

IBM TotalStorage SAN Volume Controller



Service Guide

Version 3.1.0

IBM TotalStorage SAN Volume Controller



Service Guide

Version 3.1.0

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

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About this guide

This guide describes how to service the 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 FRUs (field replaceable units) 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.

Who should use this guide

This guide should be read by the IBM® Customer Engineer who is responsible for the service of the 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 SC26-7542-04 SAN Volume Controller Service Guide

Listed below are changes to this guide since the previous edition (SC26-7542-03).

New information

This edition includes the following new information:

The following topics were added:

- Controls and indicators for the SAN Volume Controller 2145-8F2
- Error LED
- Product serial number
- Cache LED

- Operator information panel
- Release latch
- System-error LED
- Information error LED
- Location LED
- Hard disk drive activity LED
- SAN Volume Controller 2145-8F2 rear panel indicators
- Fibre-channel LEDs
- Ethernet connection LED
- Power, location, and system error LEDs
- AC and DC LEDs
- MAP 5050: Power 2145-8F2
- MAP 5800: Light path
- MAP 5900: Hardware boot
- Removing and replacing SAN Volume Controller 2145-8F2 parts
- Removing the top cover from the SAN Volume Controller 2145-8F2
- Replacing the top cover from the SAN Volume Controller 2145-8F2
- Removing the SAN Volume Controller 2145-8F2 service controller
- Replacing the SAN Volume Controller 2145-8F2 service controller
- Removing the SAN Volume Controller 2145-8F2 SATA disk drive
- Replacing the SAN Volume Controller 2145-8F2 SATA disk drive
- Removing the SAN Volume Controller 2145-8F2 power backplane
- Replacing the SAN Volume Controller 2145-8F2 power backplane
- Replacing the SAN Volume Controller 2145-8F2 frame assembly
- Removing the SAN Volume Controller 2145-8F2 CMOS battery
- Replacing the SAN Volume Controller 2145-8F2 CMOS battery
- Removing the SAN Volume Controller 2145-8F2 power supply
- Replacing the SAN Volume Controller 2145-8F2 power supply
- Removing the SAN Volume Controller 2145-8F2 adapter assemblies
- Replacing the SAN Volume Controller 2145-8F2 adapter assemblies
- Removing the SAN Volume Controller 2145-8F2 operator information panel
- Replacing the SAN Volume Controller 2145-8F2 operator information panel
- Removing the SAN Volume Controller 2145-8F2 fans
- Replacing the SAN Volume Controller 2145-8F2 fans
- Removing the SAN Volume Controller 2145-8F2 microprocessor
- Replacing the SAN Volume Controller 2145-8F2 microprocessor
- Removing the SAN Volume Controller 2145-8F2 VRM
- Replacing the SAN Volume Controller 2145-8F2 VRM
- Removing and replacing SAN Volume Controller 2145-4F2 parts
- Replacing the SAN Volume Controller 2145-4F2 disk drive cables
- Removing and replacing parts shared by the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-4F2
- Replacing the memory modules
- Removing and replacing 2145 UPS-1U parts
- Removing and replacing 2145 UPS parts

- Assembly 1: SAN Volume Controller 2145-8F2
- Removing the fan holder and fan backplanes
- Replacing the fan holder and fan backplanes

The following error codes were added:

- Cluster error codes
 - 1090
 - 1091
- Node error codes
 - 511
 - 513
 - 514
 - 515
 - 9xx

Changed information

This section lists the updates that were made in this document.

- The previous release referred to the uninterruptible power supply (UPS) as UPS 5115 and UPS 5125, by model number. For this release, the UPS is referred to by machine type. For example, this publication states 2145 uninterruptible power supply-1U (2145 UPS-1U) and 2145 uninterruptible power supply (2145 UPS). 2145 UPS-1U refers to the UPS 5115 and 2145 UPS refers to 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 2145 UPS-1U or the 2145 UPS, then the specific UPS is designated.

- There is a new SAN Volume Controller supported model. The SAN Volume Controller is now documented by model number. For example, this publication states two SAN Volume Controller models types: SAN Volume Controller 2145-4F2 and the new SAN Volume Controller 2145-8F2.

Note: If text is referring to the SAN Volume Controller then it is referring to a generic SAN Volume Controller and can be referring to either SAN Volume Controller model. When the SAN Volume Controller is referred to as the SAN Volume Controller 2145-4F2 or the SAN Volume Controller 2145-8F2, then the specific SAN Volume Controller is designated.

- The IBM TotalStorage® FASTT series is now called the IBM TotalStorage DS4000 series.

Removed Information

This section lists information that was removed from this book.

- The SAN Volume Controller no longer arrives with a CD set. All publication and product upgrades are available from the following Web site:
<http://www.ibm.com/servers/storage/support/virtual/2145.html>
- Cluster error codes 1120, 1125 and 1126

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

Emphasis

Different typefaces are used in this guide to show emphasis.

The following typefaces are used to show emphasis:

Boldface	Text in boldface represents menu items and command names.
<i>Italics</i>	Text in <i>italics</i> is used to emphasize a word. In command syntax, it is used for variables for which you supply actual values, such as a default directory or the name of a cluster.
Monospace	Text in monospace identifies the data or commands that you type, samples of command output, examples of program code or messages from the system, or names of command flags, parameters, arguments, and name-value pairs.

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) from the following Web site:

<http://www.ibm.com/servers/storage/support/virtual/2145.html>

Title	Description	Order number
<i>IBM TotalStorage SAN Volume Controller: CIM agent Developer's Reference</i>	This reference guide describes the objects and classes in a Common Information Model (CIM) environment.	SC26-7590
<i>IBM TotalStorage SAN Volume Controller: Command-Line Interface User's Guide</i>	This guide describes the commands that you can use from the SAN Volume Controller command-line interface (CLI).	SC26-7544

Title	Description	Order number
<i>IBM TotalStorage SAN Volume Controller: Configuration Guide</i>	This guide provides guidelines for configuring your SAN Volume Controller.	SC26-7543
<i>IBM TotalStorage SAN Volume Controller: Host Attachment Guide</i>	This guide provides guidelines for attaching the SAN Volume Controller to your host system.	SC26-7575
<i>IBM TotalStorage SAN Volume Controller: Installation Guide</i>	This guide includes the instructions the service representative uses to install the SAN Volume Controller.	SC26-7541
<i>IBM TotalStorage SAN Volume Controller: Planning Guide</i>	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
<i>IBM TotalStorage SAN Volume Controller: Service Guide</i>	This guide includes the instructions the service representative uses to service the SAN Volume Controller.	SC26-7542
<i>IBM TotalStorage SAN Volume Controller: Translated Safety Notices</i>	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
<i>IBM TotalStorage Master Console Installation and User's Guide</i>	This guide includes the instructions on how to install and use the SAN Volume Controller Console	GC30-4090

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
<i>IBM TotalStorage Multipath Subsystem Device Driver: User's Guide</i>	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 <i>IBM TotalStorage Multipath Subsystem Device Driver: User's Guide</i> .	SC26-7608

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.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:

<http://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:

<http://www.ibm.com/shop/publications/order/>

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.

Safety and environmental notices

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

Please review the topics concerning the safety and environmental notices to ensure that you are in compliance.:

Definitions of notices

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

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

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.

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.

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

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

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)

DANGER

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. *Wash hands after handling.* (33)

DANGER

Electrical current from power, telephone and communication cables is hazardous. To avoid a shock hazard, use the following rules:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To connect	To disconnect
<ol style="list-style-type: none">1. Turn everything off.2. Attach all cables to devices.3. Attach signal cables to connectors.4. Attach power cords to outlet.5. Turn device on.	<ol style="list-style-type: none">1. Turn everything off.2. Remove power cords from outlet.3. Remove signal cables from connectors.4. Remove all cables from devices.

(34)

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following:

- There is laser radiation when open.
- Do not stare into the beam.
- Do not view directly with optical instruments.
- Avoid direct exposure to the beam.

(35)

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 might 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)

DANGER

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. *Wash hands after handling.* (33)

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:

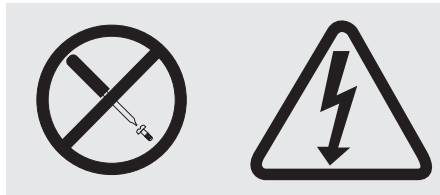
This product contains a registered/certified class 1 laser that complies with the FDA radiation performance standards and is in compliance with the IEC/EN 60825-1 standards. (21)

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)

CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician. (23)

CAUTION:

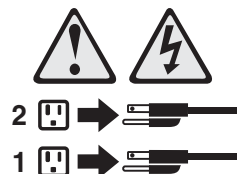
When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of. Do not do any of the following to the battery:

- Throw or immerse into water.
- Heat to more than 100°C (212°F).
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations. (24)

CAUTION:

The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.




(25)

CAUTION:

Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the machine covers, unless instructed otherwise in the installation and configuration procedures. (26)

CAUTION:

Use safe practices when lifting.

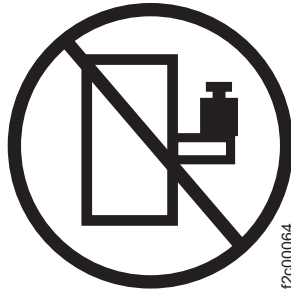
		
18-32 kg (39.7-70.5 lbs)	32-55 kg (70.5-121.2 lbs)	≥ 55 kg (≥121.2 lbs)

svc00146

(27)

CAUTION:

Do not place any object weighing more than 82 kg (180 lbs.) on top of rack-mounted devices.



(28)

CAUTION:

When laser products (such as CD-ROMs, DVD-ROM drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure. (29)

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 2145 UPS must not have an earth leakage current greater than 2.5 milliamperes and the 2145 UPS-1U must not have an earth leakage current 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 2145 UPS-1U weighs 18.8 kg (41.4 lb) and the 2145 UPS weighs 39 kg (86 lb) with the electronics assembly and the battery assembly installed:

- Do not attempt to lift the UPS by yourself. Ask another service representative for assistance.
- Remove the battery assembly from the UPS before removing the UPS from the shipping carton.
- Do not attempt to install the UPS into the rack unless the electronics assembly and the battery assembly have been removed. (15)

CAUTION:

The electronics assembly for the 2145 UPS weighs 6.4 kg (14 lb). Take care when you remove it from the 2145 UPS. (16)

CAUTION:

The 2145 UPS weighs 12.2 kg (27 lb) with the electronics assembly and battery assembly removed. Do not attempt to lift the 2145 UPS battery unit by yourself. Ask another service representative for aid. (17)

CAUTION:

The 2145 UPS battery assembly weighs 20.4 kg (45 lb). Do not attempt to lift the 2145 UPS battery unit by yourself. Ask another service representative for aid. (19)

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)

CAUTION:

Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the machine covers, unless instructed otherwise in the installation and configuration procedures. (26)

CAUTION:

Use safe practices when lifting.

		
18-32 kg (39.7-70.5 lbs)	32-55 kg (70.5-121.2 lbs)	≥ 55 kg (≥121.2 lbs)

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(27)

General safety

When you service the SAN Volume Controller or the uninterruptible power supply, follow general safety guidelines.

Use the following general rules to ensure safety to yourself and others:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object, do the following:
 1. Ensure that you can stand safely without slipping.
 2. Distribute the weight of the object equally between your feet.
 3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
 4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes a hazard to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconducting clip, approximately 8 cm (3 in.) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

Remember: Metal objects are good electrical conductors.

- Wear safety glasses when you are: hammering, drilling soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly after you have finished servicing the machine.

Electrical safety

Observe the these rules when working on electrical equipment.

CAUTION:

Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the machine covers, unless instructed otherwise in the installation and configuration procedures. (26)

Important: Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents. Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before the following activities:
 - Performing a mechanical inspection
 - Working near power supplies
 - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:
 - Ensure that another person, familiar with the power-off controls, is near you.

Remember: Another person must be there to switch off the power, if necessary.

- Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.

- When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
- Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.

- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts with the power on when they are removed from their normal operating places in a machine. (This practice ensures correct grounding of the units.)
 - Power supply units
 - Pumps
 - Blowers and fans
 - Motor generators
 - And similar units

- If an electrical accident occurs:
 - Use caution; do not become a victim yourself.
 - Switch off power.
 - Send another person to get medical aid.

Inspecting the SAN Volume Controller for unsafe conditions

Use caution when working in any potential safety hazardous situation that is not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you can continue before you correct the problem.

Before you start the safety inspection, make sure the power is off, and the power cord is disconnected.

Each machine has required safety items installed to protect users and service personnel from injury. This guide addresses only those items.

Important: Good judgment must also be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem. For example, consider the following conditions and their potential safety hazards:

Electrical hazards (especially primary power)

Primary voltage on the frame can cause serious or lethal electrical shock.

Explosive hazards

A damaged CRT face or a bulging capacitor can cause serious injury.

Mechanical hazards

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

Perform the following steps to inspect each SAN Volume Controller node for unsafe conditions. If necessary, see any suitable safety publications.

1. Turn off the SAN Volume Controller and disconnect the power cord.
2. Check the frame for damage (loose, broken, or sharp edges).
3. Check the power cables using the following steps:
 - a. Ensure that 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. Ensure that the power cord is the appropriate type, as specified in the parts listings.
 - c. Ensure that the insulation is not worn or damaged.
4. Check for any obvious nonstandard changes, both inside and outside the machine. 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, contamination, 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 2145-8F2 and the 2145 UPS-1U”

Ensure that you understand how to check the grounding of the SAN Volume Controller 2145-8F2 and the 2145 uninterruptible power supply-1U (2145 UPS-1U).

“Checking the grounding of the SAN Volume Controller 2145-4F2 and the 2145 UPS” on page xxxv

Ensure that you understand how to check the grounding for the SAN Volume Controller 2145-4F2 and the 2145 uninterruptible power supply (2145 UPS).

External machine check

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

Perform the following steps to conduct an external machine check:

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.

Internal machine checks

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

Perform the following steps to conduct the internal machine check:

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.

Checking the grounding of the SAN Volume Controller 2145-8F2 and the 2145 UPS-1U

Ensure that you understand how to check the grounding of the SAN Volume Controller 2145-8F2 and the 2145 uninterruptible power supply-1U (2145 UPS-1U).

Perform the following steps to ensure that the SAN Volume Controller 2145-8F2 is properly grounded:

1. Ensure that all power is removed.
2. Ensure that the power cable **2** is plugged into the load segment receptacle of the 2145 UPS-1U. Also, ensure that the other end of the 2145 UPS-1U's power cable is connected from the 2145 UPS-1U to the distribution point in the rack. Figure 1 shows the connectors for the SAN Volume Controller 2145-8F2 and the 2145 UPS-1U.

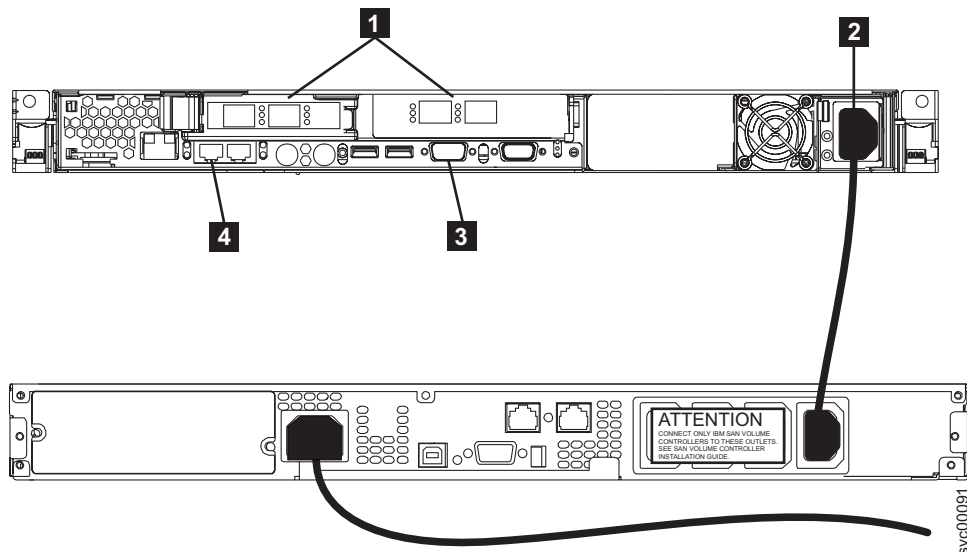


Figure 1. Power cable and signal sockets for the SAN Volume Controller 2145-8F2 and 2145 UPS-1U

Attention: Some electrical circuits can be damaged if the external signal cables are present at the SAN Volume Controller 2145-8F2 while it is undergoing a grounding check.

3. Ensure that no external cables are present at connectors **1** 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 2145-8F2. Any test equipment must be connected to the frame of the SAN Volume Controller 2145-8F2.

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

If the grounding is *not* correct, unplug the power cable **2** from the 2145 UPS-1U.

6. Check for continuity between the frame of the SAN Volume Controller 2145-8F2 and the ground pin of each main power connector. The ground pin is shown as **1** in Figure 2 on page xxxv.

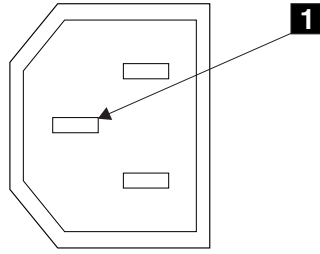


Figure 2. Ground pin

7. If the 2145 UPS-1U has no continuity, exchange it for a new one, and then perform another complete grounding check.
If the 2145 UPS-1U 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 perform step 1 on page xxxiv through step 5 on page xxxiv again.

Checking the grounding of the SAN Volume Controller 2145-4F2 and the 2145 UPS

Ensure that you understand how to check the grounding for the SAN Volume Controller 2145-4F2 and the 2145 uninterruptible power supply (2145 UPS).

Perform the following steps to ensure that the SAN Volume Controller 2145-4F2 is properly grounded:

1. Ensure that all power is removed.
2. Ensure that the power cable is plugged into the 2145 UPS. Also, ensure that the other end of the power cable is connected from the 2145 UPS to the distribution point in the rack. Figure 3 on page xxxvi shows the connectors for the SAN Volume Controller 2145-4F2 and the 2145 UPS. The power cable connector is shown as **1** in the figure.

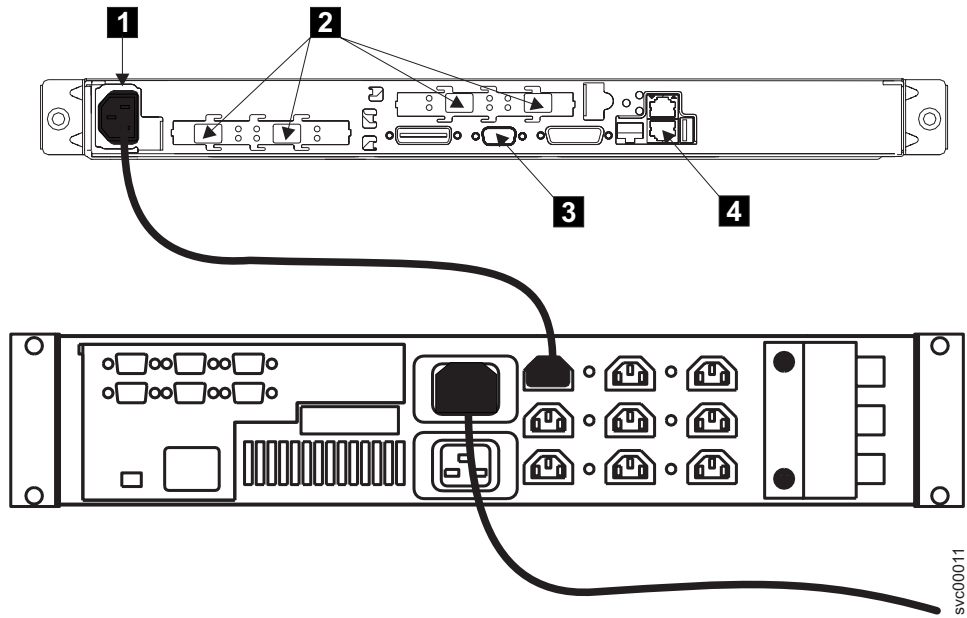


Figure 3. Power cable and signal sockets for the SAN Volume Controller 2145-4F2 and 2145 UPS

Attention: Some electrical circuits can be damaged if the external signal cables are present at the SAN Volume Controller 2145-4F2 while it is undergoing a grounding check.

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 2145-4F2. Any test equipment must be connected to the frame of the SAN Volume Controller 2145-4F2.

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

If the grounding is *not* correct, unplug the power cable **1** from the 2145 UPS.

6. Check for continuity between the frame of the SAN Volume Controller 2145-4F2 and the ground pin of each main power connector. Figure 4 shows the location of the ground pin.

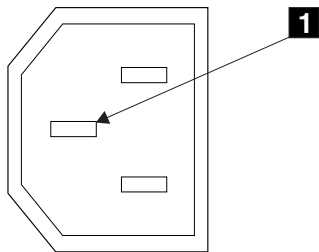


Figure 4. Ground pin

7. If the 2145 UPS has no continuity, exchange it for a new one, and then perform another complete grounding check.

If the 2145 UPS 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 perform step 1 on page xxxv through step 5 on page xxxvi again.

Inspecting the UPS for unsafe conditions

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

Consider the following conditions and their potential safety hazards:

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.

Use caution when working in a potential safety hazard that is not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you can continue before you correct 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. Perform the following steps to file a claim for the shipping damage:
 - a. File with the carrier within fifteen days of receipt of the equipment.
 - b. Send a copy of the damage claim within fifteen days to your service support representative.

Uninterruptible power supply requirements

Ensure that you comply with the requirements for the uninterruptible power supply (UPS).

The following list describes requirements for the 2145 UPS:

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

The following list describes requirements for the 2145 UPS-1U:

- The voltage that is supplied to the 2145 UPS-1U must be 220-240 V single phase.
- The frequency that is supplied must be between 50 and 60 Hz.

Note that the 2145 UPS-1U 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 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 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 each uninterruptible power supply (UPS) support emergency power-off (EPO) shutdowns.

In the event of a room EPO shutdown, the 2145 uninterruptible power supply-1U (2145 UPS-1U) automatically shuts down within five minutes of the input power being removed. When the 2145 uninterruptible power supply (2145 UPS) detects a loss of input power, this power loss is reported to the SAN Volume Controller, which completes the process of shutting down the output from the within five minutes.







Attention: If an EPO event occurs and the 2145 UPS is not connected to at least one operational SAN Volume Controller, you must unplug the output cables of the 2145 UPS to remove output power from the UPS.

Checking the safety labels on the SAN Volume Controller

Before you install, use, or service the SAN Volume Controller, you must ensure that you understand the safety labels.

1. Locate the following labels for the SAN Volume Controller:

- Agency/ratings label for the SAN Volume Controller 2145-4F2

<p>MACHINE TYPE 2145</p> <p>MODEL: ■ 4F2</p> <p>RATING: ■ 100-240V ~ 50/60Hz 3.5- 1.75A</p> <p>PIN 64P7837</p>	<p>IBM® SAN JOSE CA, USA</p> <p>© Registered Trademark of International Business Machines Corporation IBM Canada Ltd. Registered User</p> <p>Marca Registrada CANADA ICES/NMB-003 Class/Classe (A)</p> <p>This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.</p> <p>    </p> <p>E-D019-00-3904(A) ME01</p>	<p> 警告使用者: 這是甲類的資訊產品, 在居住的環境中使用時, 可能會造成射頻干擾, 在這種情況下, 使用者會被要求採取某些適當的對策。</p> <p>この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用する と電波妨害を引き起こすことがあります。 この場合には使用者が適切な対策 を講ずるよう要求されることがあります。 VCCI-A</p> <p>PIN 18P5457</p>
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- Agency/ratings label for the SAN Volume Controller 2145-8F2

<p>IBM® San Jose, CA USA 美国制造</p> <p>©Registered Trademark of International Business Machines Corporation</p> <p>Marca Registrada</p> <p>Product certified in San Jose, CA USA 美国制造</p> <p>Licensed Machine Code - Property of IBM ©Copyright IBM Corp. 1981, 2002 All rights reserved. US Government Users Restricted Rights. Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.</p> <p>This machine is manufactured from new parts, or new and used parts. Canada ICES/NMB-003 Class/Classe A</p>	<p>警告使用者: 這是甲類的資訊產品, 在居住的環境中使用時, 可能會造成射頻干擾, 在這種情況下, 使用者會被要求採取某些適當的對策。</p> <p>Apparaten skall anslutas till jordat uttag Apparätet må tilkoples jordet stikkontakt Laitte on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan</p> <p> </p> <p>VCCI-A</p>	<p> R33026</p> <p> ME01</p> <p> SP® C US</p> <p> EU Only</p> <p>This device complies with part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.</p> <p> 廢電池請回收</p> <p>TotalStorage SAN Volume Controller SAN控制器 TYPE 型号: 2145-8F2 服务器 额定电压: 200-240 V ~ 额定电流: 3.2 A 额定频率: 50/60 Hz</p> <p>PIN 64P8160</p>
---	--	---

- No user access label



- **Class 1 laser label**

 <p>Class 1 Laser</p>	<p>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.</p>
--	--

2. Before you continue, ensure that you understand each of these labels.


Checking the labels on the outside of the UPS

Before you install, use, or service the uninterruptible power supply (UPS), you must ensure that you understand the safety labels.

Checking the 2145 UPS-1U labels

Before you continue, ensure that you locate and understand each of the following 2145 uninterruptible power supply-1U (2145 UPS-1U) labels:

- **Agency label**

<p>EC: E28808 IBM Model: 2145UPS-1U P27H0683 SNYM1000YMDXXX[4.4] Input ~ : 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</p>	 <p>LISTED UPS SC30 E12662</p>   <p>N869</p> 
---	--

svcc00047

- **IT compatible label**



- Do not discard the UPS or the UPS batteries in the trash label








Note: The UPS can contain sealed, lead-acid batteries, which must be recycled.



Checking the 2145 UPS labels

Ensure that you locate and understand each of the following 2145 uninterruptible power supply (2145 UPS) labels:

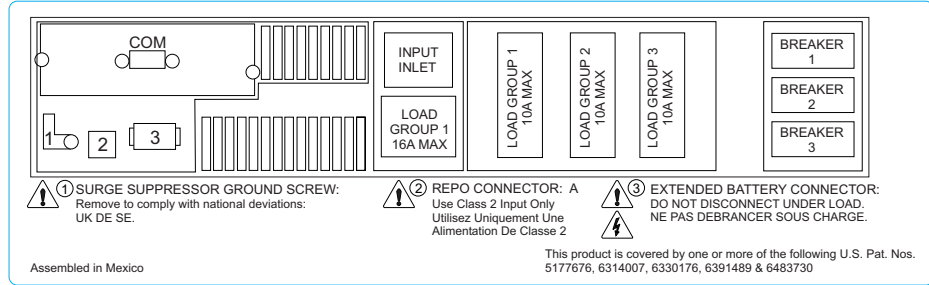
- Agency label

<p>EC: H80784 IBM Model: 2145UPS P64P8103 SNYM1000YMDXXX [4.4] Input ~ : 200-240V, 50/60Hz 16A MAX Input  : 120V, 30A Output ~ : 200-240V, 50/60Hz 15A MAX 3000VA/2700W</p>	<p> LISTED UPS 33C0 E82662</p> <p> </p> <p></p> <p> </p>
<p>Made in Mexico - TWWYY [4.11]</p>	

syc00149

- Rear panel configuration label

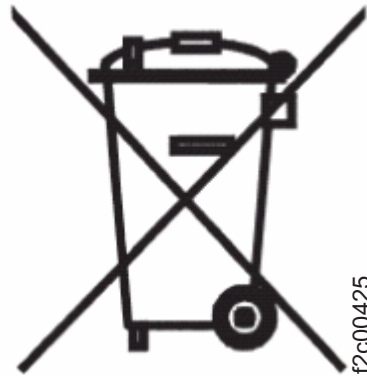
Note: This label is installed on the cover of the power supply of the SAN Volume Controller.



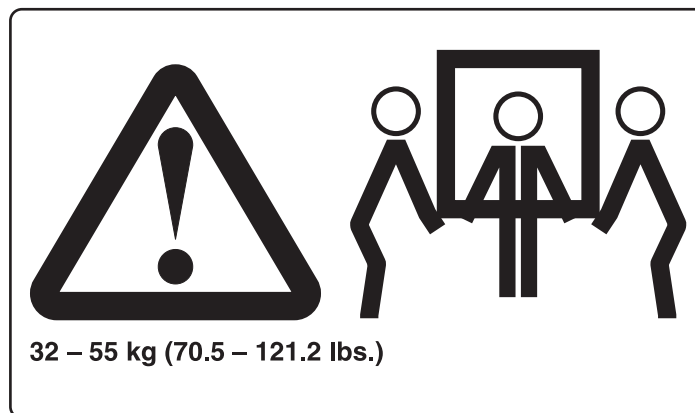
- **Do not discard the UPS or the UPS batteries in the trash label**

Notes:

- The UPS can contain sealed, lead-acid batteries, which must be recycled.
- If you have a 2145 UPS unit that is already installed, you might not have this label affixed to the outside of the UPS due to changing labeling requirements.



- **Three-man lift label**



- **Weight label**



- **IT compatible label**



- **Power ratings and no user access label**



Checking the labels on the battery of the UPS

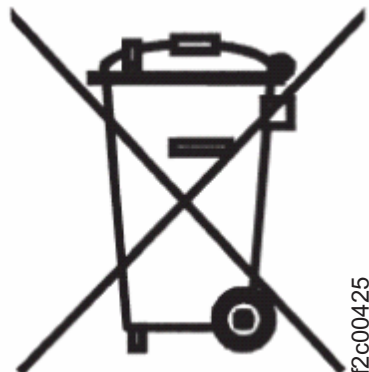
Before you install, use, or service the battery of the uninterruptible power supply (UPS), you must ensure that you understand the safety labels.

Checking the battery label of the 2145 UPS-1U

Locate the following labels for the battery of the 2145 uninterruptible power supply-1U (2145 UPS-1U).

- **Do not discard the UPS or the UPS batteries in the trash label**

Note: The UPS can contain sealed, lead-acid batteries, which must be recycled.



f2c00425

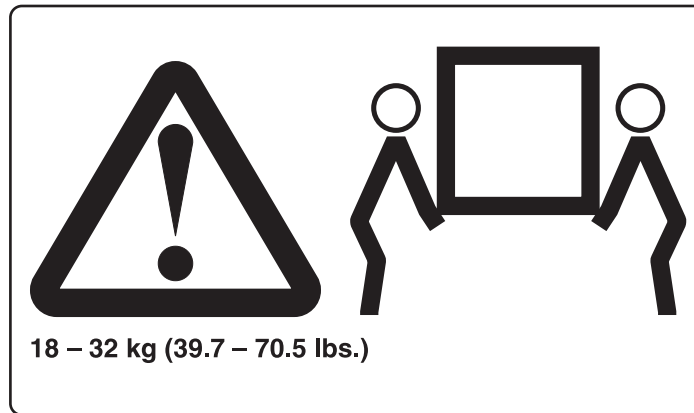
- **Recycling label**



Checking the battery labels of the 2145 UPS

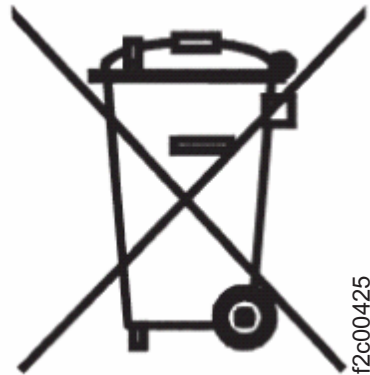
Ensure that you can locate and understand the battery labels for the 2145 uninterruptible power supply (2145 UPS).

- **Two-man lift label**



- **Do not discard the UPS or the UPS batteries in the trash label**

Note: The UPS can contain sealed, lead-acid batteries, which must be recycled.



- **Recycling label**



• **Weight label**



• **Power ratings and no user access label**



• **Battery faceplate label**

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



Environmental notices and statements

You must become familiar with the environmental notices and statements.

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

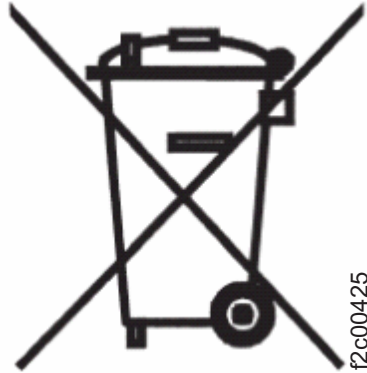
Product recycling

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

This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist

equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet site at

<http://www.ibm.com/ibm/environment/products/prp.shtml>



Note:

This mark applies only to countries within the European Union (EU) and Norway.

Appliances are labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the EU. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential affects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'étiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

Product disposal

You must understand 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.

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, contact your local waste disposal facility or go to the following Web site:

<http://www.ibm.com/ibm/environment/products/batteryrecycle.shtml>

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and other battery packs from IBM Equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Please have the IBM part number listed on the battery available prior to your call.

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)



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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 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. SAN Volume Controller overview

The *SAN Volume Controller* is a SAN (storage area network) appliance that attaches open-systems storage devices to supported open-systems hosts.

The SAN Volume Controller is a rack-mounted unit that you can install in a standard Electrical Industries Association (EIA) 19-inch rack. It provides symmetric virtualization by creating a pool of managed disks (MDisks) from the attached storage subsystems. Those storage systems are then mapped to a set of virtual disks (VDisks) for use by attached host systems. System administrators can view and access a common pool of storage on the SAN. This lets the administrators use storage resources more efficiently and provides a common base for advanced functions.

A 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, hubs, and switches. The area of the network that contains these units is known as the *fabric* of the network. For more information about SANs, see *IBM Storage Networking Virtualization: What's it all about?* and *IBM TotalStorage SAN Volume Controller: What is it and how to use it*.

The SAN Volume Controller is analogous to a logical volume manager (LVM) on a SAN. The SAN Volume Controller performs the following functions for the SAN storage that it controls:

- Creates a single pool of storage
- Provides logical unit virtualization
- Manages logical volumes
- Provides the following advanced functions for the SAN:
 - Large scalable cache
 - Copy Services
 - FlashCopy® (point-in-time copy)
 - Metro Mirror (synchronous copy)
 - Data migration
 - Space management
 - Mapping that is based on desired performance characteristics
 - Metering of service quality

Each SAN Volume Controller is a *node*; that is, it is either an end point of a link or a junction that is common to two or more links of the SAN. There are two types of SAN Volume Controller nodes: the SAN Volume Controller 2145-4F2 and the SAN Volume Controller 2145-8F2. Figure 5 on page 2 and Figure 6 on page 2 provide illustrations of the two types of SAN Volume Controller nodes. The nodes are always installed in pairs with one-to-four pairs of nodes constituting a *cluster*. Each node in a pair is configured to backup the other. Each pair of nodes is known as an I/O group.

All I/O operations that are managed by the nodes in an I/O group are cached on both nodes. Each virtual volume is defined to an I/O group. To avoid any single point of failure, the nodes of an I/O group are protected by independent uninterruptible power supplies (UPSs). There are two different UPSs. The UPSs are

called the 2145 uninterruptible power supply-1U (2145 UPS-1U) or 2145 uninterruptible power supply (2145 UPS) units.

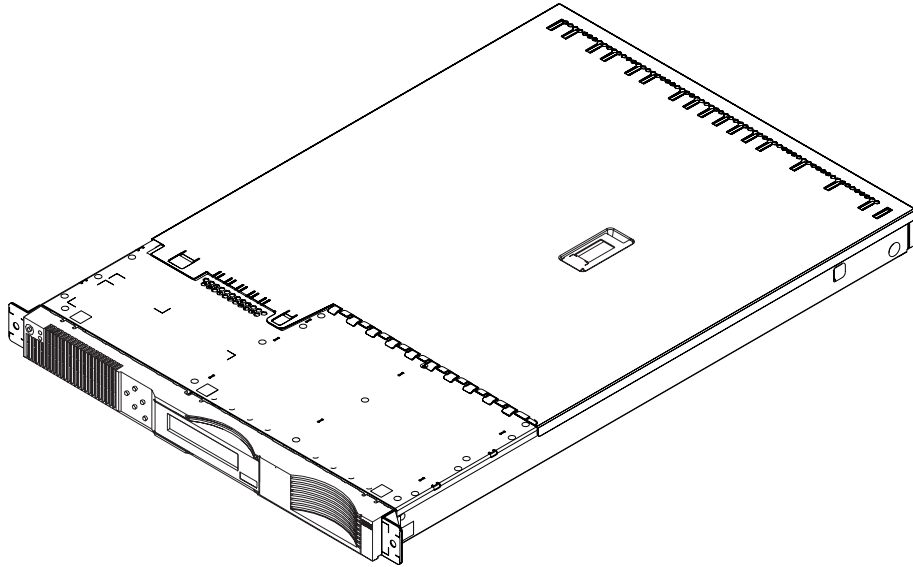


Figure 5. A SAN Volume Controller 2145-4F2 node

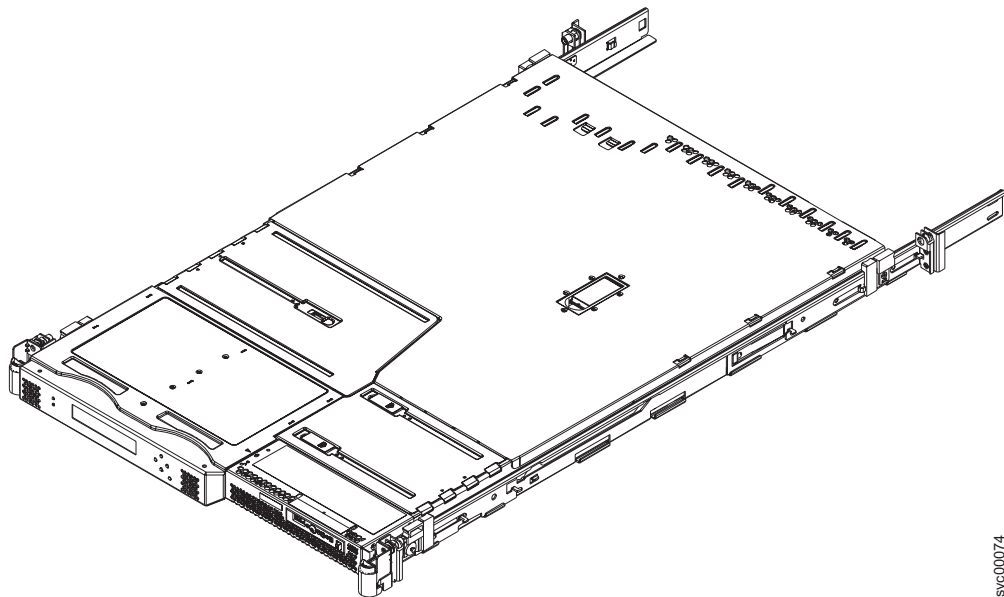


Figure 6. A SAN Volume Controller 2145-8F2 node

A SAN Volume Controller I/O group takes the storage that is presented to the SAN by the back-end controllers as MDisks and translates that storage into logical disks, known as VDisks, that are used by applications on the hosts. Each node must reside in only one I/O group and provide access to the VDisks in that I/O group.

The SAN Volume Controller provides continuous operations and can also optimize the data path to ensure that performance levels are maintained. Ensure that you use the IBM TotalStorage Productivity Center for Disk and Replication tool to analyze the performance statistics. See the following IBM TotalStorage Productivity Center for Disk and Replication publications for more information:

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- *IBM TotalStorage Productivity Center for Disk and Replication Version 2.1 Installation and Configuration Guide*
- *IBM TotalStorage Productivity Center for Disk and Replication Version 2.1 User's Guide*
- *IBM TotalStorage Productivity Center for Disk and Replication Version 2.1 Command-Line Interface User's Guide*

You can remove and replace any field replaceable unit (FRU) on one node while the other node of the pair continues to run. This allows the attached hosts to continue to access the attached storage while a node is repaired.

Related reference

“Controls and indicators for the SAN Volume Controller 2145-8F2” on page 22
All controls and indicators are located on the front panel of the SAN Volume Controller 2145-8F2.

“SAN Volume Controller 2145-8F2 hardware” on page 32
You need to be aware of the SAN Volume Controller 2145-8F2 hardware.

“SAN Volume Controller 2145-8F2 connectors” on page 34
The external connectors for the SAN Volume Controller 2145-8F2 can be easily located.

“Preparing your SAN Volume Controller 2145-8F2 environment” on page 34
Before installing the SAN Volume Controller 2145-8F2, you must prepare the physical environment.

SAN fabric overview

The SAN fabric is an area of the network that contains routers, gateways, hubs, and switches. A single cluster SAN contains two distinct types of zones: a host zone and a disk zone.

In the host zone, the host systems can identify and address the SAN Volume Controller nodes. You can have more than one host zone. Generally, you create one host zone per operating system type. In the disk zone, the SAN Volume Controller nodes identify the disk drives. Host systems cannot operate on the disk drives directly; all data transfer occurs through the SAN Volume Controller nodes. Figure 7 on page 4 shows several host systems that are connected in a SAN fabric.

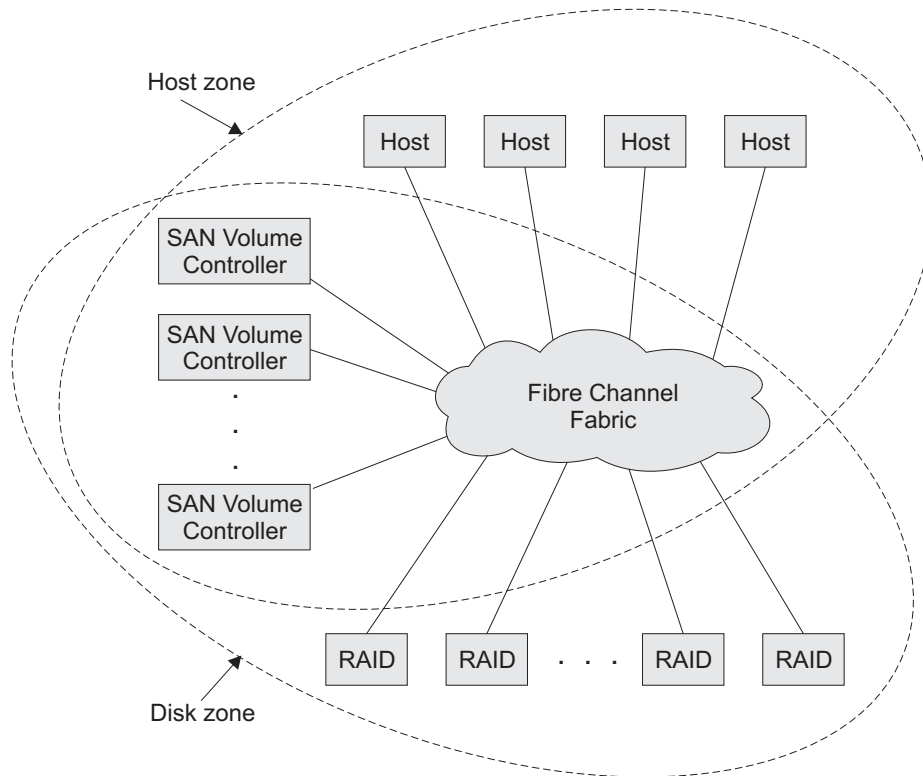


Figure 7. Example of a SAN Volume Controller in a fabric

A cluster of SAN Volume Controller nodes is connected to the same fabric and presents virtual disks (VDisks) to the host systems. You create these VDisks from units of space within a managed disk (MDisk) group. An MDisk group is a collection of MDisks that are presented by the back-end RAID controllers. The MDisk group provides a storage pool. You choose how each group is made up, and you can combine MDisks from different manufacturers' controllers in the same MDisk group.

Note: Some operating systems cannot tolerate other operating systems in the same host zone, although you might have more than one host type in the SAN fabric. For example, you can have a SAN that contains one host that runs on an AIX® operating system and another host that runs on a Windows® operating system.

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

Each SAN Volume Controller node contains its own vital product data (VPD). Each cluster contains VPD that is common to all the SAN Volume Controller nodes in the cluster, and any system that is connected to the Ethernet network can access this VPD.

Cluster configuration information is stored on every SAN Volume Controller node that is in the cluster to allow concurrent replacement of FRUs. When a new FRU is installed and when the SAN Volume Controller node is added back into the cluster,

configuration information that is required by that SAN Volume Controller node is read from other SAN Volume Controller nodes in the cluster.

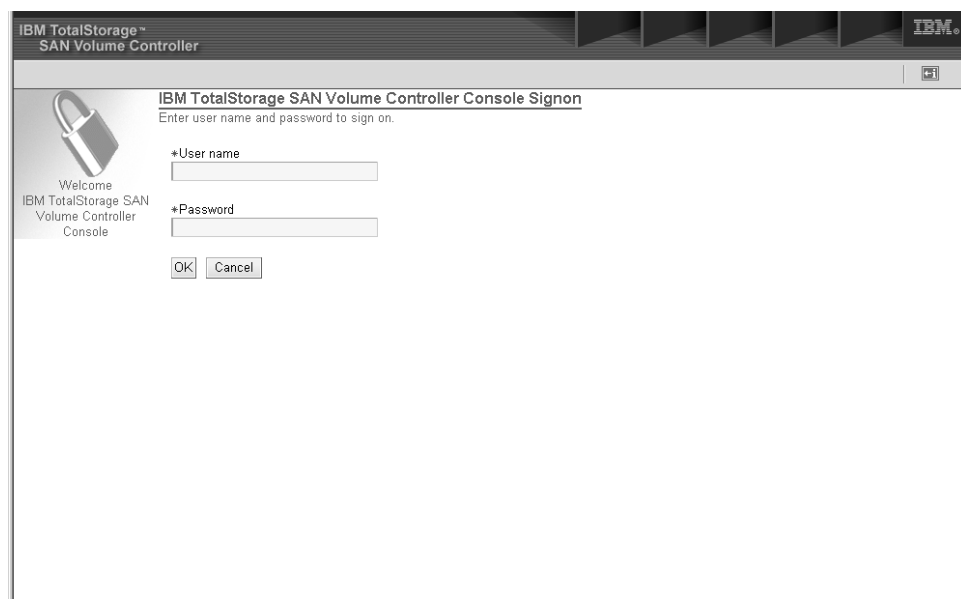
Using the SAN Volume Controller Console application on the master console

The SAN Volume Controller Console is an application that runs on the SAN Volume Controller master console. It can also be installed on any other server that meets the requirements.

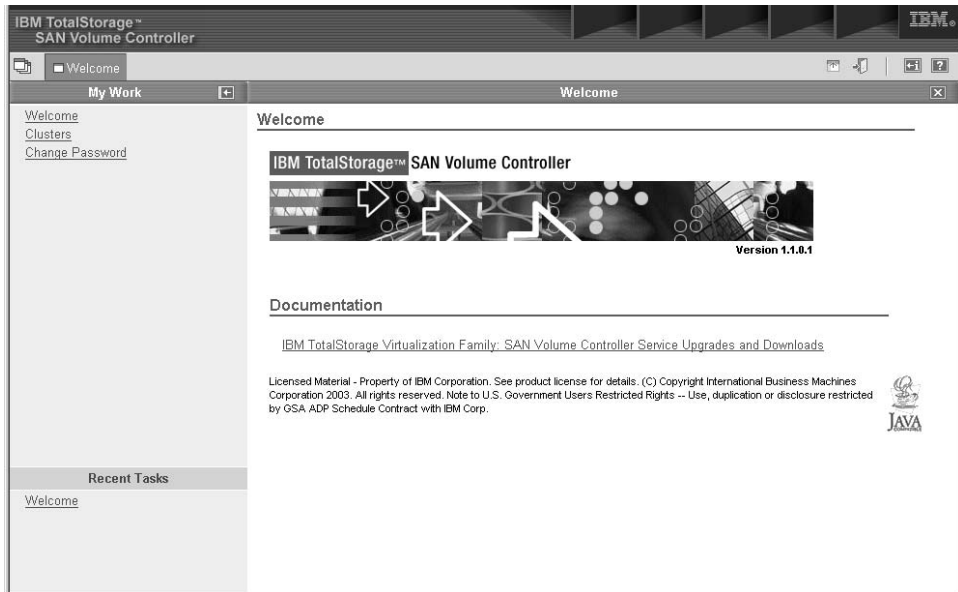
You can access the application directly through the SAN Volume Controller master console, or you can start the application from a Web browser if that browser is connected to the same Ethernet network as the SAN Volume Controller master console. You can access both service and configuration tools using this application.

Perform the following steps to start the SAN Volume Controller Console application from the master console.

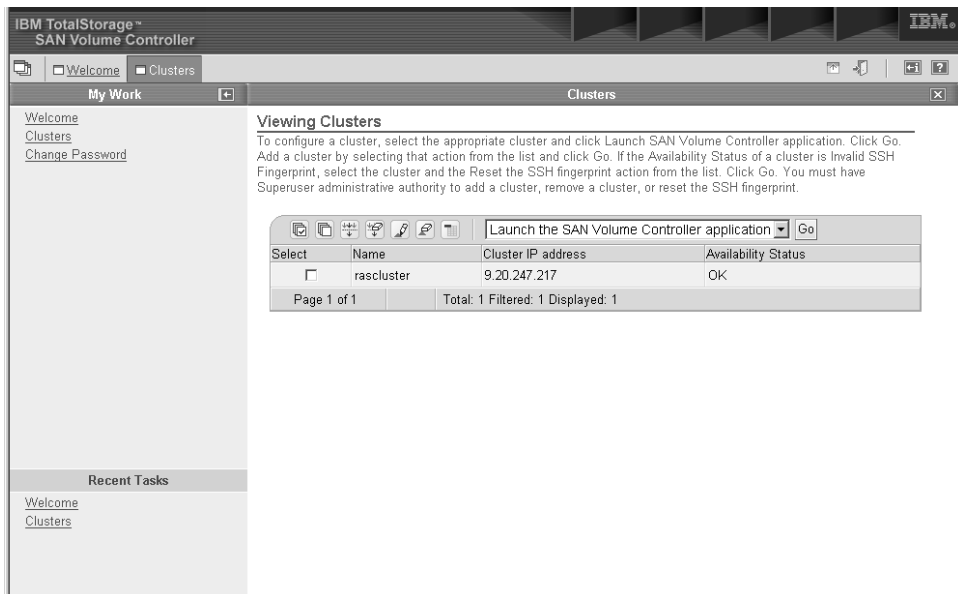
1. Log on to the master console using the user name and the password that is provided by the customer. Double-click the SAN Volume Controller Console icon and the SAN Volume Controller Console Signon panel is displayed.



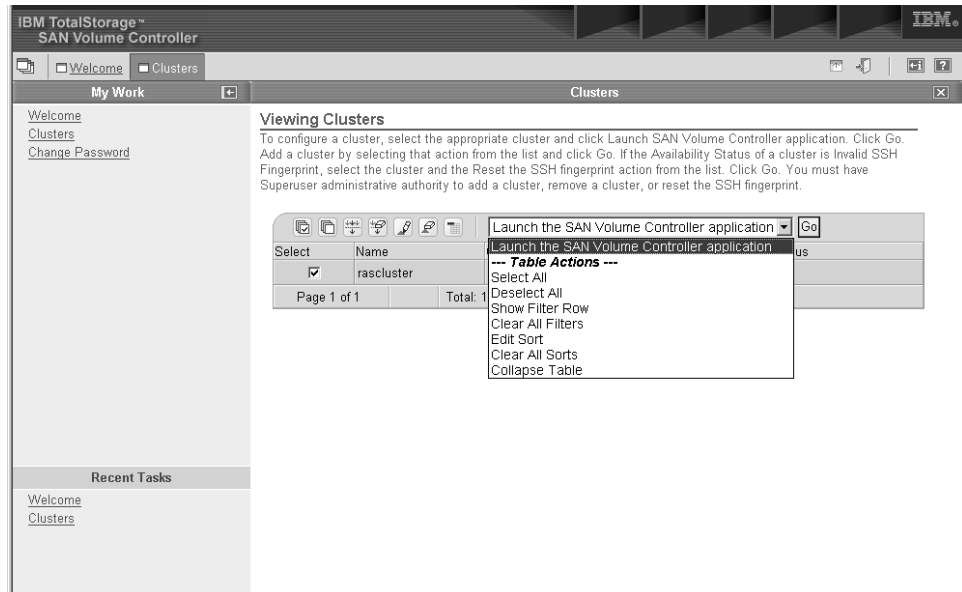
2. Enter the SAN Volume Controller Console user name and password that is provided by the customer. The following Welcome panel is displayed.



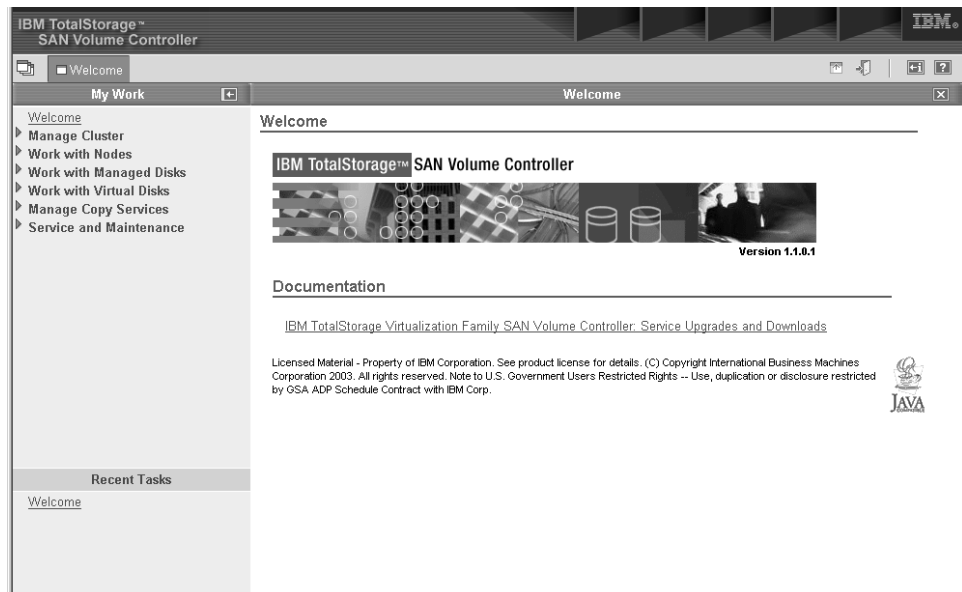
3. Select **Clusters** from the left navigation menu to access the configuration and service tools that you need and to see what is displayed in the Viewing Clusters panel.



4. Because the SAN Volume Controller Console can support a number of SAN Volume Controller clusters, you must first select the SAN Volume Controller cluster that you want to service. From the drop-down menu, select **Launch the SAN Volume Controller application** from the drop-down table actions.



5. Click **Go**. The Welcome panel is displayed in a new panel.



If the error message The specified cluster is currently unavailable is displayed, and the Availability Status of the selected cluster is shown as No Contact, go to MAP 5000: Start. If you return to this step, contact the IBM support center to resolve the problem with the SAN Volume Controller.

From this menu, you can start all of the following procedures.

- Viewing node status
- Delete a node from a cluster
- Add a node to a cluster
- Viewing the status of the virtual disk (VDisk)
- Viewing the status of the managed disk (MDisk)
- Viewing the vital product data

- Listing and saving dump data
- Start maintenance
- Viewing the error log

Viewing the error log using the SAN Volume Controller Console application on the master console

The error log must be easily accessible so that you can stay informed about the SAN Volume Controller.

You must first access the Welcome panel on SAN Volume Controller Console application from the master console.

Perform the following steps to view the error log:

1. Expand the Service and Maintenance option in the left pane.
2. Select the Analyze Error Log option.
3. The Error Log Analysis options are displayed on the right pane. Select the options that you want and press **Process**.

Starting maintenance using the SAN Volume Controller Console application

You must perform maintenance to minimize errors during processing.

You must first access the Welcome panel on the SAN Volume Controller Console application from the master console. Perform the following steps to access the Welcome panel:

1. Expand the Service and Maintenance option in the left pane.
2. Select the Maintenance Procedures option.
3. Press **Start Analysis** in the right pane.
4. Follow the on-screen instructions.

Viewing the node status using the SAN Volume Controller Console application on the master console

You should always be aware of the node status.

Before you begin, access the Welcome panel on SAN Volume Controller Console application from the master console.

Perform the following steps to view the node status:

1. Expand the Work with Nodes option in the left pane.
2. Select the Nodes option.
3. Node details are displayed in the right pane.

Related tasks

“Replacing the SAN Volume Controller 2145-8F2 service controller” on page 218
You can replace the SAN Volume Controller 2145-8F2 service controller.

Deleting a node using the SAN Volume Controller Console application on the master console

If it is required, you can delete a node from a cluster.

You might want to delete a node from a cluster if the node has failed and is being replaced with a new node, or if the repair that was performed has caused the node to be unrecognizable by the cluster. For example, if the disk drive or the software on the node has been replaced, that node will no longer be known by the cluster.

Before you begin, you must access the Welcome panel on SAN Volume Controller Console application from the master console.

Perform the following steps to delete a node from a cluster:

1. Expand the Work with Nodes option in the left pane.
2. Select the Nodes option and the Viewing Nodes panel is displayed.



3. Make a note of the Name and the I/O Group Name of the offline node. You will use this information when you add the 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, be aware that you must take special precautions when you add the node back into the cluster.
4. Select Offline node. Then select the Delete Node option from the drop-down menu, and press **Go**.
5. At the prompt, press **Yes** to confirm the delete operation.

Adding a node to a cluster using the SAN Volume Controller Console application on the master console

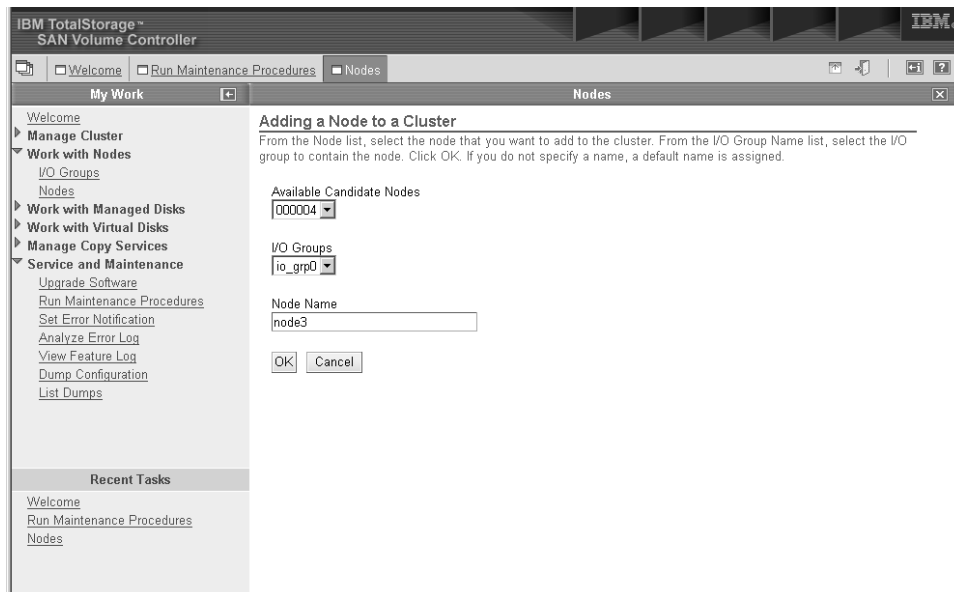
You might have to add a node back into the cluster if it has been either removed or rejected by a cluster.

Before you begin, access the Welcome panel on the SAN Volume Controller Console application from the master console.

Perform the following steps to add a node back into a cluster:

1. Expand the Work with Nodes option in the left pane.
2. Select the Nodes option.

- From the drop-down menu, select the Add a node option and press **Go**. The Adding a Node to a Cluster panel is displayed.



- From the list of candidate nodes, select the number of the node that you want to add.
- Select the I/O group that you noted when the previous node was deleted.

Attention: If more than one candidate node exists, you must 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 add the correct node might result in data corruption. If you are uncertain which candidate node belongs to the I/O group, shut down all host systems that access this cluster before you proceed. Add all the nodes back into the cluster, and then reboot each system.

For further details, see “Special procedures when adding a node to a cluster” in the *IBM TotalStorage SAN Volume Controller: Configuration Guide*.

Viewing the virtual disk status

You must view the status of virtual disks (VDisks) as part of the repair verification procedures.

When all SAN Volume Controller repairs are complete, all VDisks are shown as online. Any VDisks that remain offline, degraded, or excluded might contain errors or are not recognized because of a problem with the SAN environment. If problems still exist on VDisks after the repair actions on the SAN Volume Controller are complete, resolve the disk drive or SAN problems and then perform repair verification for the SAN Volume Controller to verify that no other problems exist.

See the *IBM TotalStorage SAN Volume Controller: Configuration Guide* to repair offline VDisks.

Perform the following steps to view the status of VDisks:

- Click **Work with Virtual Disks** → **Virtual Disks**. The Filtering Virtual Disks panel is displayed.

2. Specify the filter criteria that you want to use, and click **OK** or click **Bypass Filter** to display all objects of this type. The Viewing Virtual Disks panel is displayed.
3. Ensure that all VDisks are online.

Viewing the status of managed disks

You must view the status of managed disks (MDisks) as part of the repair verification procedures.

When all SAN Volume Controller repairs are complete, all MDisks are shown as online. Any MDisks that remain offline, degraded, or excluded might contain errors or are not recognized because of a problem with the SAN environment. If problems still exist on MDisks after the repair actions on the SAN Volume Controller are complete, resolve the disk drive or SAN problems and then perform repair verification for the SAN Volume Controller to verify that no other problems exist.

Perform the following steps to view the status of MDisks:

1. Click **Work with Managed Disks** → **Managed Disks** from the portfolio. The Filtering Managed Disks panel is displayed.
2. Specify the filter criteria that you want to use and click **OK** or click **Bypass Filter** to display all objects of this type. The Viewing Managed Disks panel is displayed.
3. Ensure that all MDisks are online.

Viewing the vital product data

Vital product data is available for each node and for the cluster.

Perform the following steps to display the vital product data:

1. Expand the Work with Nodes option in the left pane.
2. Select **Nodes**.
3. Click on the node name of any node to display the node details.
4. In the right pane, select **Vital Product Data**.

Perform the following steps to display the cluster vital product data:

1. Expand the Manage Cluster option in the left pane.
2. Select **View Cluster properties**.
3. In the right pane, select the subsection of the cluster VPD that you want to display.

Related tasks

“Replacing the SAN Volume Controller 2145-8F2 service controller” on page 218
You can replace the SAN Volume Controller 2145-8F2 service controller.

Listing and saving dump data

You can save dump data to any node in the cluster.

When you use this procedure to display dump data, only the dump files on the configuration node are displayed. An option on the dumps menu displays data from other nodes. If you choose to display or save data from another node, that data is first copied to the configuration node.

Perform the following steps to list and save dump data:

1. Expand the Service and Maintenance option in the left pane.
2. Select the **List Dumps** option.
3. Follow the instructions in the right pane to display and save the dumps that you need.

Marking errors as fixed

You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

This task assumes that you have already launched the SAN Volume Controller Console. Perform the following steps to mark errors as fixed:

1. Select **Analyze Error Log**.
2. View the error log sorted by error priority.
3. Click on the sequence number of the error that you have just fixed to display the error log in more detail.
4. Click **Mark as fixed**.

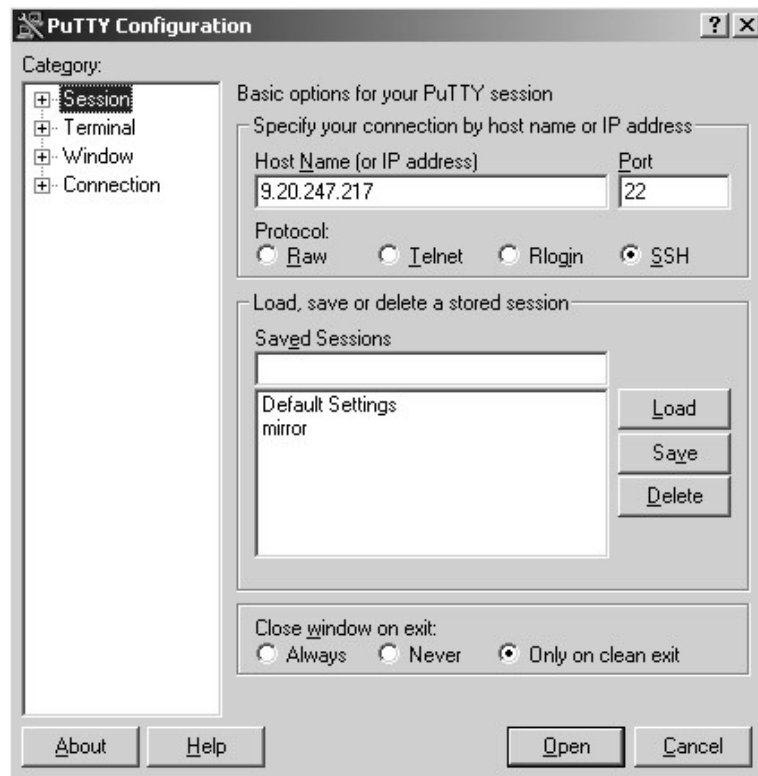
The error log entry for this error is now marked as fixed and it will not be used as part of future error log analysis.

Accessing the CLI from the master console

If you must enter and run command-line instructions, you can access the SAN Volume Controller command-line interface (CLI) from the master console.

Perform the following steps to run PuTTY from a command-line window:

1. Start PuTTY by clicking **Start** → **Programs** → **PuTTY** → **PuTTY** or by going to the C:\Program Files\Utils\PuTTY\ directory and double-clicking the putty.exe file. If the master console is configured to use PuTTY for command-line access, the session settings might be saved. Perform the following steps if the cluster you need to access is listed under Saved Sessions:
 - a. Select the menu item for the cluster.
 - b. Click **Load**.
 - c. Click **Open**.
 - d. Go to step 2 on page 13. If the cluster is not listed under Saved sessions, ask the customer to set up PuTTY for command-line access, then restart this procedure.



2. Click **Yes** if the following PuTTY alert panel opens:



The command-line window for service is displayed.

```
9.20.247.217 - PuTTY
login as: service
Authenticating with public key "rsa-key-20030213"
IBM_2145:service>
```

3. Type the user name `service` at the `login as:` prompt. When the service prompt is displayed, you may use the CLI to issue commands.

4. Issue a command following the service prompt to display information about the SAN Volume Controller. For example, issue the following command to view the current status of the nodes used by the SAN Volume Controller cluster.

```
svcinfo lsnode -nohdr -delim :
```

The current status of the nodes used by the SAN Volume Controller cluster is displayed.

```
9.20.247.217 - PuTTY
login as: service
Authenticating with public key "rsa-key-20030213"
IBM_2145:service>svcinfo lsnode -nohdr -delim :
1:node1:10L3ANP:50050768010000F6:online:0:io_grp0:no:202378101COD17A0
2:node2:10L3BNZ:5005076801000184:online:0:io_grp0:yes:202378101COD27AA
3:node3:10L3BNZ:5005076801000101:online:1:io_grp1:no:202378101COD27AA
4:node4:10L3ANP:5005076801000147:online:1:io_grp1:no:202378101COD17A0
IBM_2145:service>
```

5. Issue the following command:

```
svcinfo lscluster clustername
```

where *clustername* represents the name of the cluster whose details you want to list.

You are set up to use the CLI from the master console.

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.

This output shows what is displayed when you type the `svcinfolnode -delim :` command:

```
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 the command-line interface.

This output shows what is displayed when you type the `svcinfolnode -delim : nodename` command:

```
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 previous example 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. You might also see the following status: 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 command-line interface

You can delete a node from the cluster using the command-line interface (CLI).

1. Type the following command on the CLI to list the cluster nodes:

```
svcinfolnode
```

The following output is an example of what you might see when you issue the `svcinfolnode` command.

id	name	UPS_serial_number	WWNN	status	I0_group_id	I0_group_name	config_node	UPS_unique_id
1	node1	10L3ANP	5005076801000F6	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	5005077602000F8	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 storage area network (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. Issue 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 command-line interface”

You can add a node that has been either removed or rejected by a cluster into the cluster by using the command-line interface (CLI).

Adding a node to the cluster using the command-line interface

You can add a node that has been either removed or rejected by a cluster into the cluster by using the command-line interface (CLI).

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.

To add a node to a cluster using the CLI, perform the following steps:

1. Issue the following command on the CLI to list the node candidates:

```
svcinfolnodecandidate
```

The following example shows what you might see after you issue the `svcinfolnodecandidate` command:

id	panel_name	UPS_serial_number	UPS_unique_id
5005076801000101	000279	10L3BNZ	202378101C0D27AA

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

- Issue the following command: `svcservicetask addnode -panelname panel_name -name new_name_arg -iogrp iogroup_name`

where *panel_name* is the name that is noted in step 1 on page 16 (in this example the panel name 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 that is noted when the previous node was deleted from the cluster; *iogroup_name* is the I/O group that was noted when the previous node was deleted from the cluster.

The following example shows the command that you might issue:

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

The following 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 I/O group, shut down all host systems that access this cluster before you proceed. Reboot each system when you have added all the nodes back into the cluster.

- To check whether you added the node successfully, issue the following command:

```
svcinfolnode
```

The following example shows what you might see when you issue the `svcinfolnode` command.

id	name	UPS_serial_number	WWNN	status	I/O_group_id	I/O_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 command-line interface” on page 16
 You can delete a node from the cluster using the command-line interface (CLI).

Listing managed disks

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

To list managed disks (MDisks) with the CLI, issue the `svcinfolsmdisk -delim :` command. The example below shows what may be displayed:

```

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          **

*600a0b80000f4c92000000b3ef6c3d00000000000000000000000000000000 (This number represents the controller_name:UID)
+0080e52122fa800000000000000000000000000000000000000000000000000000000 (This number represents the controller_name:UID)
**600a0b80000c5ae4000000093eca105c0000000000000000000000000000000000000000000 (This number represents the controller_name:UID)
$0080a0b80000f643200000043ef6b4ff000000000000000000000000000000000000000000 (This number represents the controller_name:UID)
#600a0b80000f4c92000000b3ef6c3d0000000000000000000000000000000000000000000 (This number represents the controller_name:UID)
**600a0b80000f6c92000000d3er1a7d0000000000000000000000000000000000000000000 (This number represents the controller_name:UID)

```

The previous example shows a list of MDisks. To determine the status of the MDisk, see column three. The example shows that all MDisks have a status of `online`. The following list shows possible statuses for an MDisk:

- Online
- Offline
- Excluded
- Degraded

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

- Managed
- Unmanaged
- Image

You can also list more detailed information about one MDisk. Issue the `svcinfolsmdisk -delim : 3` command to see detailed information about the MDisk with an ID of 3. The result is the following output:

```

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:600a0b80000f643200000043ef6b4ff00000000000000000000000000000000000000

```


You can issue the **svctask detectmdisk** CLI command or use the **Discover MDisks** function from the SAN Volume Controller Console to have the cluster rescan the fibre-channel network. The rescan discovers any new MDisks that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

This command does not produce any output.

Checking managed disk group status

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

Issue the following command to display the example output:

```
svcinfolsmdiskgrp -nohdr -delim :
```

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

The characteristics for each MDisk group is listed one line per group. The status of the MDisk group is shown by the third item. In the previous example, Group0 status is online. MDisk 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 (CLI).

Issue the `svcinfolcontroller -delim :` command to display the example output:

```
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 CLI. Issue the following command when you check the status of a specific disk controller:

```
svcinfolcontroller -delim = controller_id
```



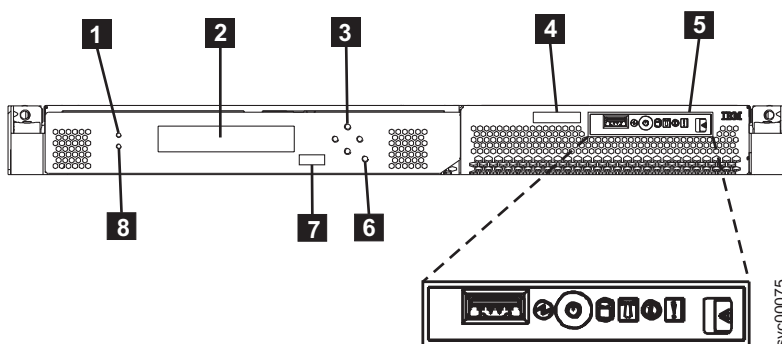
```

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 2145-8F2

All controls and indicators are located on the front panel of the SAN Volume Controller 2145-8F2.



- 1** Error LED
- 2** Front panel display
- 3** Navigation buttons
- 4** Serial number label
- 5** Operator information panel (see the operator information panel topic)
- 6** Select button
- 7** Node identification label
- 8** Cache LED

Related reference

“Error LED” on page 23

Critical faults on the service controller are indicated through the amber, error LED.

“Front panel display” on page 23

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

“Navigation buttons” on page 23

You can use the navigation buttons to move through menus.

“Select button” on page 24

You can use the select button to select an item from a menu.

“Operator information panel” on page 25

The operator information panel contains indicators and buttons for the SAN Volume Controller 2145-8F2.

“Node identification label” on page 24

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

“Product serial number” on page 24

The node contains a SAN Volume Controller product serial number that is imbedded on the system board hardware.

“Cache LED” on page 24

System activity is indicated through the green, cache LED.

Error LED

Critical faults on the service controller are indicated through the amber, error LED.

The amber error LED has the following two states:

OFF The service controller is functioning correctly.

ON A critical service controller failure was detected and you must replace the service 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

Navigation buttons

You can 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.

Note: The select button is used in tandem with the navigation buttons.

Select button

You can use the select button to select an item from a menu.

The select button, along with the navigation buttons, help you to navigate and select menu options, select boot options, and start a service panel test.

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

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 that is used in the **svctask 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 service controller assembly 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 contain the new number. No cluster reconfiguration is necessary when the front panel is replaced.

Product serial number

The node 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.

Cache LED

System activity is indicated through the green, cache LED.

See Table 1 for the system activity indicators.

Table 1. Cache LED settings

Cache LED status	Result
Off	The system has not yet started processing.
On	The system is functionally active, has joined a working cluster, and is processing data.

Table 1. Cache LED settings (continued)

Cache LED status	Result
Flashing	The node is dumping cache data in anticipation of a system reboot (from a pending power down or other controlled restart sequence). Do not remove the power cable or force a power-off while this LED is flashing.

Operator information panel

The operator information panel contains indicators and buttons for the SAN Volume Controller 2145-8F2.

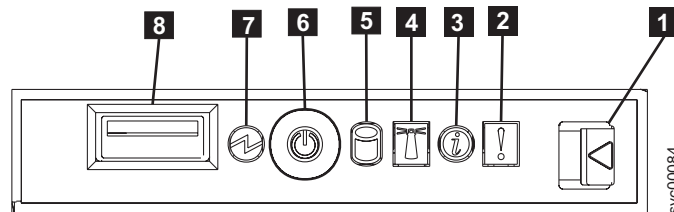


Figure 8. Operator information panel

- 1** Release latch for light path diagram
- 2** System-error LED (amber)
- 3** Information LED (amber)
- 4** Location LED (blue)
- 5** Hard disk drive activity LED (green)
- 6** Power control button
- 7** Power LED (green)
- 8** USB connector

Related tasks

“Removing the SAN Volume Controller 2145-8F2 operator information panel” on page 234

You might have to replace the operator panel on your SAN Volume Controller 2145-8F2 due to required maintenance.

“Replacing the SAN Volume Controller 2145-8F2 operator information panel” on page 235

You might have to replace the operator panel on your SAN Volume Controller 2145-8F2 due to required maintenance.

Related reference

“Release latch” on page 26

The release latch gives you access to the light path diagnostics panel, which provides a preliminary method of determining the location of a problem.

“System-error LED” on page 26

When an error is detected by the system board, the system-error LED is illuminated.

“Information-Error LED” on page 26

When the information-error LED is lit, a non-critical event has occurred.

“Location LED”

The SAN Volume Controller does not use the location LED.

“Hard disk drive activity LED”

This green LED, when lit, indicates when the hard disk drives is in use.

“Power control button” on page 27

The power control button switches on or switches off the main power to the SAN Volume Controller 2145-8F2.

“Power LED” on page 27

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

Release latch

The release latch gives you access to the light path diagnostics panel, which provides a preliminary method of determining the location of a problem.

After pressing the release latch on the information panel, you can slide the light path diagnostics panel out to view the lit LEDs. These LEDs indicate the type of error that has occurred. Light path diagnostics are described in more detail in the light path maintenance analysis procedure (MAP).

To retract the panel, push it back into the SAN Volume Controller 2145-8F2 and snap it into place.

Related tasks

“MAP 5800: Light path” on page 203

MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

System-error LED

When an error is detected by the system board, the system-error LED is illuminated.

This amber LED lights up if the SAN Volume Controller hardware detects a fatal error that requires a new field replaceable unit (FRU).

Note: Press the release latch to view the light path diagnostic panel, which will help you to isolate the faulty FRU.

Information-Error LED

When the information-error LED is lit, a non-critical event has occurred.

Check the light path diagnostics panel and the error log. Light path diagnostics are described in more detail in the light path maintenance analysis procedure (MAP).

Related tasks

“MAP 5800: Light path” on page 203

MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

Location LED

The SAN Volume Controller does not use the location LED.

Hard disk drive activity LED

This green LED, when lit, indicates when the hard disk drives is in use.

Hard disk drive activity is shown on the hard disk drive itself and also on the hard disk drive activity LED on the operator information panel.

Power control button

The power control button switches on or switches off the main power to the SAN Volume Controller 2145-8F2.

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

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

Note: If you press the power control button and do not release it, the SAN Volume Controller will malfunction.

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 of the following are true:

- No power is present at the power supply input
- The power supply has failed
- The LED has failed

On The SAN Volume Controller is powered on.

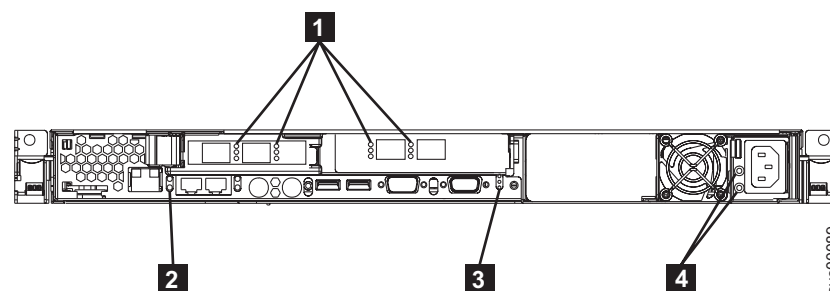
Flashing

The SAN Volume Controller is turned off but is still connected to an input power source.

Note: A power LED is also on the rear of the server.

SAN Volume Controller 2145-8F2 rear panel indicators

The controls and indicators for the SAN Volume Controller 2145-8F2 are contained on the front and back panel assembly.



- 1** Fibre-channel LEDs
- 2** Ethernet connection LED
- 3** Power, location, and system error LEDs
- 4** AC and DC LEDs

Related reference

“Fibre-channel LEDs”

The fibre-channel LEDs are unused by the SAN Volume Controller 2145-8F2.

“Ethernet connection LED”

The left Ethernet connection LED indicates that there is an active connection on the Ethernet port.

“Power, location, and system error LEDs”

The power, location, and system error LEDs are housed together on the rear of the SAN Volume Controller 2145-8F2.

“AC and DC LEDs”

The AC and DC LEDs indicate whether the SAN Volume Controller 2145-8F2 is receiving electrical current.

Fibre-channel LEDs

The fibre-channel LEDs are unused by the SAN Volume Controller 2145-8F2.

Ethernet connection LED

The left Ethernet connection LED indicates that there is an active connection on the Ethernet port.

Power, location, and system error LEDs

The power, location, and system error LEDs are housed together on the rear of the SAN Volume Controller 2145-8F2.

Below are the descriptions of the power, location, and system error LEDs:

Power LED

This is the top of the three LEDs and indicates that AC power is present on the SAN Volume Controller 2145-8F2.

Location LED

This is the middle of the three LEDs and is not used by the SAN Volume Controller 2145-8F2.

System error LED

This is the bottom of the three LEDs that indicates that a system error has occurred.

AC and DC LEDs

The AC and DC LEDs indicate whether the SAN Volume Controller 2145-8F2 is receiving electrical current.

The AC LED and DC LED are located on the rear of the SAN Volume Controller 2145-8F2. See Figure 9 on page 29.

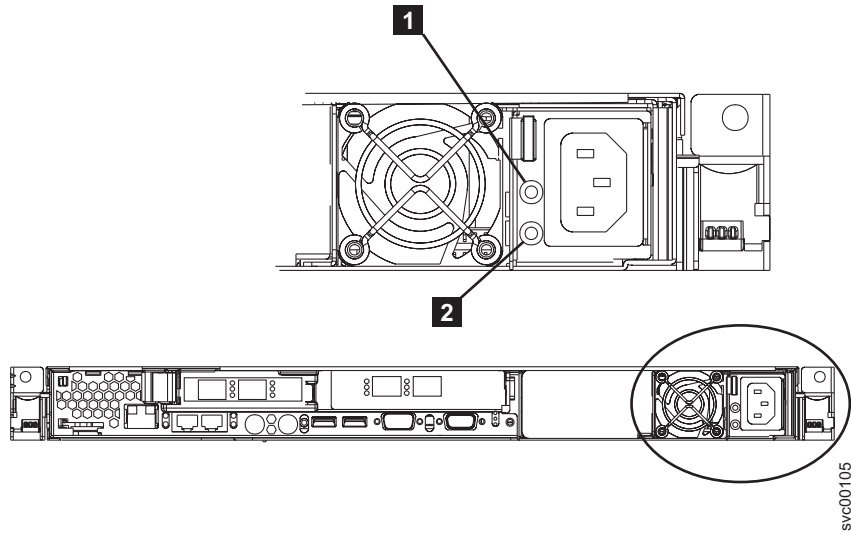


Figure 9. AC and DC LEDs

AC LED

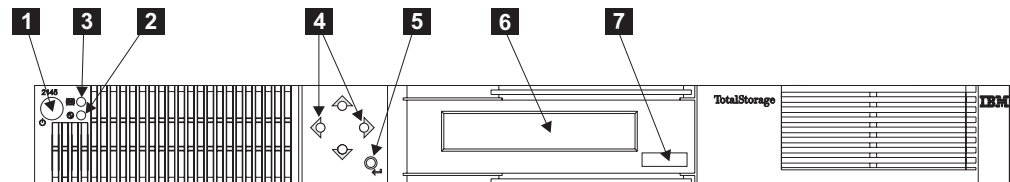
The upper LED **1** to the left of the power supply, indicates that AC current is present on the SAN Volume Controller 2145-8F2.

DC LED

The lower LED **2** to the left of the power supply, indicates that DC current is present on the SAN Volume Controller 2145-8F2.

Controls and indicators for the SAN Volume Controller 2145-4F2

All controls and indicators are located on the front panel of the SAN Volume Controller 2145-4F2.



- 1** Power button
- 2** Power LED
- 3** Check LED
- 4** Navigation buttons
- 5** Select button
- 6** Front panel display
- 7** Node identification label

Related reference

“Power button” on page 30

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

“Power LED” on page 27

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

“Check LED”

The amber, check LED is used to indicate critical failures on the service controller.

“Navigation buttons” on page 23

You can use the navigation buttons to move through menus.

“Select button” on page 24

You can use the select button to select an item from a menu.

“Front panel display” on page 23

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

“Node identification label” on page 24

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

Power button

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

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 2145 uninterruptible power supply (2145 UPS), the 2145 UPS also powers off. To power on the SAN Volume Controller, you must first power on the 2145 UPS to which it is connected.

Note: The 2145 uninterruptible power supply-1U (2145 UPS-1U) does not power off when the SAN Volume Controller is shut down from the power button.

Check LED

The amber, check LED is used to indicate critical failures on the service controller.

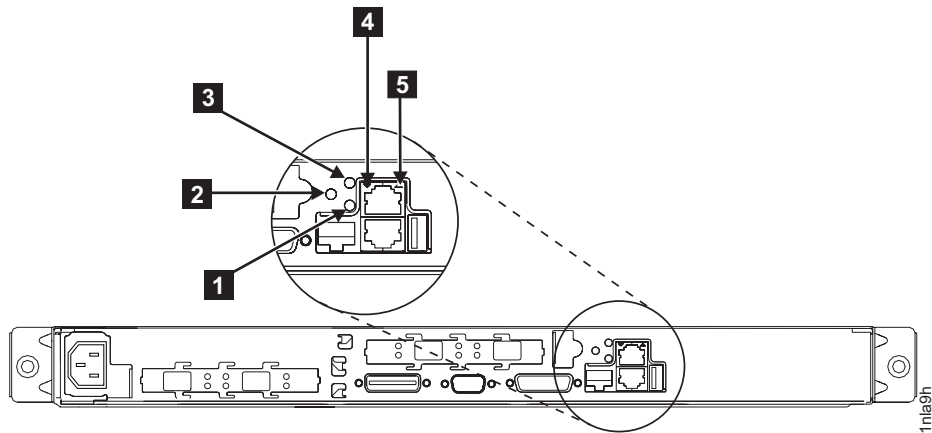
If the check LED is off and the power LED is on, the service controller is working correctly.

If the check LED is on, a critical service controller failure was 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** is on. It is normal for the power LED to be on at this time.

SAN Volume Controller 2145-4F2 rear panel indicators

The controls and indicators for the SAN Volume Controller 2145-4F2 are contained on the front and back panel assembly.



- 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”

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

“System board fault LED”

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

“Lower Ethernet connection LED” on page 32

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” on page 32

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

“Monitor LED” on page 32

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

System board power LED

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

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 the documentation on the rear panel indicators.

Monitor LED

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

You can view the monitor LED in the documentation concerning the 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 the documentation concerning the rear panel indicators.

Upper Ethernet connection LED

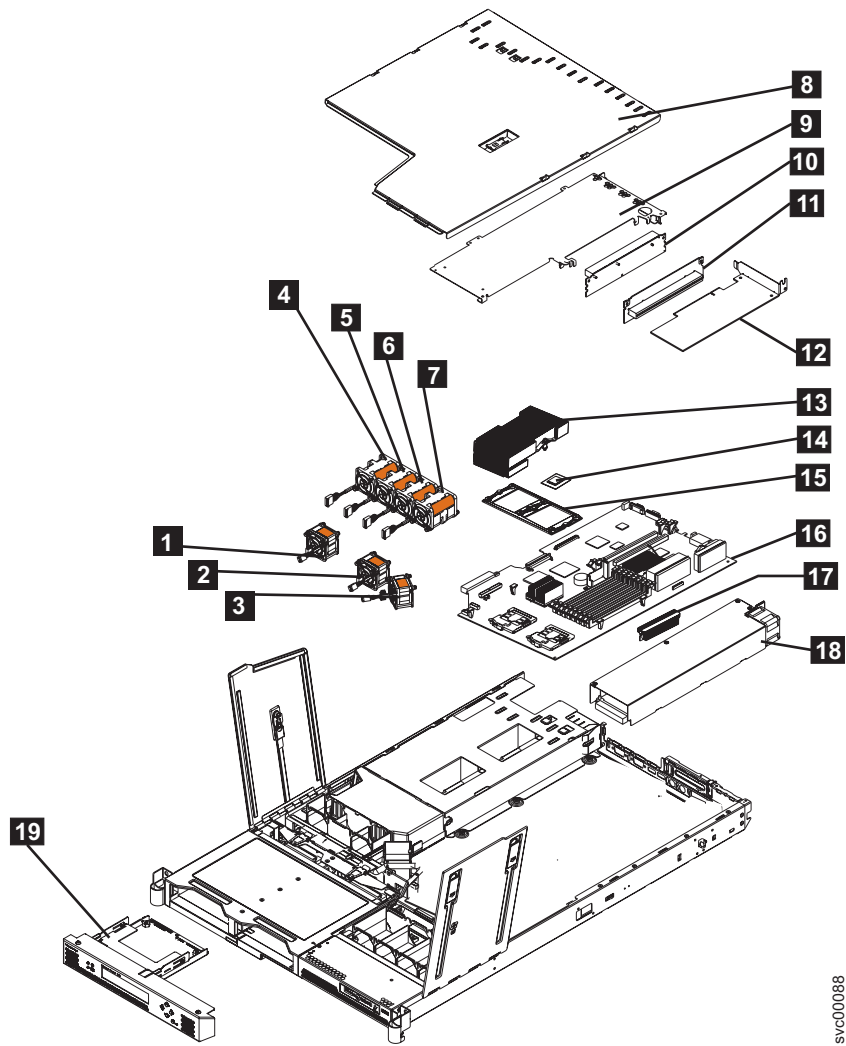
The upper Ethernet connection LED indicates the operational status of Ethernet port 2. Ethernet port 2 is not used on the SAN Volume Controller.

The upper Ethernet connection LED flashes when the Ethernet adapter communicates with the Ethernet network. You can view the upper Ethernet connection LED in the documentation concerning the rear panel indicators.

SAN Volume Controller 2145-8F2 hardware

You need to be aware of the SAN Volume Controller 2145-8F2 hardware.

The following figure displays a breakout view for the parts to the SAN Volume Controller 2145-8F2. Use the reference keys below the figure to match the reference keys in the example.



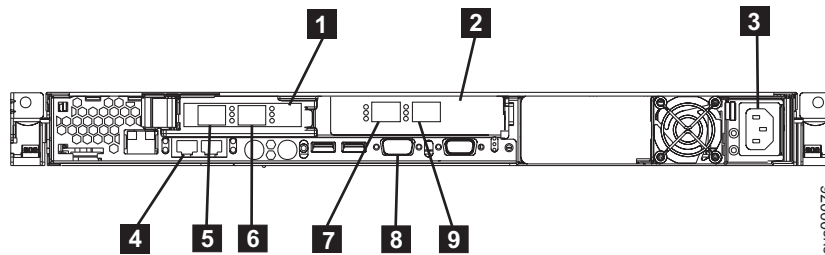
svc00068

- 1** Fan 1
- 2** Fan 2
- 3** Fan 3
- 4** Fan 4
- 5** Fan 5
- 6** Fan 6
- 7** Fan 7
- 8** Top cover
- 9** Dual port fibre-channel host bus adapter (full height)
- 10** Full height riser card
- 11** Low profile riser card
- 12** Dual port fibre-channel host bus adapter (low profile)
- 13** Microprocessor heat sink
- 14** Microprocessor

- 15** Heat sink retainer
- 16** System board
- 17** Voltage regulator module (VRM)
- 18** Power supply
- 19** Service controller

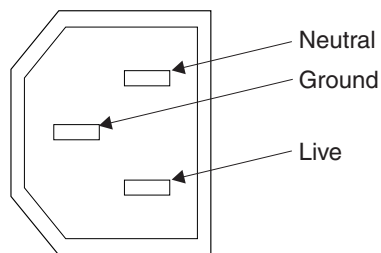
SAN Volume Controller 2145-8F2 connectors

The external connectors for the SAN Volume Controller 2145-8F2 can be easily located.



- 1** PCI slot 1
- 2** PCI slot 2
- 3** Power supply
- 4** Ethernet port 1
- 5** Fibre-channel port 1
- 6** Fibre-channel port 2
- 7** Fibre-channel port 3
- 8** Serial connection
- 9** Fibre-channel port 4

The following figure shows the type of connector located on the power supply assembly. The connector enables you to connect the SAN Volume Controller 2145-8F2 to the power source from the uninterruptible power supply.



Preparing your SAN Volume Controller 2145-8F2 environment

Before installing the SAN Volume Controller 2145-8F2, you must prepare the physical environment.

Dimensions and weight

The following tables list the physical dimensions and weight of the SAN Volume Controller 2145-8F2, as well as other environmental requirements that you must consider before you install your SAN Volume Controller 2145-8F2:

Height	Width	Depth	Maximum weight
43 mm (1.69 in.)	440 mm (17.32 in.)	686 mm (27 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)
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

The heat output (maximum) is 350 watts (1195 Btu per hour).

Related reference

“Preparing your UPS environment” on page 59

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. *Never* turn off the SAN Volume Controller by removing the power cable. 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 you have submitted a power off request. 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. After the power-off processing is complete, the front panel is blank and the front panel power light is blinking. 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 that is connected to the 2145 UPS, the 2145 UPS powers off within five minutes. You must press the power-on button on the 2145 UPS before the SAN Volume Controller can be powered on.

Note: The 2145 UPS does not power off when the SAN Volume Controller is shut down from the power button.

If you turn off a SAN Volume Controller using the power button or by a command, the SAN Volume Controller is put 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 tries to detect the status of the UPS through the UPS signal cable. If a 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 dynamic random access memory

(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. After all the data is saved, the SAN Volume Controller is turned off and the power light on the front panel turns off.

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 75

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

Using directed maintenance procedures

You can use directed maintenance procedures (DMP) 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 DMP to repair a SAN Volume Controller cluster, see the “start” maintenance analysis procedure (MAP).

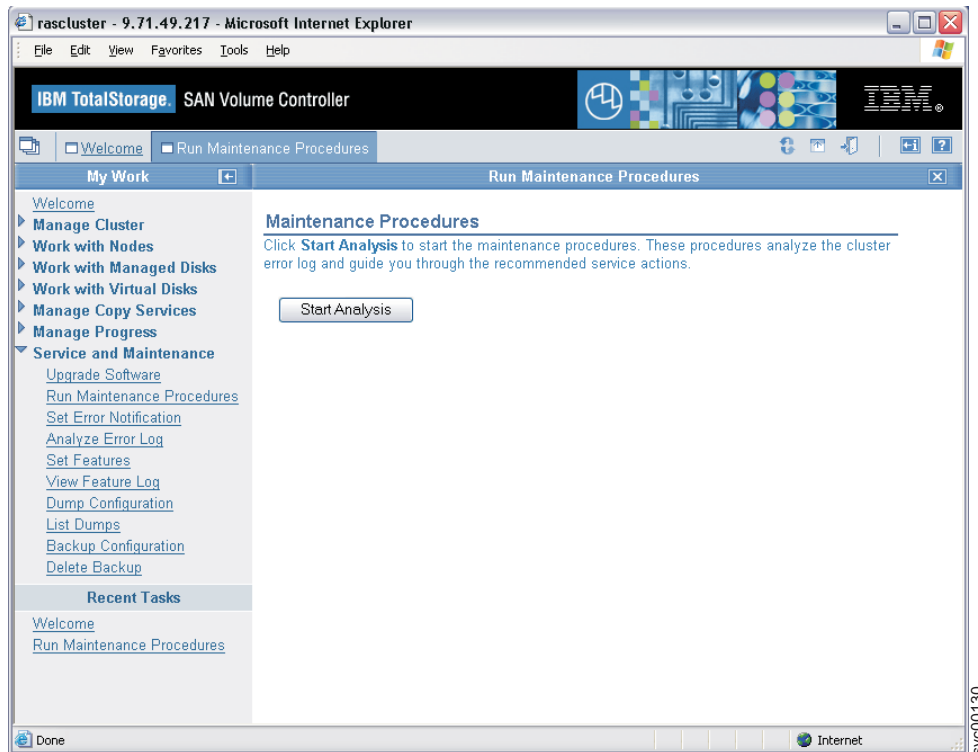
The following procedures and panels show examples of what you might see when you use the DMPs. The specific DMPs and panels that you see depend on the procedure that you select.

You can use either the DMPs through the SAN Volume Controller Console or the CLI to perform these tasks. Using the SAN Volume Controller Console is preferable, because the online procedures automatically check for correct status and mark the error as fixed if the repair is successful.

Note: The following procedures and graphics are examples of what you might see when you use the DMPs. The DMPs and graphics that you see depend on the procedure that you select. This task assumes that you have already launched the SAN Volume Controller Console.

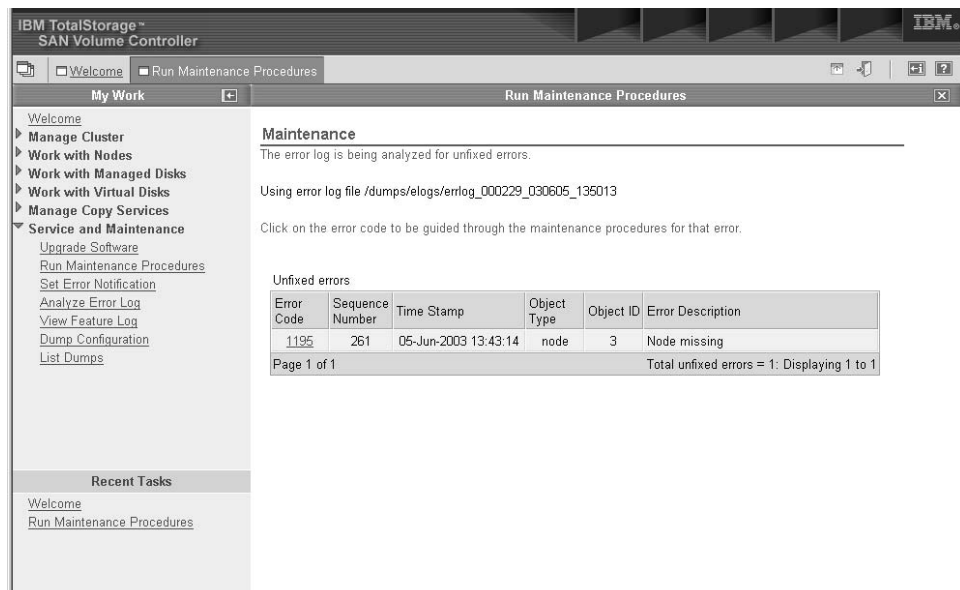
Perform the following steps to start the DMP. Use the SAN Volume Controller Console to repair a SAN Volume Controller cluster:

1. Click **Start Analysis** from the Run Maintenance Procedures panel.



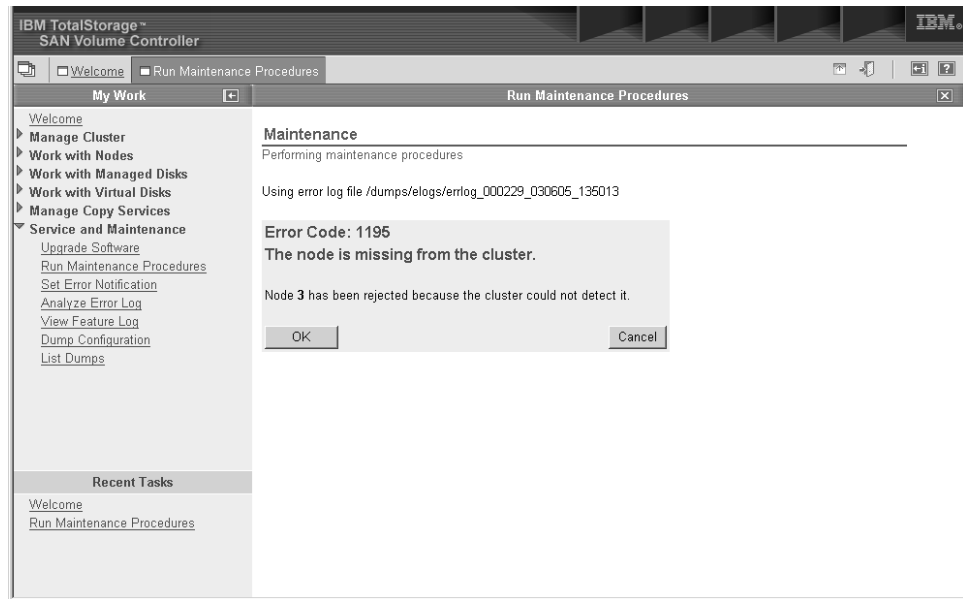
The list might contain any number of errors that must be repaired. If there is more than one error on the list, the error at the top of the list has the highest priority and must always be fixed first. If you do not fix the higher priority errors first, you might not be able to fix the lower priority errors.

2. Click on the number for the error code.

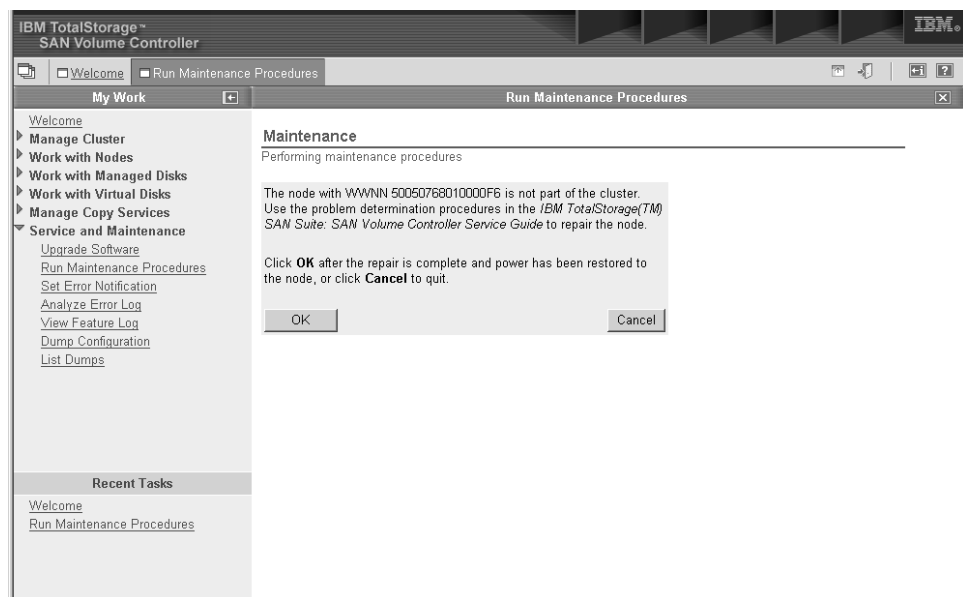


The panel displays the error code and provides a description of the error condition.

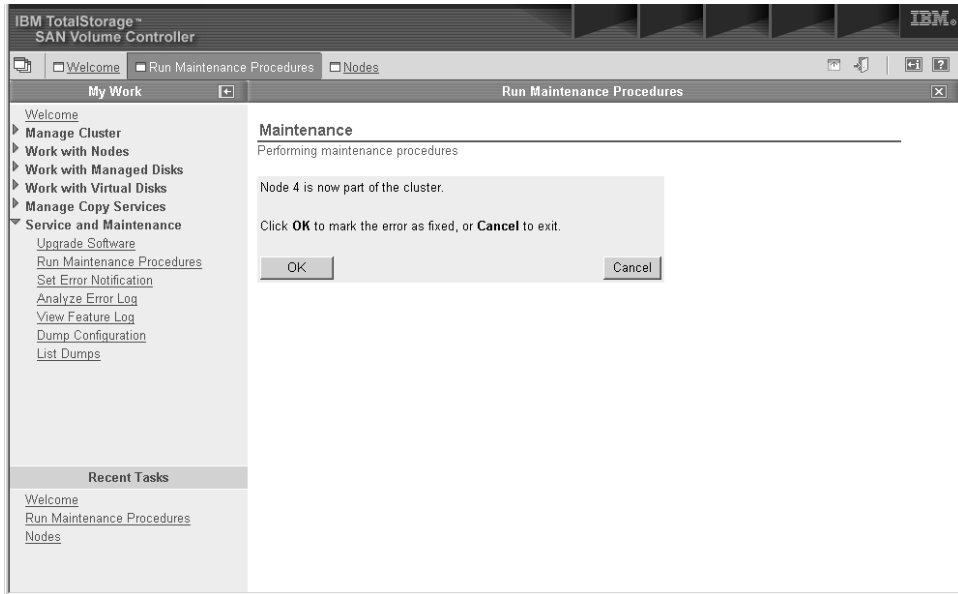
3. Click **OK**.



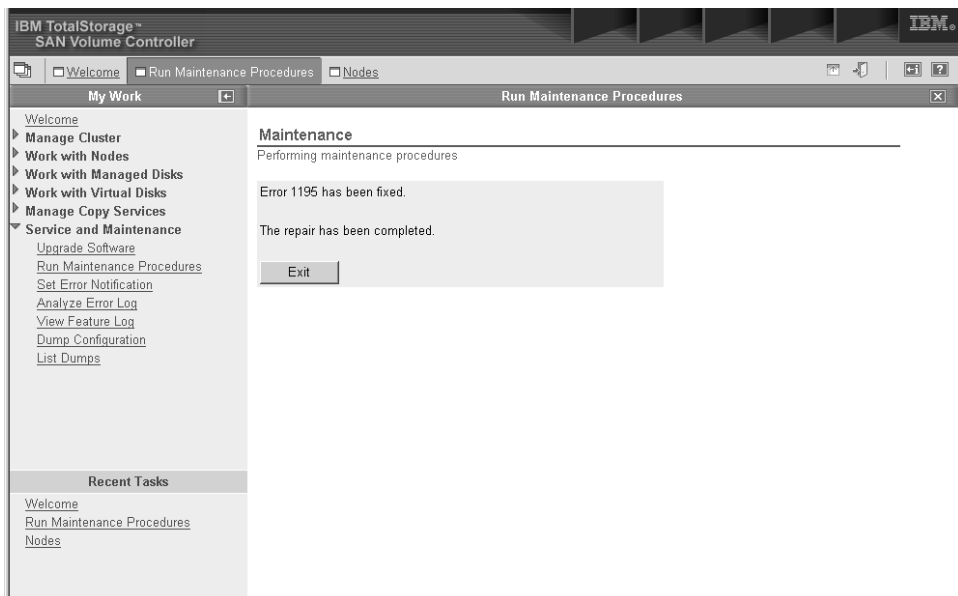
4. One or more panels might be displayed with instructions for you to replace parts or perform other repair activity. If you are not able to complete the actions at this time, click **Cancel**. When you return to the DMPs, the repair can be restarted from step 1 on page 38. When the actions that you are instructed to perform are complete, click **OK**. When the last repair action is completed, the DMPs might attempt to restore failed devices to the cluster.



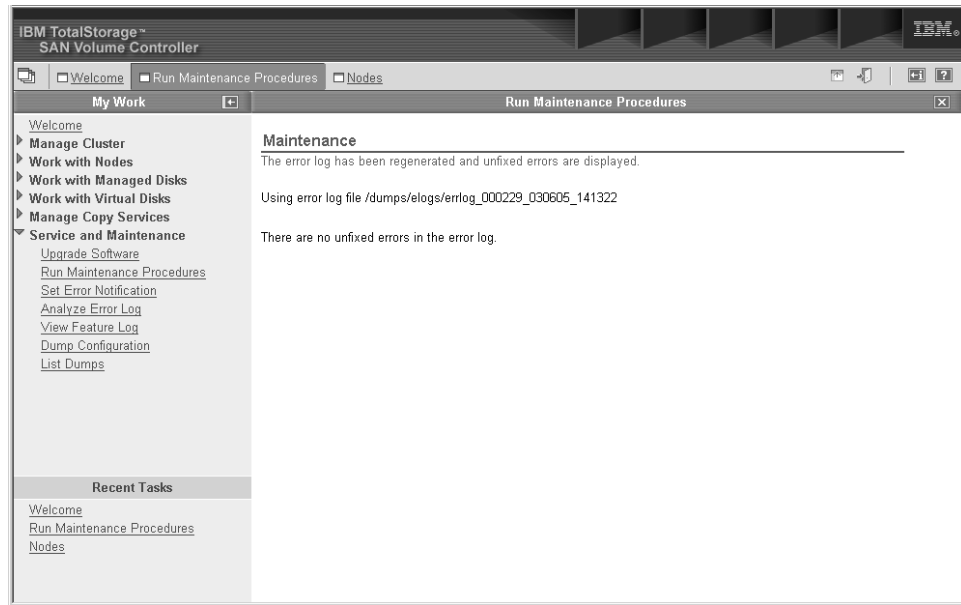
5. Click **OK** to mark the error as fixed in the error log, to prevent this instance of the error from being listed again.



6. Click **Exit**. If other errors need to be fixed, those errors are displayed and the DMPs continues.



If no errors remain, the following panel is displayed:



This panel indicates that no further repair procedures are necessary. Verify the repair using repair verification MAP.

Related tasks

“MAP 5000: Start” on page 168

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

“MAP 5700: Repair verification” on page 201

MAP 5700: Repair verification helps you to verify that field replaceable units (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

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

SAN Volume Controller 2145-8F2

The SAN Volume Controller 2145-8F2 performs a series of tests to check the operation of components and some of the options installed when first turned on. This series of tests is called the power-on self-test (POST).

If a critical failure is detected during the POST, the SAN Volume Controller 2145-8F2 software is not loaded and the system error LED on the operator information panel is illuminated. If this occurs, use the Start maintenance analysis procedure (MAP) to help isolate the cause of the failure. When the SAN Volume Controller 2145-8F2 software is loaded, additional testing takes place which ensures that all of the required hardware and software components are installed and functioning correctly. During the additional testing, the word Booting is displayed on the front panel along with a boot progress code and a progress bar.

If a test failure occurs, the word `Failed` is displayed on the front panel along with a boot progress code. If the booting progress bar fails to move to the right for two minutes, the test process is hung. Refer to the boot progress code to isolate the failure.

The service controller performs internal checks and is vital to the operation of the SAN Volume Controller 2145-8F2. When an internal check fails, the SAN Volume Controller 2145-8F2 does not operate. Ignore messages on the front panel are displayed when the front panel error LED is illuminated.

Note: Because the error LED stays lit when you program the microcode on the service controller, it does not indicate 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 2145-8F2 displays critical failure information on the front panel display or sends noncritical failure information to the SAN Volume Controller 2145-8F2 cluster error log. If the SAN Volume Controller 2145-8F2 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.

SAN Volume Controller 2145-4F2

If a critical failure is detected during the tests, the SAN Volume Controller 2145-4F2 software is not loaded and no additional fault information is provided. When the SAN Volume Controller 2145-4F2 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 and is vital to the operation of the SAN Volume Controller 2145-4F2. When an internal check fails, the SAN Volume Controller 2145-4F2 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 2145-4F2 displays critical failure information on the front panel display or sends noncritical failure information to the SAN Volume Controller 2145-4F2 cluster error log. If the SAN Volume Controller 2145-4F2 cannot communicate with the UPS, it displays a boot failure error message on the front panel display. Additional 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 must 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 detects the loss of power and continues to run on battery power until all data held in memory is saved to the internal disk drive. This increases the time that is required to make the cluster operational when input power is restored and severely increases the time that is required to recover from an unexpected loss of power that might occur before the UPS batteries can fully recharge.

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, you must press the power button on the UPS units before you press 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.

Perform the following steps to determine the fibre-channel port speed:

1. Select any fibre-channel port from the front panel.
2. Press and hold **Down**.
3. Press and release **Select**.
4. Release **Down**.
5. Press **Select** again to cancel the text display or wait 60 seconds and the text display cancels itself.

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

```
svcinfo lsccluster 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.

Perform the following steps 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 issuing the `svctask chcluster` command.

This is a customer task that 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, you can display the cluster IP address on the front panel 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 is 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 84

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

Chapter 2. UPS

The uninterruptible power supply (UPS) provides the SAN Volume Controller with a secondary power source if you lose power from your primary power source due to power failures, power sags, power surges, or line noise. The SAN Volume Controller 2145-8F2 supports the 2145 uninterruptible power supply-1U (2145 UPS-1U), but does not support the 2145 uninterruptible power supply (2145 UPS). The SAN Volume Controller 2145-4F2 supports both the 2145 UPS-1U and the 2145 UPS.

Important: The SAN Volume Controller 2145-8F2 can only operate with the 2145 UPS-1U.

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 dynamic random access memory (DRAM) in the event of an unexpected loss of external power. Data is saved to the SAN Volume Controller internal disk. The UPS units are required to power the SAN Volume Controllers even if the input power source is itself uninterruptible. Figure 11 on page 48 and Figure 10 provide illustrations of the two types of UPS units.

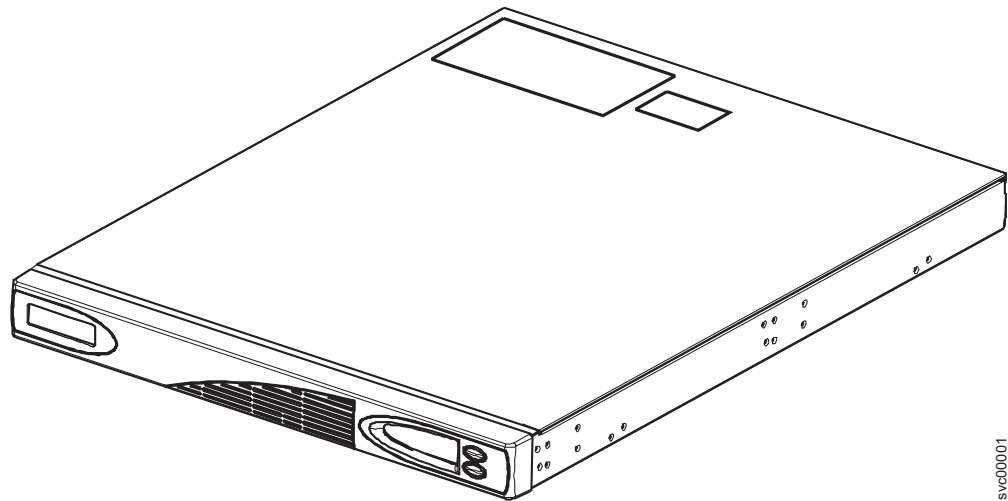


Figure 10. 2145 UPS-1U

svc00001

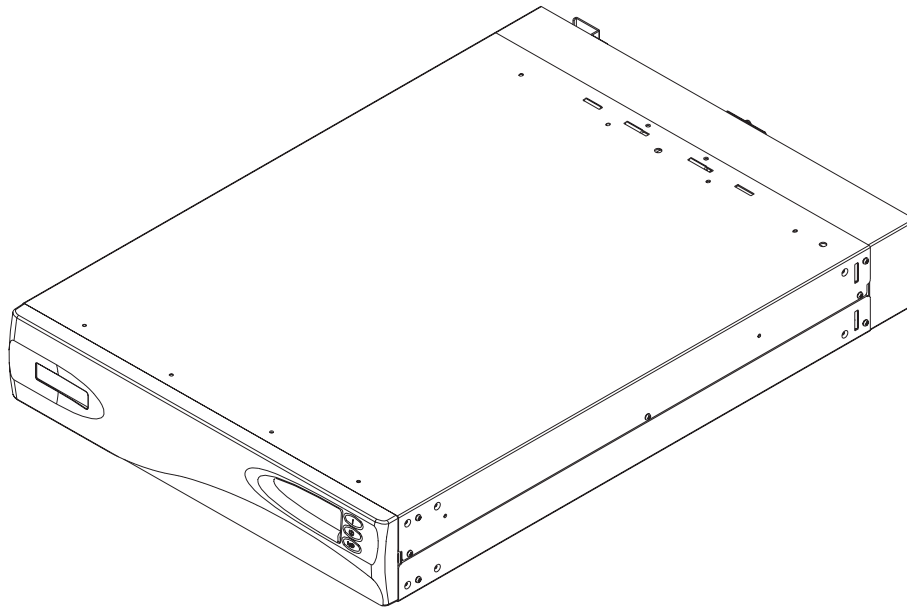


Figure 11. 2145 UPS

Note: The UPS maintains continuous SAN Volume Controller-specific communications with its attached SAN Volume Controller nodes. The SAN Volume Controller cannot operate without the UPS. The SAN Volume Controller UPS must be used in accordance with documented guidelines and procedures and must not power any equipment other than SAN Volume Controller nodes.

Related reference

“Connecting the 2145 UPS-1U to the SAN Volume Controller”

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

Connecting the 2145 UPS-1U to the SAN Volume Controller

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

For connection to the 2145 uninterruptible power supply-1U (2145 UPS-1U), each SAN Volume Controller of a pair must be connected to only one 2145 UPS-1U. You must have one 2145 UPS-1U per SAN Volume Controller.

Note: A cluster can contain no more than eight SAN Volume Controllers. The 2145 UPS-1U must be attached to a source that is both single phase and 220-240 V. The 2145 UPS-1U has an integrated circuit breaker and does not need external protection.

For connection to the 2145 uninterruptible power supply (2145 UPS), each SAN Volume Controller of a pair must be connected to a different UPS. Each UPS can support two SAN Volume Controllers.

Note: You must have two 2145 UPSs 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.

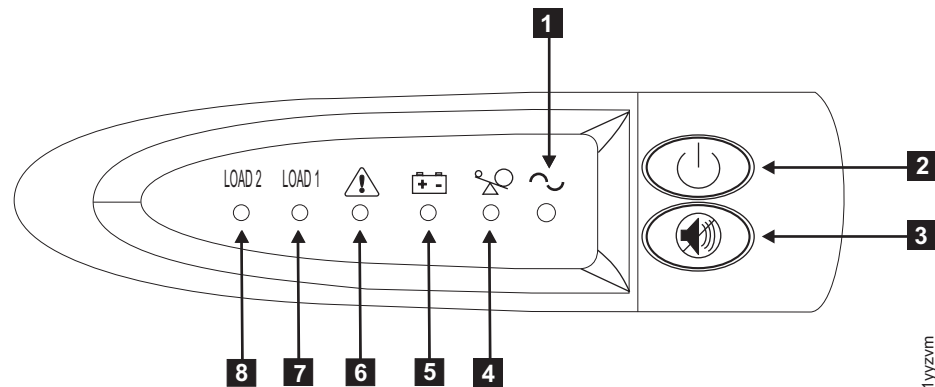
The 2145 UPS requires a dedicated branch circuit that meets the following specifications:

- 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 2145 UPS-1U

All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) 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 50

The power-on indicator is displayed when the 2145 uninterruptible power supply-1U (2145 UPS-1U) is functioning.

“On/off button” on page 50

The on/off button turns the power on or turns the power off to the 2145 uninterruptible power supply-1U (2145 UPS-1U).

“Test and alarm reset button” on page 50

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

“Overload indicator” on page 51

The overload indicator is illuminated when the capacity of the 2145 uninterruptible power supply-1U (2145 UPS-1U) is exceeded.

“On-battery indicator” on page 51

The on-battery indicator glows yellow when the 2145 uninterruptible power supply-1U (2145 UPS-1U) is powered by the battery. This indicates that the main power source has failed.

“Service indicator” on page 51

If the service indicator on the 2145 uninterruptible power supply-1U (2145 UPS-1U) is flashing red, maintenance is required.

“Load segment 1 indicator” on page 52

The load segment 1 indicator on the 2145 uninterruptible power supply-1U (2145 UPS-1U) is not currently used.

“Load segment 2 indicator” on page 52

The load segment 2 indicator on the 2145 uninterruptible power supply-1U (2145 UPS-1U) is lit (green) when power is available to load segment 2.

Power-on indicator

The power-on indicator is displayed when the 2145 uninterruptible power supply-1U (2145 UPS-1U) is functioning.

When the power-on indicator is a steady green, the 2145 UPS-1U is active.

Related reference

“Controls and indicators for the 2145 UPS-1U” on page 49

All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) are located on the front panel assembly.

On/off button

The on/off button turns the power on or turns the power off to the 2145 uninterruptible power supply-1U (2145 UPS-1U).

Turning on the 2145 UPS-1U

After connecting the 2145 UPS-1U to the outlet, it will be in *standby* mode until you turn it on. Press and hold the on/off button until the power-on indicator is illuminated (approximately 5 seconds). A self-test is initiated that takes approximately 10 seconds, during which time the indicators are turned on and off several times. The 2145 UPS-1U then enters *normal* mode.

Turning off the 2145 UPS-1U

Press and hold the on/off button until the power-on light is extinguished (approximately 5 seconds). This places the 2145 UPS-1U in *standby* mode. You must then unplug the 2145 UPS-1U to power-off the unit.

Related reference

“Controls and indicators for the 2145 UPS-1U” on page 49

All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) 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 2145 uninterruptible power supply (2145 UPS) and the 2145 uninterruptible power supply-1U (2145 UPS-1U).

Related reference

“Controls and indicators for the 2145 UPS-1U” on page 49

All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) are located on the front panel assembly.

Overload indicator

The overload indicator is illuminated when the capacity of the 2145 uninterruptible power supply-1U (2145 UPS-1U) is exceeded.

If the overload indicator is on, go to the 2145 UPS-1U MAP to resolve the problem.

Related tasks

“MAP 5150: 2145 UPS-1U” on page 181

MAP 5150: 2145 UPS-1U helps you solve problems that have occurred in the 2145 uninterruptible power supply-1U (2145 UPS-1U) systems used on a SAN Volume Controller.

Related reference

“Controls and indicators for the 2145 UPS-1U” on page 49

All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) are located on the front panel assembly.

On-battery indicator

The on-battery indicator glows yellow when the 2145 uninterruptible power supply-1U (2145 UPS-1U) is powered by the battery. This indicates that the main power source has failed.

If the on-battery indicator is on, go to the 2145 UPS-1U MAP to resolve the problem.

Related tasks

“MAP 5150: 2145 UPS-1U” on page 181

MAP 5150: 2145 UPS-1U helps you solve problems that have occurred in the 2145 uninterruptible power supply-1U (2145 UPS-1U) systems used on a SAN Volume Controller.

Related reference

“Controls and indicators for the 2145 UPS-1U” on page 49

All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) are located on the front panel assembly.

Service indicator

If the service indicator on the 2145 uninterruptible power supply-1U (2145 UPS-1U) is flashing red, maintenance is required.

If the service indicator is on, go to the 2145 UPS-1U MAP to resolve the problem.

Related tasks

“MAP 5150: 2145 UPS-1U” on page 181

MAP 5150: 2145 UPS-1U helps you solve problems that have occurred in the 2145 uninterruptible power supply-1U (2145 UPS-1U) systems used on a SAN Volume Controller.

Related reference

“Controls and indicators for the 2145 UPS-1U” on page 49

All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) are located on the front panel assembly.

Load segment 1 indicator

The load segment 1 indicator on the 2145 uninterruptible power supply-1U (2145 UPS-1U) is not currently used.

Note: Load segment 1 is unused by the SAN Volume Controller. When the 2145 UPS-1U is configured by the SAN Volume Controller, this load segment is disabled. During normal operation, the load segment 1 indicator is off.

Related reference

“Controls and indicators for the 2145 UPS-1U” on page 49

All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) are located on the front panel assembly.

“Hardware for the 2145 UPS-1U”

The 2145 uninterruptible power supply-1U (2145 UPS-1U) hardware is shown in the following graphics.

Load segment 2 indicator

The load segment 2 indicator on the 2145 uninterruptible power supply-1U (2145 UPS-1U) is lit (green) when power is available to load segment 2.

When the load segment 2 indicator is green, the 2145 UPS-1U is running normally and power is available to this segment.

See the 2145 UPS-1U hardware documentation for the location of the power outlets for this segment.

Related reference

“Controls and indicators for the 2145 UPS-1U” on page 49

All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) are located on the front panel assembly.

“Hardware for the 2145 UPS-1U”

The 2145 uninterruptible power supply-1U (2145 UPS-1U) hardware is shown in the following graphics.

Hardware for the 2145 UPS-1U

The 2145 uninterruptible power supply-1U (2145 UPS-1U) hardware is shown in the following graphics.

Locations for the 2145 UPS-1U connectors

The following diagrams illustrate the hardware for the 2145 UPS-1U:

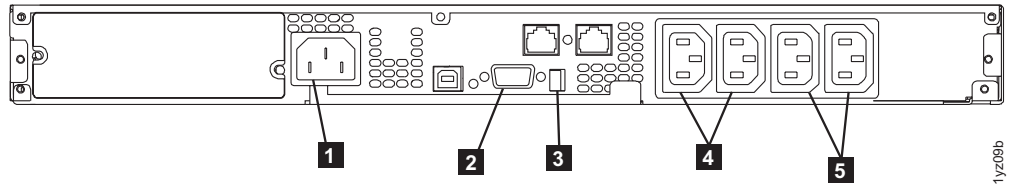


Figure 12. 2145 UPS-1U connectors and switches

- 1** Main power connectors
- 2** Communication port
- 3** Dip switches
- 4** Load segment 1 receptacles
- 5** Load segment 2 receptacles

Note: The dip switches are used to configure the input and output voltage ranges. Because this function is performed by the SAN Volume Controller software, both switches must be left in the Off position. See Figure 13.

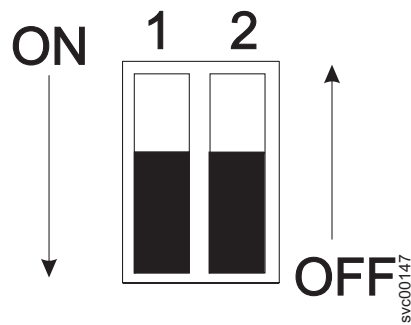
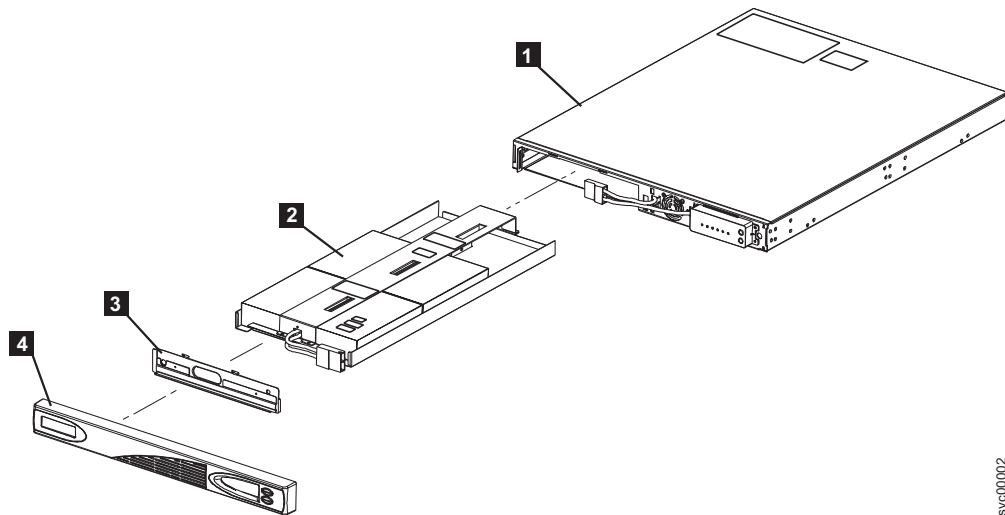


Figure 13. 2145 UPS-1U dip switches

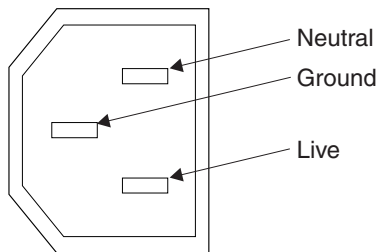
Hardware locations for the 2145 UPS-1U



svc00002

- 1** Frame assembly
- 2** Battery pack assembly
- 3** Battery plate
- 4** Front panel assembly

2145 UPS-1U power connector



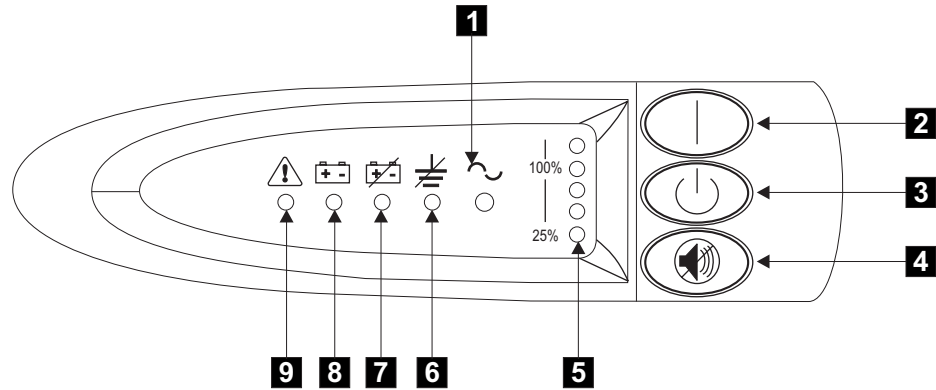
Related information

Appendix A, "Parts catalog," on page 327

Part numbers are available for the different parts and field replaceable units (FRUs) of the SAN Volume Controller and the uninterruptible power supply.

Controls and indicators for the 2145 UPS

All controls for the 2145 uninterruptible power supply (2145 UPS) 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 56

The mode indicator provides status information on the 2145 uninterruptible power supply (2145 UPS) and is located on the front panel.

“On button” on page 56

The on button turns on the main power to the 2145 uninterruptible power supply (2145 UPS).

“Off button” on page 56

The off button turns off the main power to the 2145 uninterruptible power supply (2145 UPS).

“Test and alarm reset button” on page 50

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

“Load-level indicators” on page 57

The load-level indicators show the percentage of the 2145 uninterruptible power supply (2145 UPS) capacity that the SAN Volume Controller 2145-4F2 is using.

“Site wiring fault indicators” on page 57

The site wiring fault indicator on the 2145 uninterruptible power supply (2145 UPS) shows that either a ground wire connection does not exist or the live and neutral wires are reversed in the input power connection.

“Battery service indicator” on page 57

The battery service indicator is located on the front panel of the 2145 uninterruptible power supply (2145 UPS) and shows that the charge in the battery has become low while the 2145 UPS is in battery mode.

“Battery mode indicator” on page 57

The battery mode indicator shows that the 2145 uninterruptible power supply (2145 UPS) is operating on batteries.

“General alarm indicator” on page 57

The general alarm indicator on the 2145 uninterruptible power supply (2145 UPS) turns on when a power or temperature problem occurs.

Mode indicator

The mode indicator provides status information on the 2145 uninterruptible power supply (2145 UPS) and is located on the front panel.

When the mode indicator is a steady green, the 2145 UPS is in normal mode. The 2145 UPS checks and charges its battery as necessary.

When the mode indicator is flashing green, the 2145 UPS is in standby mode. Standby mode means that the 2145 UPS is turned off but is still connected to the main power source. No power is available from the 2145 UPS output sockets but the 2145 UPS monitors and charges its battery as necessary.

When the mode indicator is steady red, the 2145 UPS is in bypass mode because of one of the following conditions:

- The 2145 UPS has overheated
- The 2145 UPS has an overload condition of 103% through 110% for 30 seconds
- The 2145 UPS detects a fault in the battery or in the 2145 UPS 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 2145-4F2 is connected to the 2145 UPS, the SAN Volume Controller 2145-4F2 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 2145-4F2 has been connected to a 2145 UPS and powered on.

On button

The on button turns on the main power to the 2145 uninterruptible power supply (2145 UPS).

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 2145 UPS.

Off button

The off button turns off the main power to the 2145 uninterruptible power supply (2145 UPS).

Attention: Never use the off button unless you are specifically directed to in the instructions that are provided with the SAN Volume Controller 2145-4F2. If you press it at any other time, you might lose data in the cluster if the other 2145 UPS 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 2145 UPS remains in standby mode until you disconnect the 2145 UPS from the main power outlet.

Load-level indicators

The load-level indicators show the percentage of the 2145 uninterruptible power supply (2145 UPS) capacity that the SAN Volume Controller 2145-4F2 is using.

When all the indicators are lit, the power requirements of the SAN Volume Controller 2145-4F2 have exceeded the capacity of the 2145 UPS.

Site wiring fault indicators

The site wiring fault indicator on the 2145 uninterruptible power supply (2145 UPS) 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 2145 UPS.

Battery service indicator

The battery service indicator is located on the front panel of the 2145 uninterruptible power supply (2145 UPS) and shows that the charge in the battery has become low while the 2145 UPS is in battery mode.

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 2145 UPS shuts down, it automatically restarts when the main power returns.

Battery mode indicator

The battery mode indicator shows that the 2145 uninterruptible power supply (2145 UPS) is operating on batteries.

The battery mode indicator comes on when the main power source fails and the 2145 UPS is running on battery power. The alarm beeps once every five seconds. When main power returns, the 2145 UPS returns to normal mode and the battery recharges. The battery mode indicator then goes out and the alarm stops.

General alarm indicator

The general alarm indicator on the 2145 uninterruptible power supply (2145 UPS) turns on when a power or temperature problem occurs.

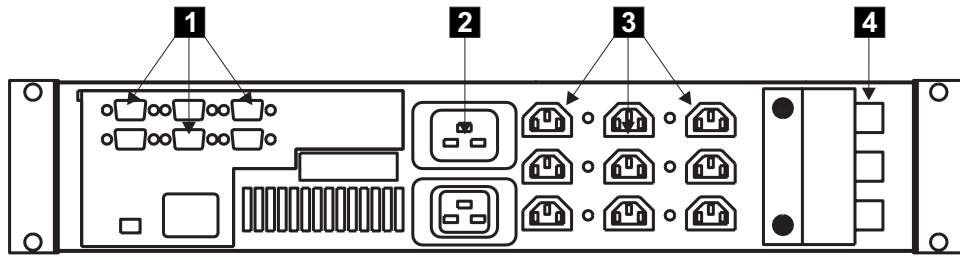
When the general alarm indicator is accompanied by the audio alarm beeping every five seconds, the battery is low. If the audio alarm is continuous, the internal temperature of the 2145 UPS is too high or there has been a momentary output overload.

Hardware for the 2145 UPS

The 2145 uninterruptible power supply (2145 UPS) hardware is shown in the following graphics.

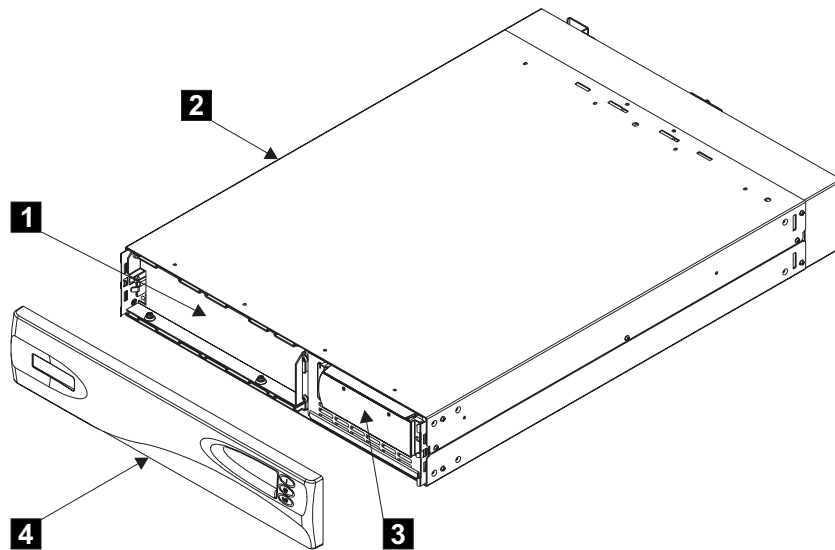
Locations for the 2145 UPS connectors and circuit breakers

The following diagrams illustrate the hardware for the 2145 UPS:



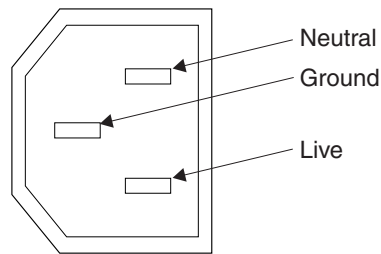
- 1** Signal cable connectors
- 2** Main power connector
- 3** Output connectors
- 4** Circuit breakers

Hardware locations for the 2145 UPS



- 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 327

Part numbers are available for the different parts and field replaceable units (FRUs) of the SAN Volume Controller and the uninterruptible power supply.

Preparing your UPS environment

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

The 2145 UPS-1U

When you configure the 2145 uninterruptible power supply-1U (2145 UPS-1U), the voltage that is supplied to the 2145 UPS-1U must be 220 – 240 V, single phase.

Note: The 2145 UPS-1U has an integrated circuit breaker and does not require external protection.

The 2145 UPS

Use the following considerations when configuring the 2145 uninterruptible power supply (2145 UPS):

- Each 2145 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 2145 UPS.
- The voltage that is supplied to the 2145 UPS 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 UPSs:

- 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.

UPS specifications

2145 UPS-1U 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)

2145 UPS 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

	2145 UPS-1U	2145 UPS
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)

The heat output parameters are the following:

- 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 2145-8F2 environment” on page 34
Before installing the SAN Volume Controller 2145-8F2, you must 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 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 indicates the source of the software error. The additional data might look like this:

```
Assert File /build/lodestone/030129_nd/src/user/vg/vgagentvt.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 is 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 is taken automatically 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 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 SAN Volume Controller software packages”

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

“Determining the version of the SAN Volume Controller software” on page 64

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

“Recovering from software installation failures” on page 65

During the automatic software installation process, the installation process might stop if certain conditions occur.

Obtaining the SAN Volume Controller software packages

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

To obtain a revised software package, access the following site to download the type of software package that you need:

<http://www.ibm.com/servers/storage/support/virtual/2145.html>

The software packages are available as full packages and as upgrade packages in TAR format and in CD 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 CD image format is suitable for creating a standard ISO format CD if it is necessary to deliver a CD 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.

Related tasks

“Determining the version of the SAN Volume Controller software” on page 64

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

“Recovering from software installation failures” on page 65

During the automatic software installation process, the installation process might stop if certain conditions occur.

Related reference

Chapter 3, “Installing and maintaining the software for the SAN Volume Controller,” on page 61

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

Installing or upgrading the SAN Volume Controller software

The SAN Volume Controller software can be installed or upgraded after you have downloaded the software package from the SAN Volume Controller Web site.

Software package

The software installation or upgrade procedure copies the new software level to the cluster and starts an automatic installation process. During the installation process, each node is restarted. While each node restarts, there might be some degradation in the maximum I/O rate that can be sustained by the cluster. The amount of time that is needed to install or upgrade the software is dependent on the size of the cluster and the size of the software update package. The size of the software update package is determined by the number of components that are being replaced. After all the nodes in the cluster are successfully restarted with the new software level, the new software level is automatically committed.

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, these restrictions are documented on the SAN Volume Controller Web site that you use to download the software packages. During the software upgrade procedure, only the following SAN Volume Controller commands are operational from the time the install process starts to the time that the new software level is committed, or until the process has been backed-out. All other commands fail with a message that indicates a software upgrade is in progress. The object type in the following commands is xxxx:

- `svcinfolxxxx`
- `svcinfolxxxxcandidate`
- `svcinfolxxxxprogress`
- `svcinfolxxxxmember`
- `svcinfolxxxxextent`
- `svcinfolxxxxdumps`
- `svcinfolcaterrlog`
- `svcinfolserrlogbyxxxx`
- `svcinfolcaterrlogbyseqnum`
- `svctask rmnode`
- `svcservicetask rmnode`

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

Related tasks

“Obtaining the SAN Volume Controller software packages” on page 62
You must obtain software packages from the SAN Volume Controller Web site. Before you retrieve the software package, determine the type of packs and format that you need.

“Determining the version of the SAN Volume Controller software” on page 64
The current software version can be obtained from the node or cluster vital product data (VPD).

“Recovering from software installation failures” on page 65
During the automatic software installation process, the installation process might stop if certain conditions occur.

Related reference

Chapter 3, “Installing and maintaining the software for the SAN Volume Controller,” on page 61

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

Determining the version of the SAN Volume Controller software

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

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

Note: 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 version release number of 1, a major number of 2, and a minor number of 3. This number determines whether software versions can be reverted to the previous version. It is not possible to revert 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.

Issue the following command on the CLI to determine the version of the software that is currently running on the cluster:

```
svcinfolcluster <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:

```
IBM_2145:your_cluster_name:admin>svcinfolcluster 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” on page 65

During the automatic software installation process, the installation process might stop if certain conditions occur.

Related reference

Chapter 3, “Installing and maintaining the software for the SAN Volume Controller,” on page 61
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 might stop 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 are downgraded to the original code level. Check the error log to determine the reason for the failure before attempting to upgrade the cluster.

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. This might take up to four hours for an eight-node cluster.
3. Restart the software installation.

Related tasks

“Determining the version of the SAN Volume Controller software” on page 64
The current software version can be obtained from the node or cluster vital product data (VPD).

Related reference

Chapter 3, “Installing and maintaining the software for the SAN Volume Controller,” on page 61
The software for the SAN Volume Controller is preinstalled on all nodes.

Replacing a version of the software

You might need to remove a version of software to replace it 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.

Note: 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 version release number of 1, a major number of 2, and a minor number of 3. This number determines whether software versions can revert to the previous version. It is not possible to revert 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.

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.
 - 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.
 - 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 SAN Volume Controller software packages” on page 62

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

“Determining the version of the SAN Volume Controller software” on page 64

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

“Recovering from software installation failures” on page 65

During the automatic software installation process, the installation process might stop if certain conditions occur.

Related reference

Chapter 3, “Installing and maintaining the software for the SAN Volume Controller,” on page 61

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 the related topic about 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 the related topic about cluster VPD for information about the fields for the cluster.

Related reference

“Understanding the fields for the node VPD”

You must be aware of the fields for the node vital product data (VPD).

“Understanding the fields for the cluster VPD” on page 70

You must be aware of the fields for the cluster vital product data (VPD).

Displaying the vital product data

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

Issue 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

You must be aware of the fields for the node vital product data (VPD).

Table 2 shows the fields you see for the system board.

Table 2. 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 3 shows the fields you see for each processor that is installed.

Table 3. Fields for the processors

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

Table 4 shows the fields that are repeated for each cache installed on each processor.

Table 4. Fields that are repeated for cache installed on each processor

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

Table 5 shows the fields that you see for each fan that is installed.

Table 5. Fields for the fans

Item	Field name
Fan	Part Number
	Location

Table 6 shows the fields that are repeated for each installed memory module.

Table 6. Fields that are repeated for each installed memory module

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

Table 7 shows the fields that are repeated for each installed fibre-channel adapter card.

Table 7. 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 8 shows the fields that are repeated for each SCSI and IDE device that is installed.

Table 8. 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 9 shows the fields that are specific to the node software.

Table 9. Fields that are specific to the node software

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

Table 10 shows the fields that are provided for the front panel.

Table 10. Fields that are provided for the front panel

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

Table 11 shows the fields that are provided for the uninterruptible power supply (UPS) assembly that is powering the node.

Table 11. 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”

You must be aware of the fields for the cluster vital product data (VPD).

Understanding the fields for the cluster VPD

You must be aware of the fields for the cluster vital product data (VPD).

Table 12 shows the fields that are provided for the cluster.

Table 12. 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 VDIs
	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 67

You must be aware of the fields for the node vital product data (VPD).

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.

See the related topics for the SAN Volume Controller indicators and switches.

Related concepts

“Boot progress indicator”

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

“Boot failed”

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

“Hardware boot” on page 74

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.

“Node rescue request” on page 74

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

“Power failure” on page 74

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

“Powering off” on page 75

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

“Restarting” on page 75

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

“Shutting down” on page 75

The **front panel indicator** tracks shutdown operations.

Related reference

“Error codes” on page 76

Error codes are displayed on the front panel display.

Boot progress indicator

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

Figure 14 shows that the node is starting.



Figure 14. 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 the topic containing the boot codes where you can find a description of the failure and the appropriate steps you must perform to correct the failure.

Related information

“Understanding the boot codes” on page 138

The boot codes are displayed on the screen when a node is booting.

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. The cause might be a hardware failure or the software on the hard disk drive is missing or damaged. Refer to the *IBM TotalStorage SAN Volume Controller: Service Guide* topic on how to determine a hardware boot failure.

Node rescue request

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

Figure 15 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 15. Node-rescue-request display

Power failure

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

Figure 16 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 node cache data to the internal disk drive. When the progress bar reaches zero, the node powers 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

Powering off

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

Figure 17 shows that the power button has been pressed and the node is powering off. Powering off may take several minutes.



Figure 17. Powering-off display

The progress bar moves to the left when the power is removed.

Restarting

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



The software is restarting for one of the following reasons:

- An internal error was detected
- A power-off operation 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 to the left until the node finishes saving its data. After the data is saved, the progress bar moves to the right during the restart operation.

Shutting down

The **front panel indicator** tracks shutdown operations.

Figure 18 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 to the 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 shuts down.



Figure 18. Shutting down display

Error codes

Error codes are displayed on the front panel display.

For descriptions of the error codes that are displayed on the front panel display, see the various error code topics for a full description of the failure and the actions that you must perform to correct the failure.

SAN Volume Controller menu options

Menu options are available on the front panel display on the SAN Volume Controller.

Menu options enable you to review the operational status of the cluster, node, and external interfaces. They also provide access to the tools that you need to install and service the node.

Figure 19 shows the sequence of the menu options. Only one option at a time is displayed on the front panel display. For some options, additional data is displayed on line 2. The first option displayed is the cluster option.

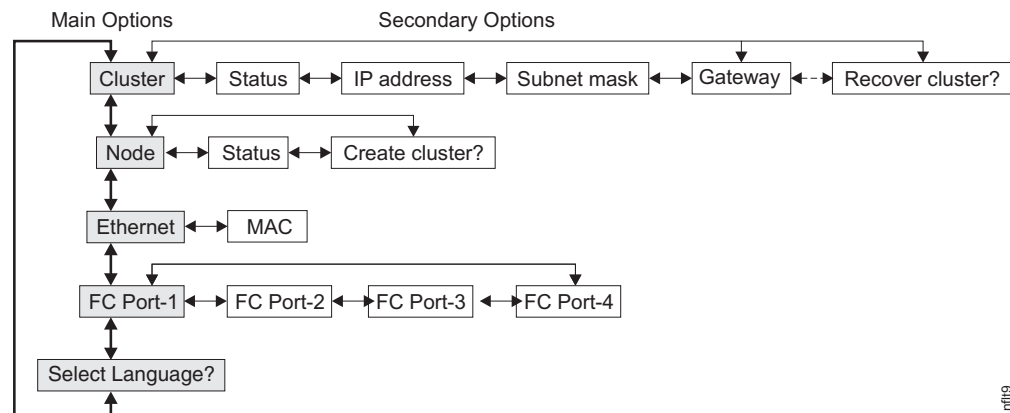


Figure 19. Menu options sequence

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

Note: Messages might not display fully on the screen. You might see a right angle bracket (>) on the right-hand 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 the 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.

There are five main options available:

- Cluster
- Node
- Ethernet
- FC port-1 through 4
- Select language

Related concepts

“Cluster options”

The main cluster option from the menu can display the cluster name, IP address, or can be blank.

“Node options” on page 78

The node option displays the identification number or name of the SAN Volume Controller.

Related tasks

“Navigating through the change language menu” on page 87

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

Related reference

“Ethernet option” on page 82

The Ethernet option displays the operational states of the Ethernet port and its media access control (MAC) address.

“Fibre channel port-1 through 4 option” on page 83

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

“Select language? option” on page 83

The language displayed can be changed from the menu.

“Create cluster menu navigation” on page 85

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

Cluster options

The main cluster option from the menu can display the cluster name, IP address, or can be blank.

The main cluster option displays the cluster name that the user has assigned. If no name has been assigned, the IP address of the cluster is displayed. If this SAN Volume Controller is not assigned to a cluster, the field is blank.

Related reference

“Recover cluster navigation” on page 84

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

Status

Status is indicated on the front panel.

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

The IP address is used to access the cluster from the command line tools or Web browser.

This field contains the existing Ethernet IP address of the cluster. It is set during the create-cluster operation. 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

The subnet mask address is set when a cluster is created.

The subnet mask option displays the subnet mask address. It is set during the create-cluster operation.

Related reference

“Gateway”

The gateway address is set when the cluster is created.

Gateway

The gateway address is set when the cluster is created.

The gateway option displays the gateway address.

Related concepts

“Subnet mask”

The subnet mask address is set when a cluster is created.

Node options

The node option displays the identification number or name of the SAN Volume Controller.

The main node option displays the identification number of the SAN Volume Controller or the name of the SAN Volume Controller if the user has assigned a name.

Related concepts

“Hardware boot” on page 74

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 reference

“Node identification label” on page 24

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

“Cluster identification” on page 44

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

“Create cluster menu navigation” on page 85

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

Status

Use the status to diagnose cluster failures.

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?

Clusters can be created from the Create Cluster menu.

The Create cluster? field allows you to create a new SAN Volume Controller cluster. Press the select button to go to the create cluster menu. Figure 20 on page 80 shows the create cluster menu sequence.

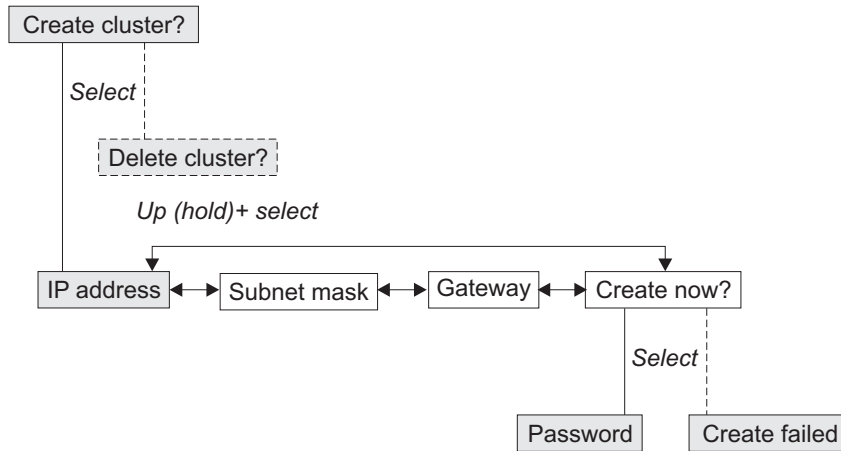


Figure 20. Create cluster? menu sequence

Press the left and right buttons to navigate through the secondary options that are associated the Create cluster? option. When you have navigated to the desired option, press the select button. The secondary options available include:

- IP address
- Subnet mask
- Gateway
- Create now?

IP address

The IP address lets you display or change the Ethernet IP address for the cluster that you are going to create. Be sure to verify the correct IP address with the customer before you create a cluster.

Attention: If you change the IP address, ensure that you type the correct address. Otherwise, you cannot access the cluster using the command line tools or a Web browser.

Perform the following steps to change the IP address:

1. From the Create Cluster? option, press the select button. The IP address option displays.
2. Press the select button again. The first IP address number is highlighted.
3. Press the up button if you want to increase the value that is displayed; press the down button if you want to decrease that value. If you want to *quickly* increase or decrease the value, hold the up or down button, respectively.

Note: If you want to disable the fast increase/decrease function, press and hold the down button, press and release the select button, then release the down button. The disabling of fast increase/decrease lasts until cluster creation is completed or until the feature is re-enabled. While disabled, if the up or down buttons are pressed and held, the value will increase or decrease once every two seconds. To re-enable fast increase/decrease, press and hold the up button, press and release the select button, then release the up button.

4. Press the right or left buttons to move to the number field that you want to update.

5. Repeat steps 3 on page 80 and 4 on page 80 for each number field that you want to update.
6. Press the select button to complete the change.

Press the right button to display the next secondary option or the left button to display the previous options.

Subnet Mask

This option lets you display or change the subnet mask.

Attention: If you change the subnet mask address, ensure that you type the correct address. Otherwise, you cannot access the cluster using the command line tools or a Web browser.

Perform the following steps to change the subnet mask:

1. Press the select button. The first subnet mask number is displayed.
2. Press the up button if you want to increase the value that is displayed; press the down button if you want to decrease that value. If you want to *quickly* increase or decrease the value, hold the up or down button, respectively.

Note: If you want to disable the fast increase/decrease function, press and hold the down button, press and release the select button, then release the down button. The disabling of fast increase/decrease lasts until cluster creation is completed or until the feature is re-enabled. While disabled, if the up or down buttons are pressed and held, the value will increase or decrease once every two seconds. To re-enable fast increase/decrease, press and hold the up button, press and release the select button, then release the up button.

3. Press the right or 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.

Gateway

Attention: If you change the gateway address, ensure that you type the correct address. Otherwise, you cannot access the cluster from the Web interface or from a 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. Press the up button if you want to increase the value that is displayed; press the down button if you want to decrease that value. If you want to *quickly* increase or decrease the value, hold the up or down button, respectively.

Note: If you want to disable the fast increase/decrease function, press and hold the down button, press and release the select button, then release the down button. The disabling of fast increase/decrease lasts until cluster creation is completed or until the feature is re-enabled. While disabled, if the up or down buttons are pressed and held, the value will increase or decrease once every two seconds. To re-enable fast increase/decrease, press and hold the up button, press and release the select button, then release the up button.

3. Press the right or left buttons to move to the number field that you want to update.
4. Repeat steps 2 on page 81 and 3 for each number field that you want to update.
5. Press the select button to complete the change.

Create Now?

This option lets you start an operation to create a cluster. Press the Select button to start the operation.

If the create operation is successful, Password is displayed on line 1. The password that you can use to access the cluster is displayed on line 2. Be sure to immediately record the password; it is required on the first attempt to access the cluster.

Attention: The password displays for only 60 seconds, or until a front panel button is pressed. The cluster is created only after the password display is cleared.

If the create operation fails, Create Failed: is displayed on line 1 of the service display screen. Line 2 displays one of two possible error codes that you can use to isolate the cause of the failure.

Press the up button to return to the Create Cluster? option.

Delete 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 can use the command-line interface (CLI) or the graphical user interface (GUI) to delete a cluster. However, if you cannot use the CLI or GUI, you can use Delete Cluster to force the deletion of a node from a cluster. To delete a node from the cluster:

- Press and hold the up button.
- Press and release the select button.
- Release the up button.

The SAN Volume Controller is deleted from the cluster, and the node is restarted. The display then returns to the default menu. The create cluster option must be selected again to start the create option.

Use the up button to return to the Create Cluster? option.

Ethernet option

The Ethernet option displays the operational states of the Ethernet port and its media access control (MAC) address.

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 opens its Ethernet port and gains 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.

Press the right button to display the MAC address of the Ethernet port.

Fibre channel port-1 through 4 option

The fibre channel 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 caused this result:

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

Select language? option

The language displayed can be changed from the menu.

The Select language? option allows you to change the language that is displayed on the menu. Figure 21 shows the Select language? option sequence.

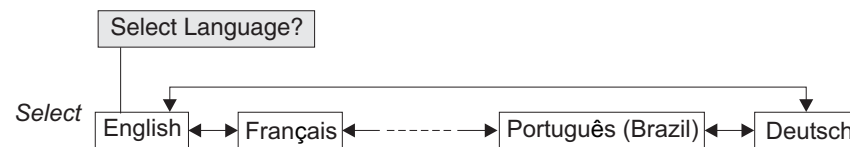


Figure 21. Select language? menu sequence

Press the right button to display the national language that you want. When the required language is displayed, press the select button.

Note: Line 1 of the menu displays an option. For some options, additional data is displayed on line 2. If, the front panel is set to Japanese, Korean, or Chinese, the menu shows only line 1. To display line 2, press the select button. To return to the option on line 1, press the select button again.

The following languages are available:

- English
- French
- German
- Italian
- Japanese
- Korean
- Portuguese

- Spanish
- Chinese (simplified)
- Chinese (traditional)

If you do not understand the language that is displayed, wait for at least 60 seconds for the menu to reset to the default option. To select the required language, perform the following steps:

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 required language is displayed.
6. Press the select button.

Note: This procedure does not work if the node is displaying a boot error.

Related tasks

“Navigating through the change language menu” on page 87

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 22) 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.

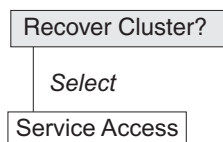


Figure 22. Recover cluster navigation

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 is displayed 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.

Related concepts

“SAN Volume Controller menu options” on page 76

Menu options are available on the front panel display on the SAN Volume Controller.

Create cluster menu navigation

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

Figure 23 on page 86 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.

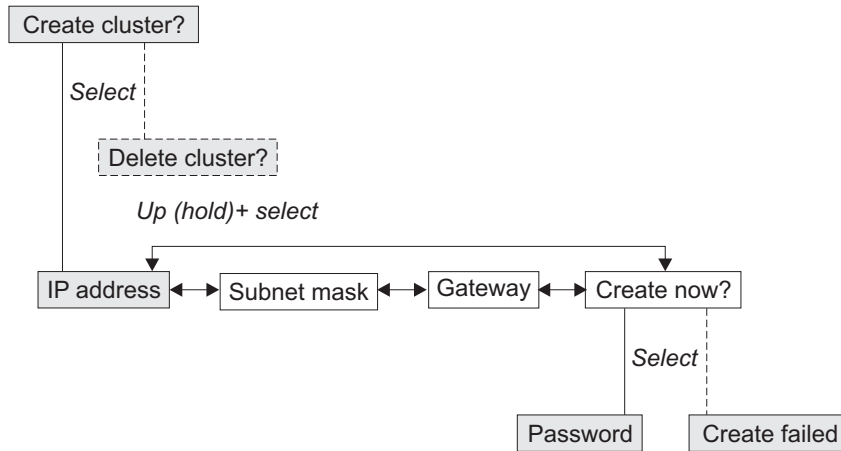


Figure 23. Create-cluster navigation menu sequence

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

Related concepts

“SAN Volume Controller menu options” on page 76

Menu options are available on the front panel display on the SAN Volume Controller.

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 (CLI) or the graphical user interface (GUI) to delete a cluster. However, if you cannot use the CLI or GUI, 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 returns 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.

Password

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

Create failed

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

Related information

“Understanding the create cluster error codes” on page 163

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.

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 24 shows an illustration of what is displayed on the front panel when you want to select a language.



Figure 24. 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. For SAN Volume Controller 2145-8F2 users, you can also use the light path diagnostics to help find the cause of errors.

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 168

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 is 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. After it is full, newer entries replace the oldest entries. If the old entry has not been fixed, it is not 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 one that you made more than 25 hours after the first entry, a new error record is opened.

Related tasks

“MAP 5000: Start” on page 168

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 (CLI) or the SAN Volume Controller Console.

Perform the following steps to view the full contents of each error log entry using the CLI:

1. Issue the `svctask dumperrlog` command to create a dump file that contains the current error log data.
2. Issue the `svcinfolerrlogdumps` command to determine the name of the dump file that you have just created.
3. Issue the `secure copy` command to copy the dump file to the master console.

You can then view the file with a text viewer.

Figure 25 on page 91 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 Aug 23 16:02:18 2005
                   : Epoch + 1051027338
Last Error Timestamp  : Tue Aug 23 16:02:18 2005
                   : 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

```

Figure 25. Example of an error log entry when you use the command-line interface

You can also view the error log using the SAN Volume Controller Console. The error log contains a large number of entries but by using this method of viewing the log you can select only the type of information that you need. For example, if you are repairing a fault, you might only want to select **Show unfixed errors**.

Figure 26 on page 92 shows an example of an error log summary that is displayed when you select the type of information that you want.

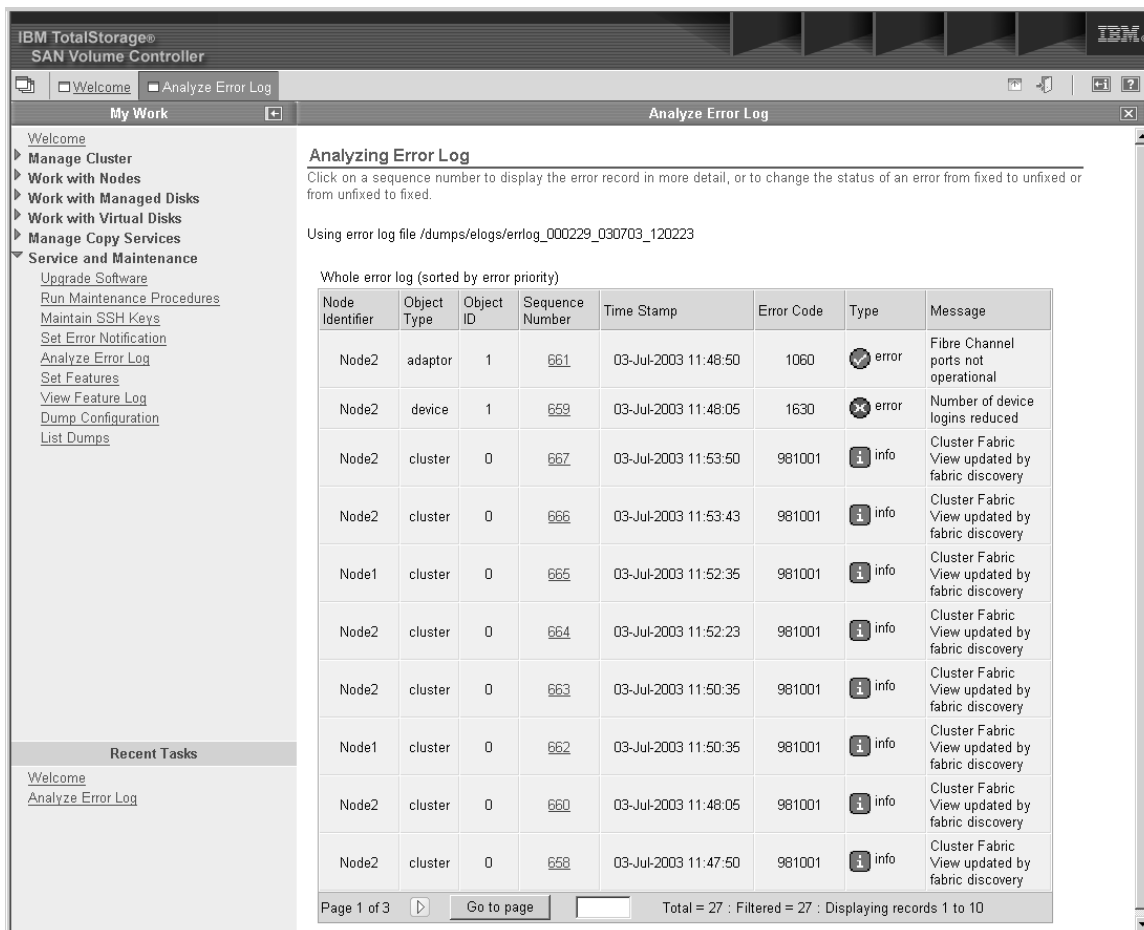




Figure 26. Example of an Error Log Summary

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 13 describes the meaning of the information in the type field.

Table 13. 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 13. 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.
	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 14 describes the fields you see when you use the command-line interface to produce an error log.

Table 14. 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 15 on page 94.
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 16 on page 94.
Type flag	For details of the type flag. See Table 18 on page 95.

Table 14. Description of data fields for the error log (continued)

Data field	Description
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 data describe the ASCII format.

Table 15 describes the types of error log objects.

Table 15. 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 16 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 16. Description of flags for the error log

Flag	Description
Unfixed	This log entry requires a service action.
Fixed	This entry is marked as fixed. It remains in the error log until it becomes the oldest record in the log, at which point it is 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 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 17 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 17. 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	<i>not possible</i>
1	0	0	UNFIXED
1	0	1	<i>not possible</i>
1	1	0	FIXED
1	1	1	<i>not possible</i>

Table 18 shows the types of error log flags.

Table 18. 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 are included with the trap data 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 also marks 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 causes an SNMP trap to be raised if requested by the user.

Related tasks

“Viewing the error log” on page 90

You can view the error log by using the SAN Volume Controller command-line interface (CLI) 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:

- A simple network management protocol (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 problem machine history (PMH) report is 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 37

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

Related information

“Defining cluster error codes” on page 99

Every cluster error code includes an error code number, a description, action, and possible field replaceable units (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 may 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 about the action you must perform to correct the problem. Do not exchange field replaceable units (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 168

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

“MAP 5700: Repair verification” on page 201

MAP 5700: Repair verification helps you to verify that field replaceable units (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 213

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 field replaceable unit (FRU) names for the SAN Volume Controller.

Glossary of FRU names for the SAN Volume Controller 2145-8F2

Name of FRU	Header
Frame assembly	A complete SAN Volume Controller 2145-8F2 with the exception of the fibre-channel cards and the service controller
Fibre-channel host bus adapter (HBA) (full height)	The SAN Volume Controller 2145-8F2 is connected to the fibre-channel fabric through the fibre-channel HBA. The full height card assembly is located in PCI slot 2.
Riser card, PCI (full height)	An interconnection card that provides the interface between the system board and the PCI card in slot 2
Fibre-channel HBA (low profile)	The SAN Volume Controller 2145-8F2 is connected to the fibre-channel fabric through the fibre-channel HBA. The low profile card assembly is located in PCI slot 1.
Riser card, PCI (low profile)	An interconnection card that provides the interface between the system board and the PCI card in slot 1
Disk drive assembly	A SATA (serial advanced technology attachment) disk drive assembly for the SAN Volume Controller 2145-8F2
Memory module	A 1 GB ECC DRR2 memory module
Microprocessor	The 3.0 GHz microprocessor on the system board
Voltage regulator module (VRM)	The microprocessor’s VRM
Power supply assembly	An assembly that provides DC power to the SAN Volume Controller 2145-8F2

Name of FRU	Header
Power backplane	An assembly that provides a power interface between the system board and the power supply assembly
CMOS battery	A 3.0V battery on the system board that maintains power to backup the system BIOS settings
Fan power cable	A kit that provides the cables for connecting the fan backplanes to the system board
Front panel signal cable	A ribbon cable that connects the operator information panel to the system board
Fan backplane	A kit that provides all fan holder and fan backplane assemblies
Operator information panel	The information panel that includes the power control button and the light path diagnostics LEDs
Fan, 40×40×28	The single fan assemblies located in fan positions 1-3
Fan, 40×40×56	The double fan assemblies located in fan positions 4-7
Input power cable assembly (SAN Volume Controller 2145-8F2 to 2145 uninterruptible power supply-1U (2145 UPS-1U))	The cable assembly that provides the power and signal connections between the SAN Volume Controller 2145-8F2 and the 2145 uninterruptible power supply-1U (2145 UPS-1U) assembly

Glossary of FRU names for the SAN Volume Controller 2145-4F2

Name of FRU	Definition
Frame assembly	The frame of the SAN Volume Controller 2145-4F2 and the cables that it contains.
Disk drive assembly	The disk drive of the SAN Volume Controller 2145-4F2.
Disk drive cables	The SCSI and power cable, which connect the disk drive to the SAN Volume Controller 2145-4F2 system board.
Fibre channel cable	A cable that connects the SAN Volume Controller 2145-4F2 to a fibre-channel network.
Ethernet cable	A cable that connects the SAN Volume Controller 2145-4F2 to an Ethernet network.
Power supply assembly	An assembly that provides dc power to the SAN Volume Controller 2145-4F2. 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.

Name of FRU	Definition
Fan assembly	An assembly that contains a dc cooling fan. The SAN Volume Controller 2145-4F2 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 2145-4F2 is connected to the fibre-channel fabric.
Service controller	The FRU that provides the service functions of the SAN Volume Controller 2145-4F2. 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 2145-4F2. This FRU includes the front panel, controls, and display.

Related reference

“Definitions of the FRU names for the UPS”

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

Definitions of the FRU names for the UPS

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

Name of FRU	Description
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.
Battery plate	Cover plate for the 2145 UPS-1U's battery pack assembly
Input power cable, power distribution unit to the UPS	Power cord for the 2145 UPS-1U
Front panel	Removable FRU for the 2145 UPS-1U
UPS electronics assembly	The unit that controls the functions of the 2145 UPS. This FRU is part of the 2145 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 97

The glossary below provides field replaceable unit (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 field replaceable units (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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

- 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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

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

1014 **Explanation**

Fibre-channel adapter in slot 1 is 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:

SAN Volume Controller 2145-8F2

- Dual port fibre-channel HBA - low profile (90%)
- PCI riser card - low profile (8%)
- Frame assembly (2%)

SAN Volume Controller 2145-4F2

N/A

1015 **Explanation**

Fibre-channel adapter in slot 2 is 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:

SAN Volume Controller 2145-8F2

- Dual port fibre-channel host bus adapter - full height (90%)

- PCI riser card (8%)
- Frame assembly (2%)

SAN Volume Controller 2145-4F2

N/A

1016 **Explanation**

Fibre-channel adapter (4 port) in slot 2 is 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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

N/A

1017 **Explanation**

Fibre-channel adapter in slot 1 PCI bus error.

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:

SAN Volume Controller 2145-8F2

- Dual port fibre-channel host bus adapter - low profile (80%)
- PCI riser card (10%)
- Frame assembly (10%)

SAN Volume Controller 2145-4F2

N/A

1018 **Explanation**

Fibre-channel adapter in slot 2 PCI fault.

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:

SAN Volume Controller 2145-8F2

- Dual port fibre-channel host bus adapter - full height (80%)
- PCI riser card (10%)
- Frame assembly (10%)

SAN Volume Controller 2145-4F2

N/A

1019 **Explanation**

Fibre-channel adapter (4-port) in slot 2 PCI fault.

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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

N/A

1020

Explanation

The SAN Volume Controller system board is failing.

Action

1. Replace the system board assembly.
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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

System board assembly (100%)

1025

Explanation

The SAN Volume Controller system assembly is failing.

Action

1. Go to the light path diagnostic MAP and perform the light path diagnostic procedures.
2. If the light path diagnostic procedure isolates the FRU, mark this error as "fixed" and to the repair verification MAP. If you have just replaced a FRU but it has not corrected the problem, ensure that the FRU is installed correctly and go to the next step.
3. Replace the frame assembly.
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 SAN Volume Controller.
5. Go to repair verification MAP.

Possible Cause-FRUs or other:

SAN Volume Controller 2145-8F2

Frame assembly (100%)

SAN Volume Controller 2145-4F2

N/A

1040

Explanation

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

Note: The node containing the flash module has not been rejected by the cluster.

Action

1. Replace the service controller assembly.
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:

SAN Volume Controller 2145-8F2

Service controller (100%)

SAN Volume Controller 2145-4F2

Service controller (100%)

1044

Explanation

A service controller read failure occurred.

Action

1. Replace the service controller.
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:

SAN Volume Controller 2145-8F2

Service controller (100%)

SAN Volume Controller 2145-4F2

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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

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

1054

Explanation

Fibre-channel adapter in slot 1 adapter present but failed.

Action

1. Replace the fibre-channel adapter.
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:

SAN Volume Controller 2145-8F2

Dual port fibre-channel host bus adapter - low profile (100%)

SAN Volume Controller 2145-4F2

N/A

1056

Explanation

Fibre-channel adapter in slot 2 adapter present but failed.

Action

1. Replace the fibre-channel adapter.
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:

SAN Volume Controller 2145-8F2

Dual port fibre-channel host bus adapter - full height (100%)

SAN Volume Controller 2145-4F2

N/A

1057 Explanation

Fibre-channel adapter (4 port) in slot 2 adapter present but failed.

Action

1. Exchange the FRU for 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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

N/A

1060 Explanation

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

Action

1. Go to MAP 5600: Fibre-channel to isolate and repair the problem.
2. Go to the repair verification MAP.

Possible Cause-FRUs or other:

SAN Volume Controller 2145-8F2

- Fibre-channel cable (80%)
- Dual port fibre-channel host bus adapter (fibre-channel MAP isolates to the correct type) (10%)

SAN Volume Controller 2145-4F2

- Fibre-channel cable (80%)
- Fibre-channel adapter port (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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

- Microprocessor fan (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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

- Disk drive fan (90%)
- System board assembly (10%)

1075

Explanation

The ambient temperature threshold of the node was 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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

- PSU (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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

System board assembly (100%)

1090 **Explanation**

One or more fans (40x40x28) are failing.

Action

1. Determine the failing fan(s) from the fan indicator on the system board or from the text of the error data in the log.
2. If all fans on the fan backplane are failing or if no fan fault lights are illuminated, verify that the cable between the fan backplane and the system board is connected.
3. Exchange the FRU for a new FRU. See "Possible Cause-FRUs or other" after the last action in this section.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

SAN Volume Controller 2145-8F2

- Fan 40x40x28 (98%)
- Fan power cable assembly (2%)

SAN Volume Controller 2145-4F2

N/A

1091

Explanation

One or more fans (40x40x56) are failing.

Action

1. Determine the failing fan(s) from the fan indicator on the system board or from the text of the error data in the log.
2. If all fans on the fan backplane are failing or if no fan fault lights are illuminated, verify that the cable between the fan backplane and the system board is connected.
3. Exchange the FRU for a new FRU. See "Possible Cause-FRUs or other" after the last action in this section.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

SAN Volume Controller 2145-8F2

- Fan 40x40x56 (98%)
- Fan power cable assembly (2%)

SAN Volume Controller 2145-4F2

N/A

1092

Explanation

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

Action

1. Exchange the FRU for a new FRU.
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:

SAN Volume Controller 2145-8F2

Frame assembly (100%)

SAN Volume Controller 2145-4F2

N/A

1093

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.
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:

SAN Volume Controller 2145-8F2

Frame assembly (100%)

SAN Volume Controller 2145-4F2

N/A

Other

Airflow blockage

1094

Explanation

The ambient temperature threshold 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 errors as fixed.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

None

Other:

System environment (100%)

1100

Explanation

One of the voltages that is monitored on the system board is over the set threshold.

Action

1. See the light path diagnostic MAP.
2. If the light path diagnostic MAP does not resolve the issue, exchange the frame assembly.
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:

SAN Volume Controller 2145-8F2

- Light path diagnostic MAP FRUs (98%)
- Frame assembly (2%)

SAN Volume Controller 2145-4F2

N/A

1105 Explanation

One of the voltages that is monitored on the system board is under the set threshold.

Action

1. Check the cable connections.
2. See the light path diagnostic MAP.
3. If the light path diagnostic MAP does not resolve the issue, exchange the frame assembly.
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 SAN Volume Controller.
5. Go to repair verification MAP.

Possible Cause-FRUs or other:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

N/A

1110

Explanation

The power management board detected a voltage that is outside of the set thresholds.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See "Possible Cause-FRUs or other."
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:

SAN Volume Controller 2145-8F2

- Power backplane (90%)
- Power supply assembly (5%)
- Frame assembly (5%)

SAN Volume Controller 2145-4F2

N/A

1135

Explanation

The 2145 UPS has reported an ambient over temperature. The uninterruptible power supply (UPS) switches to Bypass mode to allow the UPS to cool.

Action

1. Power off the nodes attached to the UPS.
2. Turn off the UPS, and then unplug the UPS from the main power source.
3. Ensure that the air vents of the UPS are not obstructed.
4. Ensure that the air flow around the UPS is not restricted.
5. Wait for at least five minutes, and then restart the UPS. 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:

UPS electronics unit (50%)

Other:

The system ambient temperature is outside the specification (50%)

1136 **Explanation**

The 2145 UPS-1U has reported an ambient over temperature. The uninterruptible power supply (UPS) switches to bypass mode to allow the UPS to cool.

Action

1. Power off the node attached to the UPS.
2. Turn off the UPS, and then unplug the UPS from the main power source.
3. Ensure that the air vents of the UPS are not obstructed.
4. Ensure that the air flow around the UPS is not restricted.
5. Wait for at least five minutes, and then restart the UPS. 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:

UPS assembly (50%)

Other:

The system ambient temperature is outside the specification (50%)

1140 **Explanation**

The 2145 UPS has reported that it has a problem with the input AC power.

Action

1. Check the input AC power, whether it is missing or out of specification. Correct if necessary. Otherwise, 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:

- UPS input power cable (10%)
- Electronics assembly (10%)

Other:

- The input AC power is missing (40%)
- The input AC power is not in specification (40%)

1141

Explanation

The 2145 UPS-1U has reported that it has a problem with the input AC power.

Action

1. Check the input AC power, whether it is missing or out of specification. Correct if necessary. Otherwise, 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:

- UPS input power cable (10%)
- Electronics assembly (10%)

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 2145 UPS is failing.

Action

1. If other SAN Volume Controllers that are using this uninterruptible power supply are reporting this error, exchange the UPS electronics unit for a new one.
2. If only this SAN Volume Controller is reporting the problem, check that the signal cable, 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:

SAN Volume Controller 2145-8F2

N/A

SAN Volume Controller 2145-4F2

- Power cable assembly (40%)
- UPS electronics assembly (30%)
- System board assembly (25%)
- SAN Volume Controller disk drive assembly (5%)

1146 **Explanation**

The signal connection between a SAN Volume Controller and its 2145 UPS-1U is failing.

Action

1. 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:

SAN Volume Controller 2145-8F2

- Power cable assembly (40%)
- UPS assembly (30%)
- Frame assembly (30%)

SAN Volume Controller 2145-4F2

- Power cable assembly (40%)
- UPS assembly (30%)
- System board assembly (25%)
- SAN Volume Controller disk drive assembly (5%)

1150 **Explanation**

Data that the SAN Volume Controller has received from the UPS suggests the 2145 UPS 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 UPS suggests the 2145 UPS-1U 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 UPS.

Action

1. List the cluster's SAN Volume Controllers and check that SAN Volume Controllers in the same I/O group are connected to a different UPS.
2. Connect one of the SAN Volume Controllers as identified in step 1 to a different UPS.
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**

The output load on the 2145 UPS exceeds the specification (reported by UPS alarm bits).

Action

1. Ensure that only SAN Volume Controllers are receiving power from the uninterruptible power supply (UPS). Ensure that there are no switches or disk controllers that are connected to the UPS.
2. Remove each connected SAN Volume Controller input power in turn, until the output overload is removed.
3. Exchange the FRUs for new FRUs in the sequence shown, on the overcurrent SAN Volume Controller. See "Possible Cause-FRU or other" after the last action in this section.
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:

- Power cable assembly (50%)
- Power supply assembly (40%)
- UPS electronics assembly (10%)

1161

Explanation

The output load on the 2145 UPS-1U exceeds the specifications (reported by UPS alarm bits).

Action

1. Ensure that only SAN Volume Controllers are receiving power from the uninterruptible power supply (UPS). Also, ensure that no other devices are connected to the UPS.
2. 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 UPS.
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 (50%)
- Power supply assembly (40%)
- UPS assembly (10%)

1165

Explanation

The 2145 UPS output load is unexpectedly high. The UPS 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 (UPS). Ensure that there are no switches or disk controllers that are connected to the UPS.
2. Check node status (refer to "Checking the status of the node"). If all nodes show a status of "online," the problem no longer exists. Mark the error that you have just repaired "fixed" and go to the repair verification MAP.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

None

Other:

- Configuration error

1166 Explanation

The 2145 UPS-1U output load is unexpectedly high. The UPS output is possibly connected to an extra non-SAN Volume Controller load.

Action

1. Ensure that there are no other devices that are connected to the uninterruptible power supply (UPS).
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 UPS.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- UPS assembly (5%)

Other:

- Configuration error (95%)

1170 Explanation

2145 UPS electronics fault (reported by the UPS alarm bits).

Action

1. Replace the uninterruptible power supply (UPS) electronics assembly.
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:

UPS electronics assembly (100%)

1171 **Explanation**

2145 UPS-1U electronics fault (reported by the UPS alarm bits).

Action

1. Replace the uninterruptible power supply (UPS) electronics assembly.
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:

UPS electronics assembly (100%)

1175 **Explanation**

A problem has occurred with the UPS frame fault (reported by UPS alarm bits).

Action

1. Replace the UPS assembly.
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:

UPS assembly (100%)

1180 **Explanation**

2145 UPS battery fault (reported by UPS alarm bits).

Action

1. Replace the 2145 UPS battery assembly.
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:

UPS battery assembly (100%)

1181 Explanation

2145 UPS-1U battery fault (reported by 2145 UPS-1U alarm bits).

Action

1. Replace the UPS-1U battery assembly.
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:

UPS battery assembly (100%)

1185 Explanation

2145 UPS fault, with no specific FRU identified (reported by UPS alarm bits).

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:

- UPS electronics assembly (60%)
- UPS battery assembly (20%)
- UPS assembly (20%)

1186 Explanation

A problem has occurred in the 2145 UPS-1U, with no specific FRU identified (reported by 2145 UPS-1U alarm bits).

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:

UPS assembly (100%)

1190 **Explanation**

The 2145 UPS battery has reached its end of life.

Action

1. Replace the 2145 UPS battery assembly.
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:

UPS battery assembly (100%)

1191 **Explanation**

The 2145 UPS-1U battery has reached its end of life.

Action

1. Replace the 2145 UPS-1U battery assembly.
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:

UPS battery assembly (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 is automatically 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:

- None

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/disks. Documentation related to this procedure can be found in "Rescanning the fibre-channel network for new MDisks."
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 fault (100%)

1210

Explanation

A local fibre-channel port has been excluded.

Action

1. Repair faults in the order shown.
2. Check the status of the disk controllers. If all disk controllers show a "good" status, mark the error that you just repaired, "fixed."
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- Fibre-channel cable assembly (80%)
- Fibre-channel adapter (10%)

Other:

- Fibre-channel network fabric fault (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. From the MDisk, determine the failing disk controller ID.
3. Refer to the service documentation for the disk controller and the fibre-channel network to resolve the reported problem.
4. After the disk drive is repaired, start a cluster discovery operation to recover the excluded fibre-channel port. Documentation related to this procedure can be found in "Rescanning the fibre-channel network for new MDisks."
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. 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:

- Enclosure/controller fault (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. Documentation related to this procedure can be found in "Rescanning the fibre-channel network for new MDisks."
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/controller fault.
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:

Enclosure/controller fault (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 does 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:

Enclosure/controller fault (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. List the MDisks. If at least one MDisk shows a mode of managed, mark the error as "fixed."
4. If the customer is unable to make the appropriate changes, ask IBM Software Support for assistance.
5. 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 (MDisk) 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. Include the MDisks into the cluster.
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:

Enclosure/controller fault (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 enclosures/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.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Enclosure/controller fault
- Fibre-channel switch

1360

Explanation

A SAN transport error occurred. This error has been reported because the SAN Volume Controller performed error recovery procedures in response to SAN component associated transport errors. The problem is probably caused by a failure of a component of the SAN.

Action

1. View the error log entry to determine the node that logged the problem. Determine the SAN Volume Controller node or controller that the problem was logged against.
2. Perform fibre-channel switch problem determination and repair procedures for the switches connected to the SAN Volume Controller node or controller.
3. Perform fibre-channel cabling problem determination and repair procedures for the cables connected to the SAN Volume Controller node or controller.
4. If any problems are found and resolved in step 2 and 3, mark this error as "fixed."
5. If no switch or cable 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:

- Fibre-channel switch
- Fibre-channel cabling

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 and any other fibre-channel network components.
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:

- Enclosure/controller fault
- Fibre-channel switch

1400

Explanation

The SAN Volume Controller cannot detect the Ethernet connection.

Action

1. Go to the Ethernet MAP.
2. Go to the repair verification MAP.

Possible Cause-FRUs or other:

SAN Volume Controller 2145-8F2

- Ethernet cable (25%)
- Frame assembly (25%)

SAN Volume Controller 2145-4F2

- Ethernet cable (25%)
- System board assembly (25%)

Other:

- Ethernet cable is disconnected (25%)
- Ethernet hub fault (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 fault in 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 fault (100%)

1610

Explanation

Media errors on back-end managed disk.

Action

1. Repair fault in the enclosure/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:

Enclosure/controller fault (100%)

1620

Explanation

An Mdisk group is offline.

Action

1. Repair the faults in the order shown.
2. Start a cluster discovery operation. Documentation related to this procedure can be found in "Rescanning the fibre-channel network for new MDisks."

3. Check managed disk (MDisk) status. If all MDisks show a status of "online," mark the error that you have just repaired as "fixed." If any MDisks 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 fault (50%)
- Enclosure/controller fault (50%)

1625 Explanation

Incorrect disk controller configuration. Details of the configuration error are contained in bytes 32 to 63 of the Additional Sense Data field of the error log entry and the error report.

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. Start a cluster discovery operation. Documentation related to this procedure can be found in "Rescanning the fibre-channel network for new MDisks."
3. Mark the error that you have just repaired as "fixed."
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Enclosure/controller fault

1630 Explanation

The number of device logins was reduced. One possible cause is that the user intentionally reconfigured the system.

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: `svcinfolsccontroller 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 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. Documentation related to this procedure can be found in "Rescanning the fibre-channel network for new MDisks."
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 fault (50%)
- Enclosure/controller fault (50%)

1660 **Explanation**

The initialization of the managed disk has failed.

Action

1. View the error log entry to identify the managed disk (MDisk) 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. Include the MDisk into the cluster.
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:

Enclosure/controller fault (100%)

1670 **Explanation**

The CMOS battery on the SAN Volume Controller system board failed.

Action

1. Replace the CMOS battery.
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 persistent I/O error.

Action

1. Restart Metro Mirror after fixing errors of higher priority.
2. Mark the error that you have just repaired as "fixed."
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

1800 Explanation

The SAN has been zoned incorrectly. This has resulted in more than 512 other ports on the SAN logging into one port of a SAN Volume Controller node.

Action

1. Ask the user to reconfigure the SAN.
2. Mark the error as "fixed."
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Fibre-channel switch configuration error
- Fibre-channel switch

1850 Explanation

A cluster recovery operation was performed but data on one or more VDisks has not been recovered.

Action

1. The support center will direct the user to restore the data on the affected virtual disks (VDisks).
2. When the VDisk data has been restored or the user has chosen not to restore the data, mark the error as "fixed."

3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

1900 Explanation

A FlashCopy, Trigger Prepare command has failed because a cache flush has failed.

Action

1. Correct higher priority errors, and then retry the Trigger Prepare command.
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 sense 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, and then prepare and start the FlashCopy task again.
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 persistent I/O error.

Action

1. Correct the higher priority errors and then restart Metro Mirror.
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 causes the migrate operation to be restarted. If the restart fails, a new error is logged.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

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 stops and waits 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 fail with a message indicating that a software upgrade operation is still in progress. The downgrade operation might take up to four hours for an eight-node cluster.

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/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 controllers.
2. Save the dump data with the configuration dump and logged data dump.
3. Contact IBM Product Support to resolve the problem.
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%)
- Enclosure/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.
2. Save dump data with configuration dump and logged data dump.
3. Contact IBM Product Support to resolve the problem.
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.
2. Save dump data with configuration dump and logged data dump.
3. Contact IBM Product Support to resolve the problem.
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. Attempt to restore the software by using the node rescue procedure.
2. If node rescue fails, perform the actions that are described for any failing node rescue code or procedure.

Related concepts

"Hardware boot" on page 74

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 150

If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can reinstall the software on the SAN Volume Controller by using the node rescue procedure.

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 may then use the code to isolate the fault. If the boot code detects a hardware error, `Failed` is displayed and you may then use the error code to isolate the failure. See Figure 27 on page 139 for a view of the boot progress display.

Figure 27. Boot progress display

Related concepts

“Boot progress indicator” on page 73

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

100

Explanation

Boot is running.

Action

If the progress bar has not advanced for two minutes, the boot process has hung. Go to the hardware boot MAP to resolve the problem.

Possible Cause-FRUs or other:

SAN Volume Controller 2145-8F2

- Service controller (95%)
- Frame assembly (5%)

SAN Volume Controller 2145-4F2

- Service controller (95%)
- System board (5%)

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:

SAN Volume Controller 2145-8F2

- Disk drive assembly (98%)
- Frame assembly (2%)

SAN Volume Controller 2145-4F2

- 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 ten 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:

SAN Volume Controller 2145-8F2

- Frame assembly (100%)

SAN Volume Controller 2145-4F2

- 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 powers 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:

SAN Volume Controller 2145-8F2

- Frame assembly (100%)

SAN Volume Controller 2145-4F2

- System board assembly (100%)

180 Explanation

There is a fault in the communications cable, the serial interface in the uninterruptible power supply (UPS), or SAN Volume Controller.

Action

Check that the communications cable is correctly plugged in to the SAN Volume Controller and the UPS. If the cable is plugged in correctly, replace the FRUs in the order shown.

Possible Cause-FRUs or other:

SAN Volume Controller 2145-8F2

- SAN Volume Controller power cable assembly (40%)
- 2145 UPS-1U electronics assembly (30%)
- SAN Volume Controller frame assembly (30%)

SAN Volume Controller 2145-4F2

- SAN Volume Controller power cable assembly (40%)
- UPS electronics assembly (30%)
- SAN Volume Controller system board assembly (25%)
- SAN Volume Controller disk drive assembly (5%)

181 Explanation

There is a fault in the communications cable, the serial interface in the uninterruptible power supply (UPS), or SAN Volume Controller.

Action

Check that the communications cable is correctly plugged in to the SAN Volume Controller and the UPS. If the cable is plugged in correctly, replace the FRUs in the order shown.

Possible Cause-FRUs or other:

SAN Volume Controller 2145-8F2

- SAN Volume Controller power cable assembly (40%)
- UPS (30%)
- SAN Volume Controller frame assembly (30%)

SAN Volume Controller 2145-4F2

- SAN Volume Controller power cable assembly (40%)
- UPS assembly (30%)
- SAN Volume Controller system board assembly (25%)
- SAN Volume Controller disk drive assembly (5%)

185 Explanation

The uninterruptible power supply (UPS) 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:

- UPS battery assembly (100%)

186 Explanation

The uninterruptible power supply (UPS) 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.") After replacing the battery assembly, if the UPS service indicator is on, press and hold the UPS Test button for three seconds to start the self-test and verify the repair.

Possible Cause-FRUs or other:

- UPS battery assembly (100%)

190 Explanation

A problem has occurred with the uninterruptible power supply (UPS) battery.

Action

Exchange the FRU for a new FRU. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

- UPS battery assembly (100%)

191 Explanation

A problem has occurred with the uninterruptible power supply (UPS) battery.

Action

Exchange the FRU for a new FRU. (See "Possible Cause-FRUs or other.") After replacing the battery assembly, if the UPS service indicator is on, press and hold the UPS Test button for three seconds to start the self-test and verify the repair.

Possible Cause-FRUs or other:

- UPS battery assembly
- UPS assembly

195 Explanation

A problem has occurred with the uninterruptible power supply (UPS) electronics.

Action

Exchange the FRU for a new FRU. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

- UPS electronics assembly (100%)

196 Explanation

A problem has occurred with the uninterruptible power supply (UPS) electronics.

Action

Exchange the FRU for a new FRU. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

- UPS assembly

200 Explanation

A problem has occurred with the uninterruptible power supply (UPS).

Action

Exchange the FRU for a new FRU. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

- UPS (100%)

205 Explanation

A problem with output overload was reported by the uninterruptible power supply (UPS). This is assumed to be a false error, or the UPS 2145 would have powered off and its Load Level Indicator would be red.

Action

Replace the FRU. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

- UPS electronics assembly (100%)

206 Explanation

A problem with output overload has been reported by the uninterruptible power supply (UPS). The Overload Indicator on the UPS front panel is illuminated red.

Action

Ensure that only one SAN Volume Controller is receiving power from the UPS. Also ensure that no other devices are connected to the UPS.

Disconnect the SAN Volume Controller from the UPS. 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 UPS.

Possible Cause-FRUs or other:

- SAN Volume Controller power cable assembly (45%)
- SAN Volume Controller power supply assembly (45%)
- UPS (10%)

210 **Explanation**

A problem has occurred in the uninterruptible power supply (UPS). 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:

- UPS electronics assembly (40%)
- UPS battery assembly (40%)
- UPS (20%)

Other:

- None.

211 **Explanation**

A problem has occurred in the uninterruptible power supply (UPS).

Action

In the sequence shown, exchange the FRUs for new FRUs. See "Possible Cause-FRUs or other."

Possible Cause-FRUs or other:

- UPS (100%)

Other:

- None.

215 **Explanation**

A problem has occurred with the uninterruptible power supply (UPS) load (the SAN Volume Controller has detected that the current of the UPS exceeds the current that four SAN Volume Controllers need).

Action

1. Ensure also that only SAN Volume Controllers are receiving power from the UPS; that is, no switches or disk controllers are connected to the UPS.
2. If only one SAN Volume Controller is connected to the UPS, exchange the FRU for a new FRU. See "Possible Cause-FRU or other." If more than one SAN Volume Controller is connected to the UPS, disconnect the SAN Volume Controllers from the UPS and reconnect them one-at-a-time. While the problem persists, the nodes fail to boot with boot error code 215 displayed on the SAN Volume Controller front panel. When the first failure occurs, exchange the FRU for a new FRU. See "Possible Cause-FRU or other."

Possible Cause-FRUs or other:

- FRU: UPS electronics assembly (40%)
- FRU: SAN Volume Controller power supply assembly (10%)
- Other: Configuration error (50%)

216 Explanation

A problem has occurred with the uninterruptible power supply (UPS) load (the SAN Volume Controller has detected that the UPS current exceeds the current that one SAN Volume Controller needs).

Action

Ensure that only one SAN Volume Controller is receiving power from the UPS; that is, no other devices are connected to the UPS.

Possible Cause-FRUs or other:

- None.

220 Explanation

The uninterruptible power supply (UPS) is receiving input power that might be unstable or in low voltage conditions.

Action

Ask the customer to check the site power to the UPS 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:

- UPS input power cable (10%)
- UPS electronics assembly (10%)

Other:

- AC input power (80%)

221

Explanation

The uninterruptible power supply (UPS) 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 UPS 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:

- UPS input power cable (10%)
- UPS (10%)

Other:

- AC input power (80%)

225

Explanation

An incorrect type of uninterruptible power supply (UPS) has been installed.

Action

Exchange the UPS for one of the correct type.

Possible Cause-FRUs or other:

- UPS (100%)

226

Explanation

An incorrect type of uninterruptible power supply (UPS) has been installed.

Action

Exchange the UPS for one of the correct type.

Possible Cause-FRUs or other:

- UPS (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 (UPS) has been exceeded. The UPS shows a red warning light, and an alarm sounds. The UPS switches to bypass mode to lower the temperature.

Action

1. Turn off the UPS and unplug it from the power source.
2. Clear the vents and remove any heat sources.
3. Ensure that the air flow around the UPS is not restricted.
4. Wait at least five minutes, and then restart the UPS.
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:

- UPS electronics assembly (60%)
- UPS battery assembly (20%)
- UPS (20%)

241

Explanation

The ambient temperature threshold for the uninterruptible power supply (UPS) has been exceeded. The UPS shows a flashing red warning light, and an alarm sounds.

Action

1. Turn off the UPS and unplug it from the power source.
2. Clear the vents and remove any heat sources.
3. Ensure that the air flow around the UPS is not restricted.
4. Wait at least five minutes, and then restart the UPS.
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:

- UPS (100%)

Performing the node rescue

If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can reinstall the software on the SAN Volume Controller by using the node rescue procedure.

Attention: If you recently replaced the service controller and the disk drive as part of the same repair operation, node rescue fails. See the related information about replacing a disk drive and a service controller to resolve this issue.

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 copies all the node software from any other SAN Volume Controller that can be found on the fibre-channel fabric.

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 28).



Figure 28. 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, go to the hardware boot MAP to resolve the problem. When the node rescue starts, 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 is now 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 starts but might not continue until the failed node is 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 four hours for an eight-node cluster.

If the cables are correctly located and the node rescue request symbol still displays, replace the field replaceable units (FRUs) in the following sequence:

SAN Volume Controller 2145-8F2	SAN Volume Controller 2145-4F2
1. Service controller	1. Service controller
2. Frame assembly	2. System board assembly

Related tasks

“Deleting a node using the SAN Volume Controller Console application on the master console” on page 8

If it is required, you can delete a node from a cluster.

“Adding a node to a cluster using the SAN Volume Controller Console application on the master console” on page 9

You might have to add a node back into the cluster if it has been either removed or rejected by a cluster.

Related reference

“Replacing a disk drive and a service controller on the SAN Volume Controller” on page 286

When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the “new” service controller does not contain the operating system software required to do so.

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 and hold the **left** and **right** buttons on the front panel during a power-on cycle. The menu screen displays the Node rescue request. See the node rescue request topic. 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 29 shows an example of a displayed node rescue code.



Figure 29. Example of a displayed node rescue code

The three-digit code that is shown in Figure 29 represents a node rescue code.

Attention: If the 2145 uninterruptible power supply (2145 UPS) is only connected to this SAN Volume Controller, the 2145 UPS powers off within five minutes of a node-rescue process failure. For example, if a donor node cannot be found. When the problem that is preventing node rescue has been resolved, the 2145 UPS must be powered on before powering on the SAN Volume Controller.

Note: The 2145 uninterruptible power supply-1U (2145 UPS-1U) will not power off following a node rescue failure.

Related concepts

“Node rescue request” on page 74

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 continues.
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 was 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 30 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 30. 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 field replaceable unit (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 a memory module has failed or 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. For the SAN Volume Controller 2145-4F2, exchange the memory modules in this SAN Volume Controller 2145-4F2 for modules of the correct size. For the SAN Volume Controller 2145-8F2, if you have just replaced a memory module, check that the module that you have installed is the correct size, then go to the light path MAP to isolate any possible failed memory modules.

Possible Cause-FRUs or other:

- Memory module (100%)

511 Explanation

Memory bank 1 of the SAN Volume Controller is failing.

Action

For the SAN Volume Controller 2145-8F2, go to the light path MAP to resolve this problem.

For the SAN Volume Controller 2145-4F2, 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

For the SAN Volume Controller 2145-8F2, go to the light path MAP to resolve this problem.

For the SAN Volume Controller 2145-4F2, exchange both memory modules of bank 2 for new modules.

Possible Cause-FRUs or other:

- Memory module (100%)

514 Explanation

Memory bank 3 of the SAN Volume Controller is failing.

Action

Go to the light path MAP to resolve this problem.

Possible Cause-FRUs or other:

- Memory module (100%)

515

Explanation

Memory bank 4 of the SAN Volume Controller is failing.

Action

Go to the light path MAP to resolve this problem.

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:

SAN Volume Controller 2145-8F2

- Ethernet cable
- Frame assembly

SAN Volume Controller 2145-4F2

- 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 list the missing IDs for the SAN Volume Controllers

and the quorum disk controller. Each missing node is listed by its node ID. A missing quorum disk is listed as WWWWWWWWWWWWWWWWW/LL, where WWWWWWWWWWWWWWWWW is a WWPN on the disk controller that contains the missing quorum disk and LL is the Logical Unit Number (LUN) of the missing quorum disk on that 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 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.
 - e. Press and release the Select button.
 - f. Release the Up button. The node is deleted from the cluster and restarts.
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 and re-add the node. If the problem persists, exchange the FRUs for new FRUs in the sequence shown.

Possible Cause-FRUs or other:

SAN Volume Controller 2145-8F2

- Disk drive assembly (90%)
- Frame assembly (10%)

SAN Volume Controller 2145-4F2

- Disk drive assembly (45%)
- System board assembly (50%)
- Disk drive cables (5%)

Other:

- 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:

SAN Volume Controller 2145-8F2

- Disk drive assembly (90%)
- Frame assembly (10%)

SAN Volume Controller 2145-4F2

- System board assembly (50%)
- Disk drive assembly (45%)
- 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 is 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 2145-8F2

- SAN Volume Controller power cable (45%)
- Uninterruptible power supply assembly (45%)
- Frame assembly (10%)

SAN Volume Controller 2145-4F2

- 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 rejoins 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 from 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, 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:

SAN Volume Controller 2145-8F2

Service controller (100%)

SAN Volume Controller 2145-4F2

- Front panel assembly (50%)
- Service controller (50%)

Other:

- None

9xx **Explanation**

A cluster recovery action is required.

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.

Perform the following steps if you were sent here from either the Maintenance Analysis Procedures or the error codes:

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 redundant array of independent disk (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 168

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

Chapter 7. Maintenance analysis procedures

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 fails. The following MAPs are defined for the SAN Volume Controller:

- Start
- Power
- 2145 uninterruptible power supply-1U (2145 UPS-1U)
- 2145 uninterruptible power supply (2145 UPS)
- 2145 UPS-1U repair verification
- 2145 UPS repair verification
- Front panel
- Ethernet
- Fibre-channel
- Repair verification
- Light path
- Hardware boot

Note: Start all problem determination procedures and repair procedures with the light path MAP.

Related tasks

“MAP 5800: Light path” on page 203

MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

Using the maintenance analysis procedures

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

When you service one SAN Volume Controller, the other keeps the storage area network (SAN) operational. With concurrent maintenance, all field replaceable units (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 instructed to do so.

- To isolate the FRUs in the failing SAN Volume Controller, complete the actions and answer the questions given in these maintenance analysis procedures (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 on page 167 and 3 on page 167 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 verifying the repair.

Related tasks

“MAP 5700: Repair verification” on page 201

MAP 5700: Repair verification helps you to verify that field replaceable units (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 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 the MAPs, first read the topic about using the maintenance analysis procedures. This MAP is used for the SAN Volume Controller 2145-4F2 and for the SAN Volume Controller 2145-8F2. Be sure that you know which model you are using before you start this procedure. To determine which model you are working with, see the overview topic for the SAN Volume Controller.

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 user 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 instructed 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 169

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 or if the user has installed the “software master console” feature.

3. (from step 2)

Log on to the master console using the user ID and password provided by the user.

4. (from step 3)

Log in to the SAN Volume Controller Console using the user ID and password provided by the user, and launch the SAN Volume Controller application for the cluster you are repairing.

5. (from step 4 on page 168)

Does the SAN Volume Controller application start?

NO Go to step 8.

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.

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 168, 5, 6, and 7)

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 the topic about 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 powers on.

If the SAN Volume Controllers power on, go to step 9, otherwise go to the Power MAP.

9. (from step 8)

Is the front panel check light on any SAN Volume Controller illuminated?

See Figure 31.

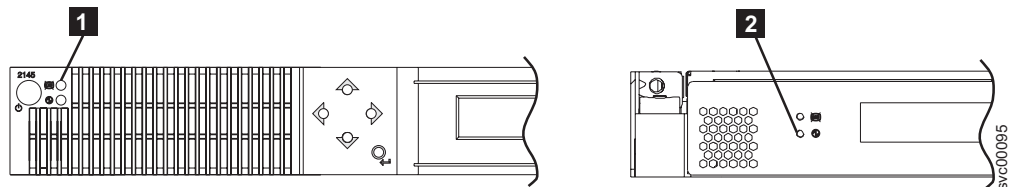


Figure 31. Service controller check lights

1 SAN Volume Controller 2145-4F2 service controller check light

2 SAN Volume Controller 2145-8F2 service controller check light

NO Go to step 10 on page 170.

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. Are you working on the SAN Volume Controller 2145-8F2?
- NO** Go to step 12.
- YES** Go to step 11
11. (from step 10)
- Is the operator panel error LED that you see in Figure 32 illuminated or flashing?**

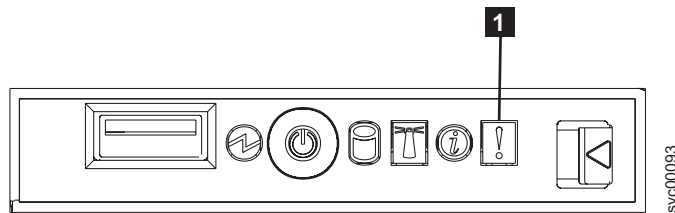


Figure 32. Operator panel error LED

- 1** Operator panel error LED
- NO** Go to step 12.
- YES** Go to the light path diagnostics MAP.
12. (from step 10 and step 11)
- Is the hardware boot display that you see in Figure 33 displayed on any of the SAN Volume Controllers?**



Figure 33. Hardware boot display

- NO** Go to step 14.
- YES** Go to step 13.
13. (from step 12)
- Has the hardware boot display that you see in Figure 33 displayed for more than three minutes?**
- NO** Go to step 14.
- YES** Perform the following:
- Go to Determining a hardware boot failure.
 - Go to the repair verification MAP.
14. (from steps 12 and 13)
- Is Failed displayed on the top line of the service display of any SAN Volume Controller?**
- NO** Go to step 15 on page 171.
- YES** Perform the following:
- Note the failure code and go to the boot codes to perform the repair actions.

- b. Go to the repair verification MAP.
15. (from step 14 on page 170)
Is Booting displayed on the top line of the service display of any SAN Volume Controller?
- NO** Go to step 17.
- YES** Go to step 16.
16. (from step 15)
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 17.
- YES** Perform the following:
- a. Note the failure code and go to the boot codes to perform the repair actions.
- b. Go to the repair verification MAP.
17. (from steps 15 and step 17)
If you pressed any of the navigation buttons on the front panel, wait for 60 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 18.
- YES** Follow the steps below:
- a. Note the failure code and go to the node error codes to perform the repair actions.
- b. Go to the repair verification MAP.
18. (from step 17)
Is Cluster Error displayed on the top line of the service display of any SAN Volume Controller?
- NO** Go to step 19.
- YES** Follow the steps below:
- a. A cluster error was detected. This error code is 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 the cluster error codes to perform the repair actions.
- b. Go to the repair verification MAP.
19. (from step 18)
Is Powering Off, Restarting, Shutting Down, or Power Failure displayed in the top line of the service display?
- NO** Go to step 21 on page 172.
- YES** The progress bar moves every few seconds. Wait for the operation to complete and then return to step 1 on page 168 in this MAP. If the progress bar does not move for three minutes, press the power button and go to step 18.
20. (from step 19)
Did the SAN Volume Controller power off?

- NO** Follow the steps below:
- Remove the power cord from the rear of the box.
 - Wait 60 seconds.
 - Replace the power cord.
 - If the node does not power on, press the power button to power-on the SAN Volume Controller, and then return to step 1 on page 168 in this MAP.
- YES** Follow the steps below:
- Wait 60 seconds.
 - Click the power button to power-on the SAN Volume Controller, and then return to step 1 on page 168 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 that is connected to the 2145 uninterruptible power supply (2145 UPS), the 2145 UPS also powers off. Before pressing the power button on the SAN Volume Controller, press the power-on button on the 2145 UPS. The 2145 uninterruptible power supply-1U (2145 UPS-1U) does not power-off if the SAN Volume Controller was powered off. The 2145 UPS-1U only powers 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.

21. (from step 20 on page 171)

Is Charging or Recovering displayed in the top line of the service display of any SAN Volume Controller?

NO Go to step 22.

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 MAP for your UPS. 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 MAP for your UPS.

22. (from step 21)

Is the service display unreadable?

NO Go to step 23.

YES Follow the steps below:

- Check the language. The display might be set to another language.
- If the language is set correctly, go to front panel map.

23. (from step 22)

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:

- Perform problem determination procedures on your host systems, disk controllers, and fibre channel switches.
- Ask your hardware support center for assistance.

If you suspect that the problem is a software problem, see the topic concerning installing and maintaining the SAN Volume Controller software.

Related concepts

Chapter 1, “SAN Volume Controller overview,” on page 1

The *SAN Volume Controller* is a SAN (storage area network) appliance that attaches open-systems storage devices to supported open-systems hosts.

Related tasks

“Using directed maintenance procedures” on page 37

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

“Navigating through the change language menu” on page 87

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

“Determining a hardware boot failure” on page 138

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 maintenance analysis procedures” on page 167

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

“MAP 5100: Power 2145-4F2” on page 178

MAP 5100: Power 2145-4F2 helps you to solve problems that have occurred on the SAN Volume Controller 2145-4F2 power. If you are using the SAN Volume Controller 2145-8F2, see the MAP for the SAN Volume Controller 2145-8F2 node.

“MAP 5150: 2145 UPS-1U” on page 181

MAP 5150: 2145 UPS-1U helps you solve problems that have occurred in the 2145 uninterruptible power supply-1U (2145 UPS-1U) systems used on a SAN Volume Controller.

“MAP 5200: 2145 UPS” on page 185

MAP 5200: 2145 UPS helps you solve problems that have occurred in the 2145 uninterruptible power supply (2145 UPS) systems used on a SAN Volume Controller.

“MAP 5400: Front panel” on page 191

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 201

MAP 5700: Repair verification helps you to verify that field replaceable units (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 61

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

“Using the power control for the SAN Volume Controller” on page 36

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 99

Every cluster error code includes an error code number, a description, action, and possible field replaceable units (FRUs).

“Understanding the boot codes” on page 138
The boot codes are displayed on the screen when a node is booting.
“Understanding the node error codes” on page 155
Node error codes are displayed on the display screen by node software.

MAP 5050: Power 2145-8F2

MAP 5050: Power 2145-8F2 helps you to solve problems that have occurred on the SAN Volume Controller 2145-8F2 power. If you are using the SAN Volume Controller 2145-4F2, see the MAP for the SAN Volume Controller 2145-4F2 node.

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the maintenance analysis procedures.

You might have been sent here for one of the following reasons:

- A problem occurred during the installation of a SAN Volume Controller 2145-4F2 system.
- The power switch failed to turn the node on.
- The power switch failed to turn the node off.
- Another MAP sent you here.

Perform the following steps:

1. **Are you here because the node is not powered on?**

NO Go to step 8 on page 176.

YES Go to step 2.

2. (from step 1)

Is the power light continuously illuminated? See Figure 34.

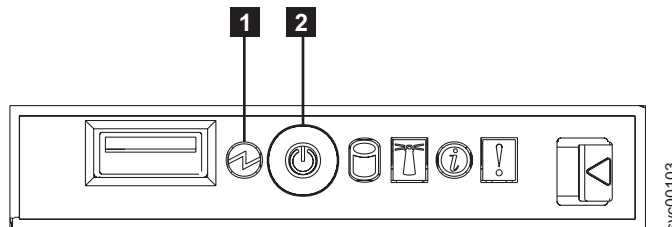


Figure 34. The SAN Volume Controller 2145-8F2 operator information panel

1 Power light

2 Power button

NO Go to step 3.

YES The SAN Volume Controller 2145-8F2 is powered on correctly. Reassess the symptoms and return to the start MAP or go to the repair verification MAP to verify the correct operation.

3. (from step 2)

Is the power light on the SAN Volume Controller 2145-8F2 operator information panel flashing?

NO Go to step 5 on page 175.

YES The SAN Volume Controller 2145-8F2 is in standby mode. Input power is present. Go to 4.

4. (from step 3 on page 174) Press the power on button on the SAN Volume Controller 2145-8F2 front panel.

Is the Power On indicator on the SAN Volume Controller 2145-8F2 front panel illuminated a solid green?

NO Verify that the operator panel cable is correctly seated at both ends. If the SAN Volume Controller 2145-8F2 still fails to power on, replace parts in the following sequence:

- a. Operator information panel
- b. Cable, signal, front panel
- c. Frame assembly

Verify the repair by continuing with the repair verification MAP.

YES The power on indicator on the front panel shows that the SAN Volume Controller 2145-8F2 has successfully powered on. Continue with the repair verification MAP to verify the correct operation.

5. (from step 3 on page 174)

Is the rear panel power LED on or flashing? See Figure 35.

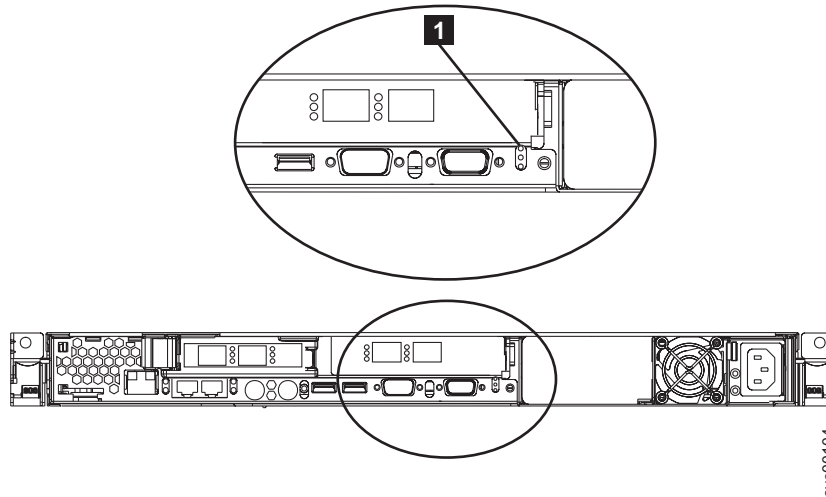


Figure 35. Power LED

1 Power LED

NO Go to step 6.

YES The operator panel is failing. Verify that the operator panel cable is correctly seated at both ends. If the cable is correctly seated and the operator panel power light is still not on or blinking, replace parts in the following sequence:

- a. Operator information panel
- b. Cable, signal, front panel
- c. Frame assembly

6. (from step 5) Locate the 2145 uninterruptible power supply-1U (2145 UPS-1U) that is connected to this SAN Volume Controller 2145-8F2.

Does the 2145 UPS-1U powering this SAN Volume Controller 2145-8F2 node have its power on and load segment 2 indicators a solid green?

NO Go to the 2145 UPS-1U MAP.

YES Go to step 7.

7. (from step 6 on page 175)

Is the AC indicator on the rear of the SAN Volume Controller 2145-8F2 power supply assembly illuminated? See Figure 36.

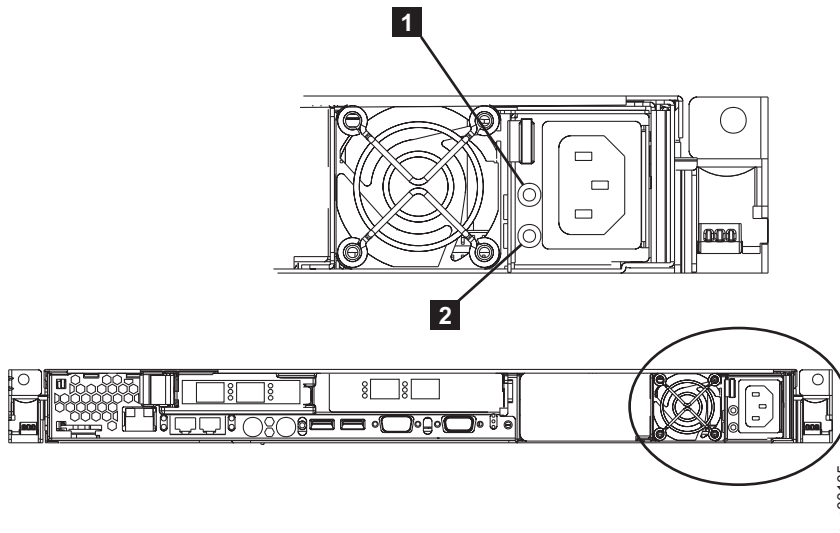


Figure 36. AC and DC LED indicators

1 AC LED

2 DC LED

NO Verify that the input power cable is securely connected at both ends and shows no sign of damage. If the cable is faulty or damaged, then replace it, otherwise replace parts in the following sequence:

- a. Power supply, 585 watt
- b. Power backplane

Verify the repair by continuing with the repair verification MAP.

YES Go to step 8.

8. (from step 7)

Is the DC indicator on the rear of the SAN Volume Controller 2145-8F2 power supply assembly illuminated? See Figure 36.

NO Replace parts in the following sequence:

- a. Power backplane
- b. Power supply, 585 watt
- c. Frame assembly

Verify the repair by continuing with the repair verification MAP.

YES Verify that the operator panel cable is correctly seated at both ends. If the SAN Volume Controller 2145-8F2 still fails to power on, replace parts in the following sequence:

- a. Operator information panel

- b. Cable, signal, front panel
- c. Frame assembly

Verify the repair by continuing with the repair verification MAP.

9. (from step 1 on page 174) The node will not power off when the power button is pressed. When the SAN Volume Controller 2145-8F2 is fully booted, power off is performed under the control of the SAN Volume Controller software. The power-off operation can take up to five minutes to complete.

Is Powering Off displayed on the front panel?

NO Go to step 10.

YES Wait for the SAN Volume Controller 2145-8F2 to power off. If the SAN Volume Controller 2145-8F2 fails to power off after 5 minutes, go to step 10.

10. (from step 9)

CAUTION:

Powering off the SAN Volume Controller 2145-8F2 by any means other than momentarily pressing the power button might cause the loss of data in the SAN Volume Controller 2145-8F2 cache. If you are performing concurrent maintenance, this node must be deleted from the cluster before you proceed. Ask the customer to delete the node from the cluster now. If they are unable to delete the node, call your support center for assistance before you proceed.

The node cannot be powered off either because of a software fault or because of a hardware failure. Press and hold the power button. The node should power off within five seconds.

Did the node power off?

NO Power off the 2145 UPS-1U that is connected to this node.

CAUTION:

Be sure that you are powering of the correct 2145 UPS-1U. If necessary, trace the cables back to the 2145 UPS-1U assembly. Powering off the wrong 2145 UPS-1U may cause customer data loss.

Go to step 11.

YES Go to step 11.

11. (from step 10)

If necessary, power on the 2145 UPS-1U that is connected to this node, then press the power button to power the node on.

Did the SAN Volume Controller 2145-8F2 power on and boot correctly?

NO Go to the start MAP to resolve the problem.

YES Go to step 12.

12. (from step 11)

The SAN Volume Controller 2145-8F2 has probably suffered a software failure. Dump data may have been captured that will help resolve the problem. Call your support center for assistance.

Related tasks

“Using the maintenance analysis procedures” on page 167

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

“MAP 5150: 2145 UPS-1U” on page 181

MAP 5150: 2145 UPS-1U helps you solve problems that have occurred in the 2145 uninterruptible power supply-1U (2145 UPS-1U) systems used on a SAN Volume Controller.

“MAP 5250: 2145 UPS-1U repair verification” on page 189

MAP 5250: 2145 UPS-1U repair verification helps you to verify that FRUs (field replaceable units) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller 2145 uninterruptible power supply-1U (2145 UPS-1U).

Related reference

“Controls and indicators for the SAN Volume Controller 2145-8F2” on page 22
All controls and indicators are located on the front panel of the SAN Volume Controller 2145-8F2.

“SAN Volume Controller 2145-8F2 rear panel indicators” on page 27

The controls and indicators for the SAN Volume Controller 2145-8F2 are contained on the front and back panel assembly.

“Understanding the fields for the node VPD” on page 67

You must be aware of the fields for the node vital product data (VPD).

MAP 5100: Power 2145-4F2

MAP 5100: Power 2145-4F2 helps you to solve problems that have occurred on the SAN Volume Controller 2145-4F2 power. If you are using the SAN Volume Controller 2145-8F2, see the MAP for the SAN Volume Controller 2145-8F2 node.

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the maintenance analysis procedures.

You might have been sent here for one of the following reasons:

- A problem occurred during the installation of a SAN Volume Controller 2145-4F2 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 2145-4F2 front panel.

Is the power-on indicator on the SAN Volume Controller 2145-4F2 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 2145-4F2 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 2145-4F2 rear panel flashing green?**

NO Go to step 3 on page 179.

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 notification MAP.
3. **Is the system board power LED indicator on the SAN Volume Controller 2145-4F2 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 the power-on switch on the SAN Volume Controller 2145-4F2 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 2145 uninterruptible power supply (2145 UPS) is 2U high (3.5 in), while the 2145 uninterruptible power supply-1U (2145 UPS-1U) is 1U high (1.75 in).
 - Through the user interface, look at the node vital product data (VPD). See the documentation on understanding the fields for the node VPD for more information.
 - Through the command-line interface, look at the node VPD by issuing the following command:


```
svcinfo lsnodevpd nodeID
```
- If your UPS is a 2145 UPS:**
Go to step 5
- If your UPS is a 2145 UPS-1U:**
Go to step 9 on page 180.
5. (from step 4)
- Does the 2145 UPS powering this SAN Volume Controller 2145-4F2 node have its mode indicator a solid green?**
- NO** Refer to the MAP for your UPS.
- YES** Go to step 6.
6. (from step 5)
- Does the 2145 UPS powering this SAN Volume Controller 2145-4F2 node have all of its circuit breakers on?**
- NO** Go to step 7 on page 180.
- YES** The input power to the SAN Volume Controller 2145-4F2 node is missing. Verify that the power cord assembly is correctly plugged in to the SAN Volume Controller 2145-4F2 and the 2145 UPS.
- 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 on page 179)

One of the 2145 UPS's circuit breakers has tripped. Reset the tripped circuit breaker to on.

Does the 2145 UPS'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 2145 UPS's output loads caused a circuit breaker to trip. Remove each of up to eight SAN Volume Controller 2145-4F2 node power cables in turn and try to reset the circuit breakers to on.

Does the removal of any SAN Volume Controller 2145-4F2 node power cables enable the circuit breaker to remain on?

NO 2145 UPS output circuit breaker is faulty.

- a. Replace the 2145 UPS assembly.
- b. Go to the 2145 UPS repair verification MAP.

YES The input power current to the SAN Volume Controller 2145-4F2 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 179)

Does the 2145 UPS-1U powering this SAN Volume Controller 2145-4F2 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 2145 UPS-1U MAP.

YES The input power to the SAN Volume Controller 2145-4F2 node is missing. Verify that the power cord assembly is correctly plugged in to the SAN Volume Controller 2145-4F2 and the 2145 UPS-1U.

Related tasks

“Using the maintenance analysis procedures” on page 167

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

“MAP 5150: 2145 UPS-1U” on page 181

MAP 5150: 2145 UPS-1U helps you solve problems that have occurred in the 2145 uninterruptible power supply-1U (2145 UPS-1U) systems used on a SAN Volume Controller.

“MAP 5200: 2145 UPS” on page 185

MAP 5200: 2145 UPS helps you solve problems that have occurred in the 2145 uninterruptible power supply (2145 UPS) systems used on a SAN Volume Controller.

“MAP 5700: Repair verification” on page 201

MAP 5700: Repair verification helps you to verify that field replaceable units (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 2145-4F2” on page 262

You can remove the front panel to perform maintenance on the SAN Volume Controller 2145-4F2.

“Removing the service controller from the SAN Volume Controller 2145-4F2” on page 247

You can remove the service controller from the SAN Volume Controller.

“Removing the SAN Volume Controller 2145-4F2 power supply” on page 258

You must remove the SAN Volume Controller 2145-4F2 power supply to replace it or to perform routine maintenance.

“Removing the SAN Volume Controller 2145-4F2 system board” on page 267

During routine maintenance, you may be required to remove and replace the system board.

“MAP 5300: 2145 UPS repair verification” on page 190

MAP 5300: 2145 UPS repair verification, helps you to verify that FRUs (field replaceable units) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller 2145 uninterruptible power supply (2145 UPS).

“MAP 5250: 2145 UPS-1U repair verification” on page 189

MAP 5250: 2145 UPS-1U repair verification helps you to verify that FRUs (field replaceable units) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller 2145 uninterruptible power supply-1U (2145 UPS-1U).

Related reference

“Controls and indicators for the SAN Volume Controller 2145-4F2” on page 29

All controls and indicators are located on the front panel of the SAN Volume Controller 2145-4F2.

“SAN Volume Controller 2145-4F2 rear panel indicators” on page 30

The controls and indicators for the SAN Volume Controller 2145-4F2 are contained on the front and back panel assembly.

“Understanding the fields for the node VPD” on page 67

You must be aware of the fields for the node vital product data (VPD).

MAP 5150: 2145 UPS-1U

MAP 5150: 2145 UPS-1U helps you solve problems that have occurred in the 2145 uninterruptible power supply-1U (2145 UPS-1U) systems used on a SAN Volume Controller.

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the maintenance analysis procedures.

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 SAN Volume Controller.
- Another MAP sent you here.
- A customer observed a problem that was not detected by the system problem determination procedures.

Figure 37 on page 182 shows an illustration of the front of the panel for the 2145 UPS-1U.

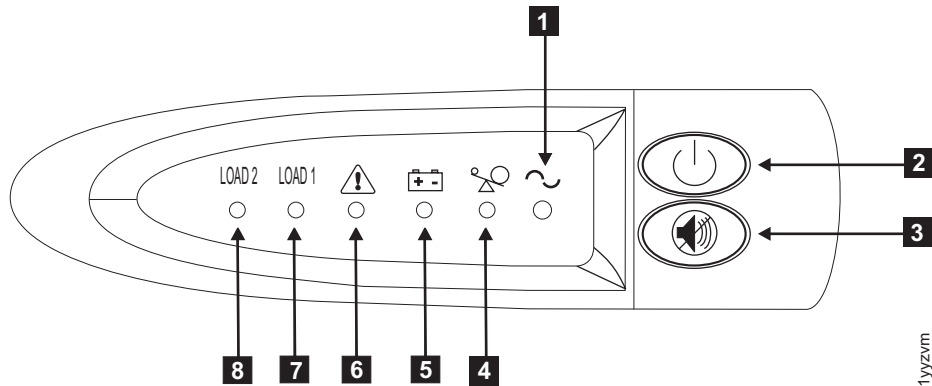


Figure 37. 2145-1U uninterruptible power supply front panel assembly

- 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 2145 UPS-1U that is connected to the failing SAN Volume Controller?**

NO Go to step 3.

YES Go to step 2.

2. (from step 1)

Are other 2145 UPS-1Us showing the power-on indicator off?

NO The 2145 UPS-1U may be in standby mode. This can be because the on/off button on this 2145 UPS-1U was pressed, input power has been missing for more than five minutes, or because the SAN Volume Controller shut it down following a reported loss of input power. Press and hold the on/off button until the 2145 UPS-1U power-on indicator is illuminated (approximately five seconds).

Go to step 3.

YES Main power is missing from installation

- a. Restore main power to installation.
- b. Verify the repair by continuing with the 2145 UPS-1U repair verification MAP.

3. (from step 1 and step 2)

Are the power-on and load segment 2 indicators for the 2145 UPS-1U illuminated solid green, with service, on-battery, and overload indicators off?

NO Go to step 4 on page 183.

YES The 2145 UPS-1U is no longer showing a fault. Verify the repair by continuing with the 2145 UPS-1U repair verification MAP.

4. (from step 3 on page 182)

Is the 2145 UPS-1U 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 2145 UPS-1U is not correctly connected or the 2145 UPS-1U is receiving input power that may be unstable or outside the specified voltage or frequency range. The SAN Volume Controller automatically adjusts the 2145 UPS-1U 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 2145 UPS-1U. If the condition persists for at least five minutes, do the following:

- a. Check the input circuit protector on the 2145 UPS-1U rear panel, and press if open.
- b. Ask the customer to check the site power for the 2145 UPS-1U 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 field replaceable units (FRUs) in the following sequence:
 - 1) 2145 UPS-1U power cord
 - 2) 2145 UPS-1U
- d. Verify the repair by continuing with the 2145 UPS-1U repair verification MAP.

5. (from step 4)

Is the 2145 UPS-1U overload indicator illuminated solid red?

NO Go to step 6.

YES The 2145 UPS-1U output power requirement has exceeded the 2145 UPS-1U capacity.

- a. Check that only one SAN Volume Controller node is connected to the 2145 UPS-1U.
- b. Check that no other loads are connected to the 2145 UPS-1U.
- c. After ensuring that the output loading is correct, turn off and unplug the input power from the 2145 UPS-1U. Wait at least five seconds until all LEDs are off and restart the 2145 UPS-1U by reconnecting to input power and pressing the on/off button until the 2145 UPS-1U power-on indicator is illuminated (approximately five seconds).
- d. If the condition persists, replace the 2145 UPS-1U.
- e. Verify the repair by continuing with the 2145 UPS-1U repair verification MAP.

6. (from step 5)

Is the 2145 UPS-1U 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 on page 184.

YES The 2145 UPS-1U battery might be fully discharged or faulty.

- a. Check that the 2145 UPS-1U has been connected to a power outlet for at least two hours to charge the battery. After charging the

battery, press and hold the test/alarm reset button for three seconds; and then check the service indicator.

- b. If the service indicator is still flashing, replace the 2145 UPS-1U.
- c. Verify the repair by continuing with the 2145 UPS-1U repair verification MAP.

7. (from step 6 on page 183)

Is the 2145 UPS-1U 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 2145 UPS-1U internal temperature is too high.

- a. Turn off and unplug the 2145 UPS-1U. Clear vents at the front and rear of the 2145 UPS-1U. Remove any heat sources. Ensure the airflow around the 2145 UPS-1U is not restricted.
- b. Wait at least five minutes and restart the 2145 UPS-1U by reconnecting to input power and pressing the on/off button until the 2145 UPS-1U power-on indicator is illuminated (approximately five seconds).
- c. If the condition persists, replace the 2145 UPS-1U.
- d. Verify the repair by continuing with the 2145 UPS-1U repair verification MAP.

8. (from step 7)

Is the 2145 UPS-1U, service, on-battery, overload, and power-on indicators illuminated and flashing?

NO The 2145 UPS-1U has an internal fault.

- a. Replace the 2145 UPS-1U.
- b. Verify the repair by continuing with the 2145 UPS-1U repair verification MAP.

YES The 2145 UPS-1U battery might be fully discharged or not faulty.

- a. Check that the 2145 UPS-1U has been connected to a power outlet for at least two hours to charge the battery. After charging the battery, press and hold the test/alarm reset button for three seconds and then check the service indicator.
- b. If the service indicator is still flashing, replace the 2145 UPS-1U.
- c. Verify the repair by continuing with the 2145 UPS-1U repair verification MAP.

Related tasks

“Checking the grounding of the SAN Volume Controller 2145-8F2 and the 2145 UPS-1U” on page xxxiii

Ensure that you understand how to check the grounding of the SAN Volume Controller 2145-8F2 and the 2145 uninterruptible power supply-1U (2145 UPS-1U).

“Using the maintenance analysis procedures” on page 167

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

“MAP 5250: 2145 UPS-1U repair verification” on page 189

MAP 5250: 2145 UPS-1U repair verification helps you to verify that FRUs (field replaceable units) that you have exchanged for new FRUs or repair actions that

have been done have solved all the problems on the SAN Volume Controller 2145 uninterruptible power supply-1U (2145 UPS-1U).

“Removing the power cable from the 2145 UPS-1U” on page 298

You can remove the power cable from the 2145 uninterruptible power supply-1U (2145 UPS-1U) if you are having problems with the power supply and suspect that the power cable is defective.

“Removing the 2145 UPS-1U” on page 286

Before you remove the 2145 uninterruptible power supply-1U (2145 UPS-1U), read all safety notices.

MAP 5200: 2145 UPS

MAP 5200: 2145 UPS helps you solve problems that have occurred in the 2145 uninterruptible power supply (2145 UPS) systems used on a SAN Volume Controller.

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the maintenance analysis procedures.

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 38 shows an illustration of the front of the panel for the 2145 UPS.

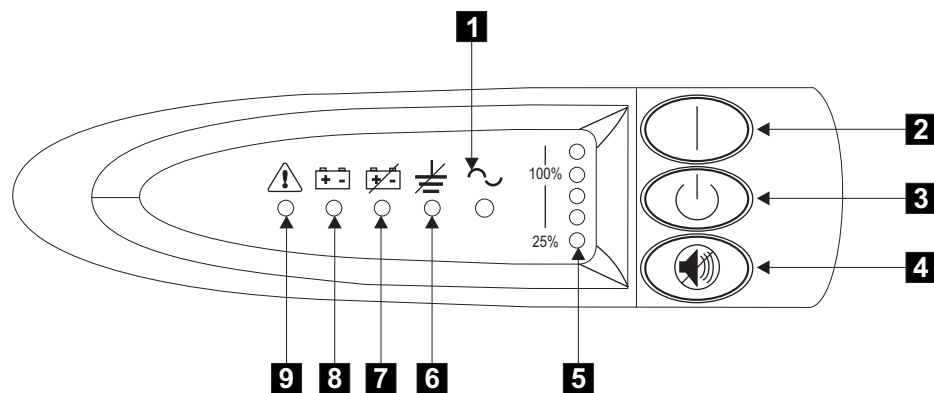


Figure 38. 2145 uninterruptible power supply front panel assembly

- 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 2145 UPS, 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 2145 UPSs showing mode indicator off?

NO The power supply to this 2145 UPS is faulty or not connected correctly.

a. Ask the customer to check the site power connection to this 2145 UPS.

b. If input power connection is okay, replace the field replaceable units (FRUs) in the following sequence:

1) 2145 UPS power cord

2) 2145 UPS electronics assembly

3) 2145 UPS assembly

c. Verify the repair by continuing with the 2145 UPS repair verification MAP.

YES Main power is missing from installation.

a. Restore main power to installation.

b. Verify the repair by continuing with the 2145 UPS repair verification MAP.

3. (from step 1)

Is the 2145 UPS mode indicator illuminated and flashing green?

NO Go to step 4.

YES The 2145 UPS is in standby mode. This can be because the SAN Volume Controllers powered by this 2145 UPS have been powered off for more than five minutes, or the off button on this 2145 UPS was pressed.

a. Press and hold the on button until you hear the 2145 UPS beep (approximately one second) and the power-on indicator shows solid green. If the mode indicator does not change to solid green, replace the 2145 UPS electronics assembly.

b. Verify the repair by continuing with the 2145 UPS repair verification MAP.

4. (from step 3)

Is the mode indicator illuminated solid red?

NO Go to step 8 on page 188.

YES The 2145 UPS is in bypass mode. Go to step 5

5. (from step 4)

Is the 2145 UPS overload load level indicator illuminated red?

NO Go to step 6 on page 187.

YES The 2145 UPS output power requirement exceeded the 2145 UPS capacity.

- a. Check that no more than four SAN Volume Controller nodes are connected to the 2145 UPS.
- b. Check that only SAN Volume Controller nodes are connected to the 2145 UPS.
- c. After ensuring output loading is correct, turn off and unplug the input power from the 2145 UPS. Wait at least five seconds until all LEDs are off and restart the 2145 UPS by reconnecting to input power and pressing the on button until you hear the 2145 UPS beep (approximately one second).
- d. If the condition persists, call the IBM support center.
- e. Verify the repair by continuing with the 2145 UPS repair verification MAP.

6. (from step 5 on page 186)

**Is the 2145 UPS general alarm indicator illuminated and flashing red?
(This causes a continuous audible alarm)**

NO Go to step 7.

YES The 2145 UPS internal temperature is too high.

- a. Turn off and unplug the 2145 UPS. Clear the vents at the front and rear of the 2145 UPS. Remove any heat sources. Ensure the airflow around the 2145 UPS is not restricted.
- b. Wait at least five minutes and restart the 2145 UPS by reconnecting to input power and pressing the on button until you hear the 2145 UPS beep (approximately one second).
- c. If the condition persists, replace the 2145 UPS electronics assembly.
- d. Verify the repair by continuing with the 2145 UPS repair verification MAP.

7. (from step 6)

**Is the 2145 UPS Battery Mode indicator illuminated and flashing red?
(This causes an audible beep every five seconds).**

NO The 2145 UPS is in bypass mode because of an internal 2145 UPS fault.

- a. Replace the following assemblies in turn:
 - 2145 UPS electronics assembly
 - 2145 UPS battery assembly
 - 2145 UPS assembly
- b. Verify the repair by continuing with the 2145 UPS repair verification MAP.

YES The 2145 UPS battery might be fully discharged or not connected correctly.

- a. Check that the 2145 UPS battery assembly is installed correctly.
- b. Check that the 2145 UPS has been connected to a power outlet for at least three hours to charge the battery. After charging the battery, press and hold the test/alarm reset button for three seconds; and then check the **Battery mode indicator**.
- c. If the **Battery mode indicator** is still on, replace the 2145 UPS battery assembly.
- d. Verify the repair by continuing with the 2145 UPS repair verification MAP.

8. (from step 4 on page 186)

Is the 2145 UPS wiring fault indicator illuminated and flashing red? (This causes an audible beep every five seconds).

NO Go to step 9.

YES The 2145 UPS ground wire connection does not exist or the power input line and neutral wires are reversed.

- a. Check the grounding of the 2145 UPS.
- b. Ask the customer to check the 2145 UPS input power connection.
- c. Verify the repair by continuing with the 2145 UPS repair verification MAP.

9. (from step 8)

Is the 2145 UPS mode indicator flashing red? (This causes an audible beep every five seconds).

NO Go to step 10.

YES The 2145 UPS is receiving input power that might be unstable or outside the specified voltage or frequency range. The SAN Volume Controller automatically adjusts the 2145 UPS 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 2145 UPS. If the condition persists for at least five minutes, do the following:

- a. Ask the customer to check the site power for the 2145 UPS providing power to this SAN Volume Controller. Check the connection, voltage, and frequency.
- b. If input power is okay, replace the 2145 UPS electronics assembly.
- c. Verify the repair by continuing with the 2145 UPS repair verification MAP.

10. (from step 9)

Are the 2145 UPS general alarm, battery power, battery mode, wiring fault, and mode indicators illuminated and flashing red? (This causes a continuous audible alarm).

NO The 2145 UPS is no longer showing a fault. Verify the repair by continuing with the 2145 UPS repair verification MAP.

YES The 2145 UPS is reporting a fault condition.

- a. Replace the following assemblies in turn:
 - 2145 UPS electronics assembly
 - 2145 UPS battery assembly
 - 2145 UPS assembly
- b. Verify the repair by continuing with the 2145 UPS repair verification MAP.

Related tasks

“Checking the grounding of the SAN Volume Controller 2145-4F2 and the 2145 UPS” on page xxxv

Ensure that you understand how to check the grounding for the SAN Volume Controller 2145-4F2 and the 2145 uninterruptible power supply (2145 UPS).

“Using the maintenance analysis procedures” on page 167
To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

“MAP 5300: 2145 UPS repair verification” on page 190

MAP 5300: 2145 UPS repair verification, helps you to verify that FRUs (field replaceable units) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller 2145 uninterruptible power supply (2145 UPS).

“Removing the power cable from the 2145 UPS” on page 312

You can replace the power cable from the 2145 uninterruptible power supply (2145 UPS) if you are having problems with the power supply and suspect that the power cable is defective.

“Removing the 2145 UPS” on page 303

Before you begin to remove the 2145 uninterruptible power supply (2145 UPS), read all safety notices.

MAP 5250: 2145 UPS-1U repair verification

MAP 5250: 2145 UPS-1U repair verification helps you to verify that FRUs (field replaceable units) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller 2145 uninterruptible power supply-1U (2145 UPS-1U).

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the maintenance analysis procedures.

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 2145 UPS-1U 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)

Is the SAN Volume Controller node powered by this 2145 UPS-1U, 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 on page 190.

YES Wait for the “Charging” display to finish. This might take up to 60 minutes. Go to step 5.

5. (from step 4 on page 189)

Press and hold the test/alarm reset button on the repaired 2145 UPS-1U for three seconds to initiate a self-test. During the test, individual indicators illuminate as various parts of the 2145 UPS-1U are checked.

Does the 2145 UPS-1U service, on-battery, or overload indicator stay on?

NO 2145 UPS-1U repair verification has completed successfully. Continue with the repair verification MAP.

YES Continue with the start MAP.

Related tasks

“Using the maintenance analysis procedures” on page 167

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

“MAP 5000: Start” on page 168

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

“MAP 5700: Repair verification” on page 201

MAP 5700: Repair verification helps you to verify that field replaceable units (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: 2145 UPS repair verification

MAP 5300: 2145 UPS repair verification, helps you to verify that FRUs (field replaceable units) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller 2145 uninterruptible power supply (2145 UPS).

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the maintenance analysis procedures.

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 2145 UPS, the 2145 UPS also powers off. To power on the 2145 UPS, press and hold the on button until you hear the 2145 UPS beep (approximately one second) and the mode indicator shows solid green.

Perform the following steps to verify your repair to the 2145 UPS:

1. **Is the mode indicator for the repaired 2145 UPS 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 2145 UPS 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 on page 190)
Are any nodes still not powered on or showing error codes in front panel display?
- NO** Go to step 4.
- YES** Continue with *MAP 5000: Start*.
4. (from step 3)
Do SAN Volume Controller nodes show “charging” on 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 2145 UPS for three seconds to initiate a self-test. During the test, individual indicators illuminate as various parts of the 2145 UPS are checked.
- Does the alarm beep or a 2145 UPS alarm indicator stay on?**
- NO** 2145 UPS repair verification has been successfully completed. Continue with the repair verification MAP.
- YES** Continue with *MAP 5000: Start*.

Related tasks

“Using the maintenance analysis procedures” on page 167

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

“MAP 5000: Start” on page 168

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

“MAP 5700: Repair verification” on page 201

MAP 5700: Repair verification helps you to verify that field replaceable units (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 maintenance analysis procedures (MAPs), first read the topic concerning using the maintenance analysis procedures.

This MAP is used for SAN Volume Controller 2145-4F2 and for SAN Volume Controller 2145-8F2. Be sure that you know which model you are using before you start this procedure. To determine which model you are working with, see the SAN Volume Controller overview.

You might have been sent here because:

- A problem occurred during the installation of a SAN Volume Controller system, 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 service controller check indicator on the SAN Volume Controller front panel illuminated and showing a solid amber? See Figure 39.

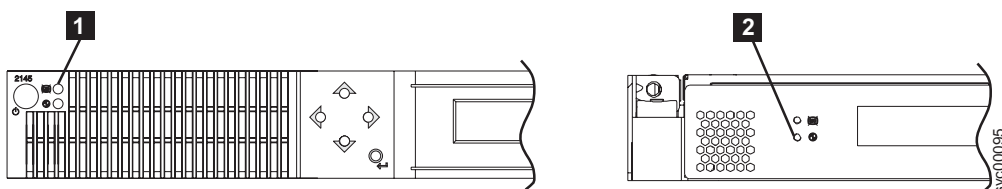


Figure 39. Service controller check lights

1 SAN Volume Controller 2145-4F2 service controller check light

2 SAN Volume Controller 2145-8F2 service controller check light

NO Start the front panel tests by pressing and holding the select button for five seconds. Go to step 3.

CAUTION:

Do not start this test until the node is powered on for at least two minutes. You may receive unexpected results.

YES The SAN Volume Controller service controller has failed. Replace the parts in the following sequence:

SAN Volume Controller 2145-4F2	1. Service controller 2. Front panel assembly
SAN Volume Controller 2145-8F2	Service controller

Verify the repair by continuing with the repair verification MAP.

3. (from step 2)

The front panel check light illuminates 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 a 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:

SAN Volume Controller 2145-4F2	1. Service controller 2. Front panel assembly
SAN Volume Controller 2145-8F2	Service controller

- Verify the repair by continuing with the repair verification MAP.

YES Go to step 4.

4. (from step 3 on page 192)

Figure 40 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.

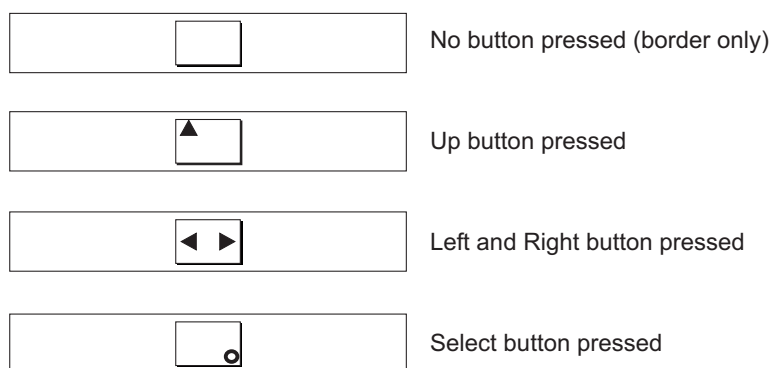


Figure 40. Sequence in which to push buttons on front panel display

Check each switch in turn. Did the service panel switches and display behave as described in Figure 40?

NO The SAN Volume Controller front panel has failed its switch test.

- Replace the parts in the following sequence:

SAN Volume Controller 2145-4F2	1. Front panel assembly 2. Service controller
SAN Volume Controller 2145-8F2	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 4 on page 191)

Is front panel display showing: Charging , Cluster Error , or Node Error ?

NO Go to step 6.

YES Press down. Go to step 6.

6. **Is front panel display now showing its Default Menu?**

NO Continue with *MAP 5000: Start*.

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 on page 193)

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 that printed on the front panel.

SAN Volume Controller 2145-4F2	Front panel assembly
SAN Volume Controller 2145-8F2	Service controller

YES Front panel tests have completed with no fault found. Verify the repair by continuing with the repair verification MAP.

Related concepts

“SAN Volume Controller menu options” on page 76

Menu options are available on the front panel display on the SAN Volume Controller.

Related tasks

“Using the maintenance analysis procedures” on page 167

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

“MAP 5000: Start” on page 168

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

“MAP 5100: Power 2145-4F2” on page 178

MAP 5100: Power 2145-4F2 helps you to solve problems that have occurred on the SAN Volume Controller 2145-4F2 power. If you are using the SAN Volume Controller 2145-8F2, see the MAP for the SAN Volume Controller 2145-8F2 node.

“MAP 5700: Repair verification” on page 201

MAP 5700: Repair verification helps you to verify that field replaceable units (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 213

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 solve problems that have occurred on the SAN Volume Controller Ethernet.

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the maintenance analysis procedures.

This MAP is used for SAN Volume Controller 2145-4F2 and for SAN Volume Controller 2145-8F2. Be sure that you know which model you are using before you start this procedure. To determine which model you are working with, see the SAN Volume Controller overview.

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:

Note: If the Ethernet connection to the configuration node has failed, the cluster is unable to report failure conditions and the SAN Volume Controller Console is unable to access the cluster to perform administrative or service tasks. If this is the case and you need immediate access to the cluster, you may cause the cluster to fail-over to an alternate configuration node. If only one node is displaying Node Error 540 on the front panel, perform the following steps:

1. Press the power button on the node that is displaying Node Error 540.
2. When Powering off is displayed on the front panel display, press the power button again.

"Restarting" is displayed. This action causes the configuration node to fail over to the next available node. The SAN Volume Controller Console is able to access the cluster again.

1. Using the front panel, display Node Error if present.

Is the front panel displaying Node Error with error code 540?

NO Go to step 2.

YES Go to step 4.

2. (from step 1)

Using the front panel, display Cluster Error if present.

Is the front panel displaying Cluster Error with error code 1400?

NO Go to step 3.

YES Go to step 4.

3. (from step 2)

Using the front panel, display the Ethernet port status.

Is the display showing an Ethernet port status of Failed?

NO Go to step 7 on page 197.

YES Go to step 4.

4. (from steps 1, 2, and 3)

Is the green LED on the Ethernet port assembly illuminated? See Figure 41 on page 196.

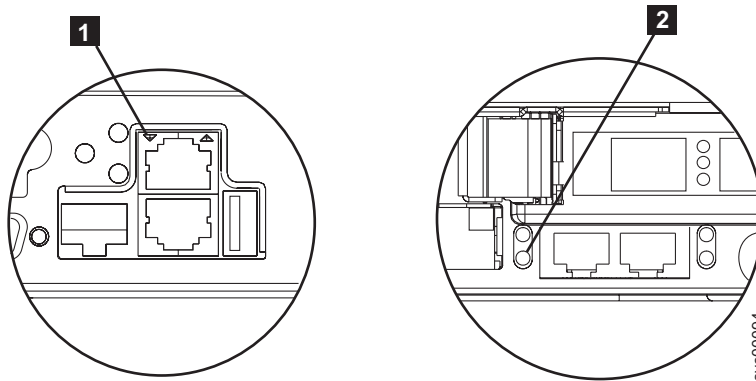


Figure 41. Ethernet connection LEDs

1 SAN Volume Controller 2145-4F2 lower Ethernet connection LED

2 SAN Volume Controller 2145-8F2 left Ethernet connection LED

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 two 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 two Ethernet connectors as described above. Go to step 5.

YES Go to step 6.

5. (from step 4 on page 195)

Are the green connection LEDs on both Ethernet ports illuminated?

NO Ethernet interfaces on the system board assembly are not working correctly.

- Perform the following tasks:
 - SAN Volume Controller 2145-4F2 users must replace the system board assembly, while SAN Volume Controller 2145-8F2 users must replace the frame 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 4 on page 195.
- 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.

6. (from step 4 on page 195)

Using the front panel, display the Ethernet status.

Is the displayed status failed?

NO Go to step 7 on page 197.

- YES** Ethernet connected LED shows an active Ethernet connection to the SAN Volume Controller. However, if the service display shows Ethernet Failed, perform the following steps:
- Replace the Ethernet hardware: SAN Volume Controller 2145-4F2 users must replace the system board assembly, while SAN Volume Controller 2145-8F2 users must replace the frame assembly.
 - Verify the repair by continuing with the repair verification MAP.
7. (from step 3 on page 195 and step 6 on page 196)
- 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 previous checks?

- NO** Perform steps in the following sequence:
- Replace the Ethernet cable.
 - Use Ethernet hub problem determination procedure to resolve an Ethernet network connection problem.
 - Replace the Ethernet hardware: SAN Volume Controller 2145-4F2 users must replace the system board assembly, while SAN Volume Controller 2145-8F2 users must replace the frame assembly.
 - 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 maintenance analysis procedures” on page 167

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

“MAP 5700: Repair verification” on page 201

MAP 5700: Repair verification helps you to verify that field replaceable units (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 SAN Volume Controller 2145-4F2 system board” on page 267
During routine maintenance, you may be required to remove and replace the system board.

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 maintenance analysis procedures (MAPs), first read the topic concerning using the maintenance analysis procedures.

This MAP is used for SAN Volume Controller 2145-4F2 and for SAN Volume Controller 2145-8F2. Be sure that you know which model you are using before you start this procedure. To determine which model you are working with, see the SAN Volume Controller overview.

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 to solve problems caused by the fibre-channel ports:

1. Display fibre-channel port 1 status on the SAN Volume Controller front panel display. See the topic concerning 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 the second line of the display.
- **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. Make a note of port-1. Go to step 6 on page 199.
 - **Failed:** The port is not operational because of a hardware failure. Make a note of port-1. Go to step 7 on page 200.
 - **Not installed:** This port is not installed. Make a note of port-1. Go to step 8 on page 200.

YES Press and release the right button to display fibre-channel port-2 . Go to step 2.

2. (from step 1)

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 the second line of the display.
- **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. Make a note of port-2. Go to step 6 on page 199.
 - **Failed:** The port is not operational because of a hardware failure. Make a note of port-2. Go to step 7 on page 200.
 - **Not installed:** This port is not installed. Make a note of port-2. Go to step 8 on page 200.

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 the second line of the display.
- **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. Make a note of port-3. Go to step 6 on page 199.
 - **Failed:** The port is not operational because of a hardware failure. Make a note of port-3. Go to step 7 on page 200.
 - **Not installed:** This port is not installed. Make a note of port-3. Go to step 8 on page 200.

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 the second line of the display.
- **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. Make a note of port-4. Go to step 6.
 - **Failed:** The port is not operational because of a hardware failure. Make a note of port-4. Go to step 7 on page 200.
 - **Not installed:** This port is not installed. Make a note of port-4. Go to step 8 on page 200.

YES Go to step 5.

5. (from step 4 on page 198)

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 previous checks?

- NO** Replace parts in the following order until the problem is resolved:
- 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.

SAN Volume Controller 2145-4F2 port 1, 2, 3 or 4	Fibre-channel adapter
SAN Volume Controller 2145-8F2 port 1 or 2	Dual port fibre-channel host bus adapter (HBA) - Low profile
SAN Volume Controller 2145-8F2 port 3 or 4	Dual port fibre-channel HBA - Full height

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 198, 2 on page 198, 3 on page 198, and step 4 on page 198)

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 the 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.

SAN Volume Controller 2145-4F2 port 1, 2, 3 or 4	Fibre-channel adapter
SAN Volume Controller 2145-8F2 port 1 or 2	Dual port fibre-channel host bus adapter (HBA) - Low profile

SAN Volume Controller 2145-8F2 port 3 or 4	Dual port fibre-channel HBA - Full height
--	---

d. Verify the repair by continuing with the repair verification MAP.

7. (from steps 1 on page 198, 2 on page 198, 3 on page 198, and step 4 on page 198)

The noted port on the SAN Volume Controller is displaying a status of failed. Replace the parts that are associated with the noted port in the following order:

- a. Fibre-channel adapter assemblies.

SAN Volume Controller 2145-4F2 port 1, 2, 3 or 4	Fibre-channel adapter
SAN Volume Controller 2145-8F2 port 1 or 2	Dual port fibre-channel host bus adapter (HBA) - Low profile
SAN Volume Controller 2145-8F2 port 3 or 4	Dual port fibre-channel HBA - Full height

b. Verify the repair by continuing with the repair verification MAP.

8. (from steps 1 on page 198, 2 on page 198, 3 on page 198, and step 4 on page 198)

The noted port on the SAN Volume Controller is displaying a status of not installed. If you have just replaced the fibre-channel adapter, make sure that it is installed correctly. If you have replaced any other system board components, make sure that the fibre-channel adapter has not been disturbed.

Is the Fibre Channel adapter failure explained by the previous checks?

NO

- a. Fibre-channel adapter assemblies.

SAN Volume Controller 2145-4F2 port 1, 2, 3 or 4	Fibre-channel adapter
SAN Volume Controller 2145-8F2 port 1 or 2	Dual port fibre-channel host bus adapter (HBA) - Low profile
SAN Volume Controller 2145-8F2 port 3 or 4	Dual port fibre-channel HBA - Full height

- b. Fibre-channel adapter connection hardware:

SAN Volume Controller 2145-4F2	System board assembly
SAN Volume Controller 2145-8F2 port 1 or 2	1. Riser card, PCI Low profile 2. Frame assembly
SAN Volume Controller 2145-8F2 port 3 or 4	1. Riser card, PCI 2. Frame assembly

- c. Verify the repair by continuing with the repair verification MAP.

YES Verify the repair by continuing with the repair verification MAP.

Related concepts

“SAN Volume Controller menu options” on page 76

Menu options are available on the front panel display on the SAN Volume Controller.

Related tasks

“SAN problem determination” on page 164

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 maintenance analysis procedures” on page 167

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

“MAP 5700: Repair verification”

MAP 5700: Repair verification helps you to verify that field replaceable units (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

“Fibre channel port-1 through 4 option” on page 83

The fibre channel 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 field replaceable units (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 maintenance analysis procedures (MAPs), first read the topic concerning using the maintenance analysis procedures.

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 to verify your repair:

1. **Are the Power LEDs on all the SAN Volume Controllers on? See the power LED topic.**

NO Go to the start MAP.

YES Go to step 2.

2. (from step 1)

Are the Check LEDs on all SAN Volume Controllers off? See the check LED topic.

NO Go to the start MAP.

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 the start MAP.

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 managed disks (MDisks).

Do all MDisks have a status of online?

NO If any MDisks have a status of offline, repair the MDisks. See the topic

about how to determine 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 storage area network (SAN) and MDisk faults before returning to this MAP.

If any MDisks show a status of excluded, include MDisks before returning to this MAP.

Go to the start MAP.

YES Go to step 5.

5. (from step 4 on page 201)

Using the SAN Volume Controller application for the cluster you have just repaired, check the status of all configured virtual disks (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. 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 164

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 maintenance analysis procedures” on page 167

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

“MAP 5000: Start” on page 168

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 21

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

“Power LED” on page 27

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

“Check LED” on page 30

The amber, check LED is 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 89

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. For SAN Volume Controller 2145-8F2 users, you can also use the light path diagnostics to help find the cause of errors.

Related information

“Defining cluster error codes” on page 99

Every cluster error code includes an error code number, a description, action, and possible field replaceable units (FRUs).

MAP 5800: Light path

MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the maintenance analysis procedures.

You might have been sent here because of the following:

- The Error LED on the operator panel is on or flashing
- Another MAP sent you here

Perform the following steps to enable the node to boot:

1. **Is the Error LED on the SAN Volume Controller 2145-8F2 operator panel illuminated or flashing?** See Figure 42.

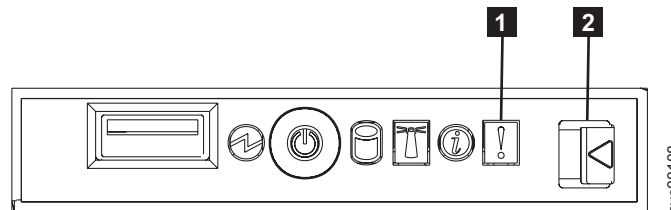


Figure 42. SAN Volume Controller 2145-8F2 operator information panel

1 Error LED

2 Release latch

NO Reassess your symptoms and return to the *MAP 5000: Start*.

YES Go to step 2.

2. (from step 1)

Press the release latch **2** and open the light path diagnostics panel. See Figure 43 on page 204.

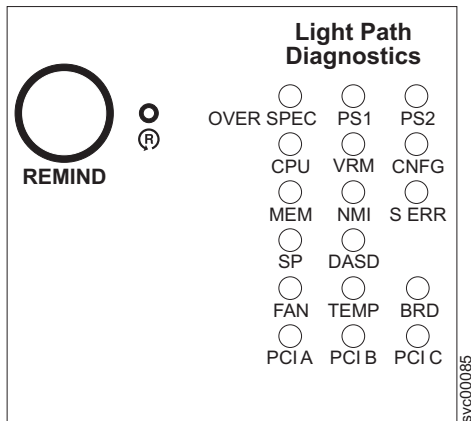


Figure 43. Light path diagnostic panel

Are one or more LEDs on the light path diagnostic panel on or flashing?

- NO** Verify that the operator panel cable is correctly seated at both ends. If the error LED is still illuminated but no LEDs are illuminated on the light path diagnostics panel, replace parts in the following sequence:
- a. Operator information panel
 - b. Cable, signal, front panel
 - c. Frame assembly

Verify the repair by continuing with the repair verification MAP.

- YES** Refer to Table 19 on page 205 and perform the action specified for the specific light path diagnostic LEDs, then go to step 3 on page 207. Some actions will require that you observe the state of LEDs on the system board or on the fan backplanes. The location of the system board LEDs are shown in Figure 44 on page 205. The fan LEDs are located adjacent to each FAN. To view the LEDs you will need to do the following:
- a. Remove power from the SAN Volume Controller 2145-8F2.
 - b. Remove the SAN Volume Controller 2145-8F2 from the rack.
 - c. Remove the top cover and open the fan doors.
 - d. Press the light path diagnostic button **1**. See Figure 44 on page 205.

Note: The light path diagnostic button is used to illuminate the light path diagnostic LEDs when power is disconnected from the SAN Volume Controller 2145-8F2.

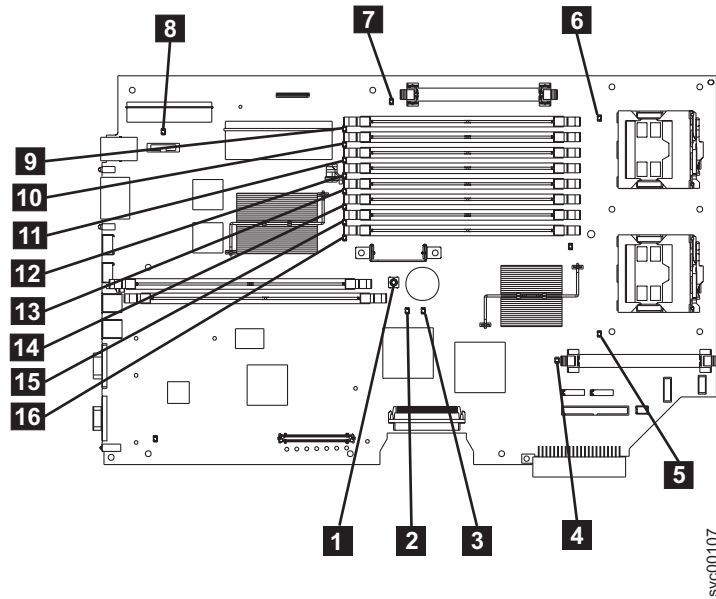


Figure 44. The SAN Volume Controller 2145-8F2 system board

- 1** Light path diagnostic button
- 2** System board fault LED
- 3** Light path activity LED
- 4** VRM 2 Error LED
- 5** CPU 2 Error LED
- 6** CPU 1 Error LED
- 7** VRM 1 Error LED
- 8** Battery LED
- 9** DIMM 1 error LED
- 10** DIMM 2 error LED
- 11** DIMM 3 error LED
- 12** DIMM 4 error LED
- 13** DIMM 5 error LED
- 14** DIMM 6 error LED
- 15** DIMM 7 error LED
- 16** DIMM 8 error LED

Table 19. Diagnostics panel LED prescribed actions

Diagnostics panel LED	Action
OVER SPEC	Replace the power supply

Table 19. Diagnostics panel LED prescribed actions (continued)

Diagnostics panel LED	Action
PS1	<p>If you have just replaced the power supply, check that it is correctly installed. If it is correctly installed, replace parts in the following sequence:</p> <ol style="list-style-type: none"> 1. Power supply 2. Power backplane
PS2	<p>This is not used on the SAN Volume Controller 2145-8F2. This is a false indication. Replace parts in the following sequence:</p> <ol style="list-style-type: none"> 1. Power backplane 2. Operator information panel 3. Frame assembly
CPU	<p>Observe the CPU indicators on the system board. The microprocessor adjacent to the illuminated LED is failing. If you have installed the incorrect type of microprocessor, the LED will be flashing. Replace parts in the following sequence:</p> <ol style="list-style-type: none"> 1. Microprocessor 2. Frame assembly
VRM	<p>Observe the VRM indicators on the system board. The VRM adjacent to the illuminated LED is failing. Verify that the VRM is correctly installed. Replace parts in the following sequence:</p> <ol style="list-style-type: none"> 1. VRM 2. Frame assembly
CNFG	<p>Observe all system board LEDs. Make sure that DIMMs, microprocessors, and VRMs are installed correctly and are of the correct type. Replace parts in the following sequence:</p> <ol style="list-style-type: none"> 1. Component adjacent to the illuminated LED 2. Frame assembly
MEM	<p>Observe the DIMM LEDs on the system board. If any DIMM LED is flashing, make sure that the correct type of DIMM is installed in every slot. Replace parts in the following sequence:</p> <ol style="list-style-type: none"> 1. Failing DIMM 2. Frame assembly <p>Note: If more than one DIMM is indicated by the light path diagnostics, replace the DIMMs one-at-a-time, starting at the lowest-numbered DIMM slot that the diagnostics indicated.</p>
NMI	<p>A non-maskable interrupt occurred. Call your support center and check if any software updates need to be applied to this SAN Volume Controller 2145-8F2. If this node will not join the cluster, run node recovery. If node recovery does not resolve the problem, replace the frame assembly.</p>
S ERR	<p>A soft error occurred. Call your support center and check if any software updates need to be applied to this SAN Volume Controller 2145-8F2. If this node will not join the cluster, run node recovery. If node recovery does not resolve the problem, replace the frame assembly.</p>
SP	<p>The Service processor has failed. Replace the frame assembly.</p>
DASD	<p>This is not used on the SAN Volume Controller 2145-8F2. This is a false indication. Replace parts in the following sequence:</p> <ol style="list-style-type: none"> 1. Operator information panel 2. Frame assembly

Table 19. Diagnostics panel LED prescribed actions (continued)

Diagnostics panel LED	Action
FAN	Observe the LEDs on the fan backplanes. The fan adjacent to the failing LED is failing. Replace parts in the following sequence: <ol style="list-style-type: none"> 1. Fan 2. Fan backplane
TEMP	If any fan failures exist, repair those before attempting this procedure. Verify that the ambient temperature is within normal operating specifications. Make sure that airflow in and around the SAN Volume Controller 2145-8F2 is not obstructed. Replace the frame assembly.
BRD	Observe the battery LED and the system board LED. If the battery LED is illuminated, replace the battery. If the system board LED is illuminated, replace the frame assembly.
PCI A	This is not used on the SAN Volume Controller 2145-8F2. This is a false indication. Replace parts in the following sequence: <ol style="list-style-type: none"> 1. Operator information panel 2. Frame assembly
PCI B	One of the fibre-channel adapter cards connected to this bus may be failing. Ensure that both adapters are correctly installed and that the riser card latches are fully closed. If possible, display the fibre-channel card status on the SAN Volume Controller 2145-8F2 front panel to determine the failing card. Otherwise, remove the fibre-channel cards one-at-a-time to determine the failing card. Replace parts in the following sequence: <ol style="list-style-type: none"> 1. Fibre-channel adapter card 2. Frame assembly
PCI C	Replace the frame assembly.

3. Continue with the repair verification MAP to verify the correct operation.

Related tasks

“Using the maintenance analysis procedures” on page 167

To allow concurrent maintenance, you must configure the SAN Volume Controllers in pairs.

“Replacing the SAN Volume Controller 2145-8F2 frame assembly” on page 223

The SAN Volume Controller 2145-8F2 frame assembly must be replaced when the system board fails or when replacing other system board components fails to isolate the error.

“Removing the SAN Volume Controller 2145-8F2 adapter assemblies” on page 231

The SAN Volume Controller 2145-8F2 contains two types of fibre-channel adapters that are functionally identical but not interchangeable.

“Replacing the SAN Volume Controller 2145-8F2 adapter assemblies” on page 233

The fibre-channel adapter card might have to be replaced.

Related reference

Chapter 7, “Maintenance analysis procedures,” on page 167

The maintenance analysis procedures (MAPs) tell you how to analyze a failure that occurs in a SAN Volume Controller.

MAP 5900: Hardware boot

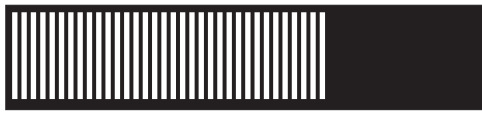
MAP 5900: Hardware boot helps you solve problems that are preventing the node from starting its boot sequence.

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the maintenance analysis procedures.

This MAP is applicable to the SAN Volume Controller 2145-4F2 and the SAN Volume Controller 2145-8F2. Be aware of which model you are using before you start this procedure.

You might have been sent here for one of the following reasons:

- The hardware boot display (below) is continuously displayed:



- The node rescue display (below) is continuously displayed:



- The boot progress is hung and Booting 100 is displayed on the front panel.
- Another MAP sent you here.

Perform the following steps to

1. **Is this a SAN Volume Controller 2145-8F2?**

NO Go to step 3

YES Go to step 2.

2. (From step 1)

Is the Error LED on the operator panel illuminated or flashing?

NO Go to step 3.

YES Go to the light path diagnostics MAP to resolve the problem.

3. (From steps 1 and 2)

If you have just installed the SAN Volume Controller or have just replaced a field replaceable unit (FRU) inside the SAN Volume Controller, perform the following:

- a. Turn off power to the SAN Volume Controller.
- b. Remove the SAN Volume Controller from the rack.
- c. Remove the top cover from the SAN Volume Controller.
- d. If you have just replaced a FRU, ensure that the FRU is correctly placed and that all connections to the FRU are secure.
- e. Ensure that all memory modules are installed correctly and the latches are fully closed.
- f. Ensure that the fibre-channel adapter cards are correctly installed.

- g. Ensure that the disk drive and its connectors are correctly installed.
- h. Ensure that the service controller is correctly installed.
- i. Replace the top cover to the SAN Volume Controller.
- j. Replace the SAN Volume Controller in the rack.
- k. Return power to the SAN Volume Controller.

Does the boot operation still hang?

NO Verify the repair by continuing with the repair verification MAP.

YES Go to step 4.

4. (from step 3 on page 208)

- a. Turn off power to the SAN Volume Controller.
- b. Remove the SAN Volume Controller from the rack.
- c. Remove the top cover from the SAN Volume Controller.
- d. If you are using the SAN Volume Controller 2145-4F2, remove all memory modules in Bank 1. If you are using the SAN Volume Controller 2145-8F2, remove the memory modules in slots 3 through 8.
- e. Remove both fibre-channel cards.
- f. Remove the disk drive.
- g. Replace the top cover to the SAN Volume Controller.
- h. Replace the SAN Volume Controller in the rack.
- i. Return power to the SAN Volume Controller.

Does the boot operation still hang with the booting display or is Booting 100 displayed on the front panel?

Note: With the FRUs removed, the boot will hang with a different boot failure code.

NO Replace the FRUs, one-at-a-time, until the failing FRU is isolated.

YES Go to step 5.

5. (from step 4)

- a. Turn off power to the SAN Volume Controller.
- b. Remove the SAN Volume Controller from the rack.
- c. Remove the top cover from the SAN Volume Controller.
- d. Replace the fibre-channel cards and the disk drive.
- e. If you are using the SAN Volume Controller 2145-4F2, replace all memory modules in Bank 1 and remove the memory modules in Bank 2. If you are using the SAN Volume Controller 2145-8F2, replace the memory modules in slots 1 and 2 with any two of the removed memory modules from slots 3 through 8.
- f. Replace the top cover to the SAN Volume Controller.
- g. Replace the SAN Volume Controller in the rack.
- h. Return power to the SAN Volume Controller.

Does the boot operation still hang with the booting display or is Booting 100 displayed on the front panel?

NO Exchange the failing memory modules for new FRUs and verify the repair by continuing with the repair verification MAP.

YES Replace the parts in the following sequence:

For the SAN Volume Controller 2145-4F2:

- a. Service controller
- b. System board

For the SAN Volume Controller 2145-8F2:

- a. Service controller
- b. Frame assembly

Verify the repair by continuing with the repair verification MAP.

Related tasks

“Replacing the SAN Volume Controller in the rack” on page 274

You must use caution when you replace the SAN Volume Controller in the rack.

“Removing the memory modules” on page 283

The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

“Replacing the memory modules” on page 285

The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

“Removing a SAN Volume Controller 2145-4F2 adapter” on page 264

The adapter assemblies are electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity.

“Removing the SAN Volume Controller 2145-8F2 adapter assemblies” on page 231

The SAN Volume Controller 2145-8F2 contains two types of fibre-channel adapters that are functionally identical but not interchangeable.

“Removing the SAN Volume Controller 2145-8F2 service controller” on page 216

You can remove the service controller from the SAN Volume Controller 2145-8F2.

“Replacing the SAN Volume Controller 2145-8F2 frame assembly” on page 223

The SAN Volume Controller 2145-8F2 frame assembly must be replaced when the system board fails or when replacing other system board components fails to isolate the error.

“Replacing the SAN Volume Controller 2145-8F2 service controller” on page 218

You can replace the SAN Volume Controller 2145-8F2 service controller.

“Replacing the SAN Volume Controller 2145-8F2 adapter assemblies” on page 233

The fibre-channel adapter card might have to be replaced.

“Removing the SAN Volume Controller 2145-4F2 disk drive” on page 251

The disk drive and cables can be removed, although be aware that the disk drive is fragile.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Replacing the top cover of the SAN Volume Controller 2145-8F2” on page 215

You must replace the top cover on the SAN Volume Controller 2145-8F2 after maintenance is completed.

“Removing the top cover from the SAN Volume Controller 2145-8F2” on page 214

You can remove the SAN Volume Controller 2145-8F2’s top cover if maintenance is necessary.

“Removing the service controller from the SAN Volume Controller 2145-4F2” on page 247

You can remove the service controller from the SAN Volume Controller.

| “Using the maintenance analysis procedures” on page 167
| To allow concurrent maintenance, you must configure the SAN Volume
| Controllers in pairs.

| “MAP 5800: Light path” on page 203

| MAP 5800: Light path helps you to solve hardware problems on the SAN
| Volume Controller 2145-8F2 that are preventing the node from booting.

| “MAP 5700: Repair verification” on page 201

| MAP 5700: Repair verification helps you to verify that field replaceable units
| (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 SAN Volume Controller 2145-4F2 system board” on page 267

| During routine maintenance, you may be required to remove and replace the
| system board.

| “Replacing the SAN Volume Controller 2145-4F2 system board” on page 270

| During routine maintenance, you may be required to replace the system board.

| **Related reference**

| “Replacing a disk drive and a service controller on the SAN Volume Controller”
| on page 286

| When you replace a service controller at the same time that you replace the
| disk drive, you cannot perform a node rescue because the nonvolatile memory
| in the “new” service controller does not contain the operating system software
| required to do so.

| **Related information**

| “Understanding the boot codes” on page 138

| The boot codes are displayed on the screen when a node is booting.

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 can find that a step within a procedure might refer you to a different remove/replace procedure. You might want to complete the new procedure before you continue with the first procedure that you started.

For the SAN Volume Controller 2145-8F2, start all problem determination and repair procedures from the light path diagnostics MAP. For the SAN Volume Controller 2145-4F2, start all problem determination and repair procedures from the start MAP.

Related tasks

“MAP 5000: Start” on page 168

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

“MAP 5800: Light path” on page 203

MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

Related information

“Removing and replacing SAN Volume Controller 2145-8F2 parts” on page 214

The remove and replace procedures for the SAN Volume Controller 2145-8F2 field replaceable units are described in the topics which follow.

“Removing and replacing SAN Volume Controller 2145-4F2 parts” on page 245

The remove and replace procedures for the SAN Volume Controller 2145-4F2 field replaceable units are described in the topics which follow.

“Removing and replacing 2145 UPS-1U parts” on page 286

The remove and replace procedures for the 2145 UPS-1U field replaceable units are described in the topics which follow.

“Removing and replacing 2145 UPS parts” on page 303

The remove and replace procedures for the 2145 UPS field replaceable units are described in the topics which follow.

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 field replaceable units (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: Do not remove the power from both SAN Volume Controllers unless the procedures instruct you to do so.

Preparing to remove and replace parts

Before you remove and replace parts, you must be aware of all safety issues.

First, read the safety precautions in *Definitions of notice*. These guidelines help you safely work with the SAN Volume Controller and uninterruptible power supply.

For the translation of the danger, caution, and 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 xxiii

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

Removing and replacing SAN Volume Controller 2145-8F2 parts

The remove and replace procedures for the SAN Volume Controller 2145-8F2 field replaceable units are described in the topics which follow.

Removing the top cover from the SAN Volume Controller 2145-8F2

You can remove the SAN Volume Controller 2145-8F2's top cover if maintenance is necessary.

Before you remove the cover, you must remove the SAN Volume Controller 2145-8F2 from the rack and open the two fan doors.

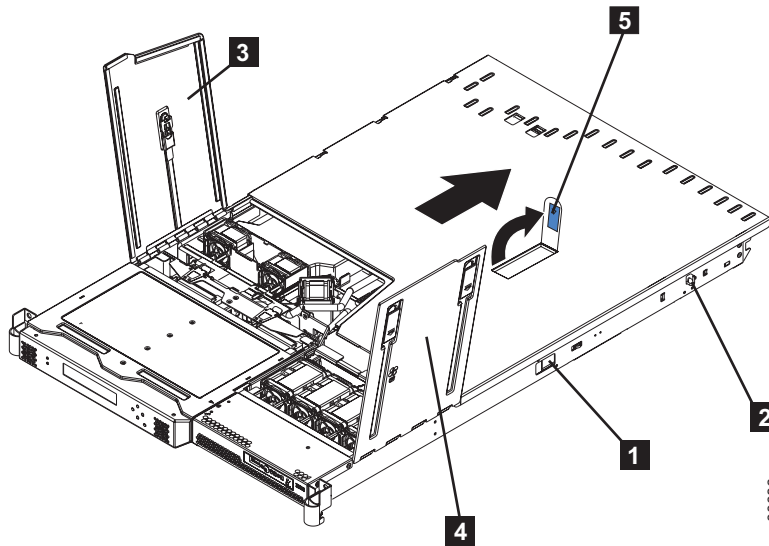


Figure 45. SAN Volume Controller 2145-8F2 with fan doors open

- 1 Side release latch
- 2 Rail lock pin
- 3 Fan door A
- 4 Fan door B
- 5 Cover release latch

Perform the following steps to remove the SAN Volume Controller 2145-8F2 top cover:

1. Remove the server from the rack:

- a. Pull the SAN Volume Controller 2145-8F2 out, about a third of the way, until it stops.
 - b. Slide both side release latches (left and right) toward the front of the SAN Volume Controller 2145-8F2. Make sure that both rail-lock pins **2** are in a vertical position, pull the SAN Volume Controller 2145-8F2 out, and remove it from the rack. See Figure 45 on page 214.
2. Open fan door A **3** and fan door B **4**. To open fan door A slide the slide latch to the left and lift up the door panel. To open fan door B slide the two slide latches to the right, and lift up the door panel.
 3. Perform the following steps to remove the SAN Volume Controller 2145-8F2 cover:
 - a. Lift up the cover release latch **5** and slide the cover to the rear of the SAN Volume Controller 2145-8F2.
 - b. Make sure that the SAN Volume Controller 2145-8F2 cover slides away from the insets that are on the front, rear, and sides of the SAN Volume Controller 2145-8F2 cover.
 - c. Lift the cover off the SAN Volume Controller 2145-8F2 and set the cover aside.

Important: Before turning on the SAN Volume Controller 2145-8F2, replace the cover for proper cooling and airflow. Operating the SAN Volume Controller 2145-8F2 for extended periods of time (more than 30 minutes) with the cover removed might damage components.

Related tasks

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the power cable from the 2145 UPS-1U” on page 298

You can remove the power cable from the 2145 uninterruptible power supply-1U (2145 UPS-1U) if you are having problems with the power supply and suspect that the power cable is defective.

“Replacing the top cover of the SAN Volume Controller 2145-8F2”

You must replace the top cover on the SAN Volume Controller 2145-8F2 after maintenance is completed.

Replacing the top cover of the SAN Volume Controller 2145-8F2

You must replace the top cover on the SAN Volume Controller 2145-8F2 after maintenance is completed.

Before turning on the SAN Volume Controller 2145-8F2, replace the SAN Volume Controller 2145-8F2 cover for proper cooling and airflow. Operating the SAN Volume Controller 2145-8F2 for extended periods of time (more than 30 minutes) with the cover removed might damage components.

Perform the following steps to replace the SAN Volume Controller 2145-8F2 top cover:

1. Position the internal cables so that they do not interfere with the cover installation.

Important: Before sliding the cover forward, make sure that all tabs on both the front, rear, and side of the cover engage the chassis correctly. If all

the tabs do not engage the chassis correctly, you might have difficulty when removing the cover.

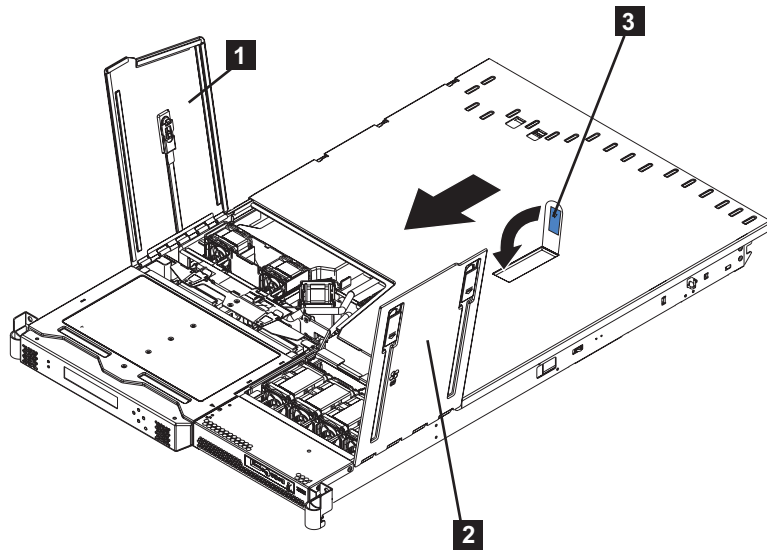


Figure 46. The SAN Volume Controller 2145-8F2 with fan doors open

- 1** Fan door A
 - 2** Fan door B
 - 3** Cover release latch
2. Position the cover on top of the SAN Volume Controller 2145-8F2 and slide it forward.
 3. Press down on the cover release latch **3** until the cover properly engages all the inset tabs on the SAN Volume Controller 2145-8F2. See Figure 46.
 4. Close the fan doors.
 5. Install the SAN Volume Controller 2145-8F2 in the rack.

Note: See the related topic for information on how to install the SAN Volume Controller 2145-8F2 in the rack.

Related tasks

“Removing the top cover from the SAN Volume Controller 2145-8F2” on page 214

You can remove the SAN Volume Controller 2145-8F2’s top cover if maintenance is necessary.

“Replacing the SAN Volume Controller in the rack” on page 274

You must use caution when you replace the SAN Volume Controller in the rack.

Removing the SAN Volume Controller 2145-8F2 service controller

You can remove the service controller from the SAN Volume Controller 2145-8F2.

Perform the following steps to remove the service controller:

1. Remove all power from the SAN Volume Controller 2145-8F2.
2. Remove the SAN Volume Controller 2145-8F2 from the rack.

3. Open fan door A **1** of the SAN Volume Controller 2145-8F2. See Figure 47.

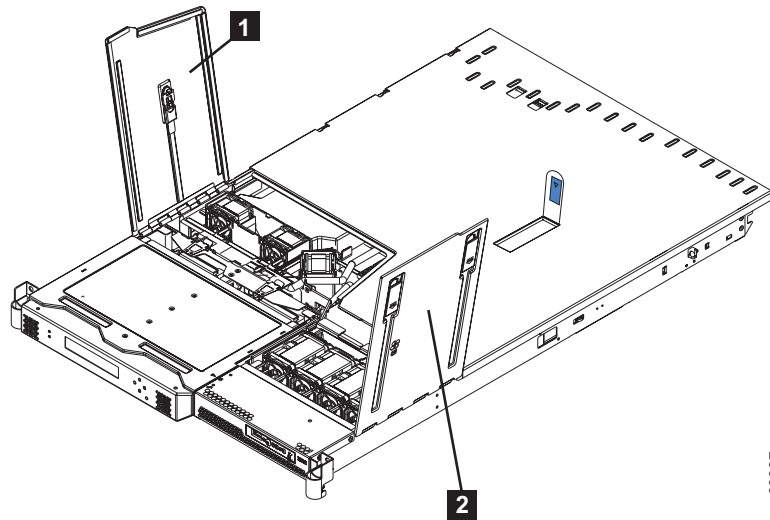


Figure 47. SAN Volume Controller 2145-8F2 with fan doors open

- 1** Fan door A
 - 2** Fan door B
4. Lift the two blue levers on the rear of the cage assembly to release it from the frame.
 5. Lift the cage assembly until the blue release latch **1** on the left side of the service controller assembly is accessible. See Figure 48.

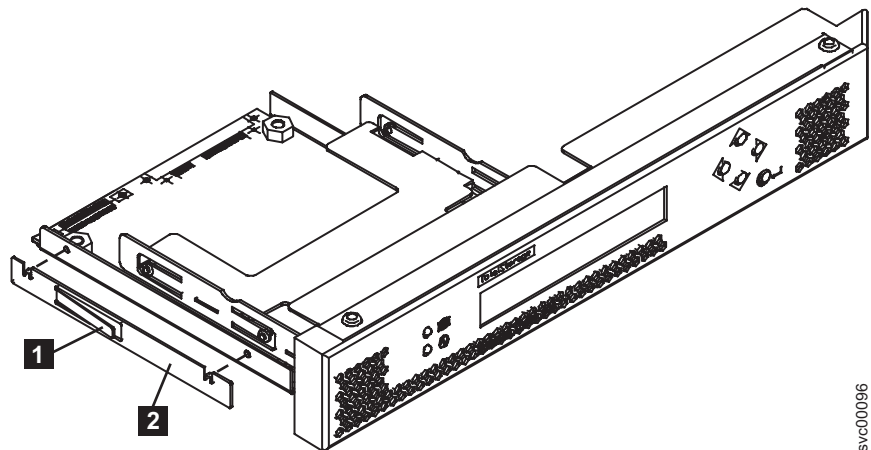


Figure 48. The SAN Volume Controller 2145-8F2 service controller

- 1** Release latch

2 Retention clip

6. Press the release latch **1**, then pull the service controller forward and out of the cage assembly.
7. Remove the retention clip **2**. Make sure to save the retention clip for when you reinstall the SAN Volume Controller 2145-8F2.

Related tasks

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

Replacing the SAN Volume Controller 2145-8F2 service controller

You can replace the SAN Volume Controller 2145-8F2 service controller.

Perform the following steps to replace the SAN Volume Controller 2145-8F2 service controller:

1. Place the retention clip **2** over the locating holes on the left side of the service controller. See Figure 49.

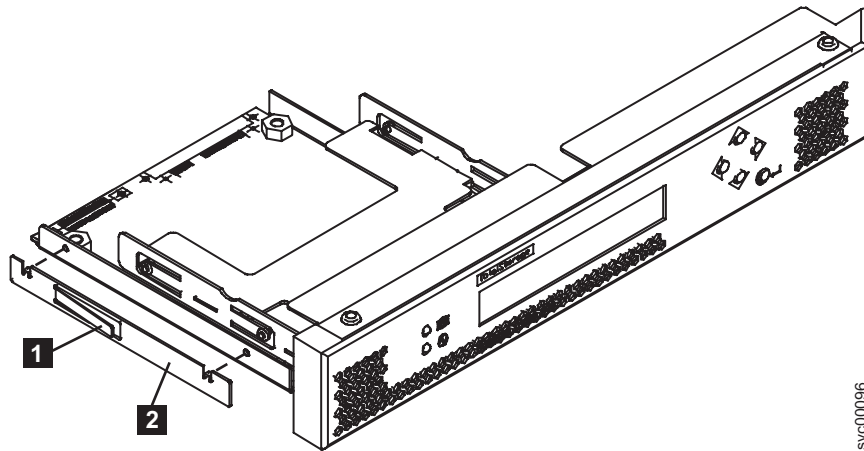


Figure 49. SAN Volume Controller 2145-8F2 service controller

2. Push the service controller into the cage until the retention clip engages.
3. Relocate the cage assembly and close the blue levers to secure the cage assembly to the frame.
4. Close the fan door **1** and replace the SAN Volume Controller 2145-8F2 in the rack. See Figure 50 on page 219.

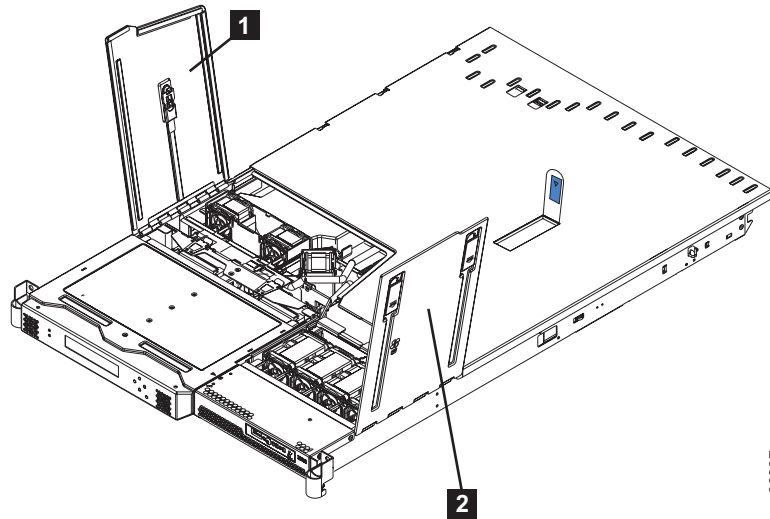


Figure 50. The SAN Volume Controller 2145-8F2 with fan doors open

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 5, you might have to re-zone the fibre-channel switches if the switch zoning uses Worldwide Port Names. You must restart the host systems before they are able to access disks through this SAN Volume Controller 2145-8F2.

5. If you replaced the service controller as part of concurrent maintenance, you must rewrite the WWNN on the new service controller. If you do not, and the fibre-channel switch zoning uses Worldwide Port Names, you cannot add the node back into the cluster until the fibre-channel switches in the SAN are re-zoned. Also, the host systems cannot access the fibre-channel ports on that node until the host systems are rebooted. To restore the WWNN, perform the following steps:
 - a. Power on the SAN Volume Controller 2145-8F2.
 - b. Display the node status on the service panel. See the procedure on how to check the status of the node ports.
 - c. Press and hold the down button.
 - d. Press and release the select button.
 - e. Release the down button. The text “WWNN” is displayed on the first line of the display, with the second line containing the last five characters of the original WWNN that was saved on the disk drive. If this second-line number is all zeros, that is probably because you have also replaced the disk drive as part of this repair operation. If so, go to step 5f. Otherwise, press the select button to accept the number. This restores the WWNN.
 - f. Display the WWNN in the vital product data (VPD) for the node on which you are working.
 - g. Record the last five characters of the WWNN.
 - h. With the WWNN displayed on the service panel, press and hold the down button.
 - i. Press and release the select button.
 - j. Release the down button.
 - k. Edit the displayed number to match the number from the VPD. Use the up and down buttons to increase or decrease the number displayed. Use the left and right buttons to move between the fields.

I. Press the select button twice to accept the number. The WWNN is restored.

Related tasks

“Replacing the SAN Volume Controller in the rack” on page 274

You must use caution when you replace the SAN Volume Controller in the rack.

“Viewing the node status using the SAN Volume Controller Console application on the master console” on page 8

You should always be aware of the node status.

“Viewing the vital product data” on page 11

Vital product data is available for each node and for the cluster.

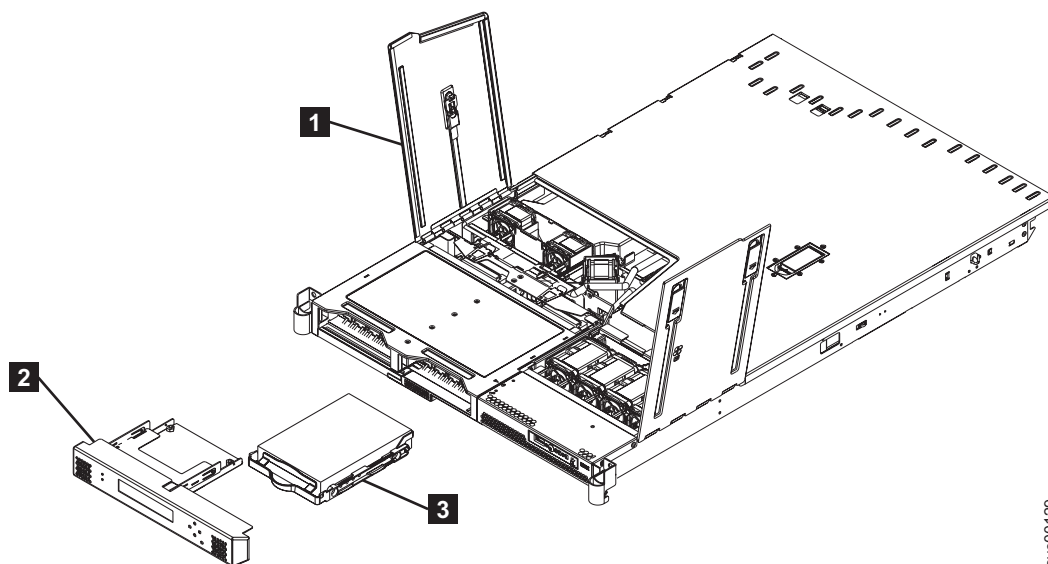
Removing the SAN Volume Controller 2145-8F2 SATA disk drive

You might have to remove the SATA (serial advanced technology attachment) disk drive due to SAN Volume Controller 2145-8F2 maintenance needs.

The SAN Volume Controller 2145-8F2 disk drive can be removed after you shut down the SAN Volume Controller 2145-8F2.

Perform the following steps to remove the SAN Volume Controller 2145-8F2 disk drive:

1. Turn off the power to the SAN Volume Controller 2145-8F2.
2. Remove and disconnect all power cords and external signal cables.
3. Remove the SAN Volume Controller 2145-8F2 from the rack.
4. Open fan door A **1**. See Figure 51.
5. Remove the service controller. See the documentation concerning removing the service controller.
6. Pull the disk drive out of the bay.



svc00129

Figure 51. Removing the SAN Volume Controller 2145-8F2 SATA disk drive

- 1** Fan Door A
- 2** Service controller
- 3** SATA disk drive

You may now replace the SAN Volume Controller 2145-8F2 disk drive.

Related tasks

“Replacing the SAN Volume Controller 2145-8F2 SATA disk drive”

You might have to replace the SATA (serial advanced technology attachment) disk drive due to SAN Volume Controller 2145-8F2 maintenance needs.

“Removing the top cover from the SAN Volume Controller 2145-8F2” on page 214

You can remove the SAN Volume Controller 2145-8F2’s top cover if maintenance is necessary.

“Removing the SAN Volume Controller 2145-8F2 service controller” on page 216

You can remove the service controller from the SAN Volume Controller 2145-8F2.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

Replacing the SAN Volume Controller 2145-8F2 SATA disk drive

You might have to replace the SATA (serial advanced technology attachment) disk drive due to SAN Volume Controller 2145-8F2 maintenance needs.

The SAN Volume Controller 2145-8F2 disk drive can be replaced after you remove the existing disk drive.

Perform the following steps to replace the SAN Volume Controller 2145-8F2 disk drive:

1. Slide the disk drive into the bay until the rear of the drive snaps into place with the rear panel-mount connector.
2. Replace the service controller.
3. Replace the SAN Volume Controller 2145-8F2 in the rack.
4. Reconnect the power cords and all external signal cables.
5. Power-on the SAN Volume Controller 2145-8F2.

Related tasks

“Removing the SAN Volume Controller 2145-8F2 SATA disk drive” on page 220
You might have to remove the SATA (serial advanced technology attachment) disk drive due to SAN Volume Controller 2145-8F2 maintenance needs.

“Replacing the top cover of the SAN Volume Controller 2145-8F2” on page 215
You must replace the top cover on the SAN Volume Controller 2145-8F2 after maintenance is completed.

“Replacing the SAN Volume Controller 2145-8F2 service controller” on page 218
You can replace the SAN Volume Controller 2145-8F2 service controller.

“Replacing the SAN Volume Controller in the rack” on page 274

You must use caution when you replace the SAN Volume Controller in the rack.

Removing the SAN Volume Controller 2145-8F2 power backplane

The SAN Volume Controller 2145-8F2 power backplane might have to be replaced.

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the power backplane.

Perform the following steps to remove the power backplane:

1. Turn off the SAN Volume Controller 2145-8F2.

2. Disconnect all power cords and external cables from the back of the SAN Volume Controller 2145-8F2.
3. Remove the SAN Volume Controller 2145-8F2 from the rack.
4. Remove the top cover.
5. Disconnect the power supply from the power backplane.
6. Slide the power backplane to the left and disconnect it from the system board. See Figure 52.

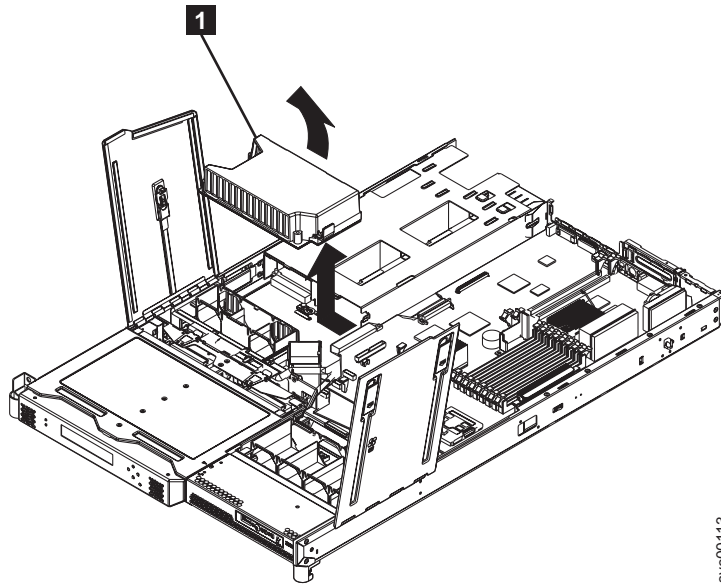


Figure 52. Removing the power backplane

7. Remove the power backplane from the SAN Volume Controller 2145-8F2.

Related tasks

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-8F2” on page 214

You can remove the SAN Volume Controller 2145-8F2’s top cover if maintenance is necessary.

“Removing a SAN Volume Controller 2145-8F2 power supply” on page 228

You must remove the SAN Volume Controller 2145-8F2 power supply if you intend to replace it.

Related reference

“Handling static-sensitive devices” on page xlvi

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

Replacing the SAN Volume Controller 2145-8F2 power backplane

The SAN Volume Controller 2145-8F2 power backplane might have to be replaced.

Ensure that you are aware of the procedures for handling static-sensitive devices before you replace the power backplane.

Perform the following steps to replace the power backplane:

1. Lower the power backplane into position on the SAN Volume Controller 2145-8F2 and slide it to the right to connect it to the system board. See Figure 53.

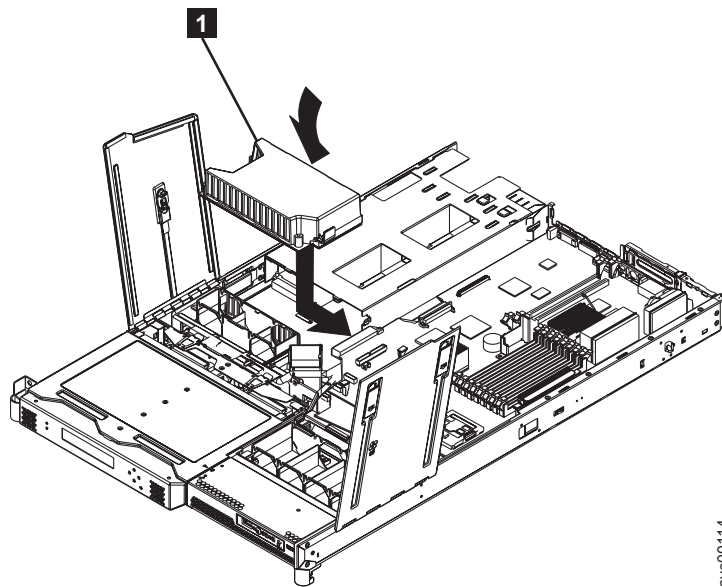


Figure 53. Replacing the power backplane

2. Connect the power supply to the power backplane.
3. Replace the top cover.
4. Place the SAN Volume Controller 2145-8F2 into the rack.
5. Connect all power cords and external cables into the back of the SAN Volume Controller 2145-8F2.
6. Turn on the SAN Volume Controller 2145-8F2.

Related tasks

“Replacing the SAN Volume Controller 2145-8F2 power supply” on page 230

“Replacing the SAN Volume Controller in the rack” on page 274

You must use caution when you replace the SAN Volume Controller in the rack.

“Replacing the top cover of the SAN Volume Controller 2145-8F2” on page 215

You must replace the top cover on the SAN Volume Controller 2145-8F2 after maintenance is completed.

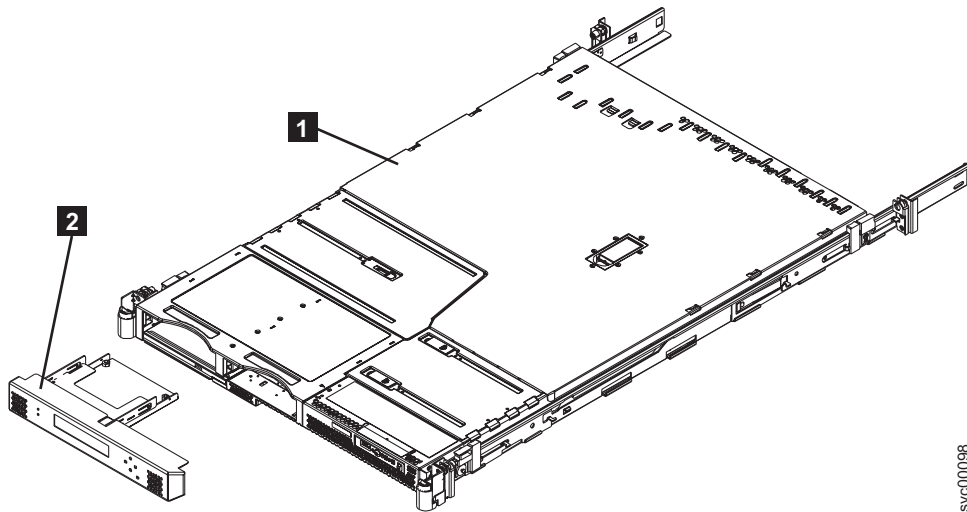
Related reference

“Handling static-sensitive devices” on page xlvi

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

Replacing the SAN Volume Controller 2145-8F2 frame assembly

The SAN Volume Controller 2145-8F2 frame assembly must be replaced when the system board fails or when replacing other system board components fails to isolate the error.



svc00058

Figure 54. The SAN Volume Controller 2145-8F2 frame assembly and service controller

- 1** Frame assembly
- 2** Service controller

Perform the following steps to replace the frame assembly:

1. Make a note of the seven-character system serial number that is on the serial number label on the front panel of the node. If you cannot read the serial number or if you want to verify that it is correct, you can also find it on the node vital product data (VPD). Perform the following steps to find the serial number in the VPD:
 - a. Start the SAN Volume Controller application.
 - b. Display the VPD for the failed node.
 - c. Note the system serial number.
2. Remove all power from the SAN Volume Controller.
3. Remove the SAN Volume Controller from the rack.
4. Remove the fibre-channel adapter cards from the frame assembly that you are replacing.
5. Remove the service controller from the frame assembly you are replacing.
6. Install the fibre-channel adapter cards into the new frame assembly.
7. Install the service controller into the new frame assembly.
8. Install the SAN Volume Controller in the rack.
9. Connect the power and signal cable from the 2145 uninterruptible power supply-1U (2145 UPS-1U), the Ethernet cable, and the fibre-channel adapter cables.
10. Power on the SAN Volume Controller.

Note: It is essential that you perform the next steps to restore the original machine serial number. Failure to do this might invalidate the customer's warranty or service agreement.
11. If you are performing this repair as part of a directed maintenance procedure, you will be prompted to type the machine serial number that you noted in step 1. Otherwise, perform the following steps:
 - a. Delete the failed node from the cluster.

- b. Add the repaired node to the cluster.
- c. Start the command-line interface.
- d. Issue the following command:

```
svcservicetask writesernum -sernum nodeserialnumber nodename
```

where *nodeserialnumber* is the number that you noted in step 1 on page 224 and *nodename* is the name of the repaired node that you added in step 11b.

The `svcservicetask writesernum -sernum nodeserialnumber nodename` command writes the machine serial number to the SAN Volume Controller system board.

- e. Write the serial number, noted in step 1 on page 224, on the blank serial number label on the front of the node.

Related tasks

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Replacing the SAN Volume Controller 2145-8F2 adapter assemblies” on page 233

The fibre-channel adapter card might have to be replaced.

“Replacing the SAN Volume Controller 2145-8F2 service controller” on page 218

You can replace the SAN Volume Controller 2145-8F2 service controller.

“Replacing the SAN Volume Controller in the rack” on page 274

You must use caution when you replace the SAN Volume Controller in the rack.

“Adding a node to a cluster using the SAN Volume Controller Console application on the master console” on page 9

You might have to add a node back into the cluster if it has been either removed or rejected by a cluster.

“Using the SAN Volume Controller Console application on the master console” on page 5

The SAN Volume Controller Console is an application that runs on the SAN Volume Controller master console. It can also be installed on any other server that meets the requirements.

“Removing the SAN Volume Controller 2145-8F2 service controller” on page 216

You can remove the service controller from the SAN Volume Controller 2145-8F2.

“Viewing the vital product data” on page 11

Vital product data is available for each node and for the cluster.

“Removing the SAN Volume Controller 2145-8F2 adapter assemblies” on page 231

The SAN Volume Controller 2145-8F2 contains two types of fibre-channel adapters that are functionally identical but not interchangeable.

“Deleting a node using the SAN Volume Controller Console application on the master console” on page 8

If it is required, you can delete a node from a cluster.

“Accessing the CLI from the master console” on page 12

If you must enter and run command-line instructions, you can access the SAN Volume Controller command-line interface (CLI) from the master console.

Removing the SAN Volume Controller 2145-8F2 CMOS battery

You must remove the system board complementary metal-oxide semiconductor (CMOS) battery to replace it or to perform routine maintenance.

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to all safety instructions. In the U.S.A., call 1-800-IBM-4333 for information about battery disposal.

CAUTION:

When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of. Do not:

- **Throw or immerse into water**
- **Heat to more than 100° C (212° F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Perform the following steps to remove the SAN Volume Controller 2145-8F2 CMOS battery:

1. Follow any special handling and installation instructions supplied with the battery.
2. Remove the SAN Volume Controller 2145-8F2 from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-8F2.
4. Locate the battery **1** on the system board. See Figure 55.

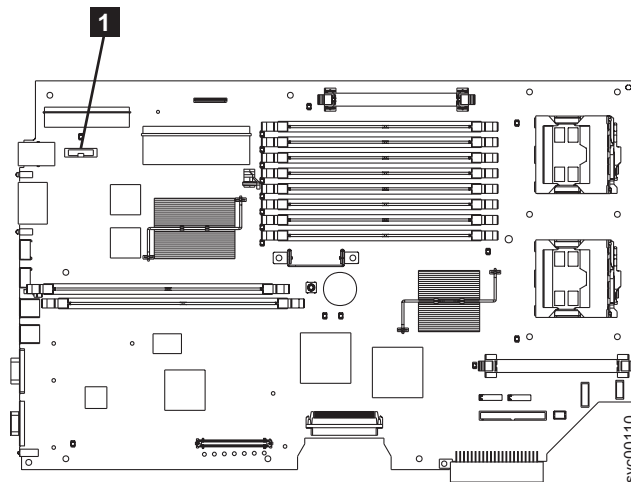


Figure 55. Battery location

5. Remove the battery:
 - a. Use one finger to pull the retainer tab that secures the battery to its housing. See Figure 56 on page 227.

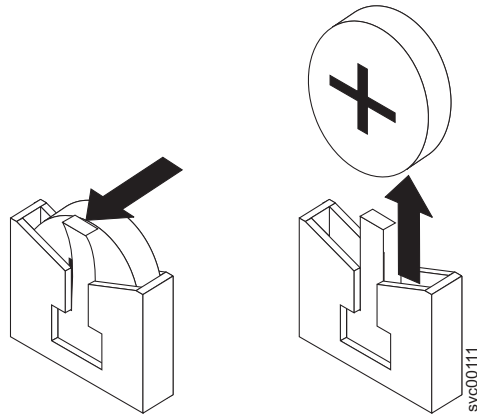


Figure 56. CMOS battery holder

- b. Use one finger to slide the battery up and out from its socket.

Related tasks

“Removing the top cover from the SAN Volume Controller 2145-8F2” on page 214

You can remove the SAN Volume Controller 2145-8F2’s top cover if maintenance is necessary.

Replacing the SAN Volume Controller 2145-8F2 CMOS battery

You must replace the system board complementary metal-oxide semiconductor (CMOS) battery after you perform routine maintenance.

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to all safety instructions. In the U.S.A., call 1-800-IBM-4333 for information about battery disposal.

CAUTION:

When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of. Do not:

- **Throw or immerse into water**
- **Heat to more than 100° C (212° F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Perform the following steps to replace the SAN Volume Controller 2145-8F2 CMOS battery:

1. Insert the new battery in the battery socket **1**. See Figure 57 on page 228.

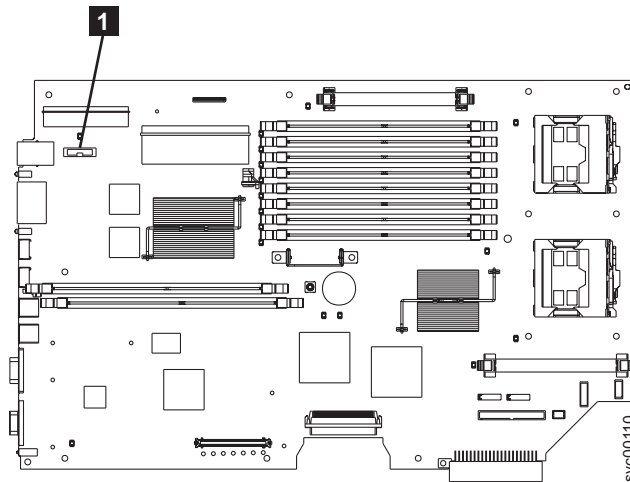


Figure 57. Location of the CMOS battery on the SAN Volume Controller 2145-8F2

- a. Hold the battery so that the positive (+) side of the battery is facing toward the center of the server.
- b. Pull the retainer tab out of the way so that you can slide the battery into its socket.
- c. Slide the battery down until it snaps into place.

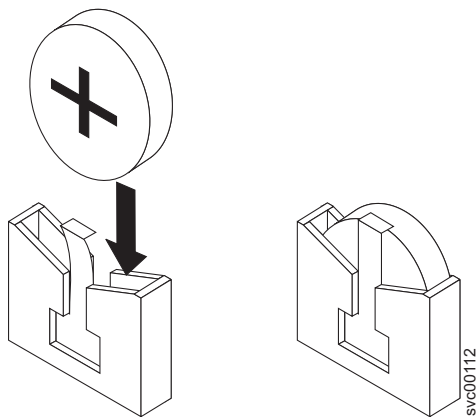


Figure 58. CMOS battery socket

2. Reinstall the SAN Volume Controller 2145-8F2 cover.
3. Replace the SAN Volume Controller 2145-8F2 in the rack.

Related tasks

“Replacing the top cover of the SAN Volume Controller 2145-8F2” on page 215
 You must replace the top cover on the SAN Volume Controller 2145-8F2 after maintenance is completed.

Removing a SAN Volume Controller 2145-8F2 power supply

You must remove the SAN Volume Controller 2145-8F2 power supply if you intend to replace it.

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the SAN Volume Controller 2145-8F2 power supply.

Perform the following steps to remove the power supply:

1. Turn off the SAN Volume Controller 2145-8F2.
2. Power-off the 2145 uninterruptible power supply-1U (2145 UPS-1U) that is supplying this SAN Volume Controller 2145-8F2.
3. Remove the power cord.

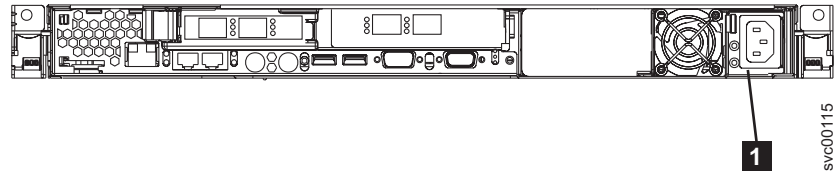
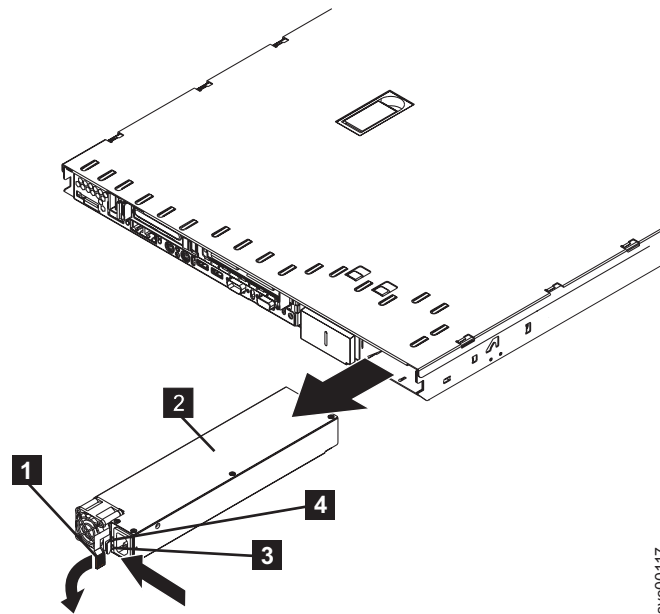


Figure 59. SAN Volume Controller 2145-8F2 power supply

4. From the rear of the SAN Volume Controller 2145-8F2, push the orange release lever to the left and then push down on it to release the power-supply assembly. This will move the power supply back, slightly, for easy removal.
5. Pull the power supply out of the power-supply bay.



- 1 Handle
- 2 Power supply
- 3 DC power LED
- 4 AC power LED

Related reference

“Handling static-sensitive devices” on page xlvi

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

Replacing the SAN Volume Controller 2145-8F2 power supply

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the power supply.

Perform the following steps to replace the SAN Volume Controller 2145-8F2 power supply:

1. Install the power supply in the empty power supply bay:
 - a. Rotate the handle **1** down on the rear of the power supply to the open position, and then slide the power supply forward into the power-supply bay. See Figure 60.

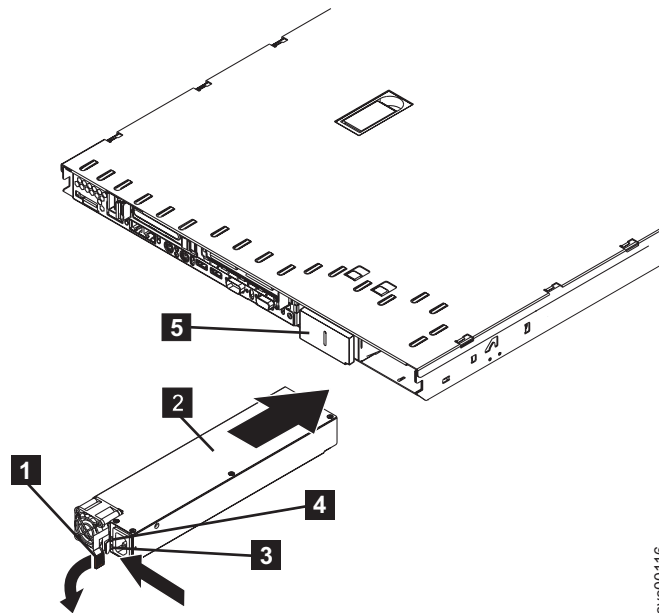


Figure 60. SAN Volume Controller 2145-8F2 power supply handle

- 1** Handle
- 2** Power supply
- 3** DC power LED
- 4** AC power LED

- b. Gently lift the handle up until it clicks. This signals that the power supply is securely seated in the bay.
2. Connect the power cord for the new power supply to the power-cord connector on the power supply.
 3. Reconnect the power cord and power-on the 2145 uninterruptible power supply-1U (2145 UPS-1U).
 4. Power-on the SAN Volume Controller 2145-8F2.
 5. Make sure that the power-supply fan starts and the AC power LED **1** and DC power LED **2** on the power supply are lit, indicating that the power supply is operating correctly. See Figure 61 on page 231.

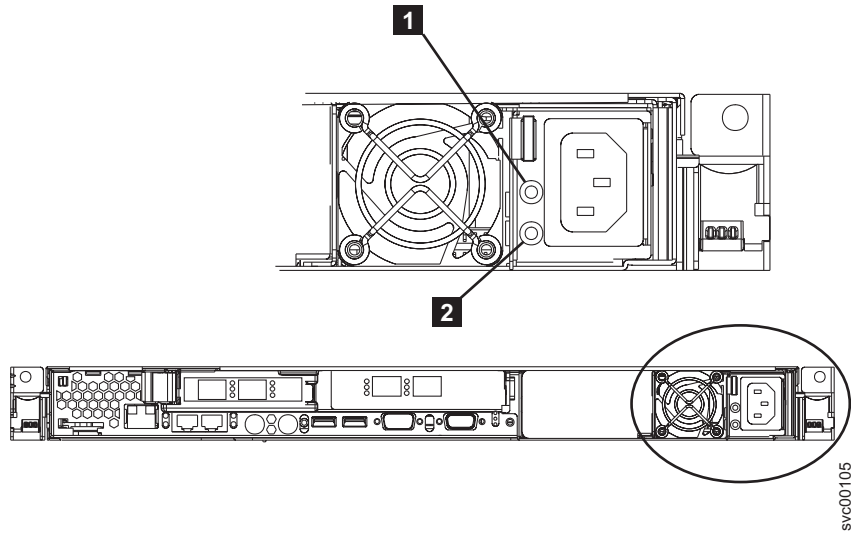


Figure 61. AC and DC power LEDs

- 1** AC power LED
- 2** DC power LED

Related reference

“Handling static-sensitive devices” on page xlvi
 Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8F2 adapter assemblies

The SAN Volume Controller 2145-8F2 contains two types of fibre-channel adapters that are functionally identical but not interchangeable.

Figure 62 shows the rear view of the SAN Volume Controller 2145-8F2 which specifies the two fibre-channel ports:

Note: The adapter assemblies are electrostatic-discharge sensitive. Take precautions when removing or replacing them to avoid damage from static electricity.

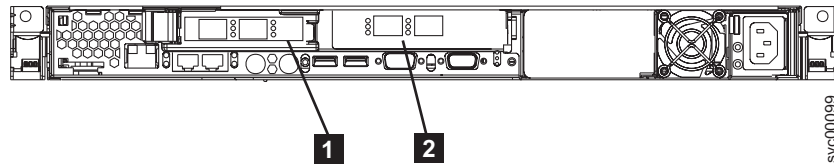


Figure 62. Rear view of the SAN Volume Controller 2145-8F2 with fibre-channel ports indicated

- 1** PCI slot 1 - contains a dual port fibre-channel host bus adapter (HBA) in a low profile
- 2** PCI slot 2 - contains a dual port fibre-channel HBA at full height

Perform the following steps to remove a fibre-channel adapter assembly:

1. Remove all power from the SAN Volume Controller 2145-8F2.

2. Remove the SAN Volume Controller 2145-8F2 from the rack.
3. Remove the top cover of the SAN Volume Controller 2145-8F2.
4. Perform the following steps to remove the PCI card from PCI slot 1 (low profile):
 - a. Pull the blue PCI card retainer **1** from the rear of the SAN Volume Controller 2145-8F2. See Figure 63.

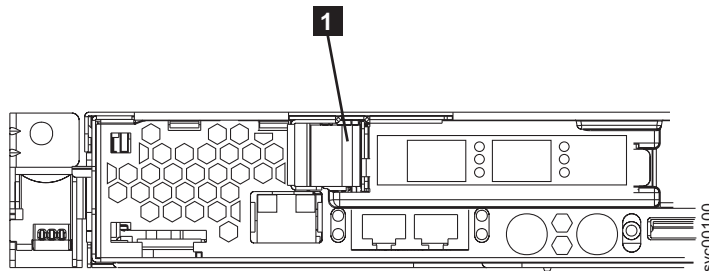


Figure 63. PCI slot 1 card retainer

1 Slot 1 card retainer

- a. Hold the blue adapter support away from the card and pull it away from the edge connector on the riser card assembly. See Figure 64.

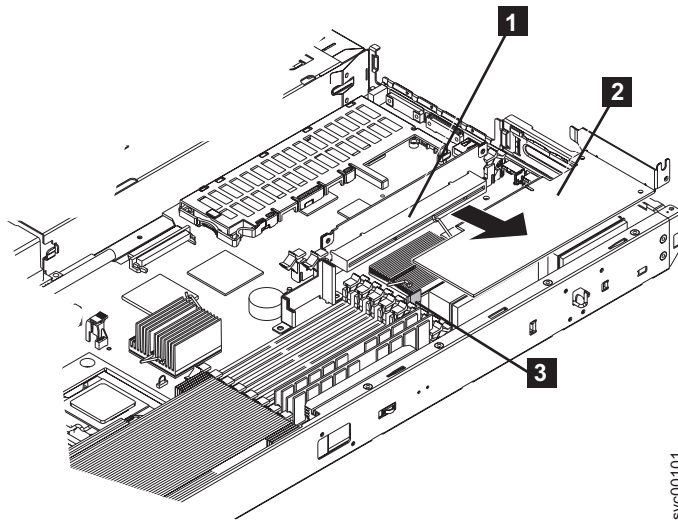


Figure 64. SAN Volume Controller 2145-8F2 riser card and low profile adapter

- 1** Riser card
- 2** Low-profile adapter
- 3** Low-profile adapter support

5. Perform the following steps to remove the PCI card from PCI slot 2 (full height):
 - a. Open the retaining clips on both sides of the slot 2 riser card by pushing the clips down and away from the riser card until the clips are no longer attached to the riser card.

Note: Insert your finger into the access hole on the slot 2 adapter cover to open the retention latch at the rear of the SAN Volume Controller 2145-8F2.

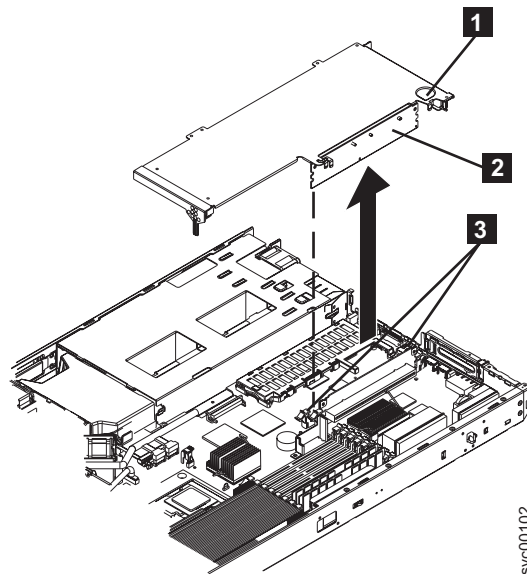


Figure 65. SAN Volume Controller 2145-8F2 slot 2 adapter

- 1** Access hole to retention latch
- 2** Riser card
- 3** Riser card retention latches

- b. Unlatch the PCI slot 2 riser card **2** and pull it clear of the system board edge connector.
- c. Lift the riser card clear of the SAN Volume Controller 2145-8F2 frame and pull the fibre-channel card from the riser card edge connector.

Related tasks

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

Replacing the SAN Volume Controller 2145-8F2 adapter assemblies

The fibre-channel adapter card might have to be replaced.

Note: The adapter assemblies are electrostatic-discharge sensitive. Take precautions when removing or replacing them to avoid damage from static electricity.

Perform the following steps to install the fibre-channel card into the riser card assembly:

1. Install the fibre-channel card in slot 1.
 - a. Slide the I/O connector portion of the adapter through the slot 1 opening and align the edge connector on the low-profile adapter with the connector on the riser card. Press the edge connector firmly into the riser-card connector. Make sure that the adapter snaps into the riser card securely and the adapter is lying on top of the low-profile adapter support.

- b. Push the adapter down past the tab so that the adapter snaps into place on the support.
 - c. Check the retention latches on the riser card and make sure that they are still securely in place.
 - d. Close the fibre-channel card retainer to secure the card.
2. Install the fibre-channel card in slot 2.
 - a. Align the edge connector on the fibre-channel adapter with the connector on the riser card. Press the edge connector firmly into the riser-card connector. The card is fully installed when the gold connectors on the edge of the fibre-channel cards are no longer visible.
 - b. Grasp the riser card assembly by its top edge or upper corners and align the riser card with the guides for the riser-card connector.
 - c. Press the riser card edge connector firmly into the slot 2 riser-card edge connector on the system board. Make sure that the retention latches snap into place to secure the riser card into the slot 2 riser-card connector.
 3. Replace the top cover of the SAN Volume Controller 2145-8F2.
 4. Replace the SAN Volume Controller 2145-8F2 in the rack.

Related tasks

“Replacing the SAN Volume Controller in the rack” on page 274

You must use caution when you replace the SAN Volume Controller in the rack.

Removing the SAN Volume Controller 2145-8F2 operator information panel

You might have to replace the operator panel on your SAN Volume Controller 2145-8F2 due to required maintenance.

Ensure that you are aware of how to handle static-sensitive devices.

Perform the following steps to remove the operator information panel:

1. Turn off the SAN Volume Controller 2145-8F2.
2. Disconnect all power cords and external cables from the back of the server.
3. Remove the top cover. If necessary, you might have to remove the SAN Volume Controller 2145-8F2 from the rack.
4. Press the operator panel release latch **2** and slide the operator information panel away from the SAN Volume Controller 2145-8F2. See Figure 66.

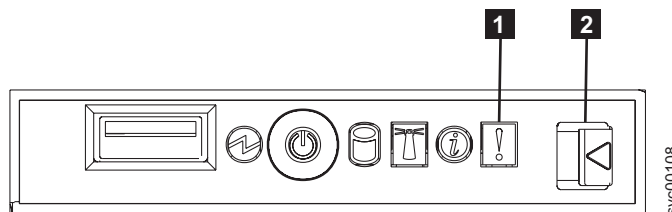


Figure 66. Operator information panel

5. Use a small screwdriver to push in the retention springs **1** on the sides of the operator information panel assembly. See Figure 67 on page 235.

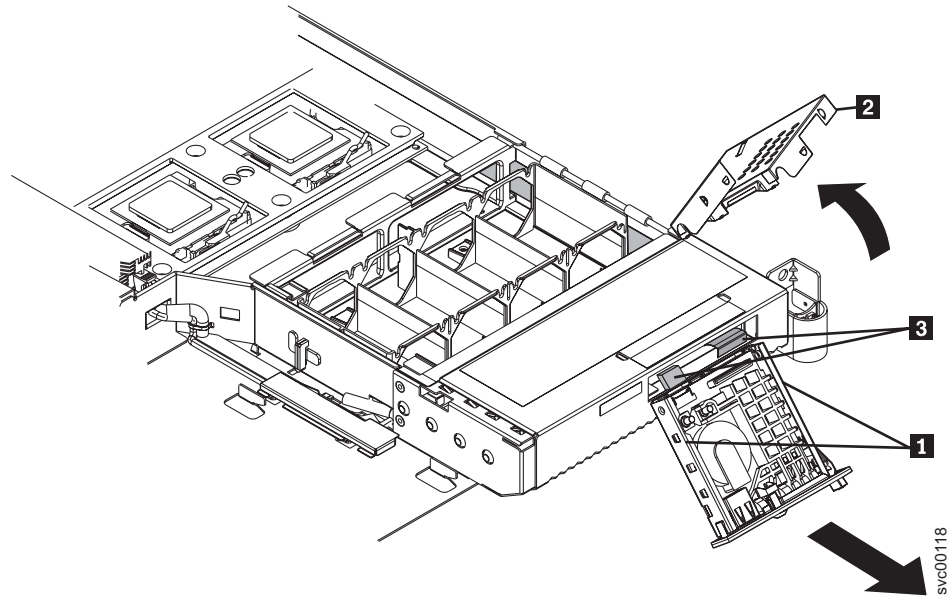


Figure 67. SAN Volume Controller 2145-8F2 with exposed operator information panel

- 1** Retention springs
- 2** Operator information panel assembly cover
- 3** Cables

6. Slide the assembly forward and out of the SAN Volume Controller 2145-8F2.
7. Push out on the two sides of the assembly cover to flare it out.
8. Rotate the assembly cover **2** up and off of the operator information panel assembly.
9. Unplug the two cables from the rear of the assembly **3**.

Related tasks

“Removing the top cover from the SAN Volume Controller 2145-8F2” on page 214

You can remove the SAN Volume Controller 2145-8F2’s top cover if maintenance is necessary.

“Replacing the top cover of the SAN Volume Controller 2145-8F2” on page 215

You must replace the top cover on the SAN Volume Controller 2145-8F2 after maintenance is completed.

Replacing the SAN Volume Controller 2145-8F2 operator information panel

You might have to replace the operator panel on your SAN Volume Controller 2145-8F2 due to required maintenance.

Ensure that you are aware of how to handle static-sensitive devices.

Perform the following steps to replace the operator information panel:

1. Plug in the two cables on the rear of the assembly **1**. See Figure 68 on page 236.

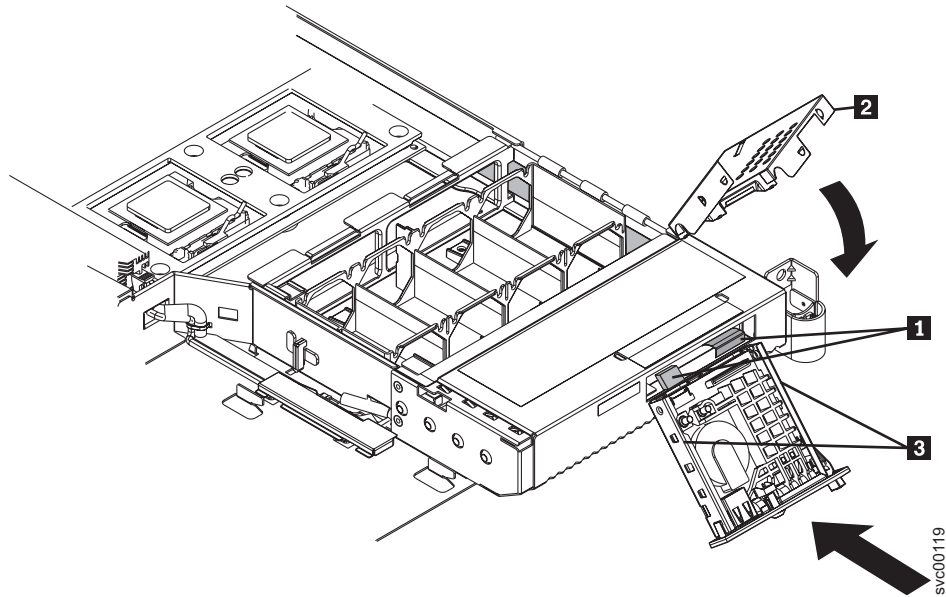


Figure 68. Replacing the operator information panel

- 1 Cables
- 2 Operator information panel assembly cover

2. Replace the assembly cover **2** onto the operator information panel assembly.
3. Slide the assembly into the SAN Volume Controller 2145-8F2 until it is firmly anchored.
4. Replace the top cover and replace the SAN Volume Controller 2145-8F2 in the rack, if necessary.
5. Connect all power cords and external cables to the back of the server.
6. Turn on the SAN Volume Controller 2145-8F2.

Related tasks

“Removing the top cover from the SAN Volume Controller 2145-8F2” on page 214

You can remove the SAN Volume Controller 2145-8F2’s top cover if maintenance is necessary.

“Replacing the top cover of the SAN Volume Controller 2145-8F2” on page 215

You must replace the top cover on the SAN Volume Controller 2145-8F2 after maintenance is completed.

Removing the SAN Volume Controller 2145-8F2 fans

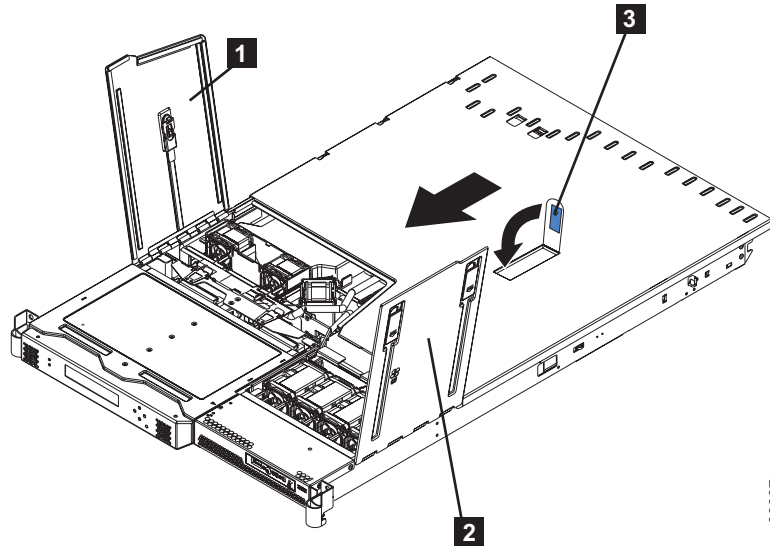
The SAN Volume Controller 2145-8F2 fans might have to be replaced due to failure.

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the SAN Volume Controller 2145-8F2 fans.

Perform the following steps to remove a failed fan:

1. Remove all power from the SAN Volume Controller 2145-8F2.
2. Remove the SAN Volume Controller 2145-8F2 from the rack.

3. Open the fan door where the failed fan resides. Fans 1, 2, and 3 are under fan door A **1** . Fans 4 through 7 are under fan door B **2** . See Figure 69.

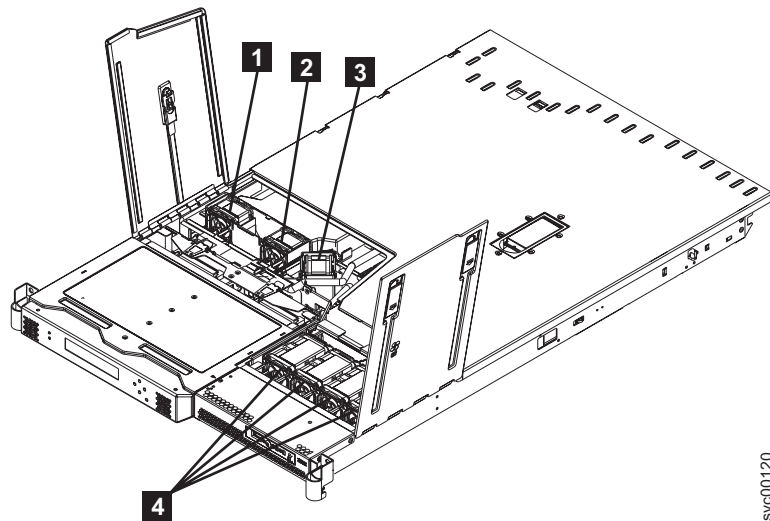


svc00087

Figure 69. SAN Volume Controller 2145-8F2 with open fan doors

- 1** Fan door A
- 2** Fan door B

4. Disconnect the cable of the failing fan from the connector.



svc00120

Figure 70. SAN Volume Controller 2145-8F2 fans

- 1** Fan 1
- 2** Fan 2
- 3** Fan 3
- 4** Fans 4, 5, 6, and 7

5. Pull up on the orange tab on the side of the failing fan.

6. Lift the fan out of the SAN Volume Controller 2145-8F2.

You can now replace the failed fan.

Related tasks

“Replacing the SAN Volume Controller 2145-8F2 fans”

The SAN Volume Controller 2145-8F2 fans might have to be replaced due to failure.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-8F2” on page 214

You can remove the SAN Volume Controller 2145-8F2’s top cover if maintenance is necessary.

Related reference

“Handling static-sensitive devices” on page xlvi

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

Replacing the SAN Volume Controller 2145-8F2 fans

The SAN Volume Controller 2145-8F2 fans might have to be replaced due to failure.

Ensure that you are aware of the procedures for handling static-sensitive devices before you replace the SAN Volume Controller 2145-8F2 fans. The replacement procedures in this topic assume that the following are true:

- The SAN Volume Controller 2145-8F2 power is turned off
- The SAN Volume Controller 2145-8F2 is removed from the rack
- The failed fan is removed

Perform the following steps to replace the SAN Volume Controller 2145-8F2 fans:

1. Orient the new fan in the same position as the fan you removed. Make sure that the airflow indicator, on top of the fan, is pointing to the rear of the server.
2. Push the fan assembly down into the server until the blue grommets are correctly seated.
3. Connect the cable of the replacement fan into the connector.
4. Close the fan door.
5. Replace the top cover.
6. Return the SAN Volume Controller 2145-8F2 to the rack.
7. Reconnect the cables and power cords.
8. Restore power to the SAN Volume Controller 2145-8F2.

Related tasks

“Removing the SAN Volume Controller 2145-8F2 fans” on page 236

The SAN Volume Controller 2145-8F2 fans might have to be replaced due to failure.

“Replacing the SAN Volume Controller in the rack” on page 274

You must use caution when you replace the SAN Volume Controller in the rack.

“Replacing the top cover of the SAN Volume Controller 2145-8F2” on page 215

You must replace the top cover on the SAN Volume Controller 2145-8F2 after maintenance is completed.

Related reference

“Handling static-sensitive devices” on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the fan holder and fan backplanes

The fan holder with fan backplanes field replaceable unit (FRU) is supplied as a kit of parts. Replace only the failed assembly and discard any unused part.

Perform the following steps to remove the fan holder with fan backplane:

1. Turn off the SAN Volume Controller 2145-8F2.
2. Disconnect all power cords and external cables from the back of the SAN Volume Controller 2145-8F2.
3. Remove the SAN Volume Controller 2145-8F2 from the rack.
4. Remove the top cover.
5. Unplug the fans from the fan backplane.
6. Remove the screws and set them in a safe place.
7. Disconnect the fan cable.
8. Pull the fan bracket out of the SAN Volume Controller 2145-8F2.

Related tasks

“Removing a SAN Volume Controller from a rack” on page 272
The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-8F2” on page 214

You can remove the SAN Volume Controller 2145-8F2’s top cover if maintenance is necessary.

Related reference

“Handling static-sensitive devices” on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the fan holder and fan backplanes

The fan holder with fan backplanes field replaceable unit (FRU) is supplied as a kit of parts. Replace only the failed assembly and discard any unused part.

Perform the following steps to replace the fan holder with fan backplane:

1. Place the fan bracket into the SAN Volume Controller 2145-8F2.
2. Connect the fan cable.
3. Replace the screws that you had set aside.
4. Plug the fans into the fan backplane.
5. Replace the top cover.
6. Replace the SAN Volume Controller 2145-8F2 in the rack.
7. Connect all power cords and external cables into the back of the SAN Volume Controller 2145-8F2.
8. Turn on the SAN Volume Controller 2145-8F2.

Tip: When reinstalling the fan brackets on the front right side of the SAN Volume Controller 2145-8F2, remove the cage assembly that holds the disk drive and service controller and remove the fan cable cover. Pull the cable loose before plugging it into the fan backplane, then install the fan holder and backplane assembly in the SAN Volume Controller 2145-8F2.

Related tasks

“Replacing the top cover on the SAN Volume Controller 2145-4F2” on page 246
You must replace the top cover on the SAN Volume Controller 2145-4F2 during your general maintenance.

“Replacing the SAN Volume Controller in the rack” on page 274

You must use caution when you replace the SAN Volume Controller in the rack.

Related reference

“Handling static-sensitive devices” on page xlvi

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

Removing the SAN Volume Controller 2145-8F2 microprocessor

The SAN Volume Controller 2145-8F2 must always be fitted with both microprocessors to function correctly.

Before you remove the microprocessor, ensure that you are aware of handling static-sensitive devices. Figure 71 shows the microprocessors and VRMs.

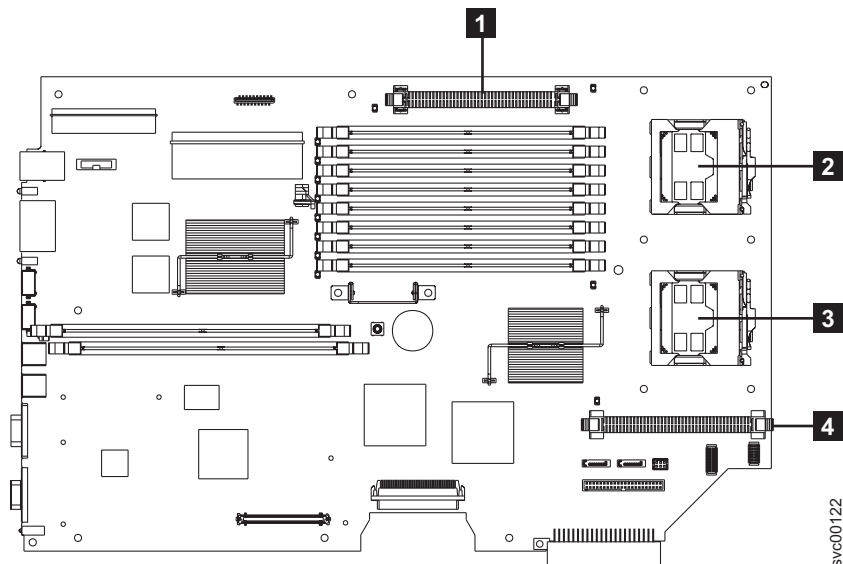


Figure 71. Location of microprocessor and VRM sockets

- 1** VRM 1
- 2** Microprocessor 1
- 3** Microprocessor 2
- 4** VRM 2

Each microprocessor is matched with a VRM and a heat sink. When removing the microprocessor, you must first remove the heat sink. Perform the following steps to remove a microprocessor:

1. Turn off all power to the SAN Volume Controller 2145-8F2.
2. Disconnect all power cords and external cables.
3. Remove the SAN Volume Controller 2145-8F2 from the rack.
4. Remove the top cover.

5. Fully loosen one captive screw before loosening the other captive screw. This helps to break the bond between the heat sink and the microprocessor.
6. Remove the heat sink.

Important: Be careful when handling the microprocessor and heat sink. If you wish to reuse the thermal grease between the heat sink and the microprocessor, do not contaminate it. If thermal grease is supplied with your replacement microprocessor, remove all traces of the used thermal grease before applying the new grease.

7. Rotate the microprocessor socket lever arm upward to its maximum vertical position. See Figure 72.

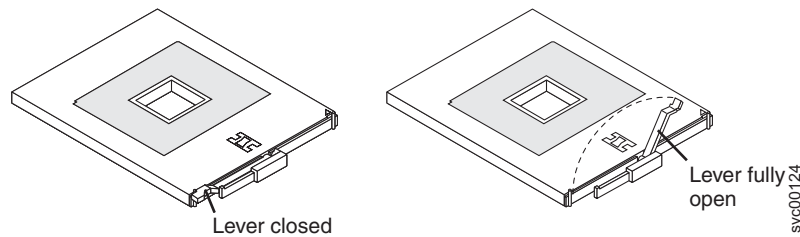


Figure 72. Microprocessor with arm locked and fully opened

8. Remove the microprocessor from the socket.

Related tasks

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-8F2” on page 214

You can remove the SAN Volume Controller 2145-8F2’s top cover if maintenance is necessary.

“Replacing the SAN Volume Controller 2145-8F2 microprocessor”

The SAN Volume Controller 2145-8F2 must always be fitted with both microprocessors in order to function correctly.

Related reference

“Handling static-sensitive devices” on page xlvii

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

Replacing the SAN Volume Controller 2145-8F2 microprocessor

The SAN Volume Controller 2145-8F2 must always be fitted with both microprocessors in order to function correctly.

The instructions below assume that you:

- Removed all power from the SAN Volume Controller 2145-8F2
- Removed the SAN Volume Controller 2145-8F2 from the rack
- Removed the top cover of the SAN Volume Controller 2145-8F2
- Removed the microprocessor that is being replaced

Perform the following steps to replace the SAN Volume Controller 2145-8F2 microprocessor:

1. Touch the static-protective package that contains the new microprocessor to any *unpainted* metal surface on the SAN Volume Controller 2145-8F2.

2. Remove the microprocessor from the package.
3. Rotate the locking lever **3** from the closed position to the open position. See Figure 73.

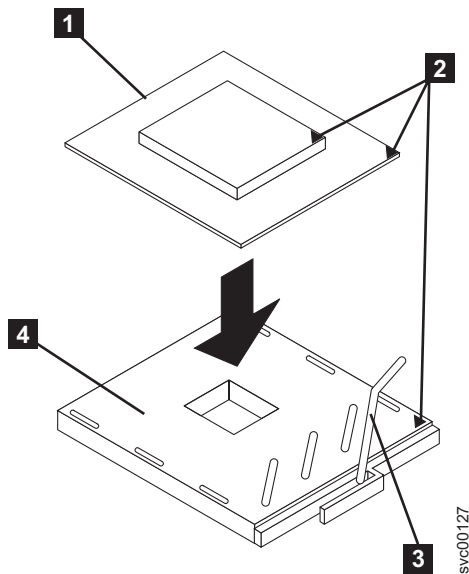


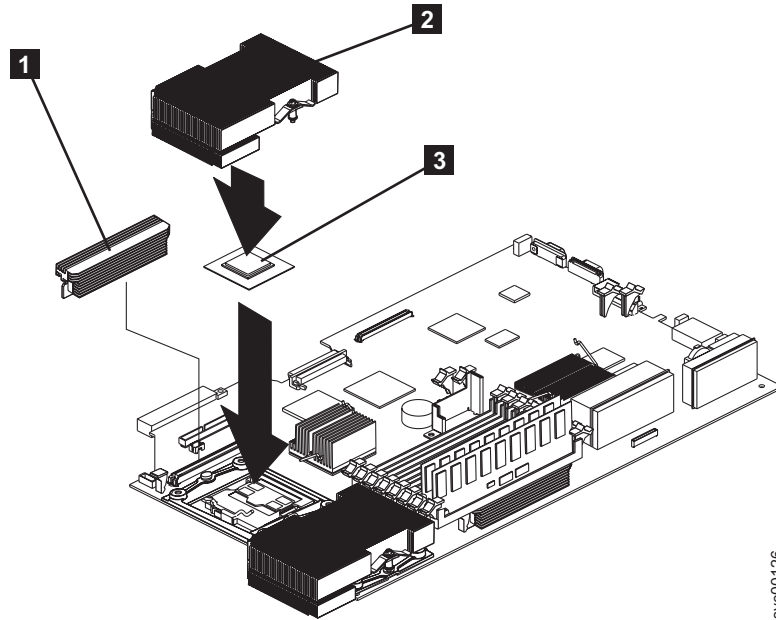
Figure 73. Microprocessor locking lever in open position

- 1** Microprocessor
- 2** Corner marks
- 3** Locking lever
- 4** Microprocessor socket

4. Center the microprocessor **1** over the microprocessor socket **4**.
5. Align the triangle **2** on the corner of the microprocessor with the triangle on the corner of the socket and carefully press the microprocessor into the socket.
Attention: Do not use excessive force when pressing the microprocessor into the socket.
6. Close the lever.

Note: A VRM and a heat sink are included in the microprocessor package.

- Do not set the heat sink down after removing it from the package.
- Do not touch or contaminate the thermal grease on the bottom of the heat sink. Doing so damages its heat-conducting capability and exposes the microprocessor to overheating.
- If you must remove the heat sink after installing it, note that the thermal grease might have formed a strong bond between the heat sink and the microprocessor. Do not force the heat sink and microprocessor apart; doing so causes damage to the microprocessor pins. Loosen one captive screw fully before loosening the other captive screw to help break the bond between the components without damaging them.



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Figure 74. Microprocessor and heat sink locations

- 1** VRM
- 2** Heat sink
- 3** Microprocessor

7. Install the heat sink **2** on top of the microprocessor **3**. See Figure 74.
8. Tighten the captive screws. Alternate between the screws until they are all tightened. Do not overtighten.

Related tasks

“Replacing the top cover on the SAN Volume Controller 2145-4F2” on page 246
 You must replace the top cover on the SAN Volume Controller 2145-4F2 during your general maintenance.

“Replacing the SAN Volume Controller in the rack” on page 274
 You must use caution when you replace the SAN Volume Controller in the rack.

“Removing the SAN Volume Controller 2145-8F2 microprocessor” on page 240
 The SAN Volume Controller 2145-8F2 must always be fitted with both microprocessors to function correctly.

Related reference

“Handling static-sensitive devices” on page xlvii
 Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8F2 VRM

You might remove the voltage regulator module (VRM) to perform maintenance on the SAN Volume Controller 2145-8F2.

Before you remove the VRM, ensure that you are aware of handling static-sensitive devices. Figure 75 on page 244 shows the microprocessors and VRMs.

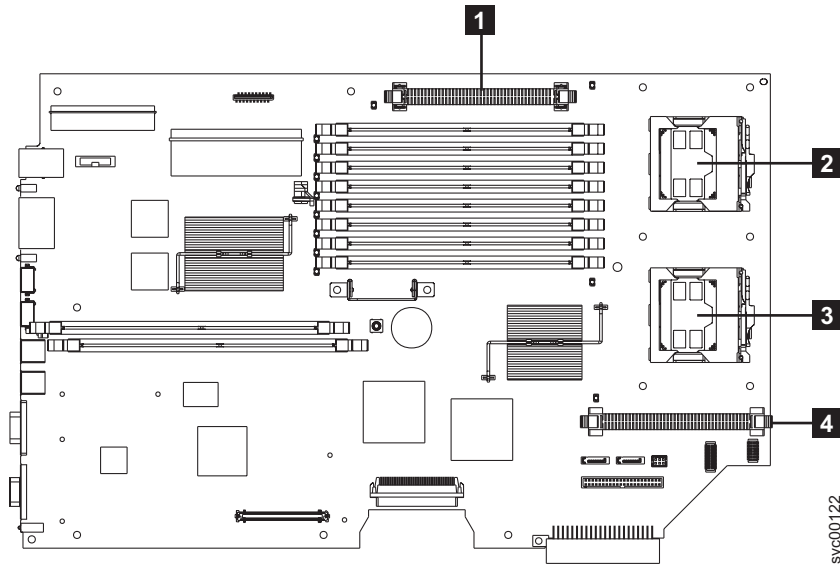


Figure 75. Location of VRM sockets

- 1** VRM 1
- 2** Microprocessor 1
- 3** Microprocessor 2
- 4** VRM 2

Perform the following steps to remove the VRM:

1. Remove all power from the SAN Volume Controller 2145-8F2.
2. Remove the SAN Volume Controller 2145-8F2 from the rack.
3. Remove the SAN Volume Controller 2145-8F2 top cover.
4. Press the latches on both sides of the VRM downward and outward.

The VRM is pulled out of the SAN Volume Controller 2145-8F2 and you may now replace the VRM.

Related tasks

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2’s top cover if maintenance is necessary.

“Replacing the SAN Volume Controller 2145-8F2 VRM” on page 245

Before you replace the microprocessor, you must replace the voltage regulator module (VRM).

Related reference

“Handling static-sensitive devices” on page xlvii

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

Replacing the SAN Volume Controller 2145-8F2 VRM

Before you replace the microprocessor, you must replace the voltage regulator module (VRM).

Before you replace the VRM, ensure that you are aware of handling static-sensitive devices. These instructions assume the following:

- The power to the SAN Volume Controller 2145-8F2 is turned off.
- The SAN Volume Controller 2145-8F2 is removed from the rack.
- The SAN Volume Controller 2145-8F2 top cover is removed.
- The old VRM is removed from the SAN Volume Controller 2145-8F2.

Perform the following steps to replace the VRM:

1. Align the VRM in the connector.
2. Press both sides of the VRM downward until the latches click into place.
3. If you are replacing the microprocessor, perform the steps required to do so. If not, replace the SAN Volume Controller 2145-8F2 top cover.
4. Place the SAN Volume Controller 2145-8F2 in the rack.
5. Power up the SAN Volume Controller 2145-8F2.

Related tasks

“Replacing the SAN Volume Controller in the rack” on page 274

You must use caution when you replace the SAN Volume Controller in the rack.

“Replacing the top cover of the SAN Volume Controller 2145-8F2” on page 215

You must replace the top cover on the SAN Volume Controller 2145-8F2 after maintenance is completed.

“Removing the SAN Volume Controller 2145-8F2 VRM” on page 243

You might remove the voltage regulator module (VRM) to perform maintenance on the SAN Volume Controller 2145-8F2.

Related reference

“Handling static-sensitive devices” on page xlvii

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

Removing and replacing SAN Volume Controller 2145-4F2 parts

The remove and replace procedures for the SAN Volume Controller 2145-4F2 field replaceable units are described in the topics which follow.

Removing the top cover from the SAN Volume Controller 2145-4F2

You can remove the SAN Volume Controller 2145-4F2's top cover if maintenance is necessary.

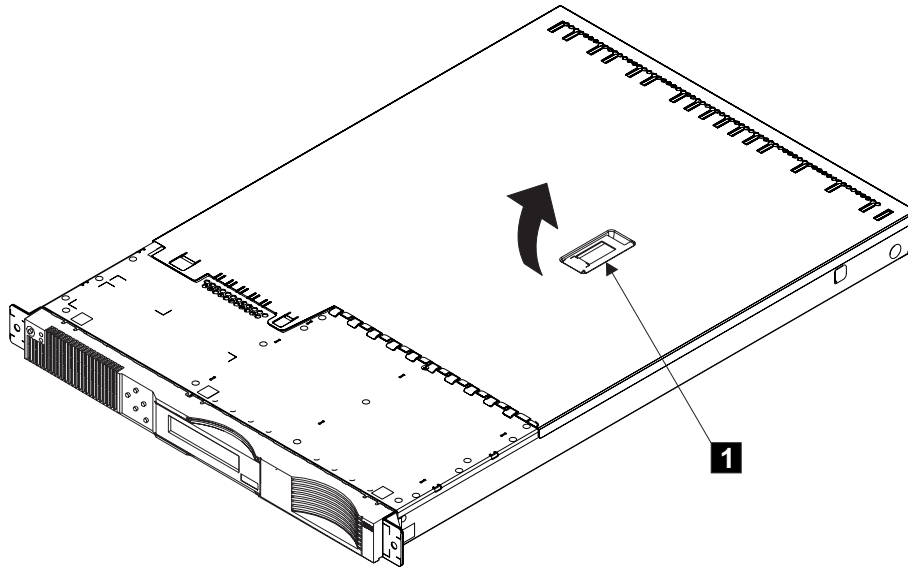


Figure 76. Removing the top cover

1 Top cover lever

Perform the steps below to remove the SAN Volume Controller 2145-4F2's top cover:

1. Remove all power from the SAN Volume Controller 2145-4F2.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Lift the lever **1**. This action moves the top cover rearward approximately 13 mm (0.5 in).
4. Lift the front of the cover, then lift the cover away from the SAN Volume Controller 2145-4F2 and set it aside.

For proper cooling and air flow, replace the server cover before turning on the SAN Volume Controller 2145-4F2. Operating the SAN Volume Controller 2145-4F2 for extended periods of time (more than 30 minutes) with the cover removed might damage components.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

Replacing the top cover on the SAN Volume Controller 2145-4F2

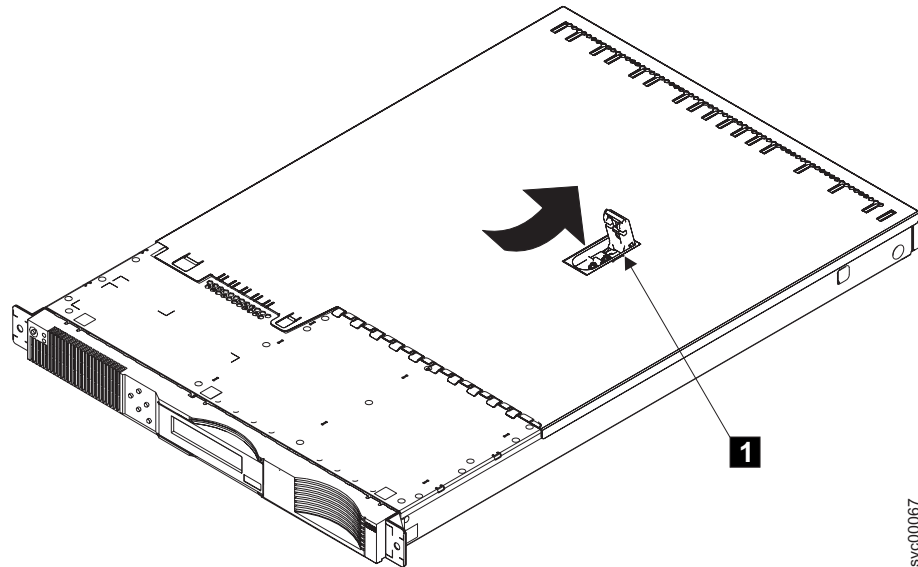
You must replace the top cover on the SAN Volume Controller 2145-4F2 during your general maintenance.

Before moving the top cover into place, position the internal cables so that they do not interfere with the cover.

Important: Before sliding the cover forward, make sure that all the tabs on both the front, rear, and side of the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be very difficult to later remove the cover.

Perform the following steps to replace the top cover on the SAN Volume Controller 2145-4F2:

1. Ensure that the lever **1** is fully up. See Figure 77.



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Figure 77. Installing the Top Cover

1 Top cover lever

2. Place the cover onto the SAN Volume Controller 2145-4F2 so that about 13 mm (0.5 in.) of the cover protrudes over the back edge of the SAN Volume Controller 2145-4F2 frame.
3. Press the lever downward. The top cover moves toward the front of the SAN Volume Controller 2145-4F2.
4. Ensure that top fingers and back lugs of the cover correctly engage the frame of the SAN Volume Controller 2145-4F2.
5. Press the lever until it fully engages.

Related tasks

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2’s top cover if maintenance is necessary.

Removing the service controller from the SAN Volume Controller 2145-4F2

You can remove the service controller from the SAN Volume Controller.

Note: 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 field replaceable unit (FRU).

Attention: If you are replacing the service controller and the disk drive as part of the same repair operation, see the related documentation.

Perform the following steps to remove the service controller:

1. Remove all power from the SAN Volume Controller 2145-4F2.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover of the SAN Volume Controller 2145-4F2.
4. Remove the front panel of the SAN Volume Controller 2145-4F2.
5. Pull the two handles **2** to release the latches. See Figure 78.

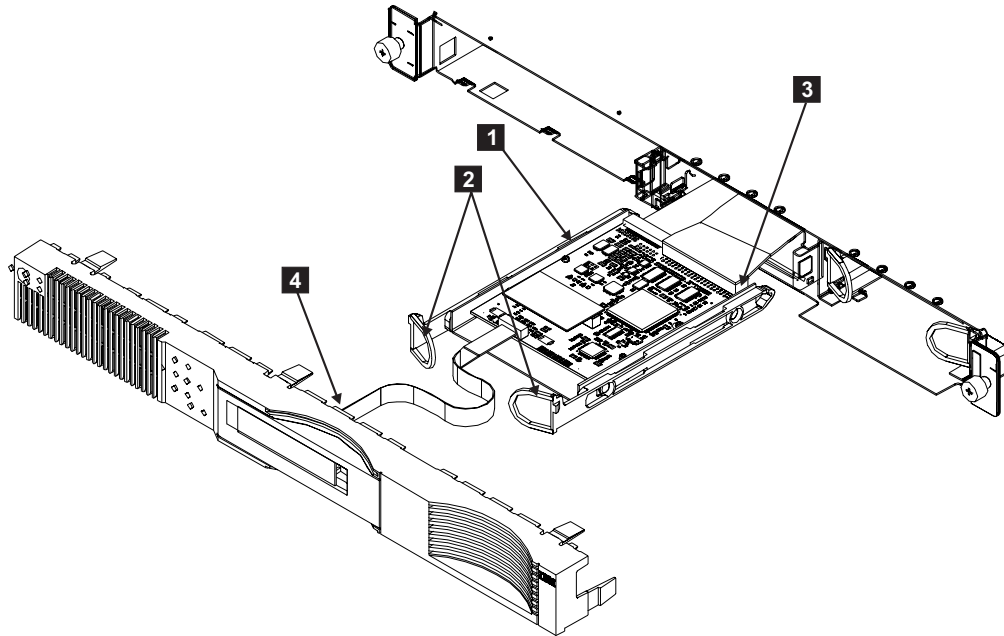


Figure 78. Removing the service controller

6. Carefully pull the service controller **1** out of the SAN Volume Controller 2145-4F2 to avoid damaging the attached cables.
7. If you have any other tasks that you need to perform while the service controller is removed, do those tasks now. Otherwise, reinstall the service controller.

Note:

- The 40-way cable connector is keyed.
- 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 each cable connector end is not visible. This ensures that the cable is fully seated. See Figure 79 on page 249 and Figure 80 on page 249.

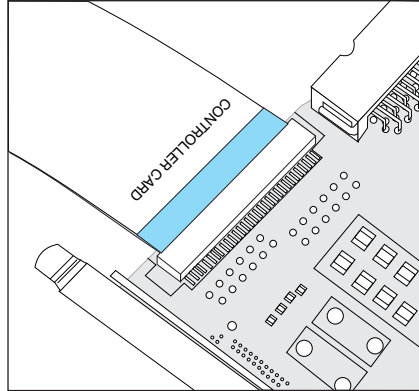


Figure 79. Service Controller card cable installed properly

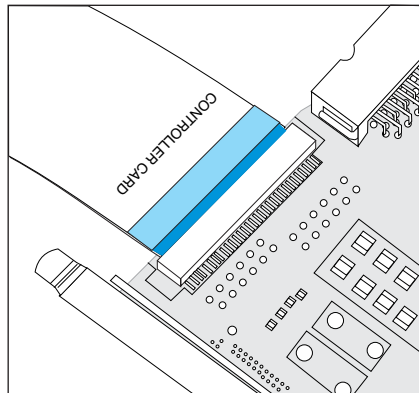


Figure 80. Service Controller card cable not properly seated

- 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 2145-4F2. Keep pushing the service controller until the latches click into place.
 - From the inside of the SAN Volume Controller 2145-4F2, 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 2145-4F2.

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 2145-4F2.
 - 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.
The WWNN is on line 1 of the display; line 2 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 9f.
 - 2) If any other number is displayed, press the select button to accept the number. The WWNN is restored.
- f. If the number displayed is all zeros, display the WWNN in the vital product data (VPD) for the node that you are working on. Record the last five characters of the number.
- g. With the WWNN displayed on the service panel, perform the following steps:
 - 1) Press and hold the down button.
 - 2) Press and release the select button.
 - 3) Release the down button.
 - 4) Edit the displayed number using the up and down buttons to increase or decrease the numbers displayed.
 - 5) 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 concepts

“SAN Volume Controller menu options” on page 76

Menu options are available on the front panel display on the SAN Volume Controller.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the front panel from the SAN Volume Controller 2145-4F2” on page 262

You can remove the front panel to perform maintenance on the SAN Volume Controller 2145-4F2.

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2’s top cover if maintenance is necessary.

Related reference

“Displaying the vital product data” on page 67

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

“Replacing a disk drive and a service controller on the SAN Volume Controller” on page 286

When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the “new” service controller does not contain the operating system software required to do so.

Removing the SAN Volume Controller 2145-4F2 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 away from strong magnetic fields.
- The disk drive is electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity. See the documentation on handling static-sensitive devices.

Perform the following steps to remove the disk drive and cables:

1. Verify that all operations between the SAN Volume Controller 2145-4F2 and the host system have been stopped.
2. Remove all power from the SAN Volume Controller 2145-4F2.
3. Remove the SAN Volume Controller 2145-4F2 from the rack.
4. Remove the top cover of the SAN Volume Controller 2145-4F2.
5. Disconnect the SCSI signal connector **1** and the power connector **2** from the back of the disk drive.

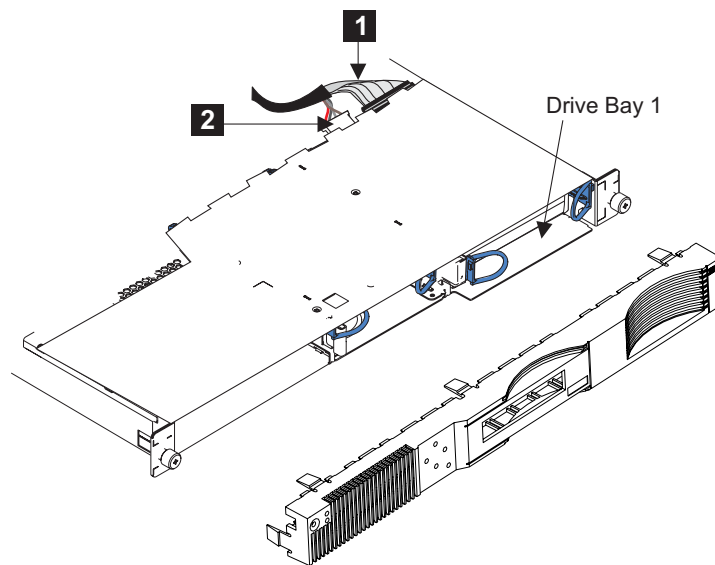


Figure 81. Removing the SAN Volume Controller 2145-4F2 disk drive

6. Remove the front panel.
7. Pull the two handles to release the latches, and pull the disk drive forward and out of the SAN Volume Controller 2145-4F2.
8. If you are exchanging the disk drive for another, see Figure 82 on page 252. Find the rails and screws that are shipped with the new disk drive. Attach the rails to the disk drive.

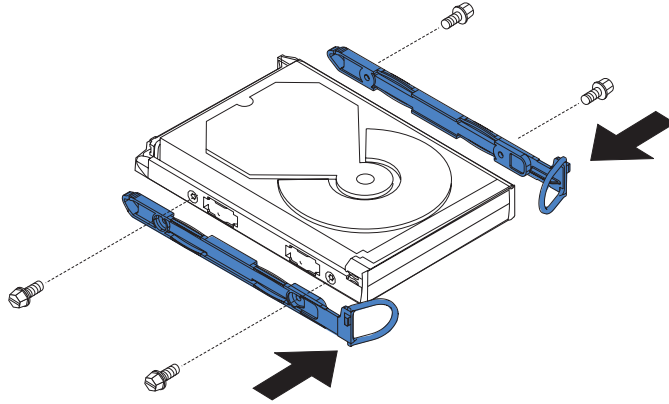


Figure 82. Attaching the rails to the disk drive

9. Check whether the old disk drive has any jumpers installed. If it does, install matching jumpers onto the new disk drive. See Figure 83.

Drive HDA (rear view, PCB facing downward)

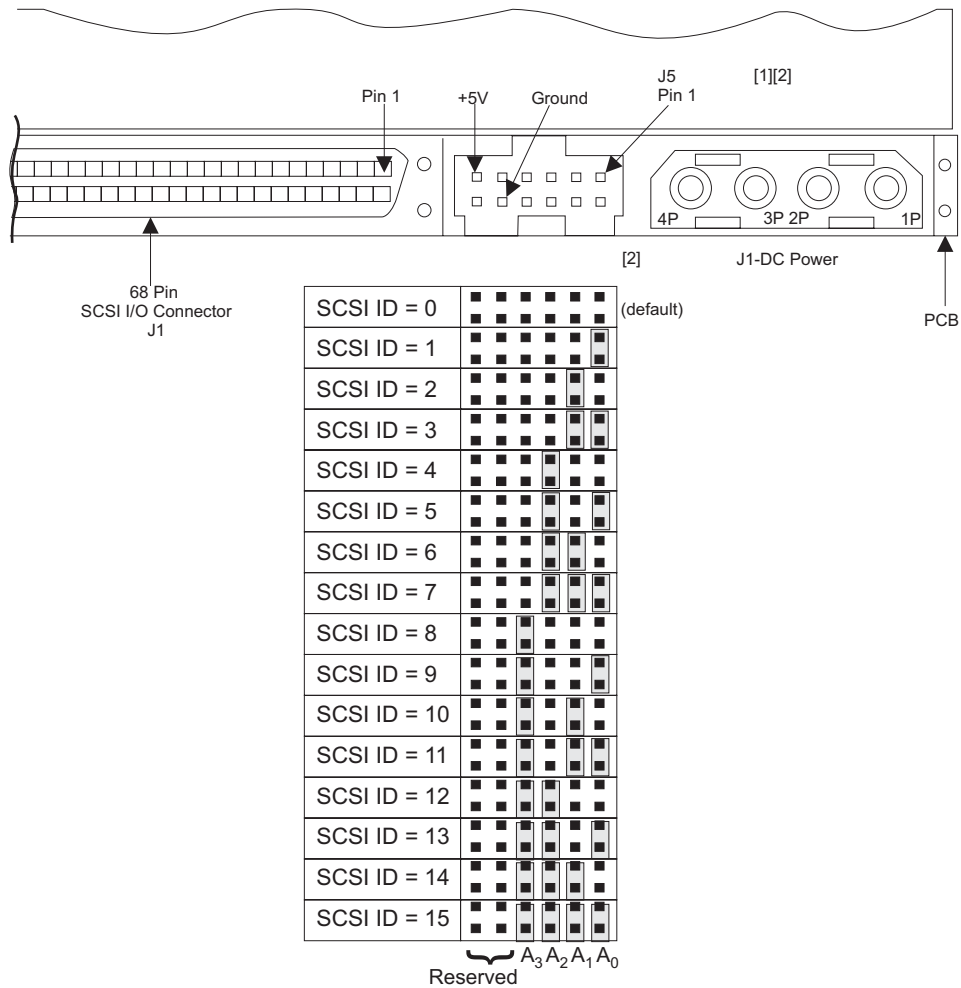


Figure 83. Disk drive jumpers

10. If you have any tasks that you need to perform while the service controller is removed, do them now. Otherwise, reinstall parts in the reverse sequence.

Note: When you install the disk drive, push it into the SAN Volume Controller 2145-4F2 until the latches click into place.

11. After you replace a disk drive, you must reinstall the software on the SAN Volume Controller 2145-4F2 by using the node rescue procedure.

Note: If you must replace the hard disk and the service controller at the same time, you cannot start the node to perform node rescue. See the documentation on replacing a disk drive and a service controller.

Related tasks

“Performing the node rescue” on page 150

If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can reinstall the software on the SAN Volume Controller by using the node rescue procedure.

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2’s top cover if maintenance is necessary.

Related reference

“Replacing a disk drive and a service controller on the SAN Volume Controller” on page 286

When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the “new” service controller does not contain the operating system software required to do so.

“Handling static-sensitive devices” on page xlvii

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

Removing the SAN Volume Controller 2145-4F2 disk drive cables

The disk drive cables must be removed if they become defective or if you want to replace them.

Perform the following steps to remove the disk drive cables:

1. Remove all power from the SAN Volume Controller 2145-4F2.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-4F2.
4. Disconnect the SCSI signal connector **1** and the power connector **2** from the back of the disk drive, and then remove the cable. See Figure 84 on page 254.

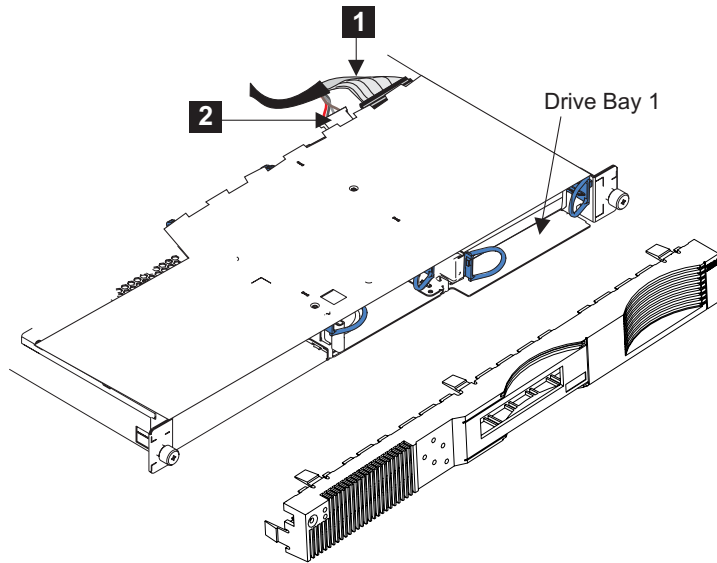


Figure 84. Removing the SAN Volume Controller 2145-4F2 disk drive cables

If you have any other tasks to do inside the SAN Volume Controller 2145-4F2, do those tasks now.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2’s top cover if maintenance is necessary.

Replacing the SAN Volume Controller 2145-4F2 disk drive cables

The disk drive cables must be replaced if they are removed.

Perform the following steps to replace the SAN Volume Controller 2145-4F2 disk drive cables:

1. Connect the SCSI signal connector **1** and the power connector **2** to the back of the disk drive, then replace the cable. See Figure 85 on page 255.

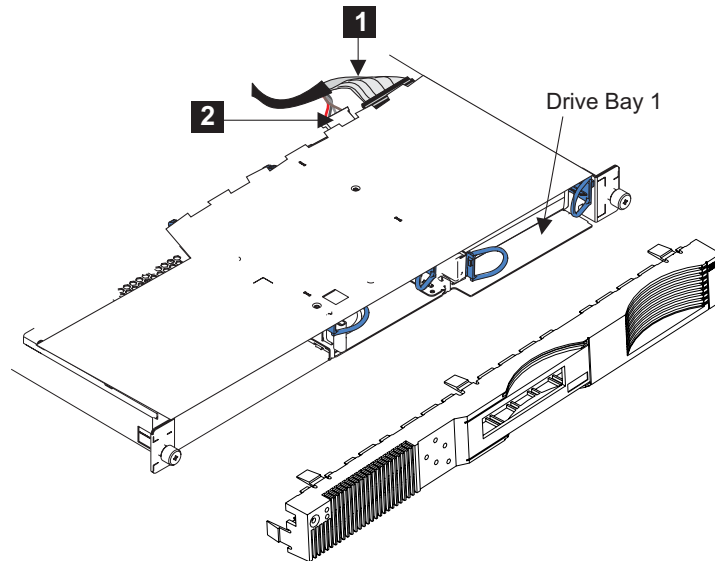


Figure 85. Replacing the SAN Volume Controller 2145-4F2 disk drive cables

2. Replace the top cover to the SAN Volume Controller 2145-4F2.
3. Place the SAN Volume Controller 2145-4F2 in the rack.
4. Replace all power to the SAN Volume Controller 2145-4F2.

Replacing the SAN Volume Controller 2145-4F2 disk drive fan

The disk drive fan must be removed if it is defective or if it needs to be replaced.

Perform the following steps to replace the disk drive fan:

1. Remove all power from the SAN Volume Controller 2145-4F2.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-4F2.
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 86.

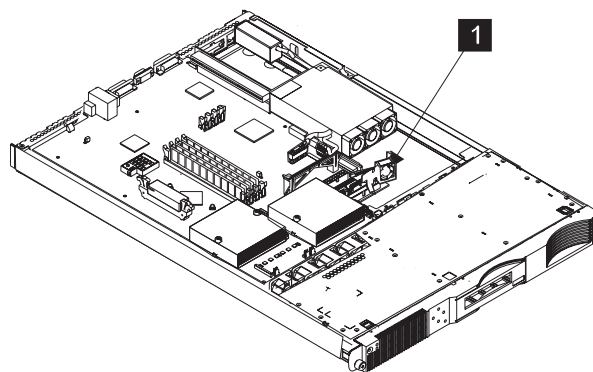


Figure 86. Removing a SAN Volume Controller 2145-4F2 disk drive fan

6. Remove the fan from the bracket by pulling the sides of the bracket apart.
7. Insert the new fan into the bracket by pulling the sides of the bracket apart.

8. If you have any other tasks that you need to perform while the fan is removed, do those tasks now. Otherwise, reinstall the parts in the reverse sequence.

Note:

- The airflow is from the front to the back of the SAN Volume Controller 2145-4F2.
- 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 2145-4F2.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2's top cover if maintenance is necessary.

Removing the SAN Volume Controller 2145-4F2 microprocessor fan

The microprocessor fan must be removed in order to perform certain routine maintenance on the SAN Volume Controller 2145-4F2.

Perform the following steps to remove the microprocessor fan:

1. Remove all power from the SAN Volume Controller 2145-4F2.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-4F2.
4. Disconnect the fan cable from the system board.

Note: The fans are numbered from one to four, from left to right. See Figure 87 on page 257.

5. 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.

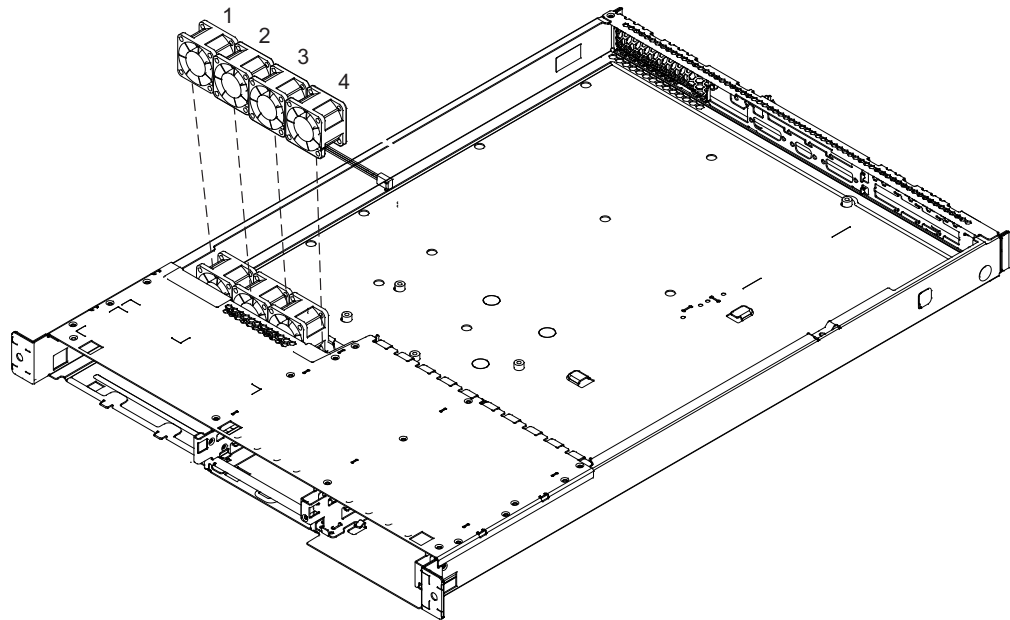


Figure 87. Removing a microprocessor fan

6. If you have any other tasks to do inside the SAN Volume Controller 2145-4F2, do those tasks now.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2’s top cover if maintenance is necessary.

Replacing the SAN Volume Controller 2145-4F2 microprocessor fan

You must remove the microprocessor fan to perform routine maintenance, such as replacing it, on the SAN Volume Controller 2145-4F2.

Note:

- The airflow is from the front to the back of the SAN Volume Controller 2145-4F2.
- The fan cable comes out of the back of the fan. When you install the fan, ensure that the back of the fan is facing the back of the SAN Volume Controller 2145-4F2.
- 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.

Perform the following steps to remove the microprocessor fan:

1. Push the fan downward into the retaining clip. See Figure 88 on page 258.

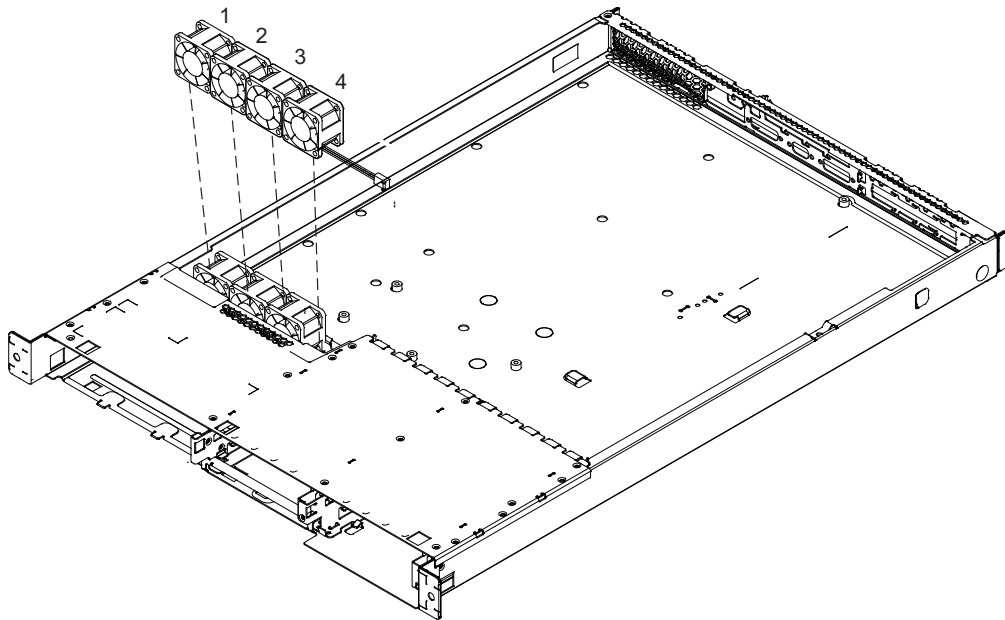


Figure 88. Replacing a microprocessor fan

Note:

- a. The airflow is from the front to the back of the SAN Volume Controller 2145-4F2.
- 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 2145-4F2.
- 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.

2. Connect the fan cable to the system board.

Note: The fans are numbered from one to four, from left to right. See Figure 88.

3. Replace the top cover to the SAN Volume Controller 2145-4F2.
4. Place the SAN Volume Controller 2145-4F2 in the rack.
5. Power up the SAN Volume Controller 2145-4F2.

Removing the SAN Volume Controller 2145-4F2 power supply

You must remove the SAN Volume Controller 2145-4F2 power supply to replace it or to perform routine maintenance.

Perform the following steps to remove the power supply:

1. Remove all power from the SAN Volume Controller 2145-4F2.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-4F2.
4. Remove the disk drive fan.

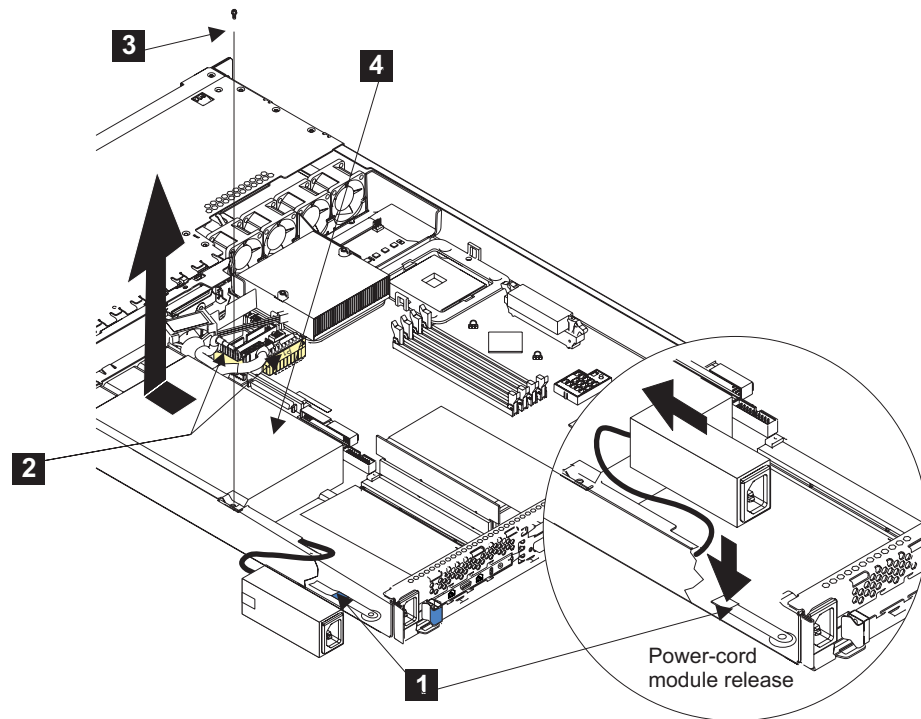


Figure 89. Removing the SAN Volume Controller 2145-4F2 power supply

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 2145-4F2 until the alignment tab is free of the slot that is on the side of the SAN Volume Controller 2145-4F2. See Figure 89.
6. Lift the power-cable module out from the SAN Volume Controller 2145-4F2 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, and then lift it from the SAN Volume Controller 2145-4F2.

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 perform while the power supply is removed, do those tasks now.

Related tasks

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2’s top cover if maintenance is necessary.

“Replacing the SAN Volume Controller 2145-4F2 disk drive fan” on page 255
The disk drive fan must be removed if it is defective or if it needs to be replaced.

Replacing the SAN Volume Controller 2145-4F2 power supply

You must replace the SAN Volume Controller 2145-4F2 power supply after you have completed any routine maintenance.

Perform the following steps to replace the power supply:

1. Slide the power supply **4** into the SAN Volume Controller 2145-4F2. See Figure 90.

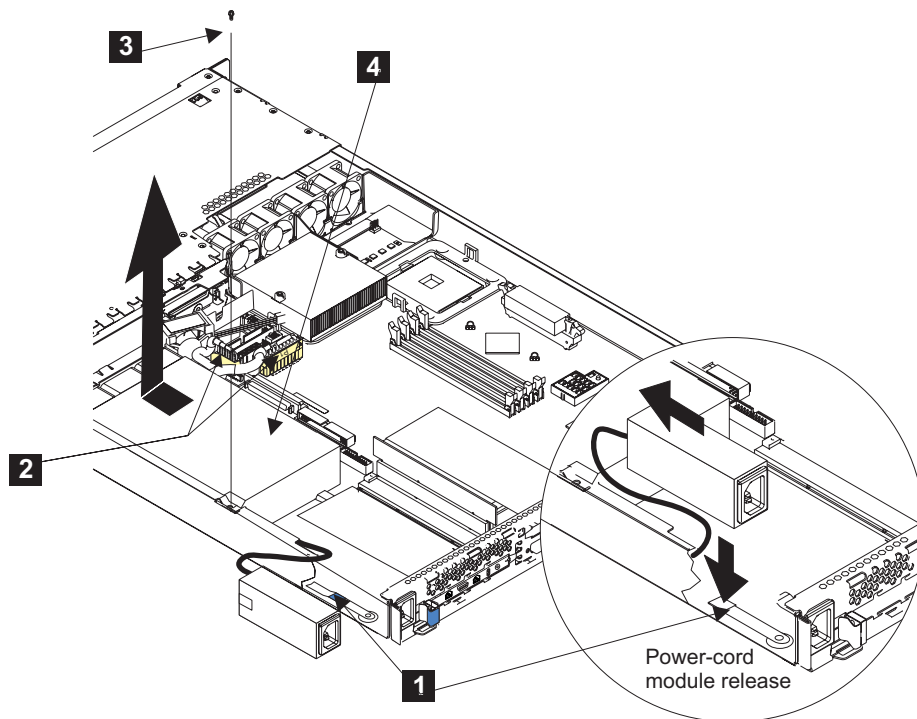


Figure 90. Replacing the SAN Volume Controller 2145-4F2 power supply

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)

2. Replace the screw **3**.
3. Connect the power connector **2**.
4. Place the power-cable module into the SAN Volume Controller 2145-4F2.

5. Slide the module toward the back of the SAN Volume Controller 2145-4F2 until the alignment tab snaps into the slot that is on the side of the SAN Volume Controller 2145-4F2.
6. Replace the disk drive fan.
7. Replace the SAN Volume Controller 2145-4F2 top cover.
8. Place the SAN Volume Controller 2145-4F2 in the rack.
9. Return all power to the SAN Volume Controller 2145-4F2.

Removing and replacing the SAN Volume Controller 2145-4F2 system board CMOS battery

You must remove the system board complementary metal-oxide semiconductor (CMOS) battery to replace it or to perform routine maintenance.

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.

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:

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)

Perform the following steps to remove the system board CMOS battery:

1. Remove all power from the SAN Volume Controller 2145-4F2.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-4F2.
4. Use a finger to lift the battery clip above the battery.

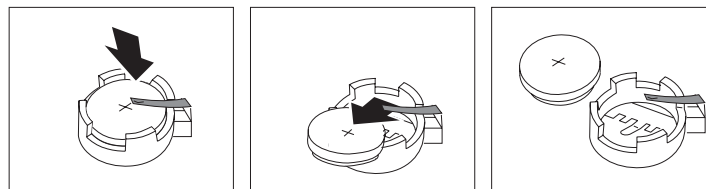


Figure 91. Removing the system board CMOS battery

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 index finger to pull the battery out 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 92.

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 2145-4F2, do those tasks now. Otherwise, reinstall parts in the reverse sequence.
4. If this SAN Volume Controller 2145-4F2 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 it if necessary.

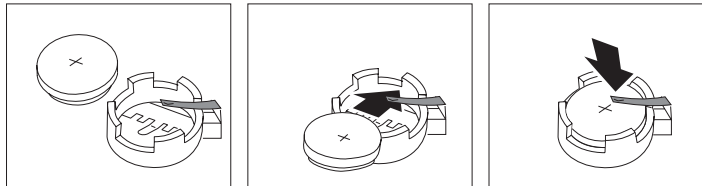


Figure 92. Replacing the SAN Volume Controller 2145-4F2 system board CMOS battery

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2’s top cover if maintenance is necessary.

Related reference

“Handling static-sensitive devices” on page xlvii

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

Removing the front panel from the SAN Volume Controller 2145-4F2

You can remove the front panel to perform maintenance on the SAN Volume Controller 2145-4F2.

Perform the following steps to remove the front panel from the SAN Volume Controller 2145-4F2:

1. Verify that all operations between the SAN Volume Controller 2145-4F2 and the host system have stopped.
2. Remove all power from the SAN Volume Controller 2145-4F2.
3. Slide the SAN Volume Controller 2145-4F2 out from the rack approximately 5 cm (2 in).
4. Press the seven latches that are on the top, sides, and bottom of the front panel to release the assembly.

5. Carefully pull the assembly and its attached cable away from the SAN Volume Controller 2145-4F2. First pull one end of the assembly, and then clear the other latches one by one by slowly pulling the end of the front panel toward you.

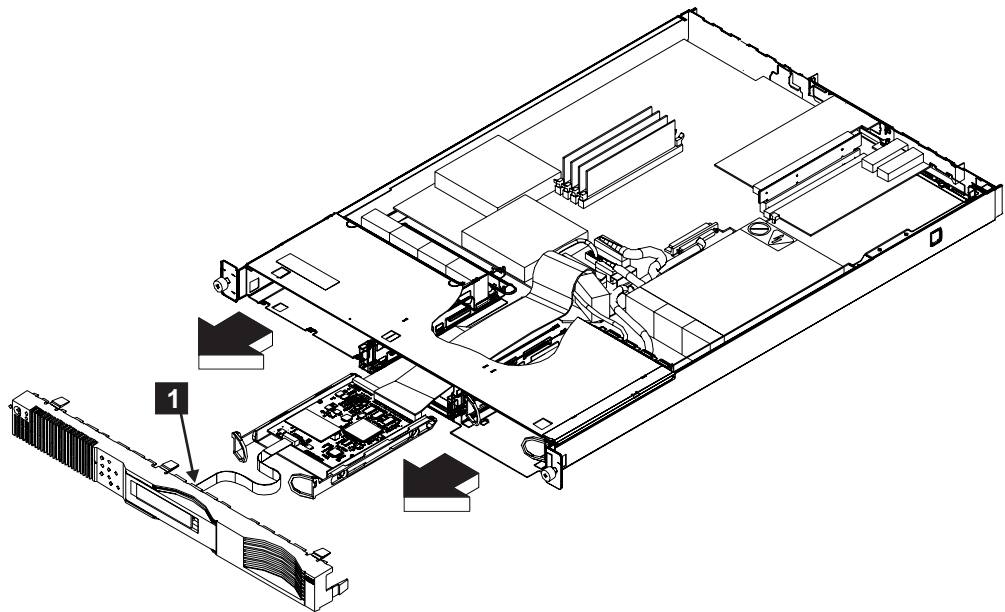


Figure 93. Removing the front panel of the SAN Volume Controller 2145-4F2

6. Disconnect the connector **1**.

Related tasks

“Replacing the front panel on the SAN Volume Controller 2145-4F2”

You can remove the front panel of the SAN Volume Controller 2145-4F2 in order to replace it.

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing the power cable from the 2145 UPS” on page 312

You can replace the power cable from the 2145 uninterruptible power supply (2145 UPS) if you are having problems with the power supply and suspect that the power cable is defective.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

Replacing the front panel on the SAN Volume Controller 2145-4F2

You can remove the front panel of the SAN Volume Controller 2145-4F2 in order to replace it.

Perform the steps below to remove the SAN Volume Controller 2145-4F2 front panel:

1. Connect the cable **1** to the front panel. See Figure 94 on page 264.

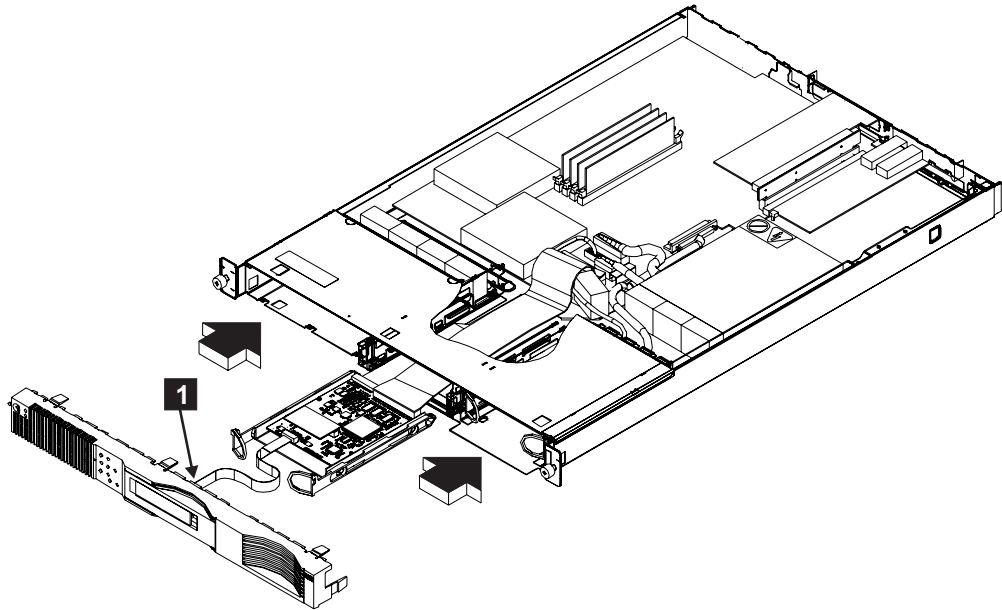


Figure 94. Replacing the front panel

2. Fold the cable into the front of the SAN Volume Controller 2145-4F2.
3. Insert the assembly and its attached cable into the front of the SAN Volume Controller 2145-4F2.
4. Align the front panel with the front of the SAN Volume Controller 2145-4F2 and ensure that the latches enter the frame of the SAN Volume Controller 2145-4F2. Push the front panel until you hear the latches click into place.

Note: If you replaced the front panel field replaceable unit (FRU) with a new FRU, go to the front panel maintenance analysis procedure (MAP) to perform the steps for the replacement of the front panel.

Related tasks

“MAP 5400: Front panel” on page 191

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 2145-4F2” on page 262

You can remove the front panel to perform maintenance on the SAN Volume Controller 2145-4F2.

Removing a SAN Volume Controller 2145-4F2 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 2145-4F2.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-4F2.
4. For the adapter that you are going to remove, press the sides of the expansion-slot clip (**2** or **3** in Figure 95 on page 265) together to unlock the clip, and then pivot the expansion-slot clip away from the adapter. The

expansion-slot clip remains loosely attached to the SAN Volume Controller 2145-4F2.

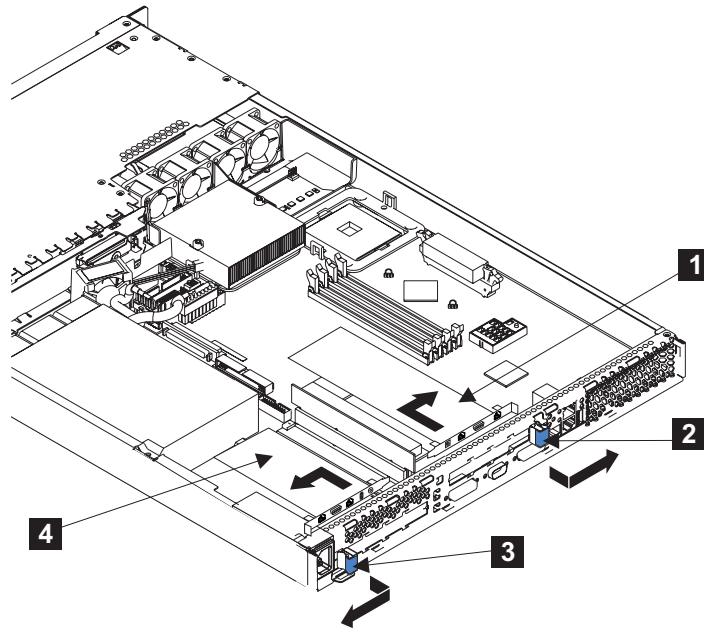


Figure 95. SAN Volume Controller 2145-4F2 before removing an adapter

- 1** Adapter A
- 2** Adapter A expansion-slot clip
- 3** Adapter B expansion-slot clip
- 4** Adapter B

Attention: Do not touch the components and gold-edge connectors of the adapter.

5. Unplug the adapter (**1** or **4**) from the connector.
6. Remove the adapter from the SAN Volume Controller 2145-4F2.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2’s top cover if maintenance is necessary.

Related reference

“Handling static-sensitive devices” on page xlvi

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

Replacing a SAN Volume Controller 2145-4F2 adapter

The adapter assemblies are electrostatic-discharge sensitive. Take precautions when replacing them to avoid damage from static electricity.

Attention: Do not touch the components and gold-edge connectors of the adapter. When you install the adapter, ensure that it is correctly seated in the connector before you turn on the SAN Volume Controller 2145-4F2. Incorrectly-seated adapters might cause damage to the system board, the riser card for slot 1, or the adapter.

Perform the following steps to replace an adapter assembly:

1. If you are installing a new adapter, remove it from its static-protective package.
2. 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.
3. Pivot the expansion-slot clip (**2** or **3** in Figure 96) toward the adapter and press it into place.

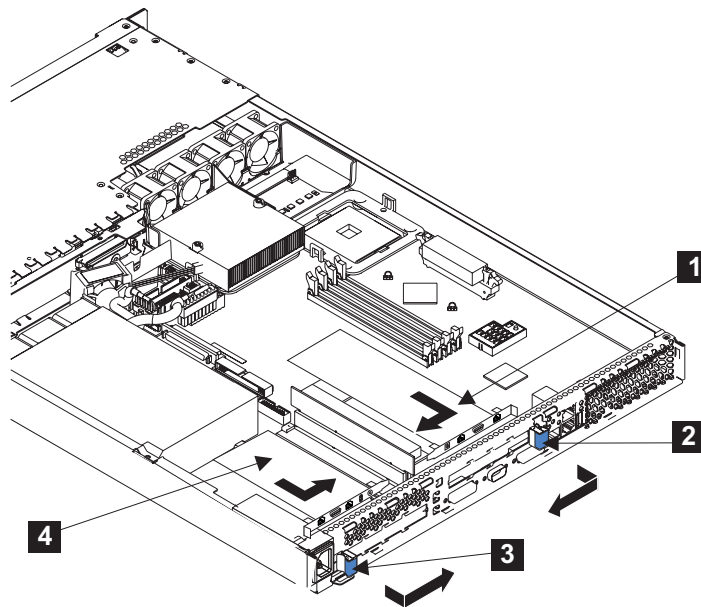


Figure 96. The SAN Volume Controller 2145-4F2 with its adapters installed

- 1** Adapter A
- 2** Adapter A expansion-slot clip
- 3** Adapter B expansion-slot clip
- 4** Adapter B

Related tasks

“Removing a SAN Volume Controller 2145-4F2 adapter” on page 264
The adapter assemblies are electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity.

Related reference

“Handling static-sensitive devices” on page xlvii
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-4F2 system board

During routine maintenance, you may be required to remove and replace the system board.

The system board field replaceable unit (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.

For information about working with static-sensitive devices, see the documentation about handling static-sensitive devices at the end of this topic.

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 from the SAN Volume Controller **1**. See Figure 97 on page 268.

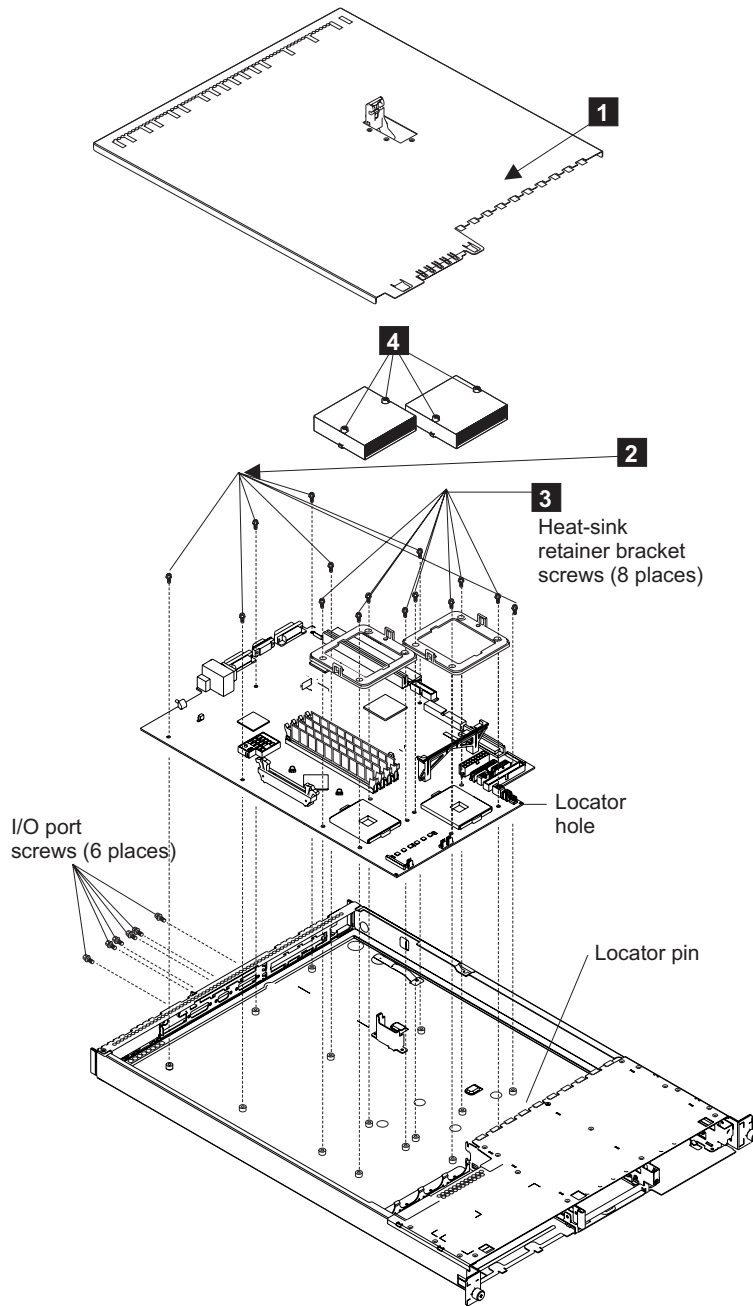


Figure 97. Removing the system board

If you are going to exchange the system board for another system board, go to step 4. Otherwise, go to step 6.

4. Remove the adapter assemblies, however keep the adapter assemblies—they must be installed onto the replacement system board.
5. Remove the memory modules, however keep the memory modules—they must be installed onto the replacement system board.
6. Disconnect the following:
 - All fan connectors
 - Power connectors P1 and P2
 - SCSI power connector

- ATA connector
 - Disk drive connectors
 - Service Controller connector
7. Lift out the air baffle.
 8. Unscrew the heat sink captive screws **4**. See Figure 97 on page 268.
 9. 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.
 10. Remove the screws from each of the heat sink retainer brackets **3**. See Figure 97 on page 268.
 11. Remove the retainer brackets.
 12. Remove the two screws from each of the three connectors.
 13. Remove the seven screws **2**. See Figure 97 on page 268.
 14. Remove the system board.

At this time if you have any tasks to do while the system board is removed, do them.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2’s top cover if maintenance is necessary.

“Removing a SAN Volume Controller 2145-4F2 adapter” on page 264

The adapter assemblies are electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity.

“Removing the memory modules” on page 283

The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

Related reference

“Handling static-sensitive devices” on page xlvii

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

“Rewriting the SAN Volume Controller serial number using the CLI”

The SAN Volume Controller serial number can be rewritten either by using the SAN Volume Controller Console or the command-line interface (CLI).

Rewriting the SAN Volume Controller serial number using the CLI

The SAN Volume Controller serial number can be rewritten either by using the SAN Volume Controller Console or the command-line interface (CLI).

To rewrite the serial number using the CLI, issue the following command:

```
svcservicetask writeserenum -sernum nodeserialnumber nodename
```

where *nodeserialnumber* is the serial number of your node and *nodename* is the name of your node. The serial number is written to the SAN Volume Controller system board. Immediately following this action, the system performs an automatic reboot.

Replacing the SAN Volume Controller 2145-4F2 system board

During routine maintenance, you may be required to replace the system board.

The system board field replaceable unit (FRU) is a kit that includes the following parts:

- PCI riser card
- Two microprocessors
- Microprocessor voltage regulator module (VRM)
- Planar

Note:

- Use all the parts in the system board FRU kit (system board, processors [2], VRM, riser card). If you removed the system board and are replacing it, reuse only the four memory modules and the two adapter assemblies that you removed. See the related documentation, at the end of this topic, on how to remove the system board.
- 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.
- Before you install the processors on the system board, remove the dust covers from the processor socket.
- If you were not sent here from the directed maintenance procedures, rewrite the SAN Volume Controller 2145-4F2 serial number. If you were sent here from directed maintenance procedures, this step is performed from within the procedure.
- The system board is electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity. For information about working with static-sensitive devices, see the related documentation at the end of this topic.

Perform the following steps to replace the system board:

1. Replace the system board.
2. Replace the seven screws **2**. See Figure 98 on page 271.
3. Replace the two screws from each of the three connectors.
4. Replace the retainer brackets.
5. Replace the screws from each of the heat sink retainer brackets **3**. See Figure 98 on page 271.
6. Screw in the heat sink captive screws **4**.
7. Return the air baffle to its place.
8. Connect the following:
 - All fan connectors
 - Power connectors P1 and P2
 - SCSI power connector
 - ATA connector

- Disk drive connectors
 - Service Controller connector
9. Replace the memory modules onto the replacement system board.
 10. Replace the adapter assemblies onto the replacement system board.
 11. Replace the top cover of the SAN Volume Controller **1**.

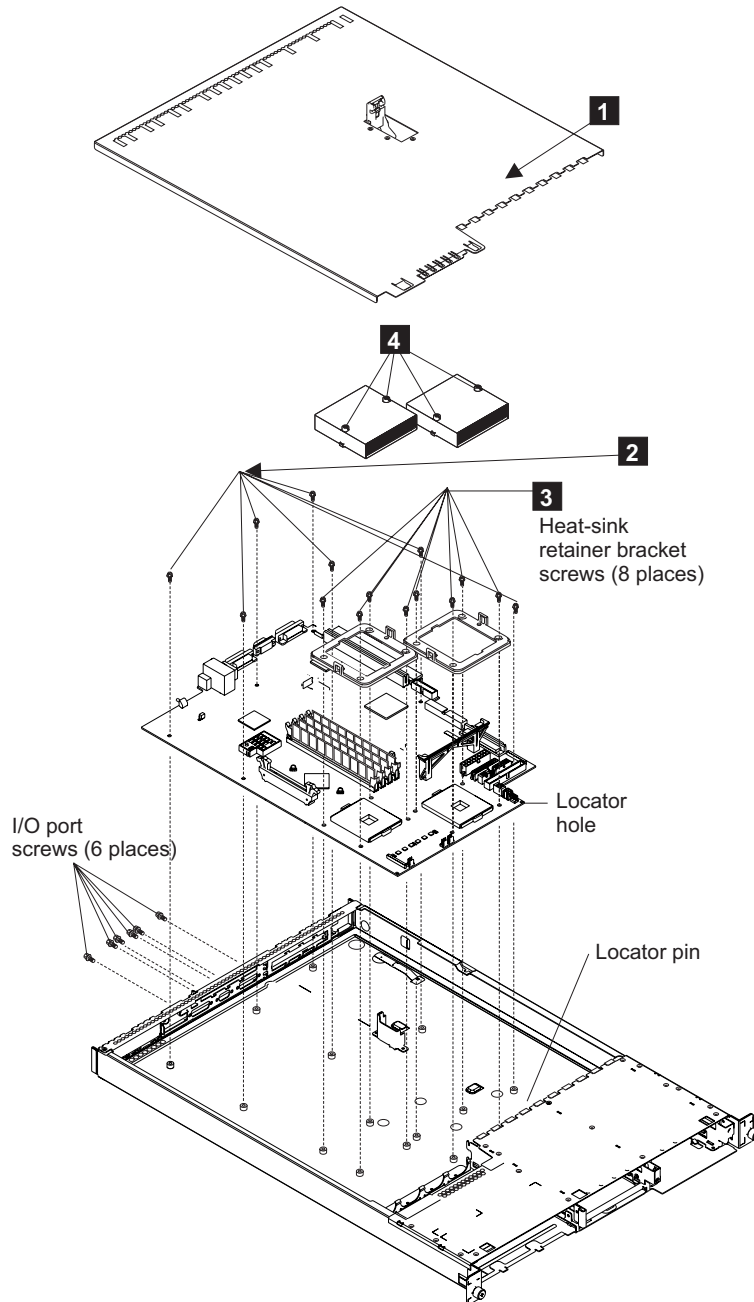


Figure 98. Replacing the system board

- 1** Top cover
- 2** Screws
- 3** Heat sink retainer brackets

4 Heat sink captive screws

12. Place the SAN Volume Controller in the rack.
13. *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 99. Be sure to verify that the blue line on the cable connector end is not visible.

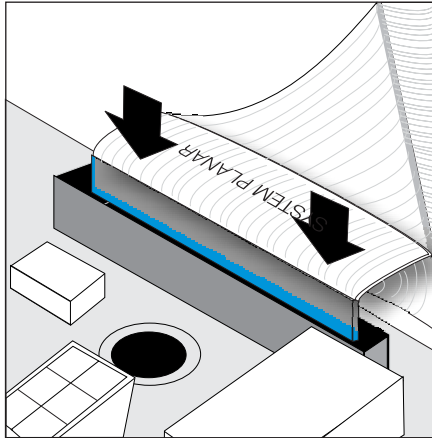


Figure 99. Install service controller cable into the system board

14. Return all power to the SAN Volume Controller.

Related tasks

“Removing the SAN Volume Controller 2145-4F2 system board” on page 267
During routine maintenance, you may be required to remove and replace the system board.

Related reference

“Handling static-sensitive devices” on page xlvii
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing and replacing parts shared by the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-4F2

The SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-4F2 share remove and replace procedures for several field replaceable units.

Removing a SAN Volume Controller from a rack

The SAN Volume Controller might have to be removed from the rack.

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. Shut down the SAN Volume Controller before removing the power cables. Ethernet and fibre-channel cables can be connected or disconnected at any time.

Follow the steps below to remove the SAN Volume Controller from the rack:

1. Remove all power from the SAN Volume Controller.
2. Make a note of the positions of all the external cables that are connected at the back of the SAN Volume Controller.

3. 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 remove or install 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.

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:

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).

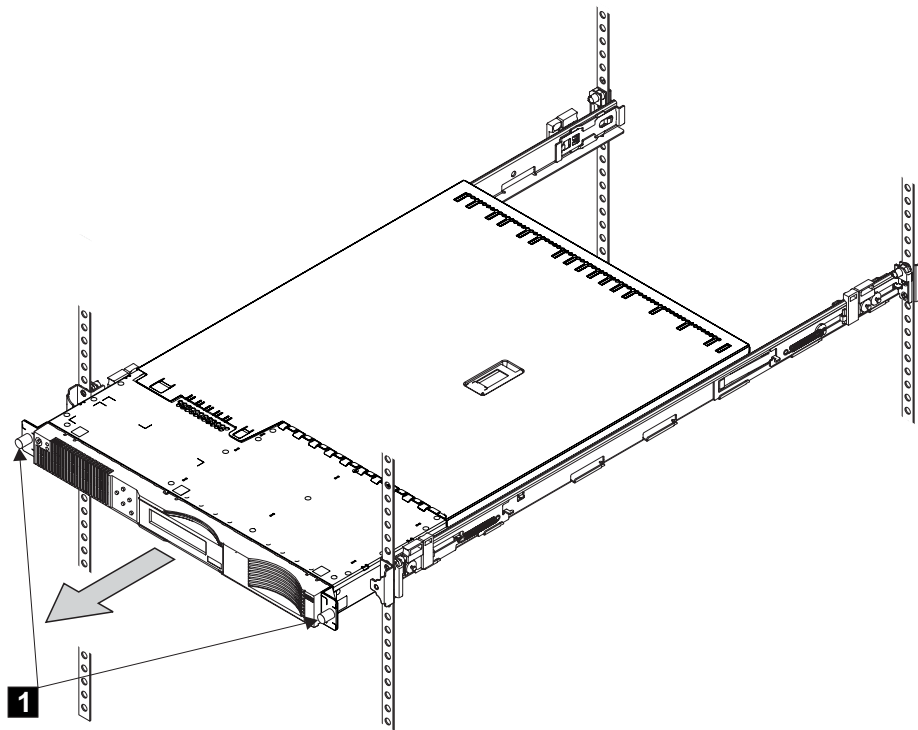


Figure 100. Unscrewing the front screws

4. For the SAN Volume Controller 2145-8F2, unlatch the two latches on the front of the rack. For the SAN Volume Controller 2145-4F2, unscrew the two front screws **1** as seen in Figure 100.
5. Pull the SAN Volume Controller forward and remove it from the rack.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing the SAN Volume Controller 2145-8F2 adapter assemblies” on page 231

The SAN Volume Controller 2145-8F2 contains two types of fibre-channel adapters that are functionally identical but not interchangeable.

Replacing the SAN Volume Controller in the rack

You must use caution when you replace the SAN Volume Controller in the rack.

Note: If you have recently replaced a field replaceable unit (FRU) in the node, the repaired node normally rejoins 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 goes offline. If you are performing this repair under directed maintenance procedures, then those procedures will automatically restore the node to the cluster. If you are not performing the repair under directed maintenance procedures, you might need to delete and add the node back into the cluster.

Follow the steps below to replace the SAN Volume Controller in the rack:

1. Slide the SAN Volume Controller onto the rack.
2. For the SAN Volume Controller 2145-8F2, latch the two latches on the front of the rack to attach the SAN Volume Controller to the rack. For the SAN Volume Controller 2145-4F2, screw in the two front screws **1**. See Figure 101 on page 275.

Note: The front of the SAN Volume Controller 2145-8F2 rail assembly appears different than in Figure 101 on page 275.

3. Connect all the external cables on the back of the SAN Volume Controller.

Attention: Do not touch the power control switches on adjoining SAN Volume Controllers when you install 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.

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:

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).

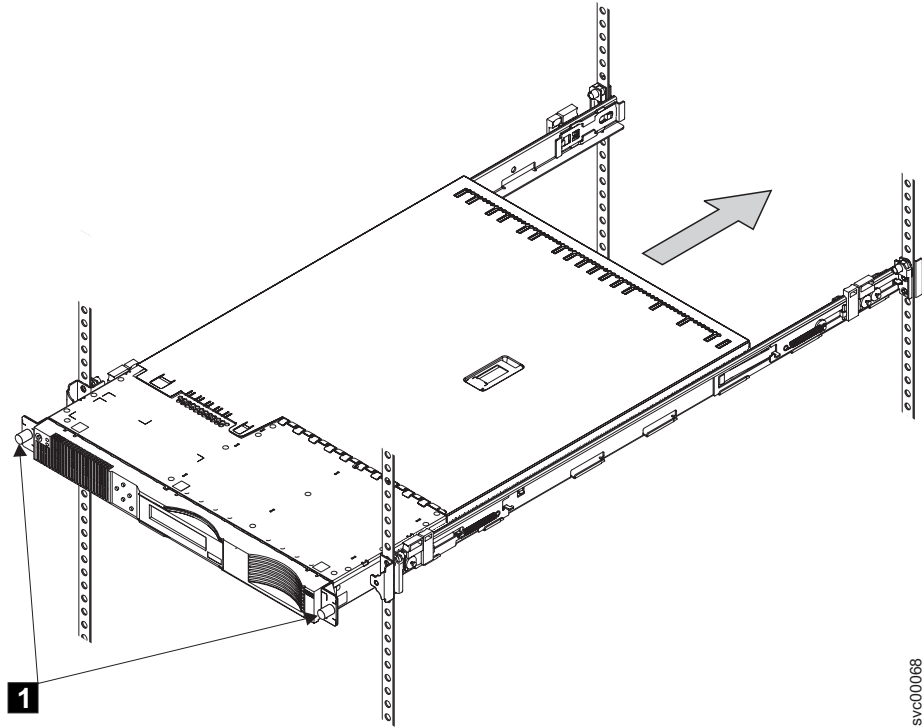


Figure 101. Attaching the SAN Volume Controller 2145-4F2 with the front screws

4. Restore all power to the SAN Volume Controller.

Related tasks

“Replacing the SAN Volume Controller 2145-8F2 service controller” on page 218
 You can replace the SAN Volume Controller 2145-8F2 service controller.

Removing the support rails for a SAN Volume Controller

The SAN Volume Controller support rails can be removed if you have to move the SAN Volume Controller.

Follow the steps below to remove the SAN Volume Controller support rails:

1. Go to the front of the left support rail.
2. Put your left index finger onto the back edge of the latch lever **2** and your left thumb on the front edge of the latch lock **1**.

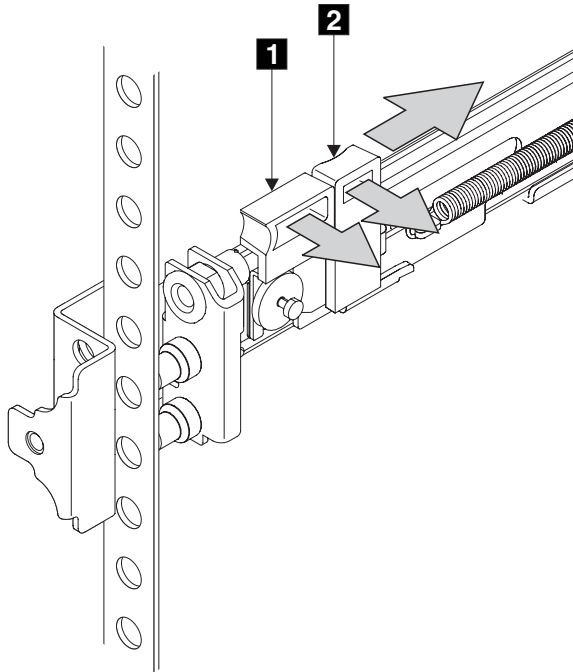


Figure 102. The left support rail for the SAN Volume Controller

3. Gently move the latch lock inward and push the latch-lock carrier toward the back of the rack until it latches onto 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 275 through 6 for the right support rail.

Related tasks

“Installing the support rails for the SAN Volume Controller”

You must install the support rails that hold the SAN Volume Controller.

Installing the support rails for the SAN Volume Controller

You must install the support rails that 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 Electrical Industries Association (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 index finger against the side of the latch-lever, **1** in Figure 103 on page 277, and put your thumb against the front of the latch-lock **2**.

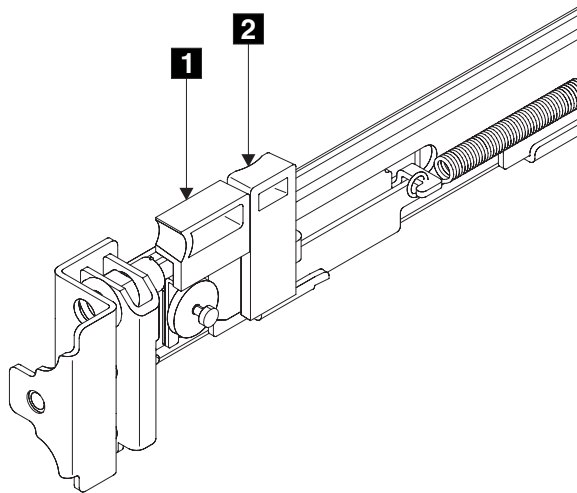
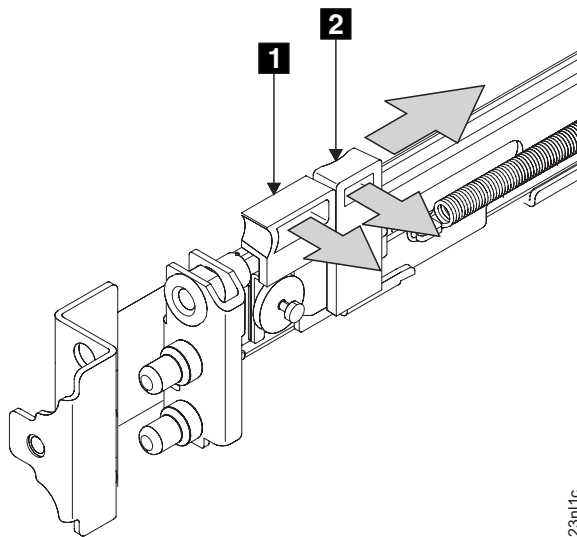


Figure 103. Retracting the latch lock carrier

1 latch-lever

2 latch-lock

3. Gently push the latch lock **2** away from the rail as you move the latch lever **1** toward the far end of the rail (Figure 104). The latch-lock carrier assembly slides against the spring tension.



23n1/c

Figure 104. 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 105 on page 278) toward the front of the rail until it stops. The rail is now at its shortest adjustment.

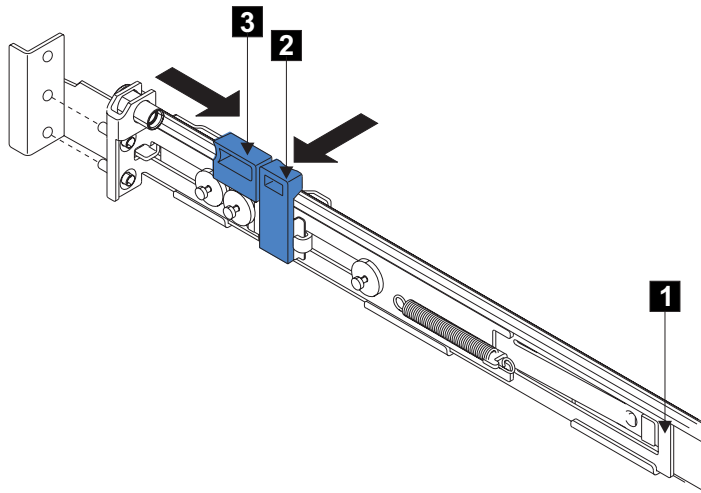


Figure 105. Opening the back latch-lock carrier assembly

- 1** back rail bracket
- 2** latch-lock
- 3** latch-lever

6. Place the front end of the left rail in the rack cabinet. Align the top of the front bracket **1** (Figure 106) with the required EIA marking that is on the rack.

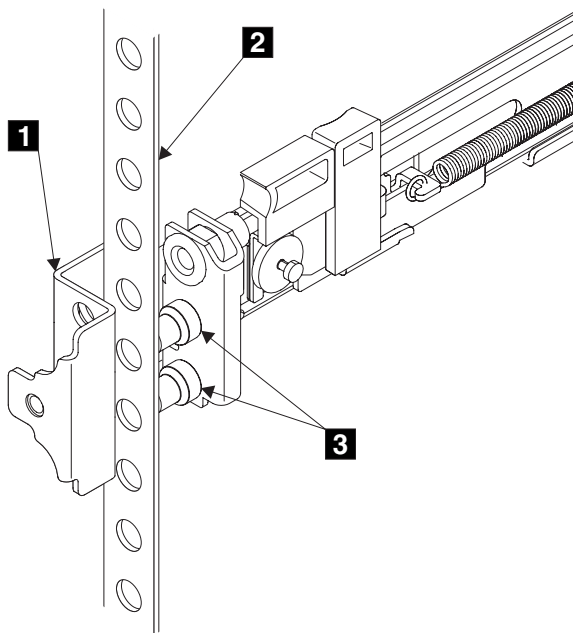


Figure 106. Installing the front end of the rail

- 1** front bracket
- 2** rack-mounting flange
- 3** locating pins

7. Align the locating pins **3** with the holes that are in the rack-mounting flange.

8. Push the latch lock **2** (Figure 107) 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.

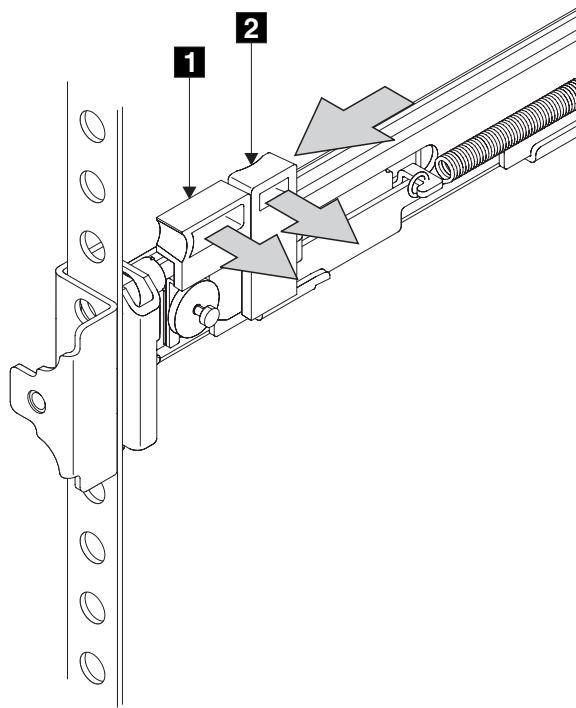


Figure 107. Closing the latch-lock carrier assembly

1 latch-lever

2 latch-lock

9. Push the back rail bracket toward the rear of the rack and align the locating pins with the rack-mounting flange.
10. Push the latch lock **2** 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.

11. 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.

You must perform this procedure for both rails.

Related tasks

“Removing the support rails for a SAN Volume Controller” on page 275

The SAN Volume Controller support rails can be removed if you have to move the SAN Volume Controller.

Removing the service controller cables

You can remove the service controller cables from the SAN Volume Controller.

Perform the following steps to remove the service controller cables:

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 power connector P2 **2**, and disconnect them from the system board. See Figure 108.

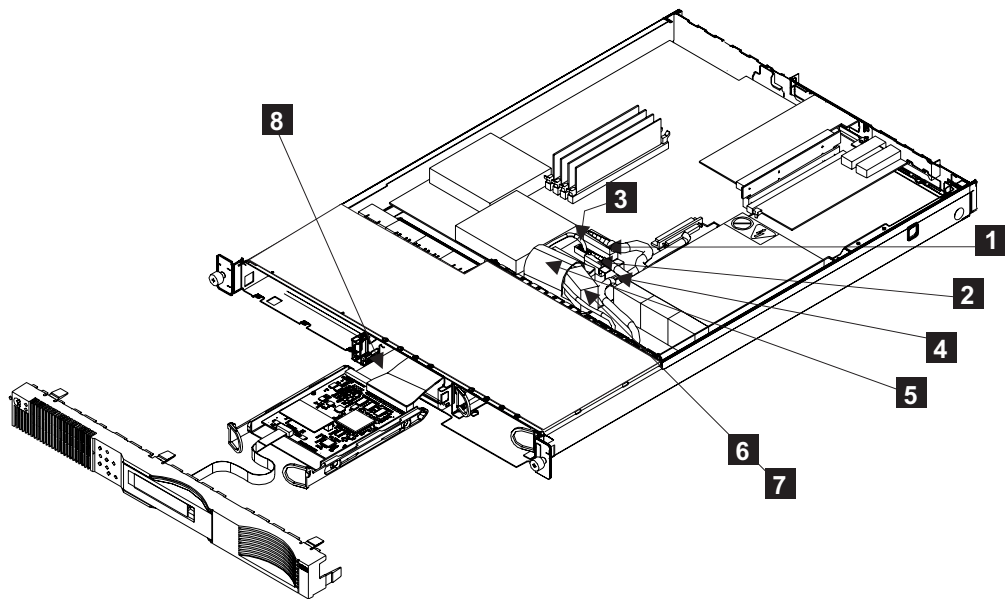


Figure 108. Service controller cables

6. Disconnect the fan cable **3**.
7. Disconnect the ATA cable **5**.
8. Lift the SCSI signal cable **4** away from the fan bracket.
9. Slide the right-hand side of the fan **6** forward, and pull the fan away from the clip **7**.
10. Lift the ribbon cable out from the connector **8**.

Note:

- The ribbon cable is labeled System Planar.
 - The ribbon cable is pre-folded so that it automatically follows the correct route inside the SAN Volume Controller.
11. 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 109 on page 281.
 12. 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.

13. *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.
14. Install the ATA cable to the rear of the service controller.
15. Carefully install the service controller while ensuring the cables do not get damaged as they slide into the chassis.
16. Verify that the blue line on each of the cable connector ends is not visible. This ensures that it is fully seated. For more information, see the documentation on removing the service controller from the SAN Volume Controller.

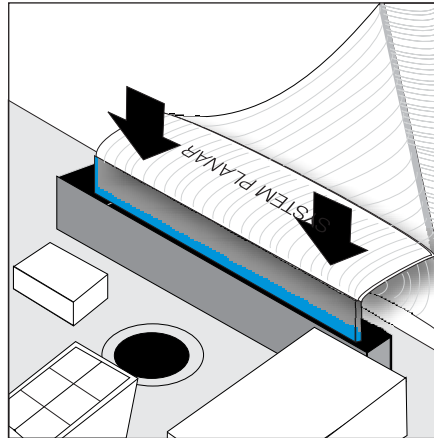


Figure 109. Install the service controller card cable into the system board

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly”
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing a SAN Volume Controller from a rack” on page 272
The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2’s top cover if maintenance is necessary.

“Removing the service controller from the SAN Volume Controller 2145-4F2” on page 247

You can remove the service controller from the SAN Volume Controller.

Removing and replacing the SAN Volume Controller power cable assembly

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

The power cable assembly comprises a power cable and a signal cable that are bound together. You can remove the power cable assembly if you have problems with the power supply and suspect that the power or signal cable are defective. When removing the power cable assembly, ensure that you also remove it from the uninterruptible power supply (UPS). Perform the following steps to remove the power cable assembly:

1. Check the SAN Volume Controller 2145-8F2 power LED **1** (Figure 110) or the SAN Volume Controller 2145-4F2 power light **1** (Figure 111). If the light is on, go to step 2. If the light is either off or flashing, power has already been removed from the SAN Volume Controller. Go to step 4 on page 283.

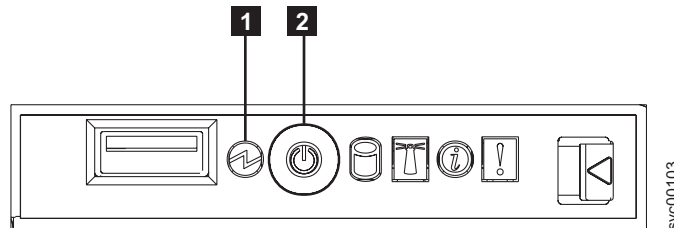


Figure 110. SAN Volume Controller 2145-8F2 operator information panel

- 1** Power LED
- 2** Power control button

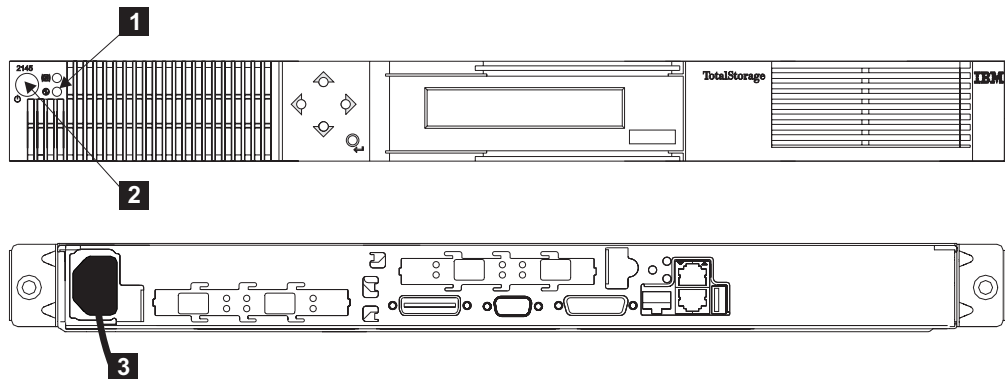


Figure 111. Front and back panel views of the SAN Volume Controller 2145-4F2

- 1** Power light
- 2** Power switch
- 3** Power cable

Important: SAN Volume Controllers operate in pairs. Both SAN Volume Controllers are in the same I/O group. One SAN Volume Controller must be operational if you are servicing the other SAN Volume Controller. If both SAN Volume Controllers are not functioning, you cannot access any of the disks in that I/O group.

2. 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 the general details documentation). 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 on page 283.

- 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 correct 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 causes 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 is automatically resolved when the repair is complete.
4. Remove the power cable **3** from the back of the SAN Volume Controller.
5. Replace the power cable and make sure it is seated.
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 2145 uninterruptible power supply (2145 UPS), the 2145 UPS also powers off within five minutes. You must press the power-on button on the 2145 UPS before the SAN Volume Controller can be powered on. The 2145 uninterruptible power supply-1U (2145 UPS-1U), however, does 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 15

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

“Deleting a node using the SAN Volume Controller Console application on the master console” on page 8

If it is required, you can delete a node from a cluster.

“Adding a node to a cluster using the SAN Volume Controller Console application on the master console” on page 9

You might have to add a node back into the cluster if it has been either removed or rejected by a cluster.

Removing the memory modules

The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

Perform the following steps to remove the memory modules:

1. Remove all power from the SAN Volume Controller.
2. Remove the SAN Volume Controller from the rack.
3. Remove the top cover from the SAN Volume Controller.

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 2145-4F2, 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. When viewing the SAN Volume Controller 2145-8F2, the modules are numbered 1 **1** through 8 **8**. See Figure 112. If more than one SAN Volume Controller 2145-8F2 DIMM is indicated by the light path diagnostics, replace the DIMMs one-at-a-time, starting at the lowest numbered DIMM slot that is indicated by the diagnostics.

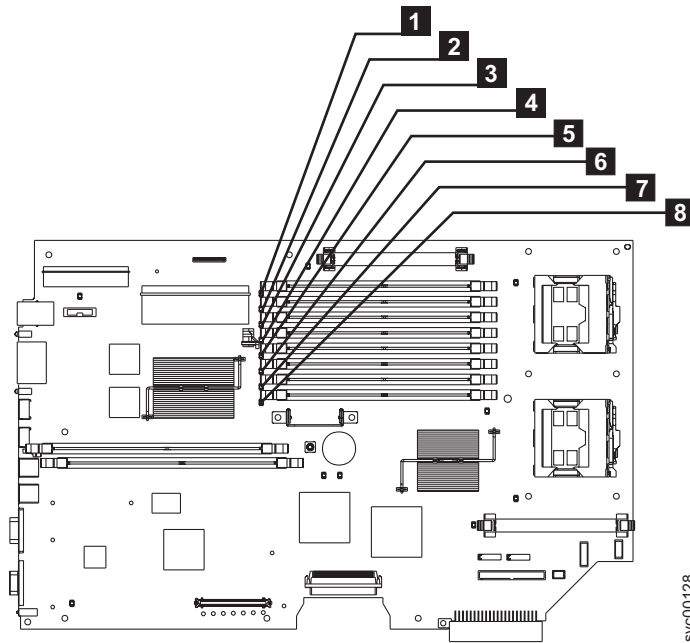


Figure 112. SAN Volume Controller 2145-8F2 system board

4. Open the clips **2** by pressing them outward. This action pulls the memory module **3** out of the connector. See Figure 113.

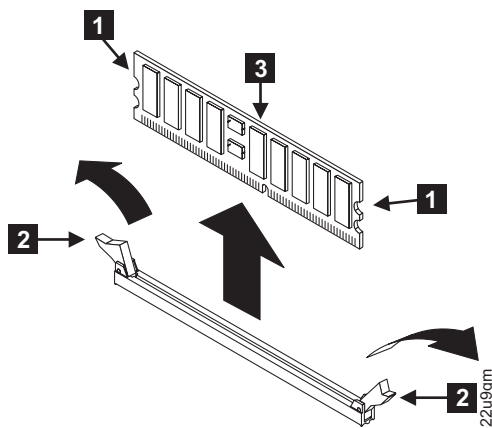


Figure 113. Removing the memory modules

- 1** Side connector latch

- 2** Memory clips
 - 3** Memory module
5. If you have any other tasks to do inside the SAN Volume Controller, do those tasks now.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing a SAN Volume Controller from a rack” on page 272

The SAN Volume Controller might have to be removed from the rack.

“Removing the top cover from the SAN Volume Controller 2145-4F2” on page 245

You can remove the SAN Volume Controller 2145-4F2’s top cover if maintenance is necessary.

Related reference

“Handling static-sensitive devices” on page xlvii

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

Replacing the memory modules

The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

These instructions assume the following:

- You have turned off all power to the SAN Volume Controller
- You have removed the SAN Volume Controller from the rack
- You have removed the SAN Volume Controller top cover
- You have removed a memory module to be replaced

Perform the following steps to replace the memory modules:

1. With the clips **2** open, lower the memory module **1** into the connector. Close the clips by pressing them inward.

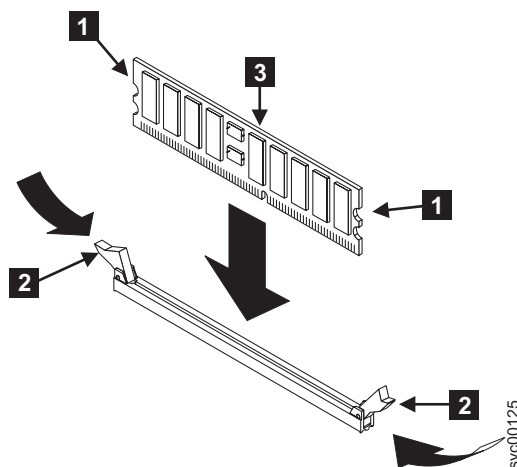


Figure 114. Replacing the memory modules

2. Replace the SAN Volume Controller top cover.
3. Replace the SAN Volume Controller in the rack.
4. Restore all power to the SAN Volume Controller.

Replacing a disk drive and a service controller on the SAN Volume Controller

When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the “new” service controller does not contain the operating system software required to do so.

Also, if you must replace the hard disk and the service controller at the same time, you cannot boot the node to perform node rescue. Perform the following step to be able to perform node rescue after replacing the disk drive *and* the service controller:

- Swap the service controller with a service controller from a working node. The results are the following:
 - The “new” 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 from the working node contains the operating system that is required to perform node rescue on that failed node.

Related tasks

“Performing the node rescue” on page 150

If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can reinstall the software on the SAN Volume Controller by using the node rescue procedure.

“Removing the service controller from the SAN Volume Controller 2145-4F2” on page 247

You can remove the service controller from the SAN Volume Controller.

“Removing the SAN Volume Controller 2145-4F2 disk drive” on page 251

The disk drive and cables can be removed, although be aware that the disk drive is fragile.

Removing and replacing 2145 UPS-1U parts

The remove and replace procedures for the 2145 UPS-1U field replaceable units are described in the topics which follow.

Removing the 2145 UPS-1U

Before you remove the 2145 uninterruptible power supply-1U (2145 UPS-1U), read all safety notices.

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 2145 UPS-1U contains its own energy source (sealed, lead-acid batteries). The output receptacles might carry live voltage even when the 2145 UPS-1U is not connected to an AC supply. (11)

CAUTION:

Do not remove or unplug the input cord when the 2145 UPS-1U is turned on. This removes the safety ground from the 2145 UPS-1U and the equipment connected to the 2145 UPS-1U. (12)

CAUTION:

To reduce the risk of fire or electric shock, install the 2145 UPS-1U 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 2145 UPS-1U are shut down and powered off, prior to step 1.

Perform the following steps to remove the 2145 UPS-1U:

1. At the front of the 2145 UPS-1U, press and hold the on/off button **1** until the power light is extinguished (approximately five seconds). See Figure 115. The 2145 UPS-1U enters standby mode.

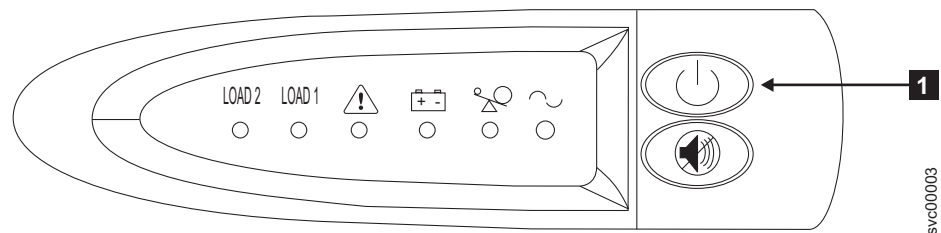


Figure 115. 2145 UPS-1U front panel assembly

2. At the back of the 2145 UPS-1U, disconnect the SAN Volume Controller power cable from load segment receptacle 2 (**5** in Figure 116).
3. Disconnect the signal cable from the communication port **2**.
4. Disconnect the main power cable from the main power source **1**.

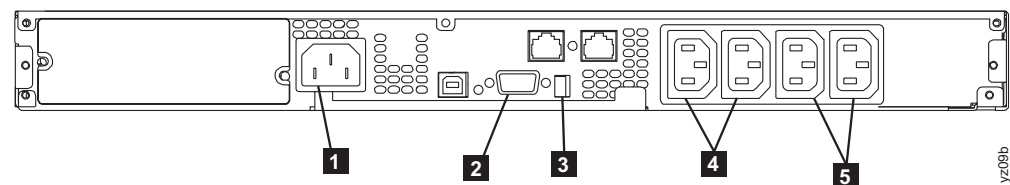
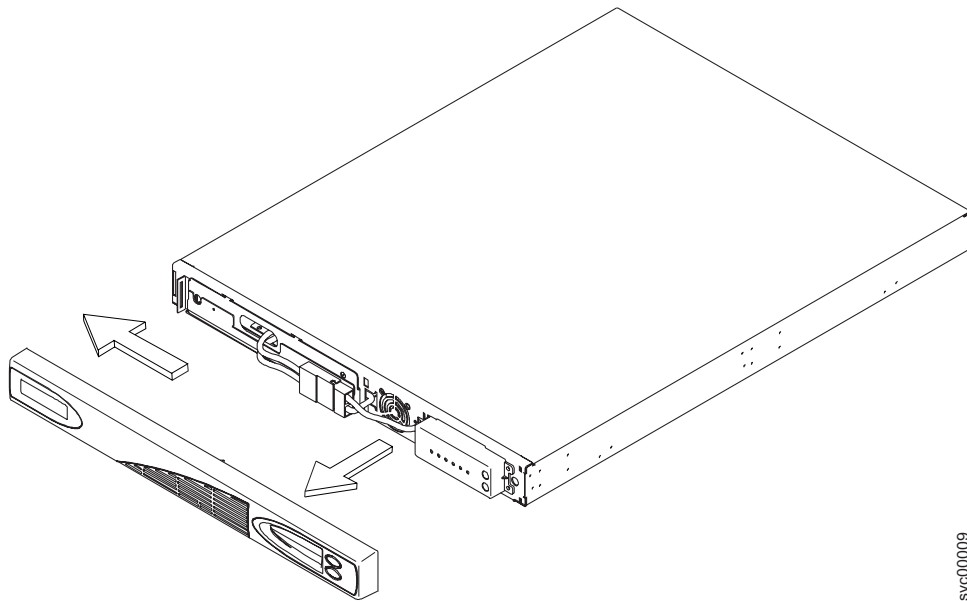


Figure 116. 2145-1U Uninterruptible power supply (rear view)

5. Remove the 2145 UPS-1U front panel (see Figure 117 on page 288).

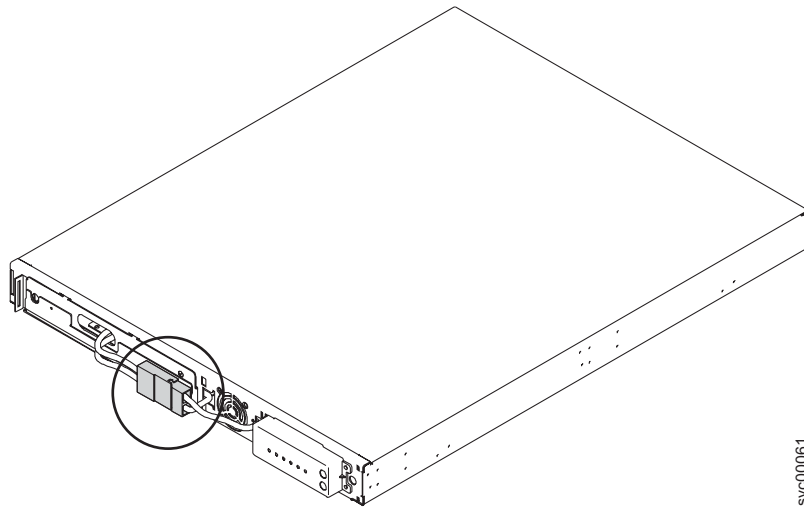
Note: If you are having difficulty pulling the right side of the panel free from the 2145 UPS-1U, insert a flat-blade screwdriver between the right side of the cover and the frame and gently pry it free.



svc00009

Figure 117. Removing the 2145 UPS-1U front panel

6. Disconnect the internal battery connector. See Figure 118.



svc00061

Figure 118. The 2145 UPS-1U internal battery connector

7. After pulling the two connectors apart, cover the exposed battery connector with adhesive tape. See Figure 119 on page 289.

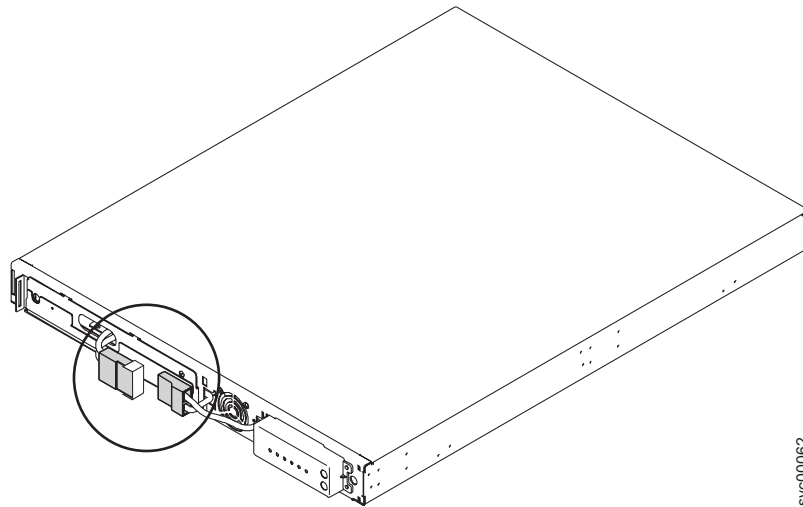


Figure 119. The 2145 UPS-1U internal battery connector with protective tape

8. Reinstall the front panel.
9. At the front of the 2145 UPS-1U, unscrew the two mounting screws. See **1** in Figure 120.

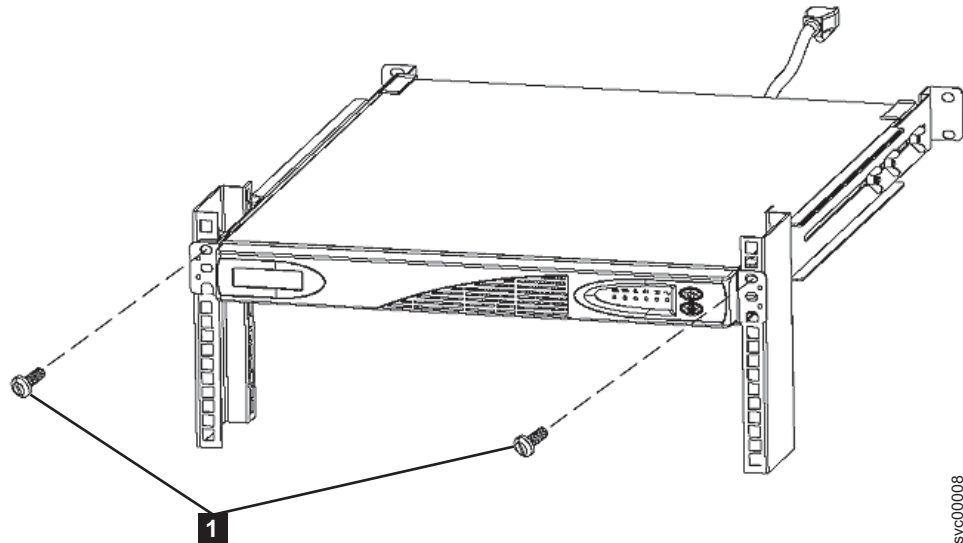


Figure 120. Removing the mounting screws from the 2145-1U uninterruptible power supply

10. From the back of the rack, push the 2145 UPS-1U forward approximately 5 cm (2 in) to enable you to pull it from the rack.
11. Go to the front of the rack.
12. Pull the 2145 UPS-1U forward and remove it from the rack.

Related concepts

“Definitions of notices” on page xxiii

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

Related tasks

“Removing the 2145 UPS-1U battery” on page 299

The 2145 uninterruptible power supply-1U (2145 UPS-1U) battery can be replaced without having to turn off power or remove the 2145 UPS-1U from the rack, ensuring that your equipment stays connected and running properly.

“Replacing the 2145 UPS-1U”

You can be replace the 2145 uninterruptible power supply-1U (2145 UPS-1U) only after you remove the previous uninterruptible power supply (UPS).

Replacing the 2145 UPS-1U

You can be replace the 2145 uninterruptible power supply-1U (2145 UPS-1U) only after you remove the previous uninterruptible power supply (UPS).

Note: Before you begin to install the 2145 UPS-1U, read the safety notices. 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, and attention notices, and the translation of the safety labels, see the *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*.

CAUTION:

The 2145 UPS-1U contains its own energy source (sealed, lead-acid batteries). The output receptacles may carry live voltage, even when the 2145 UPS-1U is not connected to an AC supply. (11)

CAUTION:

Do not remove or unplug the input cord when the 2145 UPS-1U is turned on. This removes the safety ground from the 2145 UPS-1U and the equipment connected to the 2145 UPS-1U. (12)

CAUTION:

To reduce the risk of fire or electric shock, install the 2145 UPS-1U 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 2145 UPS-1U:

1. Place the 2145 UPS-1U on a flat, stable surface with the front of the 2145 UPS-1U facing toward you.
2. On each side of the 2145 UPS-1U, attach the long end of a mounting bracket to the 2145 UPS-1U using four of the supplied M3 × 6 screws. See **2** in Figure 121 on page 291.

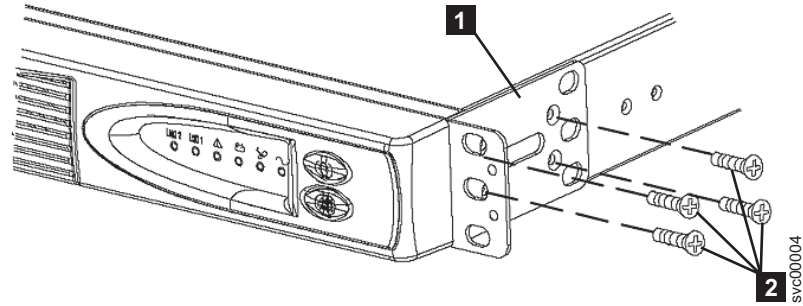


Figure 121. 2145 UPS-1U mounting bracket

3. Stand at the front of the rack and place the back of the 2145 UPS-1U onto the support rails, and then slide the 2145 UPS-1U into the rack.
4. At the front of the 2145 UPS-1U, install the two mounting screws. See **1** in Figure 122.

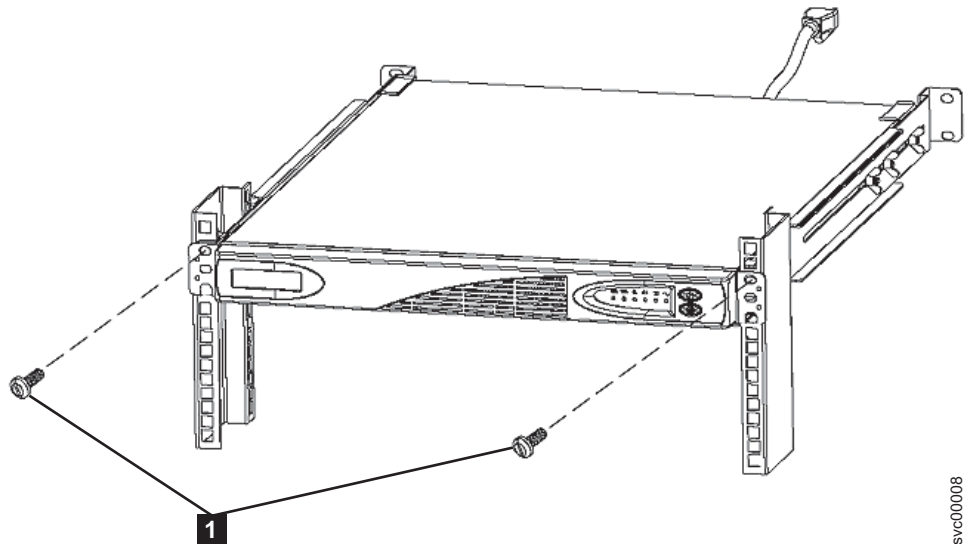
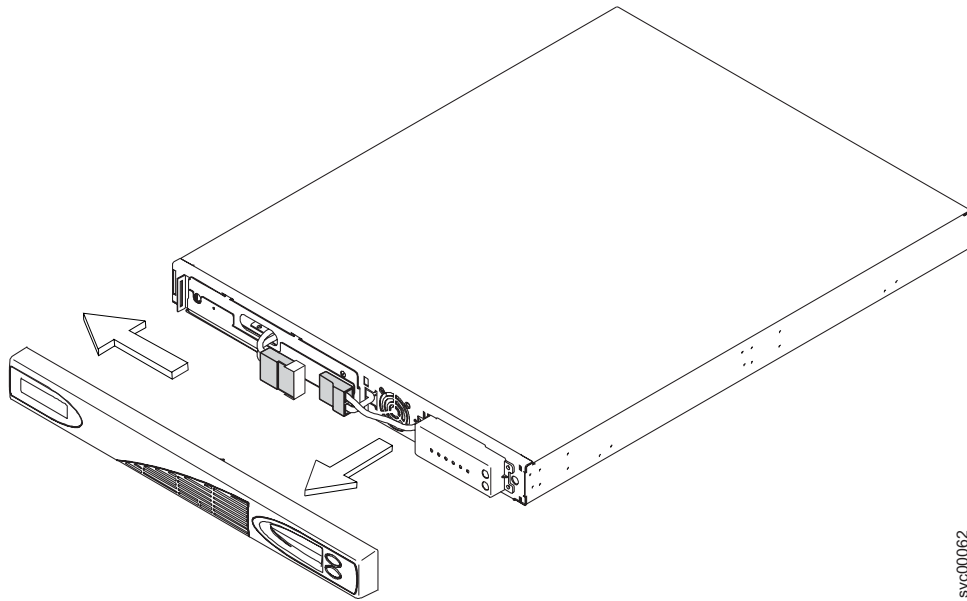


Figure 122. Replacing the 2145 UPS-1U into a rack

5. Remove the 2145 UPS-1U front panel by pulling it toward you and to the left. See Figure 123 on page 292.

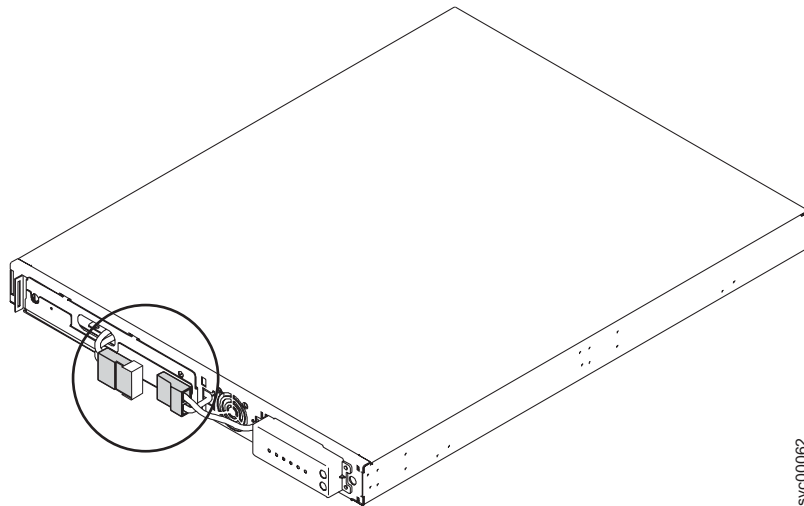
Note: If you are having difficulty pulling the right side of the panel free from the 2145 UPS-1U, insert a flat-blade screwdriver between the right side of the cover and the frame and gently pry it free.



svc00062

Figure 123. Removing the 2145 UPS-1U front panel

6. Remove the protective tape from the internal battery connector. See Figure 124.



svc00062

Figure 124. Internal battery connector with protective tape

7. Connect the internal battery connector. See Figure 125 on page 293

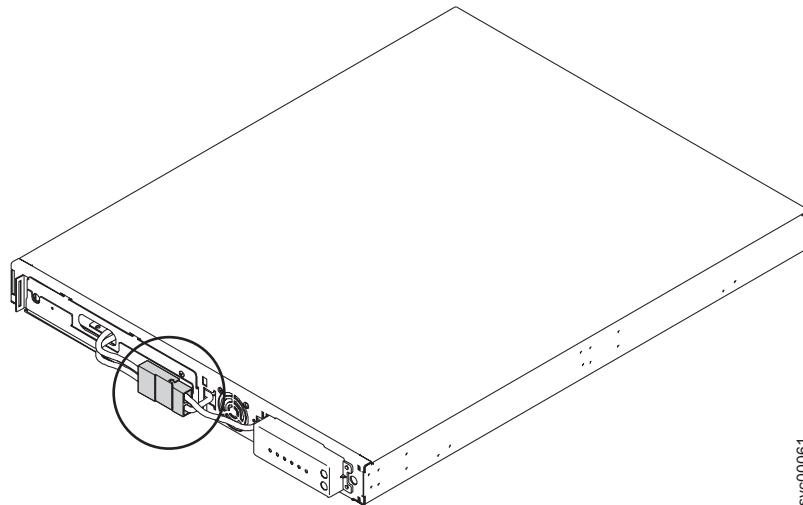


Figure 125. The 2145 UPS-1U with internal battery connectors in place

Note: A small amount of arcing may occur when connecting the batteries. This is normal and does not damage the unit or present any safety concerns.

8. Reinstall the front panel.
9. At the back of the 2145 UPS-1U, reconnect the power cable of the SAN Volume Controller to load segment 2 receptacle **5**. See Figure 126.

Note: The 2145 UPS-1U 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 2145 UPS-1U or else the SAN Volume Controller cluster malfunctions. You can only attach one SAN Volume Controller to the 2145 UPS-1U, and nothing else. Each SAN Volume Controller requires two 2145 UPS-1Us in order to function correctly.

10. Reconnect the signal cable to the communication port **2**. See Figure 126.
11. Reconnect the 2145 UPS-1U main power cable into the input connector **1**.

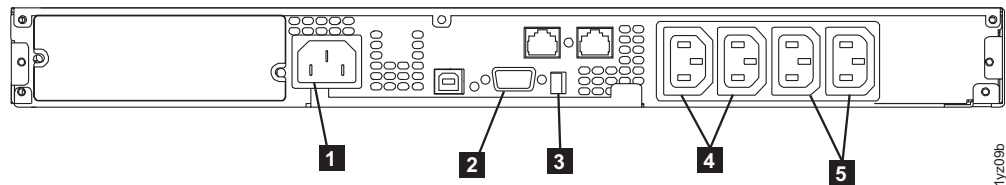


Figure 126. 2145 UPS-1U (rear view)

Note: If possible, ensure that the two UPSs are not connected to the same power source. The 2145 UPS-1U requires a dedicated branch circuit that meets the following specifications:

- Single-phase
- 50 to 60 Hz
- 200-240 Volt

The 2145 UPS-1U is now in standby mode with the SAN Volume Controller offline. All indicators that are shown in Figure 126 are off.

12. To turn the 2145 UPS-1U on, press and hold the on/off button **2** until the power light is extinguished (approximately five seconds). See Figure 127. The 2145 UPS-1U undergoes a self-test before the power-on indicator **1** and the load indicators (**7** and **8**) light up to indicate that the 2145 UPS-1U is supplying power to the SAN Volume Controller. The 2145 UPS-1U begins to charge its battery while in normal mode.

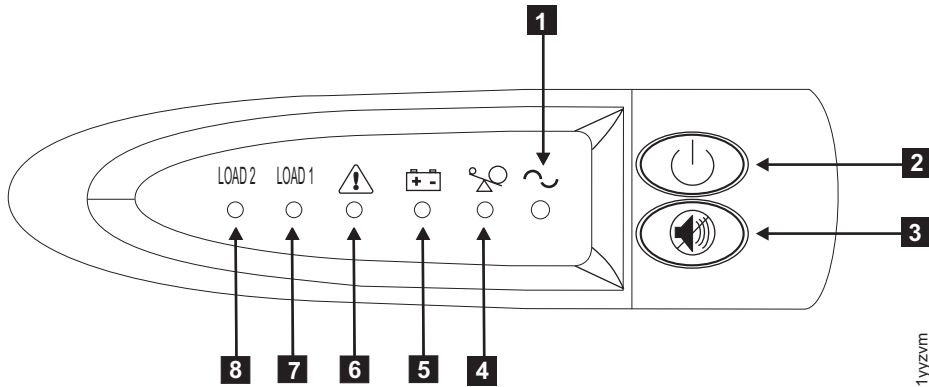


Figure 127. Power switch and indicators of the 2145 UPS-1U

Related concepts

“Definitions of notices” on page xxiii

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

Related tasks

“Removing the 2145 UPS-1U battery” on page 299

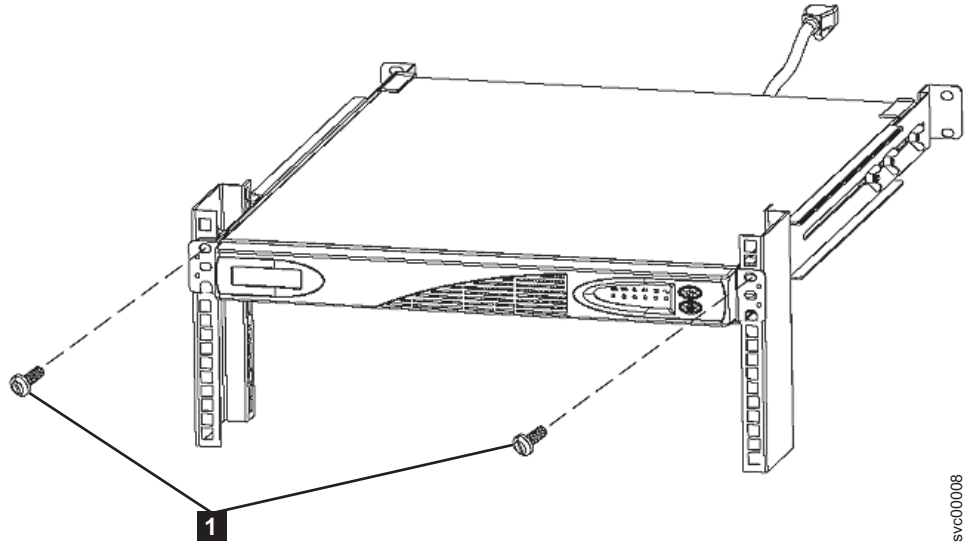
The 2145 uninterruptible power supply-1U (2145 UPS-1U) battery can be replaced without having to turn off power or remove the 2145 UPS-1U from the rack, ensuring that your equipment stays connected and running properly.

Removing the support rails for a 2145 UPS-1U

You can remove the support rails for the 2145 uninterruptible power supply-1U (2145 UPS-1U).

Perform the following steps to remove the support rails:

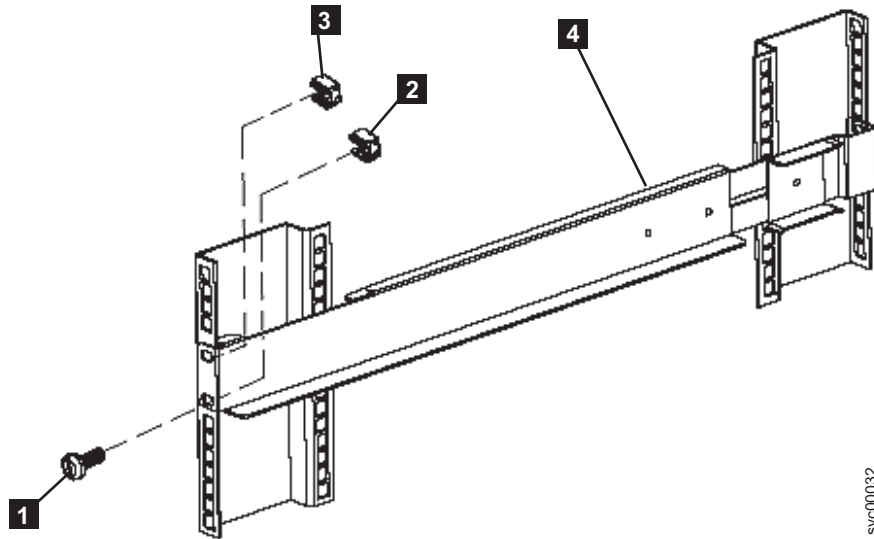
1. Loosen and remove the two M6 × 10 screws (**1** in Figure 128 on page 295) from each side as shown below.



svc00008

Figure 128. Removing the front screws from the 2145 UPS-1U

2. Remove the 2145 UPS-1U from the rack.
3. Remove the clip nut from the top hole of the rail (**3** in Figure 129).



svc00032

Figure 129. Removing the front rail on the 2145 UPS-1U

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 from the rear side of the rail (**1** in Figure 130 on page 296) and the two clip nuts (**2**).

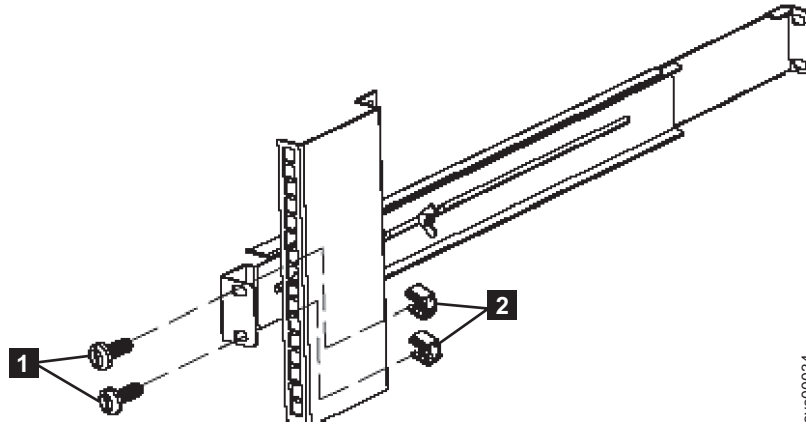


Figure 130. Removing the rear rail on the 2145 UPS-1U

6. Remove the rail from the rack.
7. Repeat step 3 on page 295 through step 6 to remove the other rail from the rack.

Installing the support rails for the 2145 UPS-1U

You must install the support rails in the rack before installing the 2145 uninterruptible power supply-1U (2145 UPS-1U).

Complete the following prerequisites before installing the support rails:

1. Refer to the user's hardware location table to determine where in the rack the 2145 UPS-1U is to be installed.
2. Discard the two handles and their associated nuts that are shipped with the support rails.
3. At the back of the rack, observe the Electrical Industries Association (EIA) positions, and determine where you are going to install the 2145 UPS-1U. The 2145 UPS-1U must always be installed into the lowest available position in the rack. The only device that can be below a UPS is another UPS.

Note: The user can already have installed in the rack a 2145 uninterruptible power supply (2145 UPS) with available spare capacity. Therefore, the SAN Volume Controller might be delivered without a 2145 UPS-1U.

Perform the following steps to install the support rails for the 2145 UPS-1U:

1. Place the 2145 UPS-1U on a flat surface with the front facing you.
2. Attach the long side of a mounting bracket **1** to each side of the 2145 UPS-1U using four M3 × 6 screws **2** for each bracket. See Figure 131 on page 297.

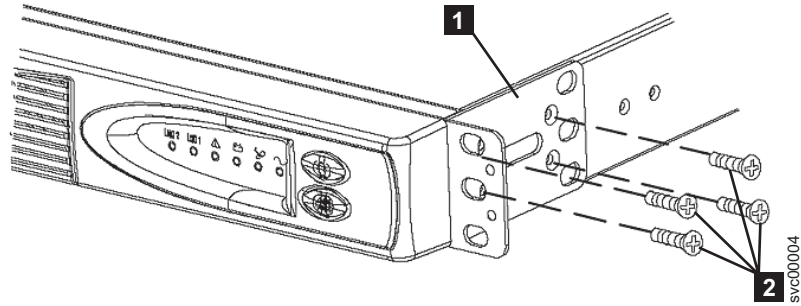


Figure 131. Installing the support rails for a 2145 UPS-1U into the rack

3. Loosen the assembly wing nuts (see **1** in Figure 132) on both rail assemblies and adjust the rail size to the depth of your rack.

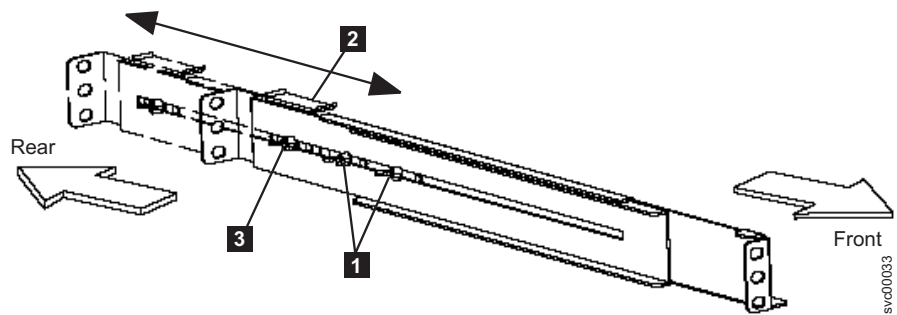


Figure 132. Adjusting the rail depth on the 2145 UPS-1U

- 1** Assembly wing nuts
- 2** Hold-down bracket
- 3** Wing nut

4. Position the rear, hold-down bracket **2** towards the end of the rail assemblies and tighten the wing nut **3**. See Figure 132.
5. Select the holes in the rail where you want to position the 2145 UPS-1U.

Note: The bottom flange of the support rail must align with the EIA mark on the rack.

6. Using two M6 × 10 screws (**1** in Figure 133 on page 298) and two clip nuts **2**, attach the rail to the rear of the rack.

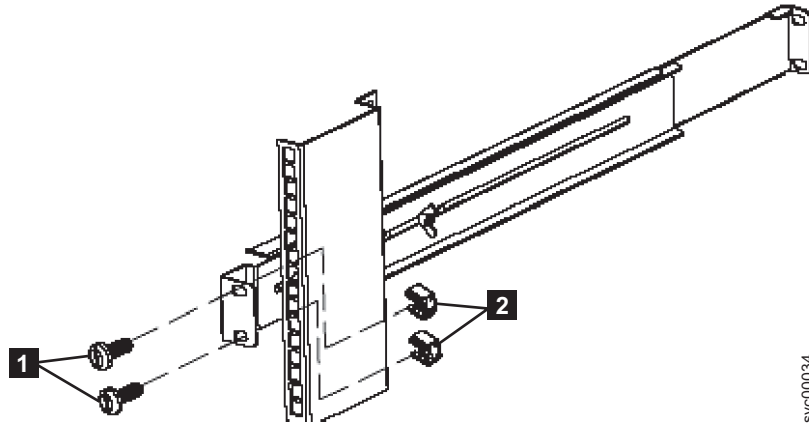


Figure 133. Securing the rear rail on the 2145 UPS-1U

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 134).

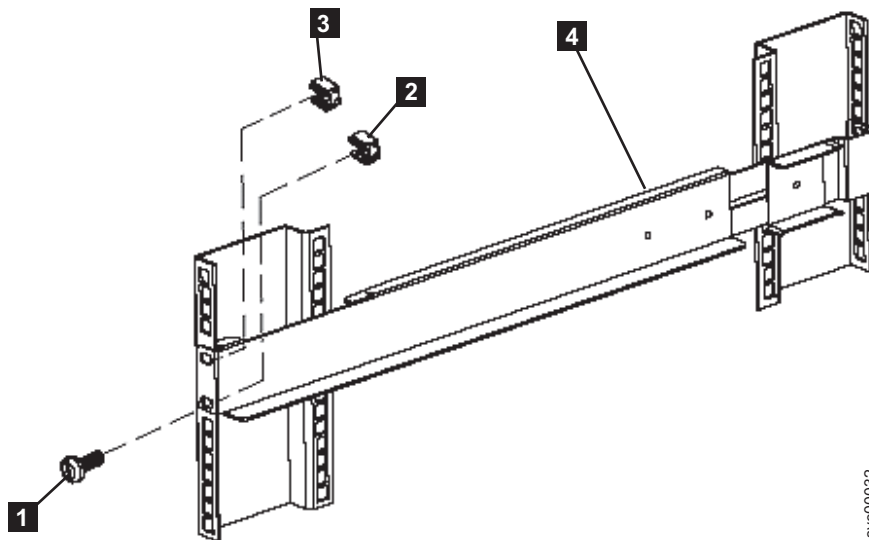


Figure 134. Securing the front rail on the 2145 UPS-1U

8. Install a clip nut in the top hole of the rail **3**.
9. Repeat step 6 on page 297 through step 8 for the other rail.
10. Tighten the assembly wing nuts on both rail assemblies.

Removing the power cable from the 2145 UPS-1U

You can remove the power cable from the 2145 uninterruptible power supply-1U (2145 UPS-1U) if you are having problems with the power supply and suspect that the power cable is defective.

Perform the following steps to remove the power cable:

1. Remove the power from each SAN Volume Controller. See the documentation on removing the power cable from the SAN Volume Controller.

- Press and hold the on/off button **2** until the power light **1** is extinguished (approximately five seconds). The 2145 UPS-1U enters standby mode, with all indicators off. See Figure 135 for an illustration of the front and rear view of the 2145 UPS-1U.

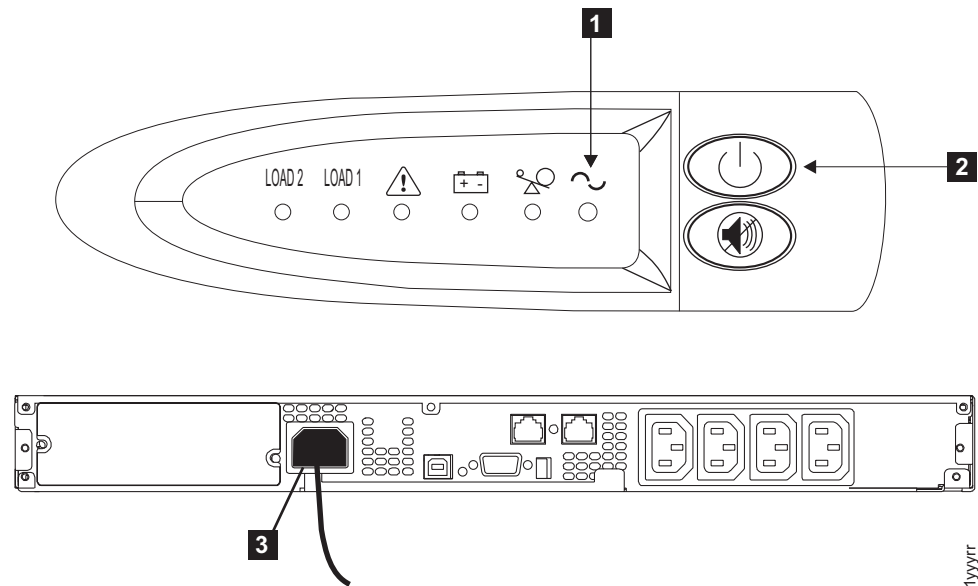


Figure 135. Front and back panels for the 2145 UPS-1U

- 1** Power-on indicator
- 2** On/off button
- 3** Power cable

- Disconnect the power cable from the main power source **3**.
- Replace the power cable and make sure it is seated. The 2145 UPS-1U enters standby mode. All indicators are off and power is not available to the SAN Volume Controller. The battery recharges when necessary.
- To turn the 2145 UPS-1U on, press and hold the on/off button **2** until the 2145 UPS-1U power button **1** is illuminated (approximately five seconds). The front panel indicators then cycle through a startup sequence while the 2145 UPS-1U conducts a self-test. When the self-test completes, the power-on indicator and the load indicators illuminate to show that the 2145 UPS-1U is supplying power. The 2145 UPS-1U resumes service in normal mode.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

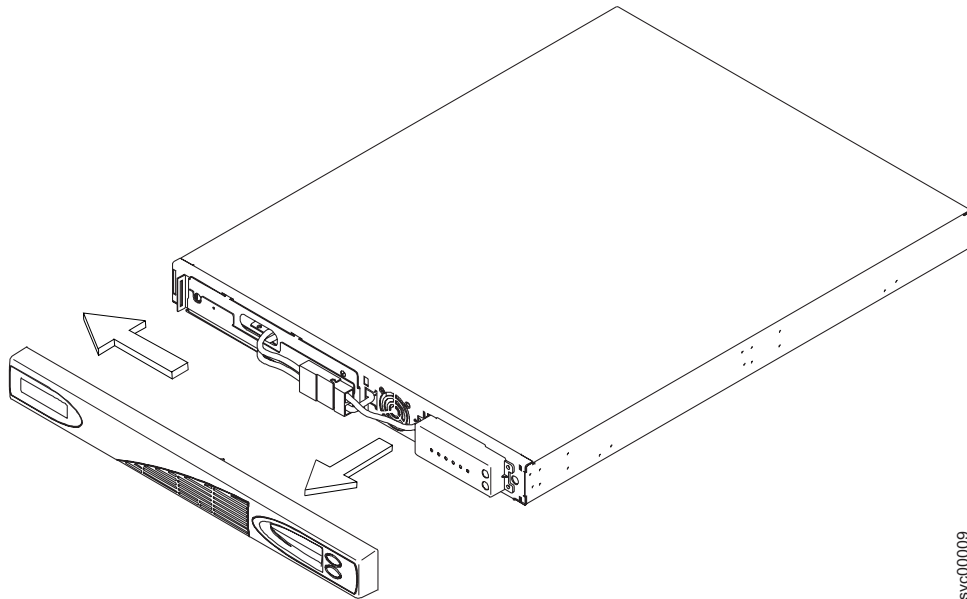
Removing the 2145 UPS-1U battery

The 2145 uninterruptible power supply-1U (2145 UPS-1U) battery can be replaced without having to turn off power or remove the 2145 UPS-1U from the rack, ensuring that your equipment stays connected and running properly.

Perform the steps below to remove the 2145 UPS-1U battery:

1. Pull the front panel from the right side until the panel is released from the right and middle sections of the 2145 UPS-1U. Push the front panel to the left to release the catch on the left end of the panel. See Figure 136.

Note: If you are having difficulty pulling the right side of the panel free from the 2145 UPS-1U, insert a flat-blade screwdriver between the right side of the cover and the frame and gently pry it free.



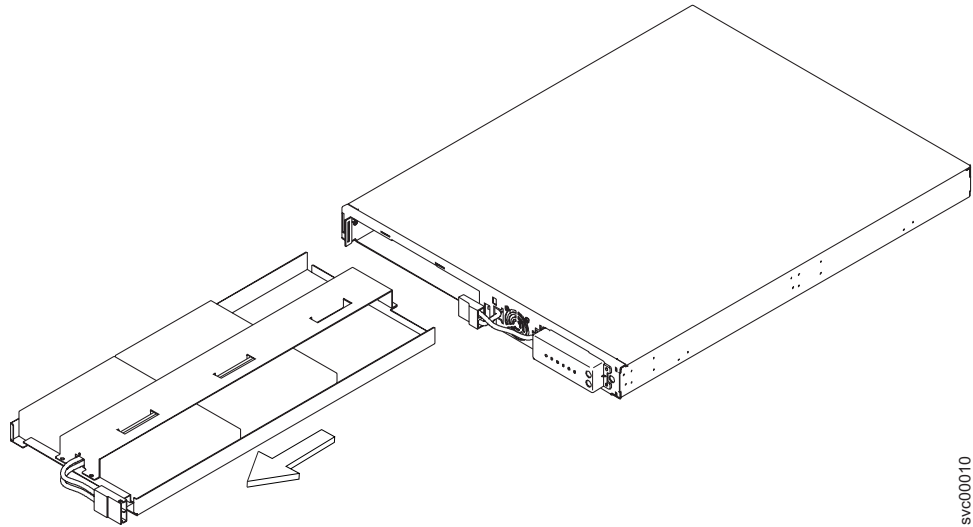
600000315

Figure 136. Removing the 2145 UPS-1U front panel

2. Unplug the battery from the 2145 UPS-1U.
3. Slide the battery cover to the right and remove it.
4. Slide the battery away from the 2145 UPS-1U and remove it, laying it on a flat surface. See Figure 137 on page 301.

CAUTION:

The 2145 UPS-1U contains its own energy source (sealed, lead-acid batteries). The output receptacles might carry live voltage even when the 2145 UPS-1U is not connected to an AC supply. (11)



svc00010

Figure 137. Removing the 2145 UPS-1U battery

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 2145 UPS-1U” on page 286

Before you remove the 2145 uninterruptible power supply-1U (2145 UPS-1U), read all safety notices.

“Replacing the 2145 UPS-1U” on page 290

You can be replace the 2145 uninterruptible power supply-1U (2145 UPS-1U) only after you remove the previous uninterruptible power supply (UPS).

Related reference

“Controls and indicators for the 2145 UPS-1U” on page 49

All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) are located on the front panel assembly.

Replacing the 2145 UPS-1U battery

The 2145 uninterruptible power supply-1U (2145 UPS-1U) battery can be replaced without having to turn off power or remove the 2145 UPS-1U from the rack, ensuring that your equipment stays connected and running properly.

This task assumes that you have disconnected the 2145 UPS-1U battery and have turned off the power. Perform the steps below to replace the 2145 UPS-1U battery:

1. Slide the battery into the 2145 UPS-1U. See Figure 138.

CAUTION:

The 2145 UPS-1U contains its own energy source (sealed, lead-acid batteries). The output receptacles might carry live voltage even when the 2145 UPS-1U is not connected to an AC supply. (11)

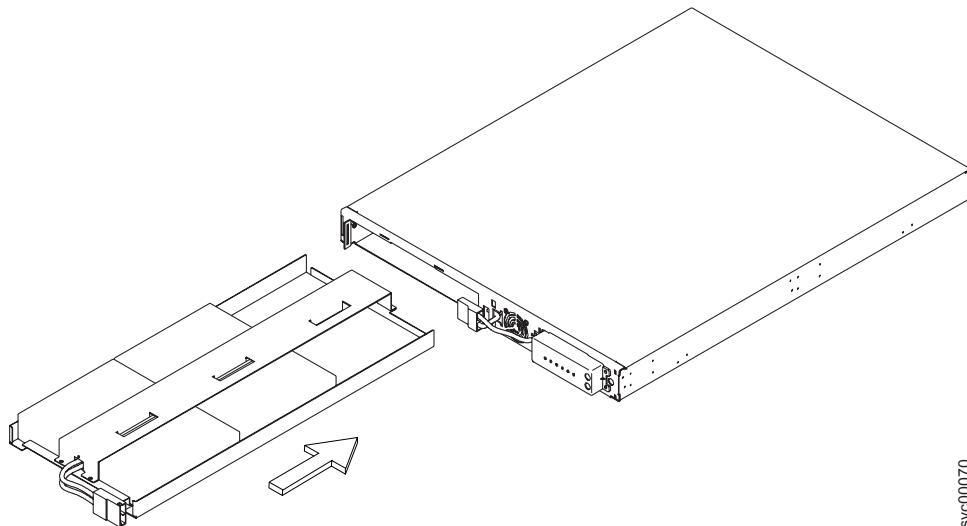


Figure 138. Replacing the 2145 UPS-1U battery

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.

2. Slide the battery cover to the left and attach it.
3. Plug the battery into the 2145 UPS-1U.
4. Push the front panel to the right to catch on the left end of the panel. Push the front panel forward until the panel snaps into the right and middle sections of the 2145 UPS-1U. See Figure 139 on page 303.

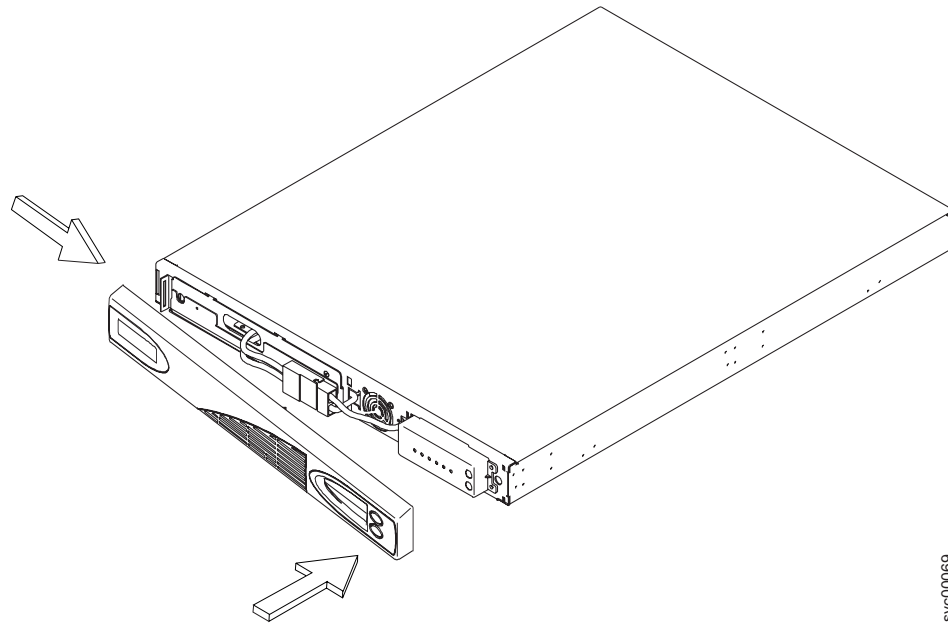


Figure 139. Replacing the 2145 UPS-1U front panel

svc00069

Removing and replacing 2145 UPS parts

The remove and replace procedures for the 2145 UPS field replaceable units are described in the topics which follow.

Removing the 2145 UPS

Before you begin to remove the 2145 uninterruptible power supply (2145 UPS), read all safety notices.

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 2145 UPS contains its own energy source (batteries). The output receptacles might carry live voltage even when the 2145 UPS is not connected to an AC supply. (11)

CAUTION:

Do not remove or unplug the input cord when the 2145 UPS is turned on. This removes the safety ground from the 2145 UPS and the equipment connected to the 2145 UPS. (12)

CAUTION:

To reduce the risk of fire or electric shock, install the 2145 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 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 2145 UPS weighs 39 kg (86 lb) with the electronics assembly and the battery assembly installed:

- Do not attempt to lift the 2145 UPS by yourself. Ask another service representatives for assistance.
- Remove the battery assembly from the 2145 UPS before removing the 2145 UPS from the shipping carton.

CAUTION:

The electronics assembly weighs 6.4 kg (14 lb). Take care when you remove it from the 2145 UPS. (16)

CAUTION:

The 2145 UPS battery unit weighs 21 kg (45 lb). Do not attempt to lift the 2145 UPS battery unit by yourself. Ask another service representative for aid. (18)

Perform the following steps to remove the 2145 UPS:

CAUTION:

Check to make sure that any SAN Volume Controller that is powered by this 2145 UPS is shut down and powered off, prior to step 1.

1. At the front of the 2145 UPS, press and hold the off button **1** for approximately five seconds or until the long beep stops. See Figure 140.

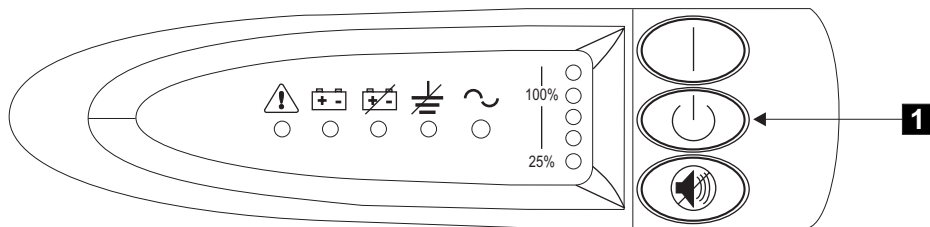


Figure 140. 2145 uninterruptible power supply front panel assembly

2. At the back of the 2145 UPS (Figure 141 on page 305), disconnect the power cables of the SAN Volume Controller **3**.
3. Disconnect the signal cables **1**.
4. Disconnect the main power cable **2** (Figure 141 on page 305).

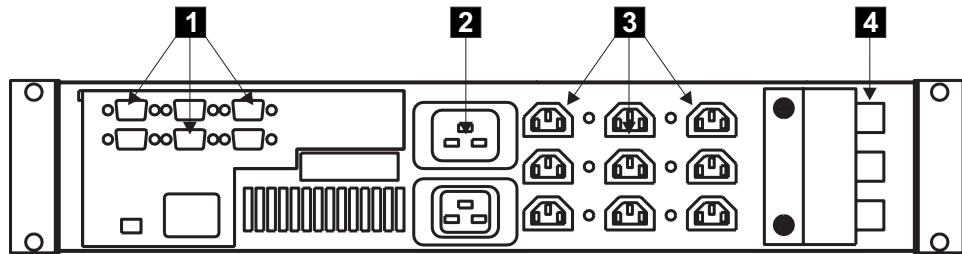


Figure 141. 2145 uninterruptible power supply (rear view)

5. Remove the battery from the 2145 UPS. Refer to the procedure for removing the 2145 UPS battery.

CAUTION:

The 2145 UPS battery unit weighs 21 kg (45 lb). Do not attempt to lift the 2145 UPS battery unit by yourself. Ask another service representative for aid. (18)

6. Remove the electronics assembly from the 2145 UPS. Refer to the procedure for removing the 2145 UPS electronics.
7. At the front of the 2145 UPS, unscrew the mounting screws, **1** in Figure 142.

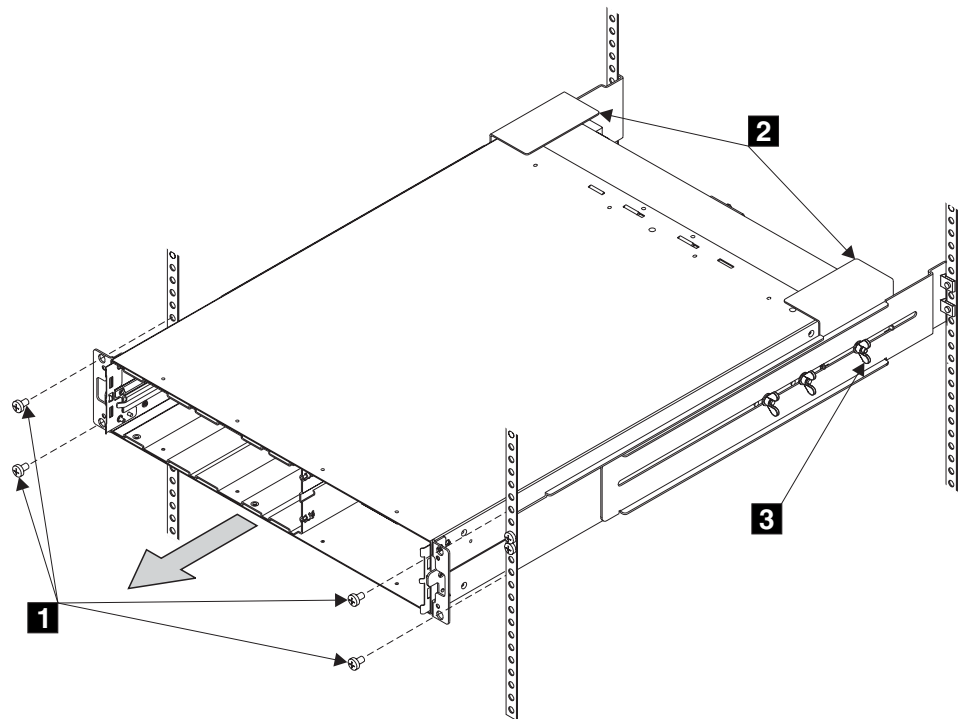


Figure 142. Removing the 2145 uninterruptible power supply

8. At the back of the rack, push the 2145 UPS forward approximately 5 cm (2 in) to enable you to pull it from the rack.
9. Go to the front of the rack.
10. With aid from another service representative, pull the 2145 UPS forward and remove it from the rack.

11. Replace the 2145 UPS. Refer to the procedure for replacing the 2145 UPS.

Related concepts

“Definitions of notices” on page xxiii

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

Related tasks

“Removing the 2145 UPS electronics” on page 313

During routine maintenance, you might have to remove the 2145 UPS electronics assembly.

“Removing the 2145 UPS battery” on page 316

Follow all safety notices when you are removing the 2145 uninterruptible power supply (2145 UPS) battery.

“Replacing the 2145 UPS”

You can replace the 2145 uninterruptible power supply (2145 UPS) after first removing the current 2145 UPS.

Replacing the 2145 UPS

You can replace the 2145 uninterruptible power supply (2145 UPS) after first removing the current 2145 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 2145 UPS contains its own energy source (batteries). The output receptacles might carry live voltage even when the 2145 UPS is not connected to an AC supply. (11)

CAUTION:

Do not remove or unplug the input cord when the 2145 UPS is turned on. This removes the safety ground from the 2145 UPS and the equipment connected to the 2145 UPS. (12)

CAUTION:

To reduce the risk of fire or electric shock, install the 2145 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 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 2145 UPS weighs 39 kg (86 lb) with the electronics assembly and the battery assembly installed:

- **Do not attempt to lift the 2145 UPS by yourself. Ask another service representative for assistance.**
- **Remove the battery assembly from the 2145 UPS before removing the 2145 UPS from the shipping carton.**

- Do not attempt to install the 2145 UPS 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 2145 UPS. (16)

CAUTION:

The 2145 UPS battery unit weighs 21 kg (45 lb). Do not attempt to lift the 2145 UPS battery unit by yourself. Ask another service representative for aid. (18)

Perform the following steps to replace the 2145 UPS:

1. Reduce the weight of the 2145 UPS by removing the battery assembly first before removing the unit from the shipping carton. Perform the following steps to remove the battery assembly:
 - a. Open the top of the shipping carton and then, with the assistance of another service representative, grip the flaps on either side of the 2145 UPS. See Figure 143.



Figure 143. Two persons unboxing a 2145 UPS

- b. Slide the 2145 UPS to the end of the carton and rest its front edge on the edge of the carton as shown. See Figure 144 on page 308.



Figure 144. Slide the 2145 UPS to the edge of the carton

- c. Remove the two bolts **1** and additional nut **2** on the left side of the bracket. See Figure 145.

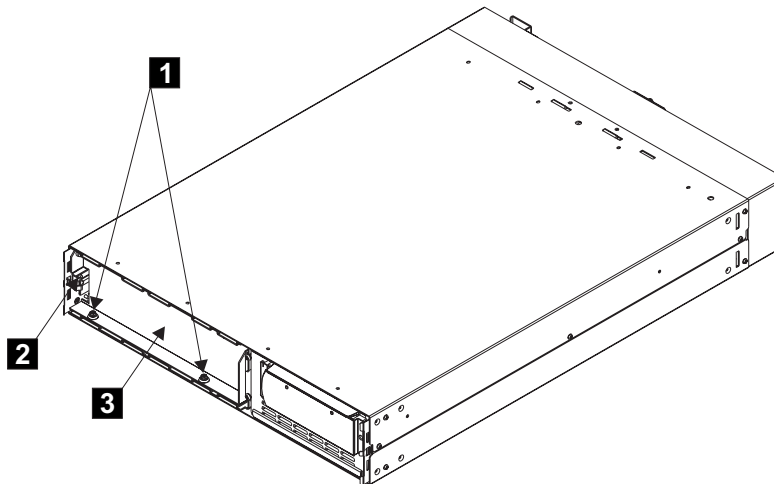


Figure 145. Remove the battery retaining bracket

- d. Remove the battery retaining bracket **3**.
- e. Grip the tab on the front of the battery and pull the battery forward until it can be accessed by two service representatives.
- f. With the assistance of another service representative, lift the battery assembly clear of the 2145 UPS and place it to one side.

Note: The cover for the 2145 UPS is not installed: it is included in the box with the 2145 UPS. Install the front cover after you have completed the other installation steps.

- 2. With the assistance of another service representative, lift the 2145 UPS onto a flat, stable surface.

3. Remove the electronic assembly from the 2145 UPS:
 - a. Remove the two screws **1** (see Figure 146).

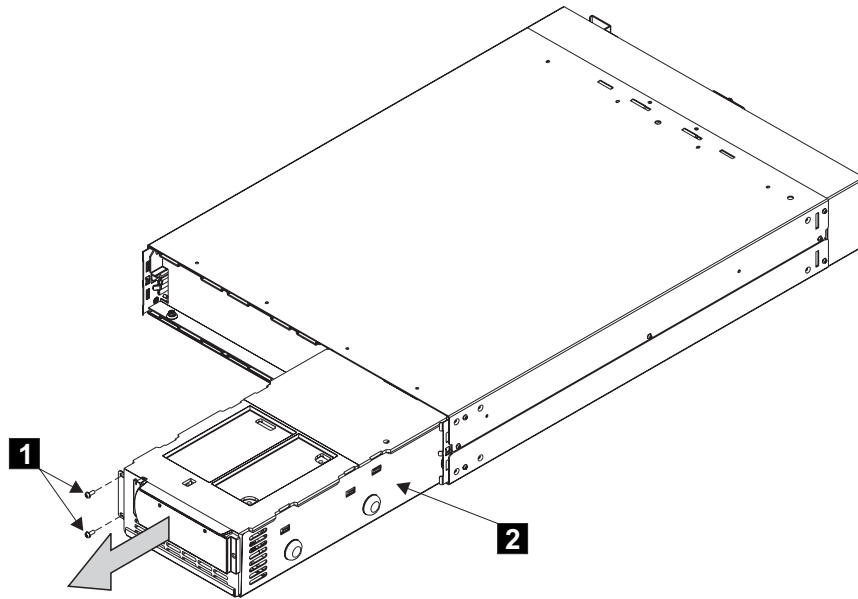


Figure 146. Removing the 2145 UPS electronics assembly

- b. Pull the electronics assembly **2** out of the 2145 UPS, 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 2145 UPS onto the support rails, and then slide the 2145 UPS into the rack.
 5. Install the front flathead screws **1** (see Figure 147 on page 310).

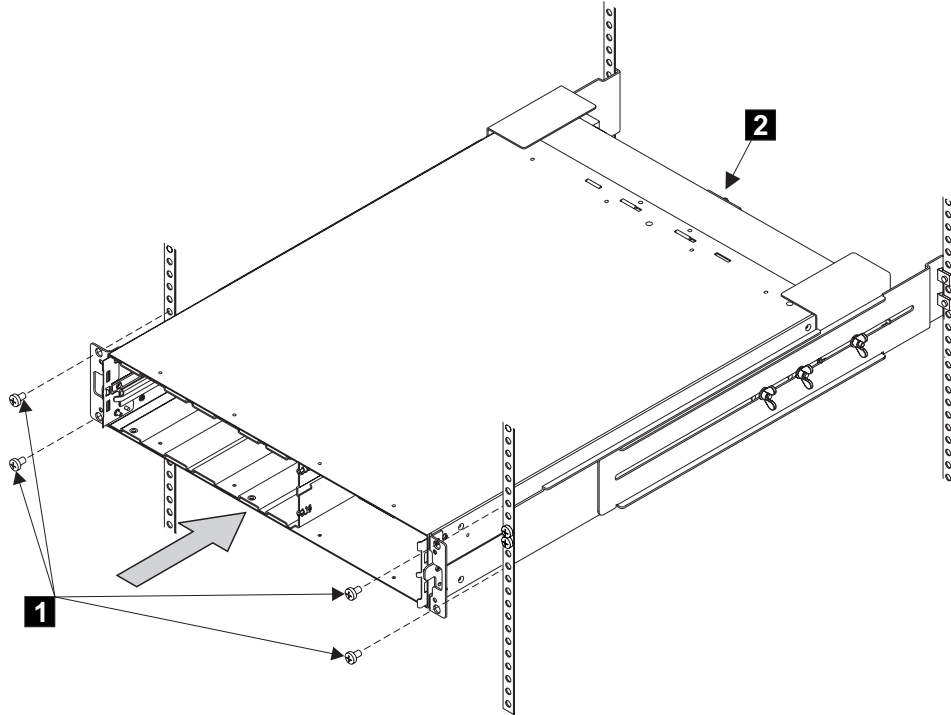


Figure 147. Replacing the 2145 UPS into a rack

6. With aid from another service representative, perform the following steps:
 - a. Install the battery.
 - b. Install the electronics assembly.

Note: A grounding screw feature is provided on the back of the 2145 UPS so that you can attach a ground bonding wire, if required by local wiring codes. Since the safety of the 2145 UPS 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 causes the 2145 UPS to malfunction.

8. Install the front panel.
9. At the back of the 2145 UPS, plug the 2145 UPS main power cable into the power socket, **1** in Figure 148 on page 311.

Note: The 2145 UPS 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 in to the 2145 UPS, or the SAN Volume Controller cluster malfunctions.

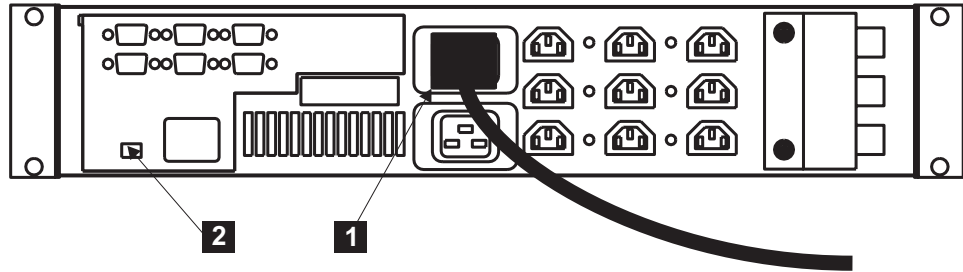


Figure 148. Installing the 2145 UPS power cable

Attention: If possible, ensure that the two UPSs are not connected to the same power source.

Note: The 2145 UPS requires a dedicated branch circuit that meets the following specifications:

- One 15 A circuit breaker in each branch circuit supplies the power to a 2145 UPS
- Single-phase
- 50 to 60 Hz
- 200–240 Volt

10. All the front panel indicators (see Figure 149) flash for a short time while the 2145 UPS runs a self test. When the test is complete, the mode indicator flashes to show that the 2145 UPS is in standby mode.

Press and hold the on button until you hear the 2145 UPS 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 2145 UPS. The 2145 UPS is now in normal mode and is charging its battery.

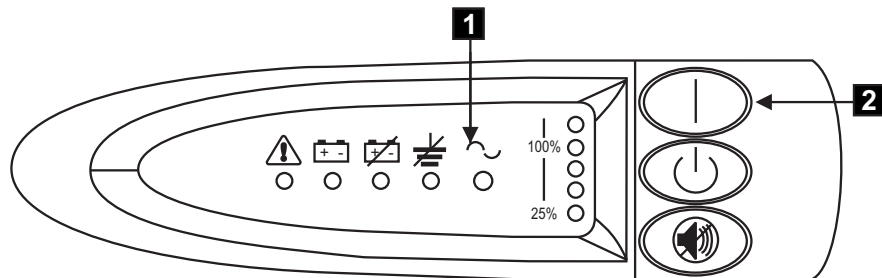


Figure 149. Power switch and indicators of the 2145 UPS

1 Mode indicator

2 On button

11. Install the front cover.

Related concepts

“Definitions of notices” on page xxiii

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

Related tasks

“Removing the 2145 UPS electronics” on page 313

During routine maintenance, you might have to remove the 2145 UPS electronics assembly.

“Removing the 2145 UPS battery” on page 316

Follow all safety notices when you are removing the 2145 uninterruptible power supply (2145 UPS) battery.

Removing the power cable from the 2145 UPS

You can replace the power cable from the 2145 uninterruptible power supply (2145 UPS) if you are having problems with the power supply and suspect that the power cable is defective.

Perform the following steps to remove the power cable:

1. Remove the power from each SAN Volume Controller. See the documentation about 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** flashes and the 2145 UPS enters standby mode.

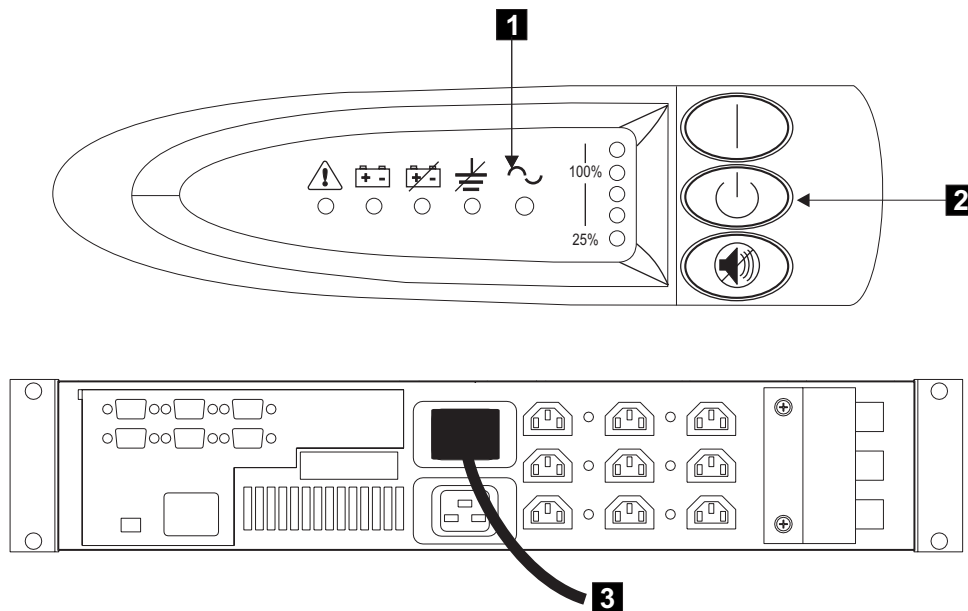


Figure 150. Front and back view of the 2145 UPS

1 Mode indicator

2 Off switch

3 Power cable

3. Unplug the power cable **3** from the main power source.
4. Reinstall the power cable (or replace it) to return power to the 2145 UPS. The 2145 UPS runs a self-test and enters standby mode.
5. Press and hold the on switch until, after approximately one second, the 2145 UPS beeps. The mode indicator stops flashing and the load-level indicators show the percentage of load that the 2145 UPS supplies.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 281
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Removing the 2145 UPS electronics

During routine maintenance, you might have to remove the 2145 UPS electronics assembly.

Follow all safety notices when removing the 2145 uninterruptible power supply (2145 UPS) electronics assembly.

CAUTION:

Check to make sure that any SAN Volume Controller that is powered by this 2145 UPS is shut down and powered off, prior to step 1.

Perform the following steps to remove the 2145 UPS electronic assembly:

1. At the front of the 2145 UPS, press and hold the off button for approximately five seconds, or until the long beep stops. See the related documentation for removing the 2145 UPS.
2. At the back of the 2145 UPS, disconnect the signal cables. See **1** in Figure 151.

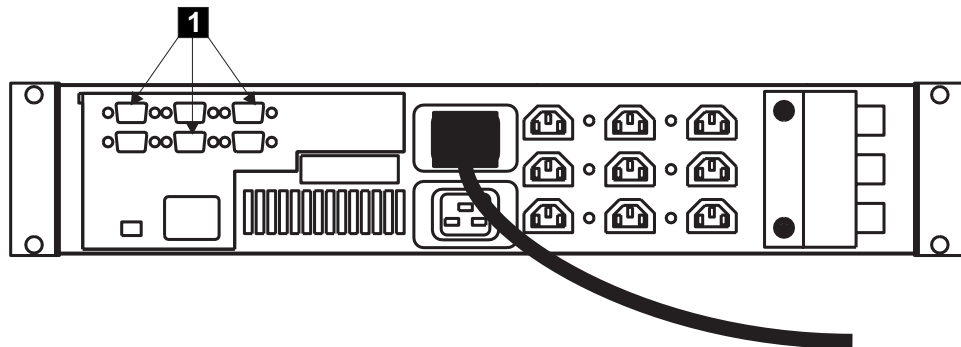


Figure 151. Disconnecting the 2145 UPS signal cables

3. Remove the front panel by pressing the sides inward and pulling both ends towards you. See Figure 152 on page 314.

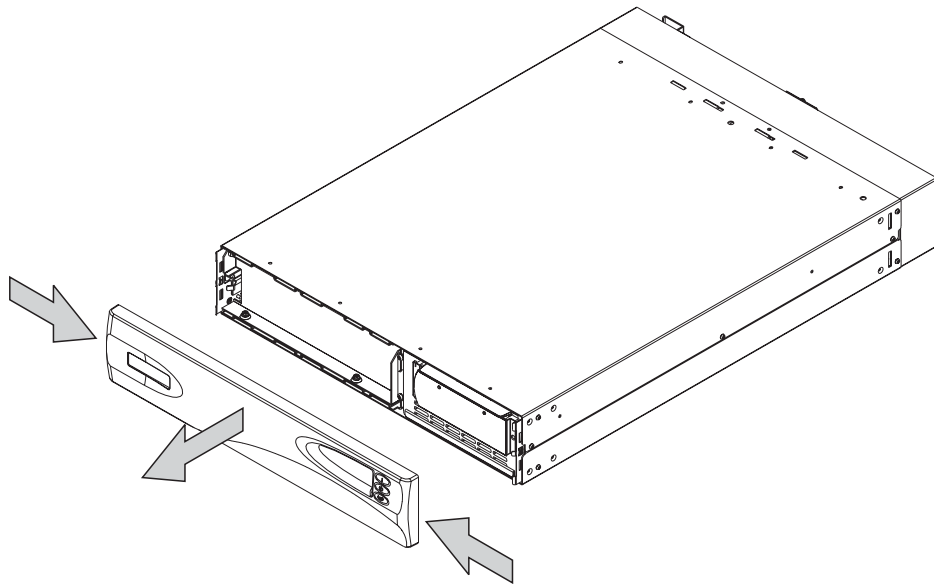


Figure 152. Removing the front panel of the 2145 UPS

4. Remove the two screws. See **1** in Figure 153.

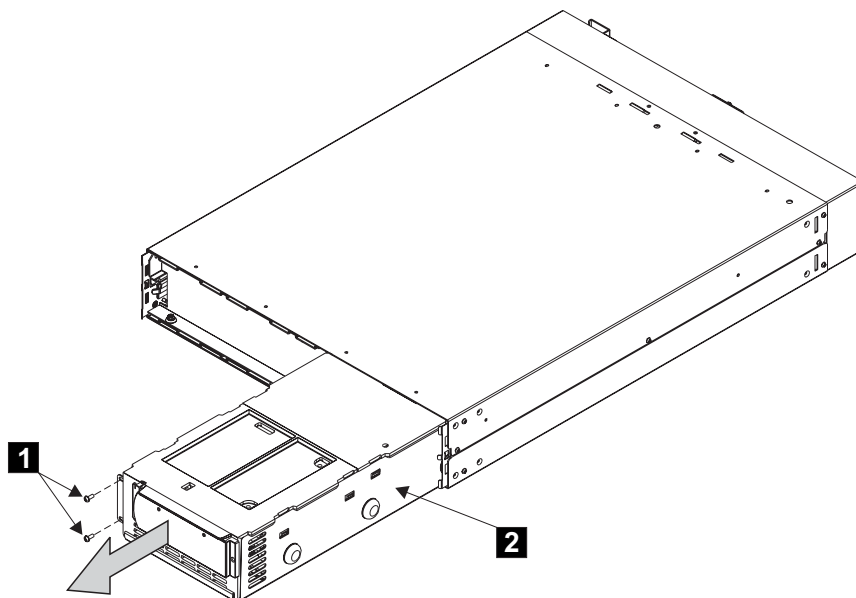


Figure 153. Removing the electronics unit from the 2145 UPS

5. Pull the electronics assembly **2** out from the 2145 UPS.

Related tasks

“Removing the 2145 UPS” on page 303

Before you begin to remove the 2145 uninterruptible power supply (2145 UPS), read all safety notices.

Related reference

“Controls and indicators for the 2145 UPS” on page 54

All controls for the 2145 uninterruptible power supply (2145 UPS) are located on the front panel assembly.

Replacing the 2145 UPS electronics

During routine maintenance, you might have to replace the 2145 UPS electronics assembly.

Follow all safety notices when replacing the 2145 uninterruptible power supply (2145 UPS) electronics assembly.

Attention: When reinstalling the signal cables, use only the top row of serial connectors. Installing signal cables in the bottom row of serial connectors causes the 2145 UPS to malfunction.

CAUTION:

Check to make sure that any SAN Volume Controller that is powered by this 2145 UPS is shut down and powered off, prior to step 1.

Perform the following steps to replace the 2145 UPS electronic assembly:

1. Replace the two screws in the front of the 2145 UPS. See **1** in Figure 154.

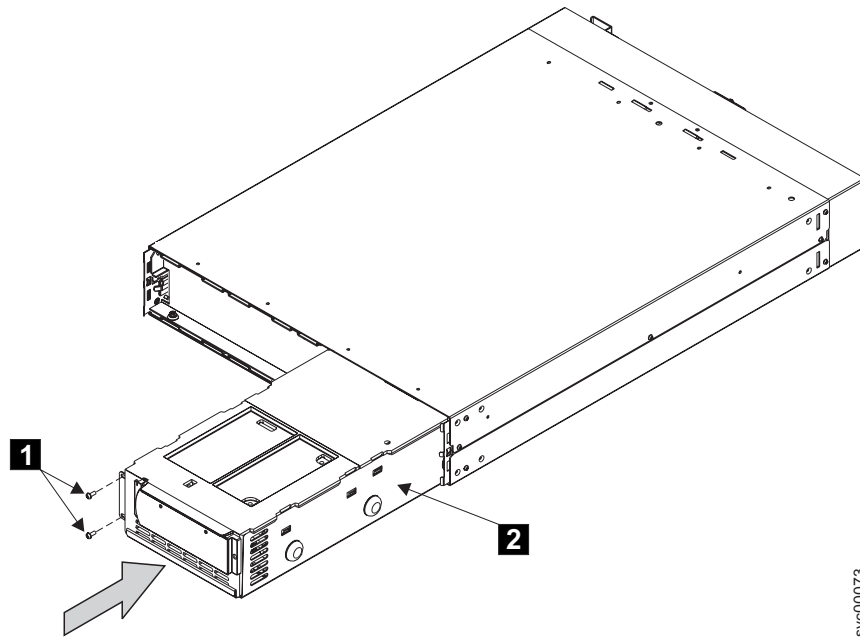
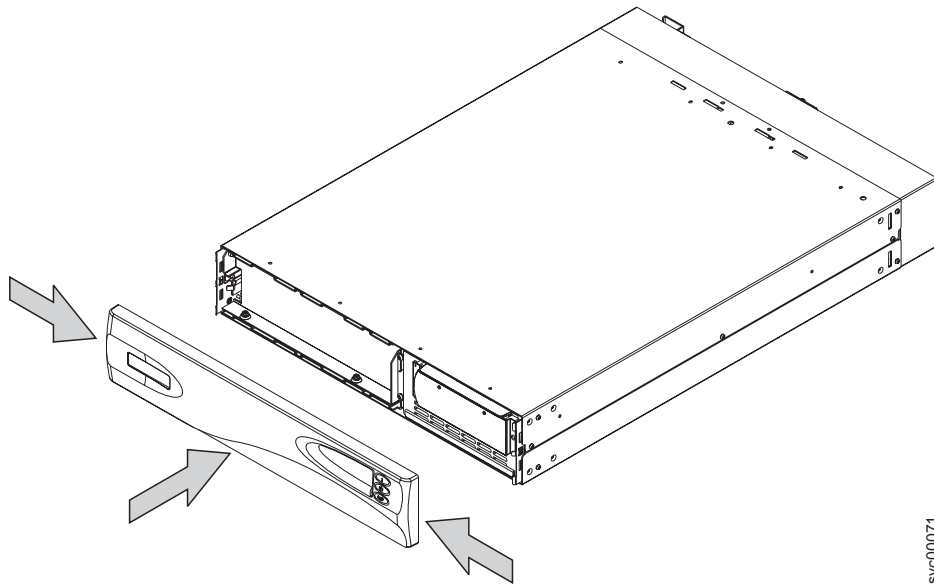


Figure 154. Replacing the electronics unit from the 2145 UPS

2. Replace the front panel by pressing the sides inward and pushing both ends towards the 2145 UPS. See Figure 155 on page 316.



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Figure 155. Replacing the front panel of the 2145 UPS

3. Insert the electronics assembly **2** into the 2145 UPS.
4. At the back of the 2145 UPS, connect the signal cables. See **1** in Figure 156.

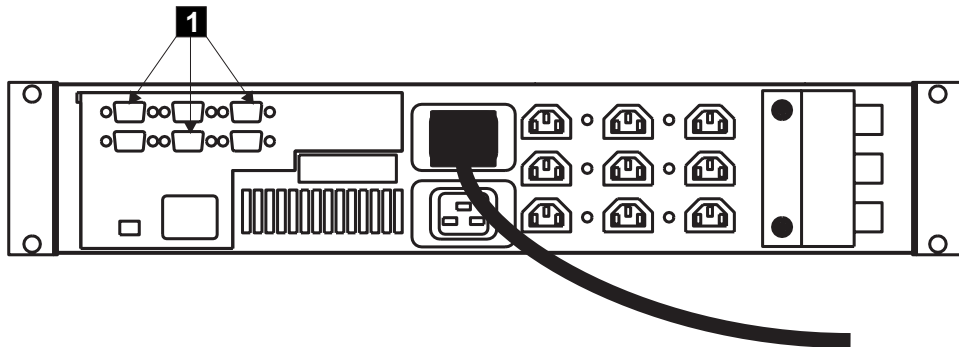


Figure 156. Connecting the 2145 UPS signal cables

5. At the front of the 2145 UPS, 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 2145 UPS. See the related documentation at the end of this topic for information about the 2145 UPS controls and indicators.

Related reference

“Controls and indicators for the 2145 UPS” on page 54

All controls for the 2145 uninterruptible power supply (2145 UPS) are located on the front panel assembly.

Removing the 2145 UPS battery

Follow all safety notices when you are removing the 2145 uninterruptible power supply (2145 UPS) battery.

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:

Check to make sure that any SAN Volume Controller that is powered by this 2145 UPS is shut down and powered off, prior to step 1.

Perform the following steps to remove the 2145 UPS battery assembly:

1. At the front of the 2145 UPS, press and hold the off button for approximately five seconds or until the long beep stops. See the related documentation for the 2145 UPS controls and indicators.
2. Remove the front panel by pressing the sides inward, and pulling on both ends towards you (see Figure 157).

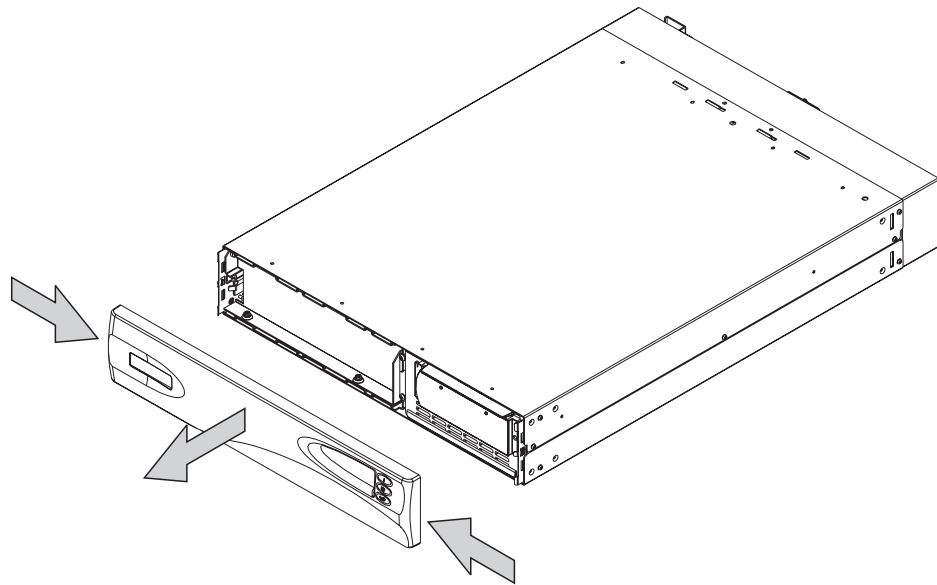


Figure 157. Removing the 2145 UPS front panel

3. Perform the following steps to remove the battery retaining bracket:
 - a. Remove the two bolts **1**. See Figure 158 on page 318.
 - b. Remove the hex nut **2**.
 - c. Remove the battery retaining bracket **3**.

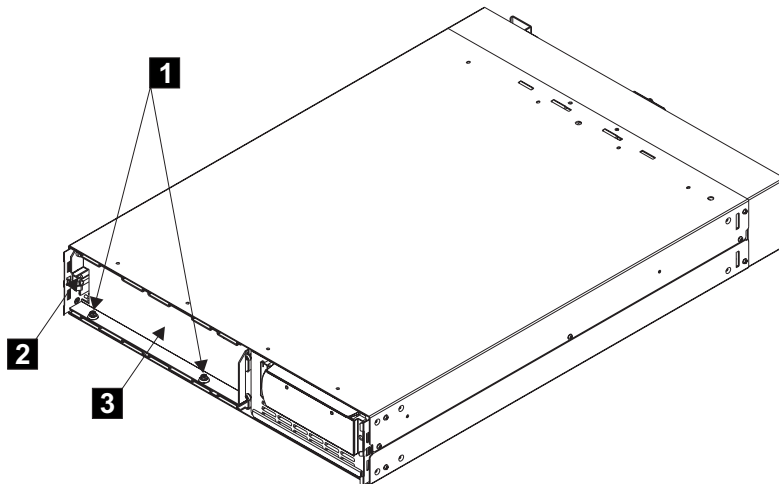


Figure 158. Removing the battery retaining bracket

4. Remove the battery plate, to access to the battery. See Figure 159.

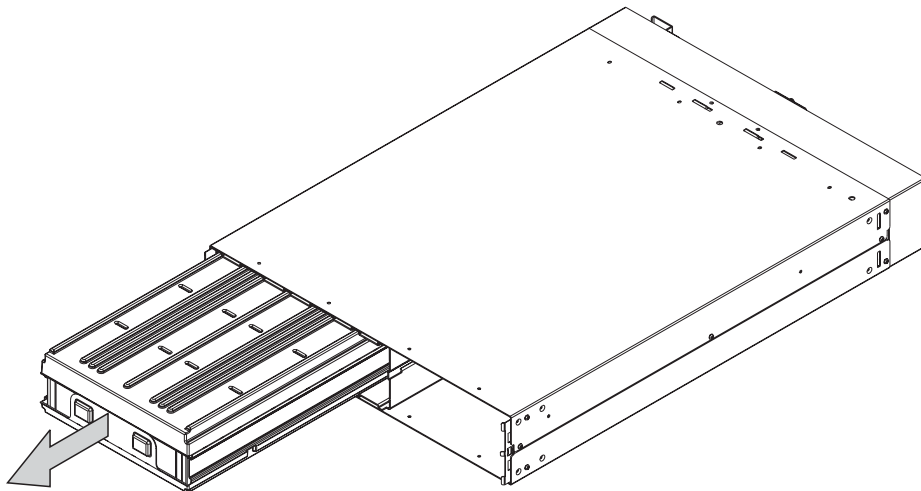


Figure 159. Removing the 2145 UPS battery

5. Grab the tabs on the battery assembly and pull the 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.

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 2145 UPS” on page 303

Before you begin to remove the 2145 uninterruptible power supply (2145 UPS), read all safety notices.

“Removing the 2145 UPS electronics” on page 313

During routine maintenance, you might have to remove the 2145 UPS electronics assembly.

“Replacing the 2145 UPS” on page 306

You can replace the 2145 uninterruptible power supply (2145 UPS) after first removing the current 2145 UPS.

Related reference

“Controls and indicators for the 2145 UPS” on page 54

All controls for the 2145 uninterruptible power supply (2145 UPS) are located on the front panel assembly.

Replacing the 2145 UPS battery

Follow all safety notices when you are replacing the 2145 uninterruptible power supply (2145 UPS) battery.

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:

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 open or damage the battery. You might release electrolytes that are harmful to the skin and eyes. (29)

CAUTION:

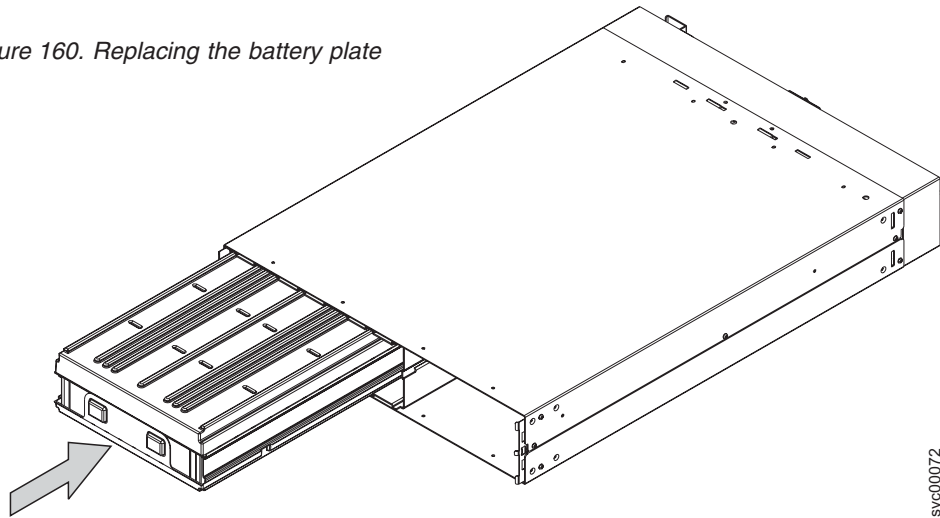
The battery weighs 20.4 kg (45 lb). Do not attempt to lift it by yourself. Ask another service representative for aid. (27)

Perform the following steps to replace the 2145 UPS battery assembly:

1. With the help from another service support representative, grab the tabs on the battery assembly and gently push the battery in to the 2145 UPS.

2. Replace the battery plate. See Figure 160.

Figure 160. Replacing the battery plate



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3. Perform the following steps to replace the battery retaining bracket:
 - a. Replace the battery retaining bracket **3**.
 - b. Replace the hex nut **2**.
 - c. Replace the two bolts **1**. See Figure 160.

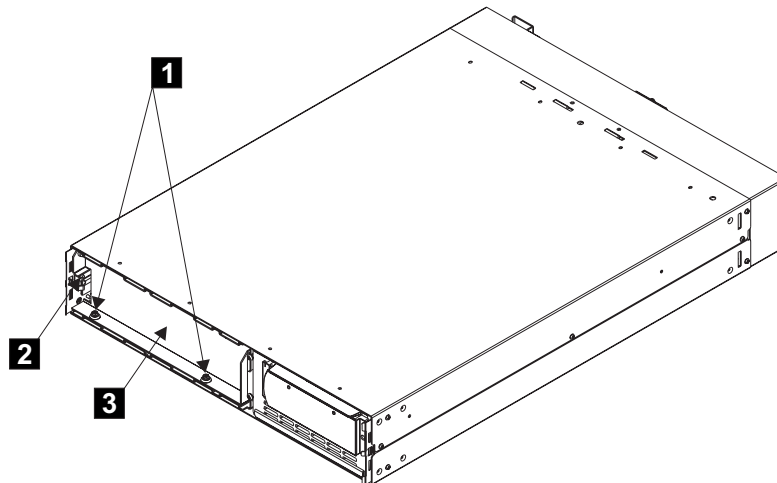
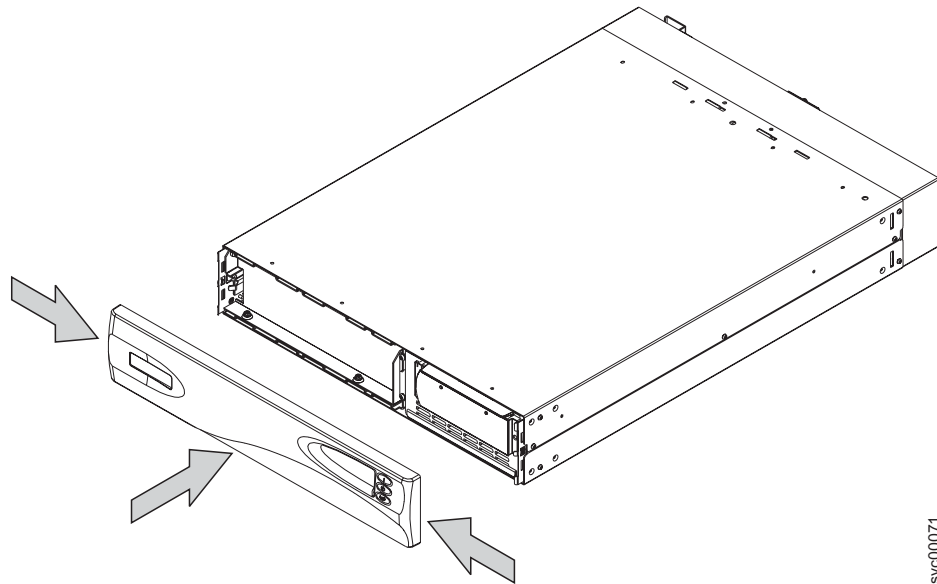


Figure 161. Replacing the 2145 UPS battery retaining bracket

4. Replace the front panel by pressing the sides inward, and pushing on both ends towards the 2145 UPS (see Figure 162 on page 321).



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Figure 162. Replacing the 2145 UPS front panel

5. At the front of the 2145 UPS, 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 2145 UPS. See the related documentation for the 2145 UPS controls and indicators.

Removing the support rails for a 2145 UPS

The support rails for a 2145 uninterruptible power supply (2145 UPS) can be removed by following the steps below:

1. Go to the left-hand support rail.
2. Loosen the two adjustment wing nuts **2** (Figure 163 on page 322).

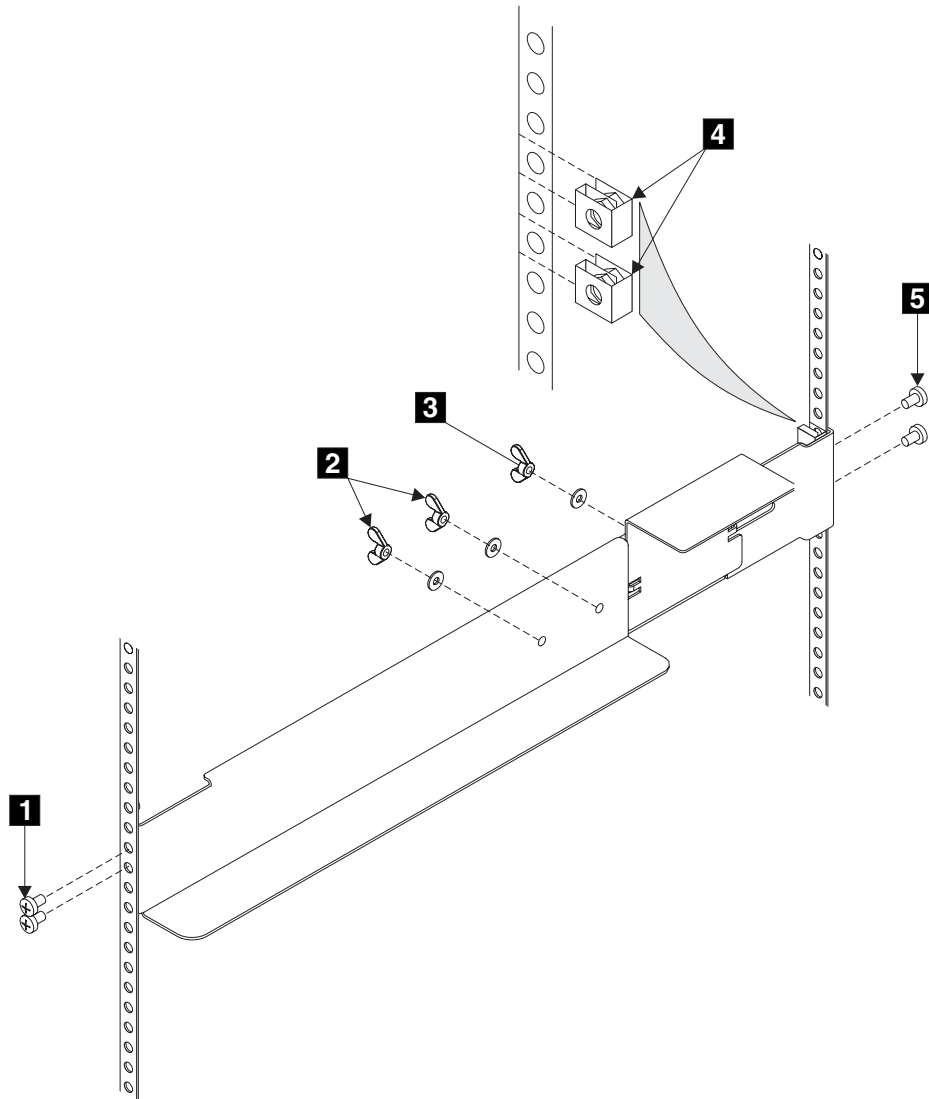


Figure 163. Removing support rails for a 2145 UPS from the rack

3. Remove the back screws **5** .
4. Remove the front screws **1** .
5. Remove the rail from the rack.
6. Remove the two clip nuts **4** .

Related tasks

“Installing the support rails for the 2145 UPS”

You must install the support rails in the rack before installing the 2145 uninterruptible power supply (2145 UPS).

Installing the support rails for the 2145 UPS

You must install the support rails in the rack before installing the 2145 uninterruptible power supply (2145 UPS).

Before installing the support rails, determine where the 2145 UPSs are to be installed in the rack. Complete the following prerequisites before installing the support rails:

- Refer to the user's hardware location table to determine where in the rack the 2145 UPS is to be installed.
- Discard the two handles and their associated nuts that are shipped with the support rails.
- At the back of the rack, observe the Electrical Industries Association (EIA) positions and determine where you are going to install the 2145 UPS. Always install the 2145 UPS into the lowest available position in the rack. The only device that can be below a 2145 UPS is another UPS. The bottom of the flange of the support rail must align with the EIA mark on the rack.

| **Note:** The user can already have installed in the rack a 2145 UPS with available
| spare capacity. Therefore, the SAN Volume Controller 2145-4F2 might be
| delivered without a 2145 UPS.

Perform the following steps for each rail:

1. Attach nut clips **4** to the rack (see Figure 164 on page 324). These nut clips must align with the second and fourth holes of the support rail flange.

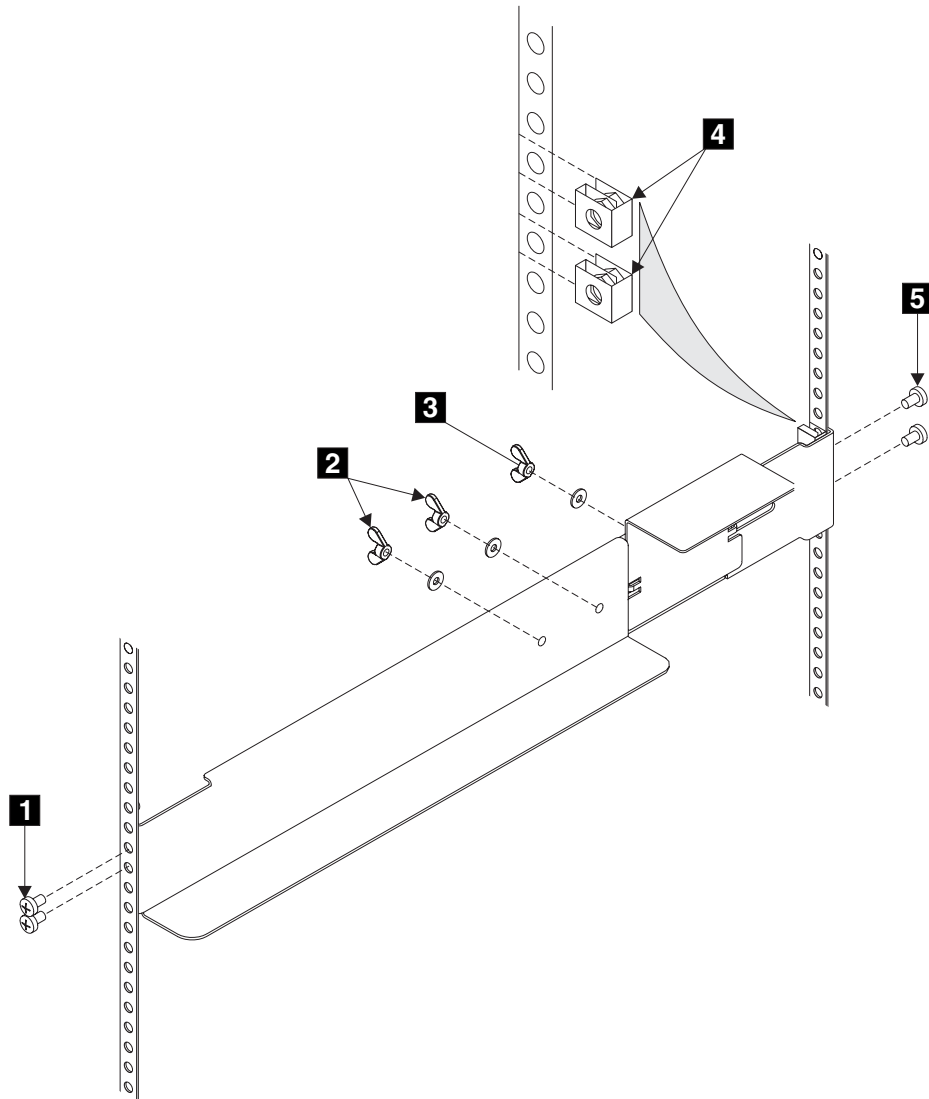


Figure 164. Installing support rails for a 2145 UPS into the rack

2. Loosen the two wing nuts **2** .
3. Loosen the wing nut **3** and slide the bracket toward the back of the rail.
4. Remain at the back of the rack holding the support rail in position in the rack, and then install and fully tighten the two mounting screws **5** .
5. Go to the front of the rack.
6. Extend the support rail toward the front of the rack.

Note: Hold the support rail in position until you have completed step 8.

7. Ensure that the support rail is horizontal (a level might be useful here).
8. Install the two mounting screws **1** into the third and fourth holes of the support rail flange. Fully tighten the screws.
9. Fully tighten the two wing nuts **2** .
10. 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.

11. Fully tighten the wing nut **3** .

Note: You must perform all of the above steps for each rail.

Related tasks

“Removing the support rails for a 2145 UPS” on page 321

The support rails for a 2145 uninterruptible power supply (2145 UPS) can be removed by following the steps below:

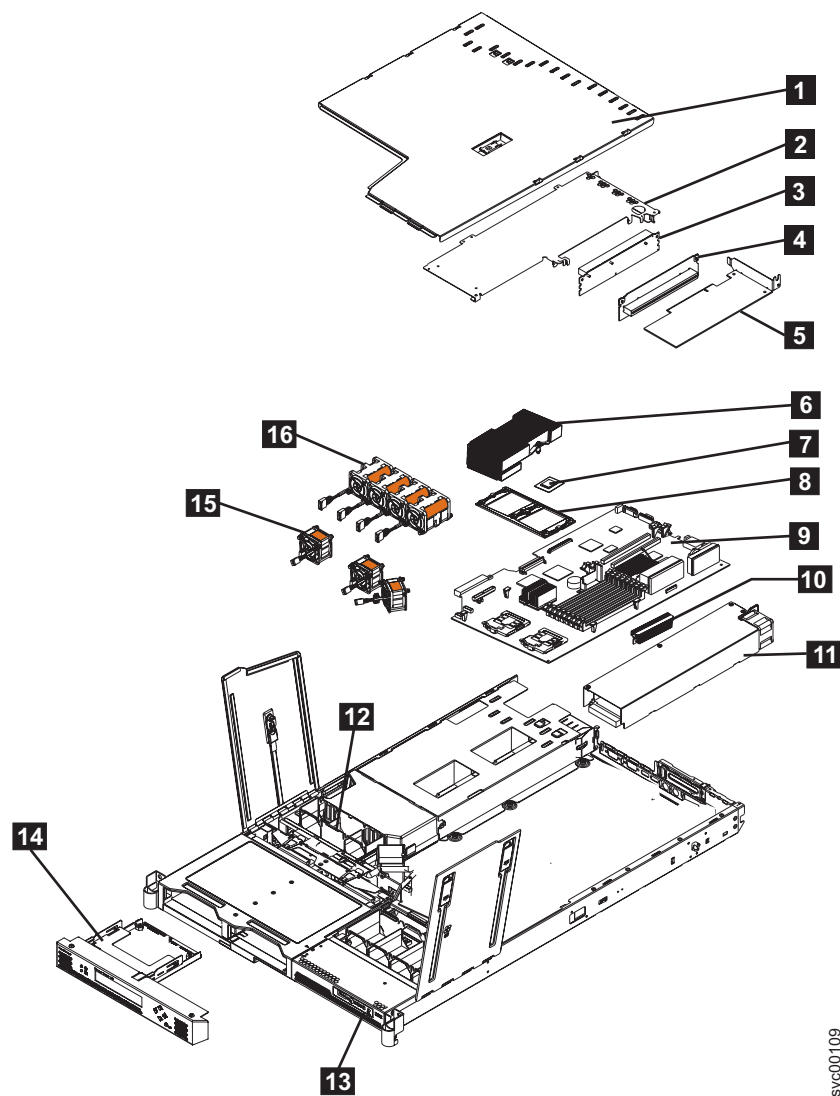
Appendix A. Parts catalog

Part numbers are available for the different parts and field replaceable units (FRUs) of the SAN Volume Controller and the uninterruptible power supply.

Assembly 1: SAN Volume Controller 2145-8F2

Information about the parts of the SAN Volume Controller 2145-8F2 are displayed below.

The following graphic displays the different parts that make up the SAN Volume Controller 2145-8F2.



The following table describes the different part numbers in reference to the above graphic. The frame assembly (Table 20 on page 328) comprises all of the parts except the service controller and fibre-channel cards. These parts are listed in Table 21 on page 328.

Table 20. Assembly 1: SAN Volume Controller 2145-8F2 frame assembly

Assembly index	Part number	Units	Description
1–	64P7934	1	Frame assembly
-1	23K4219	1	Top cover
-	64P8332	1	80GB SATA HDD
-3	23K4211	1	Riser card, PCI (full height)
-4	90P1957	1	Riser card, PCI (low profile)
-6	90P5281	2	Heat sink
-7	13M8293	2	Microprocessor, 3.0 GHz Irwindale
-8	90P5282	1	Heat sink retention module
-	90P5284	1	Chassis
-	23K4209	1	Cage assembly
-9	32R1730	1	System board
-10	24R2698	2	VRM, 1U/75A
-11	24R2640	1	Power supply assembly
-	23K4515	1	Power backplane
-	33F8354	1	Battery, 3.0V
-	33P2352	1	Cable, fan power
-	25R4052	1	Cable, signal, front panel
-12	23K4992	1	Fan holder with fan backplanes
-13	23K4490	1	Operator information panel
-15	23K4217	3	Fan, 40×40×28
-16	33P2335	4	Fan, 40×40×56
-	73P2870	8	Memory, 1 GB ECC DRR2

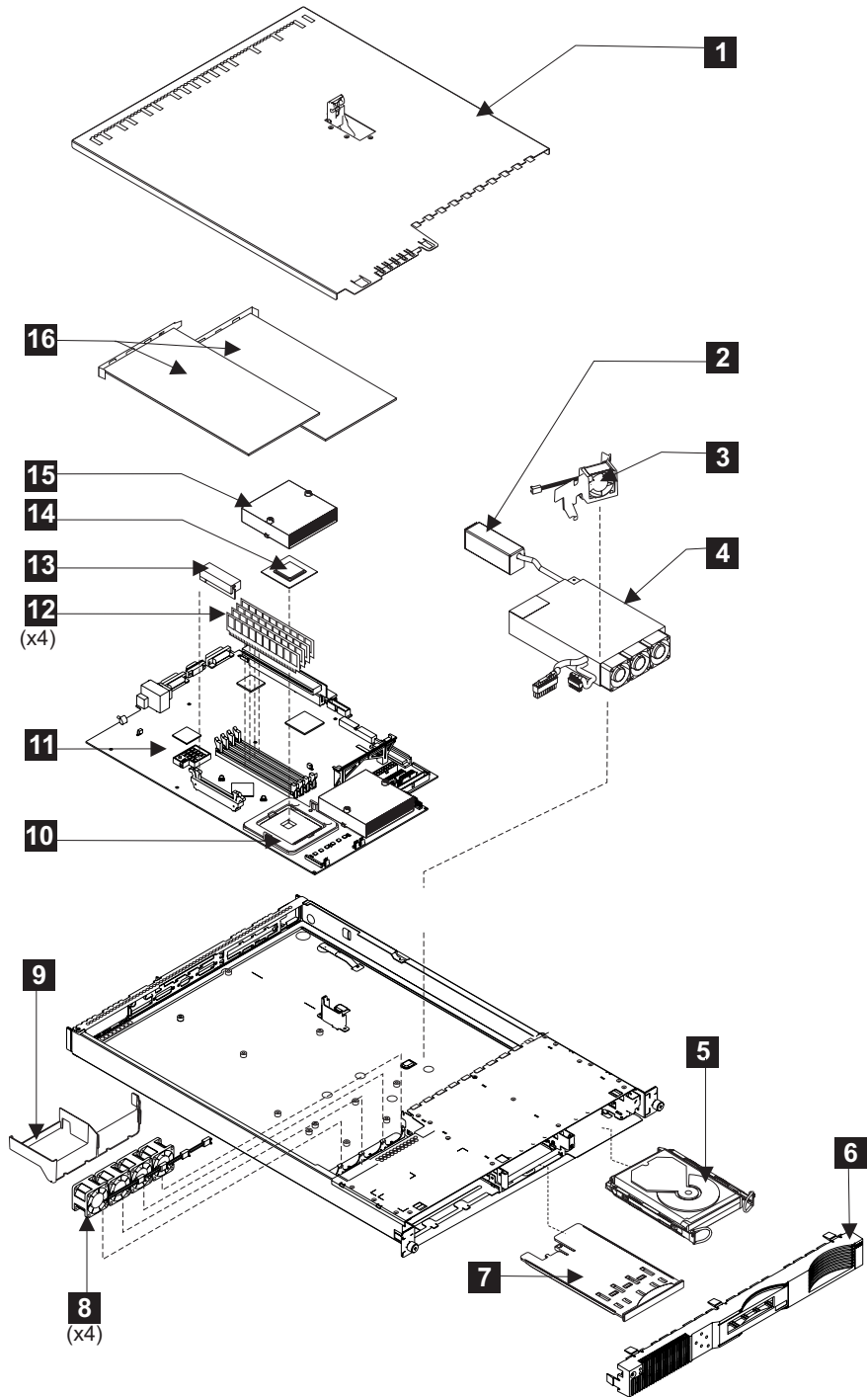
Table 21. Items not included in the frame assembly

Assembly index	Part number	Units	Description
-2	64P7763	1	Fibre-channel HBA (full height)
-5	64P7813	1	Fibre-channel HBA (low profile)
-14	64P7874	1	Service controller
-	64P7940	1	Input power cable assembly, (SAN Volume Controller 2145-8F2 to 2145 UPS-1U)
-	23K4218	1	Kit, toolless rail

Assembly 2: SAN Volume Controller 2145-4F2

Information about the parts of the SAN Volume Controller 2145-4F2 are displayed below.

The following graphic displays the different parts that make up the SAN Volume Controller 2145-8F2.



The following table describes the different part numbers in reference to the above graphic.

Table 22. Assembly 2: SAN Volume Controller 2145-4F2

Assembly index	Part number	Units	Description
2-	64P7793	1	Frame assembly
-1	24P0708	1	Top cover
-9	24P0742	1	Baffle

Table 22. Assembly 2: SAN Volume Controller 2145-4F2 (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)

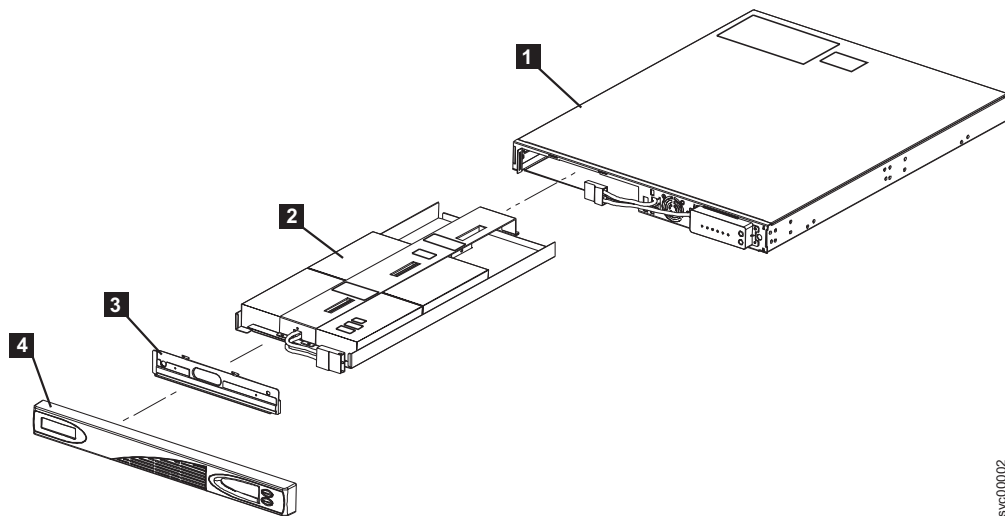
* If you need to order a system board assembly kit, first check the system board part number in the vital product data for the failed node. Perform the following steps to find the system board part number:

1. Start the SAN Volume Controller 2145-4F2.
2. Display the vital product data for the failed node. See the topic for viewing the vital product data.
3. Note the system board part number. If the part number is 64P7826, order "System Board Assembly kit part number 64P7826." If this part number is not available, part number 64P7994 may be used as a substitute. If you order part number 64P7994, order the "System Board Assembly kit part number 64P7994."

Assembly 3: 2145 UPS-1U

The 2145 uninterruptible power supply-1U (2145 UPS-1U) is constructed from four separate parts.

The following graphic shows the parts that make up the 2145 UPS-1U.



svc00002

Table 23 describes the different part numbers in reference to the previous graphic.

Table 23. Assembly 3: 2145 UPS-1U

Assembly index	Part number	Units	Description
3-	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
-	27H0687	1	Support rail kit, contains rails, nut clips, and screws

Table 23. Assembly 3: 2145 UPS-1U (continued)

Assembly index	Part number	Units	Description
-	27H0688	1	Input power cable, power distribution unit to uninterruptible power supply.
-	7842123	1	Main power cable for the United States.

Country or region power cables for the 2145 UPS-1U

The following list provides information about your country or region's requirements for the 2145 uninterruptible power supply-1U (2145 UPS-1U) 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

Country or region	Length (unshielded, rated 250 V/6 A)	Attached Plug Connection Type (designed for 200-240V ac input)	Part
Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa	2.8 m (9 ft)	AS/NZS C112	13F9940
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 4: 2145 UPS

The 2145 uninterruptible power supply (2145 UPS) is constructed from four separate parts.

The following graphic displays the different parts that make up the 2145 UPS.

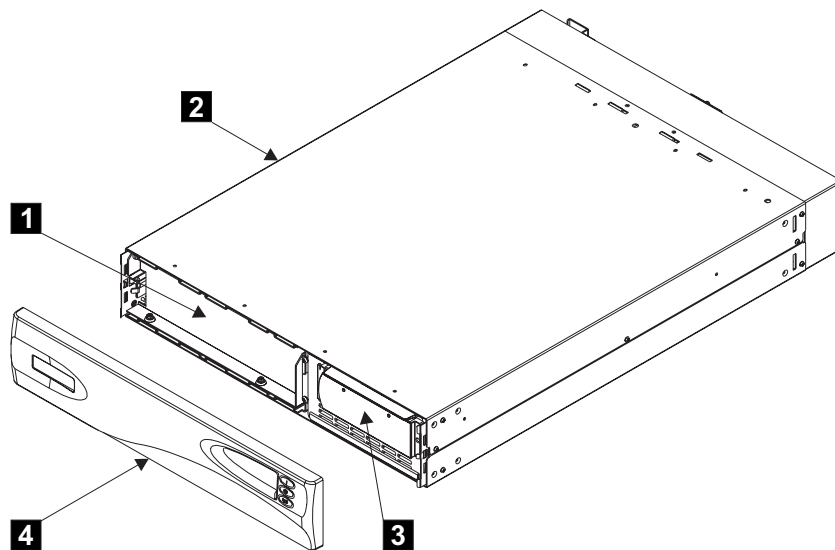


Table 24 describes the different part numbers in reference to the previous graphic.

Table 24. Assembly 4: 2145 UPS

Assembly index	Part number	Units	Description
4-	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 2145 UPS

The following list provides information about your country or region's requirements for the 2145 uninterruptible power supply (2145 UPS) 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 Indies), 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, Hungary, 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, Malaysia, 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 (CIM) 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. Issue 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. Issue 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 graphical user interface (GUI) application impact the performance of the GUI. Logging must be disabled where performance is a concern.

Common information model 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 is found in the CIMbasedirectory in the providerTrace.log file. Historic trace data is 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 impacts the performance of the GUI. Logging must be disabled where performance is a concern.

Appendix C. Fitting the service controller ATA cable

You must position the ATA (Advanced Technology Attachment) cable correctly when you fit it in the SAN Volume Controller to avoid damaging the cable.

The ATA cable connects the service controller to the SAN Volume Controller system board. If you place the ATA cable incorrectly when installing, the disk drive fan rests against the ATA cable and, subsequently, damages the cable (see Figure 165).

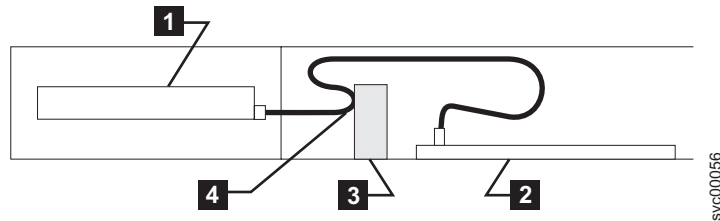


Figure 165. Incorrect placement of the ATA cable in the SAN Volume Controller

- 1 Service controller
- 2 System board
- 3 Disk fan
- 4 ATA cable pushed into disk fan

To avoid damaging the ATA cable, ensure that it is routed in a loop under the service controller (see Figure 166). This allows the excess cable to be positioned correctly when the service controller is pushed into position.

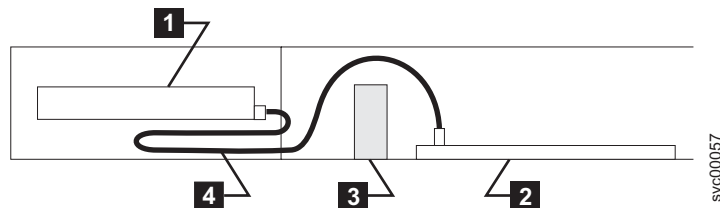


Figure 166. Proper placement of the ATA cable in the SAN Volume Controller

- 1 Service controller
- 2 System board
- 3 Disk fan
- 4 ATA cable correctly positioned

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 at the following Web site:

<http://www.ibm.com/servers/storage/support/virtual/2145.html>

Related reference

“SAN Volume Controller library and related publications” on page xx

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

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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:

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

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 run from within the SAN Volume Controller application and 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.

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