

IBM System Storage SAN Volume Controller



Installation Guide

Version 4.1.0

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Version 4.1.0

First Edition (June 2006)

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

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About this guide

This guide provides an overview of the IBM System Storage 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 GC26-7900-00 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, SC26-7541-05. 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 is now delivered with a new server, the SAN Volume Controller 2145-8F4.

- New topics:
 - Checking the grounding of the SAN Volume Controller 2145-8F4 and the 2145 UPS-1U
 - SAN Volume Controller 2145-8F4 hardware
 - SAN Volume Controller 2145-8F4 connectors

Changed information

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

- There is a new SAN Volume Controller supported model. The SAN Volume Controller is now documented by model number. For example, this publication states three SAN Volume Controller models types: SAN Volume Controller 2145-4F2, the SAN Volume Controller 2145-8F2, and the new SAN Volume Controller 2145-8F4.

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 all SAN Volume Controller models. When the SAN Volume Controller is referred to as the SAN Volume Controller 2145-4F2, the SAN Volume Controller 2145-8F2, or the SAN Volume Controller 2145-8F4, then the specific SAN Volume Controller is designated.

Removed Information

This section lists information that was removed from this book.

- Removed topics
 - Danger notices for the SAN Volume Controller
 - Danger notices for the uninterruptible power supply
 - Caution notices for the SAN Volume Controller
 - Caution notices for the uninterruptible power supply

Emphasis

Different typefaces are used in this guide to show emphasis.

The following typefaces are used to show emphasis:

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

SAN Volume Controller library and related publications

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

The tables in this section list and describe the following publications:

- The publications that make up the library for the IBM System Storage 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/storage/support/2145>

Title	Description	Order number
<i>IBM System Storage SAN Volume Controller: CIM agent Developer's Reference</i>	This reference guide describes the objects and classes in a Common Information Model (CIM) environment.	GA32-0552
<i>IBM System Storage SAN Volume Controller: Command-Line Interface User's Guide</i>	This guide describes the commands that you can use from the SAN Volume Controller command-line interface (CLI).	SC26-7903
<i>IBM System Storage SAN Volume Controller: Configuration Guide</i>	This guide provides guidelines for configuring your SAN Volume Controller.	SC26-7902
<i>IBM System Storage SAN Volume Controller: Host Attachment Guide</i>	This guide provides guidelines for attaching the SAN Volume Controller to your host system.	SC26-7905
<i>IBM System Storage SAN Volume Controller: Installation Guide</i>	This guide includes the instructions the service representative uses to install the SAN Volume Controller.	GC26-7900
<i>IBM System Storage SAN Volume Controller: Planning Guide</i>	This guide introduces the SAN Volume Controller and lists the features you can order. It also provides guidelines for planning the installation and configuration of the SAN Volume Controller.	GA32-0551
<i>IBM System Storage SAN Volume Controller: Service Guide</i>	This guide includes the instructions the service representative uses to service the SAN Volume Controller.	GC26-7901
<i>IBM System Safety Notices</i>	This guide contains the danger and caution notices for the SAN Volume Controller. The notices are shown in English and in numerous other languages.	G229-9054
<i>IBM System Storage Master Console for SAN File System and SAN Volume Controller: Installation and User's Guide</i>	This guide includes the instructions on how to install and use the SAN Volume Controller Console	GC30-4090

Other IBM publications

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

Title	Description	Order number
<i>IBM System Storage Multipath Subsystem Device Driver: User's Guide</i>	This guide describes the IBM System Storage Multipath Subsystem Device Driver Version 1.5 for TotalStorage Products and how to use it with the SAN Volume Controller. This publication is referred to as the <i>IBM System Storage Multipath Subsystem Device Driver: User's Guide</i> .	SC30-4131

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/storage/support/2145
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 must be a concern for anyone using the SAN Volume Controller or an uninterruptible power supply (UPS).

The **Danger** and **Caution** notices for the SAN Volume Controller and any related UPSs can be found in the *IBM System Safety Notices*. Please review the topics concerning the safety 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 notices throughout the SAN Volume Controller documentation and in the *IBM System Safety Notices* follow specific guidelines for their content.

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

DANGER

<p>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.</p>

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.

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice. For all danger, caution, and attention notices, see the *IBM System Safety Notices*.

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 2145-8F4 and the 2145 UPS-1U

Ensure that you understand how to check the grounding of the SAN Volume Controller 2145-8F4 and the 2145 uninterruptible power supply-1U (2145 UPS-1U).

Perform the following steps to ensure that the SAN Volume Controller 2145-8F4 is properly grounded:

1. Ensure that all power is removed.

- 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 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 2145-8F4 and the 2145 UPS-1U.

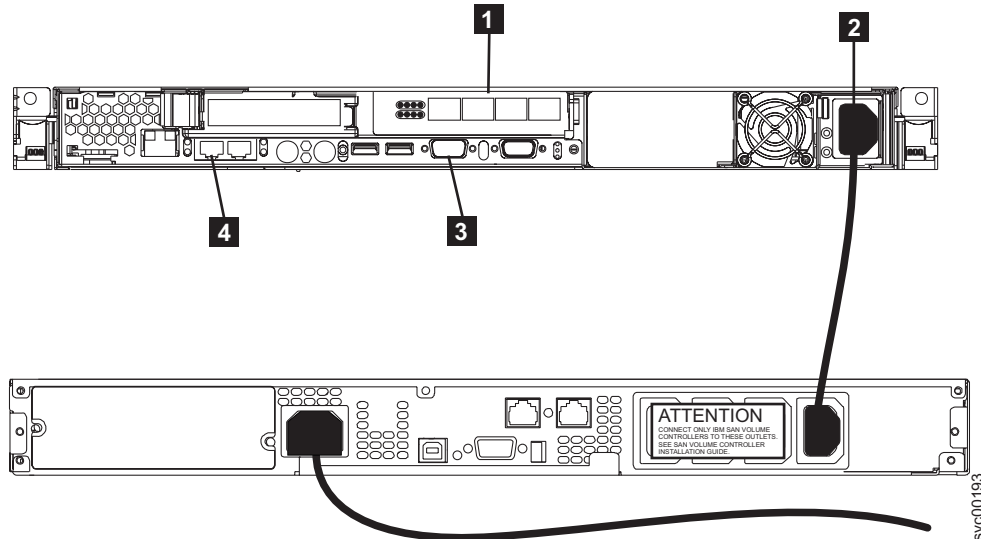


Figure 1. Power cable and signal sockets for the SAN Volume Controller 2145-8F4 and 2145 UPS-1U

Attention: Some electrical circuits can be damaged if the external signal cables are present at the SAN Volume Controller 2145-8F4 while it is undergoing a grounding check.

- Ensure that no external cables are present at connectors **1** and **3**.
- Disconnect and remove the Ethernet cable from connector **4**.
- Follow your local procedures and check the grounding of the SAN Volume Controller 2145-8F4. Any test equipment must be connected to the frame of the SAN Volume Controller 2145-8F4.

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.

- Check for continuity between the frame of the SAN Volume Controller 2145-8F4 and the ground pin of each main power connector. The ground pin is shown as **1** in Figure 2.

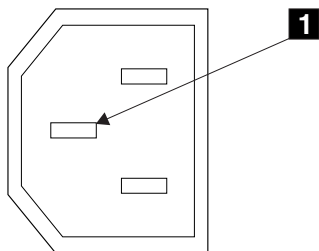


Figure 2. Ground pin

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 xiii through step 5 on page xiv again.

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 3 shows the connectors for the SAN Volume Controller 2145-8F2 and the 2145 UPS-1U.

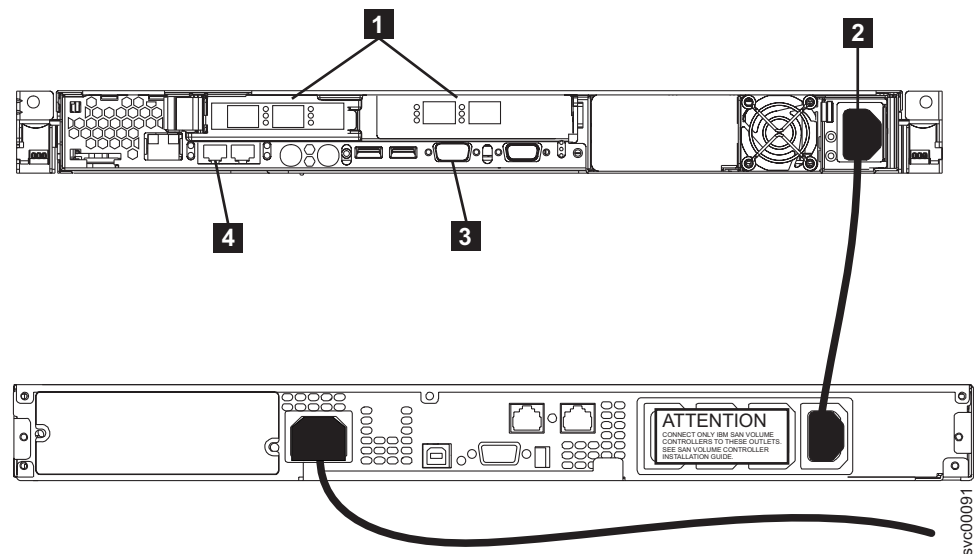


Figure 3. Power cable and signal sockets for the SAN Volume Controller 2145-8F2 and 2145 UPS-1U

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 4.

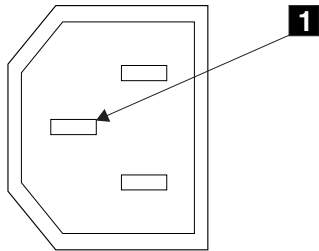


Figure 4. Ground pin

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 xv through step 5 on page xv 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 5 on page xvii 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.

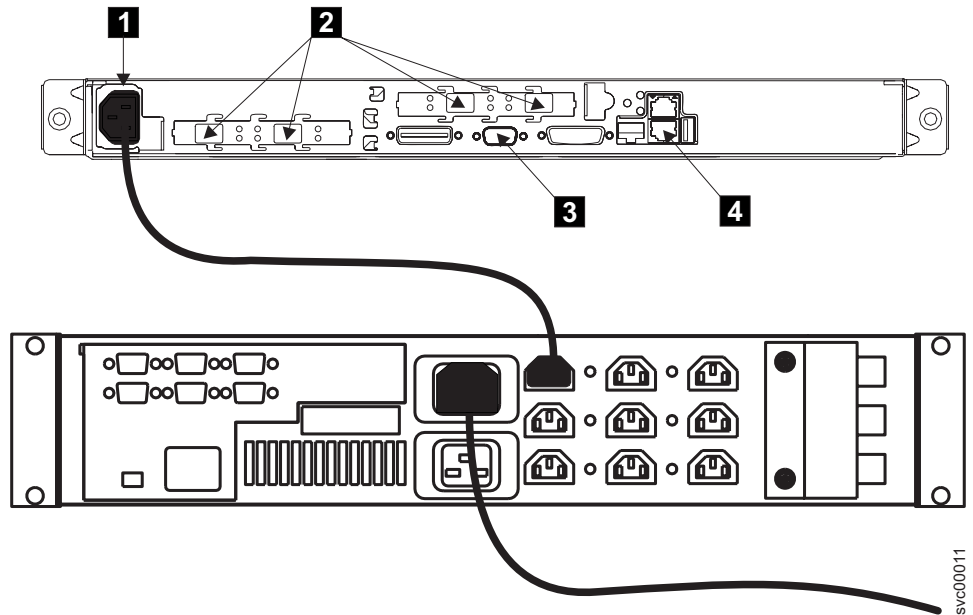


Figure 5. Power cable and signal sockets for the SAN Volume Controller 2145-4F2 and 2145 UPS

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 6 shows the location of the ground pin.

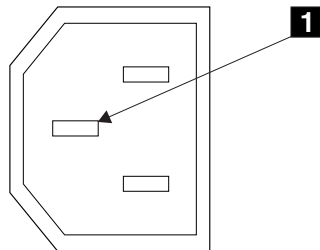


Figure 6. Ground pin

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 xvi through step 5 on page xvii 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 2145-8F4**

 <p>©Registered Trademark of International Business Machines Corporation Apparaten skall anslutas till jordat uttag Apparatet må tilkoples jordat stikkontakt Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan</p> <p>Product certified in San Jose, CA USA 美国制造</p> <p>Licensed Machine Code - Property of IBM ©Copyright IBM Corp. 1981, 2002 All rights reserved. US Government Users Restricted Rights. Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp. This machine is manufactured from new parts, or new and used parts. Canada ICES/NMB-003 Class/Classe A</p> <p>この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。</p>	<p>警告使用者： 這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。</p>	   	<p>This device complies with part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.</p>	  	<p>PN 31P0805</p> <p>TotalStorage SAN Volume Controller SAN控制器 網路儲存容體控制器 TYPE 型号: 2145-8F4 服务器 额定电压: 200-240 V ~ 额定电流: 3.2 A 额定频率: 50/60 Hz</p>

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

 <p>©Registered Trademark of International Business Machines Corporation Apparaten skall anslutas till jordat uttag Apparatet må tilkoples jordat stikkontakt Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan</p> <p>Product certified in San Jose, CA USA 美国制造</p> <p>Licensed Machine Code - Property of IBM ©Copyright IBM Corp. 1981, 2002 All rights reserved. US Government Users Restricted Rights. Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp. This machine is manufactured from new parts, or new and used parts. Canada ICES/NMB-003 Class/Classe A</p> <p>この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。</p>	<p>警告使用者： 這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。</p>	   	<p>This device complies with part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.</p>	 	<p>PN 64P8160</p> <p>TotalStorage SAN Volume Controller SAN控制器 網路儲存容體控制器 TYPE 型号: 2145-8F2 服务器 额定电压: 200-240 V ~ 额定电流: 3.2 A 额定频率: 50/60 Hz</p>


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

<p>MACHINE TYPE 2145</p> <p>MODEL: 4F2</p> <p>RATING: 100-240V ~ 50/60Hz 3.5-1.75A</p> <p>P/N 64P7837</p>	 <p>©Registered Trademark of International Business Machines Corporation SAN JOSE CA, USA IBM Canada Ltd. Registered User</p> <p>Marca Registrada CANADA ICES/NMB-003 Class/Classe (A)</p> <p>This machine is manufactured from new parts or new and used parts.</p> <p>This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.</p>       <p>E-D019-00-380(A)</p>	 <p>警告使用者： 這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。</p> <p>この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。</p>	<p>PN 18P5457</p>
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• No user access label



• Class 1 laser label

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

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

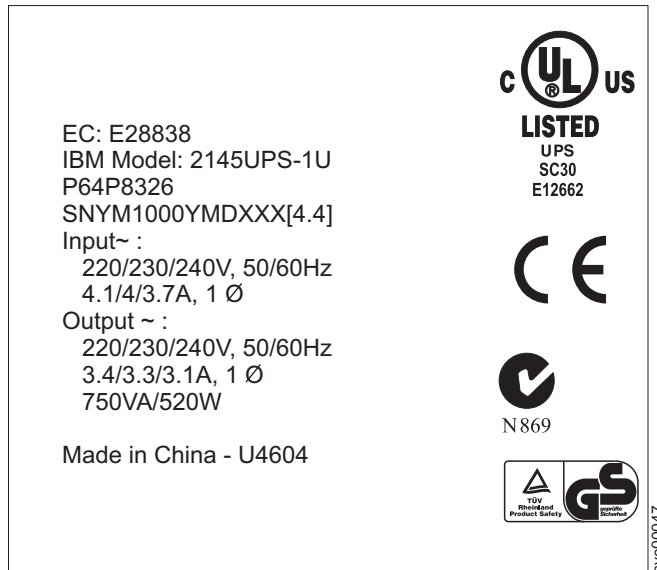
Checking the labels on the outside of the UPS

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

Checking the 2145 UPS-1U labels

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

- Agency label



- IT compatible label



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

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




Checking the 2145 UPS labels

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

- Agency label






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

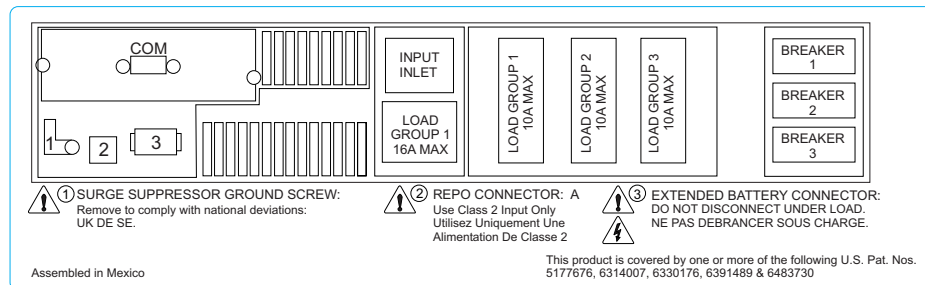
Made in Mexico - TWWYY [4.11]

svc00149

• Rear panel configuration label

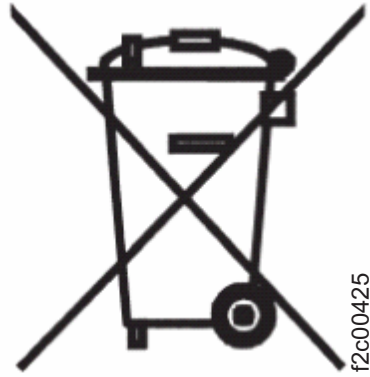
Note: This label is installed on the cover of the power supply of the SAN Volume Controller.



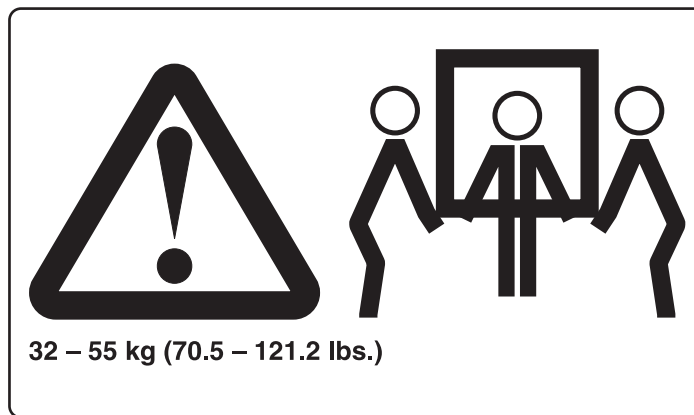
• Do not discard the UPS or the UPS batteries in the trash label

Notes:

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



- Three-man lift label



- Weight label



- IT compatible label



- Power ratings and no user access label



Checking the labels on the battery of the UPS

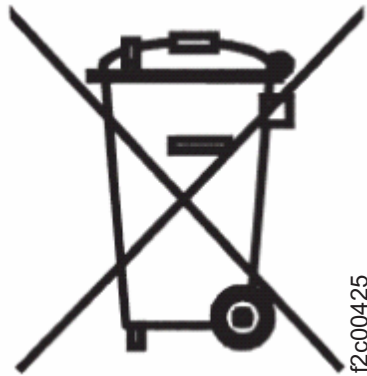
Before you install, use, or service the battery of the uninterruptible power supply (UPS), you must ensure that you understand the safety labels.

Checking the battery label of the 2145 UPS-1U

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

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

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



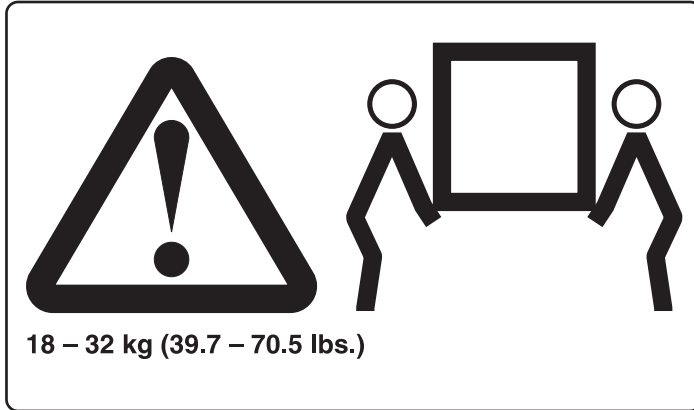
- **Recycling label**



Checking the battery labels of the 2145 UPS

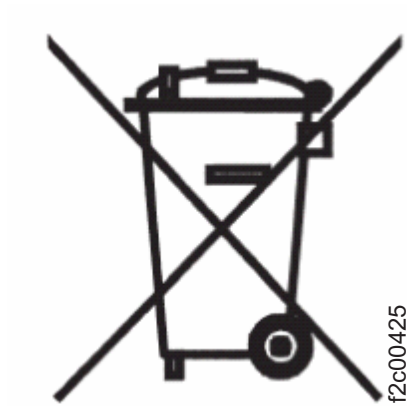
Ensure that you can locate and understand the battery labels for the 2145 uninterruptible power supply (2145 UPS).

- **Two-man lift label**



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

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



- Recycling label



- Weight label



- Power ratings and no user access label



- Battery faceplate label

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

<p>CAUTION:</p> <ul style="list-style-type: none"> For use in a controlled environment More than one live circuit Qualified service personnel ONLY <p>Per pól:</p> <ul style="list-style-type: none"> Til brug i et kontrolleret miljø Mere end én strømførende kredsløb KUN uddannede serviceteknikere <p>OPROUD:</p> <ul style="list-style-type: none"> Zu gebrui in a gekontroleerde omgewings Meer as een stroomvoerende aansluiting MOET gekwalificeerde technici gebruiken <p>注意:</p> <ul style="list-style-type: none"> 制御された環境での使用 複数のライブ回路 資格のあるサービス技術員のみ <p>CUIDADO:</p> <ul style="list-style-type: none"> Para utilização num ambiente controlado Mais de um circuito ativo APENAS pessoal qualificado de assistência técnica <p>OPROUDENING:</p> <ul style="list-style-type: none"> Zijn aangevoerd in een gecontroleerd milieu Meer dan één actief stroomcircuit ALEMEN gekwalificeerd personeel 	<p>تحذور:</p> <ul style="list-style-type: none"> استخدام في بيئة تشغيل منضبطة أكثر من دائرة واحدة فقط موظفين لتقنية الخدمة <p>PRECAUCIÓN:</p> <ul style="list-style-type: none"> Para utilizar en un entorno controlado Más de un circuito activo SOLO personal de servicio cualificado <p>זהירות:</p> <ul style="list-style-type: none"> לשימוש בסביבה מבוקרת יותר מדף זרם אחד אנשי שירות מוסמכים בלבד <p>주의:</p> <ul style="list-style-type: none"> 통제 환경에서 사용 하나 이상의 회로 전문 서비스 담당자 전용 <p>OPROUDING:</p> <ul style="list-style-type: none"> Zijn aangevoerd in een gecontroleerd milieu Meer dan één actief stroomcircuit ALEMEN gekwalificeerd personeel 	<p>CUIDADO:</p> <ul style="list-style-type: none"> Para utilização em um ambiente controlado Mais de um circuito ativo APENAS para equipe de manutenção qualificada <p>Verbod:</p> <ul style="list-style-type: none"> Gebruik in een gecontroleerde omgeving Meer dan één actief stroomcircuit Alleen gekwalificeerd personeel <p>OPSEZ:</p> <ul style="list-style-type: none"> Zu gebruiken in een gecontroleerd omgevings Meer dan één actief stroomcircuit SAEM gekwalificeerde servicepersoneel <p>WAARSCHUWING:</p> <ul style="list-style-type: none"> Gebruik niet getuigd in een gecontroleerde omgevings Meer dan één actief stroomcircuit UITSLUITEND gekwalificeerd personeel <p>OPROUDENING:</p> <ul style="list-style-type: none"> The product is not intended for use in a controlled environment More than one live circuit ONLY qualified service personnel 	<p>注意:</p> <ul style="list-style-type: none"> 電子受控環境中 具有多个带电电路 仅限合格的服务人员使用 <p>ATTENTION:</p> <ul style="list-style-type: none"> Utiliser dans un environnement sous surveillance Plusieurs circuits sous tension Personnel de maintenance qualifié UNIQUEMENT <p>FIGYELMEZTÉS:</p> <ul style="list-style-type: none"> Csak felügyelt alatt álló környezetben használható Egyes élős feszültségű áramkörök CSAK képzett szerviz szakember <p>ADVARSEL:</p> <ul style="list-style-type: none"> Til brug i et kontrolleret miljø Mer end én strømførende kredsløb KUN kvalificeret servicepersonale <p>VAROITUS:</p> <ul style="list-style-type: none"> Amoiti ympäristö, jossa tarkkavaliassa Useita eläviä virtapiirejä Vain koulutettu huoltohenkilöstö <p>POZOR:</p> <ul style="list-style-type: none"> Použití v řízeném prostředí Více než jeden aktivní elektrický obvod POUZE kvalifikovaný servisní personál <p>Achtung:</p> <ul style="list-style-type: none"> Nur in einer kontrollierten Umgebung Mehrere unter Spannung stehende Stromkreise Ausführung nur durch Fachpersonal <p>AVVERTENZA:</p> <ul style="list-style-type: none"> Per l'uso in un ambiente controllato Più di un circuito SOLO personale qualificato dell'assistenza tecnica <p>ZAGROZENIE:</p> <ul style="list-style-type: none"> Do używania w kontrolowanym środowisku Więcej niż jeden aktywny obwód TYLKO dla wykwalifikowanego personelu serwisu <p>注意:</p> <ul style="list-style-type: none"> 不安全性環境下使用 一個以上の電路開閉中 限合格的服務員
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Environmental notices and statements

You must become familiar with the environmental notices and statements.

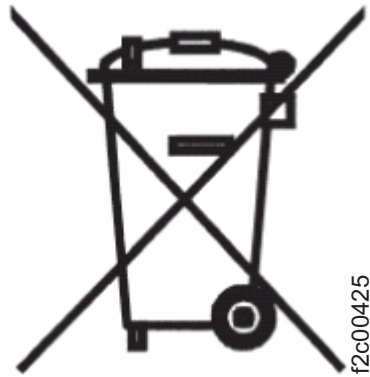
The following topics describe the environmental notices and statements that are applicable to this product.

Product recycling

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

This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet site at

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



Note:

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

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

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown previously, 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.

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)
 - Global Mirror (asynchronous copy)
 - Data migration
 - Space management
 - Mapping that is based on desired performance characteristics
 - Metering of service quality

Each SAN Volume Controller is a *node*. 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 back up the other. Each pair of nodes is known as an *I/O group*. There are three models of SAN Volume Controller nodes: the SAN Volume Controller 2145-4F2, the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-8F4. Figure 7 on page 2 and Figure 8 on page 2 provide illustrations of the three types of SAN Volume Controller nodes.

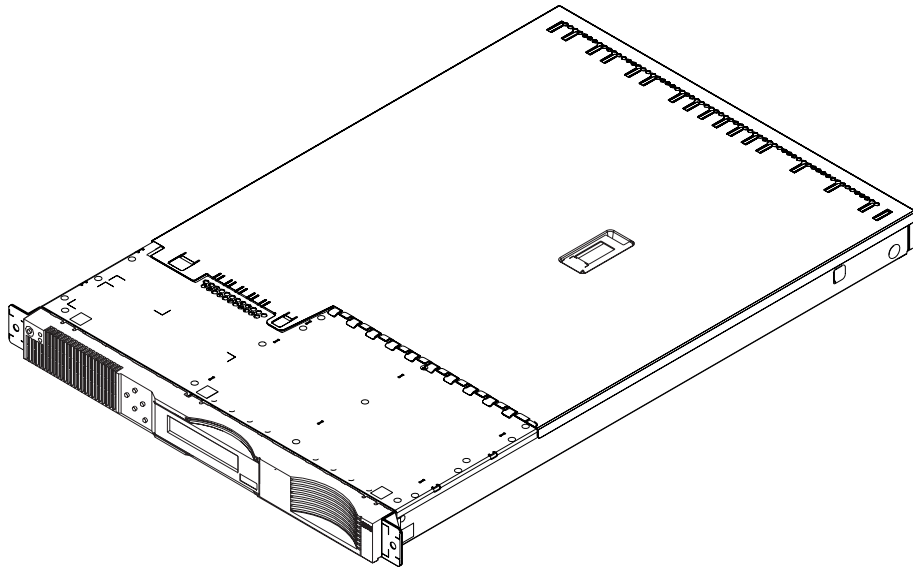


Figure 7. SAN Volume Controller 2145-4F2 node

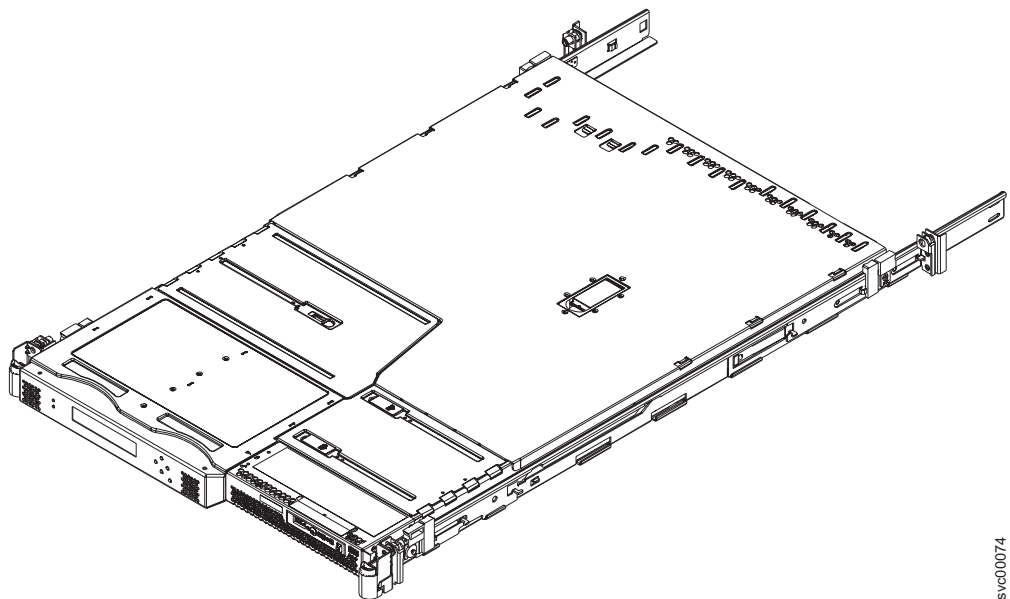


Figure 8. SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-8F4 node

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.

A SAN Volume Controller I/O group takes the storage that is presented to the SAN by the storage subsystems 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.

svc00074

The SAN Volume Controller provides continuous operations and can also optimize the data path to ensure that performance levels are maintained.

Field replaceable units (FRU) can be removed and replaced 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 2145-8F2 hardware” on page 18

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

“SAN Volume Controller 2145-8F2 connectors” on page 20

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

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 for each host 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 9 shows several host systems that are connected in a SAN fabric.

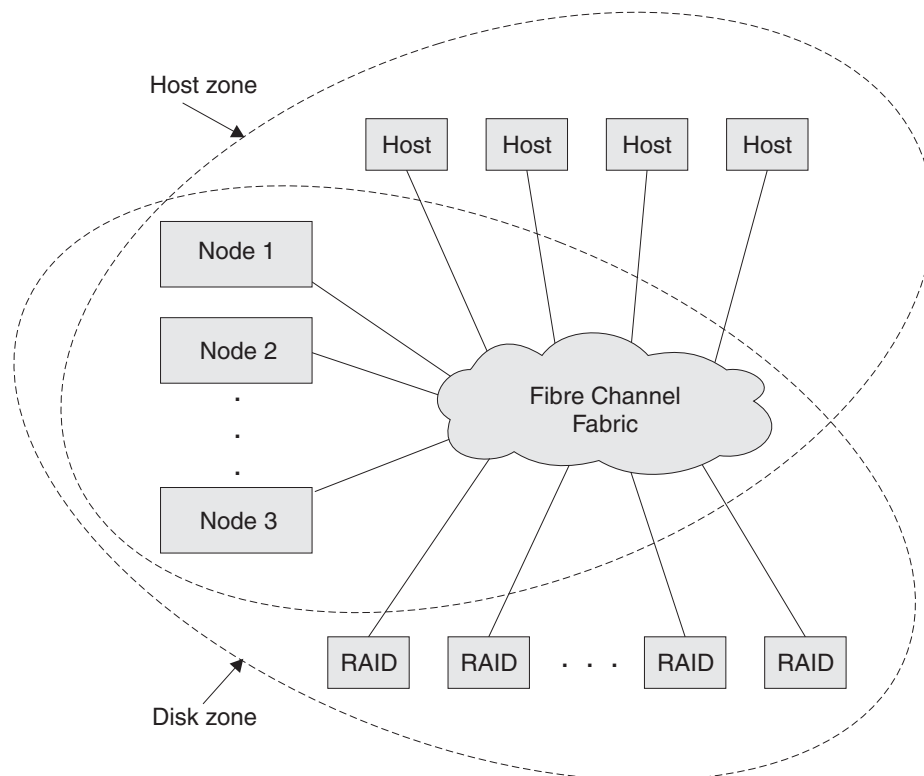


Figure 9. Example of a SAN Volume Controller in a fabric

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 storage subsystems (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 SAN Volume Controller 2145-4F2 node has the following features:

- 19-inch rack mounted enclosure
- Two 2 Gbps 2-port fibre-channel adapters (four fibre-channel ports)
- 4 GB cache memory

Features of a SAN Volume Controller 2145-8F2 node

The SAN Volume Controller 2145-8F2 node has the following features:

- 19-inch rack mounted enclosure
- Two 2 Gbps 2-port fibre-channel adapters (four fibre-channel ports)
- 8 GB cache memory

Features of a SAN Volume Controller 2145-8F4 node

The SAN Volume Controller 2145-8F4 node has the following features:

- 19-inch rack mounted enclosure
- One 4-port 4 Gbps fibre-channel adapter (four fibre-channel ports)
- 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 (CLI) that uses Secure Shell (SSH)

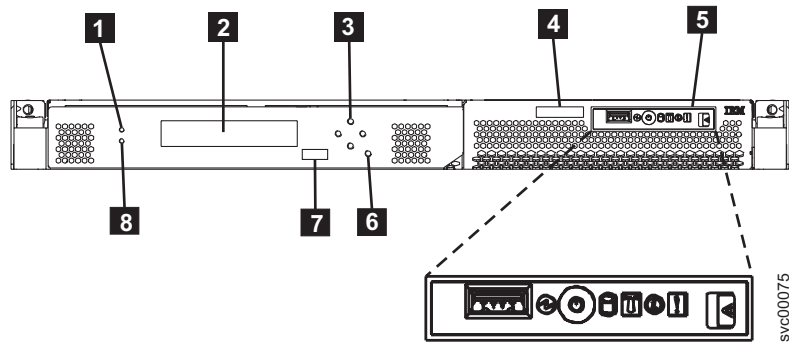
Application programming interfaces

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.

SAN Volume Controller controls and indicators

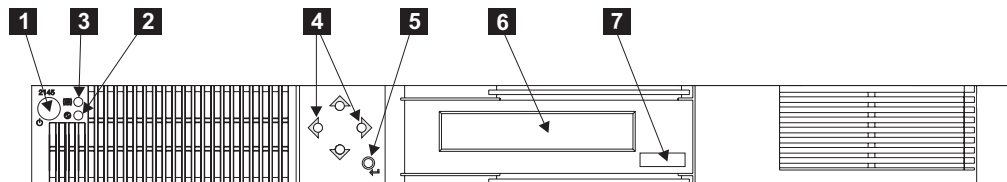
All controls and indicators are located on the front panel of the SAN Volume Controller.

SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 controls and indicators



- 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

SAN Volume Controller 2145-4F2 controls and indicators



- 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

“Operator information panel” on page 9

The operator information panel contains indicators and buttons for the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4.

“Power LED” on page 10

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

Error LED

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

The 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 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 and navigation buttons help you to navigate and select menu and 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.

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.

Operator information panel

The operator information panel contains indicators and buttons for the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4.

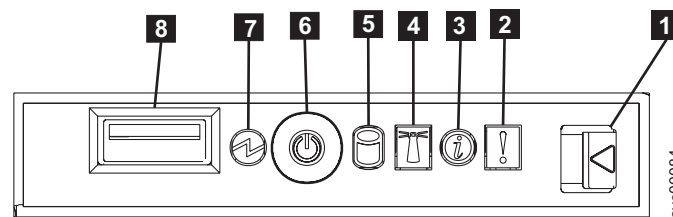


Figure 10. Operator information panel

- 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

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. The 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 node and snap it into place.

|

System-error LED

The system-error LED is illuminated when an error is detected by the system board.

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

When it is lit, the green hard disk drive activity LED indicates that the hard disk drive is in use.

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

Power control button

The power control button switches on or switches off the main power to the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4.

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

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

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

Power LED

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

The properties of the green power LED are as follows:

- Off** One or more of the following are true:
- No power is present at the power supply input
 - The power supply has failed
 - The LED has failed

On The SAN Volume Controller is powered on.

Flashing

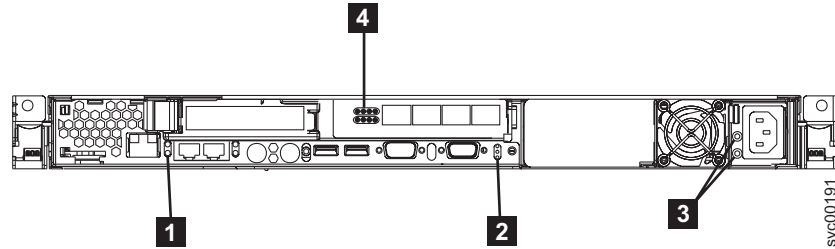
The SAN Volume Controller is turned off but is still connected to an input power source.

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

SAN Volume Controller rear panel indicators

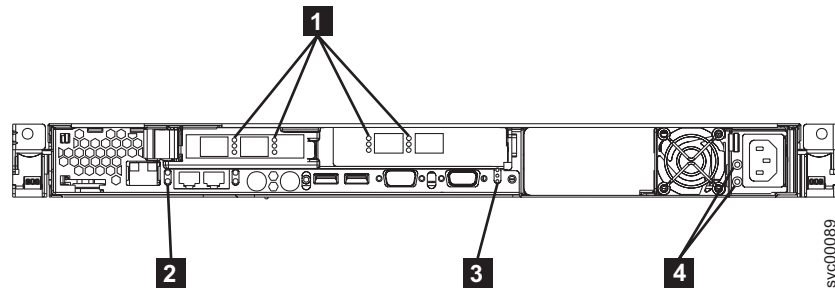
The indicators for the SAN Volume Controller are contained on the front and back panel assembly. The following graphics show the rear panel indicators.

SAN Volume Controller 2145-8F4 rear panel indicators



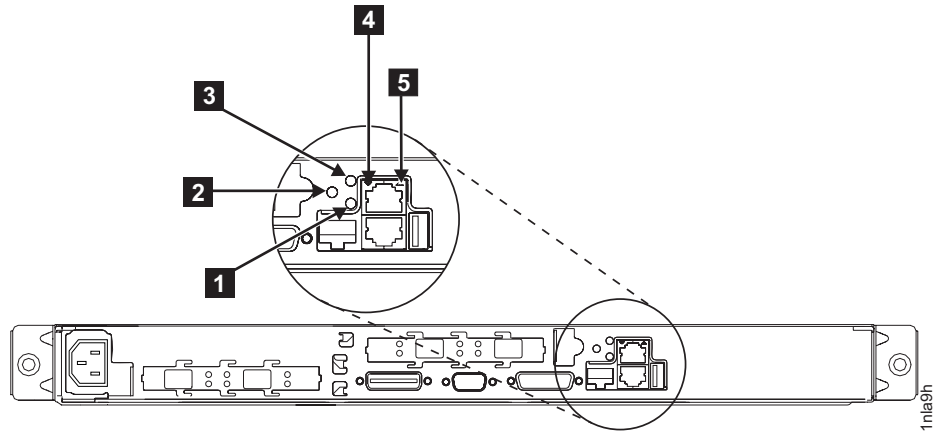
- 1** Ethernet connection LED
- 2** Power, location, and system error LEDs
- 3** Ac and dc LEDs
- 4** Fibre-channel LEDs

SAN Volume Controller 2145-8F2 rear panel indicators



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

SAN Volume Controller 2145-4F2 rear panel indicators



- 1** System board power LED
- 2** System board fault LED
- 3** Monitor LED (not used)
- 4** Lower Ethernet connection LED
- 5** Upper Ethernet connection LED

Fibre-channel LEDs

The fibre-channel LEDs indicate the status of the fibre-channel ports.

The SAN Volume Controller 2145-8F4 uses two fibre-channel LEDs per fibre-channel port, arranged one above the other. The LEDs are arranged in the same order as the ports and are displayed in Figure 11.

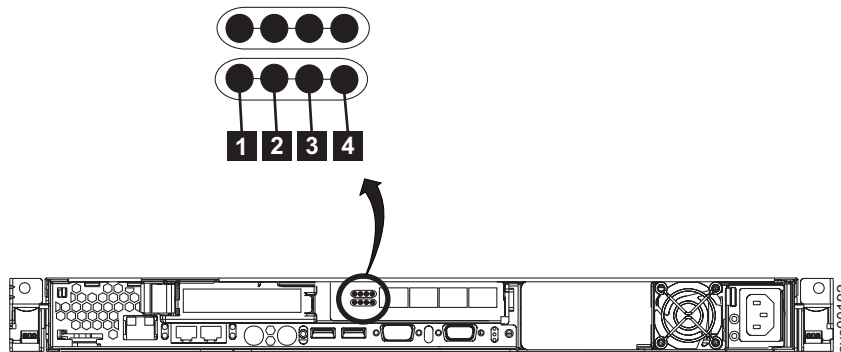


Figure 11. Fibre-channel LEDs

Table 2 describes the status of the link LEDs.

Table 2. Settings for the SAN Volume Controller 2145-8F4 fibre-channel LEDs

Top LED (link speed)	Bottom LED (link activity)	Link Status
Off	Off	Inactive
Off	On/blinking	Active 1 Gbps
Blinking	On/blinking	Active 2 Gbps
On	On/blinking	Active 4 Gbps

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

Related reference

“Fibre-channel port numbers and worldwide port numbers” on page 25
Fibre-channel ports are identified by their physical port number and by a worldwide port number (WWPN).

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 or SAN Volume Controller 2145-8F4.

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 or SAN Volume Controller 2145-8F4.

Location LED

This is the middle of the three LEDs and is not used by the SAN Volume Controller.

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 or SAN Volume Controller 2145-8F4 is receiving electrical current.

The AC LED and DC LED are located on the rear of the SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-8F4. See Figure 12 on page 14.

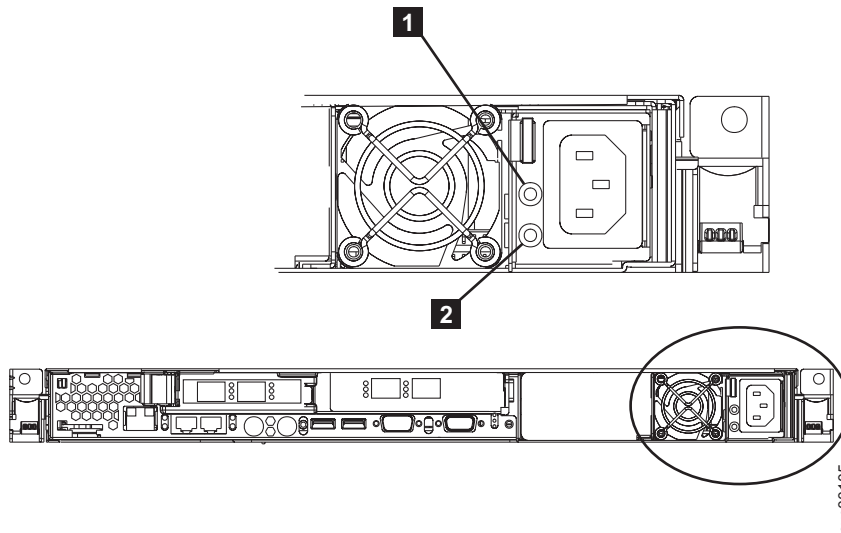


Figure 12. AC and DC LEDs

AC LED

The upper LED **1** to the left of the power supply, indicates that ac current is present on the node.

DC LED

The lower LED **2** to the left of the power supply, indicates that dc current is present on the node.

System board power LED

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

System board fault LED

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

You can view the system board fault LED in the documentation on the rear panel indicators.

Monitor LED

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

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

Lower Ethernet connection LED

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

You can view the lower Ethernet connection LED in the documentation concerning the rear panel indicators.

Upper Ethernet connection LED

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

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

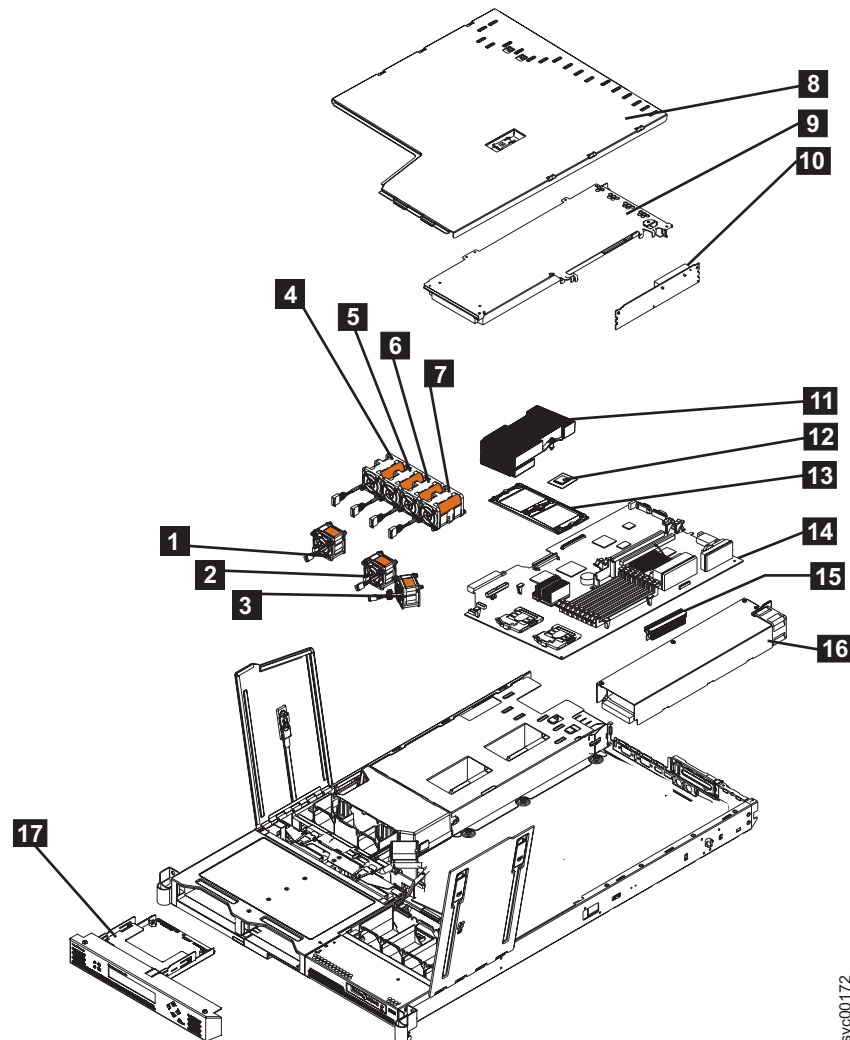
SAN Volume Controller hardware

It is important that you familiarize yourself with the SAN Volume Controller hardware.

SAN Volume Controller 2145-8F4 hardware

It is good to familiarize yourself with the SAN Volume Controller 2145-8F4 hardware.

The following figure displays a breakout view for the parts to the SAN Volume Controller 2145-8F4. Use the following reference keys to match the reference keys in the example.



svc00172

- 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 4-port fibre-channel host bus adapter
- 10 PCI Express riser card
- 11 Microprocessor heat sink
- 12 Microprocessor
- 13 Heat sink retainer
- 14 System board
- 15 Voltage regulator module
- 16 Power supply
- 17 Service controller

SAN Volume Controller 2145-8F4 cable retention bracket

The SAN Volume Controller 2145-8F4 cable restraint ensures that the node does not mistakenly become unplugged from the uninterruptible power supply (UPS). The bracket must be installed after you install the SAN Volume Controller in the rack. You can attach the bracket to the support rail by performing the following steps:

1. Install the power cable into the power supply.
2. Insert the bracket onto the power cable so that the power cable is held by the slot on the end of the bracket. Figure 13 provides a view of how to align the cable retention bracket with the cable.



Figure 13. Attaching the cable retention bracket to the SAN Volume Controller 2145-8F4 power cable

3. Position the cable retention bracket against the support rail and attach the bracket onto the slot in the rear of the rail. Figure 14 provides a view of the cable retention bracket attached to the SAN Volume Controller 2145-8F4.

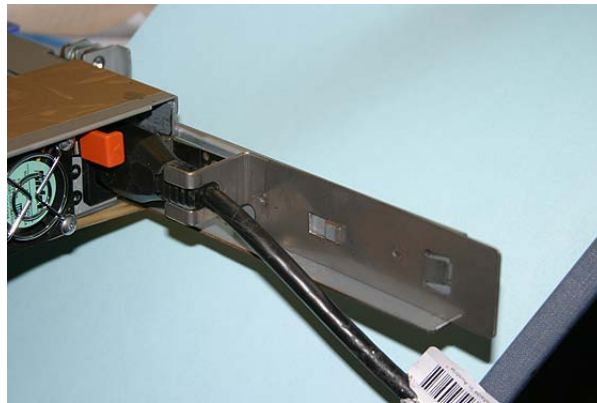
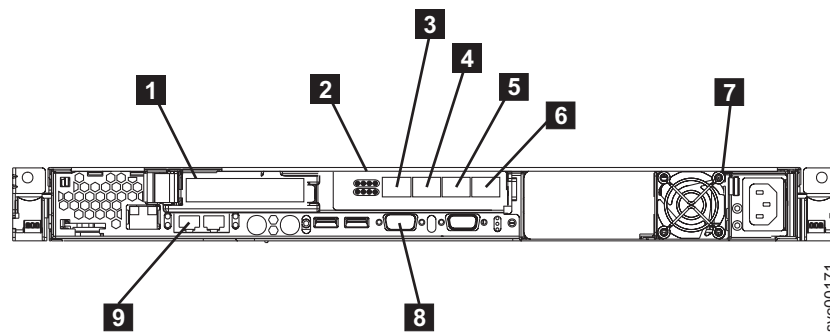


Figure 14. The SAN Volume Controller 2145-8F4 with cable retention bracket attached

Note: The 2145 uninterruptible power supply-1U (2145 UPS-1U) is also equipped with a cable retention bracket. See the related documentation on the 2145 UPS-1U hardware for more information.

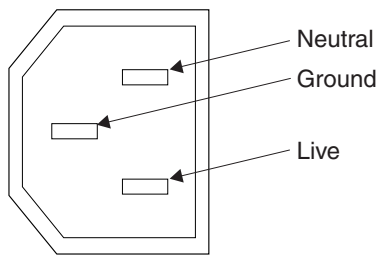
SAN Volume Controller 2145-8F4 connectors

The external connectors for the SAN Volume Controller 2145-8F4 can be easily located.



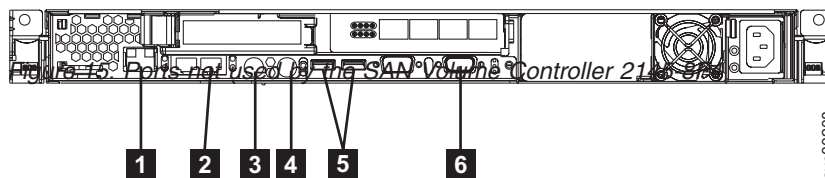
- 1 PCI slot 1
- 2 PCI slot 2
- 3 Fibre-channel port 1
- 4 Fibre-channel port 2
- 5 Fibre-channel port 3
- 6 Fibre-channel port 4
- 7 Power supply
- 8 Serial connection
- 9 Ethernet port 1

The following figure shows the type of connector that is located on the power supply assembly. The connector enables you to connect the SAN Volume Controller 2145-8F4 to the power source from the uninterruptible power supply.



SAN Volume Controller 2145-8F4 ports not used

The SAN Volume Controller 2145-8F4 is equipped with several ports which are not used by the SAN Volume Controller, and have not been tested. Use of these ports, in conjunction with the SAN Volume Controller 2145-8F4 or any other application that might be run on this hardware, is not supported. See Figure 15 for those ports that are not used.

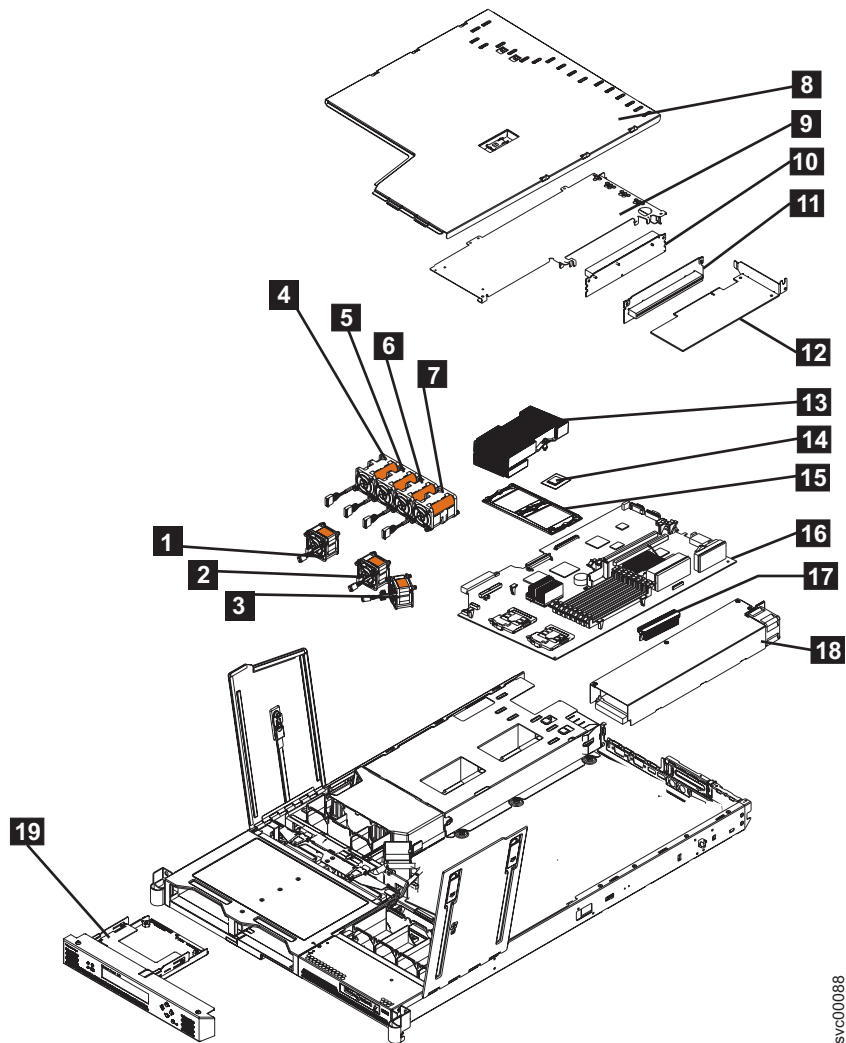


- 1** System management port
- 2** Ethernet port 2
- 3** Mouse port
- 4** Keyboard port
- 5** USB ports
- 6** Monitor port

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.



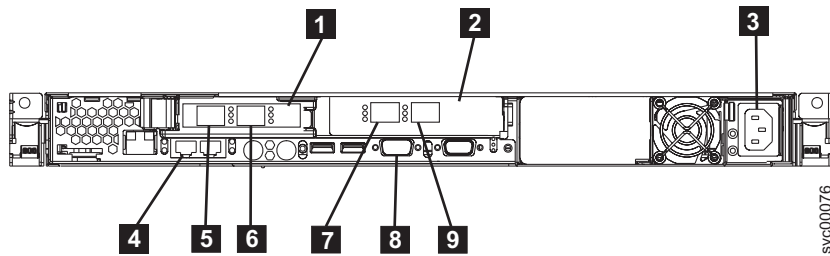
svc00088

- 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

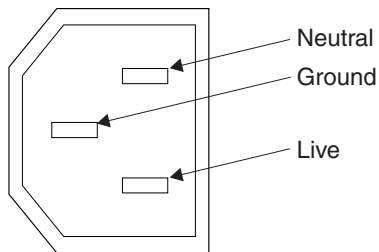
SAN Volume Controller 2145-8F2 connectors

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.



SAN Volume Controller 2145-4F2 hardware

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

See Figure 16 for a breakout view for the parts to the SAN Volume Controller. Use the reference keys below the figure to match the reference keys in the example.

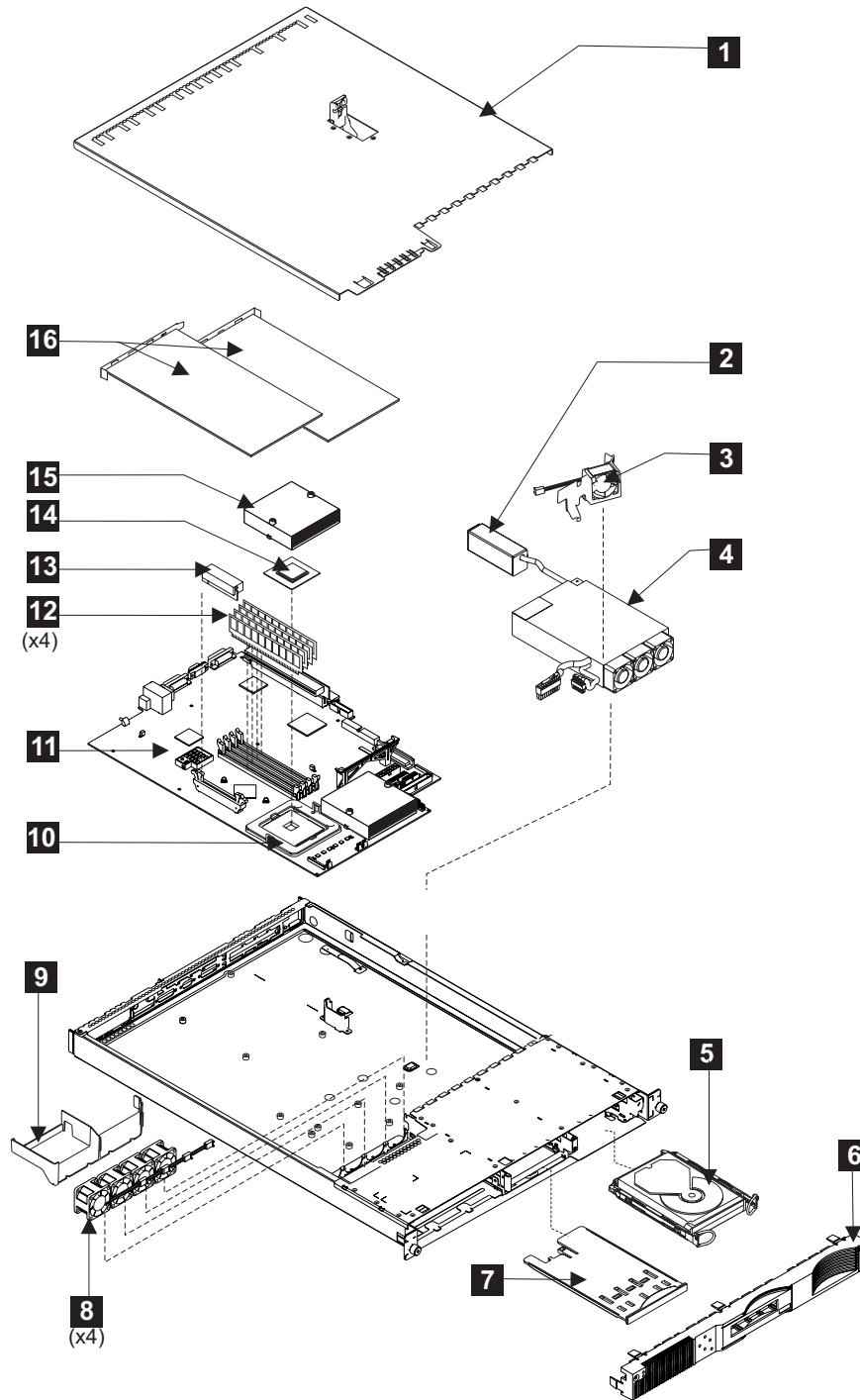


Figure 16. Exploded view of the hardware for the SAN Volume Controller 2145-4F2

- 1** Top cover
- 2** Power supply connector
- 3** Fan with baffle

- 4** Power supply assembly
- 5** Hard disk drive
- 6** Front panel
- 7** Service controller card
- 8** Fan assembly (4)
- 9** Air baffle
- 10** Microprocessor heat sink retention module
- 11** System board
- 12** DIMM modules (4)
- 13** Microprocessor Voltage Regulator
- 14** Microprocessor
- 15** Microprocessor heat sink
- 16** Fibre-channel adapters (2)

SAN Volume Controller 2145-4F2 connectors

The external connectors for the SAN Volume Controller can be located easily.

Context

Use the reference keys below the figure to match the reference keys in Figure 17.

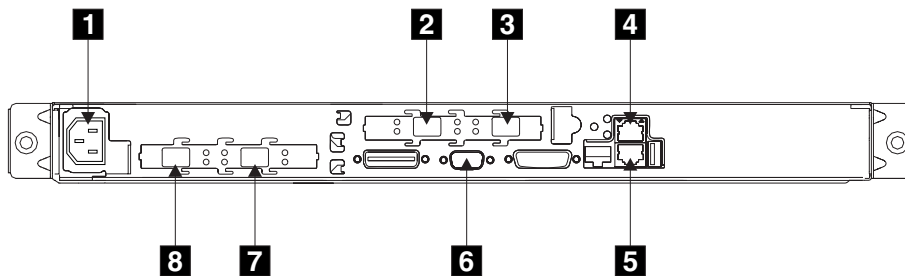
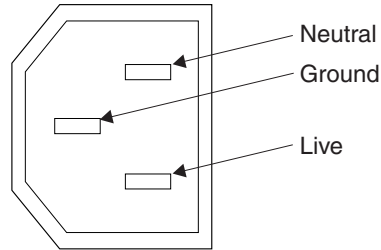


Figure 17. SAN Volume Controller 2145-4F2 connector locations

- 1** Power connector
- 2** fibre-channel port 3
- 3** fibre-channel port 4
- 4** Ethernet port 2 (*not used on the SAN Volume Controller 2145-4F2*)
- 5** Ethernet port 1
- 6** Serial connector
- 7** fibre-channel port 2

8 fibre-channel port 1

The following figure shows an illustration of the type of connector located on the power supply assembly. The connector allows you to connect the SAN Volume Controller 2145-4F2 to the power source from the uninterruptible power supply.



Preparing your SAN Volume Controller environment

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

Preparing your SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 environment

The following four tables list the physical dimensions and weight of the node, as well as other environmental requirements that you must consider before you install your SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4:

Dimensions and weight

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 requirements	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 or 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)

Preparing your SAN Volume Controller 2145-4F2 environment

The following four tables list the physical dimensions and weight of the SAN Volume Controller 2145-4F2 node, as well as other environmental requirements that you must consider before you install your SAN Volume Controller 2145-4F2.

Dimensions and weight

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 requirements	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 or 60 Hz

Environment

Environment	Temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Operating in lower altitudes	10°C to 35°C (50°F to 95°F)	0 to 914 m (0 to 2998 ft.)	8% to 80% noncondensing	23°C (74°F)
Operating in higher altitudes	10°C to 32°C (50°F to 88°F)	914 to 2133 m (2998 to 6988 ft.)	8% to 80% noncondensing	23°C (74°F)
Powered off	10°C to 43°C (50°F to 110°F)	-	8% to 80% noncondensing	27°C (81°F)
Storing	1°C to 60°C (34°F to 140°F)	0 to 2133 m (0 to 6988 ft.)	5% to 80% noncondensing	29°C (84°F)
Shipping	-20°C to 60°C (-4°F to 140°F)	0 to 10668 m (0 to 34991 ft.)	5% to 100% condensing, but no precipitation	29°C (84°F)

Heat output

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

Related reference

“Preparing your UPS environment” on page 41

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

Fibre-channel port numbers and worldwide port numbers

Fibre-channel ports are identified by their physical port number and by a worldwide port number (WWPN).

The physical port numbers identify fibre-channel cards and cable connections when you perform service tasks. The WWPNs are used for tasks such as fibre-channel switch configuration and to uniquely identify the devices on the SAN.

Figure 18 provides a view of the rear of the SAN Volume Controller 2145-8F4. The physical port numbers are 1 - 4, counting from left to right when you view the rear panel of the SAN Volume Controller 2145-8F4. The WWPNs are derived from the worldwide node number (WWNN) of the SAN Volume Controller in which the card is installed.

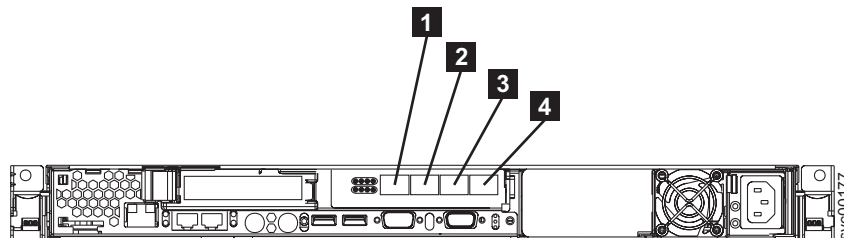


Figure 18. The port numbers for the SAN Volume Controller 2145-8F4

The WWNN is in the form 5005076801XXXXXX, where XXXXX is initially derived from the unit and is specific to a SAN Volume Controller. You can change the XXXXX value by using the front panel to facilitate service controller concurrent replacement and to enable some concurrent upgrade operations.

The WWPNS are in the form 5005076801QXXXXXX, where XXXXX is as previously stated and Q is related to the port number as follows:

Port	Value of Q
1	4
2	3
3	1
4	2

Related reference

“Fibre-channel LEDs” on page 12

The fibre-channel LEDs indicate the status of the fibre-channel ports.

Chapter 2. UPS

The uninterruptible power supply (UPS) provides a SAN Volume Controller node 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.

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 Controller nodes even if the input power source is uninterruptible.

The SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-8F4 nodes can only operate with the 2145 UPS-1U. The SAN Volume Controller 2145-4F2 node can operate with either the 2145 UPS or the 2145 UPS-1U.

Figure 20 on page 28 and Figure 19 provide illustrations of the two types of UPS units.

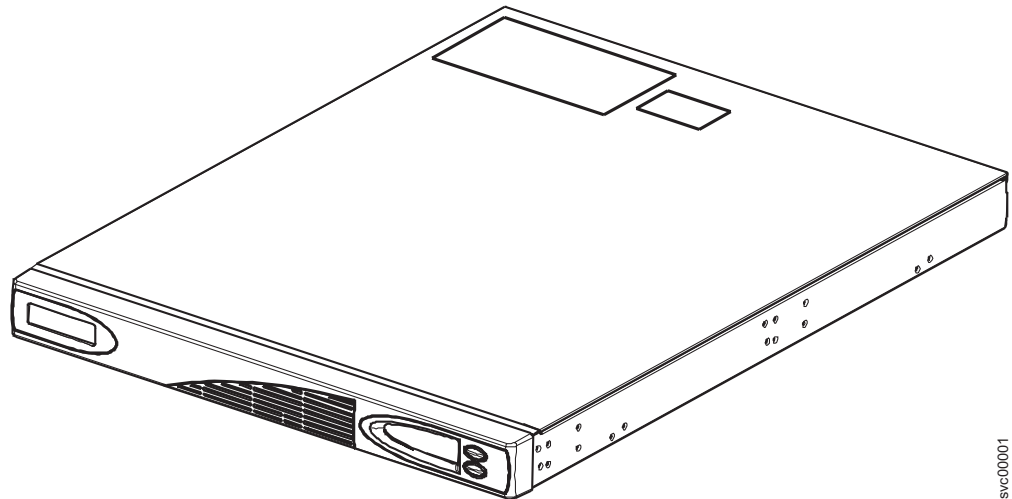


Figure 19. 2145 UPS-1U

svc00001

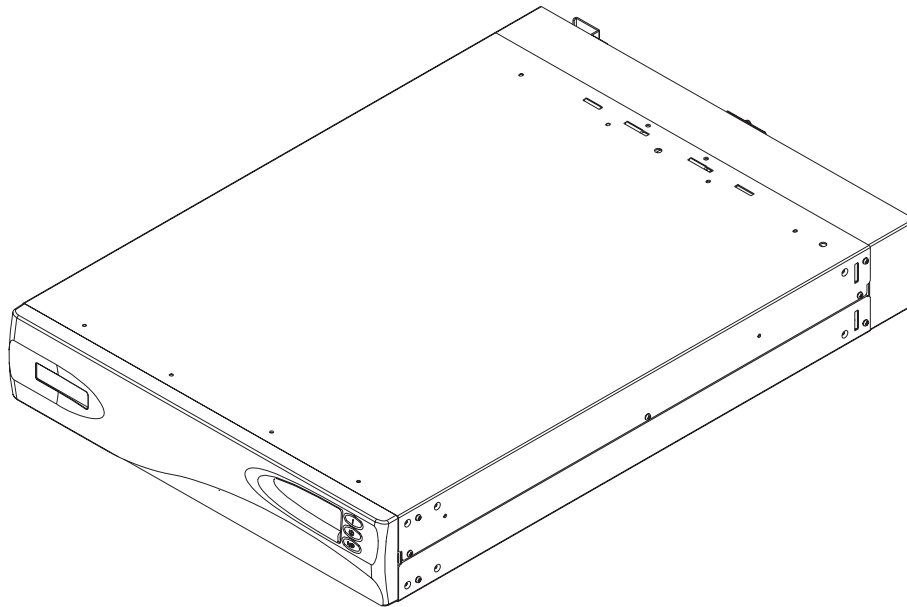


Figure 20. 2145 UPS

Note: The UPS maintains continuous SAN Volume Controller-specific communications with its attached SAN Volume Controller nodes. A SAN Volume Controller node 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.

UPS configuration

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

You must connect each SAN Volume Controller node of a pair 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 2145-8F4 node, one SAN Volume Controller 2145-8F2 node, or one 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 and the SAN Volume Controller 2145-8F4:

Number of SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 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.

The UPS is connected to the SAN Volume Controller nodes 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 Controller nodes to read status and identification information from the UPS.

UPS operation

Each SAN Volume Controller node 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 node 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 Controller node restarts and restores the original contents of the DRAM from the data saved on the disk drive.

A SAN Volume Controller node is not fully operational until the UPS battery charge state indicates that it has sufficient capacity to power the SAN Volume Controller node 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 node at least twice. For a fully-charged UPS, even after battery capacity has been used to power the SAN Volume Controller node while it saves DRAM data, sufficient battery capacity remains to allow the SAN Volume Controller node to 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 node 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 node, 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 node, a UPS that is not connected to an active SAN Volume Controller node does not shut off within the five-minute required period.

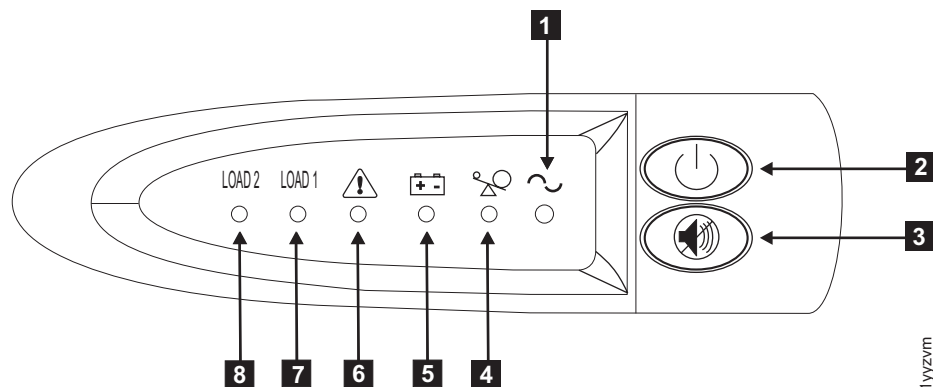
Important: Data integrity can be compromised by pushing the 2145 UPS power-off button or the 2145 UPS-1U on/off button. However, in the case of an emergency, you can manually shut down the UPS by pushing the 2145 UPS power-off button or the 2145 UPS-1U on/off button. Never shut down a UPS without first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

If you have two SAN Volume Controller 2145-4F2 nodes that use 2145 UPSs in the same I/O group, you must connect these nodes to different 2145 UPSs. This configuration ensures that cache and cluster state information is protected in the event of a failure of either the UPS or the mainline power source.

When SAN Volume Controller 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 SAN Volume Controller 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

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.

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.

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).

Overload indicator

The overload indicator lights up 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.

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.

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.

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.

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.

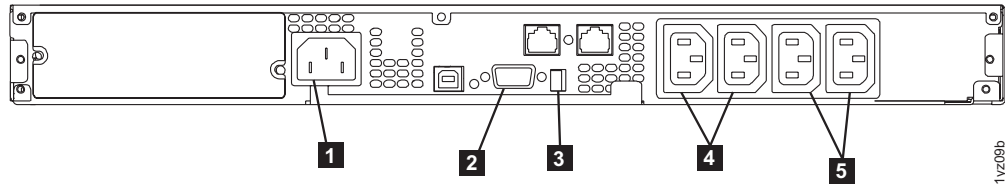
See the 2145 UPS-1U hardware documentation for the location of the power outlets for this segment.

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 and switches

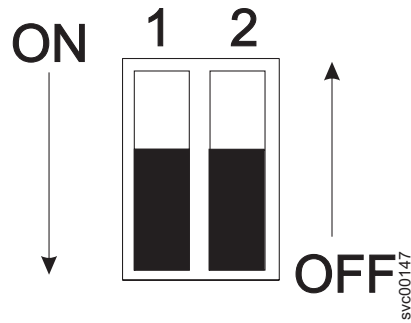
The following diagrams illustrate the hardware for the 2145 UPS-1U:



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

UPS-1U dip switches

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.



2145 UPS-1U ports not used

The 2145 UPS-1U is equipped with ports that are not used by the SAN Volume Controller and have not been tested. Use of these ports, in conjunction with the SAN Volume Controller or any other application that may be used with the SAN Volume Controller, is not supported. See Figure 21 for the 2145 UPS-1U ports that are not used.

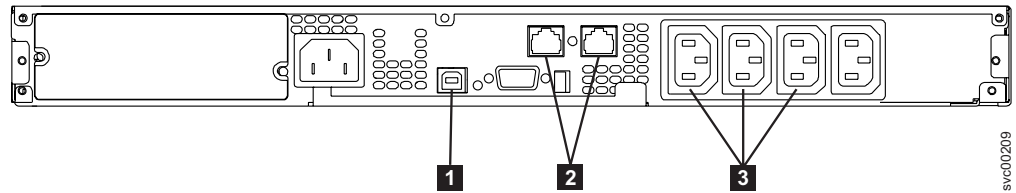
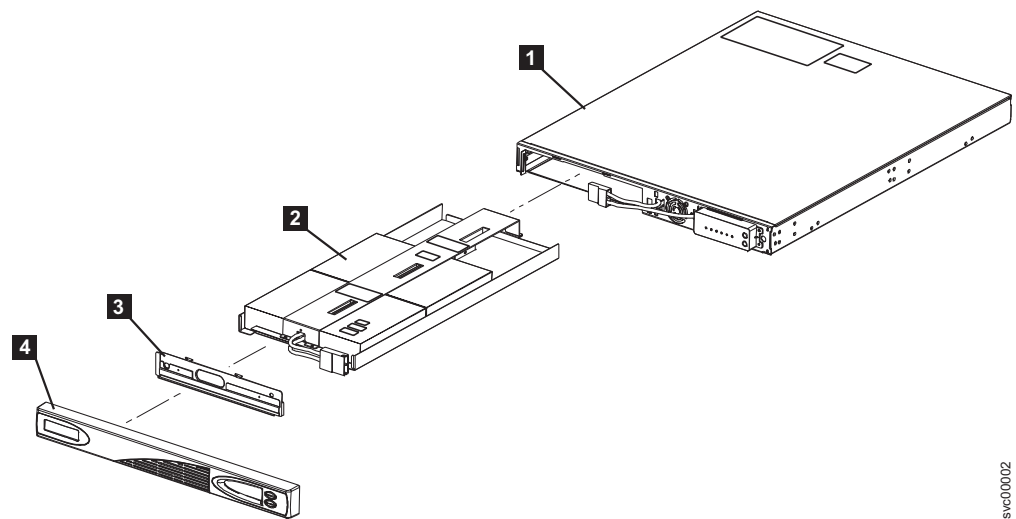


Figure 21. Ports not used by the 2145 UPS-1U

- 1** USB interface port
- 2** Network ports
- 3** Load segment receptacles

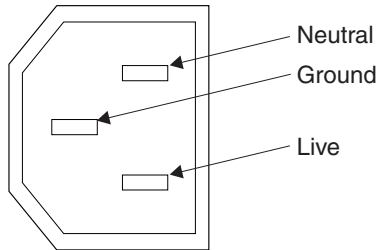
Hardware locations for the 2145 UPS-1U



- 1** Frame assembly
- 2** Battery pack assembly

- 3** Battery plate
- 4** Front panel assembly

2145 UPS-1U power connector



2145 UPS-1U cable retention bracket

The 2145 UPS-1U cable retention bracket ensures that the power cable connection between the 2145 UPS-1U and the SAN Volume Controller 2145-8F4 is stable. The bracket must be installed after you install the 2145 UPS-1U in the rack. You can attach the bracket by performing the following steps:

1. Install the power cable into the far-right power supply on the rear of the 2145 UPS-1U.
2. Remove the bracket and the two screws from the packaging. See Figure 22

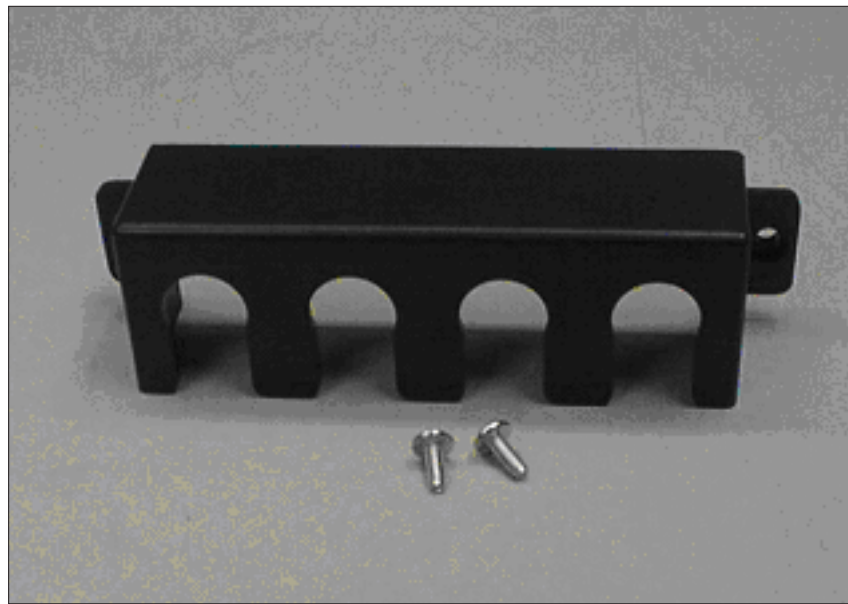


Figure 22. The 2145 UPS-1U cable retention bracket hardware

3. Place the bracket over the power supply inlets on the right rear of the 2145 UPS-1U, so that the two screw holes line up.
4. Screw in the two screws on each end of the cable retention bracket. See Figure 23 on page 35.

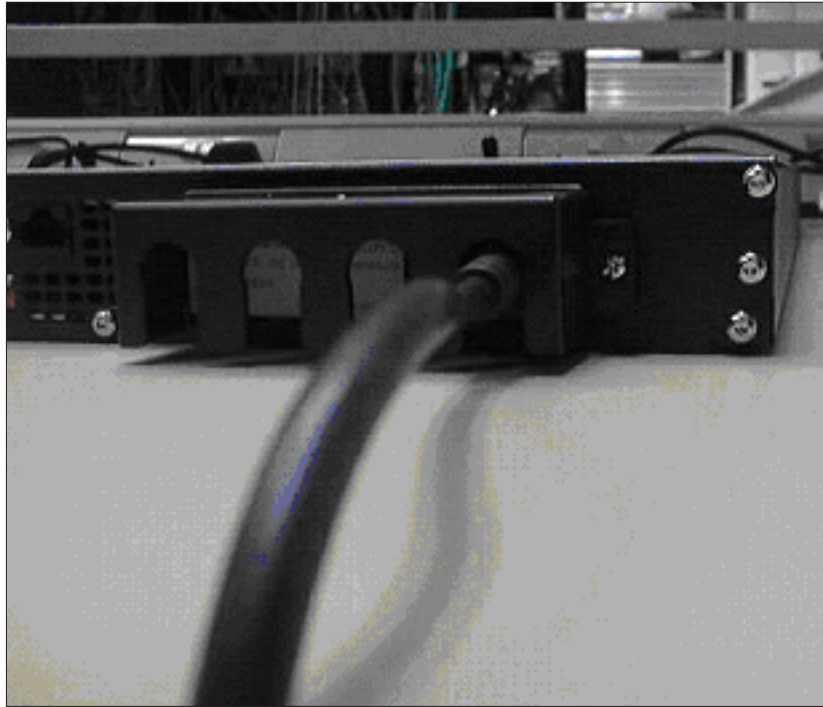


Figure 23. The 2145 UPS-1U cable retention bracket connected to the 2145 UPS-1U

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).

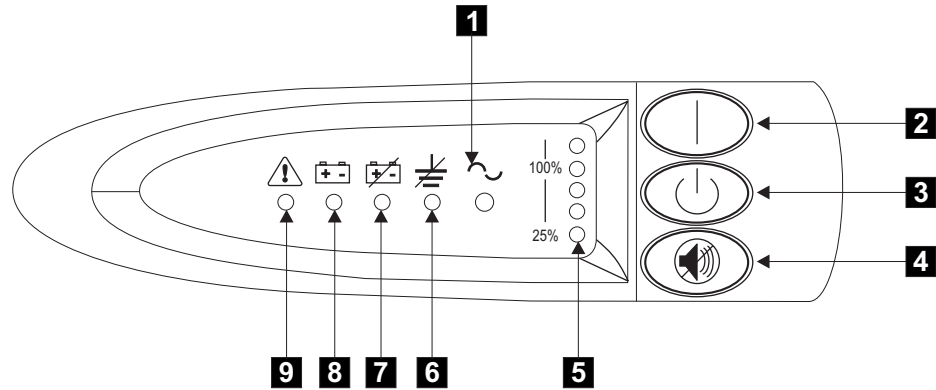
The following table lists the power cable requirements for your country or region:

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
Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela	2.8 m (9 ft)	NEMA L6-15P	7842123

Country or region	Length	Connection type (attached plug designed for 200-240V AC input)	Part
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

“Test and alarm reset button” on page 31
 Use the test and alarm reset button to start the self-test.

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 lights up 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 shuts off and the alarm ceases.

General alarm indicator

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

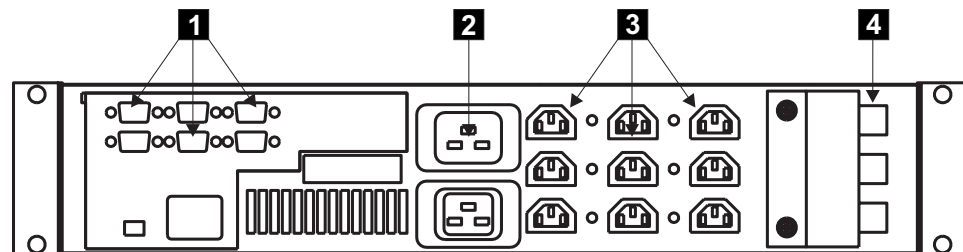
When the general alarm indicator is accompanied by the audio alarm beeping every five seconds, the battery is low. If the audio alarm is continuous, the internal temperature of the 2145 UPS is too high or there has been a momentary output overload.

Hardware for the 2145 UPS

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

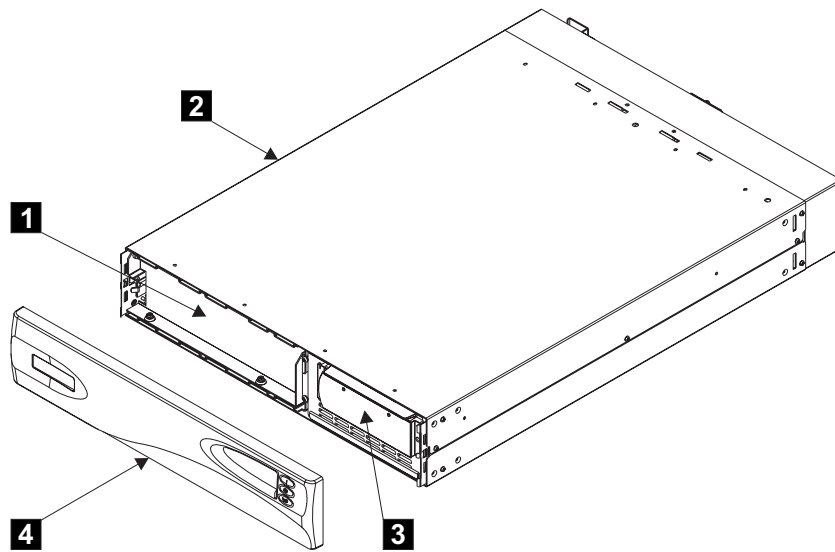
Locations for the 2145 UPS connectors and circuit breakers

The following diagrams illustrate the hardware for the 2145 UPS:



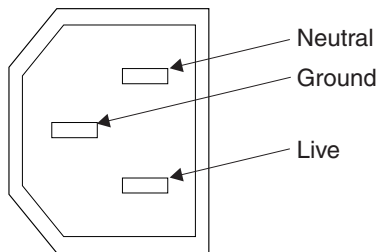
- 1** Signal cable connectors
- 2** Main power connector
- 3** Output connectors
- 4** Circuit breakers

Hardware locations for the 2145 UPS



- 1** Battery assembly
- 2** Frame assembly
- 3** Electronics assembly
- 4** Front panel assembly

Uninterruptible power supply connector



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

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	2.5 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
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 it must be 200 – 240 V, single phase.

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

The 2145 UPS

The SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-8F4 support the 2145 uninterruptible power supply-1U (2145 UPS-1U) but do 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.

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 to the 2145 UPS must be 50 or 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	200 – 240 V	200 – 240 V
Frequency	50 or 60 Hz	50 or 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 environment” on page 23
Before installing the SAN Volume Controller, 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 Console
 - Device configuration
- Command-line interface (CLI) configuration support using Secure Shell (SSH)
- SAN topology rendering
- 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 65

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.

Note: This only applies if you ordered your SAN Volume Controller with the master console pre-configured.

The following are included with the master console:

- 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/storage/support/2145>

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 installing, ensure that you have everything that you need for installation, including the customer-completed planning tables and charts that are provided in the *IBM System Storage 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 24. If any piece is missing, contact the appropriate IBM representative.

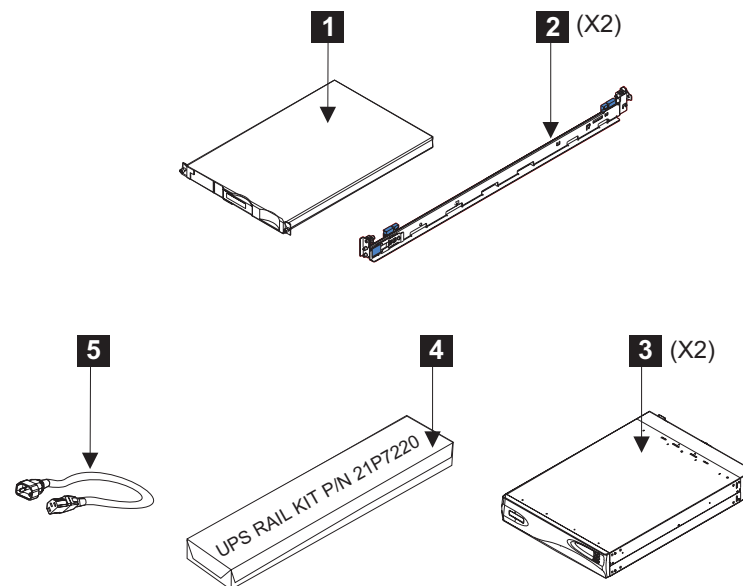


Figure 24. Parts provided for installation in the rack

- 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 System Storage Master Console for SAN File System and SAN Volume Controller: Installation and User's Guide*. Refer to the *IBM System Storage 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 reference

“Preparing your UPS environment” on page 41

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

“Preparing your SAN Volume Controller environment” on page 23

Before installing the SAN Volume Controller, 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 beneath a UPS is another UPS.

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 25.

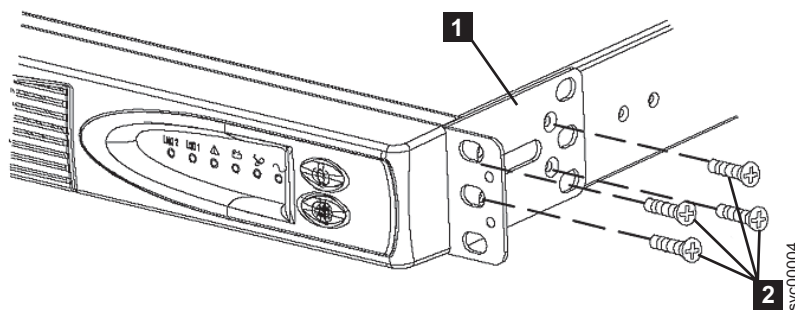


Figure 25. Installing the support rails for a 2145 UPS-1U into the rack

3. Loosen the assembly wing nuts (see **1** in Figure 26 on page 51) on both rail assemblies and adjust the rail size to the depth of your rack.

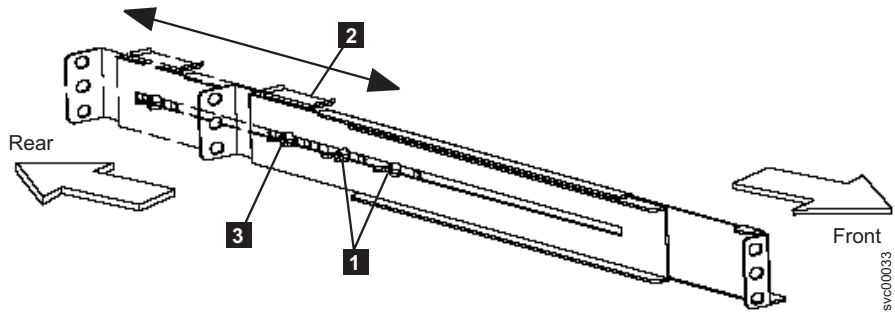


Figure 26. Adjusting the rail depth on the 2145 UPS-1U

- 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 26.
 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 27) and two clip nuts (**2**), attach the rail to the rear of the rack.

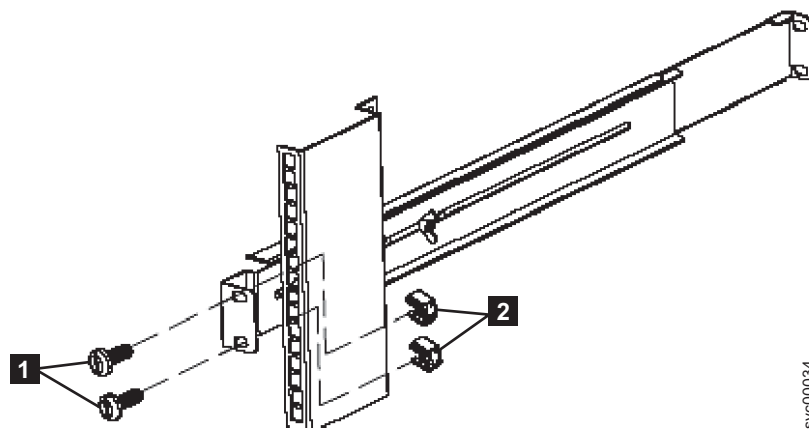


Figure 27. Securing the rear rail on the 2145 UPS-1U

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 28 on page 52).

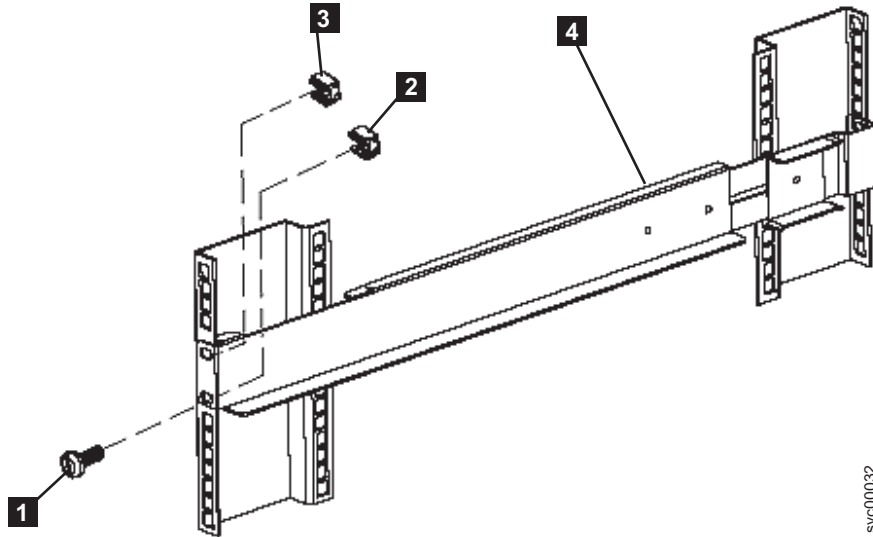


Figure 28. Securing the front rail on the 2145 UPS-1U

8. Install a clip nut in the top hole of the rail **3**.
9. Repeat step 6 on page 51 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.

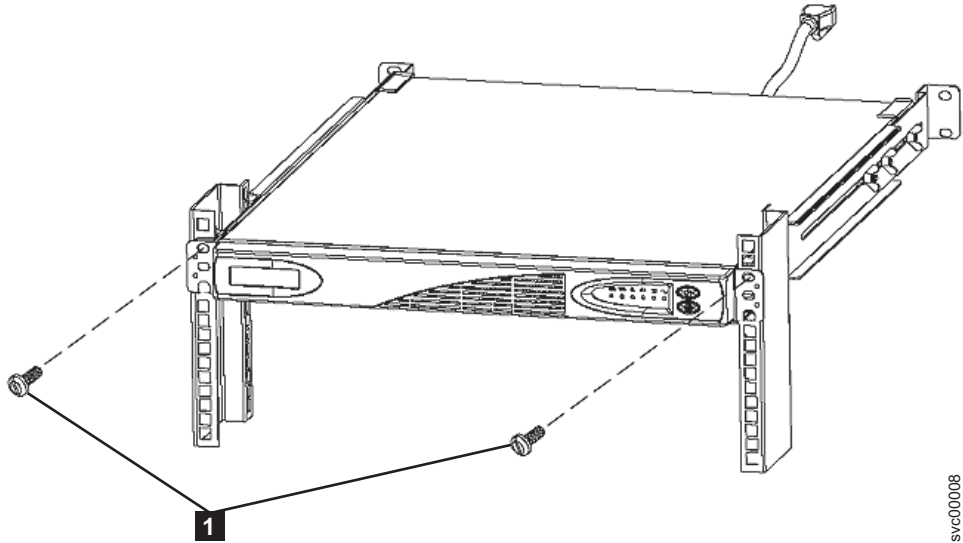
Attention: Read all safety and environmental notices before starting the installation process. Use the reference numbers in parentheses at the end of each notice to find the matching translated notice. For the translation of the danger, caution, attention notices, and the translation of the safety labels, see the *IBM System 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)



svc00008

Figure 30. Installing the mounting screws for the 2145 UPS-1U

1 Mounting screws

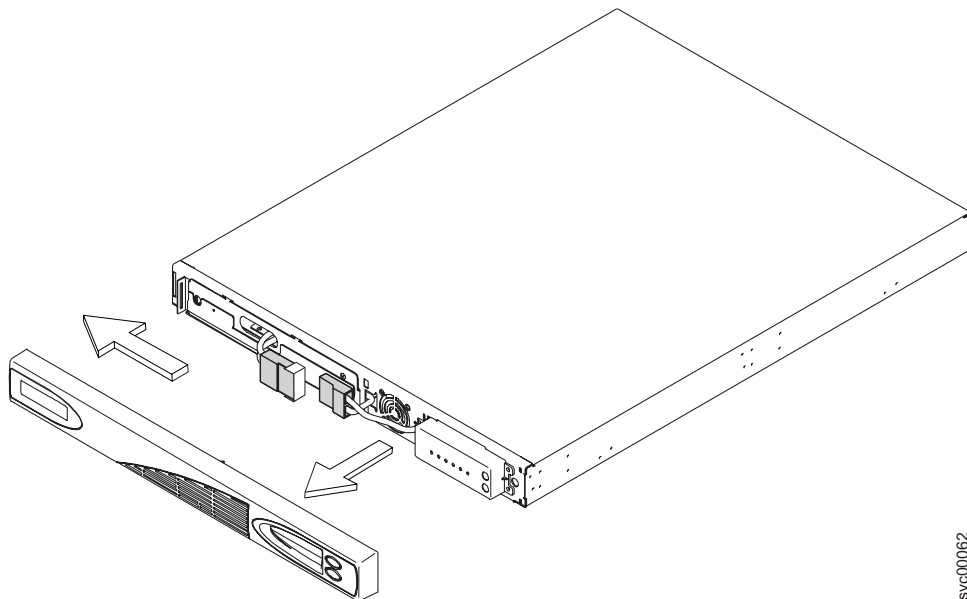
If possible, the two 2145 UPS-1Us should not be connected to the same power source.

Attention: Ensure that you comply with the following requirements:

- The voltage supplied to the 2145 UPS-1U must be 200 – 240 V single phase.
- The frequency supplied must be 50 or 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 31. Removing the 2145 UPS-1U front panel

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

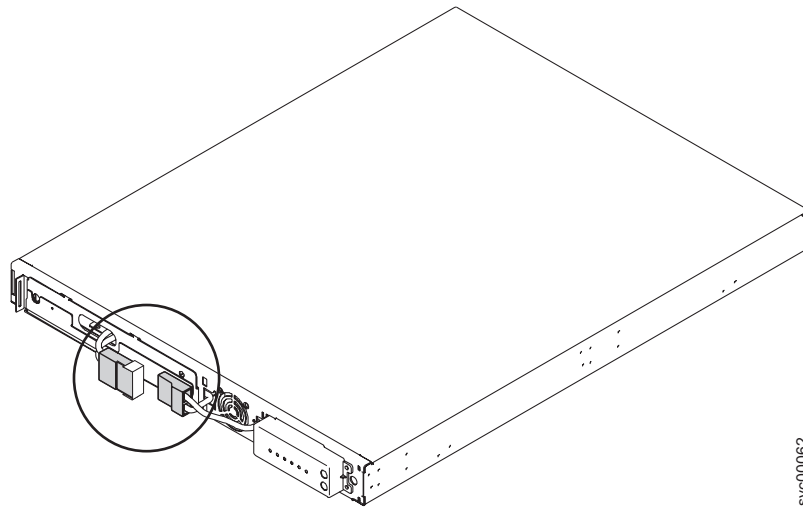
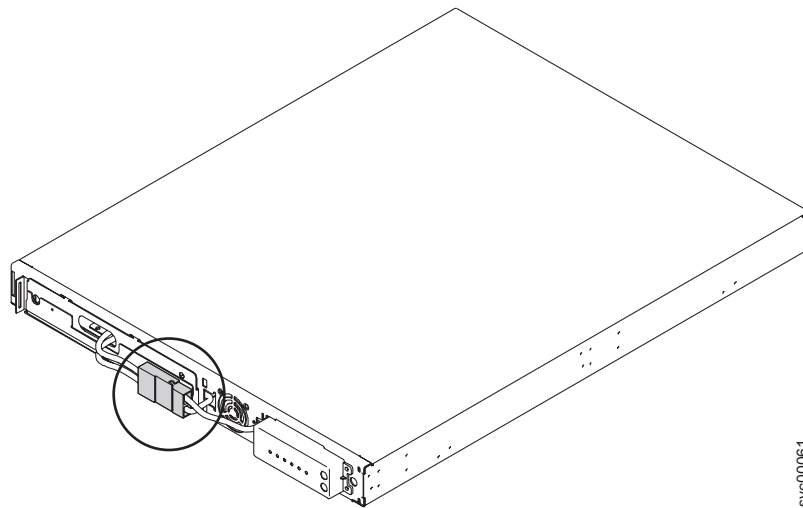


Figure 32. Internal battery connector with protective label

8. Connect the internal battery connector.



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 33 on page 56). 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.

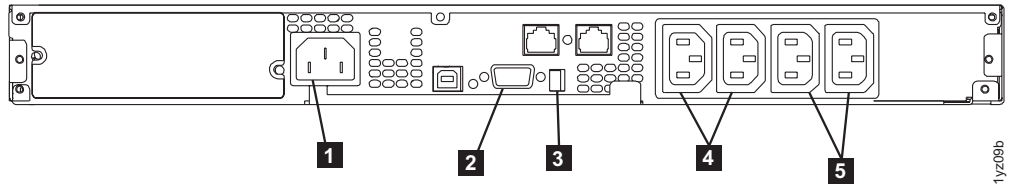


Figure 33. Installing the 2145 UPS-1U power cable

- 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 34.

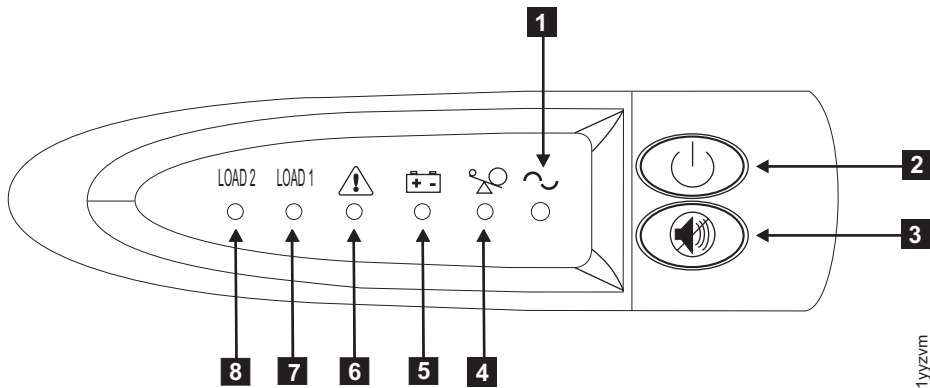


Figure 34. Power switch and indicators of the 2145 UPS-1U

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.

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 beneath 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 35 on page 58). These nut clips must align with the second and fourth holes of the support rail flange.

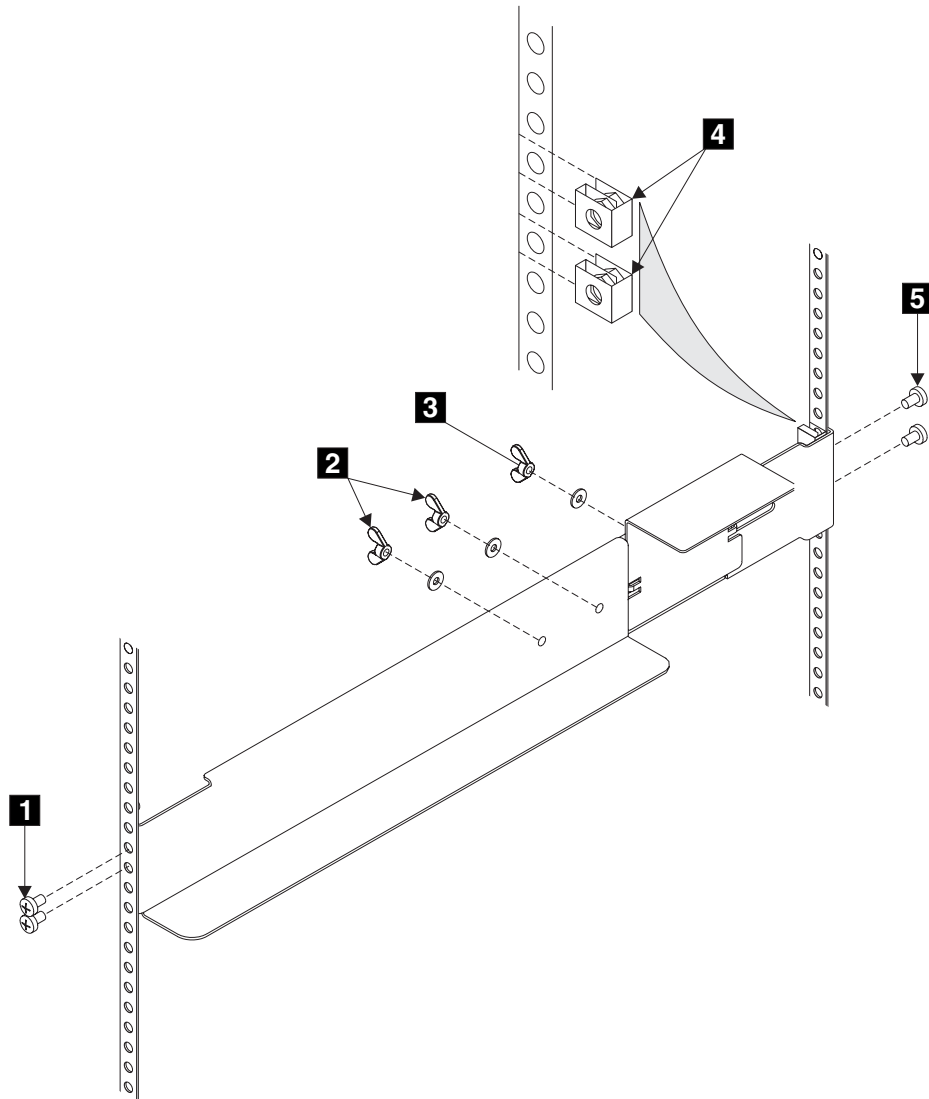


Figure 35. Installing support rails for a 2145 UPS into the rack

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, then install and fully tighten the two mounting screws **5**.
 5. Go to the front of the rack.
 6. Extend the support rail toward the front of the rack.
- Note:** Hold the support rail in position until you have completed step 8.
7. Ensure that the support rail is horizontal (a level might be useful here).
 8. Install the two mounting screws **1** into the third and fourth holes of the support rail flange. Fully tighten the screws.
 9. Fully tighten the two wing nuts **2**.
 10. Loosen the wing nut **3** and slide the bracket toward the front of the rail as far as it will go, with the front edge of the bracket against the back-end of the front support rail.

11. Fully tighten the wing nut **3**.

Note: You must perform all of the previous steps for each rail.

Installing the 2145 UPS in the rack

After you have completed the preparation procedures, you can 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 System 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.

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 36.



Figure 36. 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 37.



Figure 37. 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 38. Next, remove the battery retaining bracket **3**.

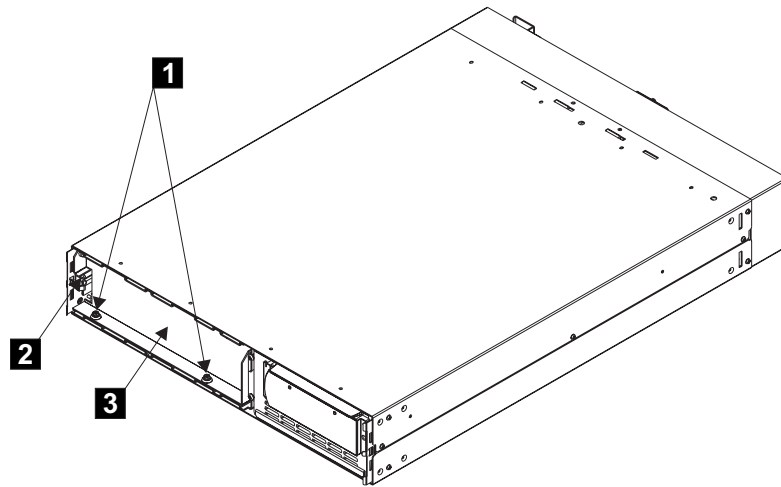


Figure 38. Removing the battery retaining bracket

- 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 39 on page 62).
4. Pull the electronics assembly **2** out of the 2145 UPS, and put it to one side.

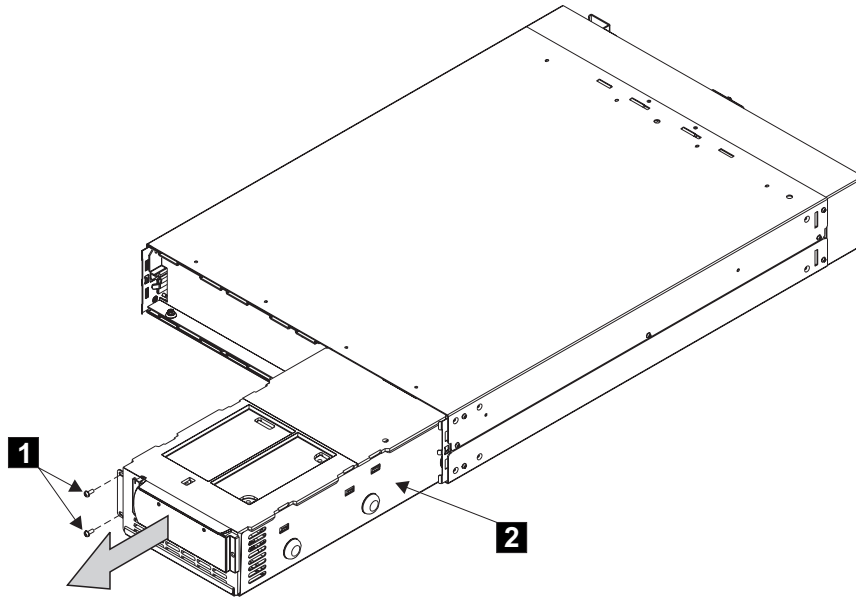


Figure 39. Removing the 2145 UPS electronics assembly

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 40 on page 63.

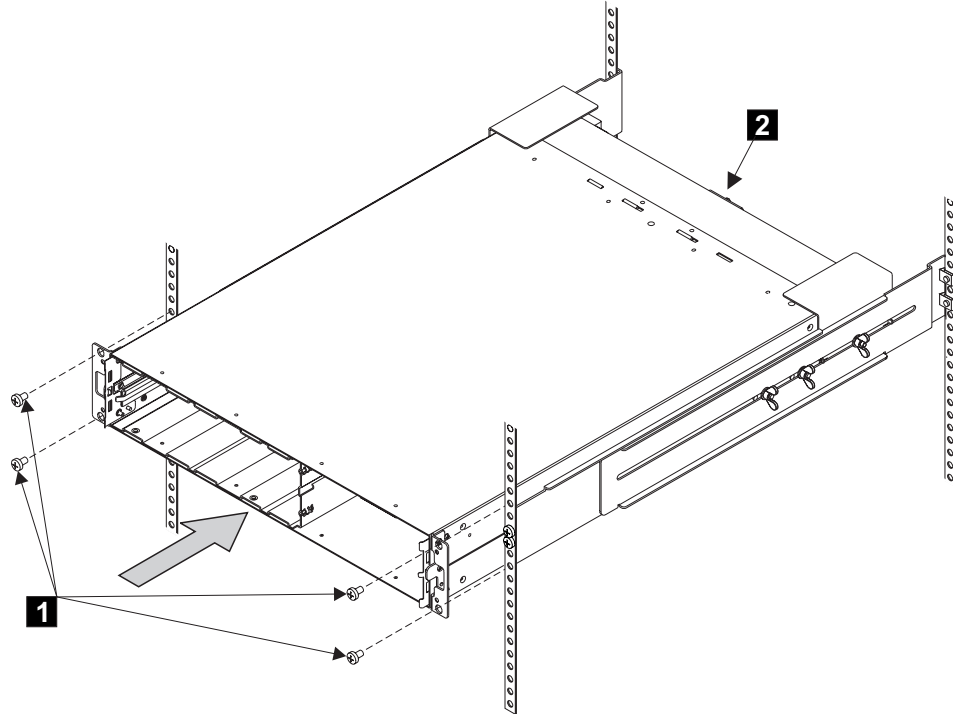


Figure 40. Installing the 2145 UPS into a rack

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 grounding 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 41 on page 64) into the power socket.

Note: The 2145 UPS is intended to maintain power on SAN Volume Controller 2145-4F2 nodes until data can be saved to the local hard disk drive. Only SAN Volume Controller 2145-4F2 nodes can be plugged in to the 2145 UPS, or the SAN Volume Controller 2145-4F2 cluster malfunctions.

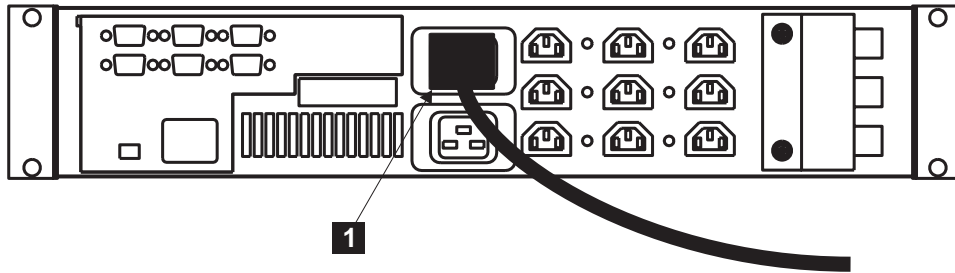


Figure 41. Installing the 2145 UPS power cable

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 42.

Press and hold the 2145 UPS On button, **2** in Figure 42, 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.

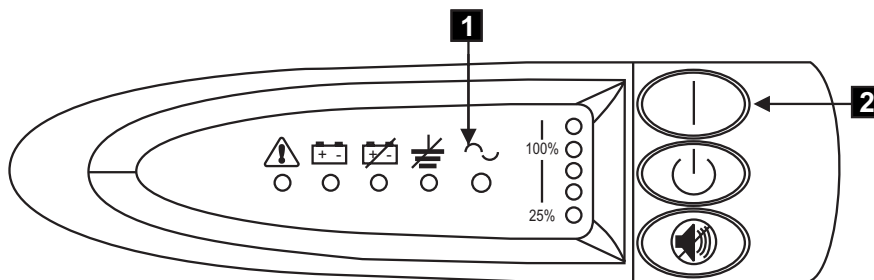


Figure 42. Power switch and indicators on the 2145 UPS

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 56

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 41

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 System Storage 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. Turn on the master console.
3. Turn on the master console.
 - 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.

4. 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.

5. **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 45

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 43, and put your thumb against the front of the latch-lock **2**.

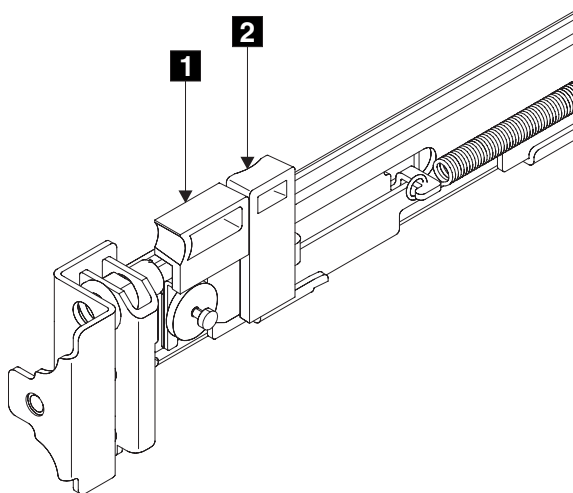


Figure 43. Retracting the latch lock carrier

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

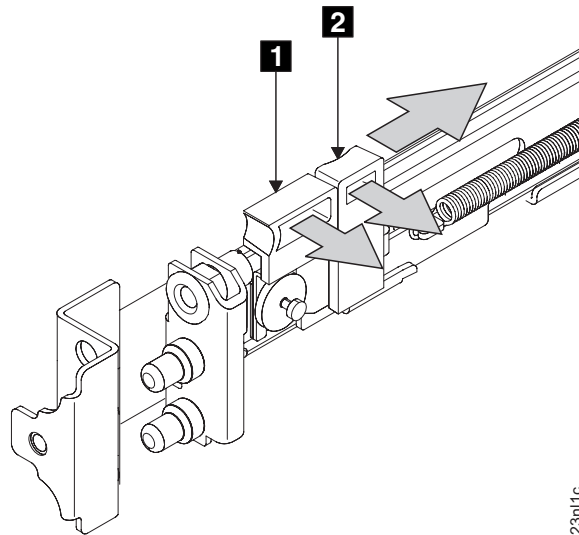


Figure 44. Opening the front latch-lock carrier assembly

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

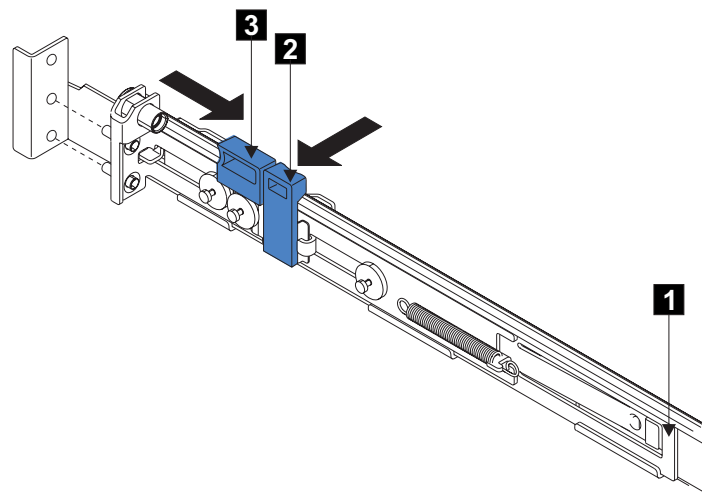


Figure 45. Opening the back latch-lock carrier assembly

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 46) with the required EIA marking that is on the rack.

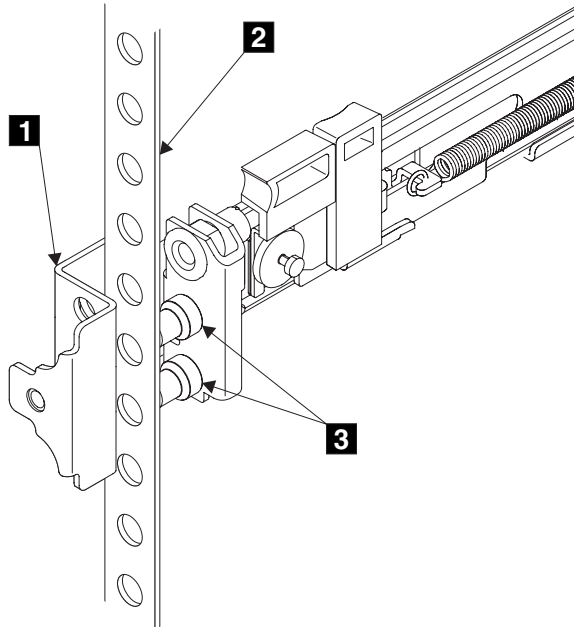


Figure 46. Installing the front end of the rail

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 47 on page 69) 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.

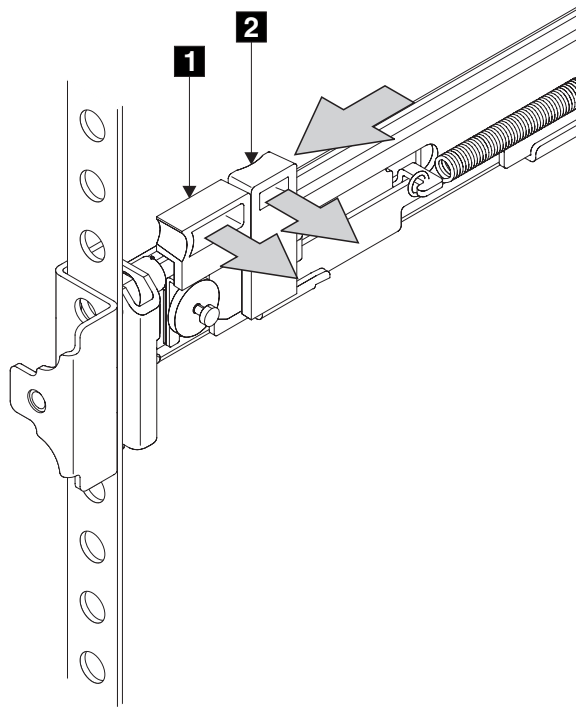


Figure 47. Closing the latch-lock carrier assembly

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 may 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, as low in the rack as possible.

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

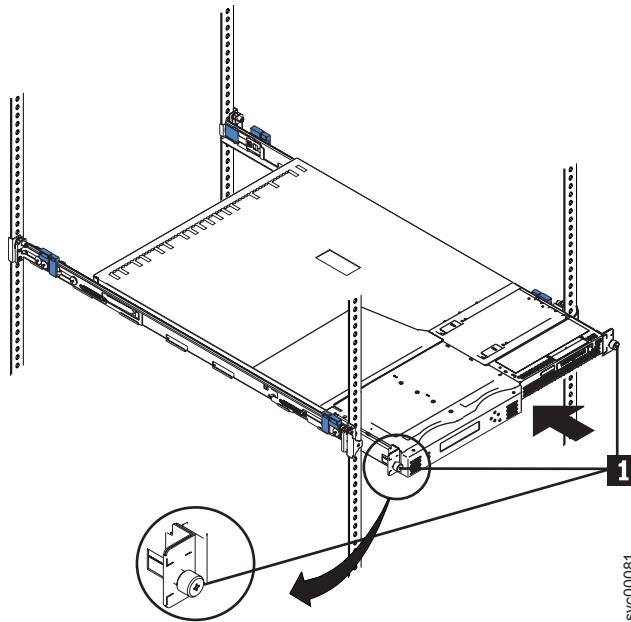


Figure 48. Installing the SAN Volume Controller into a rack

1 thumbscrews

4. Repeat this procedure for each SAN Volume Controller.

Tip: If you have available space, leave a 1U space between each node to improve the air circulation in the rack.

Related tasks

“Installing the support rails for the SAN Volume Controller” on page 66
 You must install the support rails that hold the SAN Volume Controller.

Related reference

“Preparing your SAN Volume Controller environment” on page 23
 Before installing the SAN Volume Controller, you must prepare the physical environment.

Connecting the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 to the 2145 UPS-1U

Before you connect the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 node to the 2145 uninterruptible power supply-1U (2145 UPS-1U), review the restrictions that exist between the two systems.

Each SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 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 2145-8F4 or 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 System Storage SAN Volume Controller: Planning Guide* to identify the 2145 UPS-1U to which this SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 is to be connected.

Perform the following steps to connect the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 to the 2145 UPS-1U:

1. At the back of the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4, plug a power cable into the power connector **2**. See Figure 49.

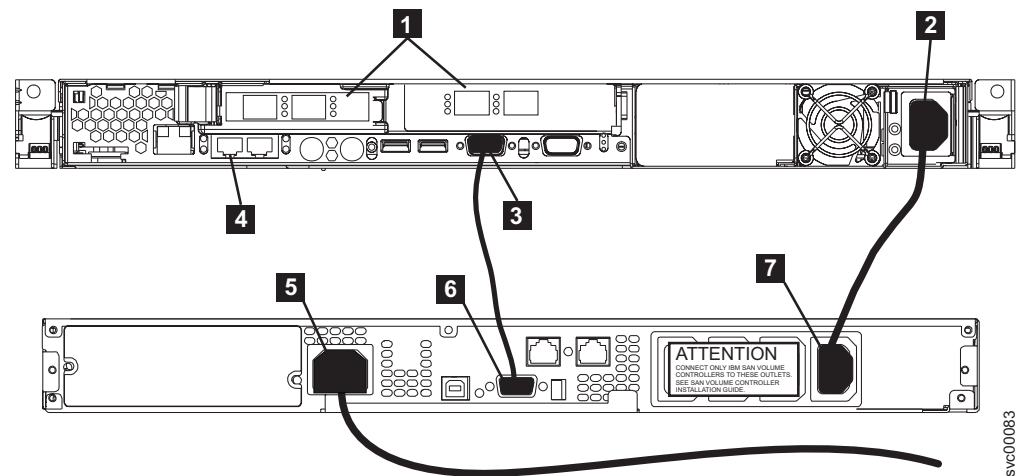


Figure 49. Connecting the SAN Volume Controller 2145-8F2 power cable to the 2145 UPS-1U

- 1** Fibre-channel ports
- 2** Power connector
- 3** Serial connector
- 4** Ethernet ports
- 5** Main power connector
- 6** Communication port
- 7** Load segment 2 receptacle

2. Place the other end of the power cable into the rightmost load segment 2 receptacle **7** on the 2145 UPS-1U.
3. Plug the signal cable into the serial connector **3** located on the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4.

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 signal cable into the communication port **6** on the 2145 UPS-1U.

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

Related tasks

“Inspecting the SAN Volume Controller for unsafe conditions” on page xii
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 xiii

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

“Internal machine checks” on page xiii

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

“Inspecting the UPS for unsafe conditions” on page xviii

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

Related reference

“SAN Volume Controller controls and indicators” on page 5

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

“SAN Volume Controller rear panel indicators” on page 11

The indicators for the SAN Volume Controller are contained on the front and back panel assembly. The following graphics show the rear panel indicators.

“Controls and indicators for the 2145 UPS-1U” on page 30

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 System Storage 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 50 on page 73.

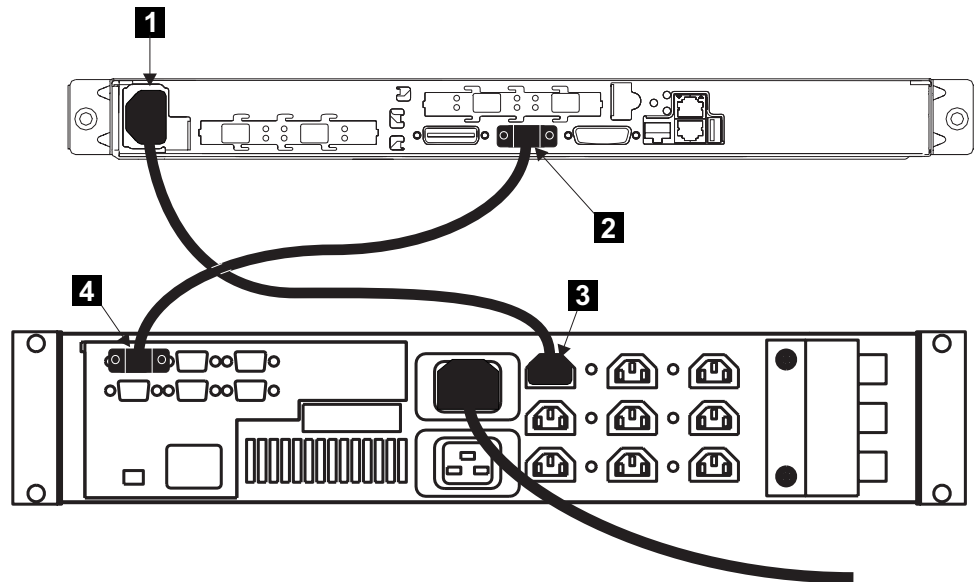


Figure 50. Connecting the SAN Volume Controller 2145-4F2 power cable to the 2145 UPS

- 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 now connected to the 2145 UPS.

Related tasks

“Inspecting the SAN Volume Controller for unsafe conditions” on page xii
 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 xiii
 Ensure that you perform an external machine check before you install the SAN Volume Controller.

“Internal machine checks” on page xiii
 Ensure that you perform an internal machine check before you install the SAN Volume Controller.

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

Related reference

“SAN Volume Controller controls and indicators” on page 5
All controls and indicators are located on the front panel of the SAN Volume Controller.

“SAN Volume Controller rear panel indicators” on page 11
The indicators for the SAN Volume Controller are contained on the front and back panel assembly. The following graphics show the rear panel indicators.

“Controls and indicators for the 2145 UPS” on page 36
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 51 for the SAN Volume Controller 2145-8F2. See Figure 52 on page 75 for the SAN Volume Controller 2145-8F4 Ethernet port **5**.

Attention: You must use only Ethernet port 1 on the SAN Volume Controller. The software is configured only for Ethernet port 1.

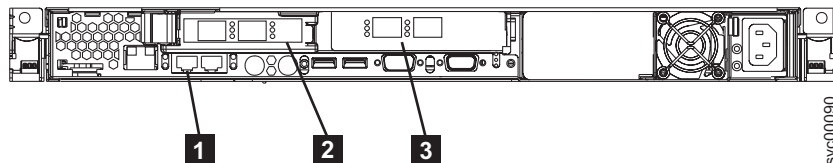


Figure 51. Connectors at the back of the SAN Volume Controller 2145-8F2

- 1** Ethernet port 1
- 2** Low profile dual port fibre-channel host bus adapter (HBA) with ports 1 and 2 (left to right)
- 3** Full height dual port fibre-channel HBA with ports 3 and 4 (left to right)

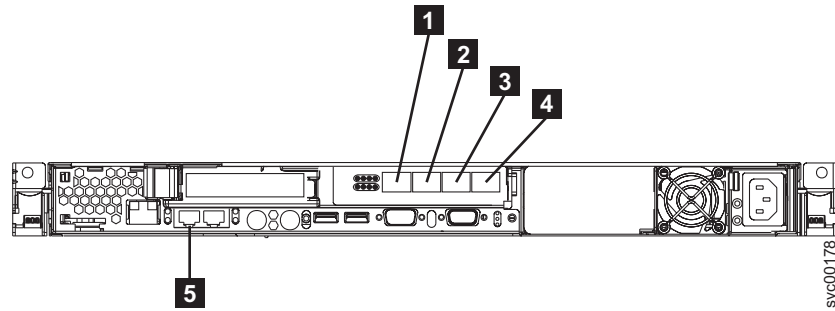


Figure 52. Connectors at the back of the SAN Volume Controller 2145-8F4

- 1 Fibre-channel port 1
- 2 Fibre-channel port 2
- 3 Fibre-channel port 3
- 4 Fibre-channel port
- 5 Ethernet port 1

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 as required by the user's configuration.
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 82

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

Related reference

"SAN Volume Controller controls and indicators" on page 5

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

"Ethernet option" on page 88

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.

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 the Start MAP (maintenance analysis procedure) in the *IBM System Storage 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 53 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.

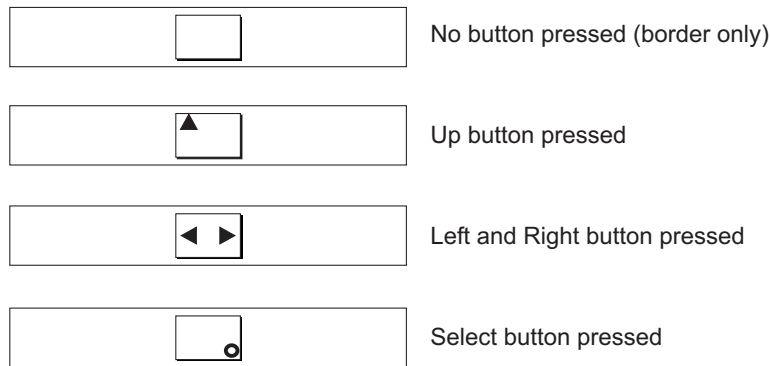


Figure 53. Front panel display when push buttons are pressed

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 54 on page 77).

Node:
XXXXXX

Figure 54. 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 55 shows the message *Inactive*. This message shows that, although an Ethernet connection is available, it cannot yet be used.

Ethernet:
Inactive

Figure 55. 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*. If *Active* is not shown on the second line, go to the fibre-channel MAP to repair the fault.
10. If you are installing a SAN Volume Controller 2145-4F2 or a SAN Volume Controller 2145-8F2, go to step 16. If you are installing a SAN Volume Controller 2145-8F4, go to step 11.
11. Press and hold the down button.
12. Press and release the select button.
13. Release the down button. The operational speed of the fibre-channel link is displayed. Use the cable connection table that is provided by the customer to verify that the fibre-channel link is operating at the expected speed. If the operational speed does not match the expected speed, go to the fibre-channel MAP to repair the fault.
14. Press the select button to return to the fibre-channel status display.
15. Press the right button to display each port in turn and repeat the above speed check. Go to step 18
16. 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 the fibre-channel MAP to repair the fault.
17. 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.

18. If you want to select a language other than English, perform the following steps:
 - a. Press the up or down button until *Select Language?* is displayed.

- b. Press the select button.
 - c. Press the left or right button until the required language is displayed.
 - d. Press the select button.
19. Repeat step 1 on page 76 through step 18 on page 77 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 System Storage 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.

Related concepts

“Cluster options” on page 83

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

“Node options” on page 84

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

Related reference

“Ethernet option” on page 88

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 88

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

“Select language? option” on page 88

The language displayed can be changed from the menu.

Boot progress indicator

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

Figure 56 shows that the node is starting.



Figure 56. 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.



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 topic on determining 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 57 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 normally not necessary to replace the software on a node, but if the software is lost for some reason (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 57. Node-rescue-request display

Power failure

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

Figure 58 on page 81 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 turns on without the front panel power button being pressed.



Figure 58. Power failure display

Powering off

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

Figure 59 shows that the power button has been pressed and the node is powering off. Powering off may take several minutes.



Figure 59. 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 60 on page 82 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 is removed from the last node that is connected to the uninterruptible power supply (UPS), the UPS also shuts down.

Shutting Down

Figure 60. 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 61 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.

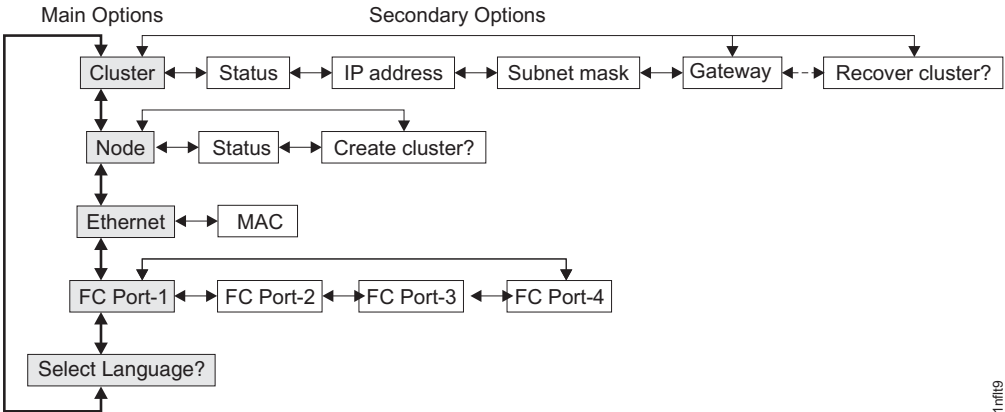


Figure 61. Menu options sequence

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

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.

Status

Status is indicated on the front panel.

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

Active

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

Inactive

- Indicates that the SAN Volume Controller node is a member of a cluster, but is not now operational. It is not operational because the other SAN Volume Controller nodes that are in the cluster cannot be accessed or because this SAN Volume Controller node was excluded from the cluster.

Degraded

- Indicates that the cluster is operational, but one or more of the member SAN Volume Controller nodes 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 62 shows the Recover cluster? menu sequence.

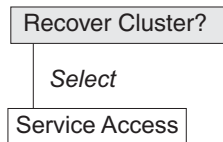


Figure 62. Recover Cluster? menu sequence

You do not need to use this field during installation. For more information about the Recover cluster? field, see the *IBM System Storage 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.

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 has no 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 63 shows the create cluster menu sequence.

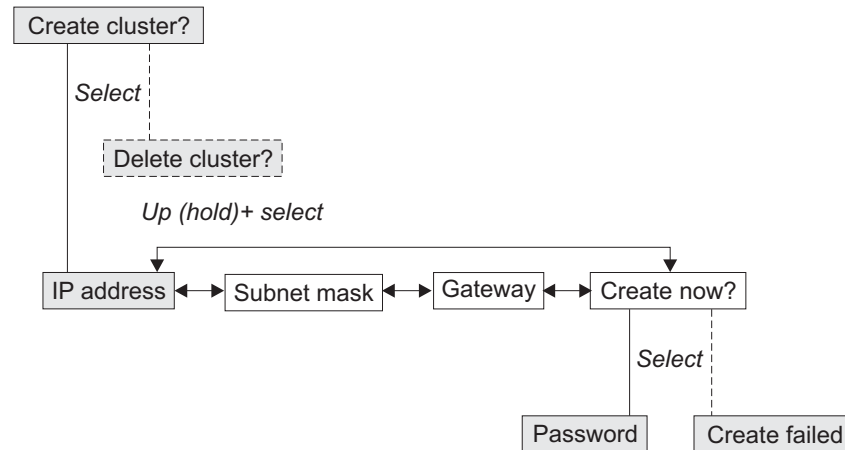


Figure 63. Create cluster? menu sequence

Press the left and right buttons to navigate through the secondary options that are associated with 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 is displayed.
2. Press the select button again. The first IP address number is highlighted.
3. Press the up button if you want to increase the value that is displayed; press the down button if you want to decrease that value. If you want to *quickly* increase or decrease the value, hold the up or down button, respectively.

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

4. Press the right or left buttons to move to the number field that you want to update.
5. Repeat steps 3 on page 85 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 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. Perform the following steps to delete a node from the cluster:

1. Press and hold the up button.
2. Press and release the select button.
3. 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 and release the select button, and release the down button. For the SAN Volume Controller 2145-4F2 or the SAN Volume Controller 2145-8F2, this action also allows you to change the fibre-channel port speed of a node that is not participating in a cluster, by pressing the up or down buttons.

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 64 shows the Select language? option sequence.



Figure 64. Select language? menu sequence

Press the right button to display the 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/storage/support/2145>

Related reference

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

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This product has been designed and built to comply with (IEC) Standard 950.

Industry Canada compliance statement

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United Kingdom telecommunications requirements

This apparatus is manufactured to the International Safety Standard EN60950 and as such is approved in the U.K. under approval number NS/G/1234/J/100003 for indirect connection to public telecommunications systems in the United Kingdom.

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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

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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.

CIM See *Common Information Model*.

cluster

In SAN Volume Controller, a pair of nodes that provides a single configuration and service interface.

Common Information Model (CIM)

A set of standards developed by the Distributed Management Task Force (DMTF). CIM provides a conceptual framework for storage management and an open approach to the design and implementation of storage systems, applications, databases, networks, and devices.

D

degraded

Pertaining to a valid configuration that has suffered a failure but continues to be supported and legal. Typically, a repair action can be performed on a degraded configuration to restore it to a valid configuration.

directed maintenance procedures

The set of maintenance procedures that can be run for a cluster. These procedures are run from within the SAN Volume Controller application and are documented in the service guide.

disk zone

A zone defined in the storage area network (SAN) fabric in which the SAN Volume Controller can detect and address the logical units that the disk controllers present.

E

error code

A value that identifies an error condition.

excluded

In SAN Volume Controller, the status of a managed disk that the cluster has removed from use after repeated access errors.

extent A unit of data that manages the mapping of data between managed disks and virtual disks.

F

failover

In SAN Volume Controller, the function that occurs when one redundant part of the system takes over the workload of another part of the system that has failed.

FC See *fibre channel*.

fibre channel

A technology for transmitting data between computer devices at a data rate of up to 4 Gbps. It is especially suited for attaching computer servers to shared storage devices and for interconnecting storage controllers and drives.

FlashCopy mapping

A relationship between two virtual disks.

G

GBIC See *gigabit interface converter*.

gigabit interface converter (GBIC)

An interface module that converts the light stream from a fibre-channel cable into electronic signals for use by the network interface card.

H

HBA See *host bus adapter*.

host bus adapter (HBA)

In SAN Volume Controller, an interface card that connects a host bus, such as a peripheral component interconnect (PCI) bus, to the storage area network.

host ID

In SAN Volume Controller, a numeric identifier assigned to a group of host fibre-channel ports for the purpose of logical unit number (LUN) mapping. For each host ID, there is a separate mapping of Small Computer System Interface (SCSI) IDs to virtual disks (VDisks).

host zone

A zone defined in the storage area network (SAN) fabric in which the hosts can address the SAN Volume Controllers.

I

inconsistent

In a Global Mirror relationship, pertaining to a secondary virtual disk (VDisk) that is being synchronized with the primary VDisk.

input/output (I/O)

Pertaining to a functional unit or communication path involved in an input process, an output process, or both, concurrently or not, and to the data involved in such a process.

Internet Protocol (IP)

In the Internet suite of protocols, a connectionless protocol that routes data

through a network or interconnected networks and acts as an intermediary between the higher protocol layers and the physical network.

I/O See *input/output*.

I/O group

A collection of virtual disks (VDisks) and node relationships that present a common interface to host systems.

IP See *Internet Protocol*.

L

local fabric

In SAN Volume Controller, those storage area network (SAN) components (such as switches and cables) that connect the components (nodes, hosts, switches) of the local cluster together.

logical unit (LU)

An entity to which Small Computer System Interface (SCSI) commands are addressed, such as a virtual disk (VDisk) or managed disk (MDisk).

logical unit number (LUN)

The SCSI identifier of a logical unit within a target. (S)

LU See *logical unit*.

LUN See *logical unit number*.

M

managed disk (MDisk)

A Small Computer System Interface (SCSI) logical unit that a redundant array of independent disks (RAID) controller provides and a cluster manages. The MDisk is not visible to host systems on the storage area network (SAN).

managed disk group

A collection of managed disks (MDisks) that, as a unit, contain all the data for a specified set of virtual disks (VDisks).

mapping

See *FlashCopy mapping*.

MDisk

See *managed disk*.

N

node One SAN Volume Controller. Each node provides virtualization, cache, and Copy Services to the storage area network (SAN).

O

object In object-oriented design or programming, a concrete realization of a class that consists of data and the operations associated with that data.

offline

Pertaining to the operation of a functional unit or device that is not under the continual control of the system or of a host.

online Pertaining to the operation of a functional unit or device that is under the continual control of the system or of a host.

P

port The physical entity within a host, SAN Volume Controller, or disk controller system that performs the data communication (transmitting and receiving) over the fibre channel.

R

RAID See *redundant array of independent disks*.

redundant array of independent disks

A collection of two or more disk drives that present the image of a single disk drive to the system. In the event of a single device failure, the data can be read or regenerated from the other disk drives in the array.

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*.

Simple Network Management Protocol (SNMP)

In the Internet suite of protocols, a network management protocol that is used to monitor routers and attached networks. SNMP is an application-layer protocol. Information on devices managed is defined and stored in the application's Management Information Base (MIB).

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.

symmetric virtualization

A virtualization technique in which the physical storage in the form of Redundant Array of Independent Disks (RAID) is split into smaller chunks of storage known as *extents*. These extents are then concatenated, using various policies, to make virtual disks (VDisks). See also *asymmetric virtualization*.

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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