IBM TotalStorage SAN Volume Controller

IBM

Installation Guide

Version 3.1.0

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About this guide

This guide provides an overview of the IBM® TotalStorage® SAN Volume Controller and detailed installation instructions.

Who should use this guide?

The intended audience for this guide is the IBM service representative.

This guide should be read by the IBM service representative who is responsible for the initial installation of the SAN Volume Controller, the uninterruptible power supply, and the master console at a customer site.

Summary of changes

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

Summary of changes for SC26-7541-05 SAN Volume Controller Installation Guide

The Summary of Changes provides a list of new, modified, and changed information since the last version of the guide.

New information

This topic describes the changes to this guide since the previous edition, SC26-7541-04. The following sections summarize the changes that have since been implemented from the previous version.

This version includes the following new information:
- New topics:
  - SAN Volume Controller master console
  - Service controller LED
  - Operator information panel
  - Release latch
  - System-error LED
  - Information LED
  - Hard disk drive activity LED

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.

- Information regarding the installation of the SAN Volume Controller master console was added to the following topic: *Installing the uninterruptible power supply, the master console, and the SAN Volume Controller*.
- 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

Summary of changes for SC26-7541-04 SAN Volume Controller Installation Guide

The Summary of Changes provides a list of new, modified, and changed information since the last version of the guide.

New information

This topic describes the changes to this guide since the previous edition, SC26-7541-03. The following sections summarize the changes that have since been implemented from the previous version.

This version includes the following new information:

- The SAN Volume Controller can be used with an uninterruptible power supply (UPS) 5115. 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:
    - Controls and indicators for the uninterruptible power supply 5115
    - Power on indicator
    - On/off button
    - Overload indicator

- On battery indicator
- Service indicator
- Load segment 1 indicator
- Load segment 2 indicator
- Installing the uninterruptible power supply 5115 in the rack
- Hardware for the uninterruptible power supply 5115
- Connecting the SAN Volume Controller to the uninterruptible power supply 5115
- Power cables for the uninterruptible power supply 5115
- Power cables for the uninterruptible power supply 5125

Changed information

This section lists the updates that were made in this document.
- Support for 4-node configurations has been updated to support 8-node.
- Updated the number of uninterruptible power supplies to support up to 8 nodes.
- Updated Preparing your uninterruptible power supply environment to support UPS 5115
- Provided a list of other IBM publications related to the SAN Volume Controller

Deleted information

Documentation for the Master Console has been removed. You can find information for the Master Console in *IBM TotalStorage Master Console Installation and User's Guide*.

The following topics were deleted for the Master Console:
- Master console
- Master console components
- Preparing your master console environment
- Installing 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.
Italics	Text in *italics* 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
IBM TotalStorage SAN Volume Controller: CIM agent Developer's Reference	This reference guide describes the objects and classes in a Common Information Model (CIM) environment.	SC26-7590
IBM TotalStorage SAN Volume Controller: Command-Line Interface User's Guide	This guide describes the commands that you can use from the SAN Volume Controller command-line interface (CLI).	SC26-7544
IBM TotalStorage SAN Volume Controller: Configuration Guide	This guide provides guidelines for configuring your SAN Volume Controller.	SC26-7543
IBM TotalStorage SAN Volume Controller: Host Attachment Guide	This guide provides guidelines for attaching the SAN Volume Controller to your host system.	SC26-7575
IBM TotalStorage SAN Volume Controller: Installation Guide	This guide includes the instructions the service representative uses to install the SAN Volume Controller.	SC26-7541
IBM TotalStorage SAN Volume Controller: Planning Guide	This guide introduces the SAN Volume Controller and lists the features you can order. It also provides guidelines for planning the installation and configuration of the SAN Volume Controller.	GA22-1052
IBM TotalStorage SAN Volume Controller: Service Guide	This guide includes the instructions the service representative uses to service the SAN Volume Controller.	SC26-7542

Title	Description	Order number
IBM TotalStorage SAN Volume Controller: Translated Safety Notices	This guide contains the danger and caution notices for the SAN Volume Controller. The notices are shown in English and in numerous other languages.	SC26-7577
IBM TotalStorage Master Console Installation and User's Guide	This guide includes the instructions on how to install and use the SAN Volume Controller Console	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
IBM TotalStorage Multipath Subsystem Device Driver: User's Guide	This guide describes the IBM TotalStorage Multipath Subsystem Device Driver Version 1.5 for TotalStorage Products and how to use it with the SAN Volume Controller. This publication is referred to as the *IBM TotalStorage Multipath Subsystem Device Driver: User's Guide*.	SC26-7608

Related 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 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)**

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
1. Turn everything off.	1. Turn everything off.
2. Attach all cables to devices.	2. Remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device on.	

(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)**

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)

svc00146

(27)

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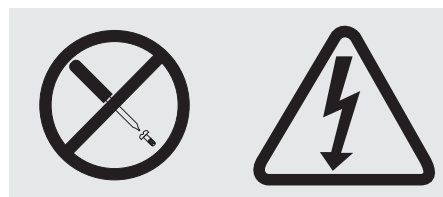
Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician. (23)

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) |

(27)

CAUTION:
Do not place any object weighing more than 82 kg (180 lbs.) on top of rack-mounted devices.
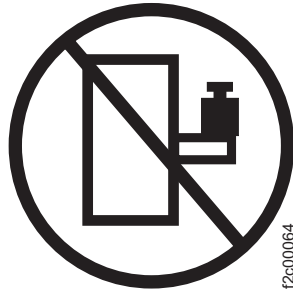
f2c00064

(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)**

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.

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 xxiv.

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 xxiii through step 5 on page xxiii 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 xxv 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.
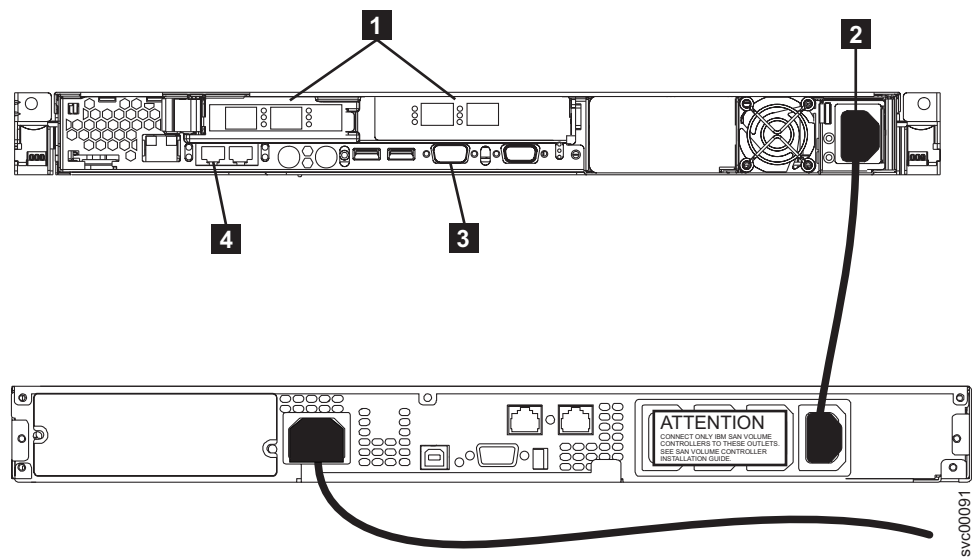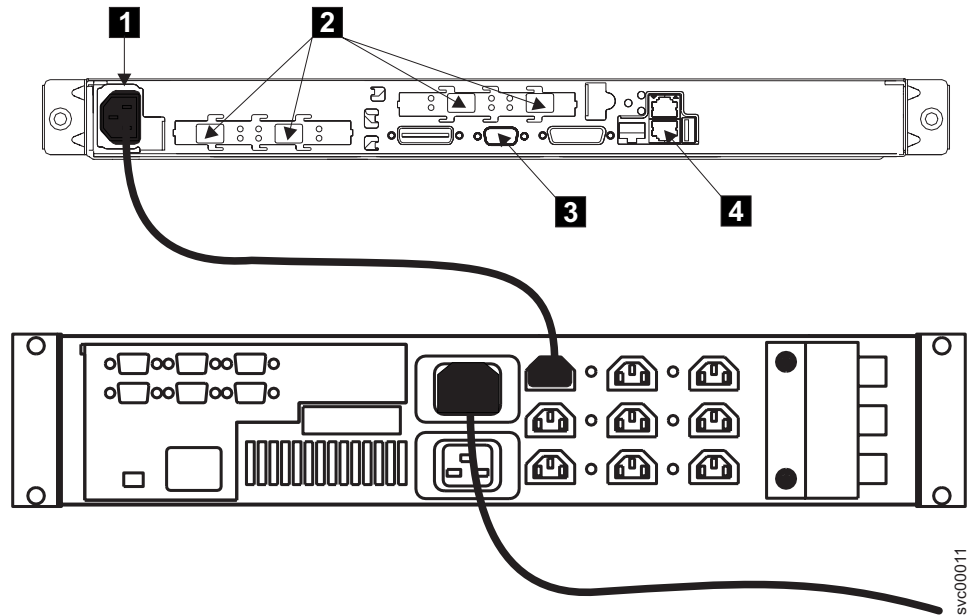
Figure 3. Power cable and signal sockets for the SAN Volume Controller 2145-4F2 and 2145 UPS

> **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.

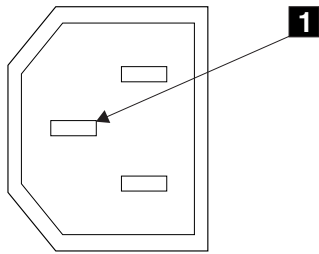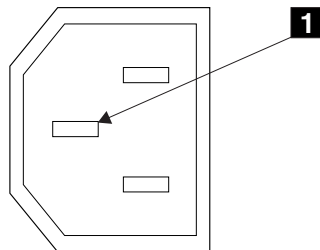*Figure 4. Ground pin*

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 xxiv through step 5 on page xxv 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.

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**
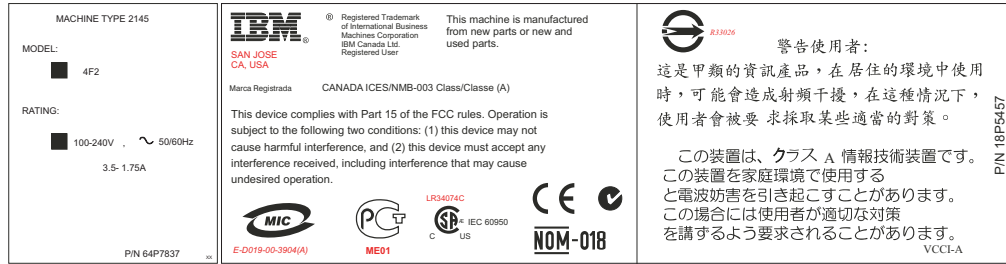
- **Agency/ratings label for the SAN Volume Controller 2145-8F2**

- **No user access label**

- **Class 1 laser label**

	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.
Class 1 Laser	
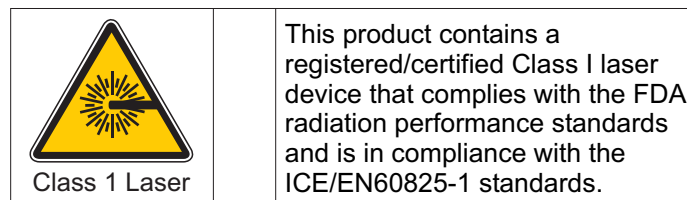
2. Before you continue, ensure that you understand each of these labels.

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**

```
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
```

c (UL) US
LISTED
UPS
SC30
E12662

CE

N869

TÜV Rheinland Product Safety GS geprüfte Sicherheit

svc00047

• **IT compatible label**

```
IT
COMPATIBLE
```

• **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.

Pb

Checking the 2145 UPS labels

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

• **Agency label**

```
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
Made in Mexico - TWWYY [4.11]
```

cULus
LISTED
UPS
33C0
E82662

NOM
NYCE

CE

PCT

GS

svc00149

• **Rear panel configuration label**

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

COM		INPUT INLET	LOAD GROUP 1 10A MAX	LOAD GROUP 2 10A MAX	LOAD GROUP 3 10A MAX	BREAKER 1	
1 2 3		LOAD GROUP 1 16A MAX				BREAKER 2	
						BREAKER 3	

⚠1 SURGE SUPPRESSOR GROUND SCREW: Remove to comply with national deviations: UK DE SE.

⚠2 REPO CONNECTOR: A Use Class 2 Input Only Utilisez Uniquement Une Alimentation De Classe 2

⚠3 EXTENDED BATTERY CONNECTOR: DO NOT DISCONNECT UNDER LOAD. NE PAS DEBRANCER SOUS CHARGE.

Assembled in Mexico

This product is covered by one or more of the following U.S. Pat. Nos. 5177676, 6314007, 6330176, 6391489 & 6483730

• **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**
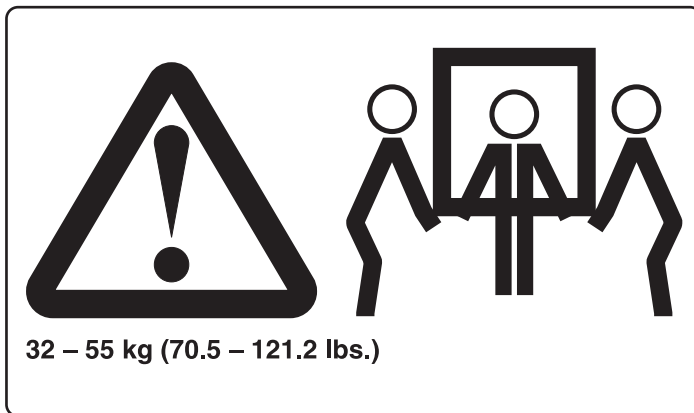
32 – 55 kg (70.5 – 121.2 lbs.)

- **Weight label**

39 kg
86 lbs

- **IT compatible label**

IT
COMPATIBLE

- **Power ratings and no user access label**
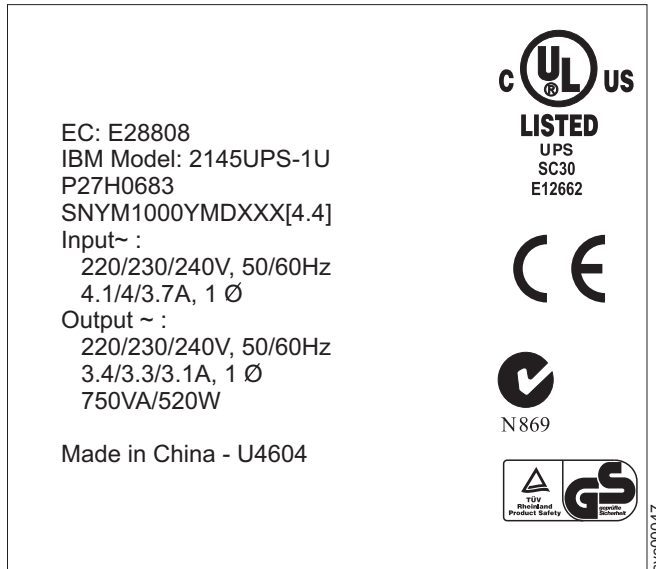
Rating ⎓ :120V, 30A
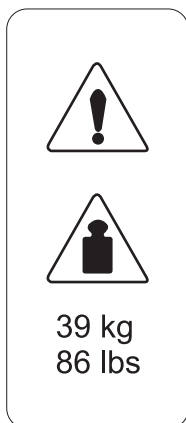
Checking the labels on the battery of the UPS

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.
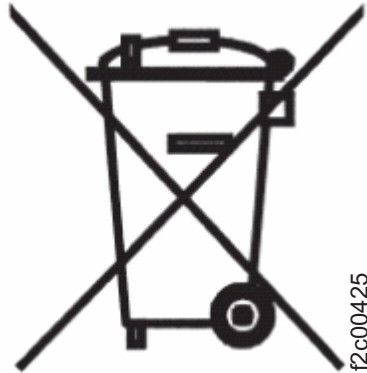
- **Recycling label**

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**
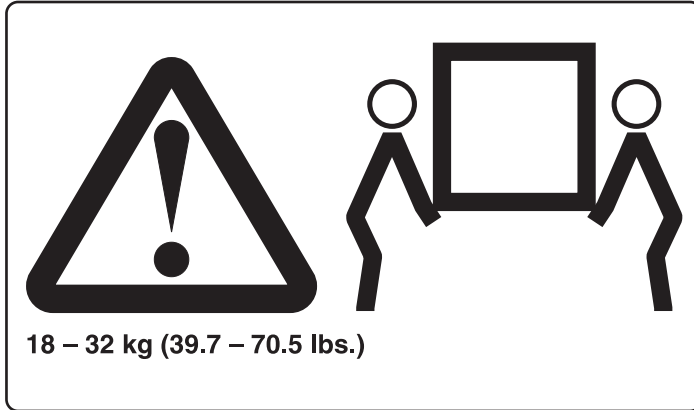
18 – 32 kg (39.7 – 70.5 lbs.)

- **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.
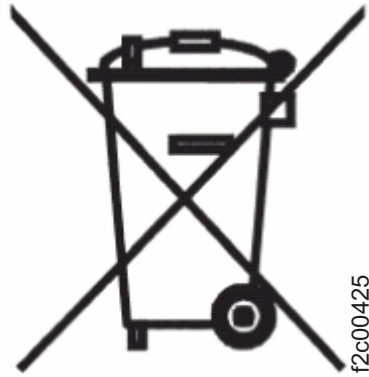
- **Recycling label**

- **Weight label**

21 kg
45 lbs

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

Rating === :120V, 30A
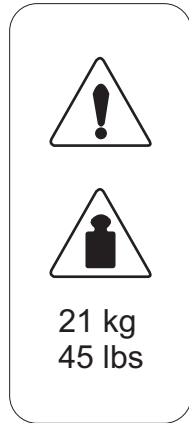
- **Battery faceplate label**

  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

f2c00425
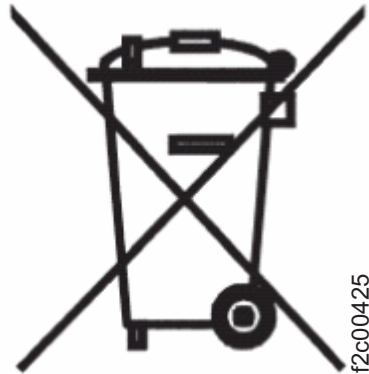
Note:

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)

廢電池請回收

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.
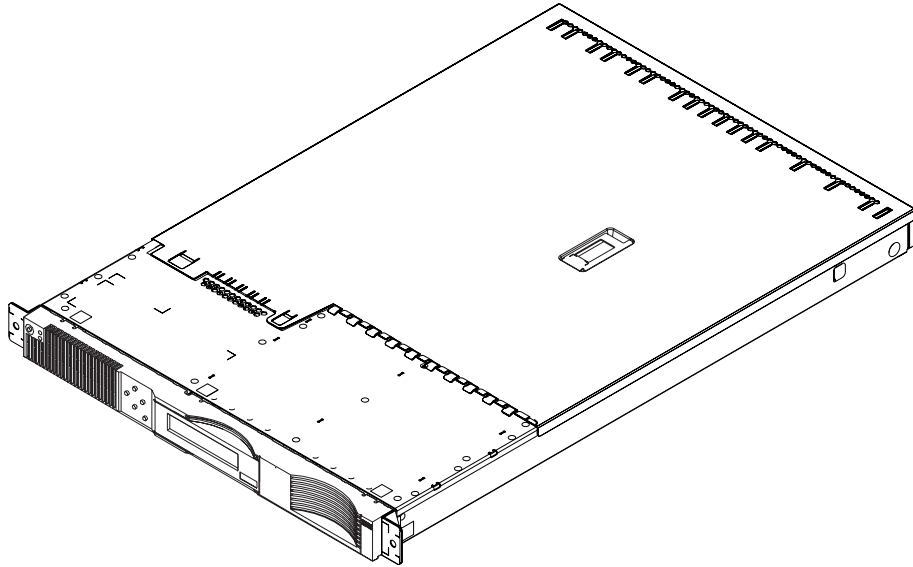
Figure 5. A SAN Volume Controller 2145-4F2 node
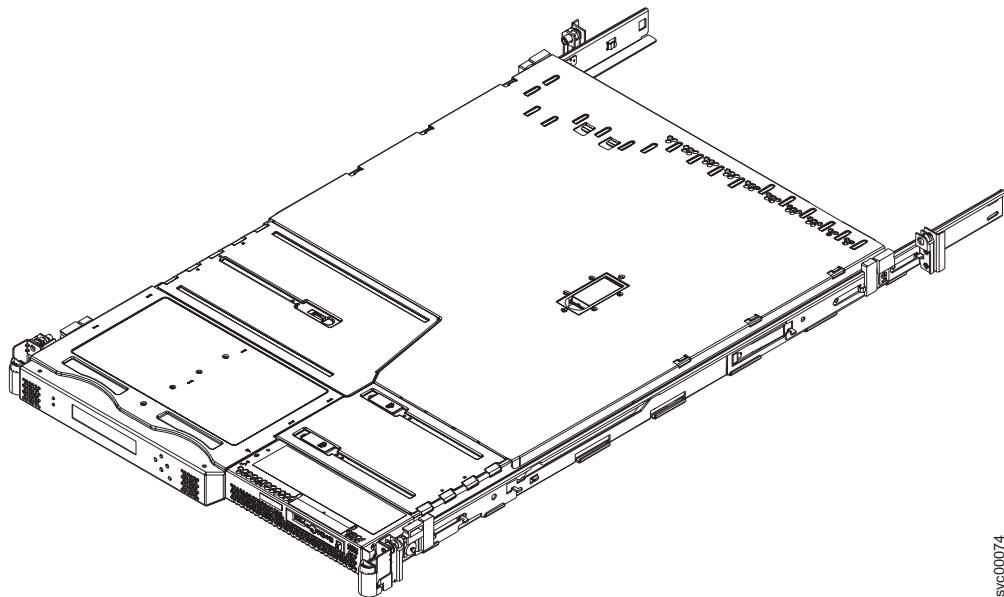
Figure 6. A SAN Volume Controller 2145-8F2 node

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:

- *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

"SAN Volume Controller operating environment" on page 5
You must set up your SAN Volume Controller operating environment using the supported multipathing software and hosts.

"Controls and indicators for the SAN Volume Controller 2145-8F2" on page 6
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 11
The controls and indicators for the SAN Volume Controller 2145-8F2 are contained on the front and back panel assembly.

"Controls and indicators for the SAN Volume Controller 2145-4F2" on page 12
All controls and indicators are located on the front panel of the SAN Volume Controller 2145-4F2.

"SAN Volume Controller 2145-8F2 hardware" on page 15
You need to be aware of the SAN Volume Controller 2145-8F2 hardware.

"SAN Volume Controller 2145-8F2 connectors" on page 17
The external connectors for the SAN Volume Controller 2145-8F2 can be easily located.

"Preparing your SAN Volume Controller 2145-8F2 environment" on page 18
Before installing the SAN Volume Controller 2145-8F2, you must prepare the physical environment.

Related information

"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.

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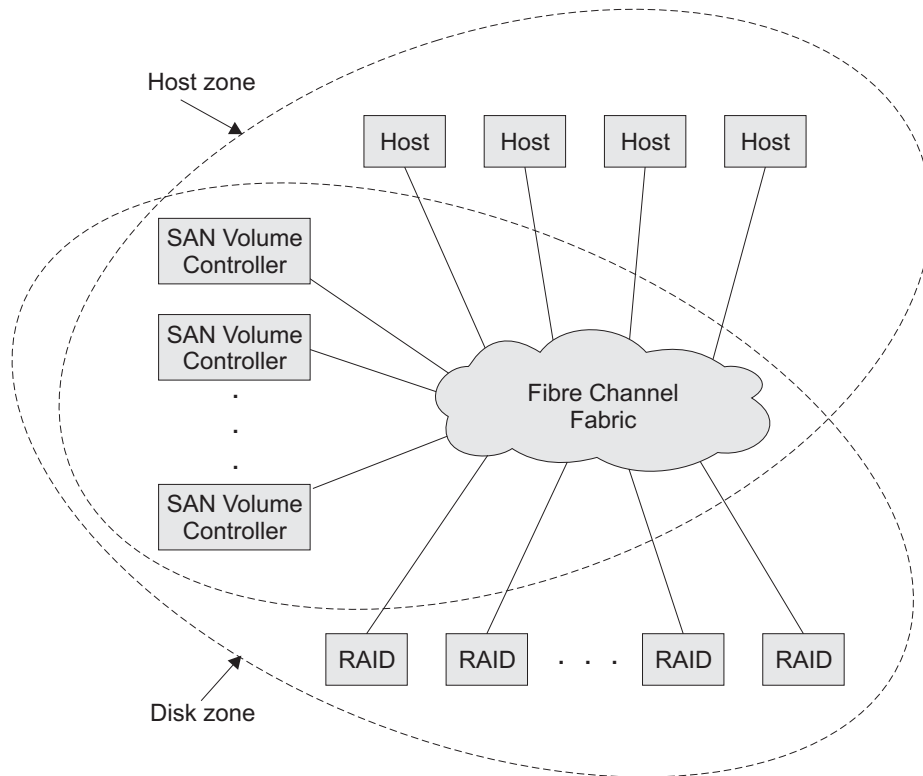
Figure 7. Example of a SAN Volume Controller in a fabric

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.

SAN Volume Controller operating environment

You must set up your SAN Volume Controller operating environment using the supported multipathing software and hosts.

Minimum requirements

You must set up your SAN Volume Controller operating environment according to the following information:
- Minimum of one pair of SAN Volume Controller nodes
- Minimum of two uninterruptible power supplies
- One master console per SAN installation for configuration

> **Note:** Depending on how you ordered your SAN Volume Controller, the master console can be preconfigured on your platform or delivered as a software-only package.

Features of a SAN Volume Controller 2145-4F2 node

The following features are available with the SAN Volume Controller 2145-4F2 node:
- 19-inch rack mounted enclosure
- 4 fibre-channel ports
- 2 fibre-channel adapters
- 4 GB cache memory

Features of a SAN Volume Controller 2145-8F2 node

The following features are available with the SAN Volume Controller 2145-8F2 node:
- 19-inch rack mounted enclosure
- 4 fibre-channel ports
- 2 fibre-channel adapters
- 8 GB cache memory

Supported hosts

See the following Web site for a list of the supported operating systems:

http://www.ibm.com/servers/storage/software/virtualization/svc

Multipathing software

See the following Web site for the latest support and coexistence information:

http://www.ibm.com/servers/storage/software/virtualization/svc

User interfaces

The SAN Volume Controller provides the following user interfaces:

- The SAN Volume Controller Console, a Web-accessible graphical user interface (GUI) that supports flexible and rapid access to storage management information
- A command-line interface that uses Secure Shell (SSH)

Application programming interfaces

The SAN Volume Controller provides an application programming interface called the Common Information Model (CIM) agent, which supports the Storage Management Initiative Specification (SMI-S) of the Storage Network Industry Association.

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.
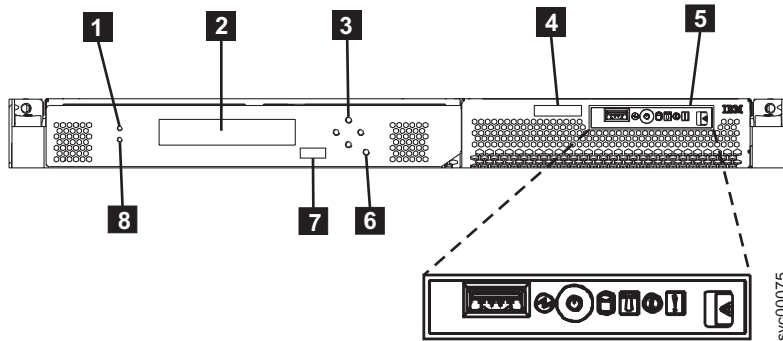
1 Error LED

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

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

You can use the navigation buttons to move through menus.

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

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

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.
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.
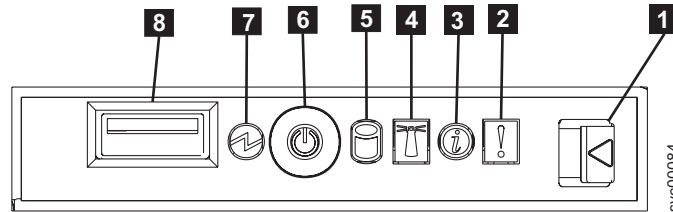
Figure 8. Operator information panel

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 reference

"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.

"System-error LED" on page 10
When an error is detected by the system board, the system-error LED is illuminated.

"Information-Error LED" on page 10
When the information-error LED is lit, a non-critical event has occurred.

"Hard disk drive activity LED" on page 10
This green LED, when lit, indicates when the hard disk drives is in use.

"Power control button" on page 10
The power control button switches on or switches off the main power to the SAN Volume Controller 2145-8F2.

"Power LED" on page 10
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.

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).

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.

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.
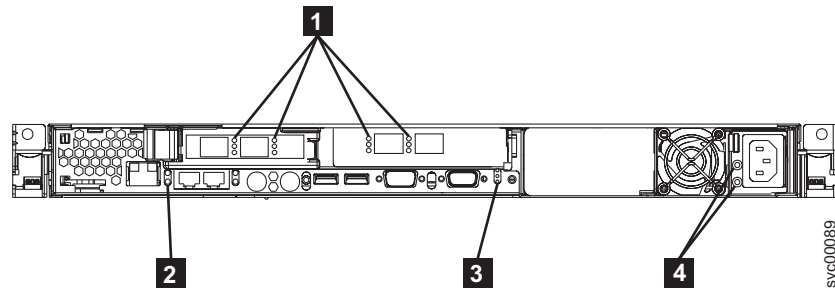
1 Fibre-channel LEDs

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" on page 12
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.
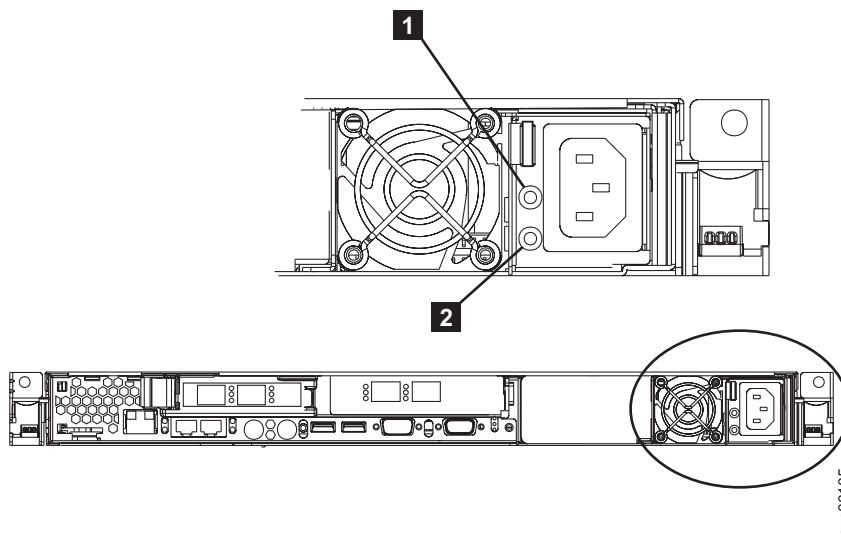
Figure 9. AC and DC LEDs

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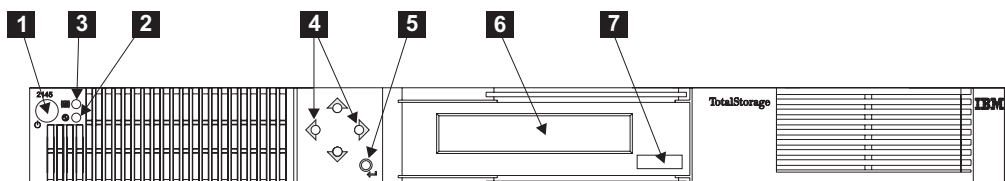
1	Power button
2	Power LED
3	Check LED
4	Navigation buttons
5	Select button
6	Front panel display
7	Node identification label

Related reference

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

"Power LED" on page 10
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 7
You can use the navigation buttons to move through menus.

"Select button" on page 8
You can use the select button to select an item from a menu.

"Front panel display" on page 7
The front panel display shows service, configuration, and navigation information.

"Node identification label" on page 8
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.
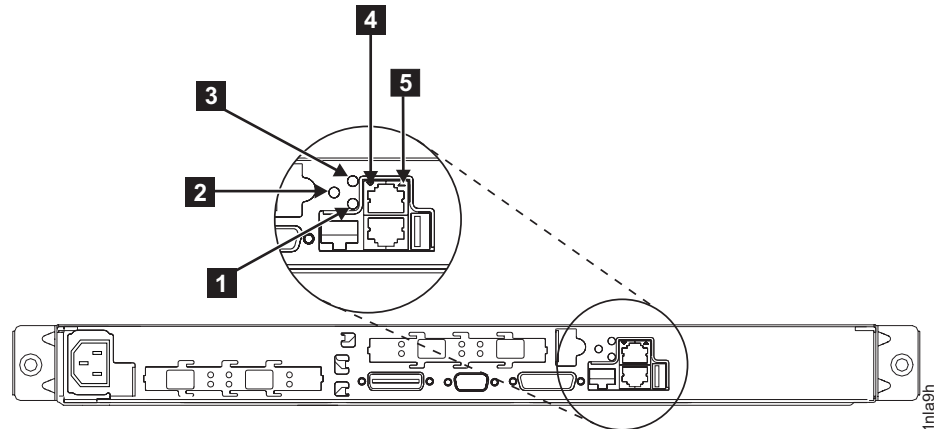
1 System board power LED

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

"Lower Ethernet connection LED" on page 15
The lower Ethernet connection LED indicates the operational status of Ethernet port 1. This LED is illuminated when a good Ethernet connection exists between the SAN Volume Controller and the Ethernet network.

"Upper Ethernet connection LED" on page 15
The upper Ethernet connection LED indicates the operational status of Ethernet port 2. Ethernet port 2 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.

Related reference

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.

Related reference

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.

Related reference

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.

Related reference

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.
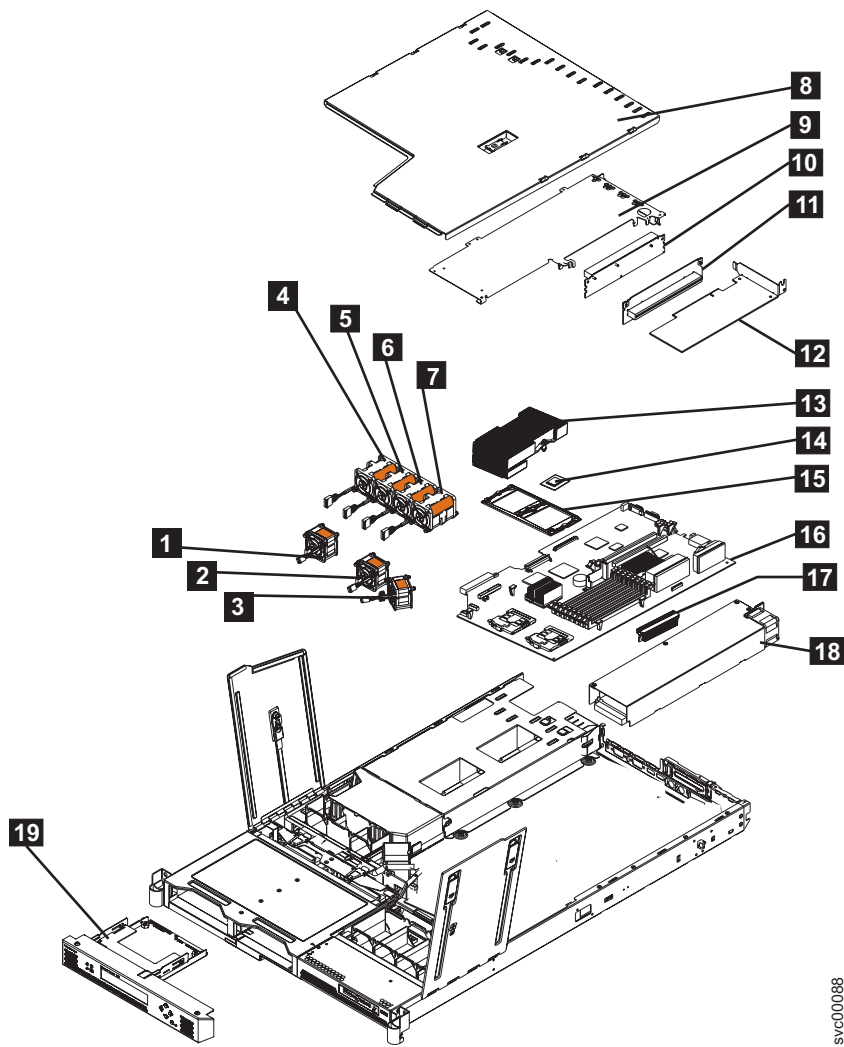
svc00088

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.
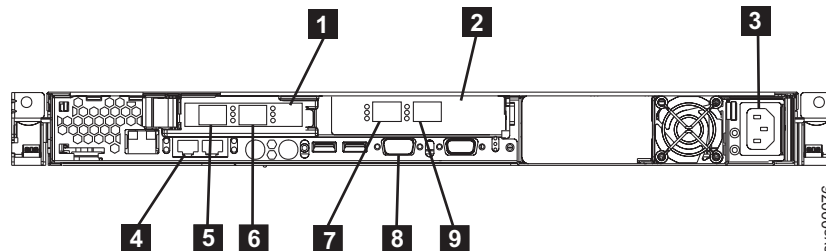
1 PCI slot 1

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.
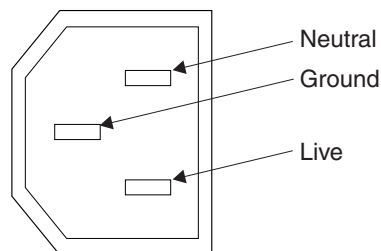
Preparing your SAN Volume Controller 2145-8F2 environment

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

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

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 22 and Figure 10 provide illustrations of the two types of UPS units.
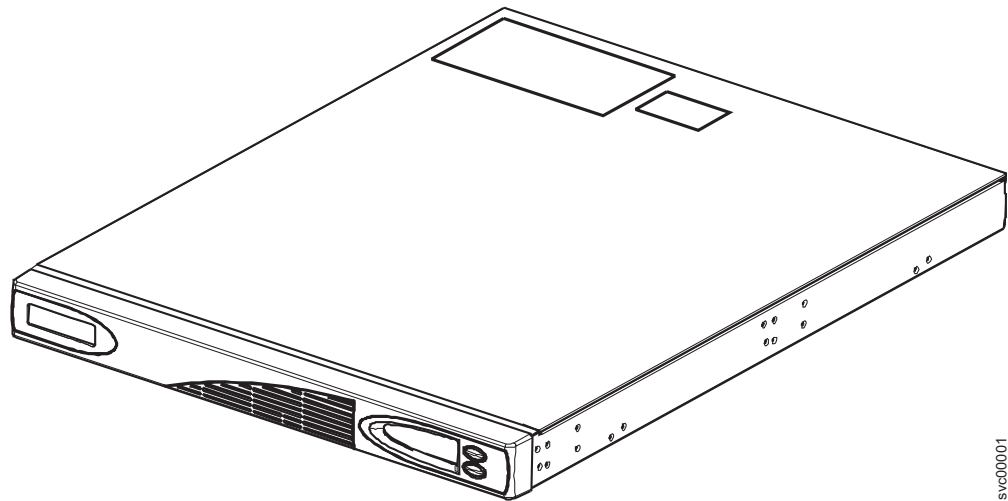
Figure 10. 2145 UPS-1U
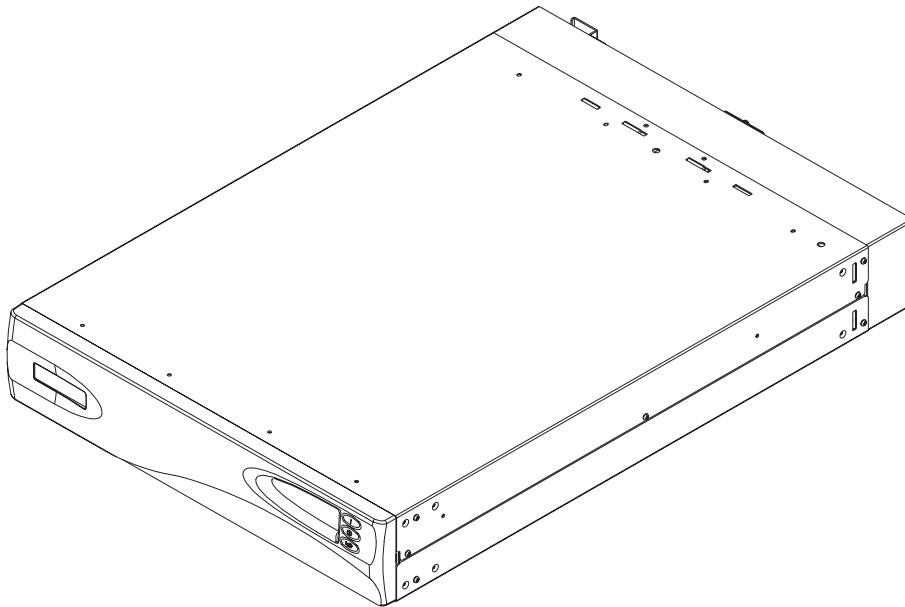
Figure 11. 2145 UPS

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 concepts

"UPS configuration" on page 23
To provide full redundancy and concurrent maintenance, the SAN Volume
Controllers must be installed in pairs.

"UPS operation" on page 24
Each SAN Volume Controller monitors the operational state of the uninterruptible
power supply (UPS) to which it is attached.

Related reference

"Controls and indicators for the 2145 UPS-1U" on page 24
All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) are
located on the front panel assembly.

"Controls and indicators for the 2145 UPS" on page 31
All controls for the 2145 uninterruptible power supply (2145 UPS) are located on
the front panel assembly.

"Hardware for the 2145 UPS-1U" on page 28
The 2145 uninterruptible power supply-1U (2145 UPS-1U) hardware is shown in
the following graphics.

"Hardware for the 2145 UPS" on page 33
The 2145 uninterruptible power supply (2145 UPS) hardware is shown in the
following graphics.

"Preparing your UPS environment" on page 36
Ensure that your physical site meets the installation requirements for the
uninterruptible power supply (UPS).

UPS configuration

To provide full redundancy and concurrent maintenance, the SAN Volume Controllers must be installed in pairs.

Each SAN Volume Controller of a pair must be connected to a different uninterruptible power supply (UPS). Each 2145 UPS can support up to two SAN Volume Controller 2145-4F2 nodes. The 2145 UPS-1U can only support one SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-4F2 node. You can connect the two UPS units for the pair to different independent electrical power sources. This reduces the chance of an input power failure at both UPS units.

The UPS must be in the same rack as the nodes.

The following table provides the UPS guidelines for the SAN Volume Controller 2145-4F2:

Number of SAN Volume Controller 2145-4F2 models	Number of 2145 UPS units	Number of 2145 UPS-1U units
2	2	2
4	2	4
6	4	6
8	4	8

The following table provides the UPS guidelines for the SAN Volume Controller 2145-8F2:

Number of SAN Volume Controller 2145-8F2 models	Number of 2145 UPS units	Number of 2145 UPS-1U units
2	Not supported	2
4	Not supported	4
6	Not supported	6
8	Not supported	8

Attention:

1. Do not connect the UPSs to an input power source that does not conform to standards.
2. Each UPS pair must power only one SAN Volume Controller cluster.

Each UPS includes power (line) cords that connect the UPS to either a rack power distribution unit (PDU), if one exists, or to an external power source. Each UPS power input requires the protection of a UL-approved (or equivalent) 250 volt, 15 amp circuit breaker.

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

UPS operation

Each SAN Volume Controller monitors the operational state of the uninterruptible power supply (UPS) to which it is attached.

If the UPS reports a loss of input power, the SAN Volume Controller stops all I/O operations and dumps the contents of its dynamic random access memory (DRAM) to the internal disk drive. When input power to the UPS is restored, the SAN Volume Controllers restart and restore the original contents of the DRAM from the data saved on the disk drive.

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

Note: If input power is disconnected from the UPS, a fully-operational SAN Volume Controller that is connected to that UPS performs a power-down sequence. This operation, which saves the configuration and cache data to an internal disk in the SAN Volume Controller, typically takes about three minutes, at which time power is removed from the output of the UPS. In the event of a delay in the completion of the power-down sequence, the UPS output power is removed five minutes after the power is disconnected from the UPS. Because this operation is controlled by the SAN Volume Controller, a UPS that is not connected to an active SAN Volume Controller does not shut off within the five-minute required period.

Attention: Data integrity can be compromised by pushing the 2145 UPS power-off button or the 2145 UPS-1U on/off button. However, in the case of an emergency, you can manually shut down the UPS by pushing the 2145 UPS power-off button or the 2145 UPS-1U on/off button. Never shut down a UPS without first shutting down the SAN Volume Controller nodes that it supports.

Important: The two SAN Volume Controller 2145-4F2 nodes in the I/O group must be connected to different 2145 UPSs. This configuration ensures that cache and cluster state information is protected in the event of a failure of the UPS or mainline power source.

When nodes are added to the cluster, you must specify the I/O group that they are joining. The configuration interfaces check the UPS units and ensure that the two nodes in the I/O group are not connected to the same UPS units.

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.
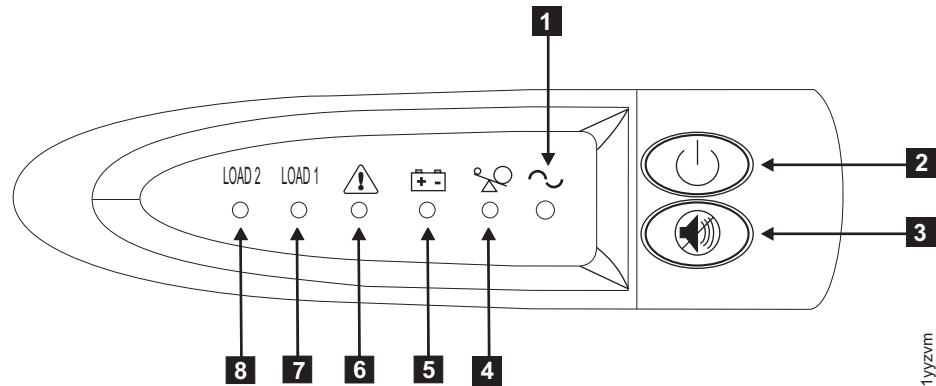
1 Power-on indicator

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 26
The power-on indicator is displayed when the 2145 uninterruptible power supply-1U (2145 UPS-1U) is functioning.

"On/off button" on page 26
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 26
Use the test and alarm reset button to start the self-test.

"Overload indicator" on page 26
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 27
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 27
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 27
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 27
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 24
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 24
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 24
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 reference

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 reference

"Controls and indicators for the 2145 UPS-1U" on page 24
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 reference

"Controls and indicators for the 2145 UPS-1U" on page 24
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 24
All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) are
located on the front panel assembly.

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 24
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.

Locations for the 2145 UPS-1U connectors

The following diagrams illustrate the hardware for the 2145 UPS-1U:
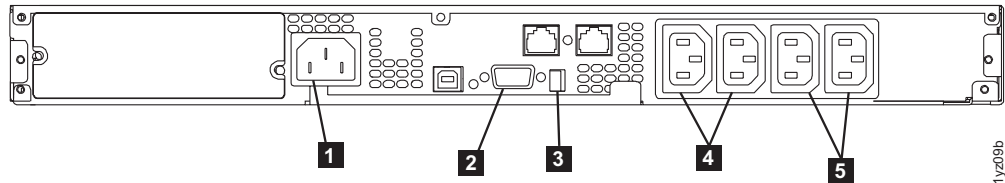
Figure 12. 2145 UPS-1U connectors and switches

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.
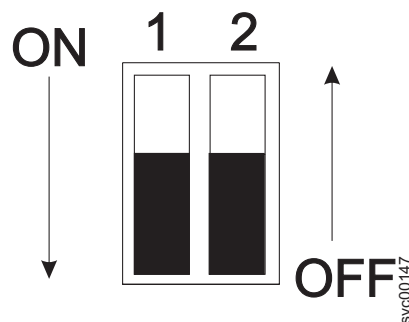
Figure 13. 2145 UPS-1U dip switches

Hardware locations for the 2145 UPS-1U
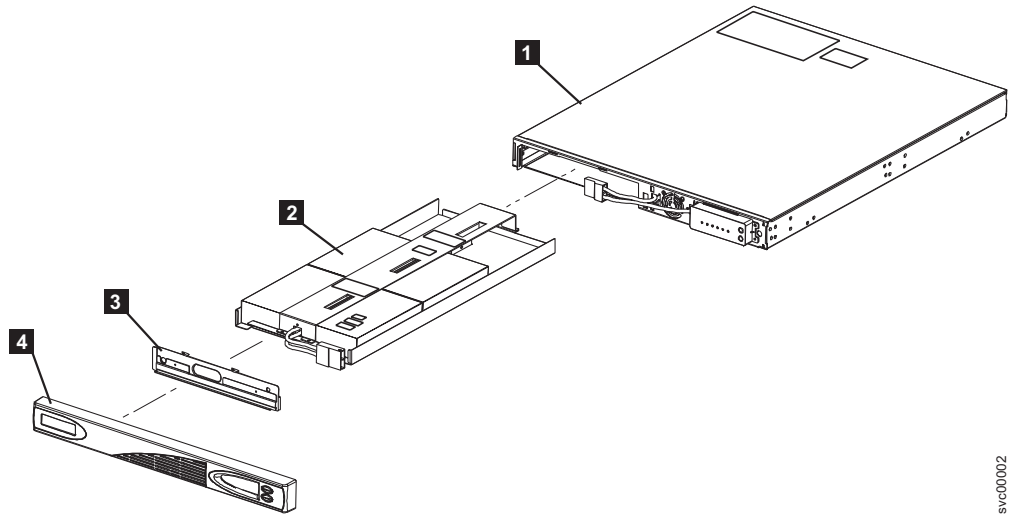
svc00002

1 Frame assembly

2 Battery pack assembly

3 Battery plate

4 Front panel assembly

2145 UPS-1U power connector

Neutral
Ground
Live
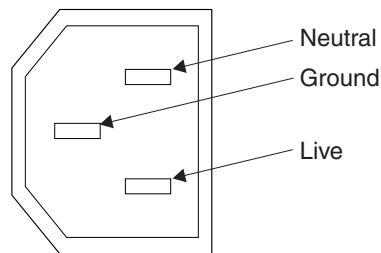
Power cables for the 2145 UPS-1U

You must follow your country or region's power requirements to choose the appropriate power cable for the 2145 uninterruptible power supply-1U (2145 UPS-1U).

The following table lists the power cable requirements for your country or region:

Country or region	Length	Connection type (attached plug designed for 200-240V AC input)	Part
United States of America (Chicago), Canada, Mexico	1.8 m (6 ft)	NEMA L6-15P	7842122

Country or region	Length	Connection type (attached plug designed for 200-240V AC input)	Part
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
Antigua, Bahrain, Brunei, Channel Islands, Hong Kong S.A.R. of China, 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
Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa	2.8 m (9 ft)	AZ/NZS C112	13F9940
Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Republic, 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
Denmark	2.8 m (9 ft)	DK2-5a	13F9997
Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	2.8 m (9 ft)	SABS 164	14F0015
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

Controls and indicators for the 2145 UPS

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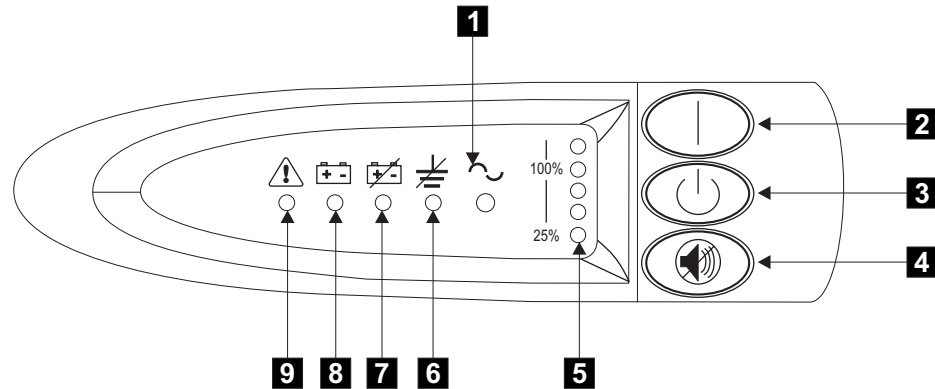
1 Mode indicator

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 32
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 32
The on button turns on the main power to the 2145 uninterruptible power supply (2145 UPS).

"Off button" on page 32
The off button turns off the main power to the 2145 uninterruptible power supply (2145 UPS).

"Test and alarm reset button" on page 26
Use the test and alarm reset button to start the self-test.

"Load-level indicators" on page 33
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 33
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 33
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 33
The battery mode indicator shows that the 2145 uninterruptible power supply (2145 UPS) is operating on batteries.

"General alarm indicator" on page 33
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:
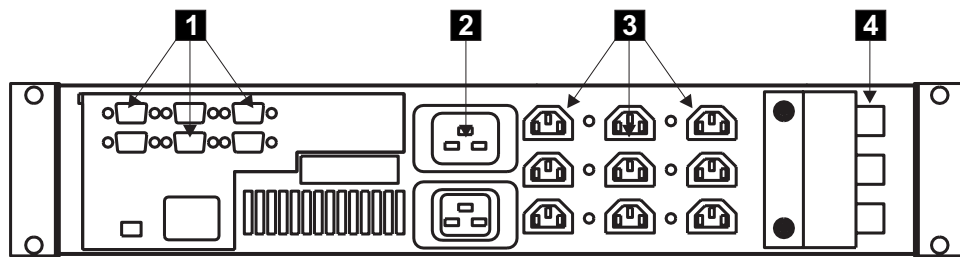
1 Signal cable connectors

2 Main power connector

3 Output connectors

4 Circuit breakers

Hardware locations for the 2145 UPS
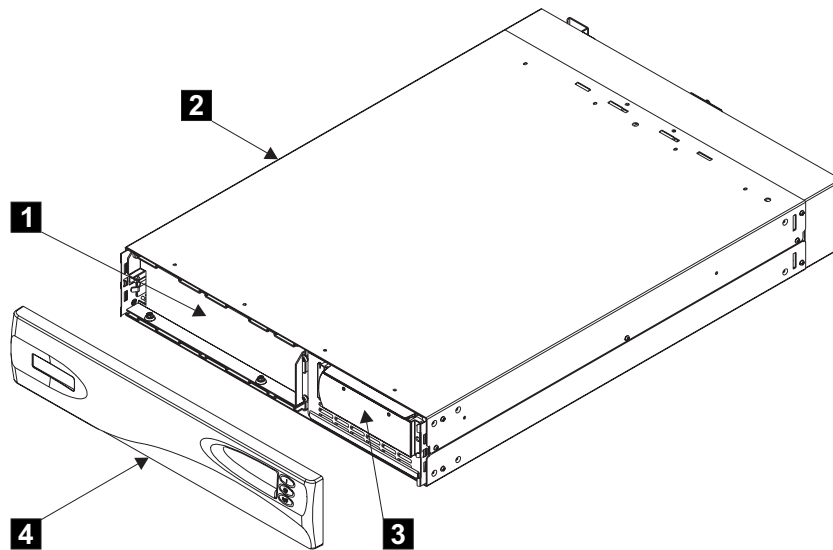
1 Battery assembly

2 Frame assembly

3 Electronics assembly

4 Front panel assembly

Uninterruptible power supply connector

Neutral
Ground
Live
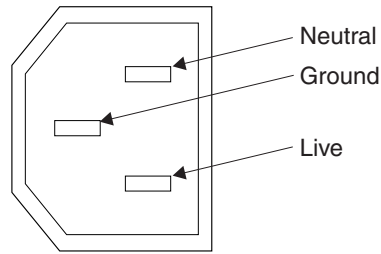
Power cables for the 2145 UPS

You must follow your country or region's power requirements to choose the appropriate power cable for the 2145 uninterruptible power supply (2145 UPS).

The following table lists the power cable requirements for your country or region:

Country or region	Length	Connection type (attached plug designed for 200-240V AC input)	Part
United States of America (Chicago), Canada, Mexico	1.8 m (6 ft)	NEMA L6-15P	14F1549
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	2.5 m (8 ft)	NEMA L6-15P	12J5119
Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Denmark, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia	2.5 m (8 ft)	IEC 309	36L8822
Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa	2.5 m (8 ft)	L6-20P	12J5118

Country or region	Length	Connection type (attached plug designed for 200-240V AC input)	Part
Afghanistan, Albania, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Republic, 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	2.5 m (8 ft)	CEE7	55H6643
Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	2.5 m (8 ft)	SABS 164	12J5124
Thailand	2.5 m (8 ft)	NEMA 6-15P	12J5120

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

Chapter 3. Master console

The SAN Volume Controller provides a master console that can be used as a single platform to configure, manage, and service the SAN Volume Controller.

The master console allows system administrators to integrate the SAN Volume Controller into their environment. The master console monitors the configuration of the whole system and all of the internal components. It offers a standard and central location for all aspects of the operation, including SAN topology rendering, SNMP trap management, call-home (service alert) and remote service facilities, as well as all the configuration and diagnostic utilities for the components.

Note: A virtual private network (VPN) connection is required for remote service facilities.

The master console provides the following functions:
- Browser support for:
  - SAN Volume Controller configuration
  - SAN Volume Controller Console
  - Fibre-channel switch
- Command-line interface (CLI) configuration support using Secure Shell (SSH)
- SAN topology rendering using IBM TotalStorage Productivity Center for Fabric
- Remote service capability through VPN
- IBM Director
  - SNMP trap management
  - Call-home (service alert) capability
  - E-mail notification to the system administrator

Related tasks

"Installing the master console" on page 59
There are a number of steps you must complete to install the master console with the SAN Volume Controller.

Master console components

Your master console is pre-configured when it is ordered together with your SAN Volume Controller.

These lists describe the hardware and installed software that are included with the master console.

Note: This only applies if you ordered your SAN Volume Controller with the master console pre-configured.
- 19-inch 1U rack-mounted server
- 19-inch 1U flat panel monitor and keyboard

Attention: If more than one power distribution bus is available, the two power connectors, one supplying the master console and the other supplying the master console monitor, should be connected to the same power distribution bus.

The following software is included with and installed on the system:
- Microsoft® Windows 2003 Standard Server Edition with the latest service pack

- IBM TotalStorage Productivity Center for Fabric
- DS4000 series (formerly FAStT) Storage Manager
- QLogic 2342 fibre-channel host bus adapter driver
- PuTTY, a client for Telnet and Secure Shell (SSH) protocol communications
  - Putty.exe, the client software
  - Puttygen.exe, a utility for generating encryption keys
  - Plink.exe, the command-line interface to the PuTTY client software
- IBM Director Server, a client/server workgroup manager
- SAN Volume Controller Console
- Adobe Acrobat Reader
- IBM Connection Manager virtual private network (VPN)

See the following Web site for the current list of supported software versions:

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

You must configure the software that is provided on the master console to meet your requirements.

Preparing your master console environment

Ensure that your physical site meets the installation requirements for the master console server and console monitor kit.

Server dimensions and weight

Below are the physical characteristics and the environmental requirements for the master console:

Height	Width	Depth	Maximum Weight
43 mm (1.7 in.)	430 mm (16.69 in.)	424 mm (16.69 in.)	12.7 kg (28 lb.)

Note: The above dimensions are for a 1U monitor and keyboard assembly.

Server AC and input-voltage requirements

Power Supply	Electrical Input
203 watt (110 or 220 V ac auto-sensing)	Sine-wave input (47–63 Hz) required Input voltage low range: Minimum: 100 V ac Maximum: 127 V ac Input voltage high range: Minimum: 200 V ac Maximum: 240 V ac Input kilovolt-amperes (kVA), approximately: Minimum: 0.0870 kVA Maximum: 0.150 kVA

Server environment

Environment	Temperature	Altitude	Relative Humidity
Server On	10° to 35°C (50°F to 95°F)	0 to 914 m (2998.0 ft.)	8% to 80%
Server Off	-40°C to 60°C (-104°F to 140°F)	Maximum: 2133 m (6998.0 ft.)	8% to 80%

Server heat output

Approximate heat output in British thermal units (BTU) per hour:
- Minimum configuration: 87 watts (297 BTU)
- Maximum configuration: 150 watts (512 BTU)

Monitor console kit dimensions and weight

Height	Width	Depth	Maximum Weight
43 mm (1.7 in.)	483 mm (19.0 in.)	483 mm (19.0 in.)	17.0 kg (37.0 lb.)

Chapter 4. Installing the UPS, the master console, and the SAN Volume Controller

There are several steps that you must perform to prepare for the installation of the uninterruptible power supply (UPS), the master console, and the SAN Volume Controller.

Attention: Before you start to install the UPS, the master console and the SAN Volume Controller, ensure that you have everything that you need, including the customer-completed planning tables and charts that are provided in the *IBM TotalStorage SAN Volume Controller: Planning Guide*. These tables include the location of hardware, cable connection, and configuration data information that you need to complete the installation procedures. If you are connecting cables to switches that are currently in use, confirm with the customer that it is safe for you to proceed. Go no further with these instructions until you are satisfied that all the information is correct and valid.

Perform the following steps to prepare for installation:

1. Check all the parts and quantities against the parts shown in Figure 14. If any piece is missing, contact the appropriate IBM representative.
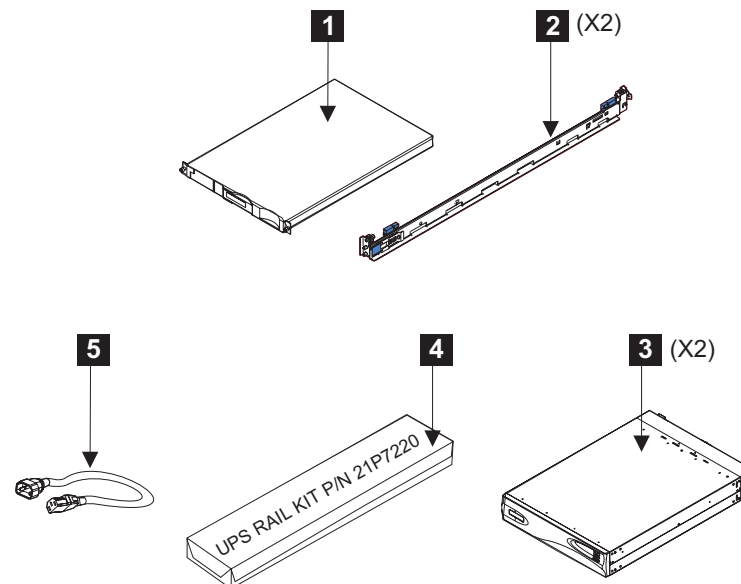

Figure 14. Parts provided for installation in the rack

    1 SAN Volume Controller

    2 SAN Volume Controller support rails (2)

    3 UPS (2)

    4 UPS rail kit

    5 Power and signal cable

2. If you are installing UPSs, read through the safety and environmental notices.

Note: The user might already have a 2145 uninterruptible power supply (2145 UPS) installed in the rack that has available spare capacity. Therefore, the SAN Volume Controller can be delivered without a UPS.

3. If you are installing the master console, be sure to read all of the safety checks that are detailed in the *IBM TotalStorage Master Console Installation and User's Guide*. Refer to the *IBM TotalStorage SAN Volume Controller: Planning Guide*, which provides the hardware location chart, the cable connection table, and the configuration data table for the user to complete prior to installation.

Related tasks

"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).

"Installing the support rails for the 2145 UPS" on page 51
You must install the support rails in the rack before installing the 2145 uninterruptible power supply (2145 UPS).

"Installing the support rails for the SAN Volume Controller" on page 60
You must install the support rails that hold the SAN Volume Controller.

Related reference

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

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

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

"Caution notices for the SAN Volume Controller" on page xix
Ensure that you understand the caution notices for the SAN Volume Controller.

"Preparing your UPS environment" on page 36
Ensure that your physical site meets the installation requirements for the uninterruptible power supply (UPS).

"Preparing your SAN Volume Controller 2145-8F2 environment" on page 18
Before installing the SAN Volume Controller 2145-8F2, you must prepare the physical environment.

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 15.
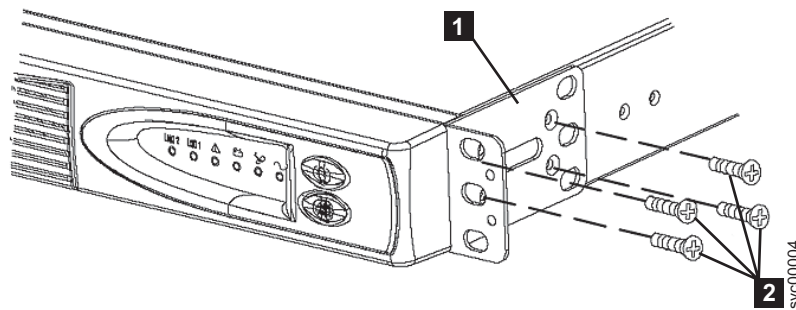
Figure 15. Installing the support rails for a 2145 UPS-1U into the rack

3. Loosen the assembly wing nuts (see **1** in Figure 16) on both rail assemblies and adjust the rail size to the depth of your rack.
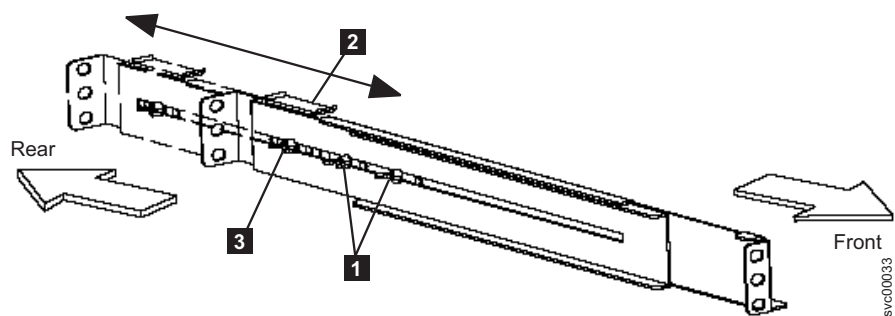
Figure 16. Adjusting the rail depth on the 2145 UPS-1U

> **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 16.

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 17) and two clip nuts **2** , attach the rail to the rear of the rack.
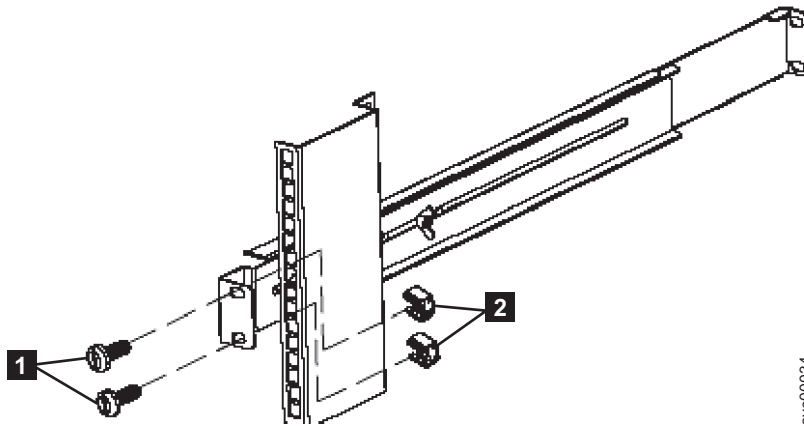
Figure 17. Securing the rear rail on the 2145 UPS-1U

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 18).
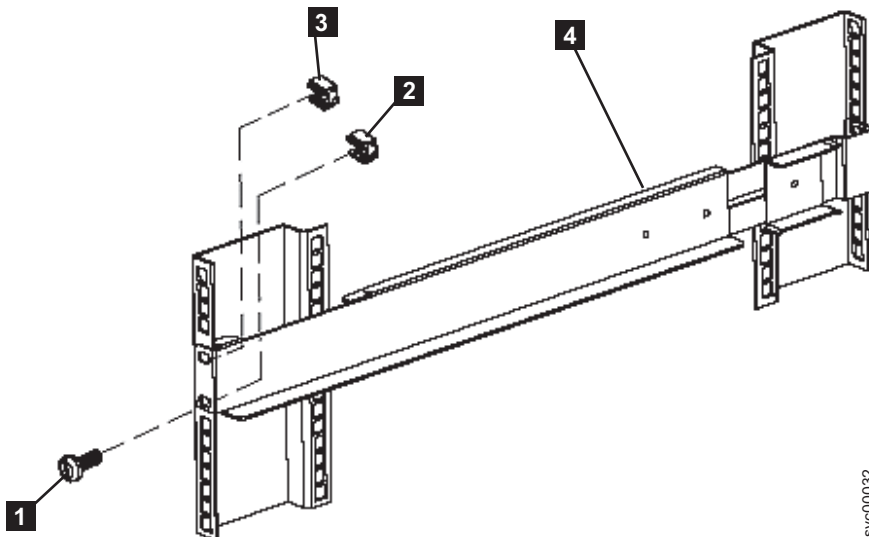
Figure 18. Securing the front rail on the 2145 UPS-1U

8. Install a clip nut in the top hole of the rail **3** .
9. Repeat step 6 through step 8 for the other rail.
10. Tighten the assembly wing nuts on both rail assemblies.

Installing the 2145 UPS-1U in the rack

After you have completed the preparation procedures, you are ready to install the 2145 uninterruptible power supply-1U (2145 UPS-1U) in the rack.

You must complete the following prerequisites before installing the 2145 UPS-1U in the rack:

1. Complete the preinstallation procedures.
2. Install the support rails for the 2145 UPS-1U.
3. Prepare your 2145 UPS-1U environment.

Attention: Read all safety and environmental notices before starting the installation process. Use the reference numbers in parentheses 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 devices are installed, observe all safety precautions for the rack into which you are installing the device.

After all of the prerequisites have been completed, you can begin the installation process.

Perform the following steps to install the 2145 UPS-1U in the rack:
1. Open the top of the 2145 UPS-1U shipping carton. Grip the flaps on either side of the 2145 UPS-1U.
2. Lift the 2145 UPS-1U clear of the shipping carton and place it on a flat, stable surface.
3. On each side of the 2145 UPS-1U, attach the long end of a mounting bracket **1** to the 2145 UPS-1U using four of the supplied M3 × 6 screws **2** . See Figure 19 on page 48.
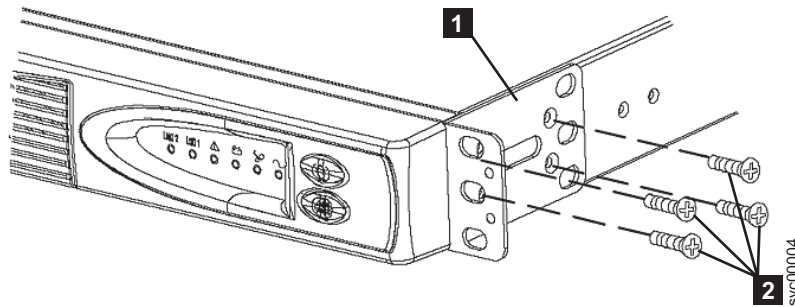
Figure 19. Attaching the mounting bracket to the 2145 UPS-1U

1 Mounting bracket

2 M3 × 6 screws

4. 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.

5. At the front of the 2145 UPS-1U, install the two mounting screws **1** (Figure 20).
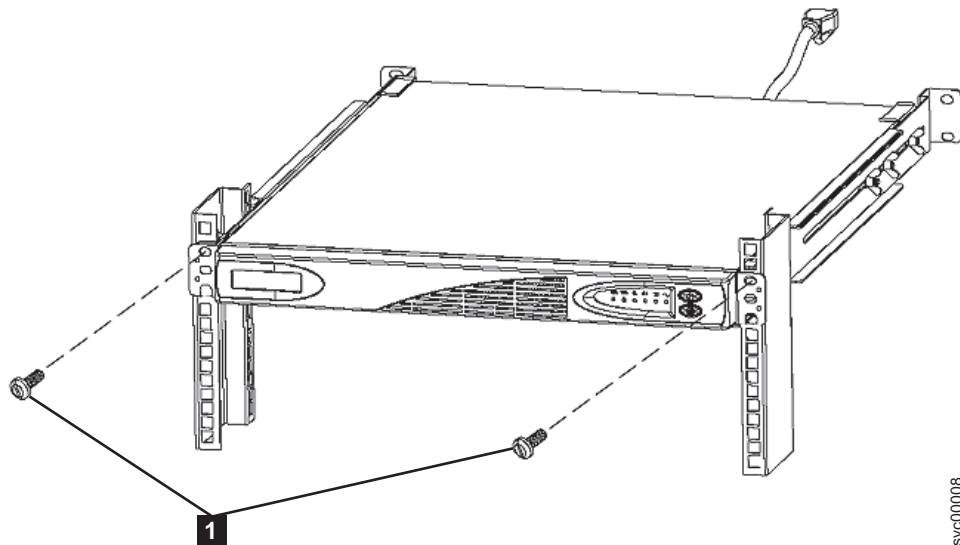
Figure 20. Installing the mounting screws for the 2145 UPS-1U

1 Mounting screws

If possible, the two 2145 UPS-1Us should not be connected to the same power source.

Attention: Ensure that you comply with the following requirements:

- Each 2145 UPS-1U should be connected to a separate branch circuit.
- The voltage supplied to the 2145 UPS-1U must be 220 – 240 V single phase.
- The frequency supplied must be between 50 and 60 Hz.

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

6. Remove the 2145 UPS-1U front panel.
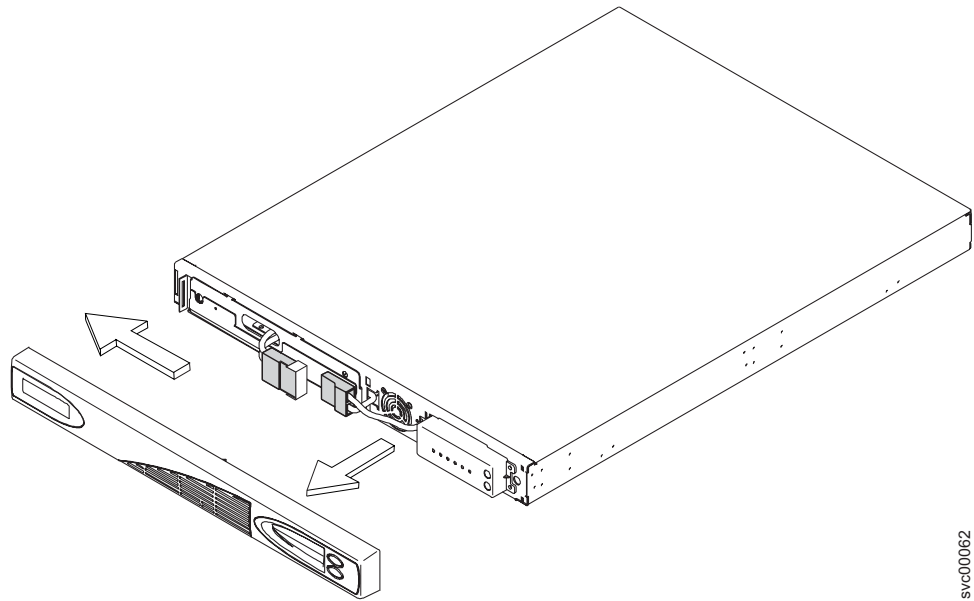
svc00062

Figure 21. Removing the 2145 UPS-1U front panel

7. Remove the protective label from the internal battery connector.
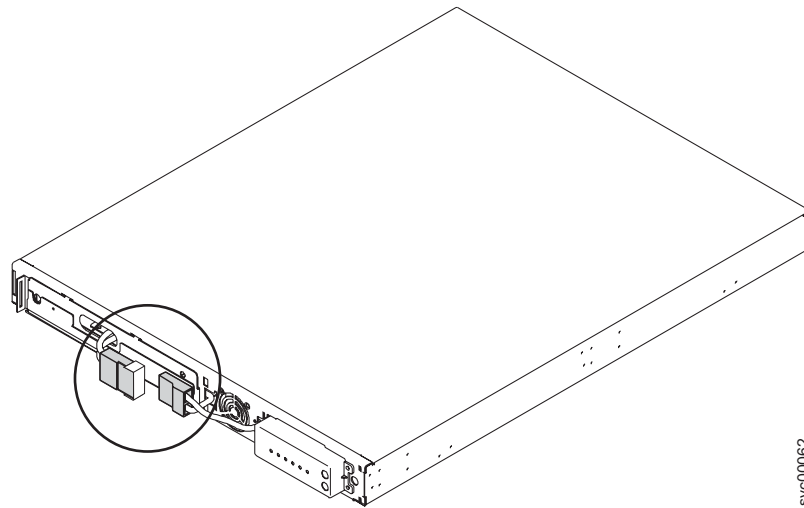
svc00062

Figure 22. Internal battery connector with protective label

8. Connect the internal battery connector.
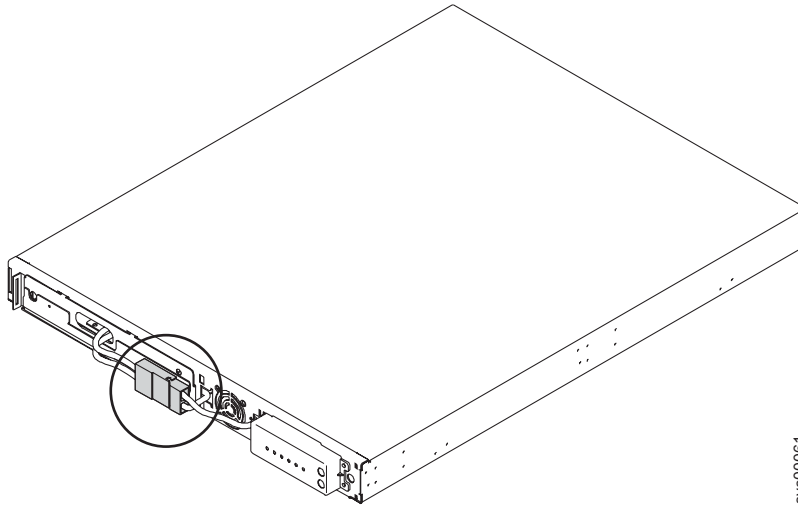
svc00061

> **Note:** A small amount of arcing might occur when connecting the batteries. This is normal and does not damage the unit or present any safety concerns.

9. Reinstall the front panel.

10. At the back of the 2145 UPS-1U, plug the 2145 UPS-1U main power connector into the power socket (**1** in Figure 23). The 2145 UPS-1U is in standby mode, so all indicators are off.

    > **Note:** The 2145 UPS-1U is intended to maintain power on SAN Volume Controller nodes until data can be saved to the local hard disk drive. Only SAN Volume Controller nodes can be plugged into the 2145 UPS-1U or the SAN Volume Controller cluster malfunctions.
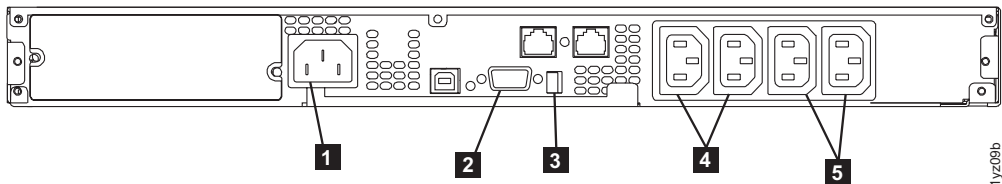
1yz09b

Figure 23. Installing the 2145 UPS-1U power cable

1 Main power connector

2 Communication port

3 Load segment 1 receptacles

4 Load segment 2 receptacles

11. Press and hold the on/off button **2** for approximately two seconds. The **front panel indicators** cycle through a startup sequence while the 2145 UPS-1U conducts a self-test; see Figure 24 on page 51.

    When the self-test is complete, the **power-on indicator 1** and the **load indicators** (**7** and **8**) illuminate to indicate that power is being supplied by the 2145 UPS-1U. The 2145 UPS-1U is now in normal mode, and is charging its battery. If the **power-on indicator 1** is flashing red and the alarm is sounding, the voltage range setting might not be correct. When a SAN Volume

Controller is connected to the 2145 UPS-1U, the SAN Volume Controller automatically adjusts the voltage range setting. Take no action for this alarm condition unless it persists for more than five minutes after a SAN Volume Controller has been connected to this 2145 UPS-1U and powered on.
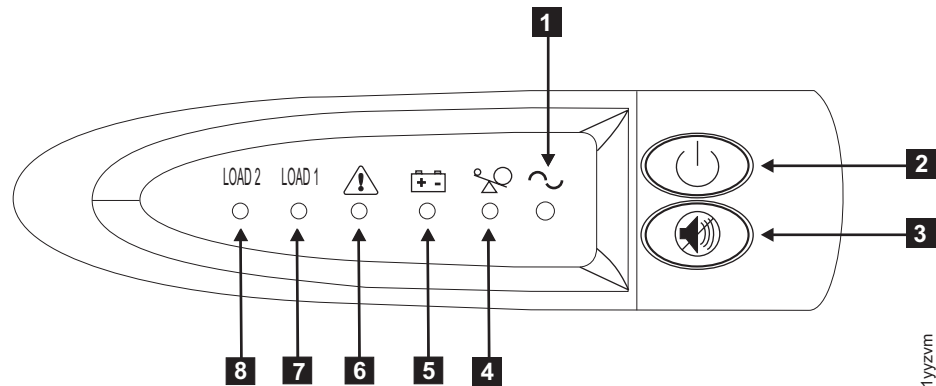
Figure 24. Power switch and indicators of the 2145 UPS-1U

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

12. Repeat all of these steps to install additional 2145 UPS-1Us.

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 25). These nut clips must align with the second and fourth holes of the support rail flange.
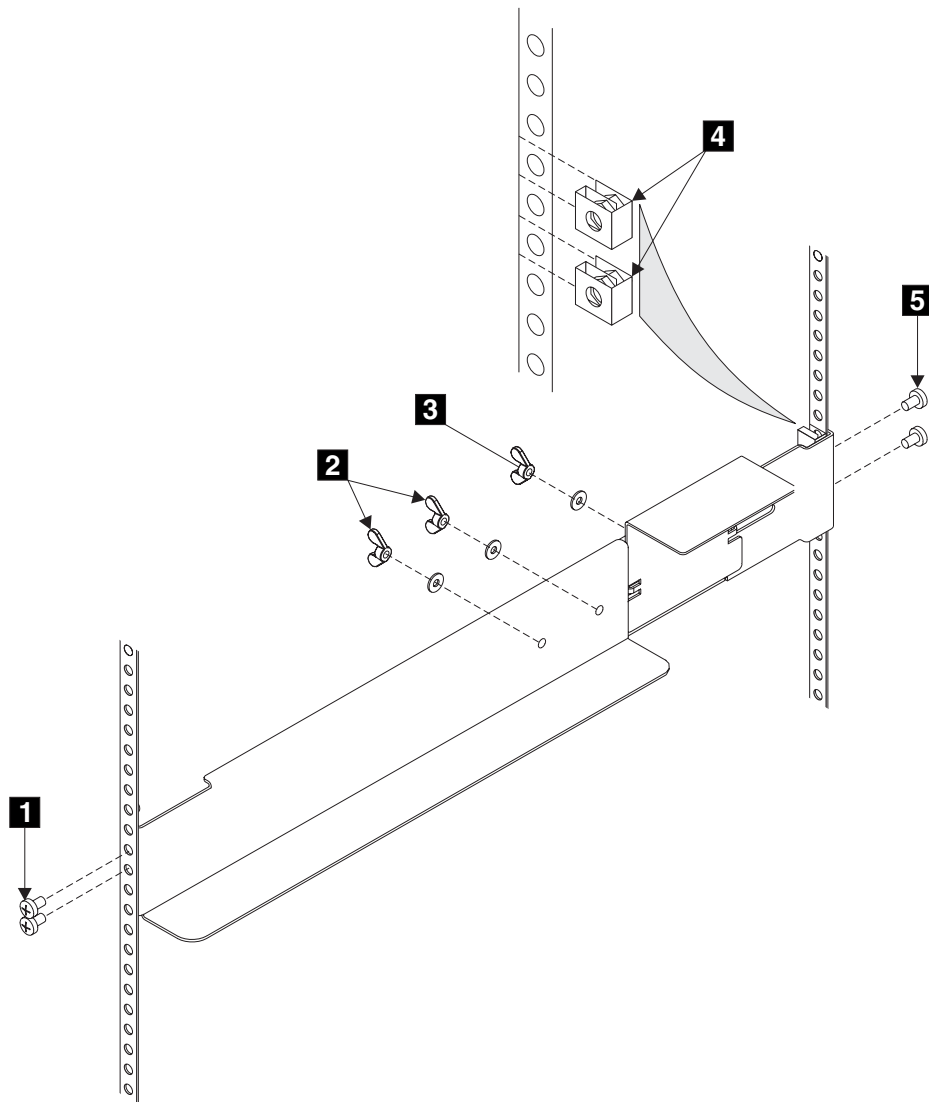
Figure 25. Installing support rails for a 2145 UPS into the rack

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 on page 53.

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.

Installing the 2145 UPS in the rack

After you have completed the preparation procedures, you are ready to install the 2145 uninterruptible power supply (2145 UPS) in the rack.

You must complete the following prerequisites before installing the 2145 UPS in the rack:

1. Complete the preinstallation procedures.
2. Install the support rails for the 2145 UPS.
3. Prepare your 2145 UPS environment.

Attention: Read all safety and environmental notices before starting the installation process. Use the reference numbers in parentheses 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 devices 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.**
- **Do not attempt to install the 2145 UPS into the rack unless the electronics assembly and the battery assembly have been removed.**

Begin the installation process after all of the prerequisites have been completed.

Perform the following steps to install the 2145 UPS in the rack:

1. Before removing the 2145 UPS from the shipping carton, you must reduce its weight by removing the battery assembly. Perform the following steps to remove the 2145 UPS battery assembly:

   a. Open the top of the 2145 UPS shipping carton. With the assistance of another service representative, grip the flaps on either side of the 2145 UPS; see Figure 26.

Figure 26. Opening the top of the 2145 UPS shipping carton

   b. Slide the 2145 UPS to the end of the carton and rest its front edge on the edge of the carton; see Figure 27 on page 55.

Figure 27. Sliding the 2145 UPS to the end of the carton.

   c. Remove the two bolts **1** and additional nut **2** on the left side of the bracket, as seen in Figure 28. Next, remove the battery retaining bracket **3** .
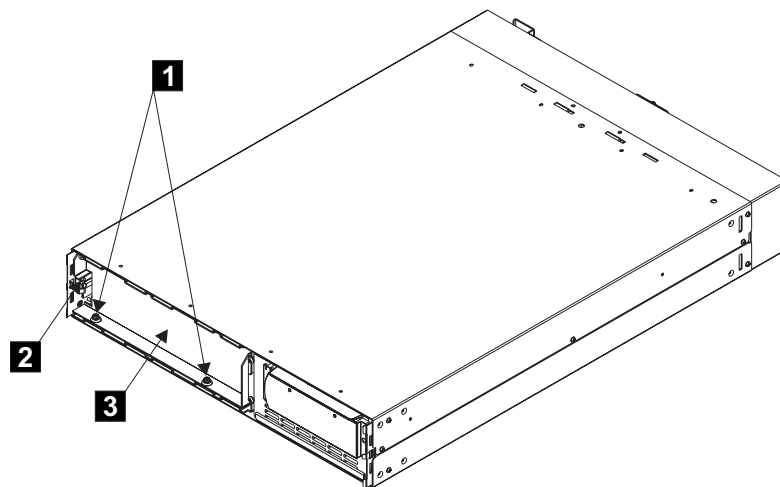
Figure 28. Removing the battery retaining bracket

   1 Bolts

   2 Nut

   3 Battery retaining bracket

   d. Grip the tab on the front of the battery and pull the battery forward until it can be accessed by two service representatives.

   e. With the assistance of another service representative, lift the battery assembly clear of the 2145 UPS and place to one side.

> **Note:** The front cover for the 2145 UPS is not installed, however, it is included inside of the shipping carton. The front cover is installed later in the installation process.

2. With the assistance of another service representative, lift the 2145 UPS clear of the shipping carton and place it on a flat, stable surface.

3. Remove the two screws **1** (Figure 29).

4. Pull the electronics assembly **2** out of the 2145 UPS, and put it to one side.

Figure 29. Removing the 2145 UPS electronics assembly

1 Screws

2 Electronics assembly

5. Stand at the front of the rack. With the help of another service representative, place the back of the 2145 UPS onto the support rails and then slide it into the rack.

6. Install the front flathead screws **1** as seen in Figure 30 on page 57.

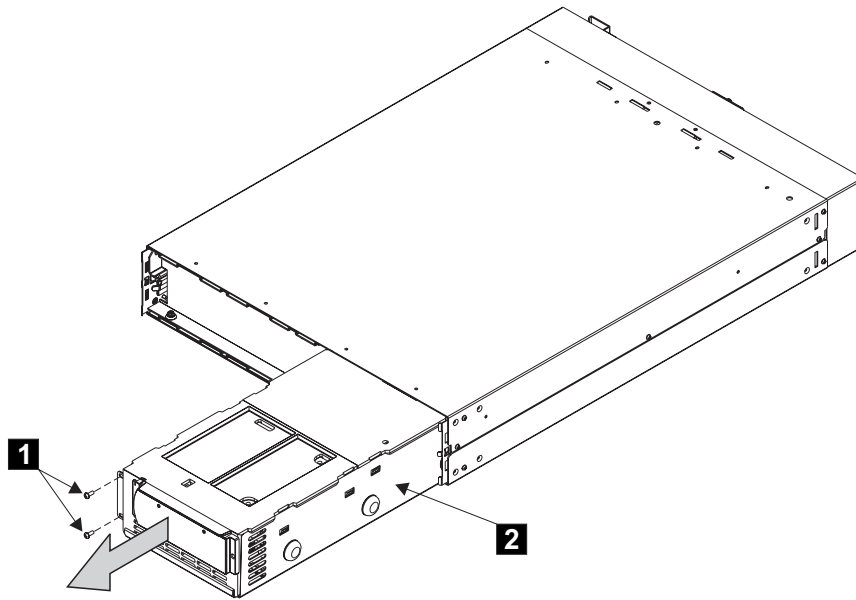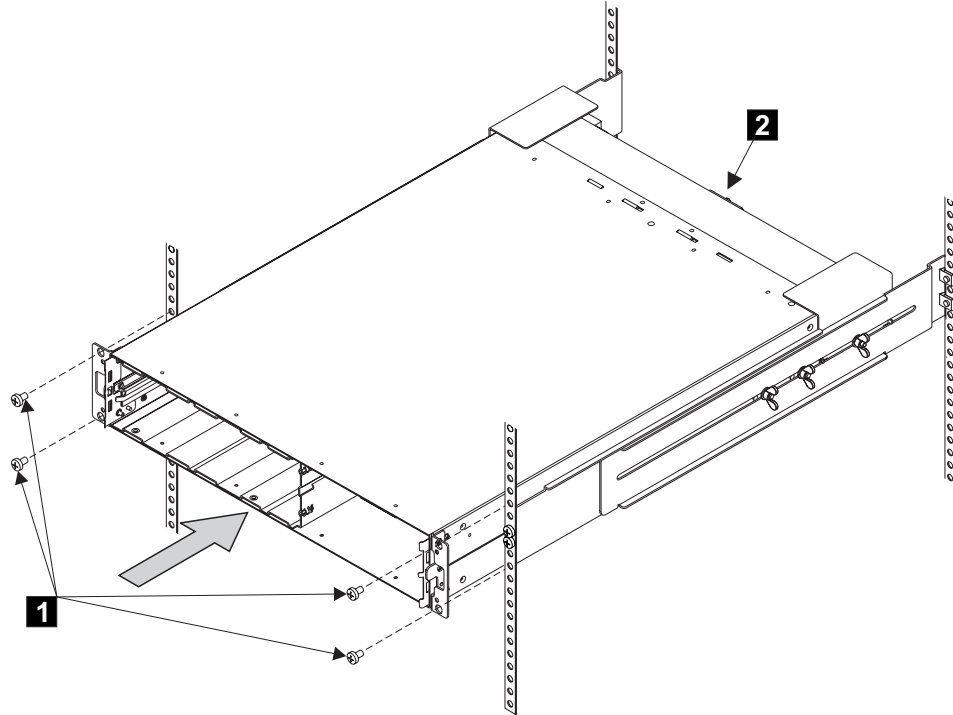*Figure 30. Installing the 2145 UPS into a rack*

1 Front flathead screws

7. With the assistance of another service representative, reinstall the following parts:

   a. Battery assembly

   b. Battery retaining bracket

   c. Electronics assembly

      Attention: 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 safety earthing 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.

8. Install the front panel.

9. At the back of the 2145 UPS, plug the 2145 UPS main power cable (**1** in Figure 31 on page 58) into the power socket.

   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 2145-4F2 cluster malfunctions.

Figure 31. Installing the 2145 UPS power cable

1 Main power cable

If possible, ensure that the two UPSs are not both connected to the same power source.Ensure that you comply with the following requirements for the 2145 UPS:

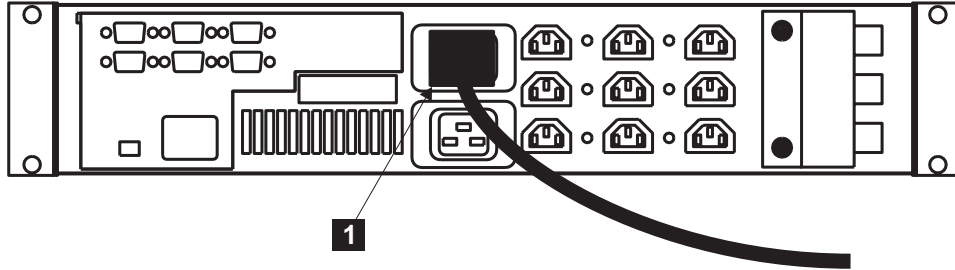- Each 2145 UPS should be connected to a separate branch circuit.
- A UL listed 15 A circuit breaker must be installed in each branch circuit that supplies power to the 2145 UPS.
- The voltage supplied to the 2145 UPS must be 200 – 240 V single phase.
- The frequency supplied must be between 50 and 60 Hz.

Note: If the 2145 UPS is cascaded from another UPS, the source UPS must have at least 3 times the capacity per phase and the total harmonic distortion must be less than 5% with any single harmonic being less than 1%. The 2145 UPS should also have input voltage capture that has a slew rate faster than 3 Hz per second and 1 msec glitch rejection.

10. All front panel indicators of the 2145 UPS flash for a short time while the 2145 UPS runs a self-test. When the test is complete, the **mode indicator** **1** flashes to show that the 2145 UPS is in standby mode; see Figure 32.

Press and hold the 2145 UPS On button, **2** in Figure 32, 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.
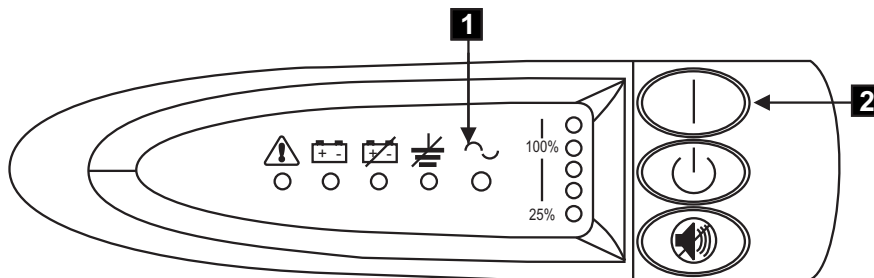

Figure 32. Power switch and indicators on the 2145 UPS

1 Mode indicator

2 On button

If the **mode indicator** **1** 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 this 2145 UPS and powered on.

11. Repeat all of these steps to install additional 2145 UPSs.

Related tasks

"Installing the support rails for the 2145 UPS" on page 51
You must install the support rails in the rack before installing the 2145 uninterruptible power supply (2145 UPS).

Related reference

"Preparing your UPS environment" on page 36
Ensure that your physical site meets the installation requirements for the uninterruptible power supply (UPS).

Installing the master console

There are a number of steps you must complete to install the master console with the SAN Volume Controller.

Attention: Before you begin the installation, review and complete all of the safety checks detailed in the documentation for the master console, the keyboard, and the display.

Ensure that the user has all of the information needed prior to installation. Refer to the *IBM TotalStorage SAN Volume Controller: Planning Guide*, which provides the hardware location chart, the cable connection table, and the configuration data table for the customer to complete prior to installation.

To install the master console in the rack, follow the instructions provided in your xSeries® Installation Guide and the instructions provided with the mounting rails to complete the installation.

Important: Do **not** follow any software installation procedures in the xSeries Installation Guide.

Software for the master console is pre-installed, therefore software installation is not necessary. After all of the prerequisites are completed, you can begin the installation process.

Perform the following steps to install the master console:

1. Ensure that no cables are connected to the Ethernet ports.

2. Connect a fibre-channel cable from one port on the fibre-channel host bus adapter (HBA) to the other port to allow for a loopback data test to check that the fibre-channel HBA is operational.

3. Turn on the master console.

4. When the following message displays, immediately press Ctrl-Q to display a list of I/O addresses:

```
Qlogic Corporation
Q123XX PCI Fibre Channel ROM BIOS version X
Copyright (C) Qlogic Corporation 1993 2002 all rights reserved
www.qlogic.com
Press <Ctrl-Q> for Fast!UTIL
```

Note: This message displays for only a few seconds and you must press Ctrl-Q while it displays.

5. Select one of the I/O addresses and press **Enter**. A Fast!UTIL Option list is displayed.
6. Select the Loopback data test option and press **Enter**.
7. Select the **Continue with loopback data test option** and press **Enter**. One of the following messages is displayed:

Loopback Data Test failed

Press any key to stop the Loopback Data Test
Press Enter twice to get back to the Fast!UTIL Option List
Select Exit Fast!UTIL

If the loopback data test fails, replace the fibre-channel cable with a new one. If the test fails again, replace the fibre-channel card.
8. Remove the fibre-channel cable that you installed between the two ports on the fibre-channel HBA.
9. Restart the machine to start the Windows operating system:
   a. Type administrator in the User ID field.
   b. Type passw0rd in the password field; this password applies to all required password fields. The master console continues booting.

   Note: This process can take several minutes before all services are started and operations are completely responsive.
10. Refer to the *IBM TotalStorage SAN Volume Controller: Planning Guide* for the customer-completed configuration data table and connect the fibre-channel cables from the master console as specified in that table.
11. Attach an RID tag to the master console using machine type 2145 and the serial number of the SAN Volume Controller that is being installed with the master console.
12. **IMPORTANT**: This step must be the last step you perform on the master console before handing over the machine; it sets up the master console to present a Windows license agreement screen at the next power on and then shuts down the master console.
    a. Select **Start → Run**
    b. Type c:\sysprep\sysprep.exe
    c. Click **OK**.

    Note: It is important that you do this step; otherwise, the user is not presented with the choice to accept or decline Windows registration conditions.

    Related reference
    Chapter 3, "Master console," on page 39
    The SAN Volume Controller provides a master console that can be used as a single platform to configure, manage, and service 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 33, and put your thumb against the front of the latch-lock **2**.
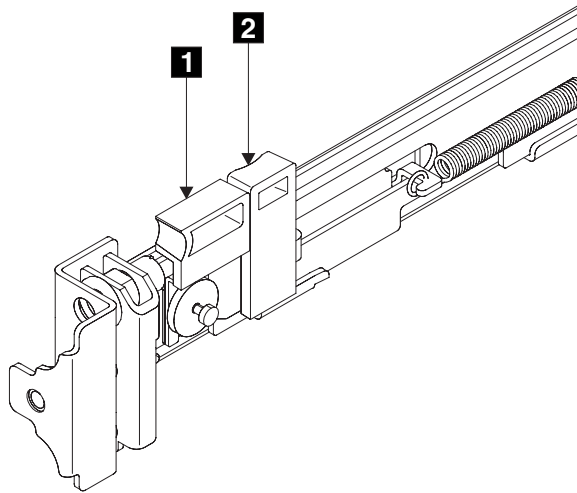

Figure 33. Retracting the latch lock carrier

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 34). The latch-lock carrier assembly slides against the spring tension.
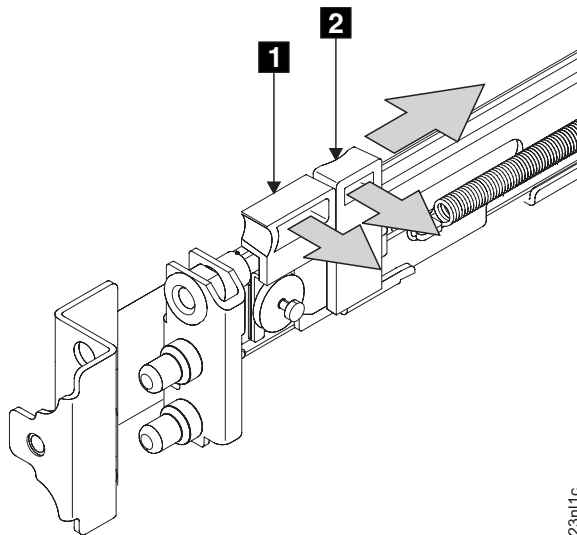

Figure 34. Opening the front latch-lock carrier assembly

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 35) toward the front of the rail until it stops. The rail is now at its shortest adjustment.
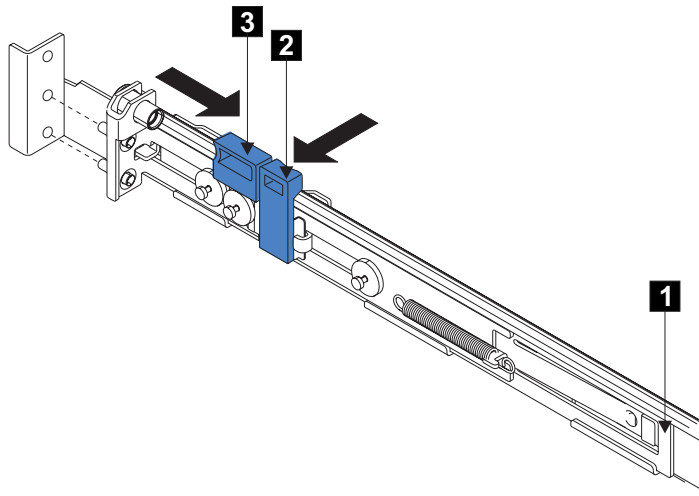

Figure 35. Opening the back latch-lock carrier assembly

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 36 on page 63) with the required EIA marking that is on the rack.
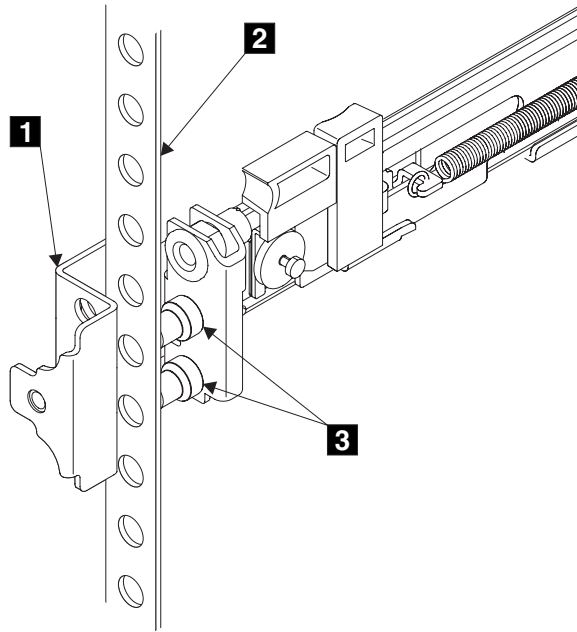
Figure 36. Installing the front end of the rail

> **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 37 on page 64) 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.
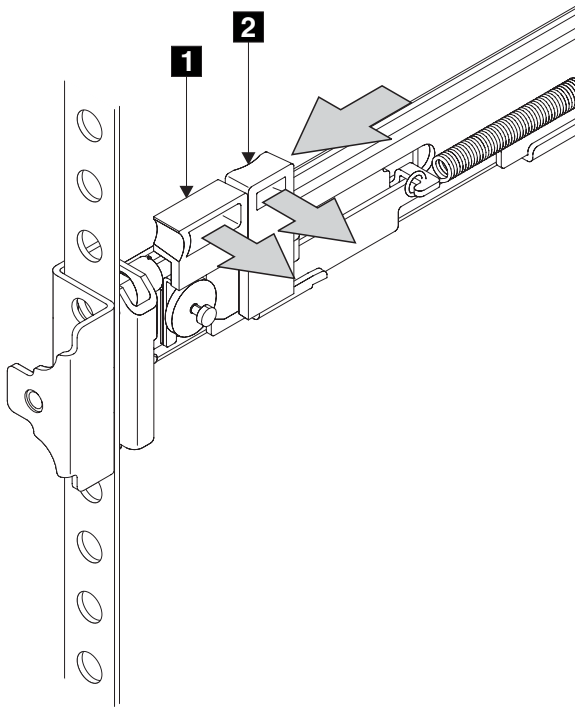
Figure 37. Closing the latch-lock carrier assembly

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.

Installing the SAN Volume Controller in the rack

After installing the support rails, you are ready to install the SAN Volume Controller in the rack.

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 install the SAN Volume Controller in the rack:

1. Stand at the front of the rack and place the back of the SAN Volume Controller onto the support rails.

2. Slide the SAN Volume Controller fully into the rack.
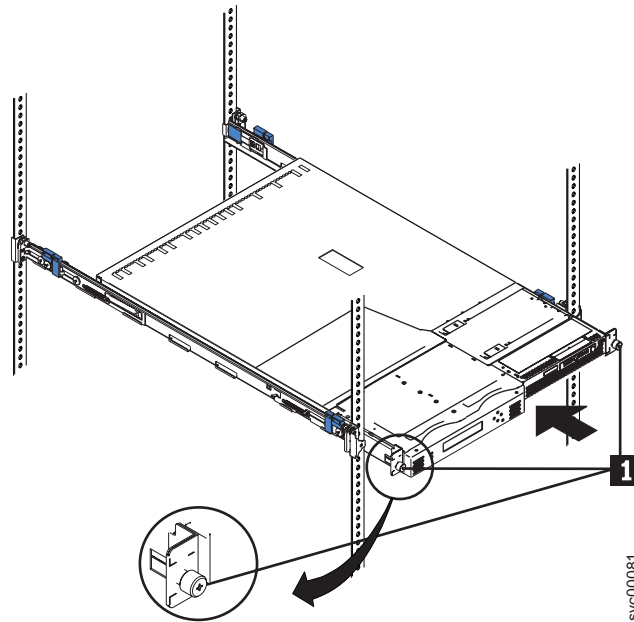
3. Fully tighten the two captive thumbscrews **1** .

Figure 38. Installing the SAN Volume Controller into a rack

1 thumbscrews

4. Repeat this procedure for each SAN Volume Controller.

   Related tasks

   "Installing the support rails for the SAN Volume Controller" on page 60
   You must install the support rails that hold the SAN Volume Controller.

   Related reference

   "Preparing your SAN Volume Controller 2145-8F2 environment" on page 18
   Before installing the SAN Volume Controller 2145-8F2, you must prepare the
   physical environment.

Connecting the SAN Volume Controller 2145-8F2 to the 2145 UPS-1U

Connecting the SAN Volume Controller 2145-8F2 node to the 2145 uninterruptible
power supply-1U (2145 UPS-1U) requires that you first review the restrictions that
exist between the two systems.

Each SAN Volume Controller 2145-8F2 of a pair must be connected to a different
UPS.

Note: You must install the 2145 UPS-1Us in pairs. There must be at least two 2145
UPS-1Us per cluster. A cluster can contain no more than eight SAN Volume
Controller 2145-8F2s. Also, ensure that each 2145 UPS-1U of a pair is
connected to a separate electrical input power source (if possible) to reduce
the chance of input power failure at both UPSs.

Before you begin this task, refer to the user's cable connection table in the *IBM
TotalStorage SAN Volume Controller: Planning Guide* to identify the 2145 UPS-1U
to which this SAN Volume Controller 2145-8F2 is to be connected.

Perform the following steps to connect the SAN Volume Controller 2145-8F2 to the 2145 UPS-1U:

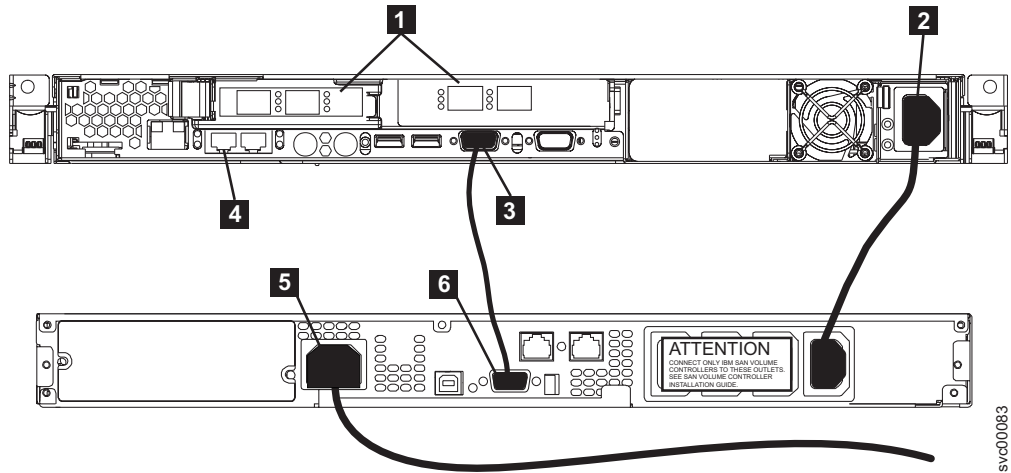1. At the back of the SAN Volume Controller 2145-8F2, plug a power cable into the power connector ❷ . See Figure 39.

Figure 39. Connecting the SAN Volume Controller 2145-8F2 power cable to the 2145 UPS-1U

❶ Fibre-channel ports

❷ Power connector

❸ Serial connector

❹ Ethernet ports

❺ Main power connector

❻ Communication port

❼ Load segment 2 receptacle

2. Place the other end of the SAN Volume Controller 2145-8F2 power cable into the rightmost load segment 2 receptacle ❼ on the 2145 UPS-1U.

3. Plug the signal cable into the serial connector ❸ located on the SAN Volume Controller 2145-8F2.

   DANGER

   You have already switched on the 2145 UPS-1U. The output sockets of the 2145 UPS-1U are live.

4. Place the other end of the SAN Volume Controller 2145-8F2 signal cable into the communication port ❻ on the 2145 UPS-1U.

The SAN Volume Controller 2145-8F2 power is connected to the 2145 UPS-1U.

Related tasks

"Inspecting the SAN Volume Controller for unsafe conditions" on page xxi
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.

"External machine check" on page xxii
Ensure that you perform an external machine check before you install the SAN Volume Controller.

"Internal machine checks" on page xxii
Ensure that you perform an internal machine check before you install the SAN Volume Controller.

"Inspecting the UPS for unsafe conditions" on page xxvi
Ensure that you take the time to inspect the uninterruptible power supply (UPS) for unsafe conditions.

Related reference

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

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

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

"Caution notices for the SAN Volume Controller" on page xix
Ensure that you understand the caution notices for the SAN Volume Controller.

"Controls and indicators for the SAN Volume Controller 2145-8F2" on page 6
All controls and indicators are located on the front panel of the SAN Volume Controller 2145-8F2.

"SAN Volume Controller 2145-4F2 rear panel indicators" on page 14
The controls and indicators for the SAN Volume Controller 2145-4F2 are contained on the front and back panel assembly.

"Controls and indicators for the 2145 UPS-1U" on page 24
All controls for the 2145 uninterruptible power supply-1U (2145 UPS-1U) are located on the front panel assembly.

Connecting the SAN Volume Controller 2145-4F2 to the 2145 UPS

Connecting the SAN Volume Controller 2145-4F2 node to the 2145 uninterruptible power supply (2145 UPS) requires that you first review the restrictions that exist between the two systems.

Each SAN Volume Controller 2145-4F2 of a pair must be connected to a different 2145 UPS. Each 2145 UPS can support up to two SAN Volume Controller 2145-4F2s.

Attention: Do not connect two nodes to the same pair of 2145 UPSs. Both nodes are lost in the event that a power failure occurs on both of those 2145 UPSs.

Note: You must install 2145 UPSs in pairs. There must be at least two 2145 UPSs per cluster. A cluster can contain no more than eight SAN Volume Controller 2145-4F2s. Also, ensure that each 2145 UPS of a pair is connected to a separate electrical input power source (if possible) to reduce the chance of input power failure at both 2145 UPSs.

Before you begin this task, refer to the user's cable connection table in the *IBM TotalStorage SAN Volume Controller: Planning Guide* to identify the 2145 UPS to which this SAN Volume Controller 2145-4F2 is to be connected.

Perform the following steps to connect the SAN Volume Controller 2145-4F2 to the 2145 UPS:

1. At the back of the SAN Volume Controller 2145-4F2, plug a power cable into the power connector **1** . See Figure 40.
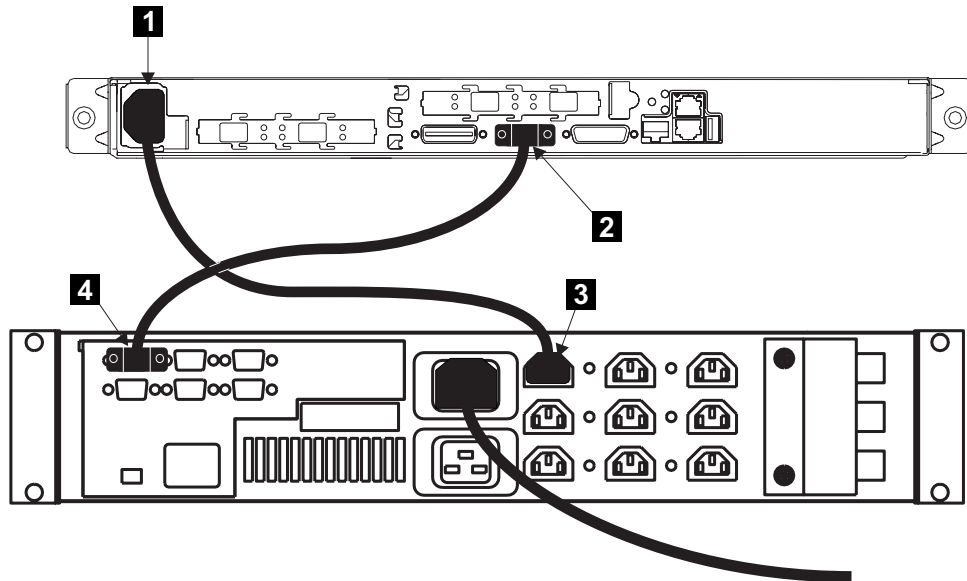

Figure 40. Connecting the SAN Volume Controller 2145-4F2 power cable to the 2145 UPS

1 Power connector

2 Serial connector

3 Output connector

4 Signal cable connector

2. Plug the signal cable of the power cable assembly into the serial connector **2** .

   DANGER

   > **You have already switched on the 2145 UPS. The output sockets of the 2145 UPS are live.**

3. Place the other end of the SAN Volume Controller 2145-4F2 power cable into any vacant output connector **3** on the 2145 UPS.

4. Place the other end of the signal cable into any vacant position on the top row of serial connectors **4** on the 2145 UPS.

   Attention: Do not plug any signal cables into the bottom row of signal cable connectors or the 2145 UPS malfunctions.

The SAN Volume Controller 2145-4F2 power is connected to the 2145 UPS.

   Related tasks

   "Inspecting the SAN Volume Controller for unsafe conditions" on page xxi
   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.

"External machine check" on page xxii
Ensure that you perform an external machine check before you install the SAN Volume Controller.

"Internal machine checks" on page xxii
Ensure that you perform an internal machine check before you install the SAN Volume Controller.

"Inspecting the UPS for unsafe conditions" on page xxvi
Ensure that you take the time to inspect the uninterruptible power supply (UPS) for unsafe conditions.

Related reference

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

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

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

"Caution notices for the SAN Volume Controller" on page xix
Ensure that you understand the caution notices for the SAN Volume Controller.

"Controls and indicators for the SAN Volume Controller 2145-8F2" on page 6
All controls and indicators are located on the front panel of the SAN Volume Controller 2145-8F2.

"SAN Volume Controller 2145-4F2 rear panel indicators" on page 14
The controls and indicators for the SAN Volume Controller 2145-4F2 are contained on the front and back panel assembly.

"Controls and indicators for the 2145 UPS" on page 31
All controls for the 2145 uninterruptible power supply (2145 UPS) are located on the front panel assembly.

Connecting the SAN Volume Controller to the SAN and to the Ethernet network

Before you connect the SAN Volume Controller to the SAN, you must connect the Ethernet and fibre-channel cables.

Before you begin this task, refer to the user's cable connection table to find out where to connect the Ethernet and fibre-channel cables.

1. Connect the Ethernet cable to the Ethernet port **1** . See Figure 41.

   Attention: You must use only Ethernet port 1 on the SAN Volume Controller. The software is configured only for Ethernet port 1.
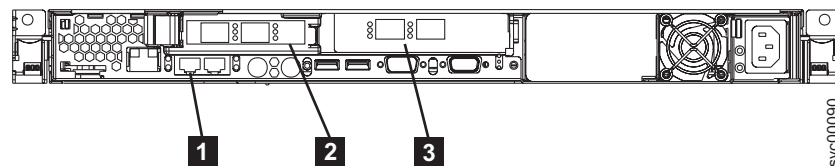
Figure 41. Connectors at the back of the SAN Volume Controller

1 Ethernet port 1

2 Low profile duel port fibre-channel host bus adapter (HBA) with ports 1 and 2 (left to right)

3 Full height duel port fibre-channel HBA with ports 3 and 4 (left to right)

Attention: When routing the fibre-channel cables, do not tighten the cable straps or bend the cables to a radius smaller than 76 mm (3 in.).

2. Connect the fibre-channel cables to the fibre-channel ports **2** , **3** and **4** as required by the user's configuration. See Figure 41 on page 69. These numbers correspond to the numbers that are shown in the user's cable connection table.

3. Connect the other end of the Ethernet cable to the proper connector on the Ethernet hub or switch.

4. Connect the other ends of the fibre-channel cables to the proper connectors of the fibre-channel switches.

   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 reference

   "Controls and indicators for the SAN Volume Controller 2145-8F2" on page 6
   All controls and indicators are located on the front panel of the SAN Volume Controller 2145-8F2.

   "Ethernet option" on page 82
   The Ethernet option displays the operational states of the Ethernet port and its media access control (MAC) address.

Verifying the SAN Volume Controller installation

You must verify the SAN Volume Controller installation after the installation has completed.

Check the speed at which the SAN Volume Controller nodes are to be operated (usually 2 Gbps) in the configuration data table that is provided by the user.

This task shows you how to verify the installation after you install the SAN Volume Controller in the rack and connect it to both the uninterruptible power supply and the storage area network (SAN).

Perform the following steps to verify installation:

1. Press the SAN Volume Controller **power** switch. Verify that the green **power** light is on. If the light is not on, see *MAP 5000: Start* in the *IBM TotalStorage SAN Volume Controller: Service Guide* to repair the problem.

   Note: You do not need to install any software. The node boots automatically.

   Verify that the node is booting without error. If it boots without error, the Charging message is displayed in the first line of the front-panel display and a progress bar is displayed on the second line. In most cases, the battery is delivered charged, so you do not see the Charging message. Battery charging can take up to three hours until the battery is fully charged. In the meantime, the battery charging menu is replaced if you press any navigation buttons. Battery charging, though, continues (you can re-enter the menu system to view the charging progress). If you are still able to view the battery charging menu,

when the battery is charged enough, `Cluster:` is displayed on the first line of the front-panel display. The second line is left blank.

2. Press and hold the Select button for five seconds. The check light comes on and a display test is performed. When the display test is complete, the check light goes off and a button test is started.

3. Press the Up, Down, Left, and Right buttons to verify that they are working. Figure 42 shows four examples of what the front panel should display when you press the buttons. When you have finished testing the buttons, press and hold the Select button for five seconds in order to exit the test.

No button pressed (border only)

Up button pressed

Left and Right button pressed

Select button pressed
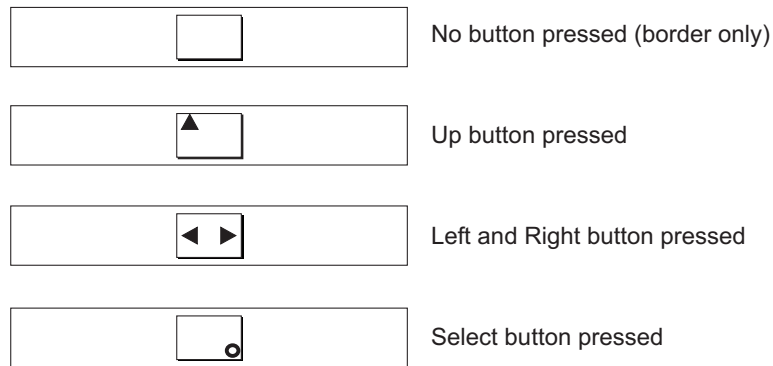
Figure 42. Front panel display when push buttons are pressed

4. If the `Charging` message is displayed on the front panel display, press the Select button to switch to the menu. The menu continues to be displayed while you press the buttons on the front panel. If you do not press any buttons within 60 seconds, the menu changes to display the charging progress. You can switch the front panel display to the menu at any time by pressing the Select button again.

5. Press and release the Up or Down button until the `Node:` option is displayed on the first line of the front-panel display.

6. Verify that the node number that is displayed on the second line of the front-panel display is the same as the node number that is printed on the front panel of the node (see Figure 43).

Node:
xxxxxx

Figure 43. Node number

7. Press and release the Up or Down button until the `Ethernet` option is shown on the front panel display. The second line of the front-panel display in Figure 44 on page 72 shows the message `Inactive`. This message shows that, although an Ethernet connection is available, it cannot yet be used.

```
Ethernet:
Inactive
```

Figure 44. Ethernet mode

8. Press and release the Up or Down button until the `FC Port-1` option shows in the display.

9. Check whether the second line of the front-panel display shows the message `Active`.

10. Press and release the Left or Right button to display the other port options. Check whether for each port, the second line of the front-panel display shows the message `Active`. If `Active` is not shown for any port, go to *MAP 5600: Fibre-channel* to repair the fault.

11. If the configuration data table provided by the user indicates that the SAN Volume Controller nodes are to be operated at 1 Gbps, follow these steps:

    a. Press and hold the Down button.

    b. Press and release the Select button.

    c. Release the Down button.

    The second line of the front-panel display shows the current fibre-channel speed setting of the node. Press the Up or Down button until `1 Gbps` is displayed and then press the Select button. This changes the fibre-channel speed for all ports on this node to 1 Gbps.

12. If you want to select a language other than English, perform the following steps:

    a. Press the Up or Down button until `Select Language?` displays.

    b. Press the Select button.

    c. Press the Left or Right button until the required language is displayed.

    d. Press the Select button.

13. Repeat step 1 on page 70 through step 12 for each SAN Volume Controller.

When the battery is fully charged, the charge progress bar is replaced by the `Cluster` option on the front panel display of the SAN Volume Controller. The installation is now complete. Refer to the *IBM TotalStorage SAN Volume Controller: Configuration Guide* to assist you with the customer configuration process.

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.

Boot progress indicator

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

Figure 45 shows that the node is starting.

```
Booting          130
 ▭▭▭▭▭▭▭▭▭▭▭
```

Figure 45. 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.

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 46 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 46. Node-rescue-request display

Power failure

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

Figure 47 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 47. Power failure display

Powering off

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

Figure 48 on page 75 shows that the power button has been pressed and the node is powering off. Powering off may take several minutes.

Figure 48. 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 49 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 49. 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 50 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.
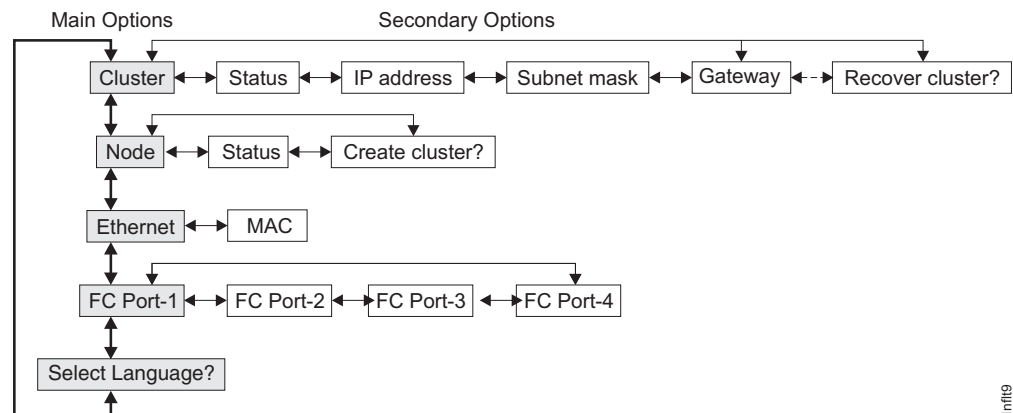
Figure 50. Menu options sequence

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" on page 77
  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 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 82
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.

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 concepts

"Status"
Status is indicated on the front panel.

"IP address" on page 78
The IP address is used to access the cluster from the command line tools or Web browser.

"Subnet mask" on page 78
The subnet mask address is set when a cluster is created.

Related reference

"Gateway" on page 78
The gateway address is set when the cluster is created.

"Recover cluster?" on page 78
The Recover cluster? option is useful if the administrator password has been lost or forgotten.

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.

Gateway

The gateway address is set when the cluster is created.

The gateway option displays the gateway address.

Recover cluster?

The Recover cluster? option is useful if the administrator password has been lost or forgotten.

This field allows you to recover a lost administrator password or make the node accessible via the service password.

Figure 51 shows the Recover cluster? menu sequence.

```
┌─────────────────┐
│ Recover Cluster? │
└─────────────────┘
   │
   │ Select
   │
┌──────────────┐
│ Service Access │
└──────────────┘
```
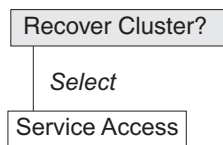
Figure 51. Recover Cluster? menu sequence

You do not need to use this field during installation. For more information about the Recover cluster? field, see the *IBM TotalStorage SAN Volume Controller: Service Guide*.

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 reference

"Status" on page 79
Use the status to diagnose cluster failures.

"Create cluster?" on page 79
Clusters can be created from the Create Cluster 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 52 shows the create cluster menu sequence.
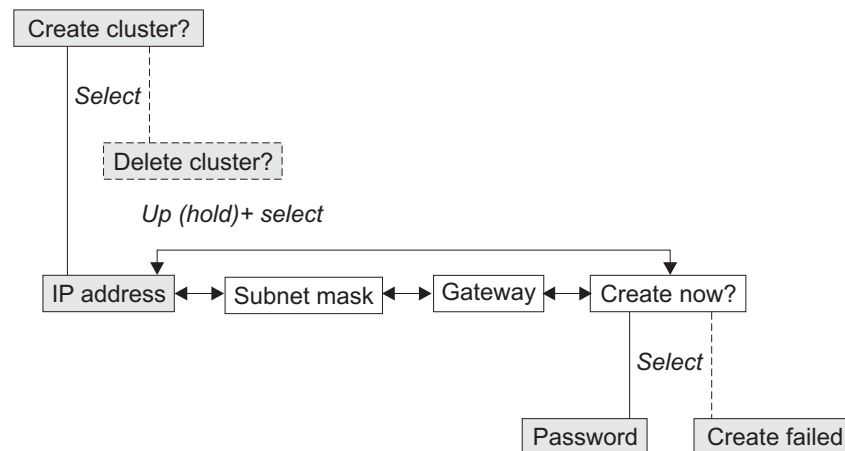
Figure 52. Create cluster? menu sequence

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 and 4 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 on page 80 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 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 53 shows the Select language? option sequence.
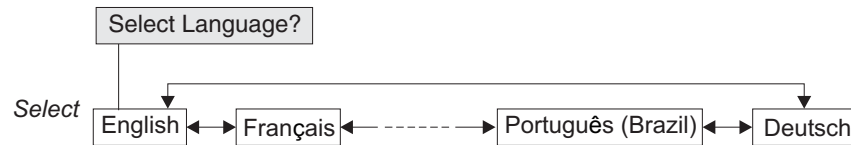
Figure 53. Select language? menu sequence

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.

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 xii
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.

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Japanese Voluntary Control Council for Interference (VCCI) statement

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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.

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

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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.

Industry Canada compliance statement

This Class A digital apparatus complies with IECS-003.

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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

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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

Ensure you are familiar with the list of terms and their definitions used in this guide.

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.

CIM See *Common Information Model*.

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.

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.

FC See *fibre channel*.

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.

IP See *Internet Protocol*.

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.

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*.

Small Computer System Interface (SCSI)
> A standard hardware interface that enables a variety of peripheral devices to communicate with one another.

SNMP See *Simple Network Management Protocol*.

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)

subsystem device driver (SDD)
> An IBM pseudo device driver designed to support the multipath configuration environments in IBM products.

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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Numerics

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Installation Guide
Version 3.1.0

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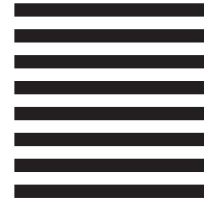Fold and Tape   **Please do not staple**   Fold and Tape

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