRUs or other:

- Unknown.

1900
Explanation

A FlashCopy prepare task has failed because a cache flush has failed.

Action

1. Correct higher priority errors, and then retry the prepare tasks.
2. Mark the error that you have just repaired as ″fixed.″
3. Go to repair verification map.

Possible Cause-FRUs or other:

- None.

Other:

- Cache flush error (100%).

1910
Explanation

A FlashCopy mapping task was stopped because of the error that is indicated in the data. A stopped FlashCopy may affect the status of other VDisks in the same I/O group. Preparing the stopped FlashCopy operations as soon as possible is advised.

Action

1. Correct higher priority errors, then retry the prepare task.
2. Mark the error that you have just repaired as ″fixed.″
3. Go to repair verification map.

Possible Cause-FRUs or other:

- None.

Other:

- Data error (100%).

1920
Explanation

A Metro Mirror relationship was stopped because of a continuous I/O error.

Action

1. Correct the higher priority errors, and then retry the prepare task.
2. Mark the error that you have just repaired as ″fixed.″
3. Go to repair verification map.

Possible Cause-FRUs or other:
- None.

Other:
- Data error (100%).

1930
Explanation

Migration suspended.

Action
1. Ensure that all error codes of a higher priority have already been fixed.
2. Ask the customer to ensure that all MDisk groups that are the destination of suspended migrate operations have available free extents.
3. Mark this error as ″fixed.″ This will cause the migrate operation to be restarted. If the restart fails, a new error will be logged.
4. Go to repair verification map.

Possible Cause-FRUs or other:
- Unknown.

2010
Explanation

A software upgrade has failed. This might be caused by a hardware error or it might be from a failure in the new version of the software. An automatic software downgrade is performed to restore the SAN Volume Controllers to their previous software version. If the downgrade operation fails to downgrade a SAN Volume Controller (for example, because it is offline), the download operation will stop and wait for the offline SAN Volume Controller to be repaired or deleted from the cluster. While the downgrade operation is in progress, configuration commands sent to the cluster will fail with a message indicating that a software upgrade operation is still in progress. The downgrade operation might take up to three hours.

Action
1. Display the status of the nodes on the cluster (refer to ″Viewing the node status using the SAN Volume Controller Console application on the master console″ for the user interface or ″Checking the status of the node″ for the command line interface).
2. If any node is offline, delete the offline node from the cluster. See cluster diagnostic and service-aid commands in the ″IBM TotalStorage SAN Volume Controller: Command-Line Interface User's Guide″ for detailed information about deleting a node from a cluster. If the delete operation fails with a message indicating that a software upgrade is in progress, the downgrade process is still active. Wait for this operation to either complete or stop on the offline node and then retry the delete operation. If the downgrade operation had stopped, it can now continue.
3. Solve all logged hardware problems.
4. Ask the user to retry the software install.
5. If the installation fails again, report the problem to your software support center.
6. Mark the error that you have just repaired as ″fixed.″
7. Go to repair verification map.

Possible Cause-FRUs or other:
* None.

Other:
* SAN Volume Controller software (100%).

2030
Explanation

The error that is logged in the cluster error log indicates a software problem either in the SAN Volume Controller cluster or in a disk enclosure or disk controller that is connected to the SAN Volume Controller.

Action
1. Ensure that the software is at the latest level on the cluster and on the disk controllers.
2. Run a configuration dump and a logged data dump. Save the dump data.
3. Ask IBM Product Support for assistance.
4. Mark the error that you have just repaired as ″fixed.″
5. Go to repair verification map.

Possible Cause-FRUs or other:
* None.

Other:
* SAN Volume Controller software (50%).
* Disk drive enclosure or disk controller software (50%).

2040
Explanation

A software upgrade is required. The software cannot determine the VPD for a FRU. Probably, a new FRU was installed and the software does not recognize that FRU.

Action
1. Ensure that the software is at the latest level on the cluster and on the disk controllers.
2. Run a configuration dump and a logged data dump. Save the dump data.
3. Ask IBM Product Support for assistance.
4. Mark the error that you have just repaired as ″fixed.″
5. Go to repair verification map.

Possible Cause-FRUs or other:
* None.

Other:
* SAN Volume Controller software (100%).

2100

Explanation

A software error has occurred. One of the SAN Volume Controller server software components (sshd, crond, or httpd) has failed and reported an error.

Action

1. Ensure that the software is at the latest level on the cluster and on the disk controllers.
2. Run a configuration dump and a logged data dump. Save the dump data.
3. Ask IBM Product Support for assistance.
4. Mark the error that you have just repaired as ″fixed.″
5. Go to repair verification map.

Possible Cause-FRUs or other:
• None.

Other:
• SAN Volume Controller software (100%).

Determining a hardware boot failure

If you see that the hardware boot display stays on the front panel for more than three minutes, the node cannot boot. The cause might be a hardware failure or the software on the hard disk drive is missing or damaged.

Perform the following steps to determine a hardware boot failure:

1. If you have just installed the box or you have just replaced a FRU inside the SAN Volume Controller, check to see that the cables between the system board, service controller and disk drive are installed correctly.
2. Attempt to restore the software by using the node rescue procedure.
3. If node rescue fails, perform the actions that are described for any failing node rescue code or procedure.

   Related concepts

   "Hardware boot" on page 55
   The hardware boot display shows system data when power is first applied to the node as the node searches for a disk drive to boot.

   Related tasks

   "Performing the node rescue" on page 114
   You can follow the step-by-step instructions to perform the node rescue.

Understanding the boot codes

The boot codes are displayed on the screen when a node is booting.

The codes indicate the progress of the boot operation or the condition that has caused the node to fail to boot. They are used to isolate failures when boot hangs or when boot detects an unrecoverable error. Line 1 of the menu screen displays the message `Booting` followed by the boot code. Line 2 of the display shows a boot progress indicator. If the boot hangs, the progress bar stops and you should use the code to isolate the fault. If the boot code detects a hardware error, `Failed` is displayed and you should use the error code to isolate the failure. See Figure 13 on page 56 for an illustration of the boot progress indicator.

100
Explanation

Boot is running.

Action

If the progress bar has not advanced for two minutes, the boot process has hung. In the sequence shown, remove the following FRUs. Each time you remove a FRU or a group of FRUs, try the boot operation again. If you return to this error code, put back the removed FRU and remove the next FRU in the list. If after removing a FRU you get a new boot code, perform the actions described for that boot code.

1. All fibre-channel adapter cards. (A fibre-channel adapter missing error occurs when adapters are removed.)
2. Bank 1 memory modules. (A memory bank 1 error occurs when the modules are removed.)
3. Bank 2 memory modules. (A memory bank 2 error occurs when the modules are removed.)
4. Disk drive assembly. (A disk drive hardware error occurs when the disk drive assembly is removed.)

If the problem remains, exchange, in the sequence shown, the FRUs for new FRUs. After each FRU exchange, try the boot operation again. See "Possible Cause-FRUs or other."

Possible Cause-FRUs or other:
- SAN Volume Controller system board assembly (75%)
- Service controller (25%).

110
Explanation

The SAN Volume Controller is loading kernel code.

Action

If the progress bar has been stopped for two minutes, run the node rescue procedure.

Possible Cause-FRUs or other:
- None.

120
Explanation

A disk drive hardware error has occurred.

Action

Exchange the FRU for a new FRU. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:
- Disk drive assembly (95%).
- Disk drive cables (5%).

130

Explanation

The SAN Volume Controller is checking the file systems.

Action

If the progress bar has been stopped for at least 90 seconds, run the node rescue procedure.

Possible Cause-FRUs or other:

- None.

135

Explanation

The SAN Volume Controller is verifying the software.

Action

This process may take up to 1 hour, no action is required.

Possible Cause-FRUs or other:

- None.

137

Explanation

Updating service processor firmware.

Action

If the progress bar has been stopped for at least 90 seconds, run the node rescue procedure.

Possible Cause-FRUs or other:

- None.

140

Explanation

The SAN Volume Controller software is corrupted.

Action

Run the node rescue procedure.

Possible Cause-FRUs or other:

- None.

150

Explanation

The SAN Volume Controller is loading the cluster code.

Action

If the progress bar has been stopped for at least 90 seconds, run the node rescue procedure.

Possible Cause-FRUs or other:
*   None.

155
Explanation

The SAN Volume Controller is loading the cluster data.

Action

If the progress bar has been stopped for at least 90 seconds, run the node rescue procedure.

Possible Cause-FRUs or other:
*   None.

160
Explanation

The SAN Volume Controller is recovering flash disk.

Action

If the progress bar has been stopped for at least five minutes, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ at the end of this section.

Possible Cause-FRUs or other:
*   Service Controller (100%)

170
Explanation

A flash module hardware error has occurred.

Action

Exchange the FRU for a new FRU. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:
*   Service controller (100%).

174
Explanation

The service processor on the system board has failed.

Action

Exchange the FRU for a new FRU. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:
- System board assembly (100%).

175
Explanation

The service processor has indicated an overheating. The SAN Volume Controller temperature soft or hard shutdown threshold has been exceeded. The SAN Volume Controller will be powered off after 10 seconds.

Action

Clear vents and remove any heat sources. Ensure the airflow around the SAN Volume Controller is not restricted. Check that the operating environment is as required. If these actions do not fix the problem, replace the FRU.

Possible Cause-FRUs or other:
- System board assembly (100%).

180
Explanation

There is a fault in the communications cable, the serial interface in the uninterruptible power supply, or SAN Volume Controller.

Action

Check that the communications cable is correctly plugged in to the SAN Volume Controller and the uninterruptible power supply. If the cable is plugged in correctly, replace the FRUs in the order shown.

Possible Cause-FRUs or other:
- SAN Volume Controller power cable assembly (40%).
- Uninterruptible power supply electronics assembly (30%).
- SAN Volume Controller system board assembly (30%).

181
Explanation

There is a fault in the communications cable, the serial interface in the uninterruptible power supply, or SAN Volume Controller.

Action

Check that the communications cable is correctly plugged in to the SAN Volume Controller and the uninterruptible power supply. If the cable is plugged in correctly, replace the FRUs in the order shown.

Possible Cause-FRUs or other:
- SAN Volume Controller power cable assembly (40%).

- Uninterruptible power supply (30%).
- SAN Volume Controller system board assembly (30%).

185
Explanation

The uninterruptible power supply battery has reached its end of life. (The maximum available capacity can no longer support four SAN Volume Controllers.)

Action

Exchange the FRU for a new FRU. (See *"Possible Cause-FRUs or other."*)

Possible Cause-FRUs or other:
- Uninterruptible power supply battery assembly (100%).

186
Explanation

The uninterruptible power supply battery has reached its end of life. (The maximum available capacity can no longer support one SAN Volume Controller.)

Action

Exchange the FRU for a new FRU. (See *"Possible Cause-FRUs or other."*)

Possible Cause-FRUs or other:
- Uninterruptible power supply (100%).

190
Explanation

A problem has occurred with the uninterruptible power supply battery.

Action

Exchange the FRU for a new FRU. (See *"Possible Cause-FRUs or other."*)

Possible Cause-FRUs or other:
- Uninterruptible power supply battery assembly (100%).

191
Explanation

A problem has occurred with the uninterruptible power supply battery.

Action

Exchange the FRU for a new FRU. (See *"Possible Cause-FRUs or other."*)

Possible Cause-FRUs or other:
- Uninterruptible power supply (100%).

195
Explanation

A problem has occurred with the uninterruptible power supply electronics.

Action

Exchange the FRU for a new FRU. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:
- Uninterruptible power supply electronics assembly (100%).

196
Explanation

A problem has occurred with the uninterruptible power supply electronics.

Action

Exchange the FRU for a new FRU. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:
- Uninterruptible power supply electronics assembly (100%).

200
Explanation

A problem has occurred with the uninterruptible power supply.

Action

Exchange the FRU for a new FRU. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:
- Uninterruptible power supply (100%).

205
Explanation

A problem with output overload has been reported by the uninterruptible power supply.

Action

Identify the uninterruptible power supply output cable that caused the output overload by disconnecting one at a time. Identify the cable on the SAN Volume Controller that caused the output overload and exchange the FRUs for new FRUs in the sequence shown. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:
- SAN Volume Controller power cable assembly (50%)
- Power supply assembly (50%)

206
Explanation

A problem with output overload has been reported by the uninterruptible power supply. The Overload Indicator on the uninterruptible power supply front panel is illuminated red.

Action

Ensure that only one SAN Volume Controller is receiving power from the uninterruptible power supply. Also ensure that no other devices are connected to the uninterruptible power supply.

Disconnect the SAN Volume Controller from the uninterruptible power supply. If the Overload Indicator is now off, on the disconnected SAN Volume Controller, in the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.

If the Overload Indicator is still illuminated with all outputs disconnected, replace the uninterruptible power supply.

Possible Cause-FRUs or other:
* SAN Volume Controller power cable assembly (45%)
* SAN Volume Controller power supply assembly (45%)
* Uninterruptible power supply (10%).

210
Explanation

A problem has occurred in the uninterruptible power supply. No specific FRU has been identified.

Action

In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other.″

Possible Cause-FRUs or other:
* Uninterruptible power supply electronics assembly (40%).
* Uninterruptible power supply battery assembly (40%)
* Uninterruptible power supply (20%).

Other:
* None.

211
Explanation

A problem has occurred in the uninterruptible power supply.

Action

In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other.″

Possible Cause-FRUs or other:

- Uninterruptible power supply (100%)

Other:

- None.

215
Explanation

A problem has occurred with the uninterruptible power supply load (the SAN Volume Controller has detected that the current of the uninterruptible power supply exceeds the current that four SAN Volume Controllers need).

Action

Ensure that both SAN Volume Controllers of a pair are not connected to the same uninterruptible power supply. Ensure also that only SAN Volume Controllers are receiving power from the uninterruptible power supply; that is, no switches or disk controllers are connected to the uninterruptible power supply.

Possible Cause-FRUs or other:

- None.

216
Explanation

A problem has occurred with the uninterruptible power supply load (the SAN Volume Controller has detected that the uninterruptible power supply current exceeds the current that one SAN Volume Controllers needs).

Action

Ensure that only one SAN Volume Controller is receiving power from the uninterruptible power supply; that is, no other devices are connected to the uninterruptible power supply.

Possible Cause-FRUs or other:

- None.

220
Explanation

The uninterruptible power supply is receiving input power that might be unstable or in low voltage conditions.

Action

Ask the customer to check the site power to the uninterruptible power supply providing power to this SAN Volume Controller. Check the connection, voltage and frequency. If the input power is okay, exchange the FRUs for new FRUs. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

- Uninterruptible power supply input power cable (10%).
- Uninterruptible power supply electronics assembly (10%).

Other:
*   AC input power (80%).

221

Explanation

The uninterruptible power supply is receiving input power that might be unstable in low or high voltage conditions.

Action

Ask the customer to check the site power to the uninterruptible power supply providing power to this SAN Volume Controller. Check the connection, voltage, and frequency. If the input power is okay, exchange the FRUs for new FRUs. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:
*   Uninterruptible power supply input power cable (10%).
*   Uninterruptible power supply (10%).

Other:
*   AC input power (80%).

225

Explanation

An incorrect type of uninterruptible power supply has been installed.

Action

Exchange the uninterruptible power supply for one of the correct type.

Possible Cause-FRUs or other:
*   Uninterruptible power supply (100%)

226

Explanation

An incorrect type of uninterruptible power supply has been installed.

Action

Exchange the uninterruptible power supply for one of the correct type.

Possible Cause-FRUs or other:
*   Uninterruptible power supply (100%)

230

Explanation

An uninterruptible power supply (UPS) is not configured correctly. The signal cable or the SAN Volume Controller power cables are probably not connected correctly. The power cable and signal cable might be connected to different UPS assemblies.

Action

Connect the cables correctly.

Possible Cause-FRUs or other:
- None.

Other:
- Cabling error (100%).

231
Explanation

An uninterruptible power supply (UPS) is not configured correctly. The signal cable or the SAN Volume Controller power cables are probably not connected correctly. The power cable and signal cable might be connected to different UPS assemblies.

Action

Connect the cables correctly.

Possible Cause-FRUs or other:
- None.

Other:
- Cabling error (100%).

235
Explanation

A SAN Volume Controller is powered on, but the uninterruptible power supply has been instructed by another SAN Volume Controller to power off because a loss of AC input power has occurred. Although the AC input power has now returned, the SAN Volume Controller still powers off. It then powers on again.

Action

Wait for the SAN Volume Controller to power off.

Possible Cause-FRUs or other:
- None.

236
Explanation

A SAN Volume Controller is powered on, but the uninterruptible power supply has been instructed by the SAN Volume Controller to power off because a loss of AC input power has occurred. Although the AC input power has now returned, the SAN Volume Controller still powers off. It then powers on again.

Action

Wait for the SAN Volume Controller to power off.

Possible Cause-FRUs or other:

- None.

240

Explanation

The ambient temperature threshold for the uninterruptible power supply has been exceeded. The uninterruptible power supply shows a red warning light, and an alarm sounds. The uninterruptible power supply switches to bypass mode to lower the temperature.

Action

1. Turn off the uninterruptible power supply and unplug it from the power source.
2. Clear the vents and remove any heat sources.
3. Ensure that the air flow around the uninterruptible power supply is not restricted.
4. Wait at least five minutes, and then restart the uninterruptible power supply.
5. If the problem remains, exchange, in the sequence shown, the FRUs for new FRUs. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:
- Uninterruptible power supply electronics assembly (60%).
- Uninterruptible power supply battery assembly (20%).
- Uninterruptible power supply (20%).

241

Explanation

The ambient temperature threshold for the uninterruptible power supply has been exceeded. The uninterruptible power supply shows a flashing red warning light, and an alarm sounds.

Action

1. Turn off the uninterruptible power supply and unplug it from the power source.
2. Clear the vents and remove any heat sources.
3. Ensure that the air flow around the uninterruptible power supply is not restricted.
4. Wait at least five minutes, and then restart the uninterruptible power supply.
5. If the problem remains, exchange, in the sequence shown, the FRUs for new FRUs. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:
- Uninterruptible power supply (100%)

Performing the node rescue

You can follow the step-by-step instructions to perform the node rescue.

If it is necessary to replace the hard disk drive or if the software on the hard disk drive has become corrupted, you can reinstall the software on the SAN Volume Controller by using the node rescue procedure.

To provide an alternate boot device, a minimal operating system is also available in nonvolatile memory on the service controller. If it is necessary to replace the hard disk drive or the software on the hard disk drive has become corrupted, the SAN

Volume Controller cannot boot and the Hardware Boot indicator remains on the front panel display or the boot operation does not progress.

If this occurs, you can reinstall the software on the SAN Volume Controller by using the node rescue procedure. Node rescue works by booting the operating system from the service controller and running a program that will copy all the node software from any other SAN Volume Controller that can be found on the fibre-channel fabric. The following procedure tells you how to run the node rescue procedure.

Perform the following steps to complete the node rescue:

1. Ensure that the fibre-channel cables are connected.
2. Ensure that at least one other SAN Volume Controller node is connected to the fibre-channel fabric.
3. Turn off the SAN Volume Controller.
4. Press and hold the left and right buttons on the front panel.
5. Press the power button.
6. Continue to hold the left and right buttons until the node-rescue-request symbol is displayed on the front panel. Figure 23 shows the node-rescue-request symbol.

Figure 23. Node-rescue-request display

The node rescue request symbol displays on the front panel display until the SAN Volume Controller starts to boot from the service controller. If the node rescue request symbol displays for more than two minutes, check the connection between the service controller and the system board. The service display shows the progress or failure of the node rescue operation.

Note: If the recovered node was part of a cluster, the node will now be offline. Delete the offline node from the cluster and then add the node back into the cluster. If node recovery was used to recover a node that failed during a software upgrade process, the automatic software downgrade process will start but it might not continue until the failed node has been deleted from the cluster. After the failed node is deleted, it is not possible to add the node back into the cluster until the downgrade process has completed. This may take up to two hours.

If the cables are correctly located and the node rescue request symbol still displays, replace the FRUs in the following sequence:

1. System board assembly
2. Service controller

Understanding the node rescue codes

The node rescue codes are displayed on the menu screen during node rescue. Start node rescue if the boot image on the hard disk is missing or corrupted. Corrupted code is indicated during the boot process either by the display of an error code or by a hang condition.

To start node rescue, press the Left and Right buttons on the front panel during a power-on cycle. The menu screen displays the Node rescue request. See "Node rescue request." The hard disk is formatted and, if the format completes without error, the software image is downloaded from any available node. During node recovery, Line 1 of the menu screen displays the message `Booting` followed by one of the node rescue codes. Line 2 of the menu screen displays a boot progress indicator. Figure 24 shows an example of a displayed node rescue code.

Figure 24. Example of a displayed node rescue code

The three-digit code that is shown in Figure 24 represents a node rescue code.

Attention: If the uninterruptible power supply (UPS) 5125 is only connected to this SAN Volume Controller, the UPS 5125 powers off within five minutes of a node-rescue process failure. (An example of a node rescue-process failure would be because a donor node cannot be found.) When the problem that is preventing node rescue has been resolved, the UPS 5125 must be powered on before powering on the SAN Volume Controller.

Note: The UPS 5115 will not power off following a node rescue failure.

Related concepts

"Node rescue request" on page 55
If software is lost, you can use the node rescue process to copy all software from another node.

300
Explanation

The SAN Volume Controller is running node rescue.

Action

If the progress bar has been stopped for at least two minutes, exchange the FRU for a new FRU. See "Possible Cause-FRUs or other."

Possible Cause-FRUs or other:
• Service controller (100%).

310
Explanation

The SAN Volume Controller is running a format operation.

Action

If the progress bar has been stopped for two minutes, exchange the FRU for a new FRU. See "Possible Cause-FRUs or other."

Possible Cause-FRUs or other:

- Disk drive assembly (95%).
- Disk drive cables (5%).

320
Explanation

A SAN Volume Controller format operation has failed.

Action

Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other.″

Possible Cause-FRUs or other:
- Disk drive assembly (95%).
- Disk drive cables (5%).

330
Explanation

The SAN Volume Controller is partitioning its disk drive.

Action

If the progress bar has been stopped for two minutes, exchange the FRU for a new FRU.

Possible Cause-FRUs or other:
- Disk drive assembly (95%).
- Disk drive cables (5%).

Other:
- Configuration problem.
- Software error.

340
Explanation

The SAN Volume Controller is searching for donor node at 2 GB.

Action

If the progress bar has been stopped for more than two minutes, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other.″

Possible Cause-FRUs or other:
- Fibre-channel adapter (100%)

345
Explanation

The SAN Volume Controller is searching for donor node at 1 GB.

Action

If the progress bar has stopped for more than two minutes, exchange the FRU for a new FRU. See *"Possible Cause-FRUs or other."*

Possible Cause-FRUs or other:
- Fibre-channel adapter (100%).

350
Explanation

The SAN Volume Controller cannot find a donor node.

Action

If the progress bar has been stopped for more than two minutes, perform the following steps:
1. At least one Fibre Channel port must be operational to enable the node to be recovered. From the front panel, display the status of the fibre-channel ports. If none of the ports have a status of Active, see MAP 5600: Fibre-channel.
2. Ensure that at least one other node is operational and is connected to the same fibre-channel network.
3. Perform the problem determination procedures for the network.

Possible Cause-FRUs or other:
- None.

Other:
- Fibre-channel network problem.

360
Explanation

The SAN Volume Controller is loading software from the donor.

Action

If the progress bar has been stopped for at least two minutes, restart the node rescue procedure.

Possible Cause-FRUs or other:
- None.

370
Explanation

The SAN Volume Controller is installing software.

Action
1. If this code is displayed and the progress bar has been stopped for at least ten minutes, the software install process has failed with an unexpected software error.
2. Power off the SAN Volume Controller and wait for 60 seconds.

3. Power on the SAN Volume Controller. The software upgrade operation will continue.
4. Report this problem immediately to your Software Support Center.

Possible Cause-FRUs or other:
• None.

Understanding the node error codes

Node error codes are displayed on the display screen by node software.

Each code indicates that a critical error has been detected that prevents the node from becoming a member of a cluster. Line 1 of the menu screen contains the message Node Error.

Line 2 contains either the error code, or the error code and additional data. Figure 25 provides an example of a node error code. This data might exceed the maximum width of the menu screen. You can press the Right navigation to scroll the display.

```
Node Error:
550  000125
```

Figure 25. Example of a displayed node error code

The additional data is unique for any error code. It provides necessary information that enables you to isolate the problem in an offline environment. Examples of additional data are disk serial numbers and FRU location codes. When these codes are displayed, you can do additional fault isolation by navigating the default menu to determine the node and fibre-channel port status.

510
Explanation

The detected memory size for this SAN Volume Controller does not match the expected memory size for the cluster. The detected memory size, in MB, is the first number following the error code. The expected memory size for the cluster is the second number following the error code. This problem might have occurred because you have exchanged failing memory modules and have installed the wrong size modules.

Action

Check the memory size of another SAN Volume Controller that is in the same cluster, then exchange the memory modules in this SAN Volume Controller for modules of the correct size.

Possible Cause-FRUs or other:
• Memory module (100%).

511
Explanation

Memory bank 1 of the SAN Volume Controller is failing.

Action

Exchange both memory modules of bank 1 for new modules.

Possible Cause-FRUs or other:
- Memory module (100%).

513
Explanation

Memory bank 2 of the SAN Volume Controller is failing.

Action

Exchange both memory modules of bank 2 for new modules.

Possible Cause-FRUs or other:
- Memory module (100%).

520
Explanation

The failing fibre-channel adapter port is shown by the number following the displayed error code. Port number 1 or 2 indicates adapter one. Port number 3 or 4 indicates adapter two.

Action

Exchange the failing FRU for a new FRU.

Possible Cause-FRUs or other:
- Fibre-channel adapter assembly (100%).

540
Explanation

An Ethernet port has failed on the SAN Volume Controller.

Action

Go to Ethernet map.

Possible Cause-FRUs or other:
- Ethernet cable
- System board assembly

Other:
- The Ethernet cable is disconnected.
- Ethernet hub.

550
Explanation

Unable to form a cluster due to a lack of cluster resources. Supplemental data displayed with this error code will list the missing IDs for the SAN Volume

Controllers and the quorum disk controller.

Action

1. Ensure that the other SAN Volume Controllers in the cluster are powered on and operational.
2. From the front panel, display the fibre-channel port status. If any port is not active, perform the fibre-channel port problem determination procedures.
3. Do the problem determination procedures for the network.
4. The quorum disk failed or cannot be accessed. Perform the problem determination procedures for the disk controller.

Possible Cause-FRUs or other:

- None.

555
Explanation

Power Domain error. Both SAN Volume Controllers in an I/O group are being powered by the same uninterruptible power supply. The other SAN Volume Controller's ID is displayed with the node error code on the front panel.

Action

Ensure that the configuration is correct and that each SAN Volume Controller is in an I/O group is connected from a separate uninterruptible power supply.

Possible Cause-FRUs or other:

- None.

Other:

- Configuration problem.

558
Explanation

The SAN Volume Controller cannot see the fibre-channel fabric.

Action

Ensure that:

1. The fibre-channel network fabric switch is powered-on.
2. At least one fibre-channel cable connects the SAN Volume Controller to the fibre-channel network fabric.
3. At least one fibre-channel adapter is installed in the SAN Volume Controller.
4. Go to the Fibre-channel MAP. See MAP 5600: Fibre-channel.

Possible Cause-FRUs or other:

- None.

560
Explanation

The fibre-channel network fabric is too big. The configuration is not valid.

Action

1. Ensure that all the fibre-channel connections are correct.
2. Reboot the SAN Volume Controller.

Possible Cause-FRUs or other:

- None.

Other:

- See the IBM TotalStorage SAN Volume Controller Configuration Guide.

562
Explanation

The hardware configuration is not valid. This error has probably been caused by a service action error when replacing FRUs.

Action

1. Ensure that the SAN Volume Controller hardware is correct.
2. Reboot the SAN Volume Controller.

Possible Cause-FRUs or other:

- None.

564
Explanation

This SAN Volume Controller node is repeatedly crashing because of a software failure.

If this is the only node with this problem and if you can still access the data on the virtual disks (VDisks), perform the following actions. If more than one node has this problem or if you cannot access the data on the VDisks, call your support center for assistance.

Action

1. Use the front panel controls to delete the node from the cluster. To do this:
   a. Display Node on the front panel menu. See the SAN Volume Controller menu options.
   b. Press the Left or Right buttons until "Create Cluster?" is displayed.
   c. Press Select. "Delete Cluster?" is displayed.
   d. Press and hold the "Up" button, press and release the "Select" button, release the "Up" button. The node will be deleted from the cluster and will restart.
2. Delete the node from the cluster. See Deleting a node using the SAN Volume Controller application on the master console.
3. Add the node back into the cluster. See Adding a node to a cluster using the SAN Volume Controller application on the master console.
4. Call your software support center for assistance.

Possible Cause-FRUs or other:

- None.

Other:
- Software error.

570
Explanation

The SAN Volume Controller data is readable, but corrupted. The SAN Volume Controller has been rejected by the cluster.

If this is the only node with this problem and if you can still access the data on the virtual disks (VDisks), perform the following actions. If more than one node has this problem or if you cannot access the data on the virtual disks, call your support center for assistance.

Action

Perform the node rescue recovery procedure. Then, delete then re-add the node. If the problem persists, exchange the FRUs for new FRUs in the sequence shown.

Possible Cause-FRUs or other: Other:
- Disk drive assembly (45%).
- System board assembly (50%).
- Disk drive cables (5%).
- Software problem.

572
Explanation

The SAN Volume Controller cannot determine the VPD for a FRU. A FRU in the SAN Volume Controller has been changed, and the VPD is unreadable or unrecognized.

Action
1. Update the SAN Volume Controller software to the latest level.
2. Exchange the most-recently replaced FRU for a new FRU.

Possible Cause-FRUs or other:
- None.

Other:
- Software problem.

574
Explanation

The SAN Volume Controller software on this node is corrupted. Recovery is required.

If this is the only node with this problem and if you can still access the data on the virtual disks (VDisks), perform the following actions. If more than one node has this problem or if you cannot access the data on the virtual disks, call your support center for assistance.

Action

1. Perform the node rescue procedure.

Possible Cause-FRUs or other:
- None.

Other:
- Software problem.

576
Explanation

The SAN Volume Controller data cannot be read. The SAN Volume Controller has been rejected from the cluster.

Action

In the sequence shown, exchange the FRUs for new FRUs.

Possible Cause-FRUs or other:
- Disk drive assembly (45%).
- System board assembly (50%).
- Disk drive cables (5%).

578
Explanation

This SAN Volume Controller node has lost power without saving data. The node has been rejected by the cluster. The problem has occurred because the node temporarily lost its input power. Power is now present.

If you can still access the data on the virtual disks (VDisks), perform the following actions. If you cannot access the data on the VDisks, call your support center for assistance.

Action

1. If this error has occurred because power was accidentally removed from this SAN Volume Controller, for example, by pulling out the power cable, you can reintroduce the node to the cluster by deleting the offline node from the cluster and then adding the node back into the cluster.
2. If you cannot determine the cause of the temporary power loss, check that the input power cable is securely connected at both the SAN Volume Controller end and at the uninterruptible power supply end. If the cable is securely connected, follow the sequence shown to exchange the FRUs for new FRUs each time this error reoccurs. See Possible Cause-FRUs or other after the last action in this section.
3. This node will be offline. Delete the offline node from the cluster and then add the node back into the cluster.

Possible Cause-FRUs or other:
- SAN Volume Controller power cable (25%).
- Power supply assembly (25%).
- Uninterruptible power supply electronics assembly (10%).

- Service controller assembly (10%).
- System board assembly (5%).
- Disk drive assembly (4%).
- Disk drive cables (1%).

Other:
- User error.

579
Explanation

The SAN Volume Controller has lost power without saving data. When the cluster is available The SAN Volume Controller will rejoin the cluster. However, this SAN Volume Controller cannot access the cluster at this time.

Action
1. Repair failures on any other SAN Volume Controllers that might be preventing a cluster form being formed.
2. Display the fibre channel port status on this SAN Volume Controller and repair any fibre channel paths that do not have a status of Active.
3. Verify with the customer that no changes have been made to the fibre channel switch zoning or cabling that might prevent this node being able to access other SAN Volume Controllers in the cluster. If changes have been made then reverse those changes to enable this SAN Volume Controller to rejoin the cluster.
4. If more than one SAN Volume Controller is displaying this error code on its front panel, those SAN Volume Controllers have simultaneously lost power without saving data. This might have been caused by simultaneous failures of SAN Volume Controller power supplies, SAN Volume Controller UPS assemblies, or the simultaneous accidental removal of SAN Volume Controller power cables. This might result in the total loss of the cluster. Call your support center for assistance.

Possible Cause-FRUs or other:
- User error.

580
Explanation

The SAN Volume Controller cannot read the unique ID from the service controller, so the fibre-channel adapters cannot be started.

Action

In the sequence shown, exchange the following FRUs for new FRUs. See "Possible Cause-FRUs or other."

Possible Cause-FRUs or other:
- Front panel assembly (50%).
- Service controller (50%).

Other:
- None.

900

Explanation

Cluster recovery required.

Action

Contact the IBM Support Center for assistance.

Possible Cause-FRUs or other:
- None.

990

Explanation

Cluster recovery has failed and a software dump has been created.

Action

Contact the IBM Support Center for assistance.

Possible Cause-FRUs or other:
- None.

Understanding the create cluster error codes

Cluster Create error codes are displayed on the menu screen when you are using the front panel to create a new cluster, but the create operation fails.

Line 1 of the menu screen contains the message `Create Failed`. Line 2 shows the error code and, where necessary, additional data.

700

Explanation

All the available unique identifications have been used. Each time a new cluster is created, the service controller creates a unique ID. When 255 clusters have been created, the service controller must be exchanged for a new one.

Action

Use a different node to create the cluster.

Possible Cause-FRUs or other:
- Service controller (100%) (See "Removing the service controller from the SAN Volume Controller").

710

Explanation

The service controller cannot increase the cluster ID counter. When a new cluster ID is requested from the service controller, the service controller is told to increase the ID counter. The new ID is read back for verification. If the ID counter has not been increased, this error code is displayed. This error has occurred because the service controller failed.

Action

Exchange the FRU for a new FRU.

Possible Cause-FRUs or other:
*   Service controller (100%) (See ″Removing the service controller from the SAN Volume Controller″).

SAN problem determination

The procedures to service the SAN Volume Controller that are provided here help you solve problems on the SAN Volume Controller and its connection to the storage area network (SAN).

SAN failures might cause the SAN Volume Controller cluster to be unable to form or they might cause SAN Volume Controller disks to be inaccessible to host systems. Failures can be caused by SAN configuration changes or by hardware failures in SAN components.

If you were sent here from the Maintenance Analysis Procedures or error codes in this chapter, perform the following steps:

1. If the customer has changed the SAN configuration by changing the fibre-channel cable connections or switch zoning, ask the customer to verify that the changes were correct and, if necessary, reverse those changes.

2. Verify that the power is turned on to all switches and RAID controllers that the SAN Volume Controller uses, and that they are not reporting any hardware failures. If problems are found, resolve those problems before proceeding further.

3. Verify that the fibre-channel cables that connect the SAN Volume Controllers to the switches are securely connected.

4. If the customer is running a SAN management tool that you are familiar with and that you have access to, use that tool to view the SAN topology and isolate the failing component. If the customer is not using any other SAN management tool, start IBM TotalStorage Productivity Center for Fabric (TPC for Fabric) Manager on the master console and use that tool to view the SAN topology and isolate the failure. For details on performing SAN problem determination with TPC for Fabric Manager, contact the TPC for Fabric support center.

    Related tasks

    "MAP 5000: Start" on page 130
    MAP 5000: Start is the entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

Chapter 7. Maintenance analysis procedures (MAPs)

The maintenance analysis procedures (MAPs) tell you how to analyze a failure that occurs in a SAN Volume Controller.

With the MAPs, you can isolate the field replaceable units (FRUs) of the SAN Volume Controller that fail. This chapter provides the following MAPs:

- Start
- Power
- Uninterruptible Power Supply
- Uninterruptible Power Supply repair verification
- Front panel
- Ethernet
- Fibre-channel
- Repair verification

Note: Start all problem determination procedures and repair procedures with "MAP 5000: Start."

Using the MAPs

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

When you service one SAN Volume Controller, the other keeps the SAN operational. With concurrent maintenance, all FRUs can be removed, replaced, and tested on one SAN Volume Controller while the SAN and host systems are powered on and doing productive work.

Note: Unless you have a particular reason, do not remove the power from both SAN Volume Controllers unless these instructions tell you to do so.

- To isolate the FRUs in the failing SAN Volume Controller, complete the actions and answer the questions given in these MAPs.
- When instructed to exchange two or more FRUs in sequence:
  1. Exchange the first FRU in the list for a new one.
  2. Verify that the problem is solved.
  3. If the problem remains:
     a. Reinstall the original FRU.
     b. Exchange the next FRU in the list for a new one.
  4. Repeat steps 2 and 3 until either the problem is solved, or all the related FRUs have been exchanged.
  5. Complete the next action indicated by the MAP.
  6. If the MAPs are being used due to a cluster error code, following the repair, mark the error as fixed in the cluster error log before completing the actions in the Repair Verification MAP.

MAP 5000: Start

MAP 5000: Start is the entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

If you are not familiar with these MAPs, first read "Using the MAPs."

You might have been sent here for one of the following reasons:
- The web-based Directed Maintenance procedure sent you here.
- A problem occurred during the installation of a SAN Volume Controller.
- Another MAP sent you here.
- A customer observed a problem that was not detected by the system.

SAN Volume Controllers are configured in pairs. While you service one SAN Volume Controller, the other permits access to all the storage managed by the pair. With concurrent maintenance, all FRUs can be removed, replaced, and tested on one SAN Volume Controller while the SAN and host systems are powered on and doing productive work

Note: Unless you have a particular reason, do not remove the power from both SAN Volume Controllers unless these instructions tell you to do so.

Perform the following steps:

1. **Were you sent here from a Directed Maintenance Procedure?**

   NO   Go to step 2

   YES   Go to step 8 on page 131

2. (from step 1)

   Find the master console that is used to access the SAN Volume Controller cluster. This is normally located in the same rack as the SAN Volume Controllers but might be located in another rack if the master console is used to support more than one SAN Volume Controller cluster.

3. (from step 2)

   Log on to the master console using the user ID and password provided by the customer.

4. (from step 3)

   Log in to the SAN Volume Controller Console using the user ID and password provided by the customer, and launch the SAN Volume Controller application for the cluster you are repairing.

5. (from step 4)

   Does the SAN Volume Controller application start?

   NO   Go to step 8 on page 131.

   YES   Go to step 6.

6. (from step 5)

   When the SAN Volume Controller cluster that you want to service is selected, is the Welcome panel displayed?

   NO   Go to step 8 on page 131.

   YES   Go to step 7.

7. (from step 6)

   Start the Directed Maintenance Procedures.

Did the maintenance procedures find an error that needs to be fixed?

NO   Go to step 8.

YES   Follow the Directed Maintenance Procedures.

8. (from steps 1 on page 130, 5 on page 130, 6 on page 130, and 7 on page 130)

   Is the power light on any SAN Volume Controller front panel off?

   NO   Go to step 9.

   YES   Try to power on the SAN Volume Controllers. See "Using the power control for the SAN Volume Controller."

           Note: The UPS that supplies the SAN Volume Controller might also be powered off. This must be powered on before the SAN Volume Controller will power on.
           If the SAN Volume Controllers power on, go to step 9, else go to Power MAP

9. (from step 8)

   Is the front panel check light on any SAN Volume Controller illuminated?

   NO   Go to step 10.

   YES   The service controller for the SAN Volume Controller failed.
           a. Replace the service controller in the SAN Volume Controller with the check light on.
           b. Go to the Repair Verification MAP.

10. (from step 9)

Figure 26. Hardware boot display

    Is the hardware boot display that you see in Figure 26 displayed on any of the SAN Volume Controllers?

    NO   Go to step 12.

    YES   Go to step 11.

11. (from step 10)

   Has the hardware boot display that you see in Figure 26 displayed for more than three minutes?

   NO   Go to step 12.

   YES   Perform the following:
           a. Go to Determining a hardware boot failure.
           b. Go to the Repair Verification MAP.

12. (from steps 10 and 11)

   Is `Failed` displayed on the top line of the service display of any SAN Volume Controller?

   NO   Go to step 13 on page 132.

   YES   Perform the following:

> a. Note the failure code. Go to Understanding the Boot codes and perform the repair actions.
>
> b. Go to the Repair Verification MAP

13. (from step 12 on page 131)

   Is Booting displayed on the top line of the service display of any SAN Volume Controller?

   NO   Go to step 15.

   YES   Go to step 14.

14. (from step 13)

   A progress bar and a boot code are displayed. If the progress bar does not advance for more than three minutes, it has stalled.

   Has the progress bar stalled?

   NO   Go to step 15.

   YES   Perform the following:
   > a. Note the failure code and go to *Understanding the boot codes* to perform the repair actions.
   >
   > b. Go to *MAP 5700: Repair verification*.

15. (from steps 13 and step 14)

   If you pressed any of the navigation buttons on the front panel, wait for sixty seconds to ensure that the display has switched to its default display.

   Is Node Error displayed on the top line of the service display of any SAN Volume Controller?

   NO   Go to step 16.

   YES   Follow the steps below:
   > a. Note the failure code and go to *Understanding the node error* codes to perform the repair actions.
   >
   > b. Go to *MAP 5700: Repair verification*.

16. (from step 15)

   Is Cluster Error displayed on the top line of the service display of any SAN Volume Controller?

   NO   Go to step 17.

   YES   Follow the steps below:
   > a. A cluster error has been detected. This error code will be displayed on all the operational nodes in the cluster. This type of error is normally repaired using the Directed Maintenance Procedures. If you are unable to start the directed maintenance procedures, go to *Cluster error codes* to perform the repair actions.
   >
   > b. Go to *MAP 5700: Repair verification*.

17. (from step 16)

   Is Powering Off, Restarting, Shutting Down, or Power Failure displayed in the top line of the service display?

   NO   Go to step 19 on page 133.

   YES   The progress bar moves every few seconds. Wait for the operation to complete and then return to step 1 on page 130 in this MAP. If the progress bar does not move for three minutes, press the power button and go to step 18 on page 133.

18. (from step 17 on page 132)

    Did the SAN Volume Controller power off?

    NO   Follow the steps below:

    a. Remove the power cord from the rear of the box.

    b. Wait 60 seconds.

    c. Replace the power cord.

    d. If the node does not power on, press the power button to power on the SAN Volume Controller, then return to step 1 on page 130 in this MAP.

    YES   Follow the steps below:

    a. Wait 60 seconds.

    b. Press the power button to power on the SAN Volume Controller, then return to step 1 on page 130 in this MAP.

    Note: If the SAN Volume Controller is powered off for more than five minutes and it is the only SAN Volume Controller connected to the uninterruptible power supply (UPS) 5125, the UPS 5125 will also power off. Before pressing the power button on the SAN Volume Controller, press the power-on button on the UPS 5125. The UPS 5115 will not power off if the SAN Volume Controller has been powered off. The UPS 5115 will only power off if its power button is pressed, input power has been lost for more than five minutes, or the SAN Volume Controller has shut it down following a reported loss of input power.

19. (from step 18)

    Is Charging or Recovering displayed in the top line of the service display of any SAN Volume Controller?

    NO   Go to step 20.

    YES   If Charging is displayed, the UPS battery is not yet charged sufficiently to support the SAN Volume Controller. If this is displayed for more than three hours, go to the UPS MAP. If Recovering is displayed, the UPS battery is not yet charged sufficiently to be able to support the SAN Volume Controller immediately following a power supply failure. However, if Recovering is displayed, the SAN Volume Controller can be used normally. If Recovering is displayed for more than two hours, go to the UPS MAP.

20. (from step 19)

    Is the service display unreadable?

    NO   Go to step 21.

    YES   Follow the steps below:

    a. Check the language. The display might be set to another language.

    b. If the language is set correctly, go to front panel map.

21. (from step 20)

    No errors have been detected by the SAN Volume Controller. If you suspect that the problem that is reported by the customer is a hardware problem, perform the following tasks:

    a. Perform problem determination procedures on your host systems, disk controllers, and fibre channel switches.

    b. Ask your hardware support center for assistance.

If you suspect that the problem is a software problem, go to Installing and maintaining the software for the SAN Volume Controller.

Related tasks

"Using directed maintenance procedures" on page 20
You can use directed maintenance procedures to diagnose and resolve problems with the SAN Volume Controller.

"Navigating through the change language menu" on page 66
The Change language menu is accessed through the SAN Volume Controller default menu.

"Determining a hardware boot failure" on page 103
If you see that the hardware boot display stays on the front panel for more than three minutes, the node cannot boot. The cause might be a hardware failure or the software on the hard disk drive is missing or damaged.

"Using the MAPs" on page 129
To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

"MAP 5100: Power" on page 135
MAP 5100: Power helps you to solve problems that have occurred on the SAN Volume Controller power.

"MAP 5200: Uninterruptible power supply 5125" on page 141
MAP 5200: Uninterruptible power supply 5125 helps you solve problems that have occurred in the uninterruptible power supply (UPS) 5125 systems used on a SAN Volume Controller.

"MAP 5150: Uninterruptible power supply 5115" on page 138
MAP 5150: Uninterruptible power supply, helps you solve problems that have occurred in the uninterruptible power supply (UPS) 5115 systems used on a SAN Volume Controller.

"MAP 5400: Front panel" on page 148
MAP 5400: Front panel, helps you to solve problems that have occurred on the SAN Volume Controller front panel.

"MAP 5700: Repair verification" on page 155
MAP 5700: Repair verification helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

Chapter 3, "Installing and maintaining the software for the SAN Volume Controller," on page 43
The software for the SAN Volume Controller is preinstalled on all nodes.

"Using the power control for the SAN Volume Controller" on page 19
SAN Volume Controllers are powered by an uninterruptible power supply (UPS) located in the same rack as the SAN Volume Controller.

Related information

"Defining cluster error codes" on page 76
Every cluster error code includes an error code number, a description, action, and possible FRUs.

"Understanding the boot codes" on page 103
The boot codes are displayed on the screen when a node is booting.

"Understanding the node error codes" on page 119
Node error codes are displayed on the display screen by node software.

MAP 5100: Power

MAP 5100: Power helps you to solve problems that have occurred on the SAN Volume Controller power.

If you are not familiar with these MAPs, first read "Using the MAPs."

You might have been sent here for one of the following reasons:
- A problem occurred during the installation of a SAN Volume Controller system.
- The Power-on switch failed to turn the node on.
- Another MAP sent you here.

Perform the following steps:
1. Press the Power On switch on the SAN Volume Controller front panel.

   Is the Power On indicator on the SAN Volume Controller front panel illuminated a solid green?

   NO Go to step 2.

   YES The Power On indicator on the front panel shows that the SAN Volume Controller has successfully powered on. Continue with the repair verification MAP to verify the correct operation.

2. **Is the System board power LED indicator on the SAN Volume Controller rear panel flashing green?**

   NO Go to step 3.

   YES The System board power LED indicator on the node rear panel shows that power is present at the power supply but the power-on switch failed to turn the node on.
   - Replace the parts in the following sequence:
     – Power supply unit.
     – Service controller.
     – Front panel assembly.
     – System board assembly.
   - Verify the repair by continuing with the repair verification MAP.

3. **Is the System board power LED indicator on the SAN Volume Controller rear panel illuminated a solid green?**

   NO Go to step 4.

   YES The System board power LED indicator on the node rear panel shows that power on the SAN Volume Controller is on, but is not being displayed on the front panel Power On indicator.
   - Replace the parts in the following sequence:
     – Service controller.
     – Front panel assembly.
     – System board assembly.
   - Verify the repair by continuing with the repair verification MAP.

4. **Determine the type of uninterruptible power supply (UPS) that you are using.**

   You can find out which UPS you are using by one of the following methods:
   - Do a physical check of the UPS. The UPS 5125 is 2U high (3.5 in), while the UPS 5115 is 1U high (1.75 in).

| | `svcinfo lsnodevpd` *nodeID*

| | **If your UPS is a UPS 5125:**
| | Go to step 5

| | **If your UPS is a UPS 5115:**
| |

5. (from step 4 on page 135)

   Does the UPS 5125 powering this SAN Volume Controller node have its mode indicator a solid green?

   NO   Refer to the UPS map.

   YES   Go to step 6.

6. (from step 5)

   Does the UPS 5125 powering this SAN Volume Controller node have all of its circuit breakers on?

   NO   Go to step 7.

   YES   The input power to the SAN Volume Controller node is missing. Verify that the power cord assembly is correctly plugged into the SAN Volume Controller and the UPS 5125.

       • Replace the parts in the following sequence:
           – Power supply assembly.
           – Power cord assembly.
           – Verify the repair by continuing with the repair verification MAP.

7. (from step 6)

   One of the UPS 5125's circuit breakers has tripped. Reset the tripped circuit breaker to On.

   Does the UPS 5125's circuit breaker remain on?

   NO   Go to step 8.

   YES   Verify the repair by continuing with the repair verification MAP.

8. (from step 7)

   One of the UPS 5125's output loads caused a circuit breaker to trip. Remove each of up to eight SAN Volume Controller node power cables in turn, and try to reset the circuit breakers to On.

   Does the removal of any SAN Volume Controller node power cables enable the circuit breaker to remain on?

   NO   UPS 5125 output circuit breaker is faulty.

       a. Replace the UPS 5125 assembly.
       b. Go to "MAP 5300: Uninterruptible power supply 5125 repair verification."

   YES   The input power current to the SAN Volume Controller node is too high.

       a. Replace the parts in the following sequence
           1) Power supply assembly.
           2) Power cord assembly

        b. Verify the repair by continuing with the repair verification MAP.

9. (from step 4 on page 135)

   Does the UPS 5115 powering this SAN Volume Controller node have its Power On and Load Segment 2 indicators a solid green, with Service, On Battery, and Overload indicators off?

   NO   Refer to the UPS map.

   YES   The input power to the SAN Volume Controller node is missing. Verify that the power cord assembly is correctly plugged in to the SAN Volume Controller and the UPS 5115.

Related tasks

"MAP 5200: Uninterruptible power supply 5125" on page 141
MAP 5200: Uninterruptible power supply 5125 helps you solve problems that have occurred in the uninterruptible power supply (UPS) 5125 systems used on a SAN Volume Controller.

"MAP 5150: Uninterruptible power supply 5115" on page 138
MAP 5150: Uninterruptible power supply, helps you solve problems that have occurred in the uninterruptible power supply (UPS) 5115 systems used on a SAN Volume Controller.

"MAP 5700: Repair verification" on page 155
MAP 5700: Repair verification helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the front panel from the SAN Volume Controller" on page 162
The front panel from the SAN Volume Controller might be removed in order to allow you to perform maintenance on it. Perform the following steps to remove the front panel from the SAN Volume Controller.

"Removing the service controller from the SAN Volume Controller" on page 166
You can remove the service controller from the SAN Volume Controller, but if you are replacing the service controller as part of a problem determination procedure, you must also replace the cables that are supplied as part of the service controller FRU.

"Removing the SAN Volume Controller power supply" on page 178
To remove the power supply, you must perform the following steps:

"Removing the system board" on page 183
The system board FRU is a kit that includes the following parts:

"MAP 5300: Uninterruptible power supply 5125 repair verification" on page 146
MAP 5300: Uninterruptible power supply repair verification, helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller uninterruptible power supply (UPS) 5125.

"MAP 5250: Uninterruptible power supply 5115 repair verification" on page 145
MAP 5250: Uninterruptible power supply 5115 repair verification, helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller uninterruptible power supply (UPS) 5115.

Related reference

"Controls and indicators for the SAN Volume Controller" on page 10
Controls and indicators are located on the front panel of the SAN Volume Controller.

The controls and indicators for the SAN Volume Controller are contained on the front and back panel assembly.

The fields for the node vital product data are listed below.

MAP 5150: Uninterruptible power supply 5115

MAP 5150: Uninterruptible power supply, helps you solve problems that have occurred in the uninterruptible power supply (UPS) 5115 systems used on a SAN Volume Controller.

If you are not familiar with these maintenance analysis procedures (MAPs), read "Using the maps" first.

You may have been sent here for one of the following reasons:
- The system problem determination procedures sent you here.
- A problem occurred during the installation of a .
- Another MAP sent you here.
- A customer observed a problem that was not detected by the system problem determination procedures.

Figure 27 shows an illustration of the front of the panel for the UPS 5115.
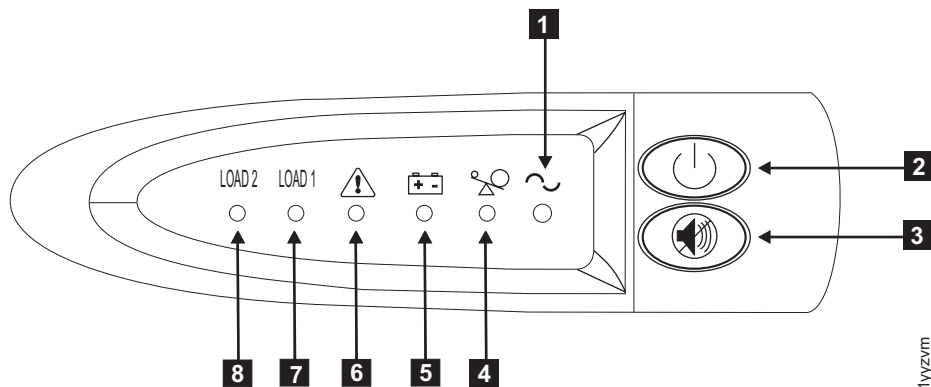
Figure 27. Uninterruptible power supply 5115 front panel assembly

1 Power-on indicator

2 On/off button

3 Test and alarm reset button

4 Overload indicator

5 On-battery indicator

6 Service indicator

7 Load segment 1 indicator

8 Load segment 2 indicator

1. **Is the Power on indicator "off" for the UPS 5115 that is connected to the failing SAN Volume Controller?**

NO Go to step 3.

YES Go to step 2.

2. (from step 1 on page 138)

   Are other UPS 5115s showing the Power-on indicator off?

   NO The UPS 5115 may be in standby mode. this could be because the on/off button on this UPS 5115 has been pressed, input power has been missing for more than five minutes, or because the SAN Volume Controller has shut it down following a reported loss of input power. Press and hold the on/off button until you hear the UPS 5115 beep (approximately two seconds).

   Go to 3.

   YES Main power is missing from installation
   a. Restore main power to installation
   b. Verify the repair by continuing with the UPS 5115 repair verification MAP.

3. (from step 1 on page 138 and step 2)

   Are the Power On and Load Segment 2 indicators for the UPS 5115 illuminated solid green, with Service, On Battery, and Overload Indicators off?

   NO Go to step 4

   YES The UPS 5115 is no longer showing a fault. Verify the repair by continuing with the UPS 5115 repair verification MAP.

4. (from step 3)

   Is the UPS 5115 On Battery indicator illuminated yellow (solid or flashing), with Service and Overload indicators off?

   NO Go to step 5.

   YES The input power supply to this UPS 5115 is not connected correctly, or the UPS 5115 is receiving input power that may be unstable or outside the specified voltage or frequency range. The SAN Volume Controller automatically adjusts the UPS 5115 voltage range. If the input voltage has recently changed, the alarm condition might be present until the SAN Volume Controller has adjusted the alarm setting. Ensure that an operational SAN Volume Controller is connected to the UPS 5115. If the condition persists for at least five minutes, do the following:
   a. Check the input circuit protector on the UPS 5115 rear panel, and press if open.
   b. Ask the customer to check the site power for the UPS 5115 providing power to this SAN Volume Controller. Check the connection, voltage, and frequency.
   c. If input power and input circuit protector is okay, replace the FRUs in the following sequence:
      1) UPS 5115 power cord
      2) UPS 5115
   d. Verify the repair by continuing with the UPS 5115 repair verification MAP.

5. (from step 4)

   Is the UPS 5115 Overload indicator illuminated solid red?

NO Go to step 6.

YES The UPS 5115 output power requirement has exceeded the UPS 5115 capacity.

    a. Check that only one SAN Volume Controller node is connected to the UPS 5115.

    b. Check that no other loads are connected to the UPS 5115.

    c. After ensuring that the output loading is correct, turn off and unplug the input power from the UPS 5115. Wait at least 5 seconds until all LEDs are off, and restart the UPS 5115 by reconnecting to input power and pressing the on/off button until you hear the UPS 5115 beep (approximately two seconds).

    d. If the condition persists, replace the UPS 5115.

    e. Verify the repair by continuing with the UPS 5115 repair verification MAP.

6. (from step 5 on page 139)

   Is the UPS 5115 Service indicator illuminated flashing red and the On Battery indicator illuminated solid yellow, with the Power On and Overload indicators off?

   NO Go to step 7.

   YES The UPS 5115 battery might be fully discharged or faulty.

       a. Check that the UPS 5115 has been connected to a power outlet for at least 2 hours to charge the battery. After charging the battery, press and hold the Test/Alarm Reset Button for 3 seconds; then check the Service indicator.

       b. If the Service indicator is still flashing, replace the UPS 5115.

       c. Verify the repair by continuing with the UPS 5115 repair verification MAP.

7. (from step 6)

   Is the UPS 5115 Service indicator illuminated flashing red, the On Battery indicator illuminated solid yellow, and the Power On illuminated solid green, with the Overload indicator off?

   NO Go to step 8.

   YES The UPS 5115 internal temperature is too high.

       a. Turn off and unplug the UPS 5115. Clear vents at the front and rear of the UPS 5115. Remove any heat sources. Ensure the airflow around the UPS 5115 is not restricted.

       b. Wait at least 5 minutes and restart the UPS 5115 by reconnecting to input power and pressing the On/Off button until you hear the UPS 5115 beep (approximately two seconds).

       c. If the condition persists, replace the UPS 5115.

       d. Verify the repair by continuing with the UPS 5115 repair verification MAP.

8. (from step 7)

   Is the UPS 5115, Service, On Battery, Overload, and Power On indicators illuminated and flashing?

   NO The UPS 5115 has an internal fault.

       a. Replace the UPS 5115.

| b. Verify the repair by continuing with the UPS 5115 repair verification MAP.

YES The UPS 5115 battery might be fully discharged or not faulty.

| a. Check that the UPS 5115 has been connected to a power outlet for at least 2 hours to charge the battery. After charging the battery, press and hold the test/alarm reset button for 3 seconds, and then check the service indicator.

| b. If the service indicator is still flashing, replace the UPS 5115.

| c. Verify the repair by continuing with the UPS 5115 repair verification MAP.

Related tasks

"Checking the grounding of the SAN Volume Controller and the uninterruptible power supply 5115" on page xxvi
Ensure that you understand how to check the grounding.

"MAP 5250: Uninterruptible power supply 5115 repair verification" on page 145
MAP 5250: Uninterruptible power supply 5115 repair verification, helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller uninterruptible power supply (UPS) 5115.

"Removing the power cable from the uninterruptible power supply 5115" on page 159
If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the uninterruptible power supply (UPS) 5115.

"Removing the uninterruptible power supply 5115" on page 187
Before you begin to remove the uninterruptible power supply (UPS) 5115, please read all safety notices.

MAP 5200: Uninterruptible power supply 5125

MAP 5200: Uninterruptible power supply 5125 helps you solve problems that have occurred in the uninterruptible power supply (UPS) 5125 systems used on a SAN Volume Controller.

If you are not familiar with these maintenance analysis procedures (MAPs), first read "Using the maps."

You might have been sent here for one of the following reasons:
- The system problem determination procedures sent you here.
- A problem occurred during the installation of a SAN Volume Controller.
- Another MAP sent you here.
- A customer observed a problem that was not detected by the system problem determination procedures.

Figure 28 on page 142 shows an illustration of the front of the panel for the UPS 5125.
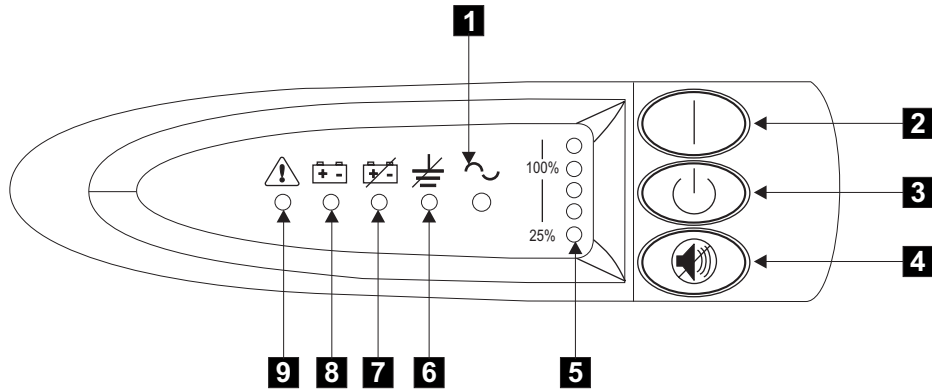
Figure 28. Uninterruptible power supply 5125 front panel assembly

1 Mode indicator

2 On button

3 Off button

4 Test and alarm reset button

5 Load-level indicator

6 Site wiring fault indicator

7 Battery service indicator

8 Battery mode indicator

9 General alarm indicator

1. **Is the UPS 5125, that is connected to the failing SAN Volume Controller, Mode indicator off?**

   NO Go to step 3.

   YES Go to step 2.

2. (from step 1)

   Are other UPS 5125s showing Mode indicator off?

   NO Power supply to this UPS 5125 is faulty or not connected correctly.
      a. Ask the customer to check the site power connection to this UPS 5125.
      b. If input power connection is okay, replace the FRUs in the following sequence:
         1) UPS 5125 power cord
         2) UPS 5125 electronics assembly
         3) UPS 5125 assembly
      c. Verify the repair by continuing with the UPS 5125 repair verification MAP.

   YES Main power is missing from installation
      a. Restore main power to installation
      b. Verify the repair by continuing with the UPS 5125 repair verification MAP.

3. (from step 1)

   Is the UPS 5125 Mode indicator illuminated and flashing green?

NO   Go to step 4.

YES   The UPS 5125 is in standby mode. This can be because the SAN Volume Controllers powered by this UPS 5125 have been powered off for more than five minutes, or the Off button on this UPS 5125 has been pressed.

      a. Press and hold the On button until you hear the UPS 5125 beep (approximately one second) and the Power On indicator shows solid green. If the Mode indicator does not change to solid green, replace the UPS 5125 electronics assembly.

      b. Verify the repair by continuing with the UPS 5125 repair verification MAP.

4. (from step 3 on page 142)

   Is the Mode indicator illuminated solid red?

   NO   Go to step 8 on page 144.

   YES   The UPS 5125 is in bypass mode. Go to step 5

5. (from step 4)

   Is the UPS 5125 Overload Load Level indicator illuminated red?

   NO   Go to step 6.

   YES   The UPS 5125 output power requirement exceeded the UPS 5125 capacity.

      a. Check that no more than four SAN Volume Controller nodes are connected to the UPS 5125.

      b. Check that only SAN Volume Controller nodes are connected to the UPS 5125.

      c. After ensuring output loading is correct, turn off and unplug the input power from the UPS 5125. Wait at least 5 seconds until all LEDs are off and restart the UPS 5125 by reconnecting to input power and pressing the On button until you hear the UPS 5125 beep (approximately one second).

      d. If the condition persists, call the IBM support center.

      e. Verify the repair by continuing with the UPS 5125 repair verification MAP.

6. (from step 5)

   Is the UPS 5125 General Alarm indicator illuminated and flashing red? (This will cause a continuous audible alarm)

   NO   Go to step 7.

   YES   The UPS 5125 internal temperature is too high.

      a. Turn off and unplug the UPS 5125. Clear vents at the front and rear of the UPS 5125. Remove any heat sources. Ensure the airflow around the UPS 5125 is not restricted.

      b. Wait at least 5 minutes and restart the UPS 5125 by reconnecting to input power and pressing the On button until you hear the UPS 5125 beep (approximately one second).

      c. If the condition persists, replace the UPS 5125 electronics assembly.

      d. Verify the repair by continuing with the UPS 5125 repair verification MAP.

7. (from step 6)

Is the UPS 5125 Battery Mode indicator illuminated and flashing red? (This causes an audible beep every five seconds).

NO The UPS 5125 is in bypass mode because of an internal UPS 5125 fault.

   a. Replace the following assemblies in turn:
   - UPS 5125 electronics assembly
   - UPS 5125 battery assembly
   - UPS 5125 assembly

   b. Verify the repair by continuing with the UPS 5125 repair verification MAP.

YES The UPS 5125 battery might be fully discharged or not connected correctly.

   a. Check that the UPS 5125 battery assembly is installed correctly.

   b. Check that the UPS 5125 has been connected to a power outlet for at least 3 hours to charge the battery. After charging the battery, press and hold the test/alarm reset button for 3 seconds; then check the battery mode indicator.

   c. If the battery mode indicator is still on, replace the UPS 5125 battery assembly.

   d. Verify the repair by continuing with the UPS 5125 repair verification MAP.

8. (from step 4 on page 143

   Is the UPS 5125 Wiring Fault indicator illuminated and flashing red? (This causes an audible beep every five seconds).

   NO Go to step 9.

   YES The UPS 5125 ground wire connection does not exist or the power input line and neutral wires are reversed.

   a. Check the grounding of the UPS 5125.

   b. Ask the customer to check the UPS 5125 input power connection.

   c. Verify the repair by continuing with the UPS 5125 repair verification MAP.

9. (from step 8)

   Is the UPS 5125 Mode indicator flashing red? (This causes an audible beep every five seconds).

   NO Go to step 10 on page 145.

   YES The UPS 5125 is receiving input power that might be unstable or outside the specified voltage or frequency range. The SAN Volume Controller automatically adjusts the UPS 5125 voltage range. If the input voltage has recently changed, the alarm condition might be present until the SAN Volume Controller has adjusted the alarm setting. Ensure that an operational SAN Volume Controller is connected to the UPS 5125. If the condition persists for at least five minutes, do the following:

   a. Ask the customer to check the site power for the UPS 5125 providing power to this SAN Volume Controller. Check the connection, voltage, and frequency.

   b. If input power is okay, replace the UPS 5125 electronics assembly.

c. Verify the repair by continuing with the UPS 5125 repair verification MAP.

10. (from step 9 on page 144

Are the UPS 5125 General Alarm, Battery Power, Battery Mode, Wiring Fault, Mode indicators illuminated and flashing red? (This causes a continuous audible alarm).

NO The UPS 5125 is no longer showing a fault. Verify the repair by continuing with the UPS 5125 repair verification MAP.

YES The UPS 5125 is reporting a fault condition.

a. Replace the following assemblies in turn:
- UPS 5125 electronics assembly
- UPS 5125 battery assembly
- UPS 5125 assembly

b. Verify the repair by continuing with the UPS 5125 repair verification MAP.

Related tasks

"Checking the grounding of the SAN Volume Controller and the uninterruptible power supply 5125" on page xxviii
Ensure that you understand how to check the grounding.

"MAP 5300: Uninterruptible power supply 5125 repair verification" on page 146
MAP 5300: Uninterruptible power supply repair verification, helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller uninterruptible power supply (UPS) 5125.

"Removing the power cable from the uninterruptible power supply 5125" on page 160
If you are having problems with the power supply and suspect that the power cable may be defective, you can remove it from the uninterruptible power supply (UPS) 5125.

"Removing the uninterruptible power supply 5125" on page 189
Before you begin to remove the uninterruptible power supply (UPS) 5125, read all safety notices.

MAP 5250: Uninterruptible power supply 5115 repair verification

MAP 5250: Uninterruptible power supply 5115 repair verification, helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller uninterruptible power supply (UPS) 5115.

If you are not familiar with these maintenance analysis procedures (MAPs), first read "Using the maps."

You may have been sent here because you have performed a repair and want to confirm that no other problems exist on the machine.

Perform the following steps:

1. **Are the power-on and load segment 2 indicators for the repaired UPS 5115 illuminated solid green, with service, on-battery, and overload indicators off?**

   NO Continue with the start MAP.

YES   Go to step 2.

2. (from step 1 on page 145)

   Is the SAN Volume Controller node powered by this UPS 5115, powered on?

   NO   Press `Power On` on all SAN Volume Controller nodes that are powered off. Go to step 3.

   YES   Go to step 3.

3. (from step 2)

   Are any nodes still not powered on or showing error codes in front panel display?

   NO   Go to step 4.

   YES   Continue with the start MAP.

4. (from step 3)

   Do SAN Volume Controller nodes show "Charging" on the front panel display?

   NO   Go to step 5.

   YES   Wait for the "Charging" display to finish. (This might take up to 60 minutes). Go to step 5.

5. (from step 4)

   Press and hold the `Test/alarm reset button` on the repaired UPS 5115 for three seconds to initiate a self-test. During the test, individual indicators illuminate as various parts of the UPS 5115 are checked.

   Does the alarm beep or a UPS 5115 service, on-battery, or overload indicator stay on?

   NO   UPS 5115 repair verification has been successfully completed. Continue with the repair verification MAP.

   YES   Continue with the start MAP.

   Related tasks

   "Using the MAPs" on page 129
   To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

   "MAP 5000: Start" on page 130
   MAP 5000: Start is the entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

   "MAP 5700: Repair verification" on page 155
   MAP 5700: Repair verification helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

MAP 5300: Uninterruptible power supply 5125 repair verification

MAP 5300: Uninterruptible power supply repair verification, helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller uninterruptible power supply (UPS) 5125.

If you are not familiar with these MAPs, read "Using the MAPs" first.

You might have been sent here because you have performed a repair and want to confirm that no other problems exist on the machine.

Attention: If a SAN Volume Controller is powered off for more than five minutes and it is the only SAN Volume Controller connected to this UPS 5125, the UPS 5125 will also power off. To power on the UPS 5125, press and hold the On button until you hear the UPS 5125 beep (approximately one second) and the Mode indicator shows solid green.

Perform the following steps:

1. **Is the mode indicator for the repaired UPS 5125 illuminated solid green and the load level indicators showing an output load level between 25% and 100%?**

   NO   Continue with the start MAP.

   YES   Go to step 2.

2. (from step 1)

   Are all SAN Volume Controller nodes powered by repaired UPS 5125 Powered On?

   NO   Press `Power On` on all SAN Volume Controller nodes that are powered off. Go to step 3.

   YES   Go to step 3.

3. (from step 2)

   Are any nodes still not Powered On or showing error codes in front panel display?

   NO   Go to step 4.

   YES   Continue with the start MAP.

4. (from step 3)

   Do SAN Volume Controller nodes show Charging on front panel display?

   NO   Go to step 5.

   YES   Wait for Charging display to finish. (This might take up to 60 minutes). Go to step 5.

5. (from step 4)

   Press and hold the `Test/alarm reset button` on the repaired UPS 5125 for three seconds to initiate a self-test. During the test, individual indicators illuminate as various parts of the UPS 5125 are checked.

   Does the alarm beep or a UPS 5125 alarm indicator stay on?

   NO   UPS 5125 repair verification has been successfully completed. Continue with the repair verification MAP.

   YES   Continue with the start MAP.

   Related tasks

   "Using the MAPs" on page 129
   To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

   "MAP 5000: Start" on page 130
   MAP 5000: Start is the entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

MAP 5700: Repair verification helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

MAP 5400: Front panel

MAP 5400: Front panel, helps you to solve problems that have occurred on the SAN Volume Controller front panel.

If you are not familiar with these MAPs, first read "Using the MAPs."

You might have been sent here because:
- A problem occurred during the installation of a SAN Volume Controller system, and the front panel display test failed, or the correct Node Number failed to be displayed.
- Another MAP sent you here.

Perform the following steps:

1. **Is the Power On indicator on the SAN Volume Controller front panel illuminated and showing a solid green?**

    NO   Continue with the power map.

    YES   Go to step 2.

2. (from step 1)

    Is the Check indicator on the SAN Volume Controller front panel illuminated and showing a solid amber?

    NO   Start the front panel tests by pressing and holding the select button for five seconds. Go to step 3.

    YES   The SAN Volume Controller Service controller has failed. Replace the parts in the following sequence:
    a. Service controller
    b. Front panel assembly

    Verify the repair by continuing with the repair verification MAP.

3. (from step 2)

    The front panel check light will illuminate and the display test of all display bits turns on for 3 seconds and then turns off for 3 seconds, then a vertical line travels left to right, followed by horizontal line travelling top to bottom. The test completes with the switch test display of a single rectangle in the center of the display.

    Did the front panel lights and display behave as described?

    NO   SAN Volume Controller front panel has failed its display test.
    - Replace the parts in the following sequence:
        - Front panel assembly
        - Service controller
    - Verify the repair by continuing with the repair verification MAP.

    YES   Go to step 4.

4. (from step 3)

Figure 29 shows four examples of what the front panel display shows when you press the no button, the up button, the left and right buttons, and the select button. To perform the front panel switch test, press any button in any sequence or any combination. The display indicates which buttons that you pressed.

(display with border only)	No button pressed (border only)
(display with up arrow)	Up button pressed
(display with left and right arrows)	Left and Right button pressed
(display with circle)	Select button pressed
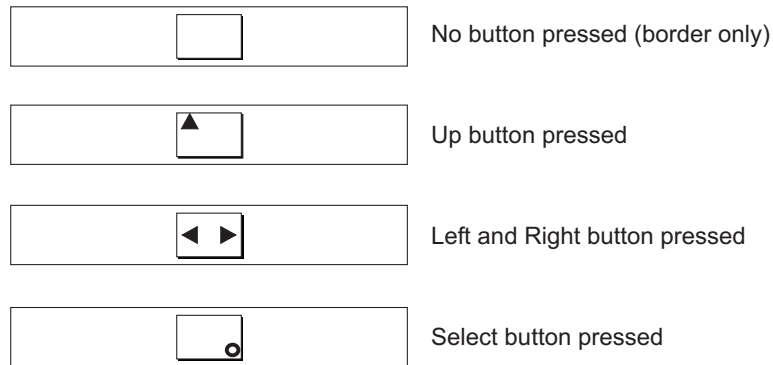
Figure 29. Sequence in which to push buttons on front panel display

Check each switch in turn. Did the service panel switches and display behave as described in Figure 29?

NO   The SAN Volume Controller front panel has failed its switch test.
- Replace the parts in the following sequence:
  – Front panel assembly
  – Service controller
- Verify the repair by continuing with the repair verification MAP.

YES   Press and hold the Select button for five seconds. Go to step 5.

5. (from step 3 on page 147)

   Is front panel display showing: `Charging`, `Cluster Error`, or `Node Error`?

   NO   Go to step 6.

   YES   Press down. Go to step 6.

6. (from step 5)

   Is front panel display now showing its `Default Menu`?

   NO   Continue with the start MAP.

   YES   Keep pressing and releasing the Down button until Node is displayed in line 1 of the menu screen. Go to step 7.

7. (from step 6)

   Is this MAP being used as part of the installation of a new node?

   NO   Front panel tests have completed with no fault found. Verify the repair by continuing with the repair verification MAP.

   YES   Go to step 8.

8. (from step 7)

   Is the node number that is displayed in line 2 of the menu screen the same as the node number that is printed on the front panel of the node?

   NO   Node number stored in front panel electronics is not the same as printed on front panel.

- Replace the front panel assembly.
- Verify the repair by continuing with the repair verification MAP.

YES Front panel tests have completed with no fault found. Verify the repair by continuing with the repair verification MAP.

Related tasks

"Using the MAPs" on page 129
To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

"MAP 5000: Start" on page 130
MAP 5000: Start is the entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5100: Power" on page 135
MAP 5100: Power helps you to solve problems that have occurred on the SAN Volume Controller power.

"MAP 5700: Repair verification" on page 155
MAP 5700: Repair verification helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"SAN Volume Controller menu options" on page 58
During normal node operation, the default menu sequence is operational. This menu sequence enables you to review the operational status of the cluster, the node, and the external interfaces. It also provides access to the tools that you need to install and service the node.

Chapter 8, "Removing and replacing parts," on page 157
You can remove and replace field replaceable units (FRUs) from the SAN Volume Controller and uninterruptible power supply.

MAP 5500: Ethernet

MAP 5500: Ethernet, helps you to solve problems that have occurred on the SAN Volume Controller Ethernet.

If you are not familiar with these MAPs, first read "Using the maps."

You might have been sent here for one of the following reasons:
- A problem occurred during the installation of a SAN Volume Controller system, and the Ethernet checks failed.
- Another MAP sent you here.

Perform the following steps:
1. Display the Ethernet status, using the Front panel display.

    Does the display read failed?

    NO Go to step 2.

    YES Go to step 5 on page 151.
2. Display Node Error if present, using the Front panel display.

    Is the front panel displaying `Node Error` with error code 540?

    NO Go to step 3 on page 151.

    YES Go to step 5 on page 151.

3. (from step 2 on page 150) Display Cluster Error if present, using the Front panel display.

Is the front panel displaying `Cluster Error` with error code 1400?

NO   Go to step 4.

YES   Go to step 5.

4. (from step 3) Display the Ethernet port status, using the Front panel display.

Is the display showing an Ethernet port status of `Failed`?

NO   Go to step 8 on page 152.

YES   Go to step 5.

5. (from steps 1 on page 150, 2 on page 150, 3, and 4) Is the green LED on the upper left of the Ethernet port assembly illuminated?

NO   The Ethernet connection between the SAN Volume Controller and the Ethernet network is faulty. If a spare Ethernet cable is available, connect the replacement cable between the lower and upper Ethernet connectors on the back of the SAN Volume Controller. If a spare Ethernet cable is not available, select a node with an Ethernet port status of Inactive (that is, working but not currently being used). Remove this cable and connect it between the upper and lower Ethernet connectors as described above.

   Note: Remove and retain any blanking plate over the unused upper Ethernet connector. Go to step 6.

YES   Go to step 7.

6. (from step 5) Are the green LEDs on the upper left and upper right of the Ethernet port assembly both illuminated?

NO   Ethernet interfaces on the system board assembly are not working correctly.
   - Perform the following tasks:
     - Replace the system board assembly.
     - Verify the repair by continuing with the repair verification MAP.

YES   The Ethernet connection between the SAN Volume Controller and the Ethernet network is faulty.

   Perform the following tasks:
   - Remove the test cable inserted in step 5.
   - Replace any blanking plate retained in step 5 to the upper Ethernet connector.
   - Replace the Ethernet cable with a new cable and display the Ethernet port status. If the status is still failed, perform the following steps:
     a. Use the problem determination procedures for your Ethernet hub to resolve an Ethernet network connection problem.
     b. Verify the repair by continuing with the repair verification MAP.

7. (from step 5) Display the Ethernet status, using the Front panel display.

Is the displayed status failed?

NO   Go to step 8 on page 152.

YES   Ethernet connected LED shows an active Ethernet connection to the SAN Volume Controller. However, if service display shows "Ethernet Failed," perform the following steps:

      a.   Replace the system board assembly.

      b.   Verify the repair by continuing with the repair verification MAP.

8. (from step 7 on page 151) A previously reported fault with the Ethernet interface is no longer being shown. Check with the customer that the Ethernet interface has not been intentionally disconnected and that there is no recent history of fixed Ethernet problems with other components of the Ethernet network.

Is the Ethernet failure explained by the above checks?

NO   Perform steps in the following sequence:

      a.   Replace the Ethernet cable

      b.   Use Ethernet hub problem determination procedure to resolve an Ethernet network connection problem.

      c.   Replace the system board assembly.

      d.   Verify the repair by continuing with the repair verification MAP.

YES   Verify the repair by continuing with the repair verification MAP.

Related tasks

"Using the MAPs" on page 129
To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

"MAP 5700: Repair verification" on page 155
MAP 5700: Repair verification helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the system board" on page 183
The system board FRU is a kit that includes the following parts:

MAP 5600: Fibre-channel

MAP 5600: Fibre-channel helps you to solve problems that have occurred on the SAN Volume Controller fibre-channel ports.

If you are not familiar with these MAPs, read about using the MAPs first.

You might have been sent here for one of the following reasons:

- A problem occurred during the installation of a SAN Volume Controller system, and the fibre-channel checks failed.
- Another MAP sent you here.

Perform the following steps:

1. Display fibre-channel port 1 status on the SAN Volume Controller front panel display. See "SAN Volume Controller menu options."

Is the front panel display on the SAN Volume Controller showing fibre-channel port-1 active?

NO   A fibre-channel port is not working correctly. Check the port status on second line of the display.

      a. **Inactive:** The port is operational but cannot access the fibre-channel fabric. The fibre-channel cable has failed, is not installed, or the device at the other end of the cable has failed. Note port-1. Go to step 6 on page 154.

      b. **Failed:** The port is not operational because of a hardware failure. Note port-1. Go to step 7 on page 154.

      c. **Not installed:** This port is not installed. Note port-1. Go to step 8 on page 154.

  YES   Press and release the right button to display fibre-channel port-2 . Go to step 2.

2. (from step 1 on page 152) **Is the front panel display on the SAN Volume Controller showing fibre-channel port-2 active?**

  NO   A fibre-channel port is not working correctly. Check port status on second line of display.

      a. **Inactive:** The port is operational but cannot access the fibre-channel fabric. The fibre-channel cable has failed, is not installed, or the device at the other end of the cable has failed. Note port-2. Go to step 6 on page 154.

      b. **Failed:** The port is not operational because of a hardware failure. Note port-2. Go to step 7 on page 154.

      c. **Not installed:** This port is not installed. Note port-2. Go to step 8 on page 154.

  YES   Press and release the right button to display fibre-channel port-3 . Go to step 3.

3. (from step 2) **Is the front panel display on the SAN Volume Controller showing fibre-channel port-3 active?**

  NO   A fibre-channel port is not working correctly. Check the port status on second line of display.

      a. **Inactive:** The port is operational but cannot access the fibre-channel fabric. The fibre-channel cable has failed, is not installed, or the device at the other end of the cable has failed. Note port-3. Go to step 6 on page 154.

      b. **Failed:** The port is not operational because of a hardware failure. Note port-3. Go to step 7 on page 154.

      c. **Not installed:** This port is not installed. Note port-3. Go to step 8 on page 154.

  YES   Press and release the right button to display fibre-channel port-4. Go to step 4.

4. (from step 3) **Is the front panel display on the SAN Volume Controller showing fibre-channel port-4 active?**

  NO   A fibre-channel port is not working correctly. Check port status on second line of display.

      a. **Inactive:** The port is operational but cannot access the fibre-channel fabric. The fibre-channel cable has failed, is not installed, or the device at the other end of the cable has failed. Note port-4. Go to step 6 on page 154.

      b. **Failed:** The port is not operational because of a hardware failure. Note port-4. Go to step 7 on page 154.

      c. **Not installed:** This port is not installed. Note port-4. Go to step 8.

   YES   Go to step 5.

5. (from step 4 on page 153) A previously reported fault with a fibre-channel port is no longer being shown. Check with the customer that fibre-channel ports have not been intentionally disconnected and that there is no recent history of fixed problems with other components of the fibre-channel fabric.

   Is the Fibre Channel port failure explained by the above checks?

   NO   Replace parts in the following order:

      a. Fibre-channel cables from the SAN Volume Controller to fibre channel network.

      b. Use the fibre-channel problem determination procedure to resolve any fibre-channel fabric connection problem.

      c. Fibre-channel adapter assemblies.

      d. Verify the repair by continuing with the repair verification MAP.

   YES   Verify the repair by continuing with the repair verification MAP.

6. (from steps 1 on page 152, 2 on page 153, 3 on page 153, 4 on page 153) The noted port on the SAN Volume Controller is displaying a status of inactive. If the noted port still displays a status of inactive. Replace parts associated with the noted port in the following order:

   a. Fibre-channel cables from the SAN Volume Controller to fibre channel network.

   b. Use the fibre-channel problem determination procedure to resolve any fibre-channel fabric connection problem.

   c. Fibre-channel adapter assemblies.

   d. Verify the repair by continuing with the repair verification MAP.

7. (from steps 1 on page 152, 2 on page 153, 3 on page 153, 4 on page 153) The noted port on the SAN Volume Controller is displaying a status of failed. Replace parts that are associated with the noted port in the following order:

   a. Fibre-channel adapter assemblies.

   b. Verify the repair by continuing with the repair verification MAP.

8. (from steps 1 on page 152, 2 on page 153, 3 on page 153, 4 on page 153) The noted port on the SAN Volume Controller is displaying a status of not installed. Replace parts that are associated with the noted port in the following order:

   a. Fibre-channel adapter assemblies.

   b. System board assembly.

   c. Verify the repair by continuing with the repair verification MAP.

Related tasks

"SAN problem determination" on page 127
The procedures to service the SAN Volume Controller that are provided here help you solve problems on the SAN Volume Controller and its connection to the storage area network (SAN).

"Using the MAPs" on page 129
To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

"MAP 5700: Repair verification" on page 155
MAP 5700: Repair verification helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"SAN Volume Controller menu options" on page 58
During normal node operation, the default menu sequence is operational. This menu sequence enables you to review the operational status of the cluster, the node, and the external interfaces. It also provides access to the tools that you need to install and service the node.

"Fibre channel port-1 through 4 option" on page 61
The FC port-1 through 4 options display the operational status of the fibre channel ports.

MAP 5700: Repair verification

MAP 5700: Repair verification helps you to verify that FRUs that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

If you are not familiar with these MAPs, read about using the maps first.

You might have been sent here because you performed a repair and want to confirm that no other problems exists on the machine.

Perform the following steps:

1. **Are the Power LEDs on all the SAN Volume Controllers on? See "Power LED" on page 12.**

   NO   Go to MAP 5000: Start.

   YES   Go to step 2.

2. (from step 1) **Are the Check LEDs on all SAN Volume Controllers off? See Check LED.**

   NO   Go to MAP 5000: Start.

   YES   Go to step 3.

3. (from step 2) **Are all the SAN Volume Controllers displaying `cluster` on the top line of the front panel display with the second line blank or displaying a cluster name?**

   NO   Go to MAP 5000: Start.

   YES   Go to step 4.

4. (from step 3) Using the SAN Volume Controller application for the cluster, you have just repaired, check the status of all configured MDisks. **Do all MDisks have a status of online?**

   NO   If any MDisks have a status of offline, repair the MDisks. See "Determining the failing enclosure or disk controller" to locate the disk controller with the offline MDisk. Use the problem determination procedure for the disk controller to repair the MDisk faults before returning to this MAP.

                If any MDisks have a status of degraded repair any SAN and MDisk faults before returning to this MAP.

                If any MDisks show a status of excluded, include managed disks before returning to this MAP.

                Go to MAP 5000: Start.

   YES   Go to step 5 on page 156.

5. (from step 4 on page 155) Using the SAN Volume Controller application for the cluster, you have just repaired, check the status of all configured vdisks. **Do all vdisks have a status of online?**

    NO   Go to step 6.

    YES   Go to step 7.

6. (from step 5) Following a repair of the SAN Volume Controller, a number of vdisks are showing a status of offline. Refer the customer to *Recovering from offline VDisks after a node or an I/O group failed* for details on how to resolve this problem. This might be because data on these disks has been lost.

7. (from step 5) You have successfully repaired the SAN Volume Controller.

    Related tasks

    "SAN problem determination" on page 127
    The procedures to service the SAN Volume Controller that are provided here help you solve problems on the SAN Volume Controller and its connection to the storage area network (SAN).

    "Using the MAPs" on page 129
    To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

    "MAP 5000: Start" on page 130
    MAP 5000: Start is the entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

    Related reference

    "Determining the failing enclosure or disk controller" on page 9
    You can determine the failing enclosure or disk controller by using the SAN Volume Controller user interface or the command-line interface.

    "Check LED" on page 12
    This is an amber LED used to indicate critical failures on the service controller.

    Chapter 6, "Diagnosing problems with the SAN Volume Controller, the uninterruptible power supply, and the master console," on page 67
    You can diagnose problems with SAN Volume Controller, the uninterruptible power supply, and the master console using either the command-line interface (CLI) or the SAN Volume Controller Console.

    Related information

    "Defining cluster error codes" on page 76
    Every cluster error code includes an error code number, a description, action, and possible FRUs.

Chapter 8. Removing and replacing parts

You can remove and replace field replaceable units (FRUs) from the SAN Volume Controller and uninterruptible power supply.

Each FRU has its own removal procedure. Sometimes you will find that a step within a procedure might refer you to a different procedure within this chapter. You might want to complete the new procedure before you continue with the procedure that you started.

Start all problem determination and repair procedures from "MAP 5000: Start."

Related tasks

"MAP 5000: Start" on page 130
MAP 5000: Start is the entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

Enabling concurrent maintenance

To allow concurrent maintenance, SAN Volume Controllers must be configured in pairs.

While one SAN Volume Controller is being serviced, the other keeps the I/O group operational. With concurrent maintenance, all FRUs can be removed, replaced, and tested on one SAN Volume Controller while the SAN and host systems are powered on and doing productive work

Attention: Unless you have a particular reason, do not remove the power from both SAN Volume Controllers unless these instructions tell you to do so.

Preparing to remove and replace parts

There are several tasks to perform before you remove and replace parts.

First, read the safety precautions. These guidelines in the section will help you work safely when you work with the SAN Volume Controller and uninterruptible power supply.

For the translation of the danger, caution, attention notices, and the translation of the safety labels, see the *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*.

Related concepts

"Definitions of notices" on page xxi
Ensure that you understand the typographic conventions that are used in this publication to indicate special notices.

Removing the power cable from the SAN Volume Controller

If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

To remove the power cable, perform the following steps:

1. Check the SAN Volume Controller power light **1** . If the light is on, go to step 2 on page 158. If the light is either off or blinking, power has been removed from

the SAN Volume Controller; go to step 4. See Figure 30.
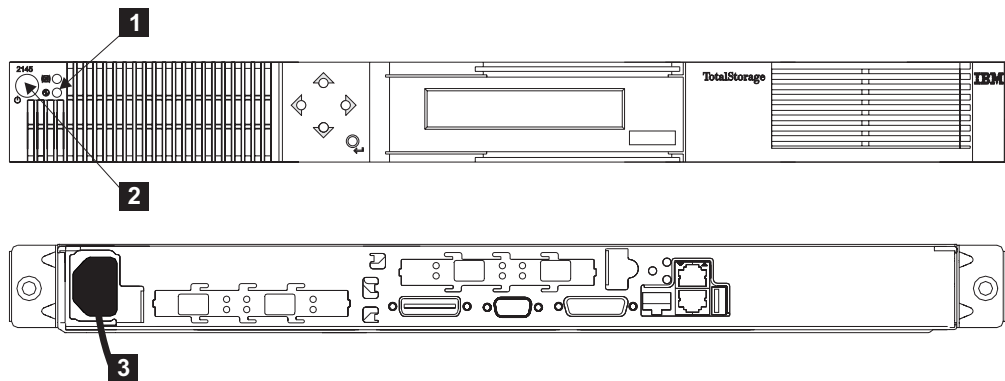
Figure 30. Removing the power cable from a SAN Volume Controller

2. SAN Volume Controllers operate in pairs. The members of each pair are in the same I/O group. Before removing power, determine if the SAN Volume Controller is an active member of the cluster. If you are not certain whether the SAN Volume Controller is being used, check the status of the node (refer to "Viewing general details"). Check the status of the SAN Volume Controller that you are planning to power off and the other SAN Volume Controller in the same I/O group. Complete one of the following steps.

   a. If the SAN Volume Controller is offline, go to step 3.

   b. If the SAN Volume Controller from which you want to remove the power is online, but the other SAN Volume Controller in the same I/O group is offline, you must resolve the problem on the SAN Volume Controller that is offline before you continue this repair.

   Attention: If both SAN Volume Controllers are online, removing the power from one SAN Volume Controller will cause some performance degradation because I/O operations are automatically rerouted through the other SAN Volume Controller. You must obtain the customer's agreement before you continue with this procedure.

3. Press and release the power switch **2** . Wait one minute for the SAN Volume Controller to power off. The other SAN Volume Controllers in the cluster might display an error code indicating that a node is missing from the cluster. Ignore this error code; it will be resolved automatically when the repair is complete.

4. Remove the power cable **3** from the back of the SAN Volume Controller.

5. To return power to the SAN Volume Controller, reinstall the power cable **3** .

6. If the SAN Volume Controller does not turn on automatically, press and release the power switch.

   Note: If the SAN Volume Controller is powered off and it is the only SAN Volume Controller connected to the uninterruptible power supply (UPS) 5125, the UPS 5125 will also power off within five minutes. You must press the power-on button on the UPS 5125 before the SAN Volume Controller can be powered on.

   Note: The UPS 5115 will not power off when the SAN Volume Controller is shut down from the power button.

   Related concepts

"Checking the status of the node" on page 3
You can check the status of the node by using the SAN Volume Controller user interface or by using the command-line interface.

Related tasks

"Removing the power cable from the uninterruptible power supply 5125" on page 160
If you are having problems with the power supply and suspect that the power cable may be defective, you can remove it from the uninterruptible power supply (UPS) 5125.

"Removing the power cable from the uninterruptible power supply 5115"
If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the uninterruptible power supply (UPS) 5115.

Removing the power cable from the uninterruptible power supply 5115

If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the uninterruptible power supply (UPS) 5115.

Remove the power cable by following the steps below:

1. Remove the power from each SAN Volume Controller. See *Removing the power cable from the SAN Volume Controller.*

2. Press and hold the on/off button **2** for two seconds. The UPS 5115 will enter standby mode, with all indicators off. See Figure 31 for an illustration of the front and rear view of the UPS 5115.
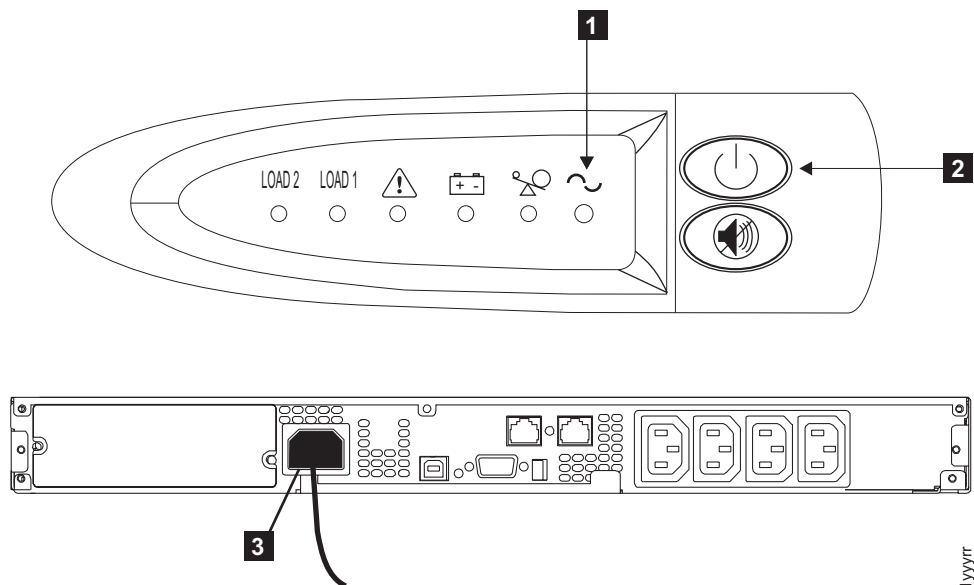
Figure 31. Removing the power cable from the uninterruptible power supply 5115

3. Unplug the power cable from the main power source **3** .
4. To return power to the UPS 5115, reinstall the power cable. The UPS 5115 enters standby mode All indicators are off and power is not available to the SAN Volume Controller. The battery recharges when necessary.

| **Related tasks**

Removing the power cable from the uninterruptible power supply 5125

If you are having problems with the power supply and suspect that the power cable may be defective, you can remove it from the uninterruptible power supply (UPS) 5125.

Remove the power cable by following the steps below:

1. Remove the power from each SAN Volume Controller. See *Removing the power cable from the SAN Volume Controller*.

2. Press and hold the off switch **2** ; a long beep sounds for approximately five

   seconds. When the beep stops, release the switch. The mode indicator **1** starts
   to flash, and the UPS 5125 enters standby mode.
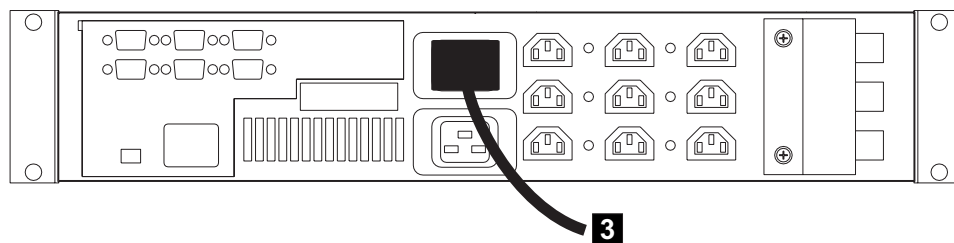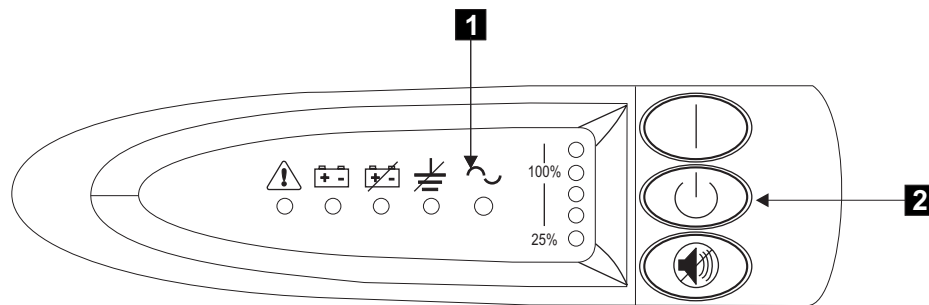
3. Unplug the power cable **3** from the main power source.

4. To return power to the UPS 5125, reinstall the power cable. The UPS 5125 runs a self-test and enters standby mode.

5. Press and hold the On switch until, after approximately one second, the UPS 5125 beeps. The mode indicator stops flashing and the load-level indicators show the percentage of load that is being supplied by the UPS 5125.

   Related tasks

If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

Removing a SAN Volume Controller from a rack

The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

Attention: Unless host systems or fibre channel switches must be switched off for some other reason, do not turn them off when servicing the SAN Volume Controller. The SAN Volume Controller power cables must not be removed unless the SAN Volume Controller has first been shut down. Ethernet and fibre channel cables can be connected or disconnected at any time.

1. If not already done, complete the following tasks:

   a. Remove all power from the SAN Volume Controller.

   b. Make a note of the positions of all the external cables that are connected at the back of the SAN Volume Controller.

   c. Disconnect all the external cables from the back of the SAN Volume Controller.

   Attention: Do not touch the power control switches on adjacent SAN Volume Controllers when you are removing or installing SAN Volume Controllers in a rack. Touching these switches on adjacent SAN Volume Controllers might cause those devices to power off and make customer data inaccessible.

2. Refer to Figure 32 on page 162

   For the translation of the danger, caution, attention notices, and the safety labels, see *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*.

   CAUTION:
   To avoid any hazard from the rack tipping forward when boxes are installed or removed, observe all safety precautions for the rack into which you are installing or removing the device (24).
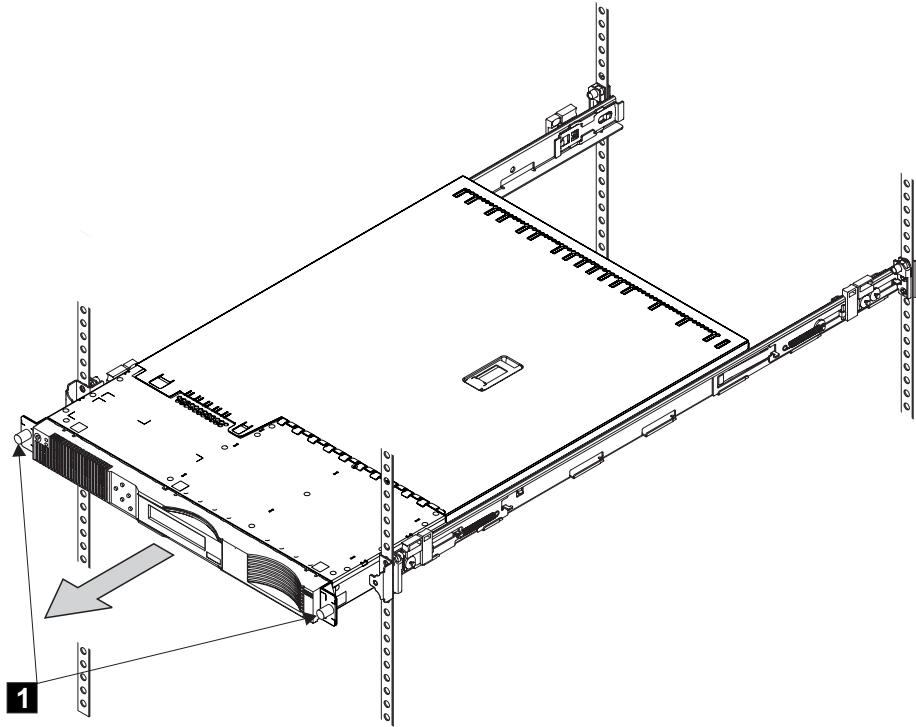
Figure 32. Unscrewing the front screws

3. Unscrew the two front screws **1** .
4. Pull the SAN Volume Controller forward and remove it from the rack.
5. Reinstall parts in the reverse sequence.

Note: If you have replaced a FRU in the node, the repaired node will normally rejoin the cluster as soon as it is powered-on and has completed its self-tests. There are some exceptions to this, such as when a disk drive has been replaced, or when for some other reason the node has lost its identity or the integrity of its cluster metadata. Under these circumstances, the node will be offline and you must delete and add the node back into the cluster. You can also perform these actions using the command-line interface.

Related tasks

"Removing the power cable from the SAN Volume Controller" on page 157
If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

Removing the front panel from the SAN Volume Controller

The front panel from the SAN Volume Controller might be removed in order to allow you to perform maintenance on it. Perform the following steps to remove the front panel from the SAN Volume Controller.

1. Verify with the customer that all operations between the SAN Volume Controller and the host system have been stopped.
2. Remove all power from the SAN Volume Controller.
3. Slide the SAN Volume Controller out from the rack approximately two inches.
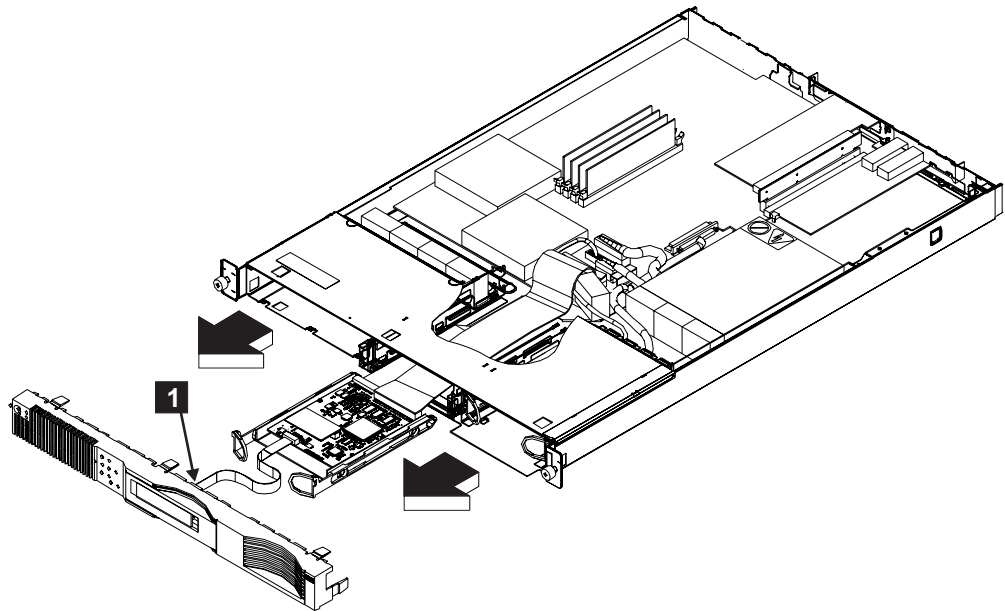
Figure 33. Removing the front panel of the SAN Volume Controller

4. Press the seven latches that are on the top, sides, and bottom of the front panel, and then carefully pull the assembly and its attached cable away from the SAN Volume Controller.

   Note: Release the side and end latches first. Pulling the released end of the front panel toward you, release the other latches one by one.

5. Disconnect the connector **1** .

   Related tasks

   "Replacing the front panel on the SAN Volume Controller"
   The front panel of the SAN Volume Controller can be replaced by following the steps below:

   "Removing the power cable from the SAN Volume Controller" on page 157
   If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

   "Removing the power cable from the uninterruptible power supply 5125" on page 160
   If you are having problems with the power supply and suspect that the power cable may be defective, you can remove it from the uninterruptible power supply (UPS) 5125.

   "Removing a SAN Volume Controller from a rack" on page 161
   The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

Replacing the front panel on the SAN Volume Controller

The front panel of the SAN Volume Controller can be replaced by following the steps below:

1. Connect the cable **1** to the front panel. See Figure 34 on page 164.
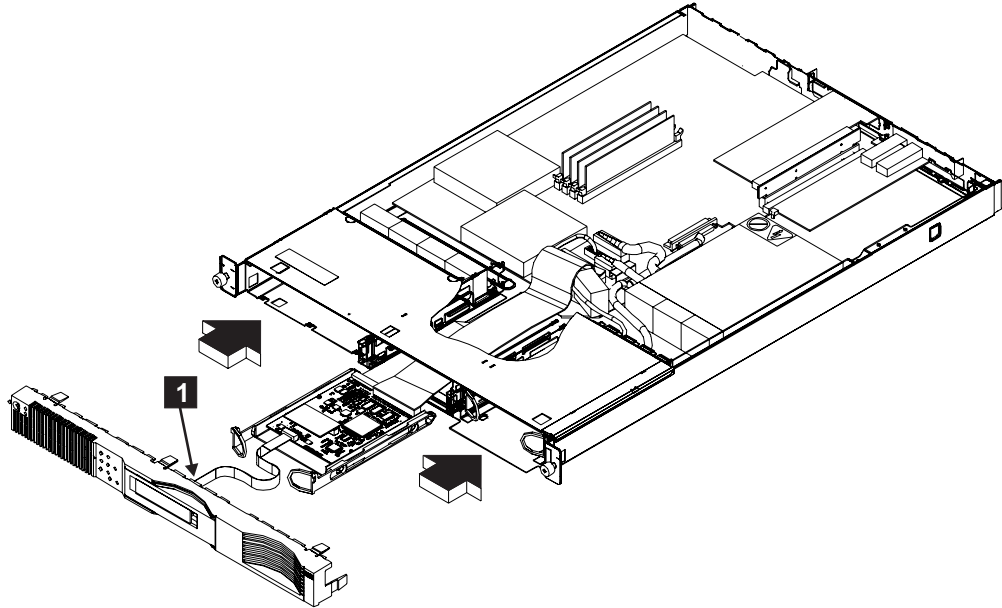
Figure 34. Replacing the front panel

2. Insert the cable into the front of the SAN Volume Controller.

3. Align the front panel with the front of the SAN Volume Controller, and ensure that the latches enter the frame of the SAN Volume Controller. Push the front panel until you hear the latches click home.

> **Note:** If you replaced the front panel FRU with a new FRU, go to ″MAP 5400: Front panel,″ to perform the steps for the replacement of the front panel.

Related tasks

"MAP 5400: Front panel" on page 148
MAP 5400: Front panel, helps you to solve problems that have occurred on the SAN Volume Controller front panel.

"Removing the front panel from the SAN Volume Controller" on page 162
The front panel from the SAN Volume Controller might be removed in order to allow you to perform maintenance on it. Perform the following steps to remove the front panel from the SAN Volume Controller.

Top cover

The top cover of the SAN Volume Controller can be removed and replaced.

Removing the top cover from the SAN Volume Controller

The top cover from the SAN Volume Controller can be removed by following these instructions.

1. Remove all power from the SAN Volume Controller.

2. Remove the SAN Volume Controller from the rack.

3. Lift the lever **1** . This action moves the top cover rearward approximately 13 mm (0.5 in). See Figure 35 on page 165.
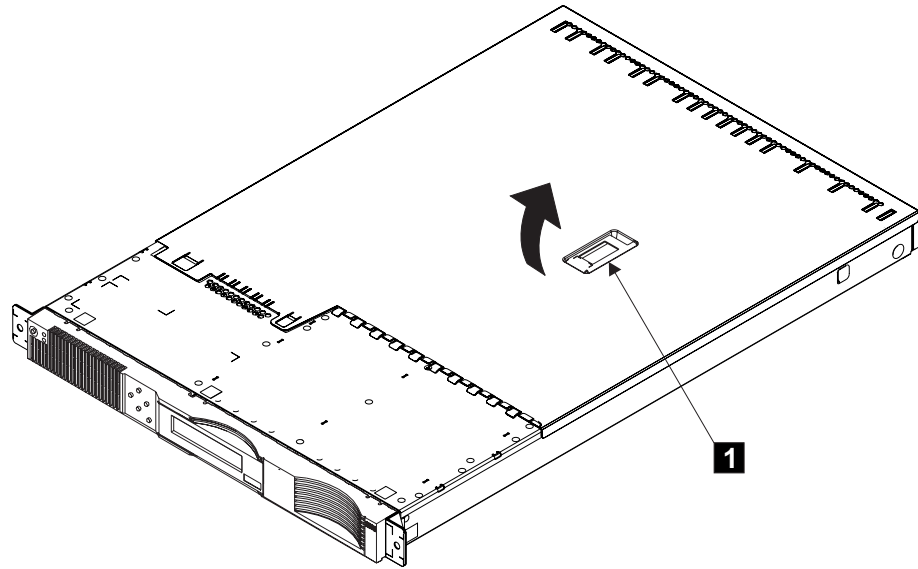
Figure 35. Removing the top cover

4. Lift the front of the cover, then lift the cover away from the SAN Volume Controller.

   Related tasks

   "Removing the power cable from the SAN Volume Controller" on page 157
   If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

   "Removing a SAN Volume Controller from a rack" on page 161
   The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

Replacing the top cover on the SAN Volume Controller

To replace the top cover on the SAN Volume Controller, perform these steps.

1. Ensure that the lever **1** is fully up. See Figure 36 on page 166.
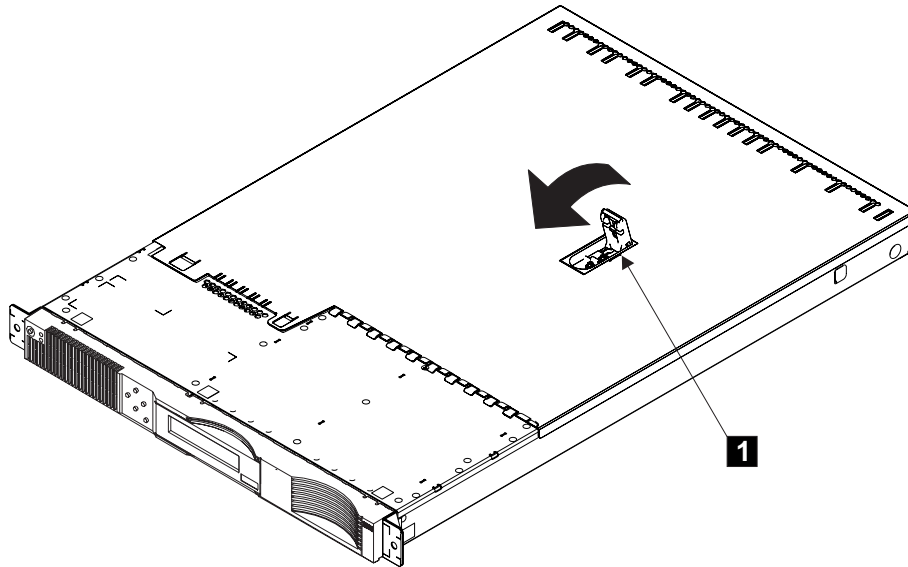
Figure 36. Installing the Top Cover

2. Place the cover onto the SAN Volume Controller so that about 13 mm (0.5 in.) of the cover protrudes over the back edge of the SAN Volume Controller frame.

3. Press the lever downward. The top cover moves toward the front of the SAN Volume Controller.

4. Ensure that top fingers and back lugs of the cover correctly engage the frame of the SAN Volume Controller.

5. Press the lever fully home.

6. Install the SAN Volume Controller into the rack when required.

   Related tasks

   "Removing the top cover from the SAN Volume Controller" on page 164
   The top cover from the SAN Volume Controller can be removed by following these instructions.

Removing the service controller from the SAN Volume Controller

You can remove the service controller from the SAN Volume Controller, but if you are replacing the service controller as part of a problem determination procedure, you must also replace the cables that are supplied as part of the service controller FRU.

Perform the following steps to remove the service controller:

1. Remove all power from the SAN Volume Controller. See Figure 37 on page 167.
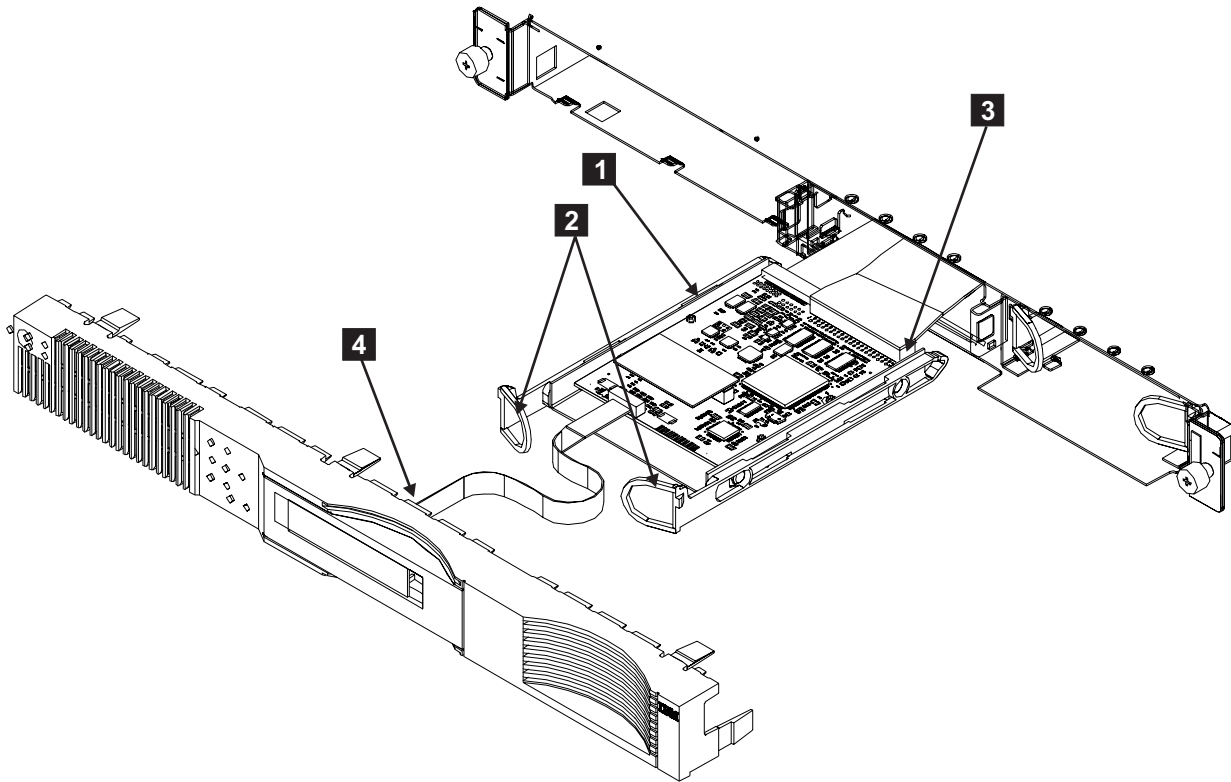
Figure 37. Removing the service controller

2. Remove the SAN Volume Controller from the rack.

3. Remove the top cover of the SAN Volume Controller.

4. Remove the front panel of the SAN Volume Controller.

5. **Attention:** Carefully remove the service controller to avoid damage to the attached cables.

   Pull the two handles **2** to release the latches, and carefully pull the service controller out of the SAN Volume Controller.

6. Remove the service controller **1** .

7. If you have any other tasks to do inside the SAN Volume Controller, do those tasks now. Otherwise, reinstall the service controller.

   Note:

   a. The 40-way cable connector is keyed.

   b. Before you reconnect the ribbon cable, ensure that its contacts are downward. *Carefully* install the cable to the rear of the service controller being sure to install the cable straight in with no rocking or twisting during installation. Be sure to verify that the dark blue line on the cable connector ends is not visible. This ensures that the cable is fully seated. See Figure 38 on page 168 and Figure 39 on page 168.
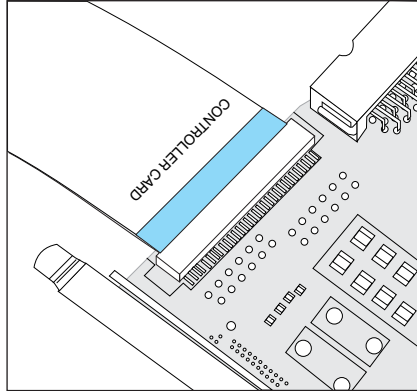
Figure 38. Service Controller card cable installed properly
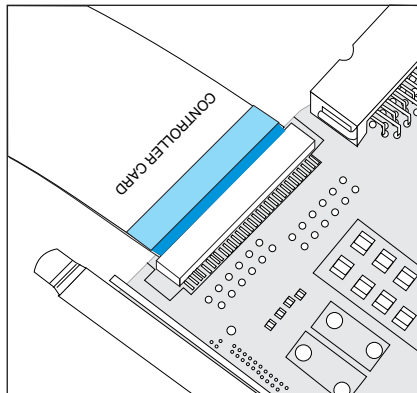
Figure 39. Service Controller card cable not properly seated

    c. When you install the service controller, ensure that the cables do not come into contact with the fan assembly that is mounted behind the service controller bay. Fold the cables under the service controller as you push the service controller into the SAN Volume Controller. Keep pushing the service controller until the latches click home.

    d. From the inside of the SAN Volume Controller, ensure that the cables are correctly attached to the service controller.

8. Reinstall other parts in the reverse sequence.

    Note: The Worldwide Port Names of the fibre-channel ports are derived from the Worldwide Node Name (WWNN) of the service controller. If you do not perform step 9, you must restart the host systems before they are able to access disks through this SAN Volume Controller.

9. If a service controller is replaced as part of concurrent maintenance, it is necessary to rewrite the WWNN on the new service controller. Failure to do so means the host systems cannot access the fibre channel ports on that node until the host systems are rebooted. To restore the WWNN, do the following:

    a. Power-on the SAN Volume Controller

    b. Display the node status on the service panel. See the procedure for displaying node status on the service panel.

    c. Press and hold the down button.

    d. Press and release the select button.

e.   Release the down button.

f.   The WWNN is displayed on Line 1 of the display; line 2 of the display contains the last five characters of the original WWNN. If the number displayed is all zeros, this is probably because you have also replaced the disk drive as part of this repair operation.

1)   If all zeros are displayed go to step 9g.

2)   If any other number is displayed, press the select button to accept the number. The WWNN is restored.

g.   If the number displayed is all zeros, display the WWNN in the VPD for the node that you are working on. Record the last five characters of the number.

h.   With the WWNN displayed on the service panel, press and hold the down button, press and release the select button, release the down button. Edit the displayed number using the up and down buttons to increase or decrease the numbers displayed. Use the left and right buttons to move between fields. When the number that you noted from the VPD is displayed, press the select button twice to accept the number. The WWNN is restored.

Related tasks

"Removing the power cable from the SAN Volume Controller" on page 157
If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

"Removing a SAN Volume Controller from a rack" on page 161
The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

"Removing the front panel from the SAN Volume Controller" on page 162
The front panel from the SAN Volume Controller might be removed in order to allow you to perform maintenance on it. Perform the following steps to remove the front panel from the SAN Volume Controller.

"Removing the top cover from the SAN Volume Controller" on page 164
The top cover from the SAN Volume Controller can be removed by following these instructions.

Related reference

"Displaying the VPD" on page 49
You can use the command-line interface to display the SAN Volume Controller cluster or node vital product data (VPD).

"SAN Volume Controller menu options" on page 58
During normal node operation, the default menu sequence is operational. This menu sequence enables you to review the operational status of the cluster, the node, and the external interfaces. It also provides access to the tools that you need to install and service the node.

Removing the service controller cables

If you must remove the service controller cables, perform the following steps:

1.   Remove all power from the SAN Volume Controller.

2.   Remove the SAN Volume Controller from the rack.

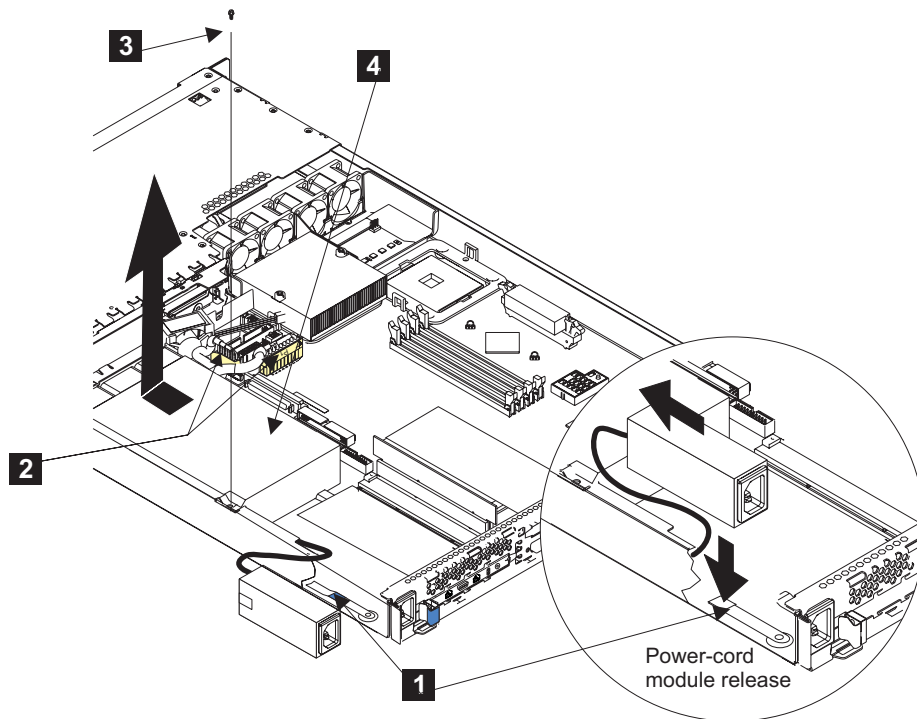3.   Remove the top cover of the SAN Volume Controller.

4.   Remove the service controller and the front panel cable from the front of the service controller.

5.   Press the latch on power connector P1 **1** , and disconnect it from the system board. See Figure 40 on page 170.
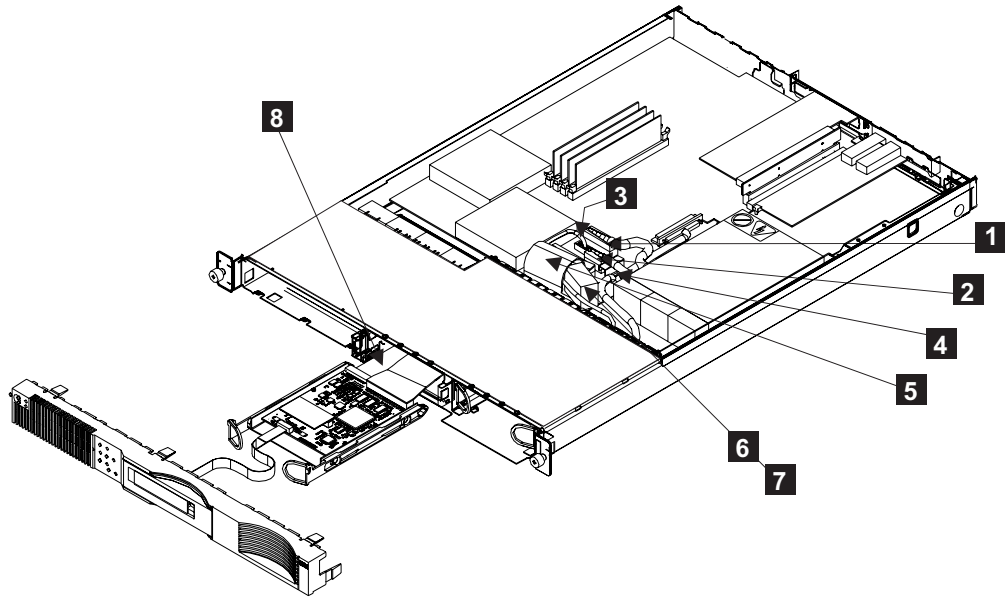
Figure 40. Service controller cables

6. Do the same actions for power connector P2 **2** .

7. Disconnect the fan cable **3** .

8. Disconnect the ATA cable **5** .

9. Lift the SCSI signal cable **4** away from the fan bracket.

10. Slide the right-hand side of the fan **6** forward, and pull the fan away from the clip **7** .

11. Lift the ribbon cable out from the connector **8** .

   Note:

   a. The ribbon cable is labeled "System Planar."

   b. The ribbon cable is pre-folded so that it automatically follows the correct route inside the SAN Volume Controller.

   c. To reinstall the cables, *carefully* install the one end of the ribbon cable (marked "System Planar") to the system board being sure to install the cable straight in. See Figure 41 on page 171. Now route the flat cable and feed it through the opening where the service controller is to be installed and bring the other end of the cable (marked "Controller Card") out of the front end of the SAN Volume Controller chassis. Next, *carefully* install this other end of the cable to the rear of the service controller being sure to install the cable straight in with no rocking or twisting during installation. Install the ATA cable to the rear of the service controller. Carefully install the service controller while ensuring the cables do not get damaged as they slide into the chassis. Be sure to verify that the blue line on the cable connector ends is not visible. This ensures that it is fully seated. See Figure 38 on page 168 and Figure 39 on page 168.
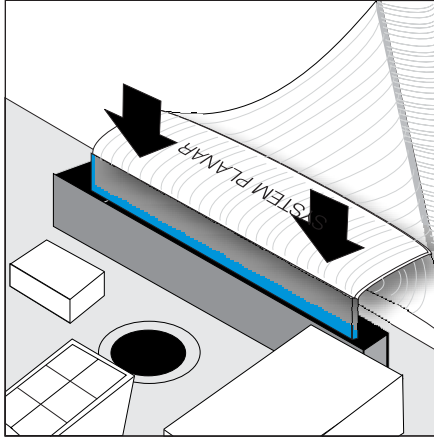
Figure 41. Install the service controller card cable into the system board

Related tasks

"Removing the power cable from the SAN Volume Controller" on page 157
If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

"Removing a SAN Volume Controller from a rack" on page 161
The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

"Removing the top cover from the SAN Volume Controller" on page 164
The top cover from the SAN Volume Controller can be removed by following these instructions.

"Removing the service controller from the SAN Volume Controller" on page 166
You can remove the service controller from the SAN Volume Controller, but if you are replacing the service controller as part of a problem determination procedure, you must also replace the cables that are supplied as part of the service controller FRU.

Replacing a disk drive and a service controller

When you replace a service controller, the nonvolatile memory does not contain the operating system software that enables node rescue to perform. This is not a problem because the software is restored automatically as the node boots from the hard disk. If you must replace the hard disk and the service controller at the same time, you cannot boot the node to perform node rescue.

You must swap the service controller with a service controller from a working node. The service controller that is swapped into the working node has its nonvolatile memory updated when the node is booted from the hard disk. The service controller that is swapped into the failed node will contain the operating system required to enable node rescue to be performed on that node.

Related tasks

"Removing the service controller from the SAN Volume Controller" on page 166
You can remove the service controller from the SAN Volume Controller, but if you are replacing the service controller as part of a problem determination procedure, you must also replace the cables that are supplied as part of the service controller FRU.

"Removing the disk drive"
The disk drive and cables can be removed, although be aware that the disk drive is fragile.

Removing the disk drive

The disk drive and cables can be removed, although be aware that the disk drive is fragile.

Attention:

- Handle the disk drive with care and keep it well away from strong magnetic fields.
- The disk drive is electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity. For information about handling these devices, see ″Handling static-sensitive devices.″

Perform the following steps to remove the disk drive and cables:

1. Verify with the customer that all operations between the SAN Volume Controller and the host system have been stopped.
2. Remove all power from the SAN Volume Controller.
3. Remove the SAN Volume Controller from the rack.
4. Remove the top cover of the SAN Volume Controller. See Figure 42.
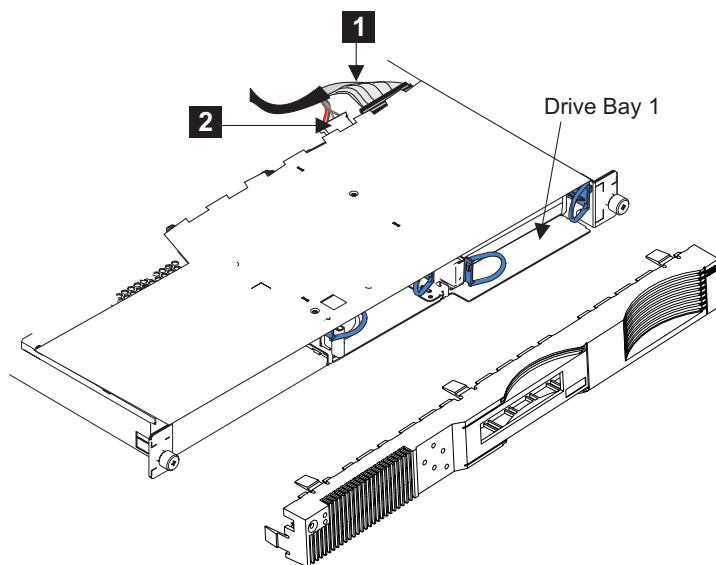
Figure 42. Removing the disk drive

5. Disconnect the SCSI signal connector **1** and the power connector **2** from the back of the disk drive.
6. Remove front panel.
7. Pull the two handles to release the latches, and pull the disk drive forward and out of the SAN Volume Controller.
8. If you are exchanging the disk drive for another, see Figure 43 on page 173. Find the rails and screws that are shipped with the new disk drive. Attach the rails to the disk drive.
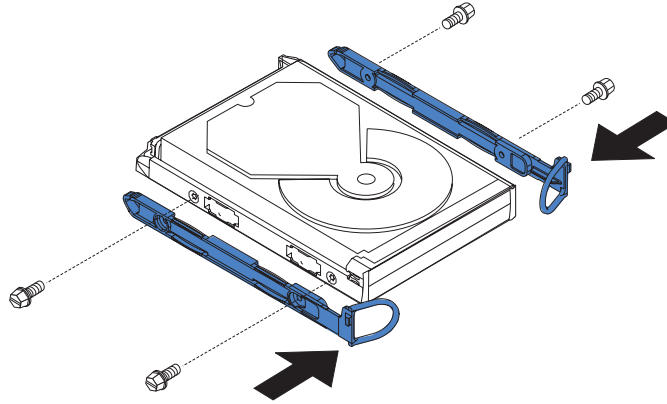
Figure 43. Attaching the rails to the disk drive

9. Check whether the old disk drive has any jumpers installed. If it has, install matching jumpers onto the new disk drive. See Figure 44.

Drive HDA (rear view, PCB facing downward)

SCSI ID = 0	(default)
SCSI ID = 1	
SCSI ID = 2	
SCSI ID = 3	
SCSI ID = 4	
SCSI ID = 5	
SCSI ID = 6	
SCSI ID = 7	
SCSI ID = 8	
SCSI ID = 9	
SCSI ID = 10	
SCSI ID = 11	
SCSI ID = 12	
SCSI ID = 13	
SCSI ID = 14	
SCSI ID = 15	

$A_3 A_2 A_1 A_0$

Reserved
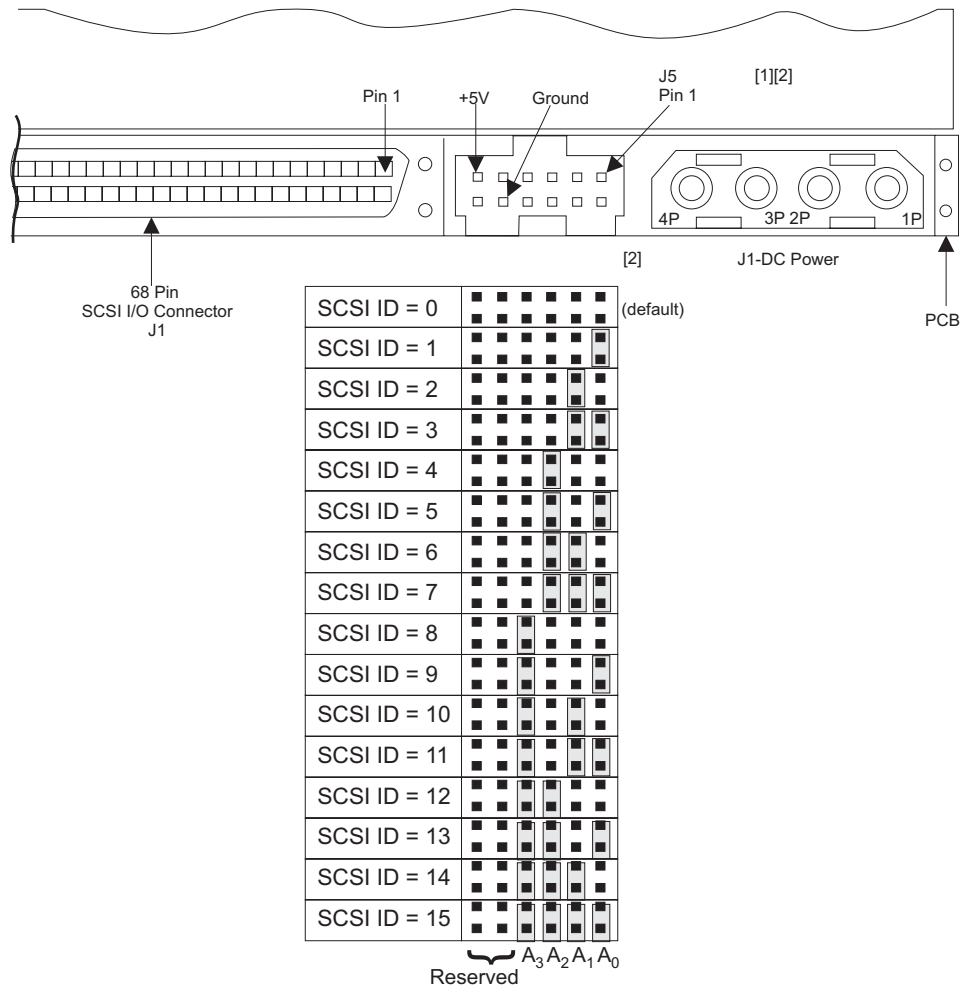
Figure 44. Disk drive jumpers

10. If you have any other tasks to do inside the SAN Volume Controller, do those tasks now. Otherwise, reinstall parts in the reverse sequence.

> **Note:** When you install the disk drive, push it into the SAN Volume Controller until the latches click home.

11. After you replace a disk drive, you must reinstall the software on the SAN Volume Controller by using the node rescue procedure.

> **Note:** If you must replace the hard disk and the service controller at the same time, you cannot boot the node to perform node rescue. See "Replacing a disk drive and a service controller."

Related tasks

"Performing the node rescue" on page 114
You can follow the step-by-step instructions to perform the node rescue.

"Removing the power cable from the SAN Volume Controller" on page 157
If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

"Removing a SAN Volume Controller from a rack" on page 161
The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

"Removing the top cover from the SAN Volume Controller" on page 164
The top cover from the SAN Volume Controller can be removed by following these instructions.

Related reference

"Replacing a disk drive and a service controller" on page 171
When you replace a service controller, the nonvolatile memory does not contain the operating system software that enables node rescue to perform. This is not a problem because the software is restored automatically as the node boots from the hard disk. If you must replace the hard disk and the service controller at the same time, you cannot boot the node to perform node rescue.

Removing the disk drive cables

The disk drive cables may be removed by performing the following steps:

1. Remove all power from the SAN Volume Controller.
2. Remove the SAN Volume Controller from the rack.
3. Remove the top cover of the SAN Volume Controller.
4. Disconnect the SCSI signal connector **1** and the power connector **2** from the back of the disk drive, then remove the cable. See Figure 45 on page 175.
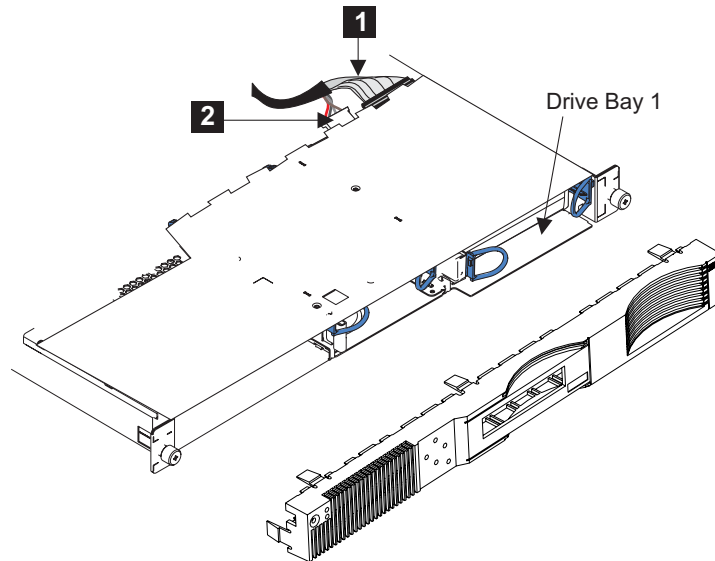
Figure 45. Removing the disk drive cables

5. If you have any other tasks to do inside the SAN Volume Controller, do those tasks now. Otherwise, reinstall parts in the reverse sequence.

   Related tasks

   "Removing the power cable from the SAN Volume Controller" on page 157
   If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

   "Removing a SAN Volume Controller from a rack" on page 161
   The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

   "Removing the top cover from the SAN Volume Controller" on page 164
   The top cover from the SAN Volume Controller can be removed by following these instructions.

Removing the disk drive fan

The disk drive fan can be removed by following the steps below:

1. Remove all power from the SAN Volume Controller.

2. Remove the SAN Volume Controller from the rack.

3. Remove the top cover of the SAN Volume Controller.

4. Unplug the power cables connected to the system board.

5. Remove the entire fan assembly **1** by sliding the right-hand side of the disk drive fan forward. Then, pull the assembly away from the clip. See Figure 46 on page 176.
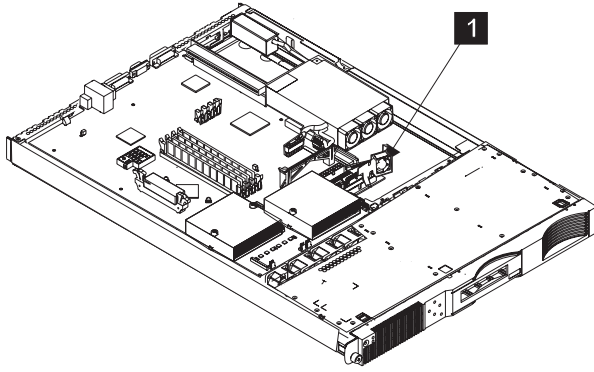
Figure 46. Removing a disk drive fan

6. To replace the fan, perform the following steps:

   a. Remove the old fan from the bracket by pulling the sides of the bracket apart.

   b. Insert the new fan into the bracket by pulling the sides of the bracket apart.

7. If you have any other tasks to do inside the SAN Volume Controller, do those tasks now. Otherwise, reinstall the parts in the reverse sequence.

   Note:

   a. The airflow is from the front to the back of the SAN Volume Controller.

   b. The fan cable comes out of the back of the fan. When you install a fan, ensure that the back of the fan is facing the back of the SAN Volume Controller.

   Related tasks

   "Removing the power cable from the SAN Volume Controller" on page 157
   If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

   "Removing a SAN Volume Controller from a rack" on page 161
   The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

   "Removing the top cover from the SAN Volume Controller" on page 164
   The top cover from the SAN Volume Controller can be removed by following these instructions.

Removing the microprocessor fan

The microprocessor fan can be removed by performing the following steps:

1. Remove all power from the SAN Volume Controller.

2. Remove the SAN Volume Controller from the rack.

3. Remove the top cover of the SAN Volume Controller.

4. Disconnect the fan cable from the system board.
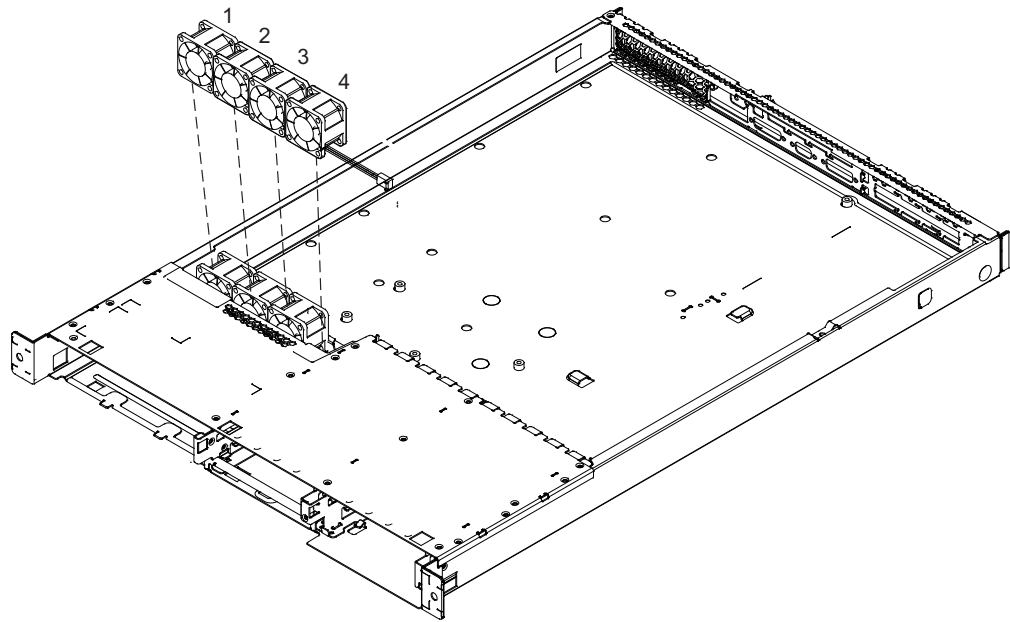
Figure 47. Removing a microprocessor fan

5. The fans are numbered from one to four, from left to right. See Figure 47. Lift the fan upward out of the retaining clip.

   Note: To remove the fourth fan, first remove the third fan. Then move the fourth fan to the left before lifting it.

6. If you have any other tasks to do inside the SAN Volume Controller, do those tasks now. Otherwise, reinstall parts in the reverse sequence.

   Note:

      a. The airflow is from the front to the back of the SAN Volume Controller.

      b. The fan cable comes out of the back of the fan. When you install a fan, ensure that the back of the fan is facing the back of the SAN Volume Controller.

      c. If you are installing a microprocessor fan, orient the fan in the retaining clip so that the cable can reach the connector on the system board.

Related tasks

"Removing the power cable from the SAN Volume Controller" on page 157
If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

"Removing a SAN Volume Controller from a rack" on page 161
The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

"Removing the top cover from the SAN Volume Controller" on page 164
The top cover from the SAN Volume Controller can be removed by following these instructions.

Removing the SAN Volume Controller power supply

To remove the power supply, you must perform the following steps:

1. Remove all power from the SAN Volume Controller.
2. Remove the SAN Volume Controller from the rack.
3. Remove the top cover of the SAN Volume Controller.

Figure 48. Removing the power supply

4. Remove the disk drive fan. See Figure 48.

5. Press down on the clip **1** at the front of the power-cable module and slide the module toward the front of the SAN Volume Controller until the alignment tab is free of the slot that is on the side of the SAN Volume Controller.

6. Lift the power-cable module out from the SAN Volume Controller as far as its cable allows, and put it to one side.

7. Disconnect the power connector **2** .

8. Remove the screw **3** .

9. Slide the power supply **4** forward, then lift it from the SAN Volume Controller. The power supply is a complete FRU. Do not try to repair or exchange any part of it.

> **Note:** For a translation of the following notice, see *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*.

DANGER

> **Do not try to open the covers of the power supply assembly. (32)**

10. If you have any other tasks to do inside the SAN Volume Controller, do those tasks now. Otherwise, reinstall parts in the reverse sequence.

Related tasks

"Removing a SAN Volume Controller from a rack" on page 161
The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

"Removing the top cover from the SAN Volume Controller" on page 164
The top cover from the SAN Volume Controller can be removed by following these instructions.

"Removing the disk drive fan" on page 175
The disk drive fan can be removed by following the steps below:

Removing and replacing the system board CMOS battery

To remove the system board CMOS battery you must perform the following steps.

If you are exchanging the battery for a new one, use only IBM Part Number 33F8354 or a similar type of battery that the manufacturer recommends.

CAUTION:
A lithium battery can cause fire, explosion, or a severe burn. Do not recharge, disassemble, heat above 100°C (212°F), solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace only with the part number specified for your system. Use of another battery might present a risk of fire or explosion. The battery connector is polarized. Do not attempt to reverse the polarity. Dispose of the battery according to local regulations. (22)

Do not do any of the following:
* Throw into, or immerse in, water
* Heat to more than 100°C (212°F)
* Repair or disassemble

Throw away the battery as required by local ordinances or regulations.

1. Remove all power from the SAN Volume Controller.
2. Remove the SAN Volume Controller from the rack.
3. Remove the top cover of the SAN Volume Controller.
4. Use one finger to lift the battery clip over the battery.
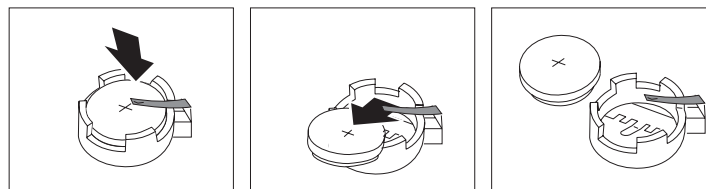
Figure 49. Removing the system board CMOS battery

5. Use one finger to slightly slide the battery out from its socket. The spring mechanism pushes the battery out toward you as you slide it from the socket.

6. Use your thumb and first finger to pull the battery from under the battery clip.

7. Ensure that the battery clip is touching the base of the battery socket by pressing gently on the clip.

Perform the following steps to replace the system board CMOS battery. See Figure 50.
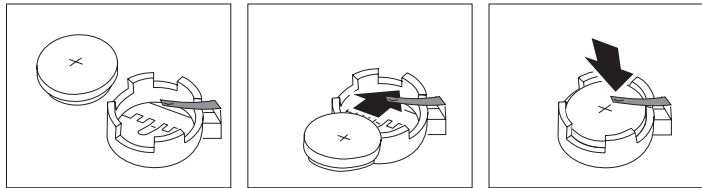
Figure 50. Replacing the system board CMOS battery

1. Tilt the battery so that you can insert it into the socket under the battery clip.

2. As you slide it under the battery clip, press the battery down into the socket.

3. If you have any other tasks to do inside the SAN Volume Controller, do those tasks now. Otherwise, reinstall parts in the reverse sequence.

4. If this SAN Volume Controller was the configuration node when the CMOS battery failed, the cluster date and time might not be correct. After replacing the CMOS battery, check the cluster time using the master console and correct if necessary.

Related tasks

"Removing the power cable from the SAN Volume Controller" on page 157
If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

"Removing a SAN Volume Controller from a rack" on page 161
The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

"Removing the top cover from the SAN Volume Controller" on page 164
The top cover from the SAN Volume Controller can be removed by following these instructions.

Removing the memory modules

The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity. You can remove the memory modules by performing the following steps:

1. Remove all power from the SAN Volume Controller.

2. Remove the SAN Volume Controller from the rack.

3. Remove the top cover of the SAN Volume Controller.

4. **Attention:** If the fault has been isolated only to the *bank* of modules, instead of to a particular module, exchange both modules of the bank. When viewed from the front of the SAN Volume Controller, the modules are numbered 4 through 1, from left to right. Modules 4 and 3 are in bank 2; modules 2 and 1 are in bank 1.

Holding your thumbs against the connector **1** , open the clips **2** by pressing them in the directions that are shown by the arrows in the diagram. This action pulls the memory module **3** out of the connector.
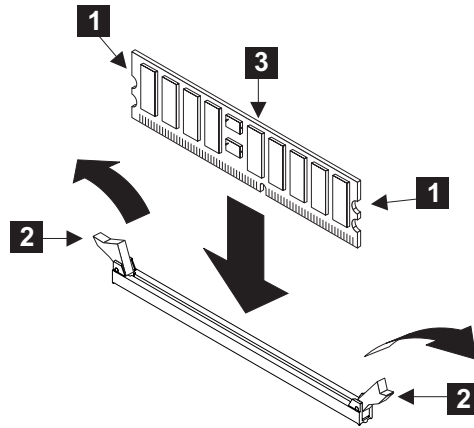
Figure 51. Removing the memory modules

5. If you have any other tasks to do inside the SAN Volume Controller, do those tasks now. Otherwise, reinstall parts in the reverse sequence.

Related tasks

"Removing the power cable from the SAN Volume Controller" on page 157
If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

"Removing a SAN Volume Controller from a rack" on page 161
The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

"Removing the top cover from the SAN Volume Controller" on page 164
The top cover from the SAN Volume Controller can be removed by following these instructions.

Related reference

"Handling static-sensitive devices" on page xxxvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Adapter assemblies

The adapter assemblies are electrostatic-discharge sensitive. Take precautions when removing or replacing them to avoid damage from static electricity.

For information about handling these devices, see ″Handling static-sensitive devices.″

Related tasks

"Removing an adapter"
The adapter assemblies are electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity.

Removing an adapter

The adapter assemblies are electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity.

Perform the following steps to remove an adapter:

1. Remove all power from the SAN Volume Controller.
2. Remove the SAN Volume Controller from the rack.
3. Remove the top cover of the SAN Volume Controller.
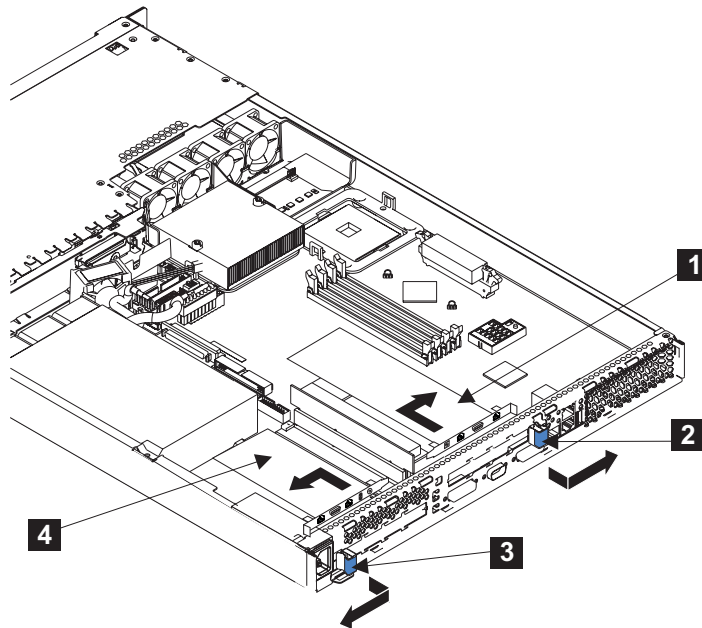
Figure 52. Removing an adapter

4. For the adapter that you are going to remove, press the sides of the clip (**2** or **3**) together to unlock the clip, and then pivot the clip away from the adapter. The clip remains loosely attached to the SAN Volume Controller.
5. **Attention:** Do not touch the components and gold-edge connectors of the adapter.
6. Unplug the adapter (**1** or **4**) from the connector.
7. Remove the adapter from the SAN Volume Controller.

   Related tasks

   "Removing the power cable from the SAN Volume Controller" on page 157
   If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

   "Removing a SAN Volume Controller from a rack" on page 161
   The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

   "Removing the top cover from the SAN Volume Controller" on page 164
   The top cover from the SAN Volume Controller can be removed by following these instructions.

   Related reference

   "Handling static-sensitive devices" on page xxxvi
   Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing an adapter

The adapter assemblies are electrostatic-discharge sensitive. Take precautions when replacing them to avoid damage from static electricity.

Perform the following steps to replace an adapter assembly:
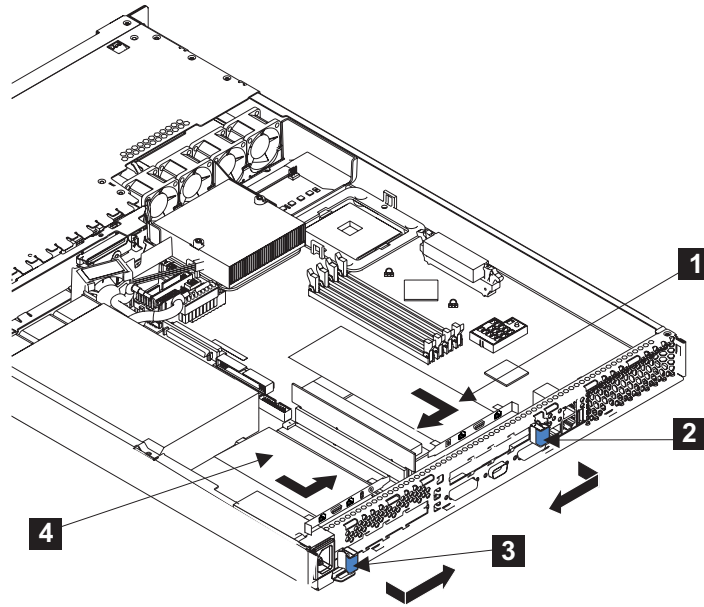
Figure 53. Replacing an adapter

1. **Attention:** Do not touch the components and gold-edge connectors of the adapter. When you install the adapter, ensure that the adapter is correctly seated in the connector before you turn on the SAN Volume Controller. Incorrectly-seated adapters might cause damage to the system board, the riser card for slot 1, or the adapter.

   If you are installing a new adapter, go to step 2.

   If you are reinstalling an adapter, go to step 3.
2. Remove the adapter from its static-protective package.
3. Hold the adapter by its top edge or upper corners, and align it with the connector. Support the riser card, and press the adapter fully into the connector.
4. Pivot the expansion-slot clip toward the adapter, and press it into place.

   Related tasks

   "Removing an adapter" on page 181
   The adapter assemblies are electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity.

Removing the system board

The system board FRU is a kit that includes the following parts:
- PCI riser card
- Two microprocessors
- Microprocessor voltage regulator module (VRM)
- Planar

Use all the parts in the kit when you replace the system board FRU.

The system board is electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity.

Perform the following steps to remove the system board:

1. Remove all power from the SAN Volume Controller.
2. Remove the SAN Volume Controller from the rack.
3. Remove the top cover of the SAN Volume Controller **1** . See Figure 54 on page 185.
4. If you are going to exchange the system board for another system board, go to step 5. Otherwise, go to step 7 on page 185.
5. Remove the adapter assemblies. Keep the adapter assemblies; they must be installed onto the replacement system board.
6. Remove the memory modules. Keep the memory modules; they must be installed onto the replacement system board.
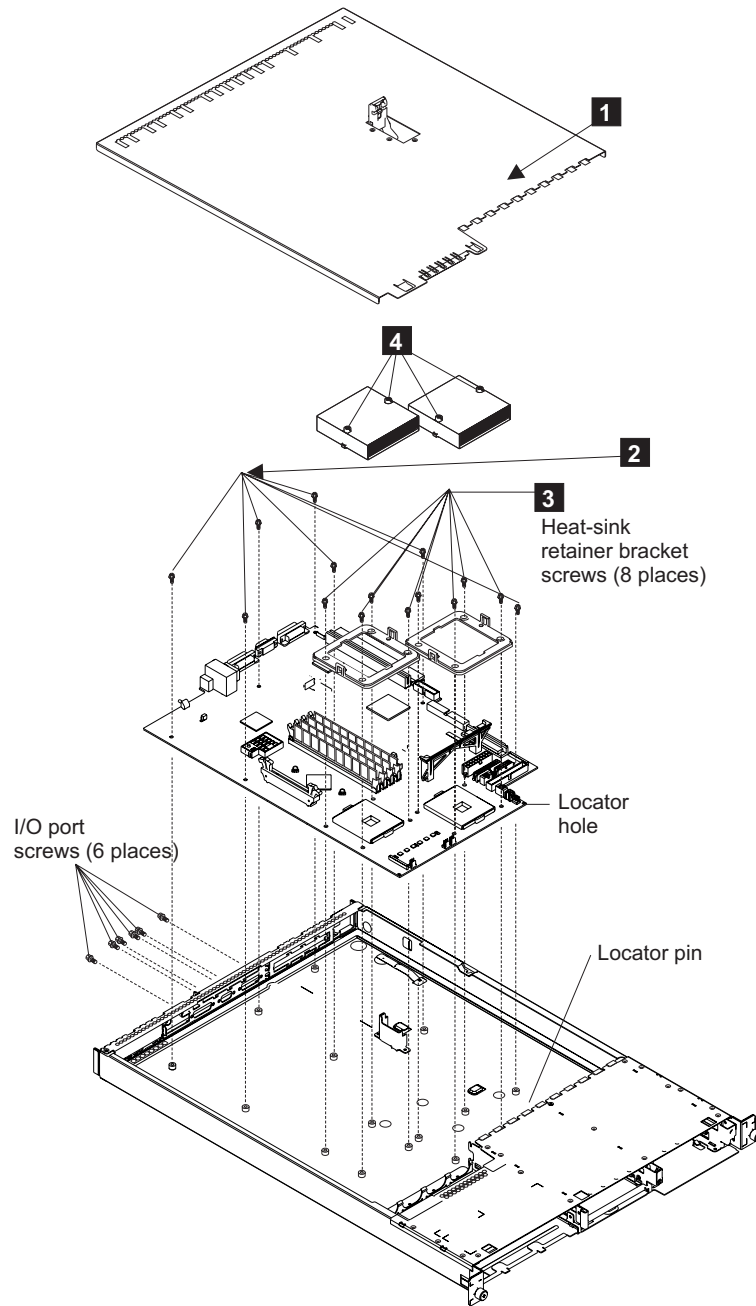
Figure 54. Removing the system board

7. Disconnect:
   a. All fan connectors
   b. Power connectors P1 and P2
   c. SCSI power connector
   d. ATA connector
   e. Disk drive connectors
   f. Service Controller connector
8. Lift out the air baffle.
9. Unscrew the heat sink captive screws **4**.

10. Move the heat sinks gently from side to side to break the seal formed by the thermal compound and then pull them off the processors.

11. Remove the screws from each of the heat sink retainer brackets **3** .

12. Remove the retainer brackets.

13. Remove the two screws from each of the three connectors.

14. Remove the seven screws **2** .

15. Remove the system board.

16. If you have any other tasks to do inside the SAN Volume Controller, do those tasks now. Otherwise, reinstall parts in the reverse sequence.

   Note:

   a. Use all the parts in the system board FRU kit (system board, processors (2), VRM, riser card). Reuse only the four memory modules that you removed in step 6 on page 184 and the two adapter assemblies that you removed in step 4 on page 184.

   b. Before you install the new system board, check whether the old system board has any jumpers installed. If it has, install matching jumpers onto the new system board.

   c. Before you install the processors on the system board, remove the dust covers from the processor socket.

   d. If you were not sent here from the directed maintenance procedures rewrite the SAN Volume Controller serial number. If you were sent here from directed maintenance procedures this step will be performed from within the procedure.

   e. *Carefully* install the end of the ribbon cable (marked "System Planar") to the system board being sure to install the cable straight in. See Figure 55. Be sure to verify that the blue line on the cable connector end is not visible.
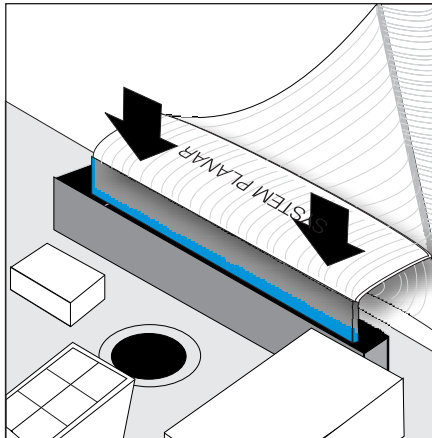
Figure 55. Install service controller cable into the system board

Related tasks

"Removing the power cable from the SAN Volume Controller" on page 157
If you are having problems with the power supply and suspect that the power cable might be defective, you can remove it from the SAN Volume Controller.

"Removing a SAN Volume Controller from a rack" on page 161
The SAN Volume Controller might, at one time, have to be removed from the rack. If so, follow the instructions below.

"Removing the top cover from the SAN Volume Controller" on page 164
The top cover from the SAN Volume Controller can be removed by following these instructions.

"Removing an adapter" on page 181
The adapter assemblies are electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity.

"Removing the memory modules" on page 180
The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity. You can remove the memory modules by performing the following steps:

Related reference

"Handling static-sensitive devices" on page xxxvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

"Rewriting the SAN Volume Controller serial number"
The serial number for the SAN Volume Controller can be rewritten either by using the SAN Volume Controller console or using the command-line interface.

Rewriting the SAN Volume Controller serial number

The serial number for the SAN Volume Controller can be rewritten either by using the SAN Volume Controller console or using the command-line interface.

When you type the following command: **svcservicetask writesernum -sernum** *nodeserialnumber nodename*

The *nodeserialnumber* is written to the SAN Volume Controller system board.

Note: Copy the serial number from the serial number label on the right hand side of the front of the frame.

Removing the uninterruptible power supply 5115

Before you begin to remove the uninterruptible power supply (UPS) 5115, please read all safety notices.

CAUTION:
The UPS 5115 contains its own energy source (sealed, lead-acid batteries). The output receptacles might carry live voltage even when the UPS 5115 is not connected to an AC supply. (11)

CAUTION:
Do not remove or unplug the input cord when the UPS 5115 is turned on. This removes the safety ground from the UPS 5115 and the equipment connected to the UPS 5115. (12)

CAUTION:
To reduce the risk of fire or electric shock, install the UPS 5115 in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% maximum). (13)

CAUTION:

To avoid any hazard from the rack tipping forward when boxes are installed, observe all safety precautions for the rack into which you are installing the device.

CAUTION:

Check to make sure that any SAN Volume Controller that is powered by this UPS 5115 are shut down and powered off, prior to step 1.

Perform the following steps to remove the UPS 5115.

1. At the front of the UPS 5115, press and hold the on/off button **1** for two seconds until all indicators are off. See Figure 56. The UPS 5115 will enter standby mode.
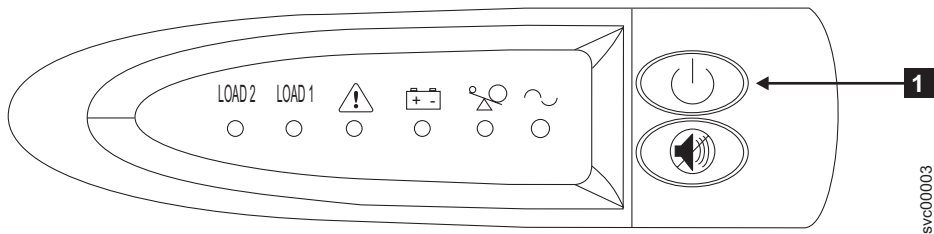
Figure 56. Uninterruptible power supply 5115 front panel assembly

2. At the back of the UPS 5115, disconnect the SAN Volume Controller power cable from load segment receptacle 2 **4** .

3. Disconnect the signal cable **2** from the communication port.

4. Disconnect the main power cable **1** from the main power source.
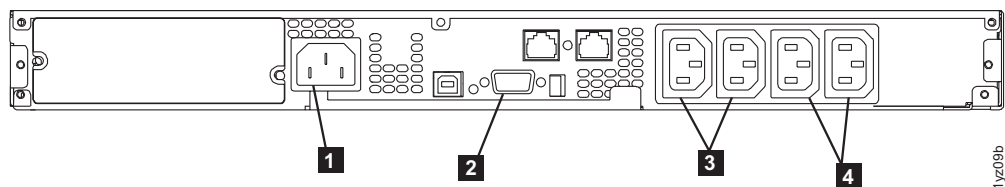
Figure 57. Uninterruptible power supply 5115 (rear view)

5. At the front of the UPS 5115, unscrew the two mounting screws **1** . See Figure 58 on page 189.
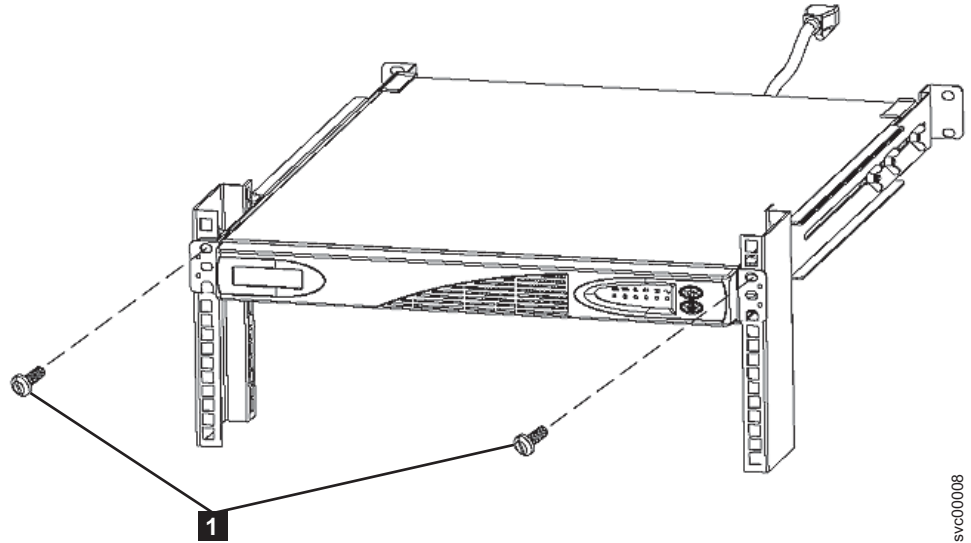
Figure 58. Removing the mounting screws from the uninterruptible power supply 5115

6. From the back of the rack, push the UPS 5115 forward approximately 5 cm (2 in).

   Attention: Do not push the UPS 5115 too far forward.

7. Go to the front of the rack.

8. Pull the UPS 5115 forward and remove it from the rack.

   Related concepts

   "Definitions of notices" on page xxi
   Ensure that you understand the typographic conventions that are used in this publication to indicate special notices.

   Related tasks

   "Removing the uninterruptible power supply 5115 battery" on page 194
   The uninterruptible power supply (UPS) 5115 battery can be replaced without having to turn off power or remove the UPS 5115 from the rack.

   "Replacing the uninterruptible power supply 5115" on page 198
   You can replace the uninterruptible power supply (UPS) 5115 after you have removed the previous UPS.

Removing the uninterruptible power supply 5125

Before you begin to remove the uninterruptible power supply (UPS) 5125, read all safety notices.

CAUTION:
The UPS 5125 contains its own energy source (batteries). The output receptacles might carry live voltage even when the UPS 5125 is not connected to an AC supply. (11)

CAUTION:
Do not remove or unplug the input cord when the UPS 5125 is turned on. This removes the safety ground from the UPS 5125 and the equipment connected to the UPS 5125. (12)

CAUTION:
To reduce the risk of fire or electric shock, install the UPS 5125 in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% maximum). (13)

CAUTION:
To avoid any hazard from the rack tipping forward when boxes are installed, observe all safety precautions for the rack into which you are installing the device.

The UPS 5125 weighs 39 kg (86 lb) with the electronics assembly and the battery assembly installed:
- **Do not attempt to lift the UPS 5125 by yourself. Ask another service representatives for assistance.**
- **Remove the battery assembly from the UPS 5125 before removing the UPS 5125 from the shipping carton.**

CAUTION:
The electronics assembly weighs 6.4 kg (14 lb). Take care when you remove it from the UPS 5125. (16)

CAUTION:
The UPS 5125 battery unit weighs 21 kg (45 lb). Do not attempt to lift the UPS 5125 battery unit by yourself. Ask another service representative for aid. (18)

Removing the UPS 5125 requires that you first remove the UPS 5125 electronics and the UPS 5125 battery.

Perform the following steps to remove the UPS 5125.

CAUTION:
Check to make sure that any SAN Volume Controller that is powered by this UPS 5125 are shut down and powered off, prior to step 1.

1. At the front of the UPS 5125, press and hold the off button **1** for approximately five seconds or until the long beep stops. See Figure 59.
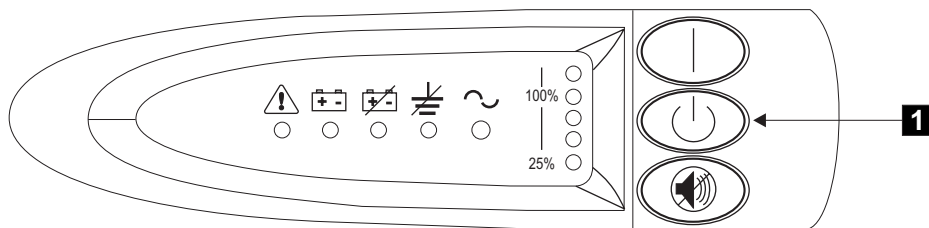
Figure 59. Uninterruptible power supply 5125 front panel assembly

2. At the back of the UPS 5125, disconnect the power cables of the SAN Volume Controller **3** .

3. Disconnect the signal cables **1** .

4. Disconnect the main power cable **2** . See Figure 60 on page 191.
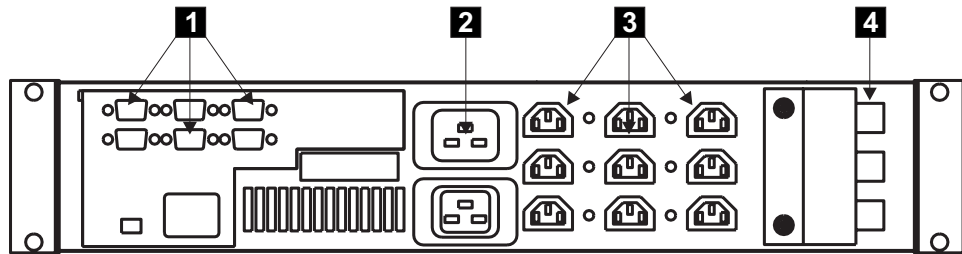
Figure 60. Uninterruptible power supply 5125 (rear view)

5. Remove the battery from the UPS 5125. Refer to the procedure for removing UPS 5125 battery.

   CAUTION:
   The UPS 5125 battery unit weighs 21 kg (45 lb). Do not attempt to lift the UPS 5125 battery unit by yourself. Ask another service representative for aid. (18)

   Note: For the translation of the danger, caution, attention notices, and the translation of the safety labels, see *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*.

6. Remove the electronics assembly from the UPS 5125. Refer to the procedure for removing the UPS 5125 electronics assembly.

7. At the front of the UPS 5125, unscrew the mounting screws, **1** in Figure 61.
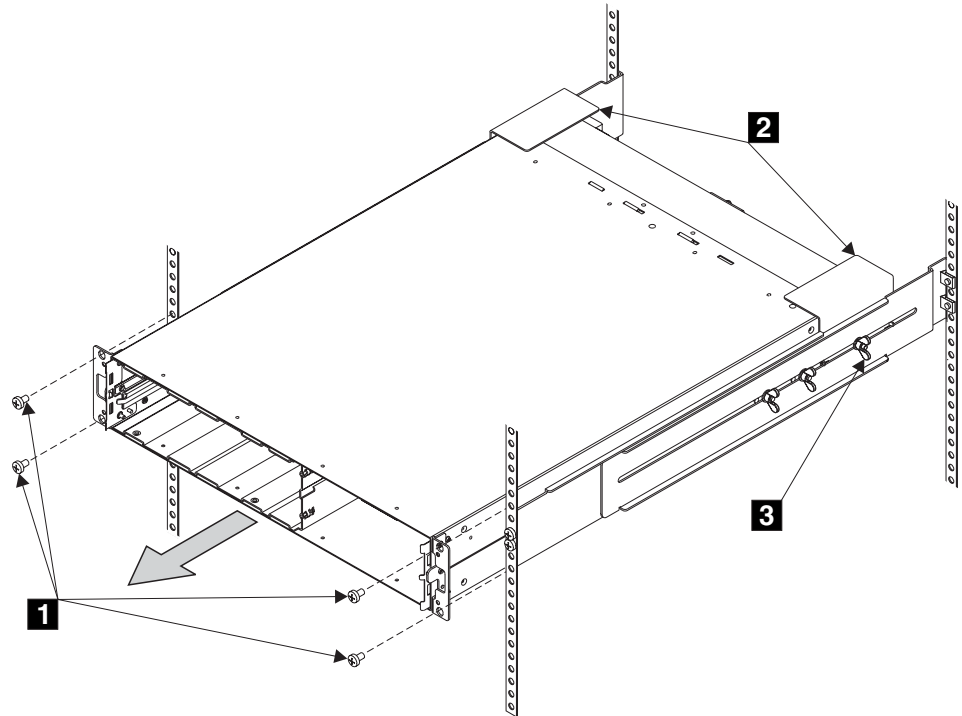
Figure 61. Removing the uninterruptible power supply 5125

8. At the back of the rack, push the UPS 5125 forward approximately 5 cm (2 in).
   Attention: Do not push the UPS 5125 too far forward.

9. Go to the front of the rack.

10. With aid from another service representative, pull the UPS 5125 forward and remove it from the rack.

11. To replace the UPS 5125 refer to the procedure for replacing the UPS 5125.

Related concepts

"Definitions of notices" on page xxi
Ensure that you understand the typographic conventions that are used in this publication to indicate special notices.

Related tasks

"Removing the uninterruptible power supply electronics 5125"
Follow all safety notices when removing the uninterruptible power supply (UPS) 5125 electronic assembly.

"Removing the uninterruptible power supply 5125 battery" on page 195
Follow all safety notices when you are removing the uninterruptible power supply (UPS) 5125 battery.

"Replacing the uninterruptible power supply 5125" on page 201
You can replace the uninterruptible power supply (UPS) 5125 after you have removed the previous UPS.

Removing the uninterruptible power supply electronics 5125

Follow all safety notices when removing the uninterruptible power supply (UPS) 5125 electronic assembly.

Perform the following steps to remove the UPS 5125 electronic assembly:

CAUTION:
Check to make sure that any SAN Volume Controller that is powered by this UPS 5125 are shut down and powered off, prior to step 1.

1. At the front of the UPS 5125, press and hold the off button for approximately five seconds, or until the long beep stops. See ″Removing the uninterruptible power supply 5125.″

2. At the back of the UPS 5125, disconnect the signal cables, **1** in Figure 62.
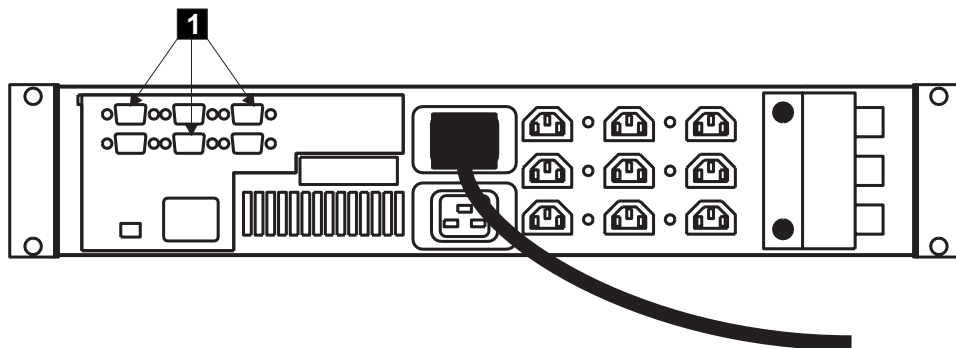
Figure 62. Disconnecting the signal cables

3. Remove the front panel by pressing the sides inward, and pulling on both ends towards you. See Figure 63 on page 193.
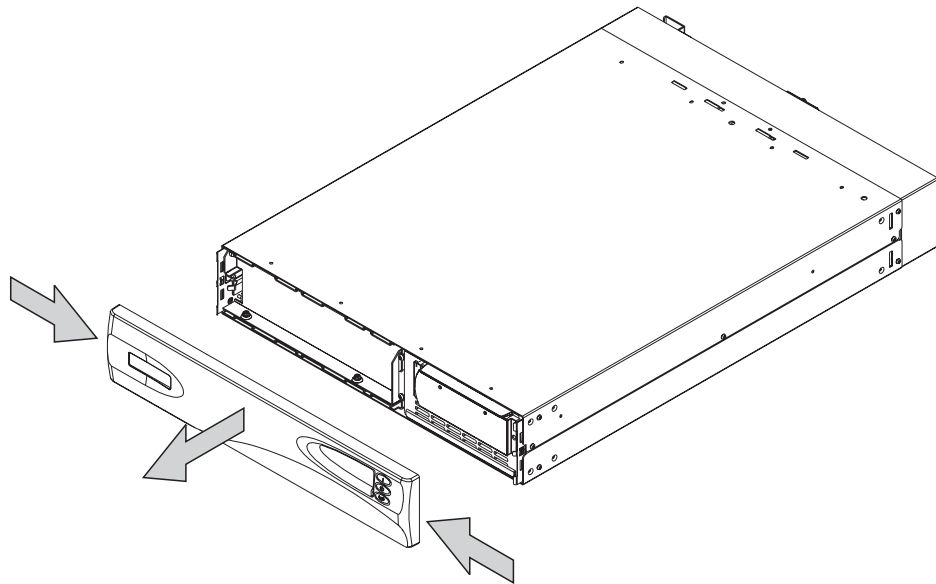
Figure 63. Removing the front panel of the uninterruptible power supply 5125

4. Remove the two screws, **1** in Figure 64.
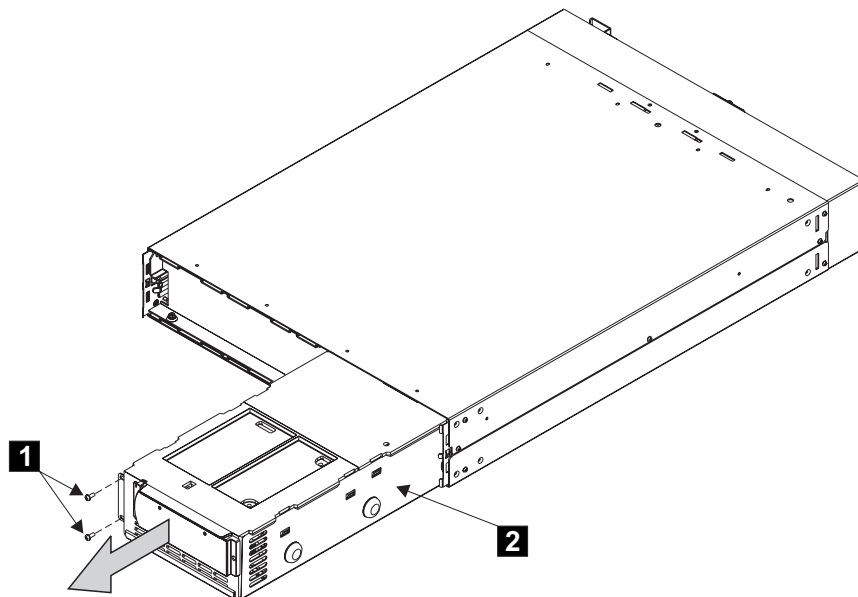
Figure 64. Removing the electronics unit from the uninterruptible power supply 5125

5. Pull the electronics assembly **2** out from the UPS 5125.
6. Reinstall parts in the reverse sequence.

   Attention: When reinstalling the signal cables only use the top row of serial connectors. Installing signal cables in the bottom row of serial connectors causes the UPS 5125 to malfunction.

   Related tasks

   "Removing the uninterruptible power supply 5125" on page 189
   Before you begin to remove the uninterruptible power supply (UPS) 5125, read all safety notices.

Removing the uninterruptible power supply 5115 battery

The uninterruptible power supply (UPS) 5115 battery can be replaced without having to turn off power or remove the UPS 5115 from the rack.

The battery for the UPS 5115 can be easily removed and replaced to ensure that your equipment stays connected and running properly.

Follow the steps below to remove the UPS 5115 battery:

1. Pull the front panel from the right side until the panel is released from the right and middle sections of the UPS 5115. Push the front panel to the left to release the catch on the left end of the panel. See Figure 65.
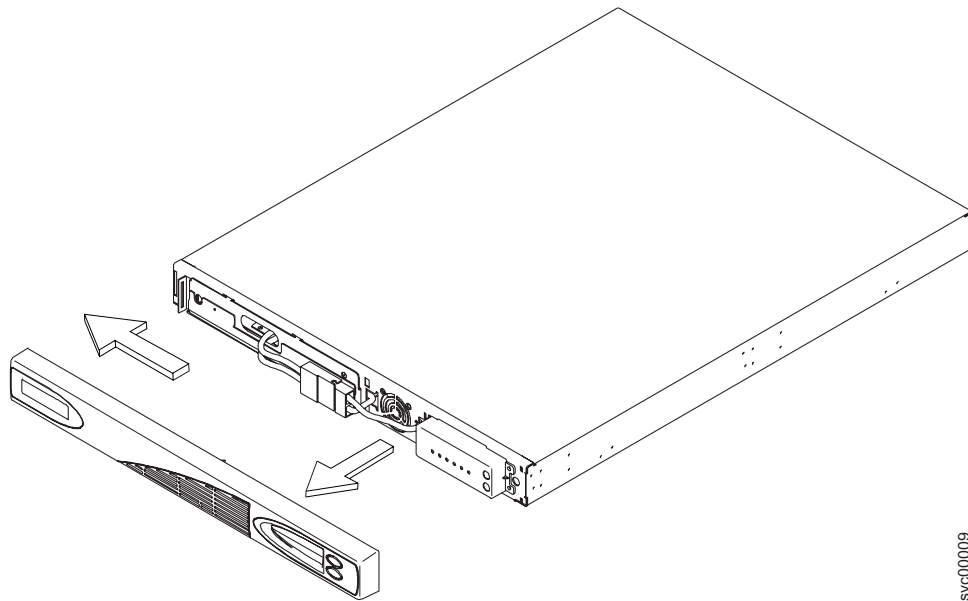
Figure 65. Removing the uninterruptible power supply 5115 front panel

2. Unplug the battery from the UPS 5115.
3. Slide the battery cover to the right and remove it.
4. Slide the battery away and remove it from the UPS 5115, laying it on a flat surface. See Figure 66 on page 195

> **Note:** The UPS 5115 battery is a sealed, lead-acid battery that requires proper handling.
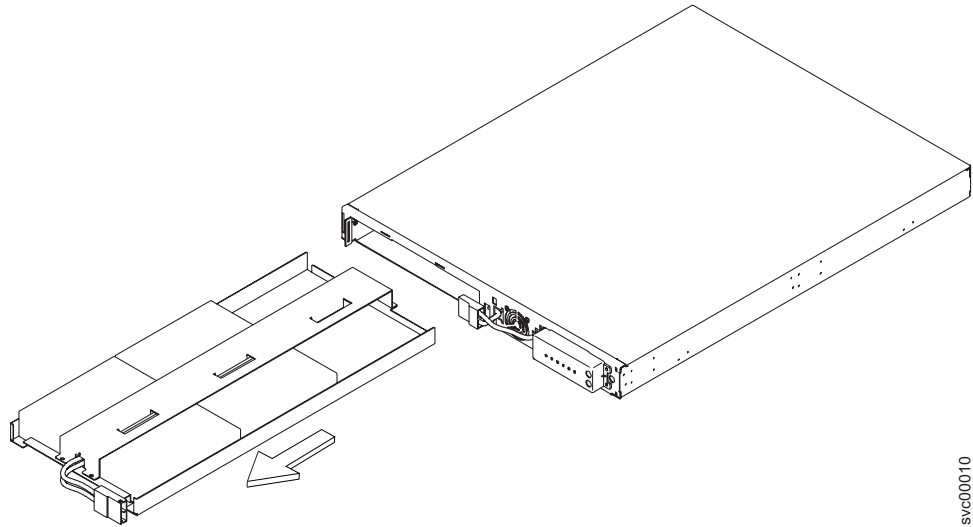
Figure 66. Removing the uninterruptible power supply 5115 battery

5. Reinstall parts in the reverse sequence.

   CAUTION:
   To avoid any hazard from the rack tipping forward when boxes are installed or removed, observe all safety precautions for the rack into which you are installing or removing the device. (23)

   CAUTION:
   Do not dispose of the battery in a fire. The battery might explode. Correct disposal of the battery is required. Refer to your local regulations for disposal requirements. (28)

   CAUTION:
   Do not open or damage the battery. You might release electrolytes that are harmful to the skin and eyes. (29)

   Note: See *IBM TotalStorage SAN Volume Controller: Translated Safety Notices* for a translation of the caution notices.

   Related tasks

   "Removing the uninterruptible power supply 5115" on page 187
   Before you begin to remove the uninterruptible power supply (UPS) 5115, please read all safety notices.

   "Replacing the uninterruptible power supply 5115" on page 198
   You can replace the uninterruptible power supply (UPS) 5115 after you have removed the previous UPS.

   Related reference

   "Controls and indicators for the uninterruptible power supply 5115" on page 31
   All controls for the uninterruptible power supply 5115 are located on the front panel assembly.

Removing the uninterruptible power supply 5125 battery

Follow all safety notices when you are removing the uninterruptible power supply (UPS) 5125 battery.

Perform the following steps to remove the UPS 5125 battery assembly:

CAUTION:
Check to make sure that any SAN Volume Controller that is powered by this UPS 5125 are shut down and powered off, prior to step 1.

1. At the front of the UPS 5125, press and hold the off button for approximately five seconds, or until the long beep stops. See ″Controls and indicators for the uninterruptible power supply.″

2. Remove the front panel by pressing the sides inward, and pulling on both ends towards you (see Figure 67).
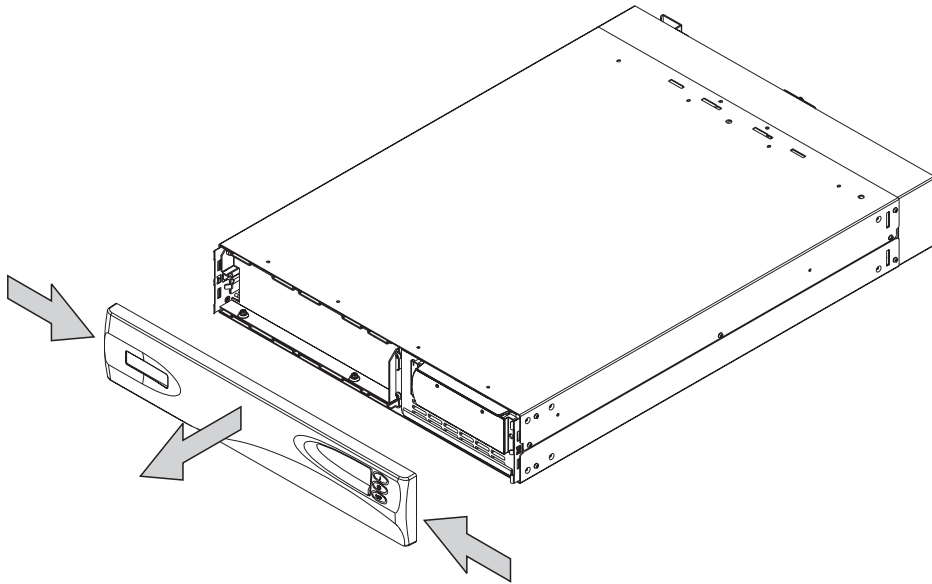
Figure 67. Removing the uninterruptible power supply 5125 front panel

3. Remove the battery retaining bracket (see Figure 68 on page 197).

    a. Remove the two bolts **1** .

    b. Remove the hex nut **2** .

    c. Remove the battery retaining bracket **3** .
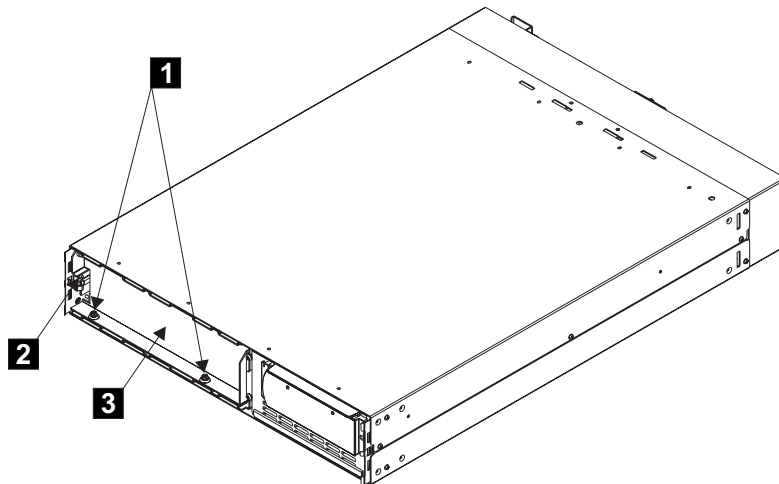
Figure 68. Removing the battery retaining bracket

4. Remove the battery plate, which will then allow access to the battery (see Figure 69 on page 198).

5. Grab the tabs on the battery assembly and pull battery outward to allow two people to access it for removal.

    CAUTION:
    The battery weighs 20.4 kg (45 lb). Do not attempt to lift it by yourself. Ask another service representative for aid. (27)

6. With the help from another service support representative, pull the battery out onto a flat, stable surface.

7. Reinstall parts in the reverse sequence.

    CAUTION:
    To avoid any hazard from the rack tipping forward when boxes are installed or removed, observe all safety precautions for the rack into which you are installing or removing the device. (23)

    CAUTION:
    Do not dispose of the battery in a fire. The battery might explode. Correct disposal of the battery is required. Refer to your local regulations for disposal requirements. (28)

    CAUTION:
    Do not open or damage the battery. You might release electrolytes that are harmful to the skin and eyes. (29)

    Note: See *IBM TotalStorage SAN Volume Controller: Translated Safety Notices* for a translation of the caution notices.

Figure 69. Removing the uninterruptible power supply 5125 battery

Related tasks

"Removing the uninterruptible power supply 5125" on page 189
Before you begin to remove the uninterruptible power supply (UPS) 5125, read all safety notices.

"Removing the uninterruptible power supply electronics 5125" on page 192
Follow all safety notices when removing the uninterruptible power supply (UPS) 5125 electronic assembly.

"Replacing the uninterruptible power supply 5125" on page 201
You can replace the uninterruptible power supply (UPS) 5125 after you have removed the previous UPS.

Related reference

"Controls and indicators for the uninterruptible power supply 5125" on page 35
All controls for the uninterruptible power supply 5125 are located on the front panel assembly.

Replacing the uninterruptible power supply 5115

You can replace the uninterruptible power supply (UPS) 5115 after you have removed the previous UPS.

Attention: Before you begin to install the UPS 5115, please read the safety notices.

CAUTION:
The UPS 5115 contains its own energy source (sealed, lead-acid batteries). The output receptacles may carry live voltage, even when the UPS 5115 is not connected to an AC supply. (11)

CAUTION:
Do not remove or unplug the input cord when the UPS 5115 is turned on. This removes the safety ground from the UPS 5115 and the equipment connected to the UPS 5115. (12)

CAUTION:
To reduce the risk of fire or electric shock, install the UPS 5115 in a temperature- and humidity-controlled indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% maximum). (13)

CAUTION:
To avoid any hazard from the rack tipping forward when boxes are installed, observe all safety precautions for the rack into which you are installing the device.

Perform the following steps to replace the UPS 5115:

1. Place the UPS 5115 on a flat, stable surface with the front of the UPS 5115 facing toward you.
2. On each side of the UPS 5115, attach the long end of a mounting bracket to the UPS 5115 using four of the supplied M3 × 6 screws (**2** , see Figure 70).
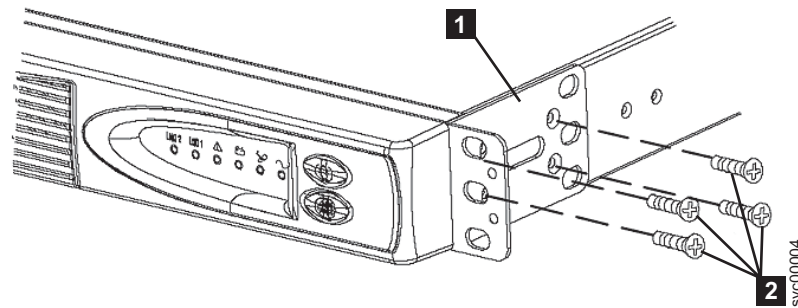
Figure 70. Uninterruptible power supply 5115 mounting bracket

3. Stand at the front of the rack and place the back of the UPS 5115 onto the support rails, and then slide the UPS 5115 into the rack.

4. At the front of the UPS 5115, install the two mounting screws **1** .
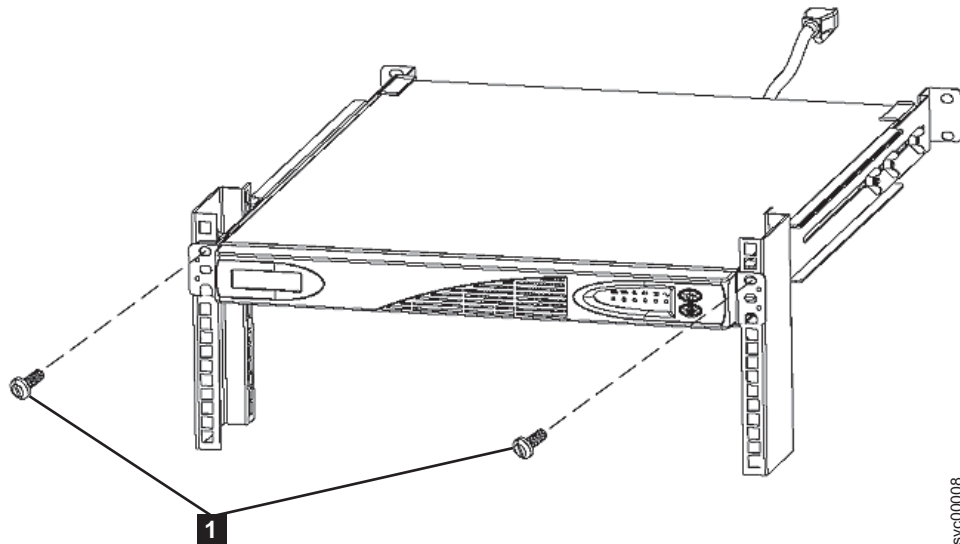
5. At the back of the UPS 5115, reconnect the power cable of the SAN Volume Controller to load segment 2 receptacle **4** . See Figure 71.

   Note: The UPS 5115 is intended to maintain power on a single SAN Volume Controller until data can be saved to the local hard disk drive. Only SAN Volume Controller nodes can be plugged in to the UPS 5115 or the SAN Volume Controller cluster malfunctions. You can only attach one SAN Volume Controller to the UPS 5115, and nothing else. Each SAN Volume Controller requires two UPSs in order to function correctly

6. Reconnect the signal cable to the communication port **2** . See Figure 71.

7. Reconnect the UPS 5115 main power cable into the input connector **1** .
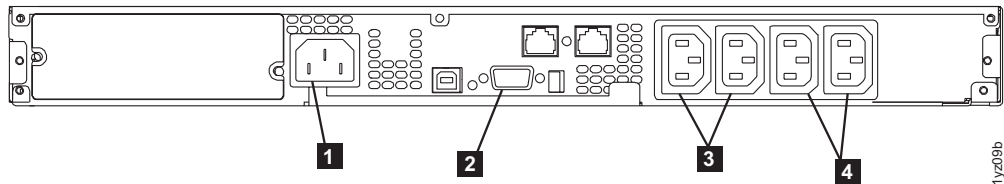
Figure 71. Uninterruptible power supply 5115 (rear view)

Attention: If possible, ensure that the two uninterruptible power supplies are not connected to the same power source.

Note: The UPS 5115 requires a dedicated branch circuit that meets the following specifications:
   - Single-phase
   - 50 to 60 Hz
   - 200-240 Volt

The UPS 5115 should now be in standby mode with the SAN Volume Controller offline. All indicators that are shown in Figure 71 should be off.

8. To turn the UPS 5115 on, press and hold the on/off button **2** until you hear the UPS 5115 beep (approximately two seconds). See Figure 72 on page 201. The UPS 5115 undergoes a self-test before the power on indicator **1** and the load indicators (**7** and **8**) light up to indicate that the UPS 5115 is supplying power to the SAN Volume Controller. The UPS 5115 begins charging its battery while in normal mode.
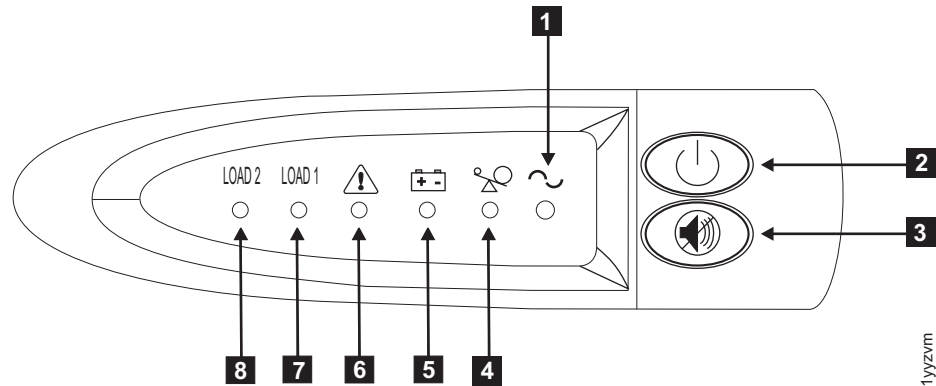
Figure 72. Power switch and indicators of the uninterruptible power supply 5115

Related concepts

"Definitions of notices" on page xxi
Ensure that you understand the typographic conventions that are used in this publication to indicate special notices.

Related tasks

"Removing the uninterruptible power supply 5115 battery" on page 194
The uninterruptible power supply (UPS) 5115 battery can be replaced without having to turn off power or remove the UPS 5115 from the rack.

Replacing the uninterruptible power supply 5125

You can replace the uninterruptible power supply (UPS) 5125 after you have removed the previous UPS.

Attention: Before you begin to install the UPS 5125, read the safety notices.

CAUTION:
The UPS 5125 contains its own energy source (batteries). The output receptacles might carry live voltage even when the UPS 5125 is not connected to an AC supply. (11)

CAUTION:
Do not remove or unplug the input cord when the UPS 5125 is turned on. This removes the safety ground from the UPS 5125 and the equipment connected to the UPS 5125. (12)

CAUTION:
To reduce the risk of fire or electric shock, install the UPS 5125 in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% maximum). (13)

CAUTION:
To avoid any hazard from the rack tipping forward when boxes are installed, observe all safety precautions for the rack into which you are installing the device.

The UPS 5125 weighs 39 kg (86 lb) with the electronics assembly and the battery assembly installed:

- **Do not attempt to lift the UPS 5125 by yourself. Ask another service representatives for assistance.**
- **Remove the battery assembly from the UPS 5125 before removing the UPS 5125 from the shipping carton.**
- **Do not attempt to install the UPS 5125 into the rack unless the electronics assembly and the battery assembly have been removed.**

CAUTION:
The electronics assembly weighs 6.4 kg (14 lb). Take care when you remove it from the UPS 5125. (16)

CAUTION:
The UPS 5125 battery unit weighs 21 kg (45 lb). Do not attempt to lift the UPS 5125 battery unit by yourself. Ask another service representative for aid. (18)

Perform the following steps to replace the UPS 5125:

1. The weight of the UPS 5125 must be reduced by removing the battery assembly before removing it from the shipping carton. To remove the battery assembly:

   a. Open the top of the UPS shipping carton and then with the assistance of another service representative grip the flaps on either side of the UPS. See Figure 73.

Figure 73. Two persons unboxing the uninterruptible power supply 5125

   b. Slide the UPS 5125 to the end of the carton and rest its front edge on the edge of the carton as shown. See Figure 74 on page 203.

Figure 74. Slide the uninterruptible power supply 5125 to the edge of the carton

    c. Remove the two bolts **1** and additional nut **2** on the left side of the bracket and remove the battery retaining bracket **3** . See Figure 75.
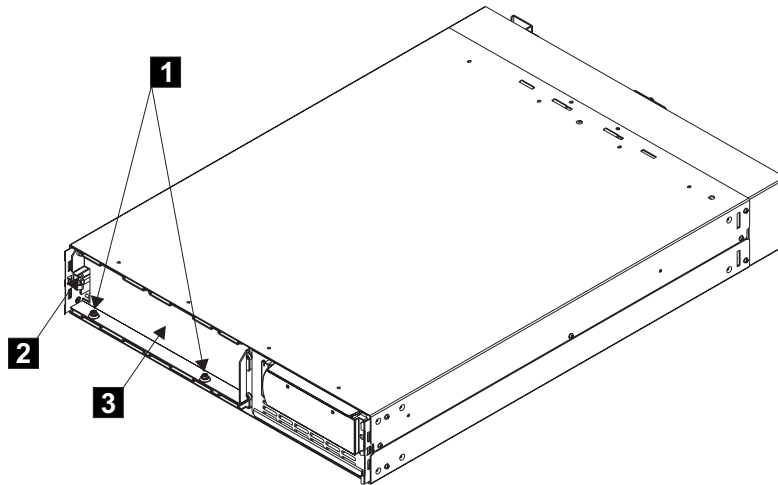
Figure 75. Remove the battery retaining bracket

    d. Grip the tab on the front of the battery and pull the battery forward until it can be accessed by two service representatives.

    e. With the assistance of another service representative, lift the battery assembly clear of the UPS 5125 and place it to one side.

        Note: The cover for the UPS 5125 is not installed: it is included in the box with the UPS 5125. Install the front cover after you have completed the other installation steps.

2. With the assistance of another service representative, lift the UPS 5125 onto a flat, stable surface.

3. Remove the electronic assembly from the UPS 5125:

a. Remove the two screws **1** (see Figure 76).
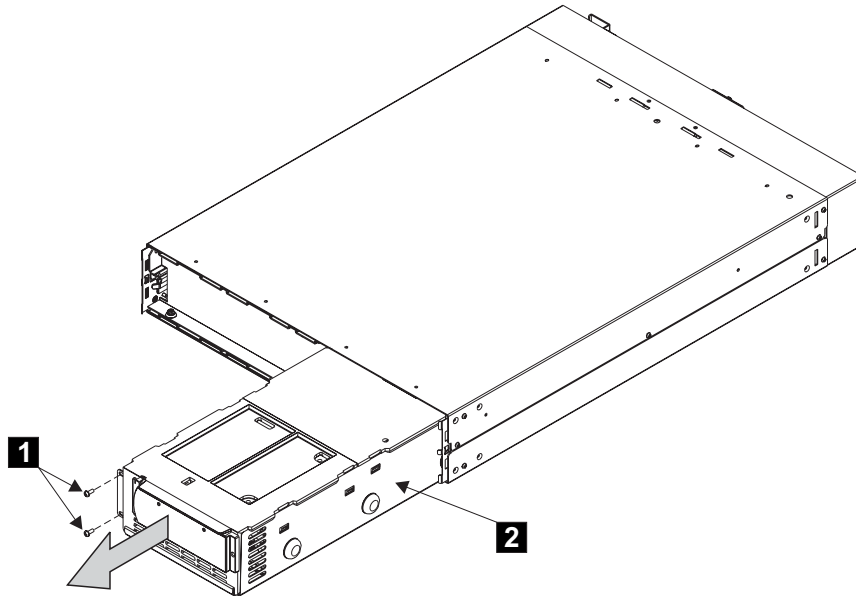
Figure 76. Removing the uninterruptible power supply 5125 electronics assembly

b. Pull the electronics assembly **2** out of the UPS 5125, and put it to one side.

4. Stand at the front of the rack and, with aid from another service representative, place the back of the UPS 5125 onto the support rails, and then slide the UPS 5125 into the rack.

5. Install the front flathead screws **1** (see Figure 77 on page 205).
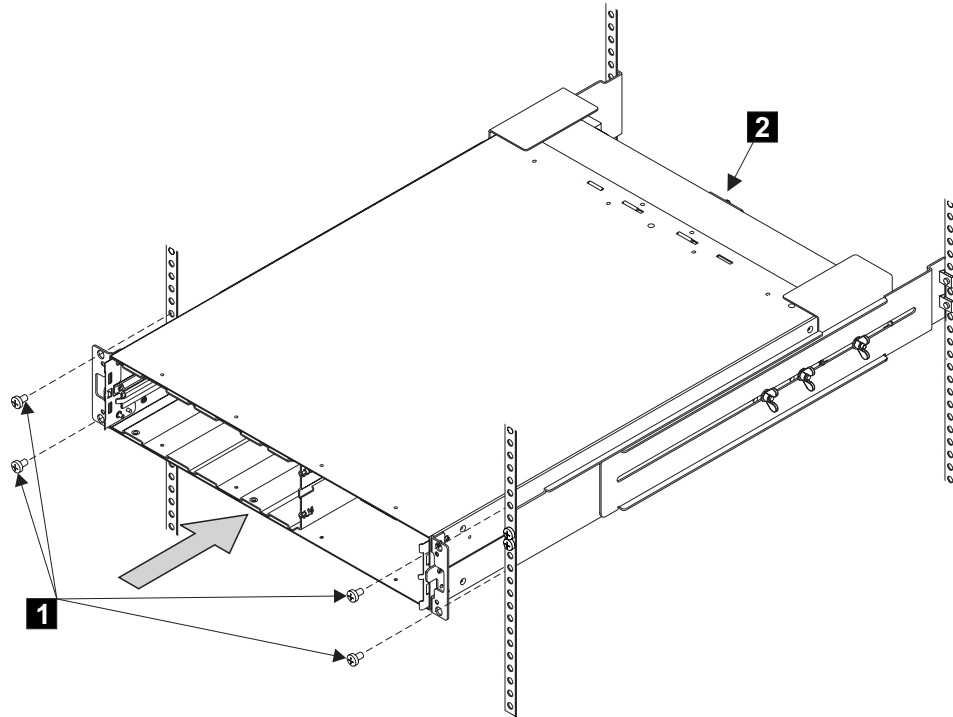
Figure 77. Replacing the uninterruptible power supply 5125 into a rack

6. With aid from another service representative, reinstall the following:

   a. Battery

   b. Electronics assembly

   Attention: A grounding screw feature is provided on the back of the UPS 5125 so that you can attach a ground bonding wire if required by local wiring codes. Since the safety of the UPS 5125 chassis is maintained through the input line power cord, you are usually not required to use this additional grounding screw feature.

7. Reconnect the signal cables.

   Attention: When reinstalling the signal cables, use only the top row of serial connectors. Installing signal cables in the bottom row of serial connectors will cause the UPS 5125 to malfunction.

8. Install the front panel.

9. At the back of the UPS 5125, plug the UPS 5125 main power cable into the power socket, **1** in Figure 78 on page 206.

   Note: The UPS 5125 is intended to maintain power on SAN Volume Controller nodes until data can be saved to the local hard disk drive. Only SAN Volume Controller nodes can be plugged into the UPS 5125 or the SAN Volume Controller cluster malfunctions.
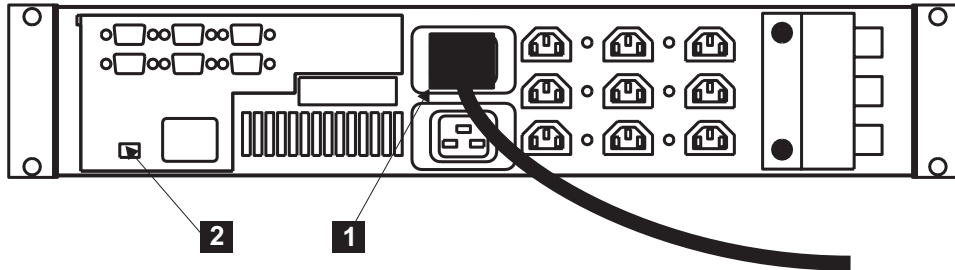
Figure 78. Installing the uninterruptible power supply 5125 power cable

Attention: If possible, ensure that the two uninterruptible power supplies are not connected to the same power source.

Note: The UPS 5125 requires a dedicated branch circuit that meets the following specifications:
- One 15 A circuit breaker in each branch circuit supplies the power to a UPS 5125
- Single-phase
- 50 to 60 Hz
- 200–240 Volt

10. All the front panel indicators (see Figure 79) flash for a short time while the UPS 5125 runs a self test. When the test is complete, the mode indicator, **1** in Figure 79, flashes to show that the UPS 5125 is in standby mode.

Press and hold the UPS 5125 on the switch, **2** in Figure 79, until you hear the UPS 5125 beep (approximately one second). The mode indicator stops flashing and the load level indicators display the percentage of load that is being supplied by the UPS 5125. The UPS 5125 is now in normal mode and is charging its battery.

Figure 79. Power switch and indicators of the uninterruptible power supply 5125

Related concepts

"Definitions of notices" on page xxi
Ensure that you understand the typographic conventions that are used in this publication to indicate special notices.

Related tasks

"Removing the uninterruptible power supply electronics 5125" on page 192
Follow all safety notices when removing the uninterruptible power supply (UPS) 5125 electronic assembly.

Follow all safety notices when you are removing the uninterruptible power supply (UPS) 5125 battery.

Support rails for the SAN Volume Controller

You can learn how to remove and install support rails for the SAN Volume Controller by reading the following sections.

Related tasks

"Removing the support rails for a SAN Volume Controller"
The support rails for the SAN Volume Controller can be removed by following the steps below:

The support rails for an uninterruptible power supply 5125 can be removed by following the steps below:

Removing the support rails for a SAN Volume Controller

The support rails for the SAN Volume Controller can be removed by following the steps below:

1. Go to the front of the left support rail.
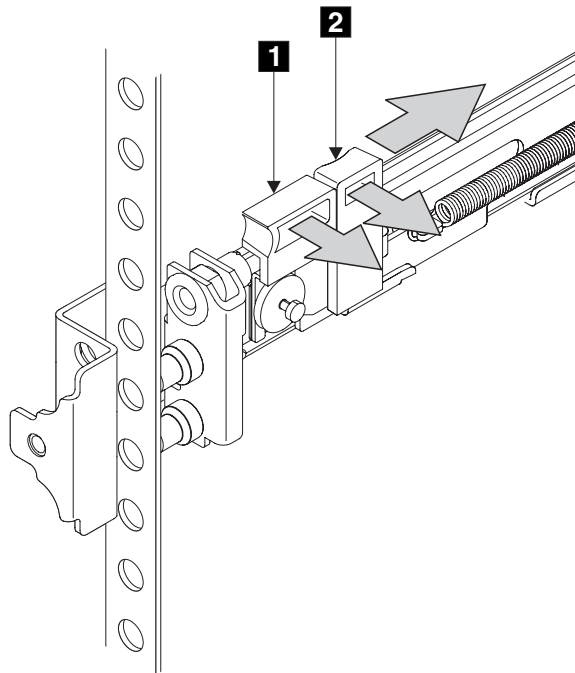
2. Put your first finger onto the back edge of the latch lever **2** and your left thumb on the front edge of the latch lock **1** .
3. Gently move the latch lock inward and push the latch-lock carrier toward the back of the rack until it latches on the rail.
4. Pull the rail out from the front rack-mounting flange.
5. Repeat the action at the back of the rail.
6. Remove the rail from the rack.

7. Repeat steps 2 on page 207 through 6 on page 207 for the right support rail.

   Related tasks

   "Installing the support rails for the SAN Volume Controller"
   The support rails should be installed to hold the SAN Volume Controller.

Installing the support rails for the SAN Volume Controller

The support rails should be installed to hold the SAN Volume Controller.

Before you install the support rails, perform the following tasks:

- Determine where the SAN Volume Controller is to be installed in the rack.
- Refer to the EIA markings on the rack and decide where you are going to install the support rails.

Perform the following steps to install the support rails:

1. Check the labels on the support rails; each rail has a label that indicates which is the front end of the rail and whether the rail is for the left or right side of the rack. Perform this procedure for both rails.

2. Put your finger against the side of the latch-lever **1** and put your thumb against the front of the latch-lock **2** . See Figure 80.
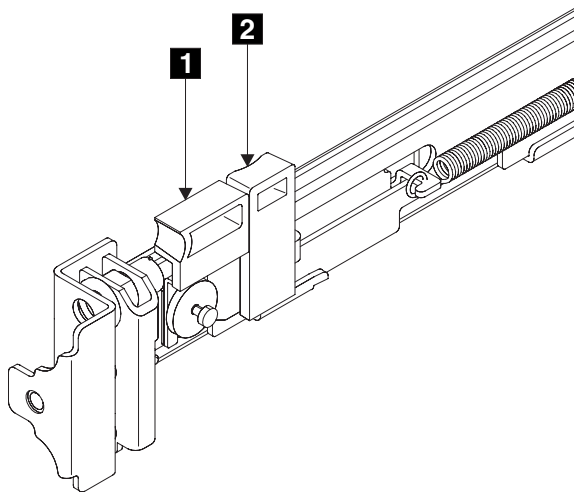
Figure 80. Retracting the latch lock carrier

1 latch-lever

2 latch-lock

3. Gently push the latch lock **2** (Figure 81 on page 209) away from the rail as you move the latch lever **1** towards the far end of the rail. The latch-lock carrier assembly slides against the spring tension.
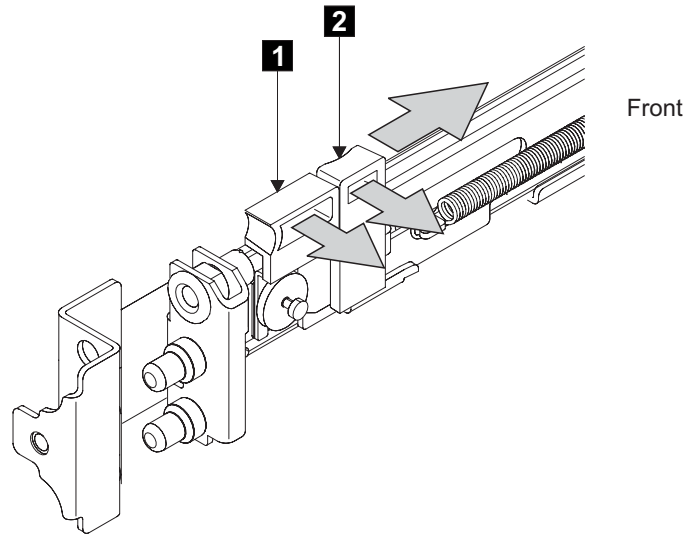
Figure 81. Opening the front latch-lock carrier assembly

1 latch-lever

2 latch-lock

4. Continue to slide the latch-lock carrier for approximately 13 mm (0.5 in). The latch-lever engages a hole in the back bracket assembly and holds the latch-lock carrier in the retracted position.

5. Push the back rail bracket **1** (Figure 82) toward the front of the rail until it stops. The rail is now at its shortest adjustment.
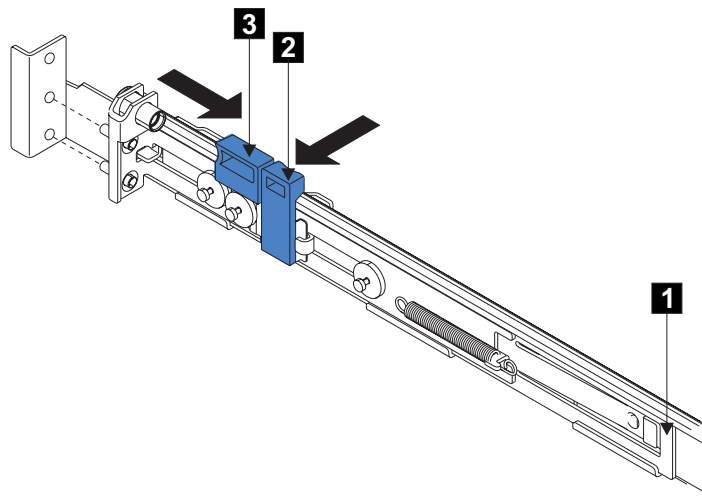
Figure 82. Opening the back latch-lock carrier assembly

1 back rail bracket

2 latch-lock

3 latch-lever

6. Put your index finger against the side of the latch lever **3** and your thumb against the front of the latch lock **2** .

7. Gently push the latch lock **2** away form the rail as you move the latch-lever
    3 towards the front of the rail. The latch-lock carrier assembly slides against
    the spring tension.

8. Release the latch lock and continue to slide the latch-lock carrier for
    approximately 13 mm (0.5 in). The latch lever engages in a hole in the back
    bracket assembly and holds the latch-lock carrier in the retracted position.

9. Place the front end of the left rail in the rack cabinet. Align the top of the front
    bracket **1** (Figure 83) with the required EIA marking that is on the rack.
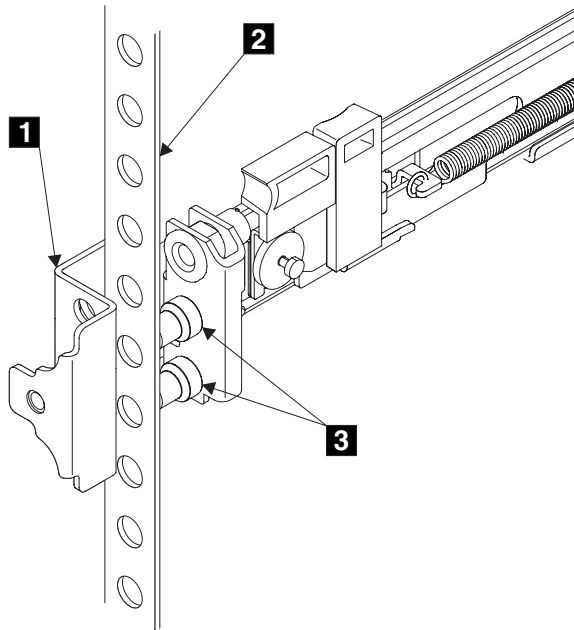
Figure 83. Installing the front end of the rail

1 front bracket

2 rack-mounting flange

3 locating pins

10. Align the locating pins **3** with the holes that are in the rack-mounting flange
    2 .

11. Push the latch lock **2** (Figure 84 on page 211) away from the rail to release
    the carrier. The latch-lock carrier slides toward the front of the rack, and the
    locating pins project through the holes that are in the front flange and in the
    front rail bracket.

    Important: Ensure that the locating pins are fully extended through the front
    rail bracket.
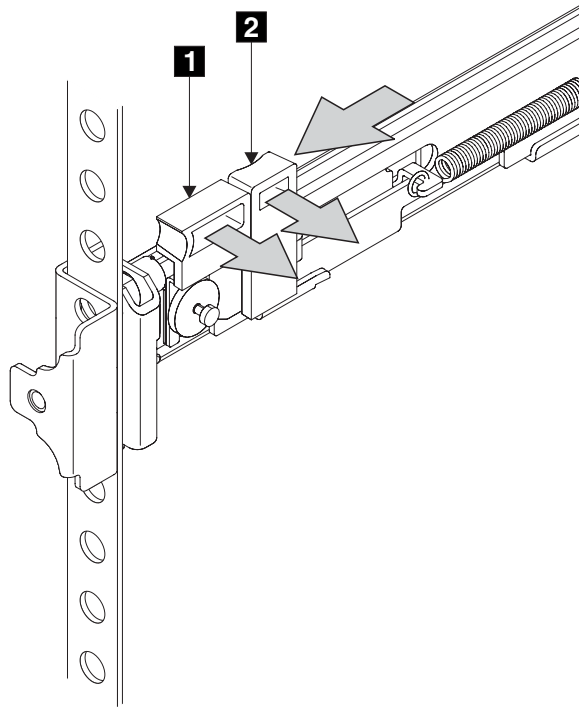
Figure 84. Closing the latch-lock carrier assembly

1 latch-lever

2 latch-lock

12. Push the back rail bracket **1** (see Figure 82 on page 209) toward the rear of the rack and align the locating pins with the rack-mounting flange.

13. Push the latch lock **2** (see Figure 82 on page 209) away from the rail to release the carrier. The latch-lock carrier slides toward the rear of the rack, and the locating pins project through the holes that are in the rear flange and in the rear rail bracket.

    Important: Ensure that the locating pins are fully extended through the rear rail bracket.

14. On the rear of each rail, press the blue release tab and slide the shipping bracket off the slide rail. Store the shipping bracket for further use.

    Related tasks

    "Removing the support rails for a SAN Volume Controller" on page 207
    The support rails for the SAN Volume Controller can be removed by following the steps below:

Removing the support rails for an uninterruptible power supply 5115

The support rails for an uninterruptible power supply 5115 can be removed by following the steps below:

1. Loosen and remove the two M6 × 10 screws from each side as shown below.
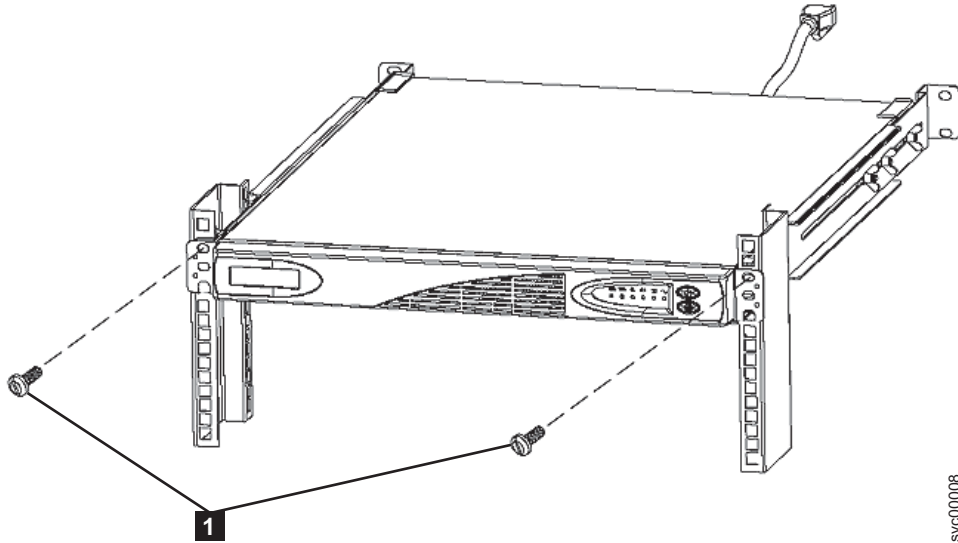
svc00008

2. Remove the UPS 5115 from the rack.

3. Remove the clip nut from the top hole of the rail (**3** in Figure 85).
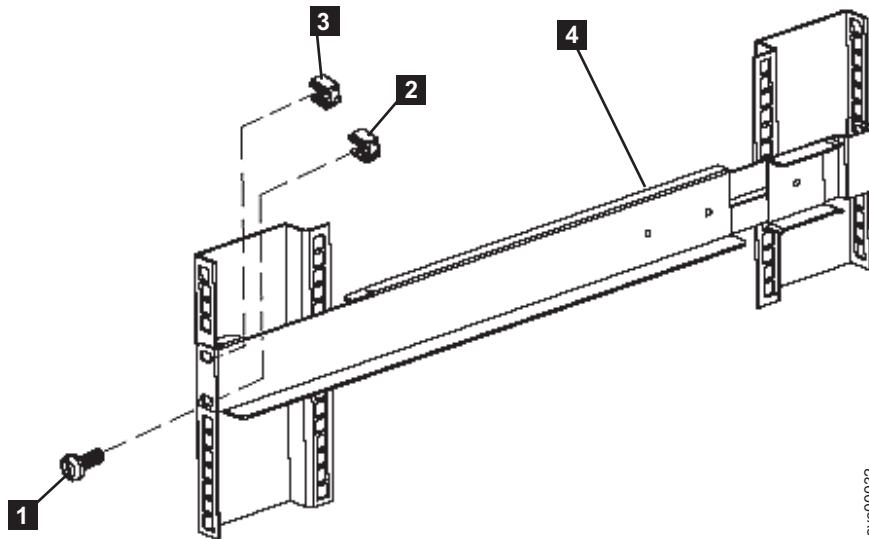
svc00032

Figure 85. Removing the front rail on the UPS 5115

4. Detach the M6 × 10 screw **1** from the clip nut **2** in the bottom hole of the rail.

5. Remove the two M6 × 10 screws (**1** in Figure 86 on page 213) and two clip nuts (**2** in Figure 86 on page 213).
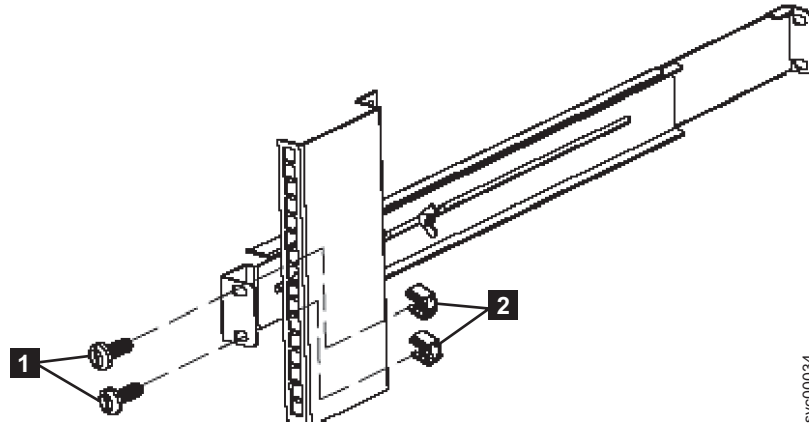
Figure 86. Removing the rear rail on the UPS 5115

6. Remove the rail from the rack.
7. Repeat 3 on page 212 through 6 to remove the other rail from the rack.

Installing the support rails for the uninterruptible power supply 5115

You might have to install the support rails for the uninterruptible power supply (UPS) 5115.

Before installing the support rails, determine where the UPS 5115s are to be installed in the rack.

Note: If you are installing the SAN Volume Controller into a rack that already contains other SAN Volume Controllers and UPSs, the installed UPSs might have spare capacity. If the customer intends to use that spare capacity, the SAN Volume Controllers that you are going to install might have been delivered without UPSs.

Perform the following steps to install the support rails for the UPS 5115:

1. Place the UPS 5115 on a flat surface with the front facing you.
2. On each side of the UPS 5115, attach the long side of a mounting bracket **1** to the UPS 5115 using four M3 × 6 screws **2** for each bracket.
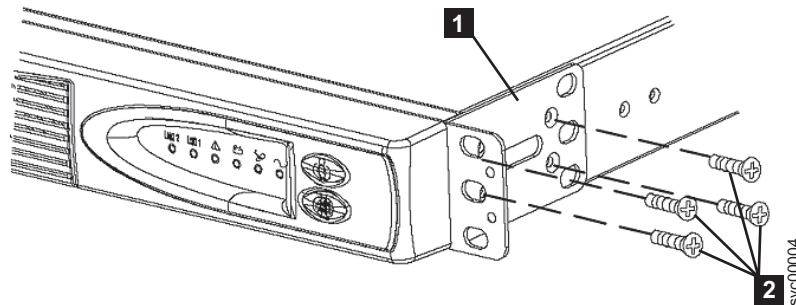
3. Loosen the assembly wing nuts (see **1** in Figure 87 on page 214) on both rail assemblies and adjust the rail size to the depth of your rack.
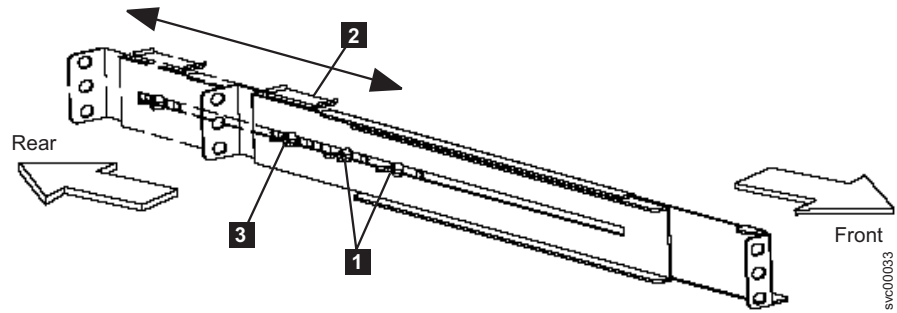
Figure 87. Adjusting the rail depth on the UPS 5115

4. Position the rear, hold-down bracket **2** towards the end of the rail assemblies and tighten the wing nut **3** .
5. Select the holes in the rail where you want to position the UPS 5115.
6. Using two M6 × 10 screws (**1** in Figure 88) and two clip nuts (**2** in Figure 88), attach the rail to the rear of the rack.
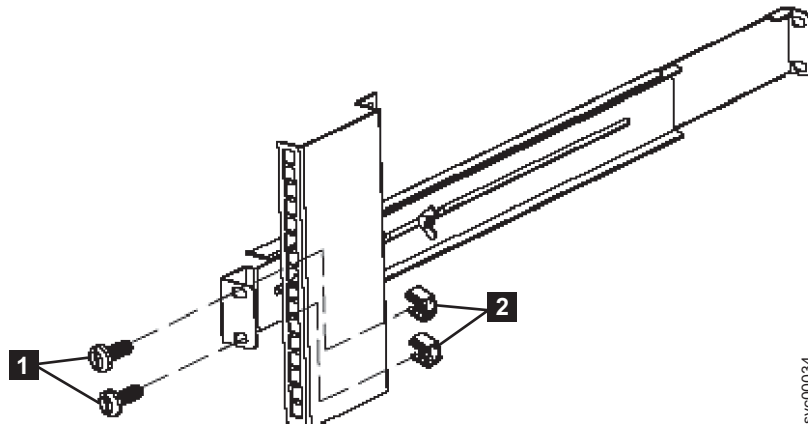
Figure 88. Securing the rear rail on the UPS 5115

7. Attach only the bottom hole of the rail to the front of the rack with one M6 × 10 screw and one clip nut (see **1** in Figure 89 on page 215).
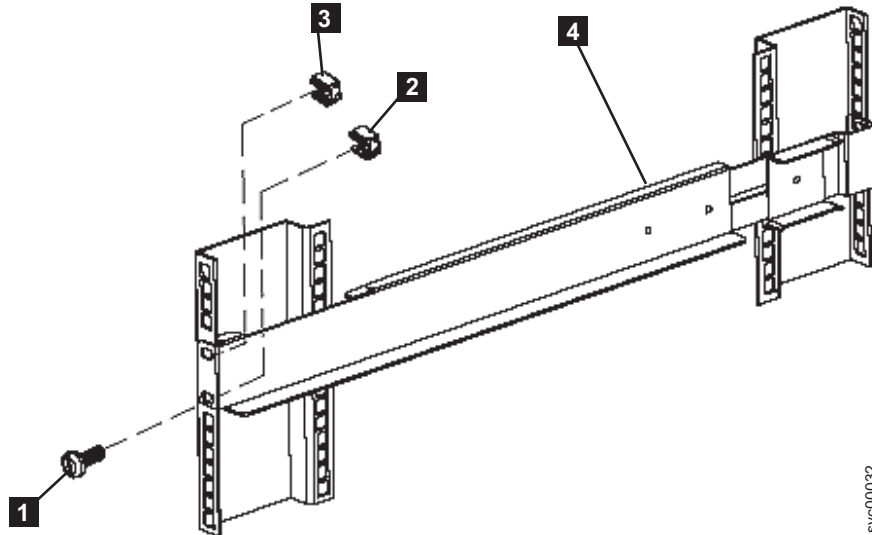
Figure 89. Securing the front rail on the UPS 5115

8. Install a clip nut in the top hole of the rail **3** .
9. Repeat 6 on page 214 through 8 for the other rail.
10. Tighten the assembly wing nuts on both rail assemblies.
11. Secure the front of the UPS 5115 to the rack with one M6 $\times$ 10 screw on each rail (see Figure 90).
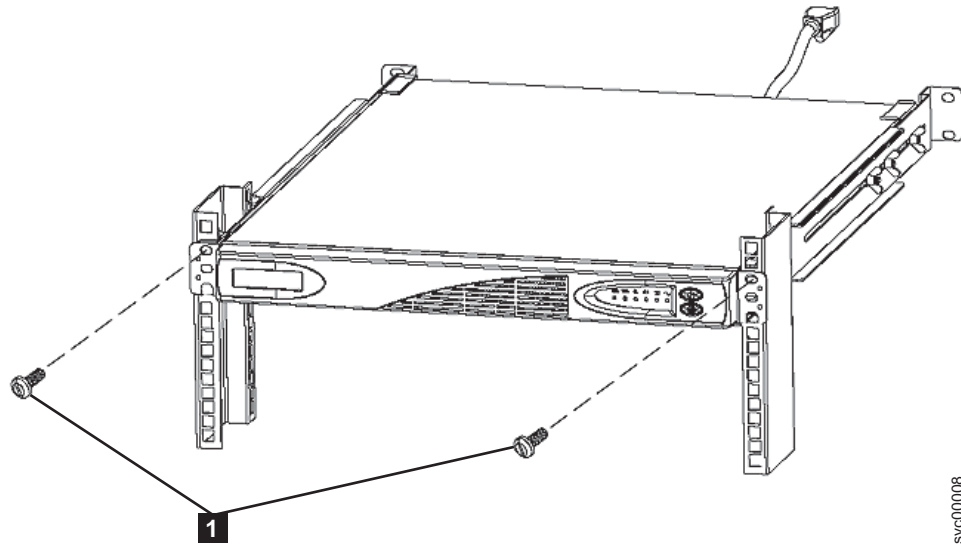
Figure 90. Securing the UPS 5115 in the rack

Removing the support rails for an uninterruptible power supply 5125

The support rails for an uninterruptible power supply 5125 can be removed by following the steps below:

1. Go to the left-hand support rail.
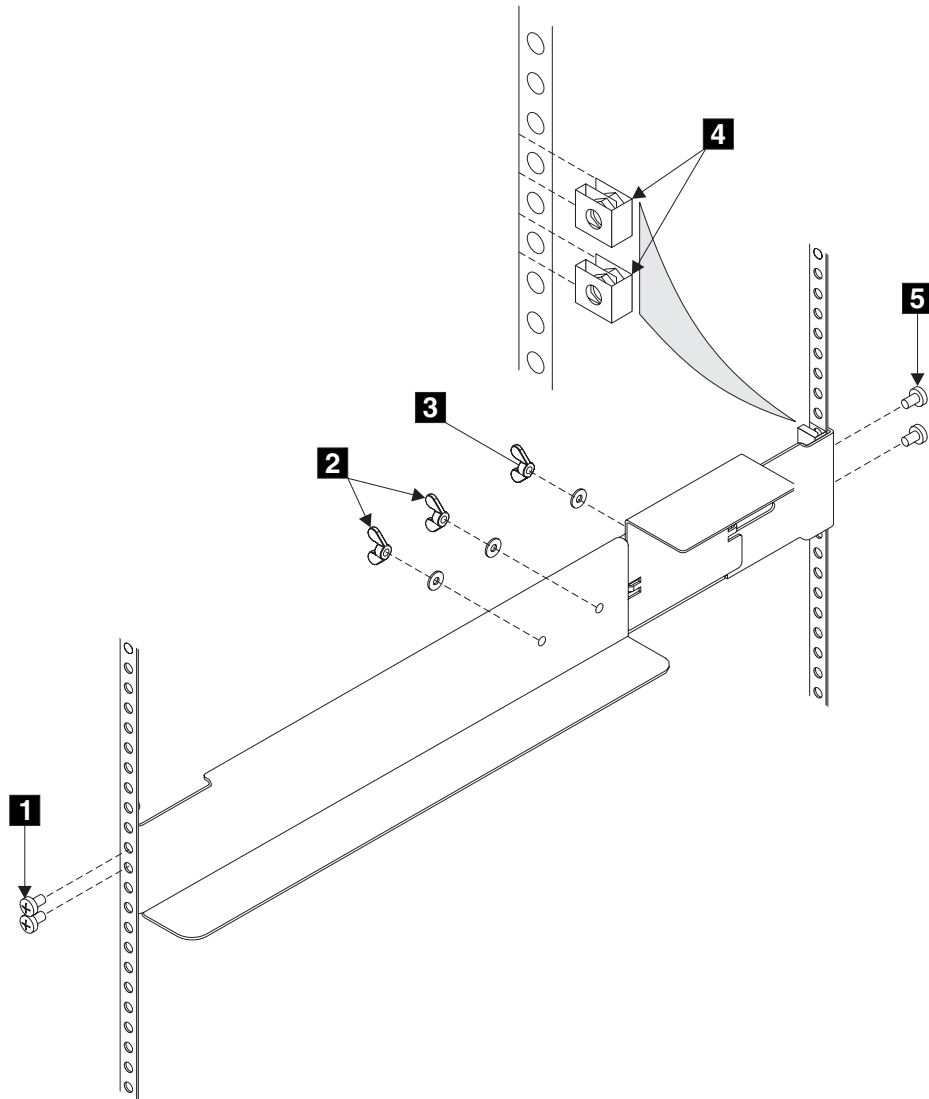
2. Loosen the two adjustment wing nuts **2** .

3. Remove back screws **5** .

4. Remove the front screws **1** .

5. Remove the rail from the rack.

6. Remove the two nut clips **4** .

   Related tasks

   "Installing the support rails for the uninterruptible power supply 5125"
   You might have to install the support rails for the uninterruptible power supply
   (UPS) 5125.

Installing the support rails for the uninterruptible power supply 5125

You might have to install the support rails for the uninterruptible power supply (UPS)
5125.

Before installing the support rails, determine where the UPS 5125s are to be
installed in the rack.

Note: If you are installing the SAN Volume Controller into a rack that already contains other SAN Volume Controllers and UPSs, the installed UPSs might have spare capacity. If the customer intends to use that spare capacity, the SAN Volume Controllers that you are going to install might have been delivered without uninterruptible power supplies.

Perform the following steps to install the support rails for the UPS 5125:

1. Discard the two handles and their associated nuts that are shipped with the support rails for the UPS 5125.

2. At the back of the rack, observe the EIA positions, and determine where you are going to install the UPS 5125. Always install the UPS 5125 into the lowest available position in the rack. The only device that can be below a UPS 5125 is another UPS.

   Note: The bottom of the flange of the support rail must align with the EIA mark on the rack.
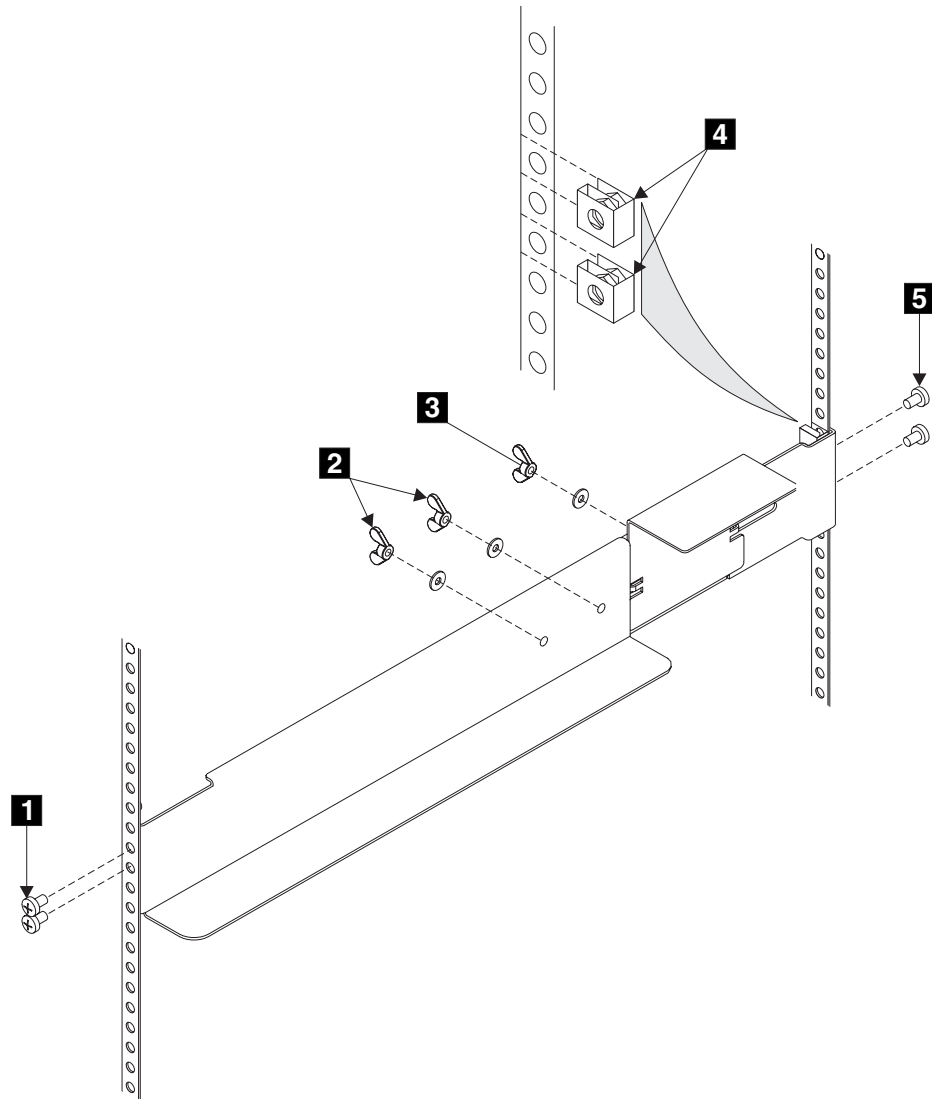
3. Perform the following steps for each rail:

a. Attach nut clips **4** to the rack. These nut clips must align with the second and fourth holes of the support rail flange.

b. Loosen the two wing nuts **2** .

c. Loosen the wing nut **3** and slide the bracket toward the back of the rail.

d. Remain at the back of the rack, hold the support rail in position in the rack, and then install and fully tighten the two mounting screws **5** .

e. Go to the front of the rack.

f. Extend the support rail toward the front of the rack.

   Note: Hold the support rail in position until you have completed step 3h.

g. Ensure that the support rail is horizontal (a level might be useful here).

h. Install the two mounting screws **1** into the third and fourth holes of the support rail flange. Fully tighten the screws.

i. Fully tighten the two wing nuts **2** .

j. Loosen the wing nut **3** and slide the bracket toward the front of the rail, as far as it will go, with the front edge of the bracket against the back end of the front support rail. Fully tighten the wing nut **3** .

Related tasks

"Removing the support rails for an uninterruptible power supply 5125" on page 215

The support rails for an uninterruptible power supply 5125 can be removed by following the steps below:

Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully.

Features

These are the major accessibility features in the SAN Volume Controller master console:

- You can use screen-reader software and a digital speech synthesizer to hear what is displayed on the screen. The following screen readers have been tested: JAWS v4.5 and IBM Home Page Reader v3.0.
- You can operate all features using the keyboard instead of the mouse.

Navigating by keyboard

You can use keys or key combinations to perform operations and initiate many menu actions that can also be done through mouse actions. You can navigate the SAN Volume Controller Console and help system from the keyboard by using the following key combinations:

- To traverse to the next link, button, or topic, press Tab inside a frame (page).
- To expand or collapse a tree node, press →or ←, respectively.
- To move to the next topic node, press V or Tab.
- To move to the previous topic node, press ^ or Shift+Tab.
- To scroll all the way up or down, press Home or End, respectively.
- To go back, press Alt+←.
- To go forward, press Alt+→.
- To go to the next frame, press Ctrl+Tab.
- To move to the previous frame, press Shift+Ctrl+Tab.
- To print the current page or active frame, press Ctrl+P.
- To select, press Enter.

Accessing the publications

You can view the publications for the SAN Volume Controller in Adobe Portable Document Format (PDF) using the Adobe Acrobat Reader. The PDFs are provided on a CD that is packaged with the product or you can access them at the following Web site:

http://www-1.ibm.com/servers/storage/support/virtual/2145.html

> **Related reference**
>
> "SAN Volume Controller library and related publications" on page xvii
> A list of other publications that are related to this product are provided to you for your reference.

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China Class A EMC compliance in Simplified Chinese

Ensure that you are familiar with the China Class A EMC compliance in Simplified Chinese statement.

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may need to perform practical actions.

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此为A级产品，在生活环境中，该产品可能会造成无线电干扰，
在这种情况下，可能需要用户对其干扰采取切实可行的措施。

Federal Communications Commission (FCC) statement

Ensure that you are familiar with the Federal Communications Commission (FCC) statement.

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

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Neither the provider nor the manufacturer is responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device might not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

Japanese Voluntary Control Council for Interference (VCCI) statement

Ensure that you are familiar with the Japanese Voluntary Control Council for Interference (VCCI) statement.

This product is a Class A Information Technology Equipment and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). In a domestic environment, this product might cause radio interference, in which event the user might be required to take adequate measures.

Korean Government Ministry of Communication (MOC) statement

Ensure that you are familiar with the Korean Government Ministry of Communication (MOC) statement.

Please note that this device has been approved for business purposes with regard to electromagnetic interference. If you find that this device is not suitable for your use, you can exchange it for one that is approved for non-business purposes.

New Zealand compliance statement

Ensure that you are familiar with the New Zealand compliance statement.

This is a Class A product. In a domestic environment this product might cause radio interference, in which event the user might be required to take adequate measures.

International Electrotechnical Commission (IEC) statement

This product has been designed and built to comply with (IEC) Standard 950.

Avis de conformité à la réglementation d'Industrie Canada

Ensure that you are familiar with the avis de conformité à la réglementation d'Industrie Canada.

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

Industry Canada compliance statement

This Class A digital apparatus complies with IECS-003.

United Kingdom telecommunications requirements

This apparatus is manufactured to the International Safety Standard EN60950 and as such is approved in the U.K. under approval number NS/G/1234/J/100003 for indirect connection to public telecommunications systems in the United Kingdom.

European Union (EU) statement

Ensure that you are familiar with the European Union (EU) statement.

This product is in conformity with the protection requirements of EU council directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Neither the provider nor the manufacturer can accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards not supplied by the manufacturer.

Radio protection for Germany

Ensure that you are familiar with the radio protection for Germany.

Zulassungsbescheinigung laut Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 30, August 1995.

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG das EG-Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM Deutschland.

Informationen in Hinsicht EMVG Paragraph 3 Abs. (2):

Das Gerät erfüllt die Schutzanforderungen nach EN 50082-1 und EN 55022 Klasse A.

EN55022 Klasse A Geräte bedürfen folgender Hinweise:

Nach dem EMVG: ″Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministeriums für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.″ (Auszug aus dem EMVG, Para.3, Abs.4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Nach der EN 55022: ″Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Massnahmen durchzuführen und dafür aufzukommen.″

Anmerkung: Um die Einhaltung des EMVG sicherzustellen, sind die Geräte wie in den Handbüchern angegeben zu installieren und zu betreiben.

Taiwan Class A compliance statement

Ensure that you are familiar with the Taiwan Class A compliance statement.

警告使用者:
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使用者會被要求採取某些適當的對策。

Glossary

This glossary includes terms for the IBM TotalStorage SAN Volume Controller

This glossary includes selected terms and definitions from A Dictionary of Storage Networking Terminology (http://www.snia.org/education/dictionary), copyrighted 2001 by the Storage Networking Industry Association, 2570 West El Camino Real, Suite 304, Mountain View, California 94040-1313. Definitions derived from this book have the symbol (S) after the definition.

The following cross-references are used in this glossary:

See   Refers the reader to one of two kinds of related information:

- A term that is the expanded form of an abbreviation or acronym. This expanded form of the term contains the full definition.
- A synonym or more preferred term.

See also
Refers the reader to one or more related terms.

Contrast with
Refers the reader to a term that has an opposite or substantively different meaning.

A

asymmetric virtualization
A virtualization technique in which the virtualization engine is outside the data path and performs a metadata-style service. The metadata server contains all the mapping and locking tables while the storage devices contain only data. See also *symmetric virtualization*

C

cache A high-speed memory or storage device used to reduce the effective time required to read data from or write data to lower-speed memory or a device. Read cache holds data in anticipation that it will be requested by a client. Write cache holds data written by a client until it can be safely stored on more permanent storage media such as disk or tape.

cluster
In SAN Volume Controller, a pair of nodes that provides a single configuration and service interface.

Common Information Model (CIM)
A set of standards developed by the Distributed Management Task Force (DMTF). CIM provides a conceptual framework for storage management and an open approach to the design and implementation of storage systems, applications, databases, networks, and devices.

D

degraded
Pertaining to a valid configuration that has suffered a failure but continues to be supported and legal. Typically, a repair action can be performed on a degraded configuration to restore it to a valid configuration.

directed maintenance procedures
> The set of maintenance procedures that can be run for a cluster. These procedures are documented in the service guide.

disk zone
> A zone defined in the storage area network (SAN) fabric in which the SAN Volume Controller can detect and address the logical units that the disk controllers present.

E

error code
> A value that identifies an error condition.

excluded
> In SAN Volume Controller, the status of a managed disk that the cluster has removed from use after repeated access errors.

extent A unit of data that manages the mapping of data between managed disks and virtual disks.

F

failover
> In SAN Volume Controller, the function that occurs when one redundant part of the system takes over the workload of another part of the system that has failed.

FC See *fibre channel*.

fibre channel
> A technology for transmitting data between computer devices at a data rate of up to 4 Gbps. It is especially suited for attaching computer servers to shared storage devices and for interconnecting storage controllers and drives.

G

GBIC See *gigabit interface converter*.

gigabit interface converter (GBIC)
> An interface module that converts the light stream from a fibre-channel cable into electronic signals for use by the network interface card.

H

HBA See *host bus adapter*.

host bus adapter (HBA)
> In SAN Volume Controller, an interface card that connects a host bus, such as a peripheral component interconnect (PCI) bus, to the storage area network.

host ID
> In SAN Volume Controller, a numeric identifier assigned to a group of host fibre-channel ports for the purpose of logical unit number (LUN) mapping. For each host ID, there is a separate mapping of Small Computer System Interface (SCSI) IDs to virtual disks (VDisks).

host zone
> A zone defined in the storage area network (SAN) fabric in which the hosts can address the SAN Volume Controllers.

I

inconsistent
In a Global Mirror relationship, pertaining to a secondary virtual disk (VDisk) that is being synchronized with the primary VDisk.

input/output (I/O)
Pertaining to a functional unit or communication path involved in an input process, an output process, or both, concurrently or not, and to the data involved in such a process.

Internet Protocol (IP)
In the Internet suite of protocols, a connectionless protocol that routes data through a network or interconnected networks and acts as an intermediary between the higher protocol layers and the physical network.

I/O   See *input/output.*

I/O group
A collection of virtual disks (VDisks) and node relationships that present a common interface to host systems.

IP   See *Internet Protocol.*

L

local fabric
In SAN Volume Controller, those storage area network (SAN) components (such as switches and cables) that connect the components (nodes, hosts, switches) of the local cluster together.

logical unit (LU)
An entity to which Small Computer System Interface (SCSI) commands are addressed, such as a virtual disk (VDisk) or managed disk (MDisk).

logical unit number (LUN)
The SCSI identifier of a logical unit within a target. (S)

LU   See *logical unit.*

LUN   See *logical unit number.*

M

managed disk (MDisk)
A Small Computer System Interface (SCSI) logical unit that a redundant array of independent disks (RAID) controller provides and a cluster manages. The MDisk is not visible to host systems on the storage area network (SAN).

managed disk group
A collection of managed disks (MDisks) that, as a unit, contain all the data for a specified set of virtual disks (VDisks).

mapping
See *FlashCopy® mapping.*

MDisk See *managed disk.*

N

node   One SAN Volume Controller. Each node provides virtualization, cache, and Copy Services to the storage area network (SAN).

O

object In object-oriented design or programming, a concrete realization of a class that consists of data and the operations associated with that data.

offline Pertaining to the operation of a functional unit or device that is not under the continual control of the system or of a host.

online Pertaining to the operation of a functional unit or device that is under the continual control of the system or of a host.

P

port The physical entity within a host, SAN Volume Controller, or disk controller system that performs the data communication (transmitting and receiving) over the fibre channel.

R

RAID See *redundant array of independent disks*.

reliability
The ability of a system to continue to return data even if a component fails.

S

SAN See *storage area network*.

SCSI See *Small Computer Systems Interface*.

SCSI back-end layer
The layer in a Small Computer Systems Interface (SCSI) network that performs the following functions: controls access to individual disk controller systems that are managed by the cluster; receives requests from the virtualization layer, processes them, and sends them to managed disks; addresses SCSI-3 commands to the disk controller systems on the storage area network (SAN).

SCSI front-end layer
The layer in a Small Computer Systems Interface (SCSI) network that receives I/O commands sent from hosts and provides the SCSI-3 interface to hosts. SCSI logical unit numbers (LUNs) are mapped to virtual disks (VDisks) in this layer as well. Thus, the layer converts SCSI read and write commands that are addressed to LUNs into commands that are addressed to specific VDisks.

Simple Network Management Protocol (SNMP)
In the Internet suite of protocols, a network management protocol that is used to monitor routers and attached networks. SNMP is an application-layer protocol. Information on devices managed is defined and stored in the application's Management Information Base (MIB).

storage area network (SAN)
A network whose primary purpose is the transfer of data between computer systems and storage elements and among storage elements. A SAN consists of a communication infrastructure, which provides physical connections, and a management layer, which organizes the connections, storage elements, and computer systems so that data transfer is secure and robust. (S)

U

uninterruptible power supply
A device connected between a computer and its power source that protects the computer against blackouts, brownouts, and power surges. The uninterruptible power supply contains a power sensor to monitor the supply and a battery to provide power until an orderly shutdown of the system can be performed.

V

valid configuration
A configuration that is supported.

VDisk See *virtual disk*.

virtual disk (VDisk)
In SAN Volume Controller, a device that host systems attached to the storage area network (SAN) recognize as a Small Computer System Interface (SCSI) disk.

virtualization
In the storage industry, a concept in which a pool of storage is created that contains several disk subsystems. The subsystems can be from various vendors. The pool can be split into virtual disks that are visible to the host systems that use them.

virtualized storage
Physical storage that has virtualization techniques applied to it by a virtualization engine.

W

worldwide node name (WWNN)
An identifier for an object that is globally unique. WWNNs are used by Fibre Channel and other standards.

worldwide port name (WWPN)
A unique 64-bit identifier associated with a fibre-channel adapter port. The WWPN is assigned in an implementation- and protocol-independent manner.

Appendix A. Parts catalog

Part numbers for the different parts and FRUs of the SAN Volume Controller and the uninterruptible power supply are available.

Assembly 1: SAN Volume Controller

Information about the parts of the SAN Volume Controller are displayed below.

The following graphic displays the different parts that make up the SAN Volume Controller.
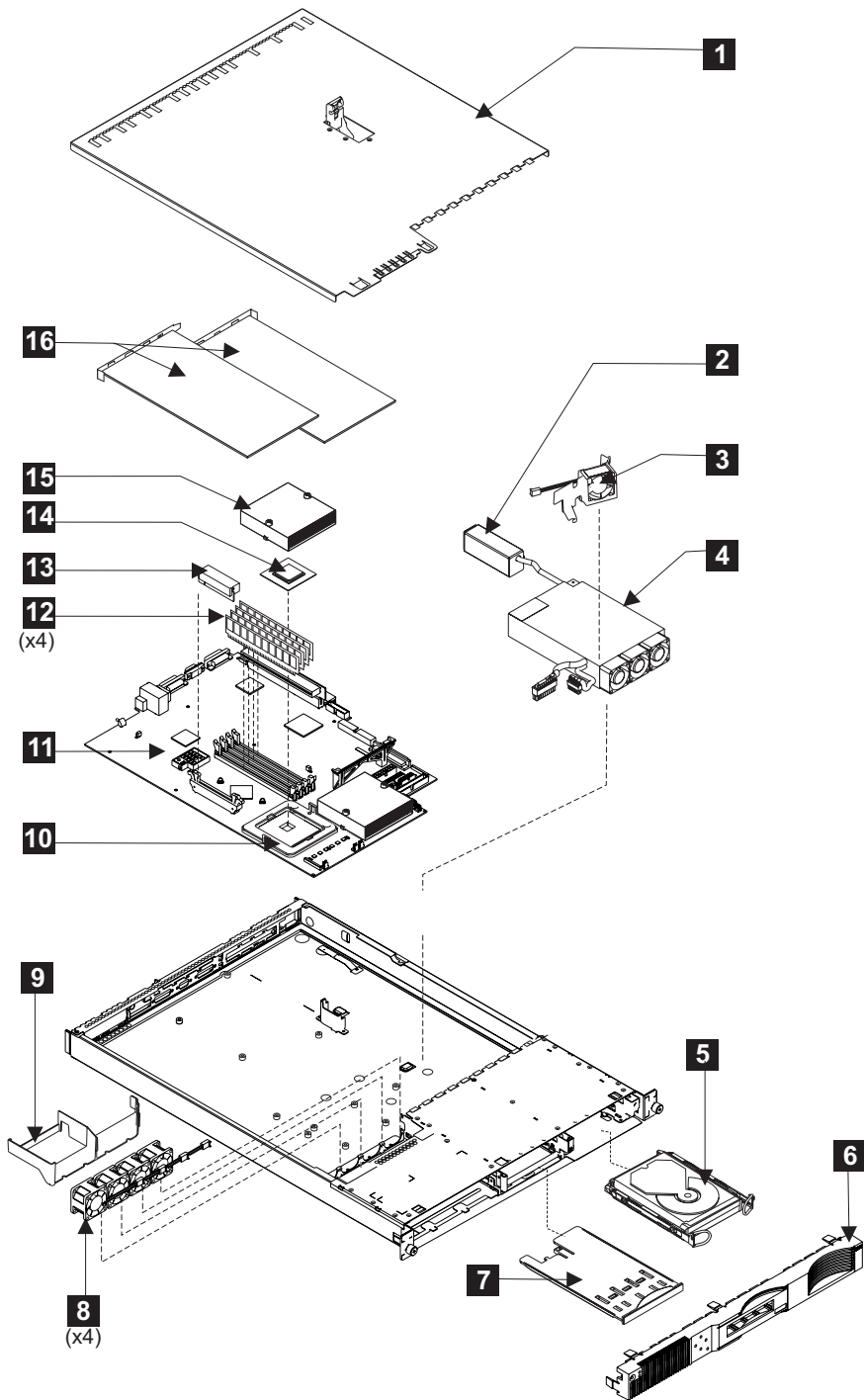
The following table describes the different part numbers in reference to the above graphic.

Table 19. Assembly 1: SAN Volume Controller

Assembly index	Part number	Units	Description
1–	64P7793	1	Frame assembly
-1	24P0708	1	Top cover
-9	24P0742	1	Baffle

Table 19. Assembly 1: SAN Volume Controller (continued)

Assembly index	Part number	Units	Description
–6	64P7858	1	Front panel assembly
–7	64P7785	1	Service controller
-5	24P3704	1	36 GB disk drive assembly
-	18P6414	1	Cable, SCSI power
-	27H0776	1	Cable, SCSI signal
-	32P1928	1	Rail kit for disk drive assembly (contains rails with screws)
-8	24P1118	4	Microprocessor fan assembly
-3	00N6991	1	Disk drive fan and bracket assembly
-11	64P7826	1	System board assembly kit
-12	09N4308	4	Memory module
-	33F8354	1	CMOS battery
-16	64P7783	2	Fibre-channel adapter assembly
-4	49P2090	1	Power supply assembly
-	32P9107	1	SAN Volume Controller support rail kit
-	64P7940	1	Power cable assembly, SAN Volume Controller to uninterruptible power supply
-	19K1265	AR	External Fibre Channel cable, LC–LC, 1.0 m (3.3 ft)
-	19K1265	AR	External Fibre Channel cable, LC–SC/LC, 1.0 m (3.3 ft)
-	19K1266	AR	External Fibre Channel cable, LC–LC, 5.0 m (16.4 ft)
-	19K1267	AR	External Fibre Channel cable, LC–LC, 25.0 m (82 ft)
-	19K1266	AR	Ethernet cable, 2 m (6.5 ft)
-	18P5056	AR	Ethernet cable, 13 m (42 ft)

Assembly 2: Uninterruptible power supply 5115

The uninterruptible power supply (UPS) 5115 is constructed from four separate parts.

The following graphic shows the parts that make up the UPS 5115.
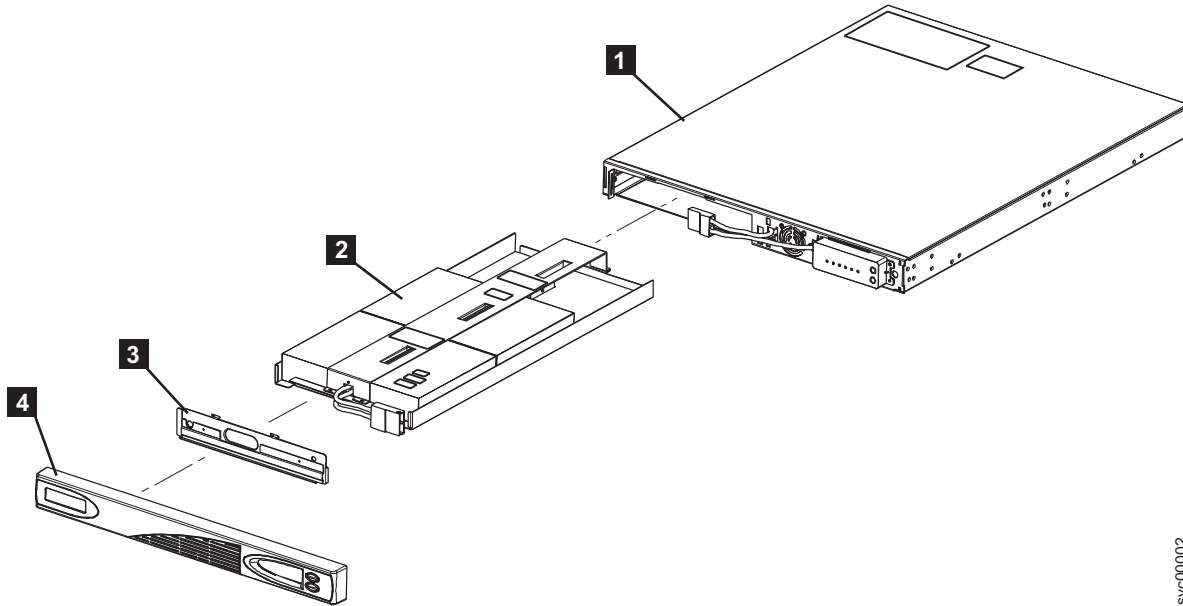
Table 20 describes the different part numbers in reference to the previous graphic.

Table 20. Assembly 2: Uninterruptible power supply 5115

Assembly index	Part number	Units	Description
2–	27H0683	1	Uninterruptible power supply assembly
-1	27H01211	1	Chassis assembly
-2	27H0686	1	Battery pack assembly
-3	27H0685	1	Battery plate
-4	27H0684	1	Front panel
-	21P7220	1	Support rail kit, contains rails, nut clips, and screws
-	7842123	1	Input power cable, power distribution unit to uninterruptible power supply.
-	12J5119	1	Main power cable for the United States.

Country or region power cables for the uninterruptible power supply 5115

The following list provides information about your country or region's requirements for the uninterruptible power supply 5115 cables.

The following table lists the power cables requirements for your country or region.

Country or region	Length (unshielded, rated 250 V/6 A)	Attached Plug Connection Type (designed for 200-240V ac input)	Part
China	2.8 m (9 ft)	GB 2099.1	02K0546
Denmark	2.8 m (9 ft)	DK2-5a	13F9997
Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	2.8 m (9 ft)	SABS 164	14F0015
Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia	2.8 m (9 ft)	BS 1363/A	14F0033
Liechtenstein, Switzerland	2.8 m (9 ft)	1011-S2450 7	14F0051
Chile, Ethiopia, Italy, Libya, Somalia	2.8 m (9 ft)	CEI 23-16	14F0069
Israel	2.8 m (9 ft)	SI 32	14F0087
Thailand	2.8 m (9 ft)	NEMA 6-15P	1838574
Argentina	2.8 m (9 ft)	IRSM 2073	36L8880
United States of America (Chicago), Canada, Mexico, and others	1.8 m (6 ft)	NEMA L6-15P	7842122
Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela	2.8 m (9 ft)	NEMA L6-15P	7842123
Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa	2.8 m (9 ft)	AS/NZS C112	13F9940

Country or region	Length (unshielded, rated 250 V/6 A)	Attached Plug Connection Type (designed for 200-240V ac input)	Part
Afghanistan, Albania, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe	2.8 m (9 ft)	CEE 7-VII	13F9979

Assembly 3: Uninterruptible power supply 5125

The uninterruptible power supply (UPS) 5125 is constructed from four separate parts.

The following graphic displays the different parts that make up the UPS 5125.
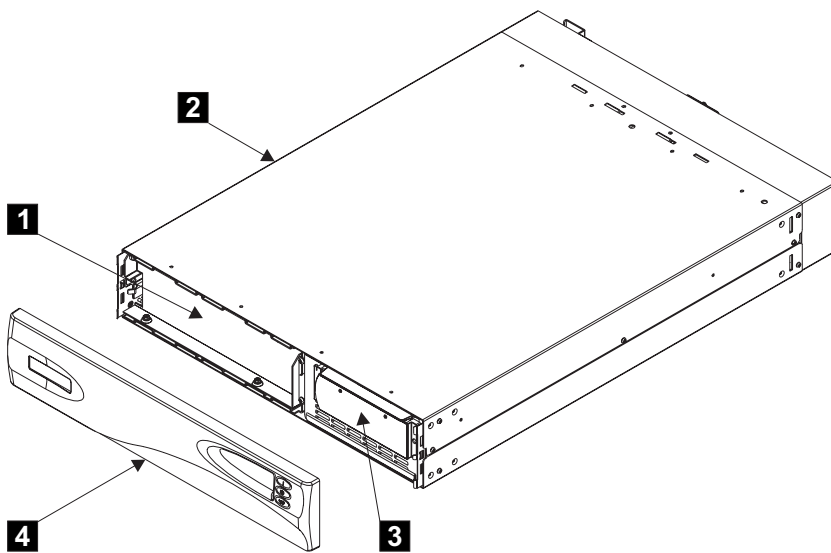
Table 21 on page 239 describes the different part numbers in reference to the previous graphic.

Table 21. Assembly 3: Uninterruptible power supply 5125

Assembly index	Part number	Units	Description
3–	18P5864	1	Uninterruptible power supply assembly
-4	18P5865	1	Front panel
-3	18P5879	1	Electronics assembly
-1	18P5880	1	Battery assembly
-	21P7220	1	Support rail kit, contains rails, nut clips, and screws
-	18P5138	1	Input power cable, power distribution unit to uninterruptible power supply.
-	12J5119	1	Main power cable for the United States.

Country or region power cables for the uninterruptible power supply 5125

The following list provides information about your country or region's requirements for the uninterruptible power supply 5125 cables.

The following table lists the power cables requirements for your country or region.

Country or region	Length	Attached Plug Connection Type	Part
Bahamas, Barbados, Bermuda, Bolivia, Brazil, Cayman Islands, Colombia, Costa Rica, Dominican republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indes), United States, Canada, and Venezuela	2.5 m (8.125 ft)	NEMA L6-15P	12J5119
Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa	2.5 m (8.125 ft)	L6-20P	12J5118

Country or region	Length	Attached Plug Connection Type	Part
Afghanistan, Albania, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guiana, Hungry, Iceland, Indonesia, Iran, Ivory Coast, Israel, Jordan, Lebanon, Luxembourg, Macao, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe	2.5 m (8.125 ft)	CEE7	55H6643
Denmark, Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Dubai, Fiji, Ghana, Hong Kong, India, Iraq, Ireland, Kenya, Kuwait, Malysia, Malawi, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia	2.5 m (8.125 ft)	IEC 309	36L8822
Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	2.5 m (8.125 ft)	SABS 164	12J5124
Chile, Ethiopia, Italy, Libya, Liechtenstein, Somalia, Switzerland	2.5 m (8.125 ft)	CEI 23-16	12J5126
Thailand	2.5 m (8.125 ft)	NEMA 6-15P	12J5120
United States (Chicago), Canada, Mexico, and others	1.8 m (6 ft)	NEMA L6-15P	14F1549

Appendix B. Websphere and CIM Logging

Instructions on how to obtain log files for the Websphere Application Server and the Common Information Model are documented below:

Websphere Application Server logging

The Websphere Application Server (WAS) produces log files that can help with problem determination.

The WAS collects trace data and writes the information to log files stored in the *WASbasedirectory*\logs\server1 directory.

Enabling Websphere Application Server logging

You can enable WAS logging and create the trace.log file by following the steps below:

1. Open the command-line application and change the directory to the WAS bin directory:

   cd *WASbasedirectory*\bin

2. Enter the following command:

   wsadmin -connType NONE -c "$AdminControl setAttribute [$AdminControl
   completeObjectName type=TraceService,process=server1,*]
   traceSpecification ConsoleTrace=all=enabled"

A successfully enabled logging session is indicated by an entry in the trace.log file similar to the following:

[5/21/03 14:31:13:874 PDT] 2ff3581b ManagerAdmin I TRAS0018I: The trace
state has changed. The new trace state is ConsoleTrace=all=enabled

Disabling Websphere Application Server logging

You can disable the WAS logging by following these steps:

1. Open the command-line application and change the directory to the WAS bin directory:

   cd *WASbasedirectory*\bin

2. Enter the following command:

   wsadmin -connType NONE -c "$AdminControl setAttribute [$AdminControl
   completeObjectName type=TraceService,process=server1,*]
   traceSpecification
   ConsoleTrace=event=disabled:ConsoleTrace=debug=disabled"

A successfully disabled logging session is indicated with an entry in the SystemOut.log file similar to the following:

[5/21/03 14:38:57:400 PDT] 2ff3581b ManagerAdmin I TRAS0018I: The trace
state has changed. The new trace state is *=all=disabled

Note: Logging enabled in the GUI application will impact the performance of the GUI. Logging should be disabled where performance is a concern.

CIM provider logging

The Common Information Model (CIM) can produce log files that can help with
problem determination.

The CIM collects data and produces log files when you enable the logging function.
Logging can be done at the following levels:

- DEBUG_MIN
- DEBUG_MID
- DEBUG_MAX

You can attain the lowest level of logging by specifying DEBUG_MIN, with the
highest level DEBUG_MAX.

Enabling CIM provider logging

You can enable the CIM to produce log files by following the steps below:

1. Stop CIMOM:
   a. Go to Control Panel ► Administrative Tools ► Services
   b. Right-click **IBM CIM Object Manager - SVC** and select **Stop**
2. Edit the logger.properties file:
   a. Go to the *CIMbasedirectory* and open the logger.properties file in a text
      editor.
   b. Edit the following entries to the desired level:
      - message.logger.level=
      - service.logger.level=
      - security.logger.level=
      - trace.logger.level=
3. Start CIMOM:
   a. Go to Control Panel ► Administrative Tools ► Services
   b. Right-click **IBM CIM Object Manager - SVC** and select **Start**

The most recent debug and trace output will be found in the *CIMbasedirectory* in
the providerTrace.log file. Historic trace data will be written to the
providerTrace[*x*].log

Disabling CIM provider logging

You can disable the CIM logging by following the steps below:

1. Stop CIMOM:
   a. Go to Control Panel ► Administrative Tools ► Services
   b. Right-click **IBM CIM Object Manager - SVC** and select **Stop**
2. Edit the logger.properties file:
   a. Go to the *CIMbasedirectory* and open the logger.properties file in a text
      editor.
   b. Edit the entries to mirror the debug levels below:
      - message.logger.level=DEBUG_MIN
      - service.logger.level=DEBUG_MIN
      - security.logger.level=DEBUG_MIN

| • trace.logger.level=DEBUG_MIN
| 3. Start CIMOM:
| a. Go to Control Panel ▶ Administrative Tools ▶ Services
| b. Right-click **IBM CIM Object Manager - SVC** and select **Start**

| **Note:** Logging enabled in the CIM Provider will impact the performance of the GUI.
| Logging should be disabled where performance is a concern.

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