IBM System Storage SAN Volume Controller

Hardware Maintenance Guide

Version 4.3.1

GC27-2226-00

IBM System Storage SAN Volume Controller

Hardware Maintenance Guide

Version 4.3.1

GC27-2226-00

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

This edition applies to version 4, release 3, modification 1 of the IBM System Storage SAN Volume Controller and to all subsequent releases and modifications until otherwise indicated in new editions. This edition and GC27-2227-00 replace GC26-7901-03.

Contents

Tables

Safety and environmental notices

Review the multilingual safety notices for the IBM® System Storage™ SAN Volume Controller, redundant ac-power switch, and the uninterruptible power supply before you install and use the product.

To find the translated text for a caution or danger notice:

1. Look for the identification number at the end of each caution notice or each danger notice. In the following examples, the numbers (C001) and (D002) are the identification numbers.

   CAUTION:
   A caution notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury. (C001)

   DANGER

   A danger notice indicates the presence of a hazard that has the potential of causing death or serious personal injury. (D002)

2. Locate *IBM Systems Safety Notices* with the user publications that were provided with the SAN Volume Controller hardware.
3. Find the matching identification number in the *IBM Systems Safety Notices*. Then review the topics concerning the safety notices to ensure that you are in compliance.
4. Optionally, read the multilingual safety instructions on the SAN Volume Controller Web site. Go to www.ibm.com/storage/support/2145, click the current product documentation link, and then click **Multi-language**.

General safety

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

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

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object, do the following:
  1. Ensure that you can stand safely without slipping.
  2. Distribute the weight of the object equally between your feet.
  3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 18 kg (40 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes a hazard to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.

- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconducting clip, approximately 8 cm (3 in.) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

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

Electrical safety

Observe the these rules when working on electrical equipment.

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

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

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

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

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

  Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
- When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
- Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

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

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

Inspecting the SAN Volume Controller for unsafe conditions

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

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

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

Important: Good judgment must also be used to identify potential safety hazards due to the 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 storage area network (SAN), check the grounding.

Related tasks

“Checking the grounding of a SAN Volume Controller, the uninterruptible power supply, and the redundant ac-power switch” on page xiii
Ensure that you understand how to check the grounding of a SAN Volume Controller, the uninterruptible power supply, and the optional redundant ac power feature.

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 a SAN Volume Controller, the uninterruptible power supply, and the redundant ac-power switch

Ensure that you understand how to check the grounding of a SAN Volume Controller, the uninterruptible power supply, and the optional redundant ac power feature.

Perform the following steps to test the grounding of a SAN Volume Controller node. Follow the steps for the SAN Volume Controller configuration that you are using. Before you start, confirm that you know the SAN Volume Controller model type, the uninterruptible power supply type, and whether you are using redundant ac power. Note the location of the signal cables that are attached to the SAN Volume Controller.

When you are asked to test the grounding continuity, use your local procedures to perform the test. The test is successful if the measured resistance is 0.1 ohm or less.

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

1. Ensure that the SAN Volume Controller node is powered off. See “MAP 5350: Powering off a SAN Volume Controller node” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.
2. If the uninterruptible power supply is a 2145 UPS, ensure that other SAN Volume Controller nodes that are powered from the uninterruptible power supply are powered off.

3. Use the power button to power off the uninterruptible power supply.
4. Disconnect all signal cables from the SAN Volume Controller node, which includes the following cables:
   - The fibre-channel cables
   - The Ethernet cable
   - The serial cable that is connected to the uninterruptible power supply.
5. Disconnect all signal cables from the uninterruptible power supply. If the uninterruptible power supply is a 2145 UPS, there might be multiple signal cables.
6. If the uninterruptible power supply is a 2145 UPS, disconnect any power cables that are connected to SAN Volume Controller nodes, except the one that is being tested.
7. If redundant ac power is not used, disconnect the uninterruptible power supply power cable from the site power distribution unit.
8. If redundant ac power is used, turn off any SAN Volume Controller that is being supplied from the redundant ac-power switch, and remove the power cable to this system from the redundant ac-power switch.
9. If redundant ac power is used, disconnect ***both*** input power leads from the site power distribution units.
10. If redundant ac power is not used, test the grounding continuity between a conductive area on the SAN Volume Controller frame and the ground pin on the plug of the uninterruptible power supply input-power cable.
11. If redundant ac power is used, test the grounding continuity between a conductive area on the SAN Volume Controller frame and the ground pin on the plug of the main power cable of the redundant ac-power switch. If the test is successful, test the grounding continuity between a conductive area on the SAN Volume Controller frame and the ground pin on the plug of the backup power cable of the redundant ac-power switch. Both tests must be successful.
12. After you have completed testing the grounding continuity, perform one of the following procedures, depending on the outcome of the test.
    - If the test is successful, reconnect any cables that were removed, and power on any uninterruptible power supply units and SAN Volume Controller nodes that were powered off.
    - If the test was not successful, ensure that all cables are securely connected. If the test still fails, test the individual system components. Before you test the individual components, remove all cables from the components. If any component test fails, replace the component. After each component has been tested and the failing ones have been replaced, repeat the complete system test by returning to step 1 on page xiii.

      Test the components in the following order:
      a. The SAN Volume Controller node, from the frame to the ground pin of the input power receptacle.
      b. The uninterruptible power supply from the ground pin of the input power receptacle to the ground conductor of the output power receptacle.
      c. If used, the redundant ac-power switch from the ground pin of the main input power receptacle to the ground conductor of the output power receptacle, and from the ground pin of the backup input power receptacle to the ground conductor of the output power receptacle.
      d. The SAN Volume Controller node to uninterruptible power supply power cable assembly, between the two ground conductors of the power cable.

e. The uninterruptible power supply input-power cable, between the two ground conductors of the power cable.

f. If used, the redundant ac-power switch main input-power cable, between the two ground conductors of the cable.

g. If used, the redundant ac-power switch backup input-power cable, between the two ground conductors of the cable.

Inspecting the uninterruptible power supply for unsafe conditions

Ensure that you take the time to inspect the uninterruptible power supply 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 uninterruptible power supply for unsafe conditions. If necessary, see any suitable safety publications.

1. If any equipment has been damaged during the shipment, keep the shipping cartons and packing materials.
2. Perform the following steps to file a claim for the shipping damage:
   a. File with the carrier within fifteen days of receipt of the equipment.
   b. Send a copy of the damage claim within fifteen days to your service support representative.

Uninterruptible power supply requirements

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

The following list describes requirements for the 2145 UPS:

- Each uninterruptible power supply 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 uninterruptible power supply.
- The voltage that is supplied to the uninterruptible power supply must be 200–240 V single phase.
- The frequency that is supplied must be 50 or 60 Hz.

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

- The voltage that is supplied to the 2145 UPS-1U must be 200-240 V single phase.
- The frequency that is supplied must be 50 or 60 Hz.

Note that the 2145 UPS-1U has an integrated circuit breaker and does not need external protection.

Note: If the uninterruptible power supply is cascaded from another uninterruptible power supply, the source uninterruptible power supply must have at least three times the capacity per phase and the total harmonic distortion must be less than 5%. The uninterruptible power supply also must have input voltage capture that has a slew rate of no more than 3 Hz per second.

Emergency power-off shutdown

The SAN Volume Controller and each uninterruptible power supply support emergency power-off (EPO) shutdowns.

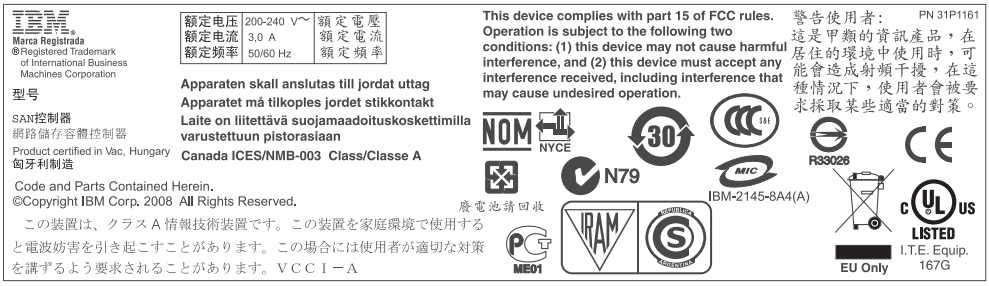
In the event of a room EPO shutdown, the 2145 UPS detects a loss of input power. This power loss is reported to the SAN Volume Controller 2145-4F2, which completes the process of shutting down the uninterruptible power supply within five minutes.

Attention: The 2145 UPS power off shutdown is normally controlled by the SAN Volume Controller 2145-4F2. If an EPO event occurs, but no SAN Volume Controller 2145-4F2 nodes that are connected to a 2145 UPS have been powered on since the 2145 UPS was powered on, you must remove output power from the uninterruptible power supply. To do this, press and hold the off button on the front panel of the 2145 UPS for at least four seconds.

Checking the 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 2145-8A4**



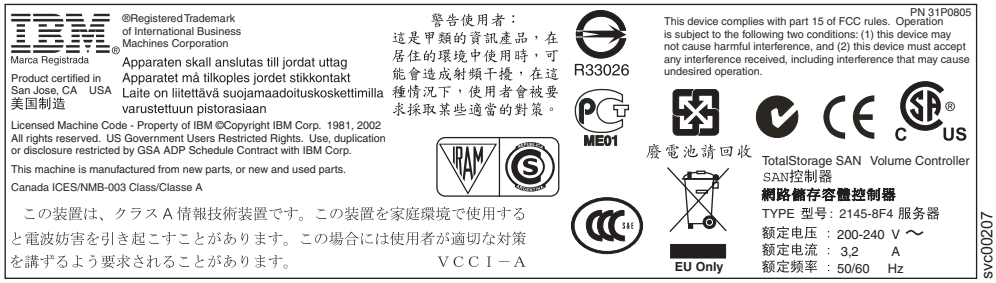
   - **Agency/ratings label for the SAN Volume Controller 2145-8G4**
     – Certified in San Jose, CA USA

svc00280

– Certified in Vac, Hungary

svc00279

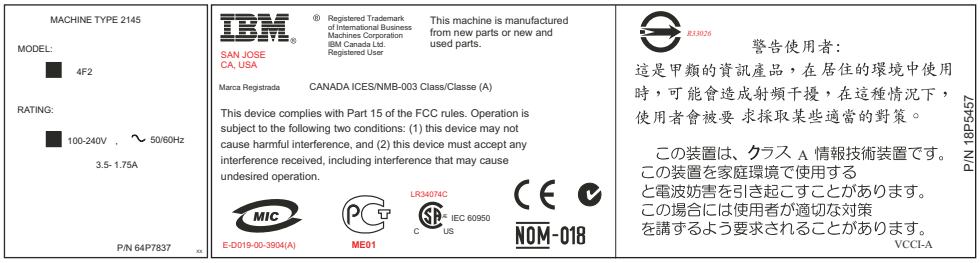
- **Agency/ratings label for the SAN Volume Controller 2145-8F4**



svc00207

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

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



- **No user access label**

- **Class 1 laser label**

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

svc00334

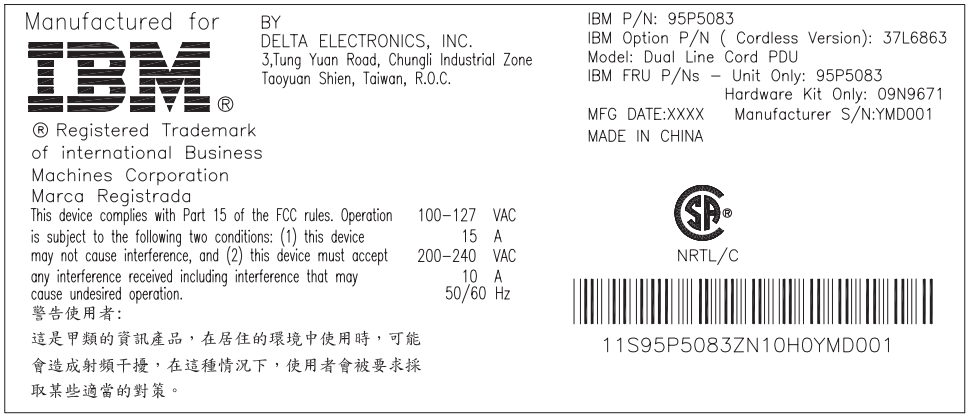
2. Before you continue, ensure that you understand each of these labels.

Checking the labels on the redundant ac-power switch

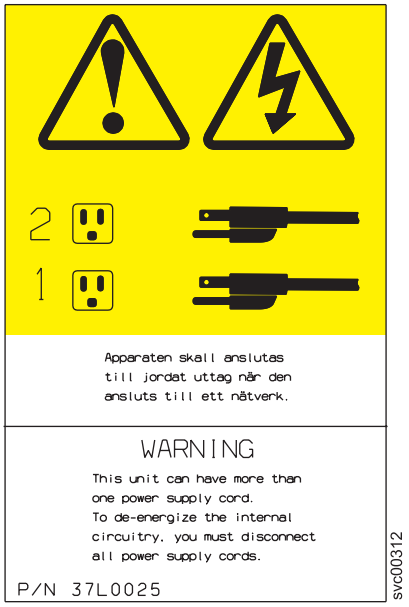
Before you install, use, or service the redundant ac-power switch, you must ensure that you understand the safety labels.

Locate the following labels on the redundant ac-power switch.

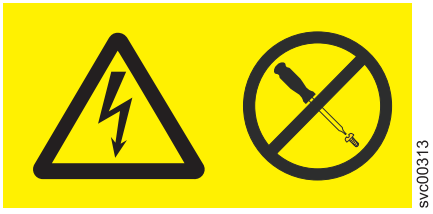
- **Agency label**



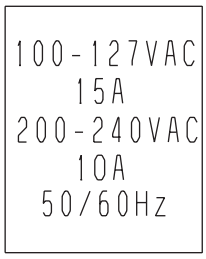
- **Dual power cord warning label**



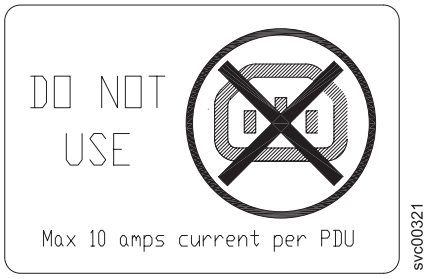
- **No user access label**



- **Input ratings label**



- **Output port warning label**



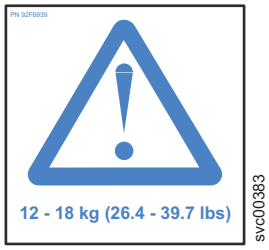
Checking the labels on the 2145 UPS-1U

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

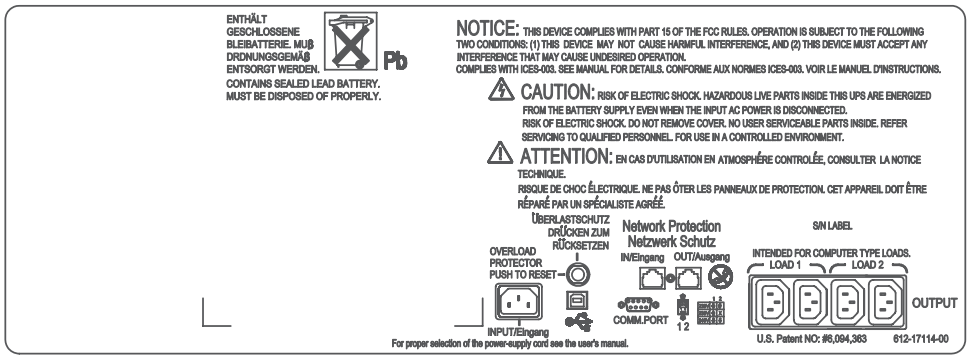
Labels on the outside of the 2145 UPS-1U

Ensure that you locate and understand each of the following 2145 UPS-1U labels:

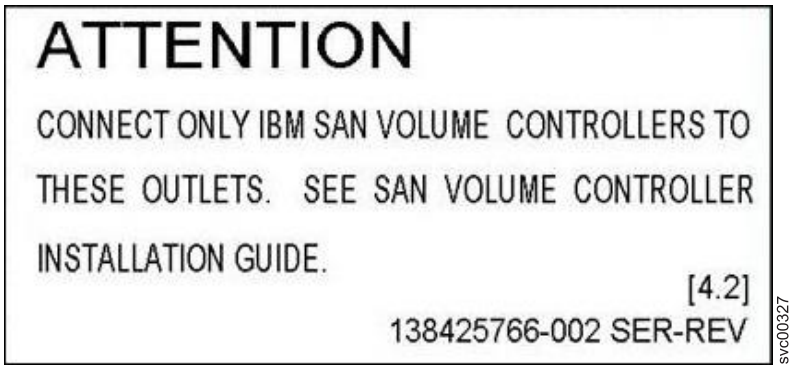
- **Weight caution label**



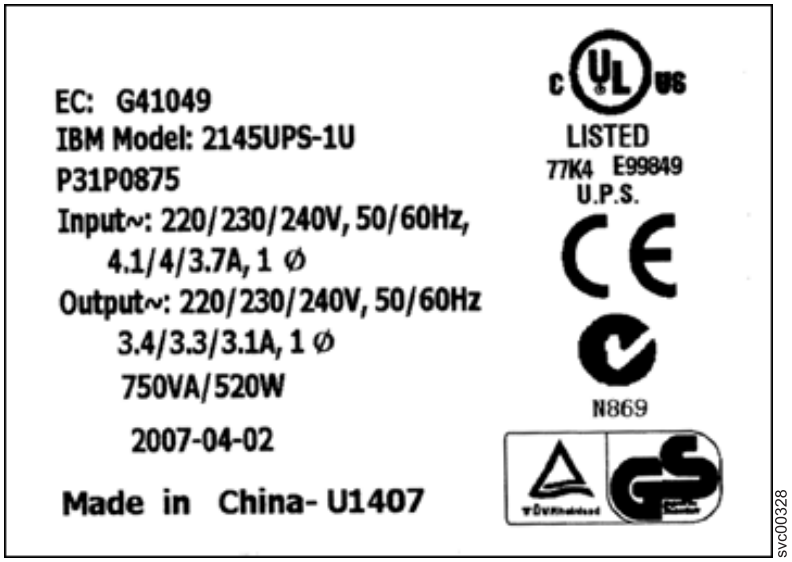
- **Safety label**



- **Power output warning label**



- **Agency label**



- **People's Republic of China Electronic Information Products (EIP) mark - 20 years**

- **Taiwan agency label**

- **IT compatible label**

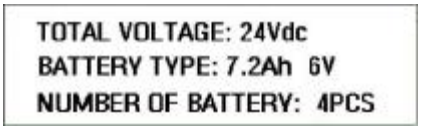
- **Do not discard the 2145 UPS-1U or the 2145 UPS-1U batteries in the trash label**

  Note: The 2145 UPS-1U can contain sealed, lead-acid batteries, which must be recycled.

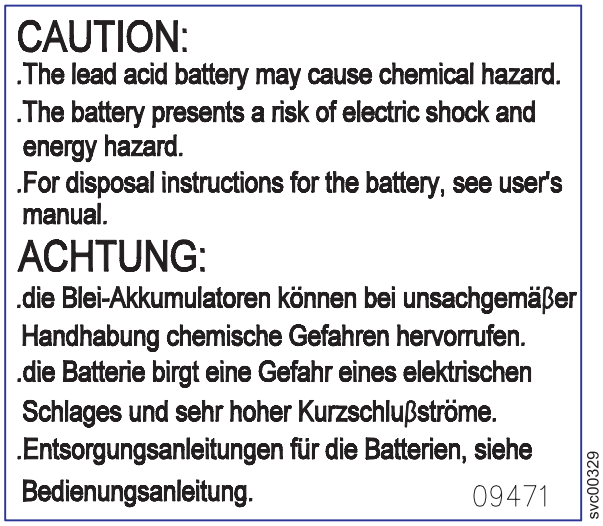
Battery labels on the 2145 UPS-1U

Ensure that you locate and understand the battery labels on the 2145 UPS-1U.

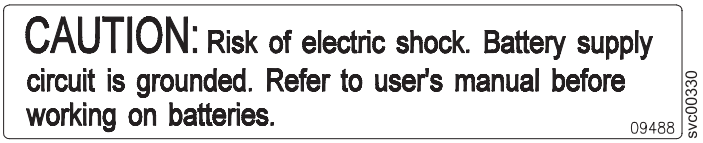
- Battery rating label



- Battery safety label



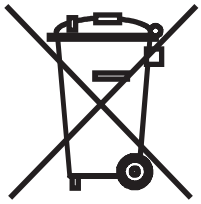
- Electric shock hazard



- **People's Republic of China Electronic Information Products (EIP) mark - 5 years**

- **Do not discard the 2145 UPS-1U or the 2145 UPS-1U batteries in the trash label**

  Note: The 2145 UPS-1U can contain sealed, lead-acid batteries, which must be recycled.



- **Recycling label**

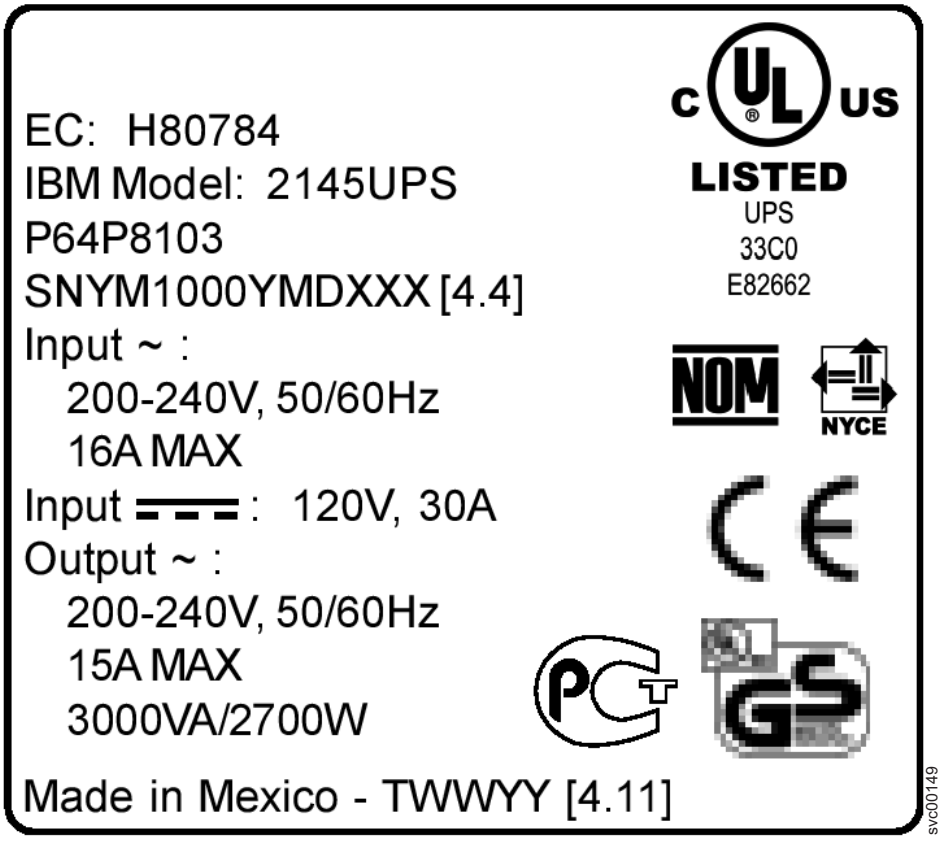
Checking the labels on the 2145 UPS

Before you install, use, or service the 2145 UPS, you must ensure that you understand the safety labels.

Labels on the outside of the 2145 UPS

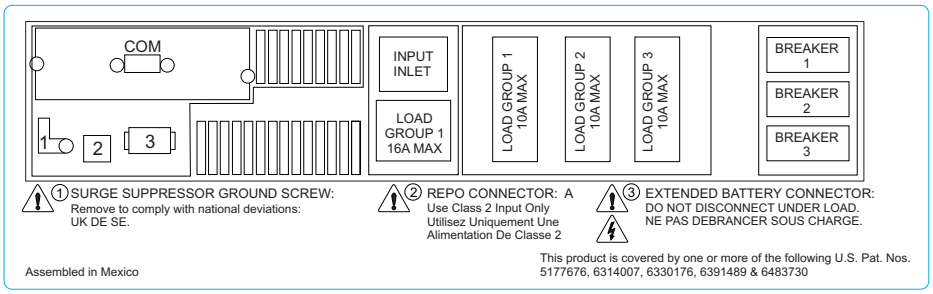
Ensure that you locate and understand each of the following 2145 UPS labels:

- **Agency label**



- **Rear panel configuration label**

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

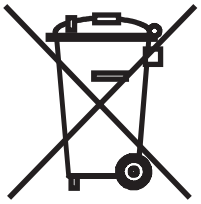


- **Do not discard the 2145 UPS or the 2145 UPS batteries in the trash label**

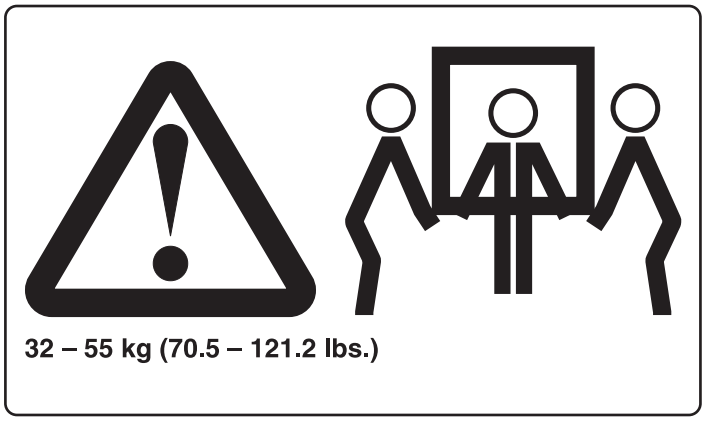
  Notes:

  – The 2145 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 2145 UPS due to changing labeling requirements.



- **Three-person lift label**



- **Weight caution label**

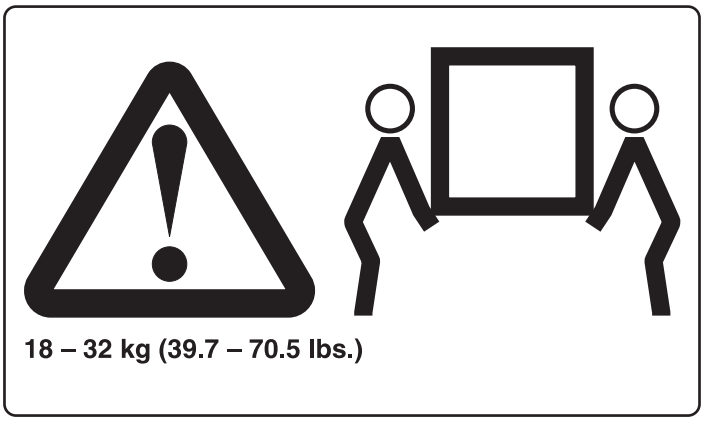
- **IT compatible label**

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

Battery labels on the 2145 UPS

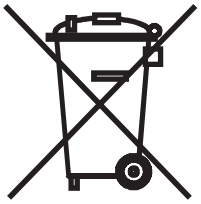
Ensure that you locate and understand the battery labels on the 2145 UPS.

- **Two-man lift label**



- **Do not discard the 2145 UPS or the 2145 UPS batteries in the trash label**

  Note: The 2145 UPS can contain sealed, lead-acid batteries, which must be recycled.



- **Recycling label**

- **Weight label**

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

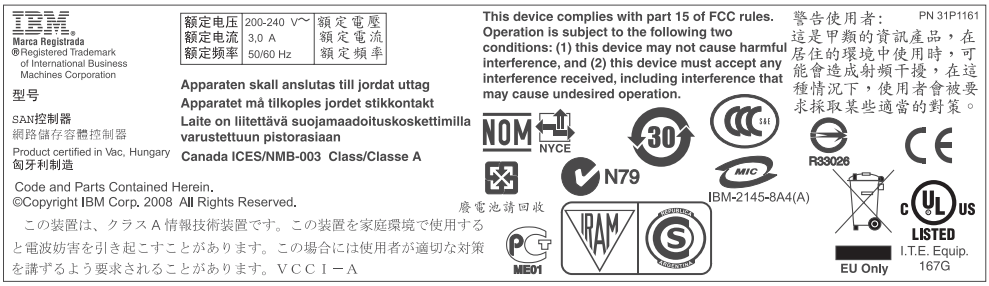
- **Battery faceplate label**

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

Checking the 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 2145-8A4**



   - **Agency/ratings label for the SAN Volume Controller 2145-8G4**
     - Certified in San Jose, CA USA

     - Certified in Vac, Hungary

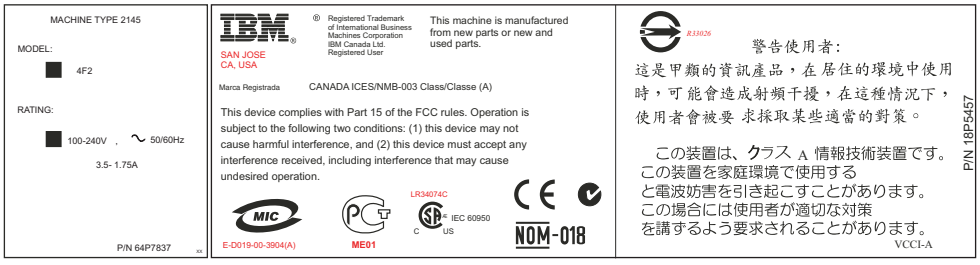
svc00279

- **Agency/ratings label for the SAN Volume Controller 2145-8F4**

svc00207

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

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



- **No user access label**

- **Class 1 laser label**

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

svc00334

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

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.

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.

1089CORE

The following comments apply to the IBM servers that have been designated as conforming to NEBS (Network Equipment-Building System) GR-1089-CORE.

Power and cabling information for NEBS (Network Equipment-Building System) GR-1089-CORE

The equipment is suitable for installation in the following:

- Network telecommunications facilities
- Locations where the NEC (National Electrical Code) applies

The intrabuilding ports of this equipment are suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding ports of this equipment *must not* be metallically connected to the interfaces that connect to the OSP (outside plant) or its wiring. These interfaces are designed for use as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metallically to OSP wiring.

Note: All Ethernet cables must be shielded and grounded at both ends.

The ac-powered system does not require the use of an external surge protection device (SPD).

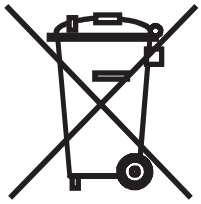
The dc-powered system employs an isolated DC return (DC-I) design. The DC battery return terminal *shall not* be connected to the chassis or frame ground.

Product recycling and disposal

Ensure that you are aware of the materials that must 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 sites at: www.ibm.com/ibm/recycle/us/index.shtml or www.ibm.com/ibm/environment/products/index.shtml.

Esta unidad debe reciclarse o desecharse de acuerdo con lo establecido en la normativa nacional o local aplicable. IBM recomienda a los propietarios de equipos de tecnología de la información (TI) que reciclen responsablemente sus equipos cuando éstos ya no les sean útiles. IBM dispone de una serie de programas y servicios de devolución de productos en varios países, a fin de ayudar a los propietarios de equipos a reciclar sus productos de TI. Se puede encontrar información sobre las ofertas de reciclado de productos de IBM en el sitio web de IBM: www.ibm.com/ibm/recycle/us/index.shtml or www.ibm.com/ibm/environment/products/index.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 European Union. 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.

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.

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。

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.

Battery return program

This product may contain sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion batteries. 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:

www.ibm.com/ibm/environment/products/index.shtml

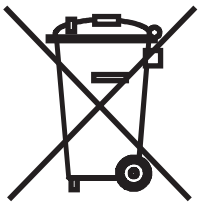
In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and other battery packs from IBM Equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Please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

For Taiwan:

Please recycle batteries

廢電池請回收

For the European Union:



Note: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueur dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

バッテリーあるいはバッテリー用のパッケージには、EU 諸国に対する廃電気電子機器指令 2006/66/EC のラベルが貼られています。この指令は、バッテリーと蓄電池、および廃棄バッテリーと蓄電池に関するものです。この指令は、使用済みバッテリーと蓄電池の回収とリサイクルの骨子を定めているもので、EU 諸国にわたって適用されます。このラベルは、使用済みになったとき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バッテリーに貼られています。

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal

concerned in the battery (Pb for lead, Hg for mercury and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, contact your local IBM representative.

Spain:

This notice is provided in accordance with Royal Decree 106/2008 of Spain: The retail price of batteries, accumulators and power cells includes the cost of the environmental management of their waste.

California:

Perchlorate Material - special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5, Chapter 33. Best Management Practices for Perchlorate Materials. This product, part, or both may include a lithium manganese dioxide battery which contains a perchlorate substance.

Flat panel display

The fluorescent lamp or lamps in the liquid crystal display contain mercury. Dispose of it as required by local ordinances and regulations.

Monitors and workstations

New Jersey – For information about recycling covered electronic devices in the state of New Jersey, go to the New Jersey Department of Environmental Protection web site at www.state.nj.us/dep/dshw/recycle/Electronic_Waste/index.html

Oregon - For information about recycling covered electronic devices in the state of Oregon, go to the Oregon Department of Environmental Quality site at www.deq.state.or.us/lq/electronics.htm.

Washington - For information about recycling covered electronic devices in the State of Washington, contact the Washington Department of Ecology at 1-800Recycle or go to the Department of Ecology Web site at fortress.wa.gov/ecy/recycle/.

About this guide

This guide describes how to service the IBM System Storage SAN Volume Controller.

The chapter that follows shows you the parts assembly for each SAN Volume Controller model, the redundant ac-power switch, and the uninterruptible power supply.

You are also provided with step-by-step procedures to remove and replace parts for the SAN Volume Controller and the uninterruptible power supply.

Note: *IBM System Storage SAN Volume Controller Hardware Maintenance Guide* and the *IBM System Storage SAN Volume Controller Troubleshooting Guide* were formerly combined in one book that was titled *IBM System Storage SAN Volume Controller Service Guide*.

Who should use this guide

This guide is intended for the systems services representative who is responsible for the service of the SAN Volume Controller, the redundant ac-power switch, the uninterruptible power supply, the IBM System Storage Productivity Center, and the master console.

Emphasis

Different typefaces are used in this guide to show emphasis.

The following typefaces are used to show emphasis:

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

SAN Volume Controller library and related publications

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

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

- The publications that make up the library for the IBM 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:

www.ibm.com/storage/support/2145

Title	Description	Order number
IBM System Storage SAN Volume Controller Planning Guide	This guide introduces the SAN Volume Controller and lists the features you can order. It also provides guidelines for planning the installation and configuration of the SAN Volume Controller.	GA32-0551
IBM System Storage SAN Volume Controller Model 2145-8A4 Hardware Installation Guide	This guide provides the instructions that the IBM service representative uses to install the hardware for SAN Volume Controller model 2145-8A4.	GC27-2219
IBM System Storage SAN Volume Controller Model 2145-8G4 Hardware Installation Guide	This guide provides the instructions that the IBM service representative uses to install the hardware for SAN Volume Controller model 2145-8G4.	GC27-2220
IBM System Storage SAN Volume Controller Software Installation and Configuration Guide	This guide provides guidelines for configuring your SAN Volume Controller. Instructions for backing up and restoring the cluster configuration, using and upgrading the SAN Volume Controller Console, using the CLI, upgrading the SAN Volume Controller software, and replacing or adding nodes to a cluster are included.	SC23-6628
IBM System Storage SAN Volume Controller CIM Agent Developer's Guide	This guide describes the concepts of the Common Information Model (CIM) environment. Steps about using the CIM agent object class instances to complete basic storage configuration tasks, establishing new Copy Services relationships, and performing CIM agent maintenance and diagnostic tasks are included.	SC23-6665

Title	Description	Order number
IBM System Storage SAN Volume Controller Command-Line Interface User's Guide	This guide describes the commands that you can use from the SAN Volume Controller command-line interface (CLI).	SC26-7903
IBM System Storage SAN Volume Controller Host Attachment Guide	This guide provides guidelines for attaching the SAN Volume Controller to your host system.	SC26-7905
IBM System Storage SAN Volume Controller Troubleshooting Guide	This guide describes the features of each SAN Volume Controller model, explains how to use the front panel, and provides maintenance analysis procedures to help you diagnose and solve problems with the SAN Volume Controller.	GC27-2227
IBM System Storage SAN Volume Controller Hardware Maintenance Guide	This guide provides the instructions that the IBM service representative uses to service the SAN Volume Controller hardware, including the removal and replacement of parts.	GC27-2226
IBM System Storage SAN Volume Controller Models 2145-8F2 and 2145-8F4 Hardware Installation Guide	This guide provides the instructions that the IBM service representative uses to install the hardware for SAN Volume Controller models 2145-8F2 and 2145-8F4.	GC27-2221
IBM System Storage SAN Volume Controller Model 2145-4F2 Hardware Installation Guide	This guide provides the instructions that the IBM service representative uses to install the hardware for SAN Volume Controller model 2145-4F2.	GC27-2222
IBM System Storage SAN Volume Controller Master Console Guide	This guide describes how to install, maintain, and service the master console.	GC27-2223
IBM Systems Safety Notices	This guide contains translated caution and danger statements. Each caution and danger statement in the SAN Volume Controller documentation has a number that you can use to locate the corresponding statement in your language in the *IBM Systems Safety Notices* document.	G229-9054

Other IBM publications

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

You can download IBM eServer™ IBM xSeries® and IBM System x™ publications from the following Web site:

www.ibm.com/jct01004c/systems/support/

Title	Description	Order number
IBM System Storage Productivity Center Introduction and Planning Guide	This guide introduces the IBM System Storage Productivity Center hardware and software.	SC23-8824
Read This First: Installing the IBM System Storage Productivity Center	This guide describes how to install the IBM System Storage Productivity Center hardware.	GI11-8938
IBM System Storage Productivity Center User's Guide	This guide describes how to configure the IBM System Storage Productivity Center software.	SC27-2336
IBM System Storage Multipath Subsystem Device Driver User's Guide	This guide describes the IBM System Storage Multipath Subsystem Device Driver for IBM System Storage products and how to use it with the SAN Volume Controller.	GC52-1309
IBM System Storage DS Storage Manager Version 10.30 Installation and Host Support Guide	This guide provides information about how to plan, install, configure, and work with IBM System Storage DS™ Storage Manager.	GC53-1135
IBM System Storage DS Storage Manager Version 10.30 Copy Services Guide	This guide provides information about setting up, installing, configuring, and working with the three IBM System Storage DS Storage Manager premium features that assist with copy services: FlashCopy®, VolumeCopy, and the Enhanced Remote Mirroring Option.	GC53-1136
IBM System Storage DS4000/DS5000 Fibre Channel and Serial ATA Intermix Premium Feature Installation Overview	This overview describes how to install the IBM System Storage DS4000/DS5000 Fibre Channel and Serial ATA Intermix Premium Feature.	GC53-1137
IBM System Storage DS5100 and DS5300 Installation, User's and Maintenance Guide	This guide describes how to install and configure the IBM System Storage DS5100 and DS5300.	GC53-1140

Title	Description	Order number
IBM System Storage EXP5000 Storage Expansion Enclosure Installation, User's, and Maintenance Guide	This guide describes how to install and configure the IBM System Storage EXP5000 Storage Expansion Enclosure.	GC53-1141
IBM System Storage DS Storage Manager Command-line Programming Guide	This guide describes the commands that you can use from the IBM System Storage DS Storage Manager command-line interface.	GC52-1275
IBM System Storage DS5000 Quick Start Guide: Quick Reference for the DS5100, DS5300 and EXP5000	This guide provides information about setting up and installing the DS5100, DS5300 and EXP5000.	GC53-1134
IBM TotalStorage DS4300 Fibre Channel Storage Subsystem Installation, User's, and Maintenance Guide	This guide describes how to install and configure the IBM TotalStorage® DS4300 Fibre-Channel Storage Subsystem.	GC26-7722
IBM eServer xSeries 306m (Types 8849 and 8491) Installation Guide	This guide describes how to install the IBM eServer xSeries 306m, which is the hardware delivered for some versions of the hardware master console.	MIGR-61615
IBM xSeries 306m (Types 8849 and 8491) User's Guide	This guide describes how to use the IBM eServer xSeries 306m, which is the hardware delivered for some versions of the hardware master console.	MIGR-61901
IBM xSeries 306m (Types 8849 and 8491) Problem Determination and Service Guide	This guide can help you troubleshoot and resolve problems with the IBM eServer xSeries 306m, which is the hardware delivered for some versions of the hardware master console.	MIGR-62594
IBM eServer xSeries 306 (Type 8836) Installation Guide	This guide describes how to install the IBM eServer xSeries 306, which is the hardware delivered for some versions of the hardware master console.	MIGR-55080
IBM eServer xSeries 306 (Type 8836) User's Guide	This guide describes how to use the IBM eServer xSeries 306, which is the hardware delivered for some versions of the hardware master console.	MIGR-55079

Title	Description	Order number
IBM eServer xSeries 306 (Types 1878, 8489 and 8836) Hardware Maintenance Manual and Troubleshooting Guide	This guide can help you troubleshoot problems and maintain the IBM eServer xSeries 306, which is the hardware delivered for some versions of the hardware master console.	MIGR-54820
IBM eServer xSeries 305 (Type 8673) Installation Guide	This guide describes how to install the IBM eServer xSeries 305, which is the hardware delivered for some versions of the hardware master console.	MIGR-44200
IBM eServer xSeries 305 (Type 8673) User's Guide	This guide describes how to use the IBM eServer xSeries 305, which is the hardware delivered for some versions of the hardware master console.	MIGR-44199
IBM eServer xSeries 305 (Type 8673) Hardware Maintenance Manual and Troubleshooting Guide	This guide can help you troubleshoot problems and maintain the IBM eServer xSeries 305, which is the hardware delivered for some versions of the hardware master console.	MIGR-44094
IBM TotalStorage 3534 Model F08 SAN Fibre Channel Switch User's Guide	This guide introduces the IBM TotalStorage SAN Switch 3534 Model F08.	GC26-7454
IBM System x3250 (Types 4364 and 4365) Installation Guide	This guide describes how to install the IBM System x3250, which is the hardware delivered for some versions of the hardware master console.	MIGR-5069761
IBM System x3250 (Types 4364 and 4365) User's Guide	This guide describes how to use the IBM System x3250, which is the hardware delivered for some versions of the hardware master console.	MIGR-66373
IBM System x3250 (Types 4364 and 4365) Problem Determination and Service Guide	This guide can help you troubleshoot and resolve problems with the IBM System x3250, which is the hardware delivered for some versions of the hardware master console.	MIGR-66374
IBM TotalStorage SAN Switch 2109 Model F16 User's Guide	This guide introduces the IBM TotalStorage SAN Switch 2109 Model F16.	GC26-7439

Title	Description	Order number
IBM TotalStorage SAN Switch 2109 Model F32 User's Guide	This guide introduces the IBM TotalStorage SAN Switch 2109 Model F32. It also describes the features of the switch and tells you where to find more information about those features.	GC26-7517

Some related publications are available from the following SAN Volume Controller support Web site:

www.ibm.com/storage/support/2145

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	www.ibm.com/storage/support/2145
Technical support for IBM storage products	www.ibm.com/storage/support/

How to order IBM publications

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

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 at no charge. You can also order publications. The publications center displays prices in your local currency. You can access the IBM Publications Center through the following Web site:

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

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.

Chapter 1. Parts listing

Part numbers are available for the different parts and field replaceable units (FRUs) of the SAN Volume Controller nodes, redundant ac-power switch, and the uninterruptible power supply units.

SAN Volume Controller supports five different node types. A label on the front of the node indicates the SAN Volume Controller node type and serial number.

SAN Volume Controller 2145-8A4 parts

You may need to replace a SAN Volume Controller 2145-8A4 field replaceable unit (FRU).

Figure 1 on page 2 shows how the different parts of the SAN Volume Controller 2145-8A4 are assembled.

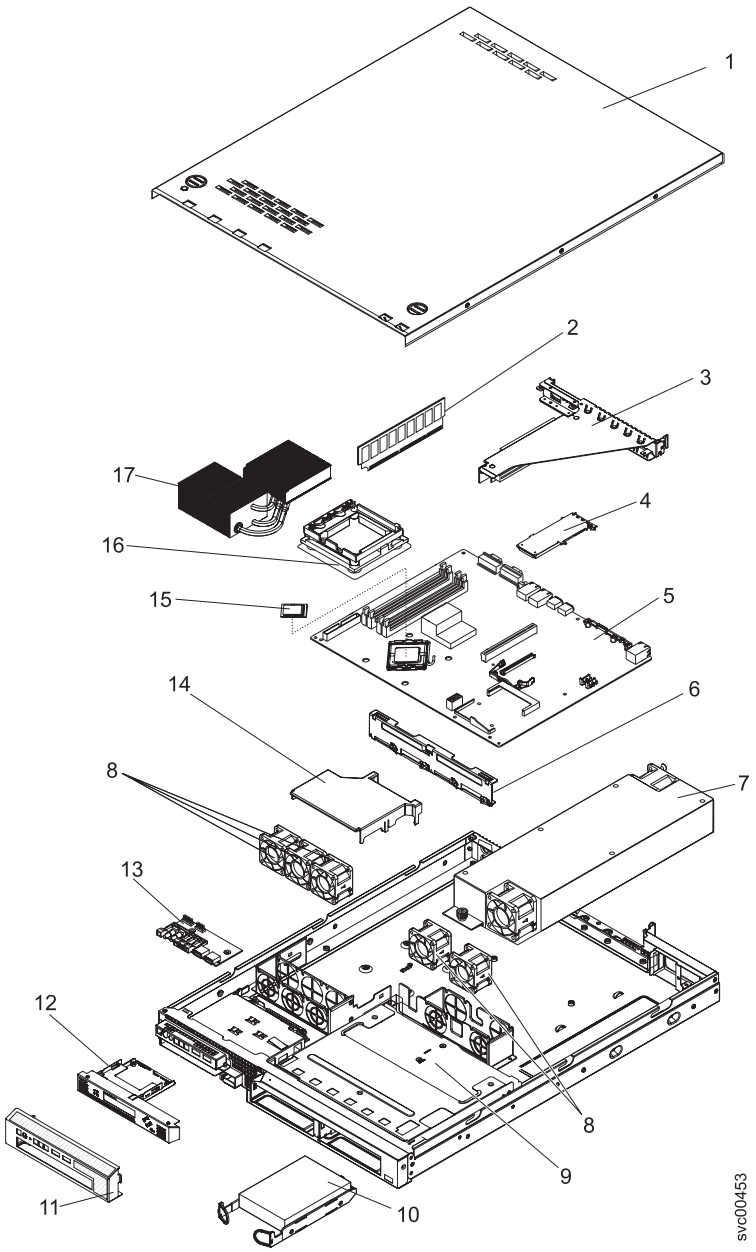


Figure 1. Exploded view of the SAN Volume Controller 2145-8A4 node

- Table 1 provides the part numbers and a brief description for parts that are exchanged within SAN Volume Controller 2145-8A4 service procedures.
- Table 2 on page 4 provides the part numbers and a brief description for parts that are not exchanged within SAN Volume Controller 2145-8A4 service procedures.

Use the assembly index number to locate and identify the parts that are shown in Figure 1.

Table 1. FRUs that are exchanged within SAN Volume Controller 2145-8A4 service procedures

Assembly index	Part number	Units	Description
-2	41Y2854	4	Memory, 2 GB PC2-5300 ECC

Table 1. FRUs that are exchanged within SAN Volume Controller 2145-8A4 service procedures (continued)

Assembly index	Part number	Units	Description
-3	43W5112	1	Riser card, PCI Express
-4	31P0937	1	4-port fibre-channel host bus adapter
-	23R2770	4	Fibre-channel SFP connector
-5	43W5103	1	System board (You need 1 alcohol wipe and 1 thermal grease syringe when you replace this FRU. If you do not already have these, order them before you begin to replace the part.)
-6	39M4347	1	Disk cable assembly (A SATA disk drive back plate with 2 SATA cables)
-7	39Y7289	1	Power supply, 351 watt
-8	39M4322	5	Fan (40 mm)
-10	41Y8247	1	Hard disk drive, 3.5 in, simple-swap SATA
-12	31P1157	1	Service controller, including the front-panel display and the display and control buttons
-13	42C1513	1	Operator-information panel
-	39M6266	1	Operator-information panel cable
-15	44X0204	1	Microprocessor, 3.0 GHz 6 MB dual core (You need 1 alcohol wipe and 1 thermal grease syringe when you replace this FRU. If you do not already have these, order them before you begin to replace the part.)
-	33F8354	1	Battery, 3.0V

Table 1. FRUs that are exchanged within SAN Volume Controller 2145-8A4 service procedures (continued)

Assembly index	Part number	Units	Description
-	31P1177	1	Power cable assembly (SAN Volume Controller to the 2145 UPS-1U). The SAN Volume Controller 2145-8A4 does not work with previous versions of the power cable assembly. The correct power cable assembly is indicated by the red tape that is used to bind the cables together.
-	12R9914	1	External fibre-channel cable, LC–LC, 5.0 m (16.4 ft)
-	12R9915	1	External fibre-channel cable, LC–LC, 25.0 m (82 ft)
-	59P4739	1	Alcohol wipe
-	41Y9292	1	Thermal grease

Table 2. FRUs that are not exchanged within SAN Volume Controller 2145-8A4 service procedures

Assembly index	Part number	Quantity	Description
-	32P9107	1	Support rail kit
-	31P1171	1	Cable retention bracket
-	43W5119	1	Chassis
1	42C1284	1	Top cover
9	42C1286	1	Drive cage
11	43W5115	1	Front bezel
14	39M6296	1	Air baffle
16	43W5117	1	Heat-sink assembly retention module
17	43W5116	1	Heat-sink assembly
-	42C1282	1	3.5 in. SATA service label
-	43W5113	1	Service label
-	43W5114	1	CRU/FRU label
-	39M4351	2	Bracket ear

SAN Volume Controller 2145-8G4 parts

You may need to replace a SAN Volume Controller 2145-8G4 field replaceable unit (FRU).

Figure 2 shows how the different parts of the SAN Volume Controller 2145-8G4 are assembled.

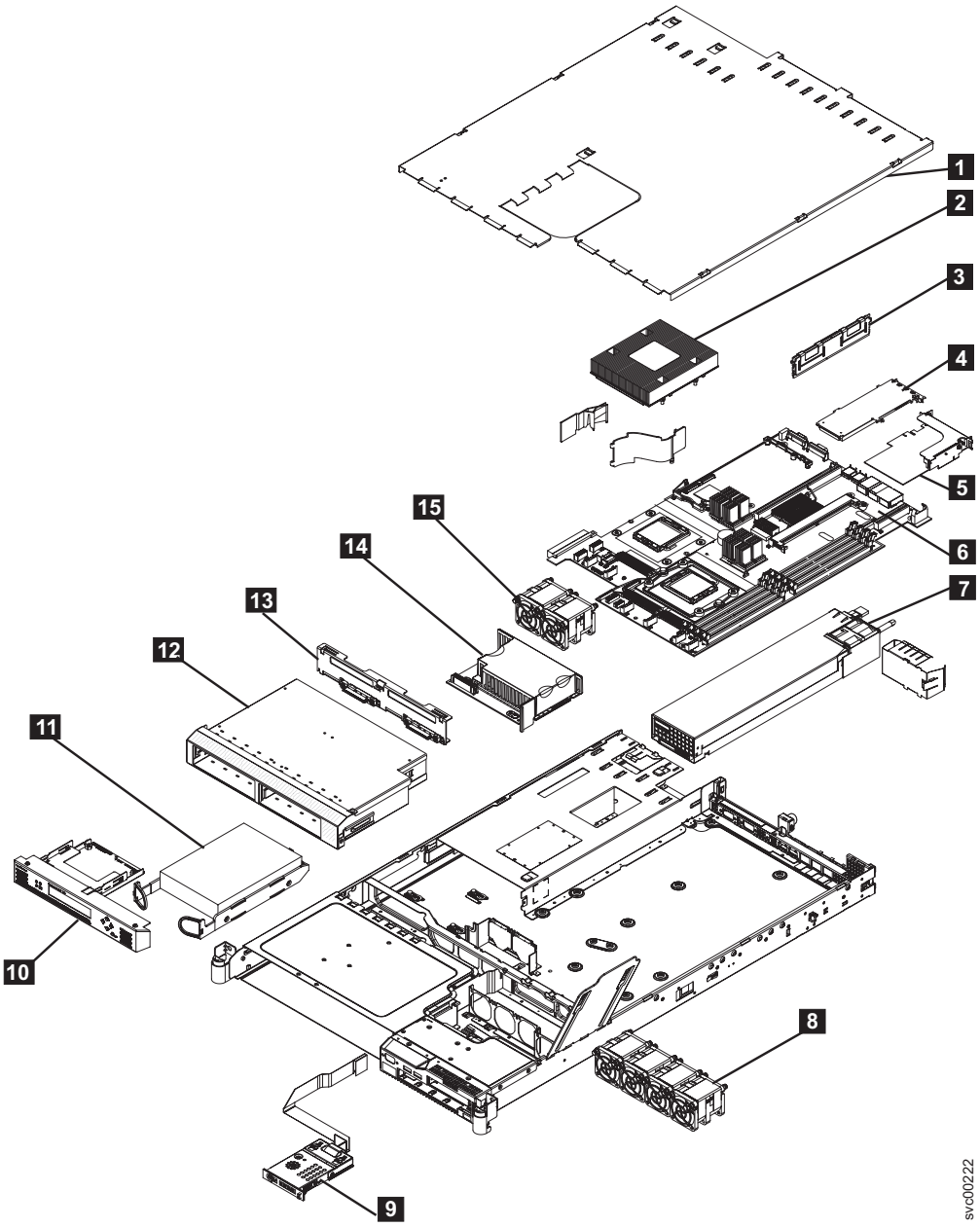


Figure 2. Exploded view of the SAN Volume Controller 2145-8G4 node

There are two versions of the SAN Volume Controller 2145-8G4 node: Rev 1 and Rev 2. The differences between these two versions are in the memory and processor configuration. See Table 3 on page 6 to determine which version you have. In addition, the vital product data (VPD) for the node indicates the correct part

numbers for nodes that are working in a cluster.

Table 3. Distinctive characteristics of the SAN Volume Controller 2145-8G4 versions

Rev 1 version	Rev 2 version
There is one label on the front of the node and it does not include a revision number	There are two labels on the front of the node; the larger label is positioned on the optical drive filler panel and includes the revision number
Has two microprocessors	Has one microprocessor
Has eight memory modules	Has four memory modules
Has a serial number in the format *mm*-F*xxxx*	Has a serial number in the format *mm*-G*xxxx*

The following tables identify part numbers and provide brief descriptions of the SAN Volume Controller 2145-8G4 parts. Use the assembly index number to locate and identify the parts that are shown in Figure 2 on page 5.

- Table 4 lists the parts that are unique for the Rev 1 version.
- Table 5 lists the parts that are unique for the Rev 2 version.
- Table 6 lists the parts that are used with both versions.
- Table 7 on page 8 lists the FRUs that are not referred to by any SAN Volume Controller 2145-8G4 service procedure.

Table 4. FRU part numbers that are unique for the SAN Volume Controller 2145-8G4 Rev 1 version

Assembly index	Part number	Units	Description
-2	42C4228	2	Microprocessor, 2.33 GHz with heat sink
-3	39M5784	8	Memory, 1 GB ECC DRR2

Table 5. FRU part numbers that are unique for the SAN Volume Controller 2145-8G4 Rev 2 version

Assembly index	Part number	Units	Description
-2	44R5646	1	Microprocessor, 2.5 GHz (You need 1 alcohol wipe and 1 thermal grease syringe when you replace this FRU. If you do not already have these, order them before you begin to replace the part.)
-3	39M5790	4	Memory, 2 GB ECC DRR2

Table 6. FRUs in the SAN Volume Controller 2145-8G4 parts assembly

Assembly index	Part number	Units	Description
-1	43W0609	1	Top cover

Table 6. FRUs in the SAN Volume Controller 2145-8G4 parts assembly (continued)

Assembly index	Part number	Units	Description
-4	31P0937	1	4-port fibre-channel host bus adapter
-5	32R2883	1	Riser card, PCI Express (Slot 1)
-6	31P1090	1	System board (You need 2 alcohol wipes and 2 thermal grease syringes when you replace this FRU. If you do not already have these, order them before you begin to replace the part.)
-7	39Y7189	1	Power supply, 670 watt
-8 and -15	26K8083	6	Fan assembly
-	33F8354	1	Battery, 3.0V
-9	43W0625	1	Operator-information panel
-10	31P0908	1	Service controller
-11	41Y8247	1	Hard disk drive, 3.5 in, simple-swap SATA (beginning with SAN Volume Controller 4.3.1)
-12	32R2823	1	Simple-swap SATA disk drive cage
-13	26K8060	1	Disk cable assembly
-14	39Y6972	1	Power back plane
-	23R2770	1	Fibre-channel SFP connector
-	31P1063	1	Power cable assembly (SAN Volume Controller to 2145 UPS-1U)
-	39M5700	1	External fibre-channel cable, LC–LC, 5.0 m (16.4 ft)
-	39M5701	1	External fibre-channel cable, LC–LC, 25.0 m (82 ft)
-	59P4739	1	Alcohol wipe
-	41Y9292	1	Thermal grease

Table 7. FRUs that are not referenced by SAN Volume Controller 2145-8G4 service procedures

Part number	Quantity	Description
39Y9510	1	Kit, toolless rail
31P1045	1	Cable retainer assembly
26K8058	2	Front panel USB cable
32R2820	1	3.5 in. SATA service label
39Y9420	1	Air flow parts
39Y9423	2	Heat sink assembly
39Y9507	1	Media bezel assembly
43W0610	1	Service labels assembly
39Y9522	1	Main panel weldment
42C3983	1	Optical interposer card
43V4869	1	CRU/FRU label
39Y9507	1	Media bezel assembly
32R2823	1	3.5 in. SATA cartridge assembly

SAN Volume Controller 2145-8F4 parts

You may need to replace a SAN Volume Controller 2145-8F4 field replaceable unit (FRU).

Figure 3 on page 9 shows how the different parts of the SAN Volume Controller 2145-8F4 are assembled.

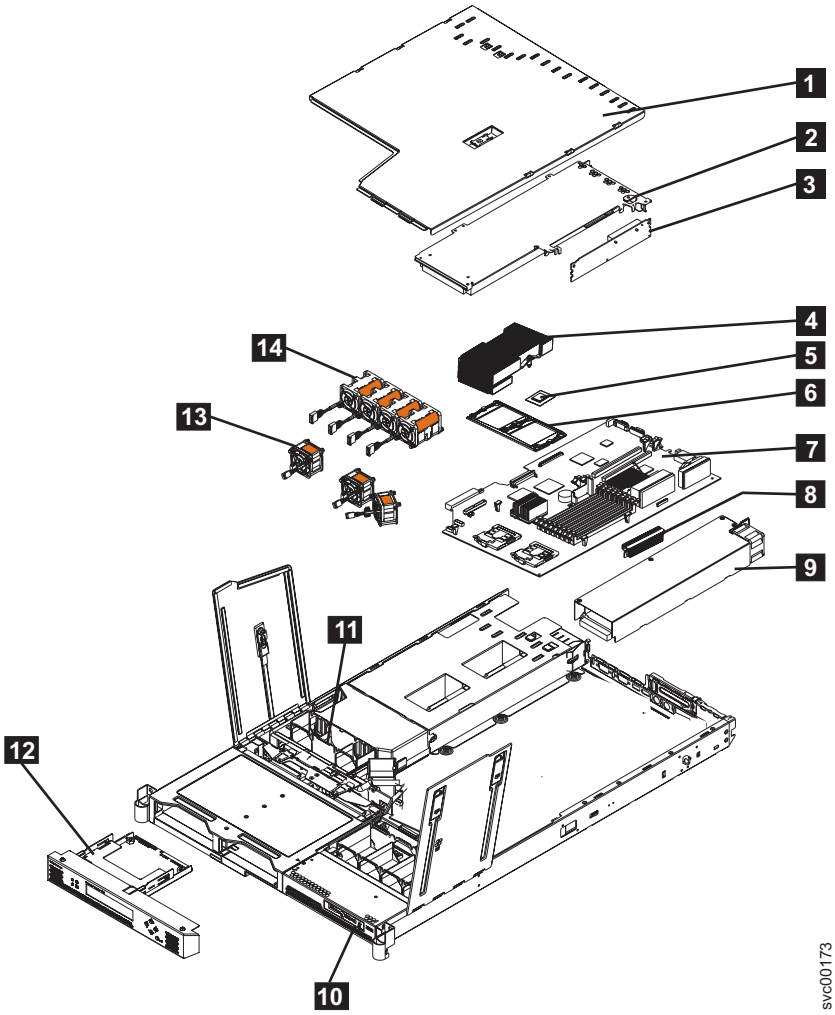


Figure 3. Exploded view of the SAN Volume Controller 2145-8F4 node

Table 8 provides the part numbers and a brief description of the frame assembly parts that are labeled in Figure 3. The frame assembly comprises all the parts except the service controller and fibre-channel cards. These parts are listed in Table 9 on page 10.

Table 8. SAN Volume Controller 2145-8F4 frame assembly

Assembly index	Part number	Units	Description
	31P0705	1	Frame assembly
-	31P0769	1	80GB SATA HDD
-1	23K4219	1	Top cover
-3	90P1956	1	Riser card, PCI Express
-4	39R9058	2	Heat sink
-5	13M8293	2	Microprocessor, 3.0 GHz
-6	90P5282	1	Heat sink retention module
-	90P5284	1	Chassis

Table 8. SAN Volume Controller 2145-8F4 frame assembly (continued)

Assembly index	Part number	Units	Description
-	23K4209	1	Cage assembly
-7	39Y6958	1	System board
-8	39Y7261	2	Voltage regulator module (VRM), 1U/75A
-9	39Y7169	1	Power supply, 585 watt
-	40K8157	1	Power backplane
-	33F8354	1	Battery, 3.0V
-	40K8160	1	Cable, fan power
-	40K8159	1	Cable, signal, front panel
-10	42C9719	1	Operator information panel
-11	40K8156	1	Fan holder with fan backplanes
-13	40K8139	3	Fan, 40×40×28
-14	40K8140	4	Fan, 40×40×56
-	73P2870	8	Memory, 1 GB ECC DRR2

Table 9. Items not included in the SAN Volume Controller 2145-8F4 frame assembly

Assembly index	Part number	Units	Description
-2	31P0714	1	4-port fibre-channel host bus adapter
-	23R2770	1	Fibre-channel SFP connector
-12	31P0708	1	Service controller
-	23K4218	1	Kit, toolless rail
-	31P1063	1	Power cable assembly (SAN Volume Controller to the 2145 UPS-1U)
-	31P0715	1	Cable retainer
-	39M5699		External Fibre Channel cable, LC–LC, 1.0 m (3.3 ft)
-	39M5700		External Fibre Channel cable, LC–LC, 5.0 m (16.4 ft)
-	39M5701		External Fibre Channel cable, LC–LC, 25.0 m (82 ft)

Table 9. Items not included in the SAN Volume Controller 2145-8F4 frame assembly (continued)

Assembly index	Part number	Units	Description
-	12R9321		External Fibre Channel cable, LC–SC/LC, 1.0 m (3.3 ft)

SAN Volume Controller 2145-8F2 parts

You may need to replace a SAN Volume Controller 2145-8F2 field replaceable unit (FRU).

Figure 4 shows how the different parts for the SAN Volume Controller 2145-8F2 are assembled.

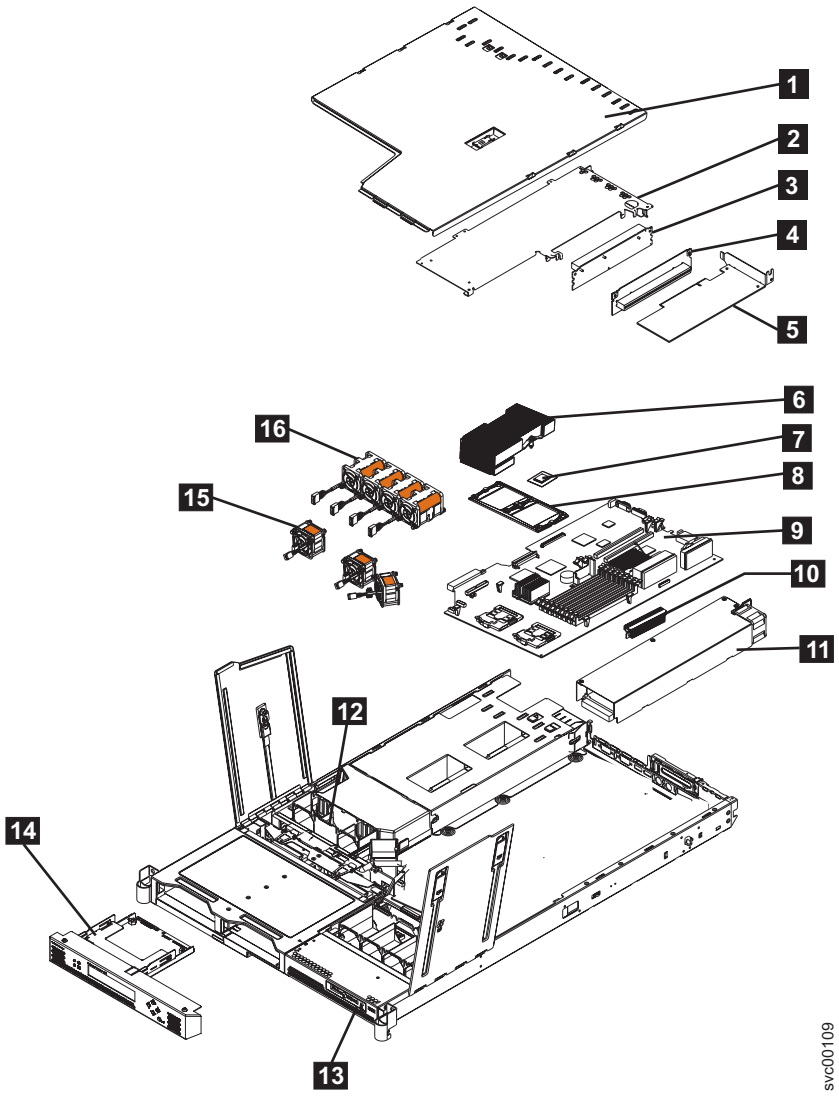


Figure 4. Exploded view of the SAN Volume Controller 2145-8F2 node

Table 10 provides the part numbers and a brief description of the frame assembly parts that are labeled in Figure 4 on page 11. The frame assembly comprises all of the parts except the service controller and fibre-channel cards. These parts are listed in Table 11.

Table 10. SAN Volume Controller 2145-8F2 frame assembly

Assembly index	Part number	Units	Description
	64P7934	1	Frame assembly
-1	23K4219	1	Top cover
-	64P8332	1	80GB SATA HDD
-3	23K4211	1	Riser card, PCI (full height)
-4	90P1957	1	Riser card, PCI (low profile)
-6	90P5281	2	Heat sink
-7	13M8293	2	Microprocessor, 3.0 GHz
-8	90P5282	1	Heat sink retention module
-	90P5284	1	Chassis
-	23K4209	1	Cage assembly
-9	32R1730	1	System board
-10	24R2698	2	VRM, 1U/75A
-11	24R2640	1	Power supply assembly
-	23K4515	1	Power backplane
-	33F8354	1	Battery, 3.0V
-	33P2352	1	Cable, fan power
-	25R4052	1	Cable, signal, front panel
-12	23K4992	1	Fan holder with fan backplanes
-13	23K4490	1	Operator information panel
-15	23K4217	3	Fan, 40×40×28
-16	33P2335	4	Fan, 40×40×56
-	73P2870	8	Memory, 1 GB ECC DRR2

Table 11. Items not included in the SAN Volume Controller 2145-8F2 frame assembly

Assembly index	Part number	Units	Description
-2	64P7783	1	Fibre-channel HBA (full height)
-5	64P7813	1	Fibre-channel HBA (low profile)
-	23R2770	1	Fibre-channel SFP connector

Table 11. Items not included in the SAN Volume Controller 2145-8F2 frame assembly (continued)

Assembly index	Part number	Units	Description
-14	64P7874	1	Service controller
-	64P7940	1	Input power cable assembly, (SAN Volume Controller 2145-8F2 to the 2145 UPS-1U)
-	23K4218	1	Kit, toolless rail
-	39M5699		External Fibre Channel cable, LC–LC, 1.0 m (3.3 ft)
-	39M5700		External Fibre Channel cable, LC–LC, 5.0 m (16.4 ft)
-	39M5701		External Fibre Channel cable, LC–LC, 25.0 m (82 ft)
-	12R9321		External Fibre Channel cable, LC–SC/LC, 1.0 m (3.3 ft)

SAN Volume Controller 2145-4F2 parts

You may need to replace a SAN Volume Controller 2145-4F2 field replaceable unit (FRU).

Figure 5 on page 14 shows how the different parts for the SAN Volume Controller 2145-4F2 are assembled.

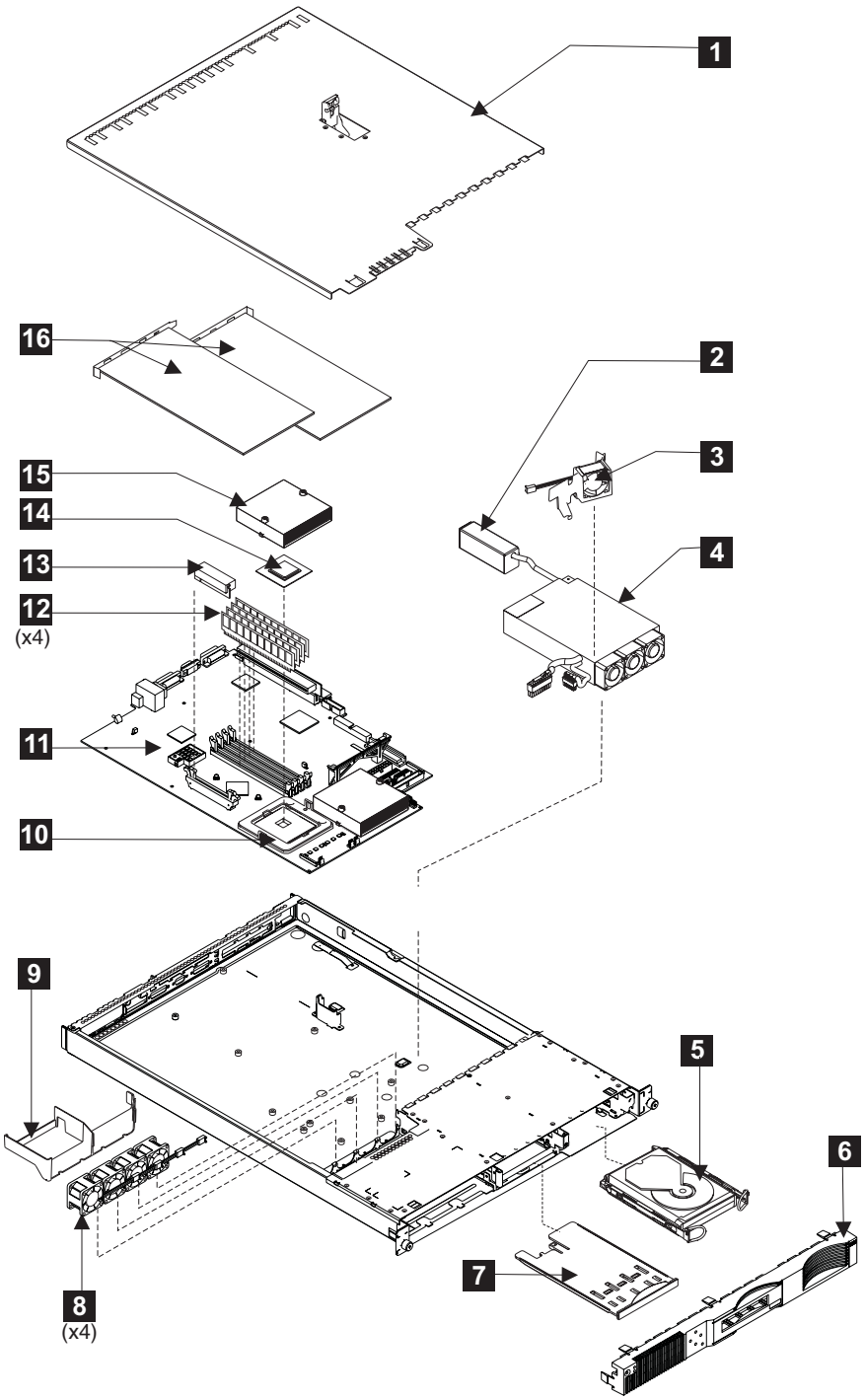


Figure 5. Exploded view of the SAN Volume Controller 2145-4F2 node

Table 12 provides the part numbers and a brief description for each part labeled in Figure 5.

Table 12. SAN Volume Controller 2145-4F2 frame assembly

Assembly index	Part number	Units	Description
	64P7793	1	Frame assembly
-1	40K9765	1	Top cover

Table 12. SAN Volume Controller 2145-4F2 frame assembly (continued)

Assembly index	Part number	Units	Description
-9	24P0742	1	Baffle
–6	64P7858	1	Front panel assembly
–7	64P7785	1	Service controller
-5	24P3704	1	36 GB disk drive assembly
-	18P6414	1	Cable, SCSI power
-	27H0776	1	Cable, SCSI signal
-	32P1928	1	Rail kit for disk drive assembly (contains rails with screws)
-8	24P1118	4	Microprocessor fan assembly
-3	00N6991	1	Disk drive fan and bracket assembly
-11	64P7826*	1	System board assembly kit
-12	09N4308	4	Memory module
-	33F8354	1	CMOS battery
-16	64P7783	2	Fibre-channel adapter assembly
-	23R2770	1	Fibre-channel SFP connector
-4	49P2090	1	Power supply assembly
-	24P1121	1	SAN Volume Controller support rail kit
-	64P7940	1	Power cable assembly, SAN Volume Controller to uninterruptible power supply
-	39M5699	AR	External Fibre Channel cable, LC–LC, 1.0 m (3.3 ft)
-	19K1268	AR	External Fibre Channel cable, LC–SC/LC, 1.0 m (3.3 ft)
-	39M5700	AR	External Fibre Channel cable, LC–LC, 5.0 m (16.4 ft)
-	39M5701	AR	External Fibre Channel cable, LC–LC, 25.0 m (82 ft)
-	18P5055	AR	Ethernet cable, 2 m (6.5 ft)

Table 12. SAN Volume Controller 2145-4F2 frame assembly (continued)

Assembly index	Part number	Units	Description
-	18P5056	AR	Ethernet cable, 13 m (42 ft)

* If you need to order a system board assembly kit, first check the system board part number in the vital product data for the failed node. Perform the following steps to find the system board part number:

1. Start the SAN Volume Controller 2145-4F2 node.
2. Display the vital product data for the failed node. See ″Viewing the vital product data″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.
3. Note the system board part number.
   - If the part number is 64P7826, order ″System Board Assembly kit part number 64P7826.″
   - If this part number is not available, you can use part number 64P7994 as a substitute.
   - If you order part number 64P7994, order the ″System Board Assembly kit part number 64P7994.″

Redundant ac-power switch parts

There is a single field replaceable unit (FRU) assembly for the redundant ac power feature. It consists of the switch and two input-power cables.

The redundant ac-power switch is an optional feature that makes the SAN Volume Controller nodes resilient to the failure of a single power circuit. The redundant ac-power switch is not a replacement for an uninterruptible power supply. You must still use a uninterruptible power supply for each node.

Figure 6 shows the redundant ac-power switch.

Table 13 lists the part numbers for the redundant ac-power switch.

Figure 6. View of the redundant ac-power switch FRU

Table 13. Redundant ac-power switch

Part number	Units	Description
31P0896	1	Redundant ac-power switch assembly

2145 UPS-1U parts

The 2145 UPS-1U is assembled from four separate parts.

A 2145 UPS-1U powers one SAN Volume Controller node. Figure 7 shows the parts that make up the 2145 UPS-1U.

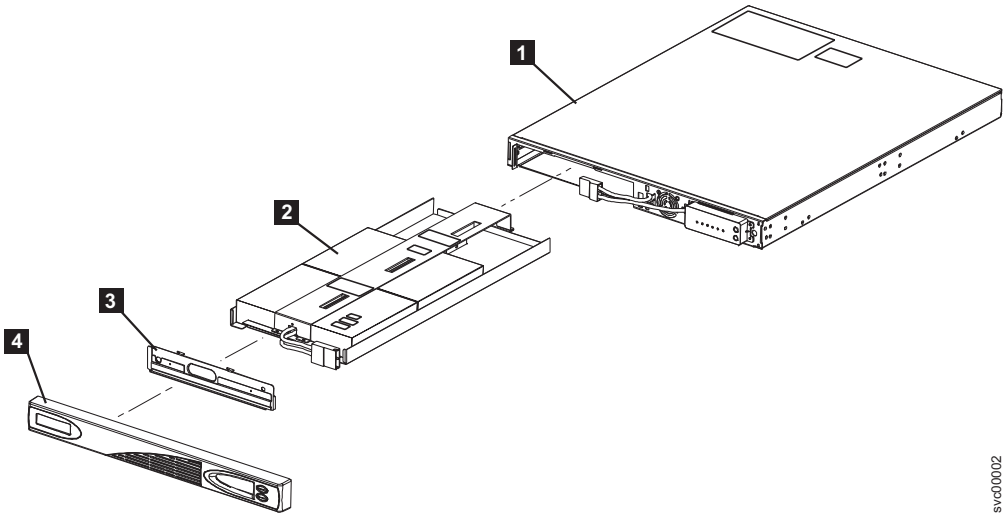


Figure 7. Exploded view of the 2145 UPS-1U hardware

Table 14 lists the different parts that are labeled in Figure 7.

Table 14. 2145 UPS-1U part numbers

Assembly index	Part number	Units	Description
	31P0875	1	2145 UPS-1U assembly
-1	Not available (this item cannot be ordered and is supplied as part of the 2145 UPS-1U assembly)	1	Chassis assembly
-2	31P0710	1	Battery pack assembly
-3	Not available (this item cannot be ordered and is supplied as part of the 2145 UPS-1U assembly)	1	Battery plate
-4	31P0709	1	Front panel
-	31P1060	1	2145 UPS-1U cable retention bracket kit
-	31P0711	1	Support rail kit, contains rails, nut clips, and screws

Table 14. 2145 UPS-1U part numbers (continued)

Assembly index	Part number	Units	Description
-	39M5376	1	Input-power cable, power distribution unit to the 2145 UPS-1U.
-	39M5116	1	Main power cable for the United States.

Power cables for the 2145 UPS-1U

If you do not connect the 2145 UPS-1U to a rack power distribution unit (PDU) or redundant ac-power switch, you must follow your country or region's power requirements to choose the appropriate power cable for the 2145 UPS-1U.

The 2145 UPS-1U is supplied with an IEC 320-C13 to C14 jumper to connect it to a rack PDU. You can also use this cable to connect the 2145 UPS-1U to the redundant ac-power switch.

The following table lists the power cable options for your country or region.

Country or region	Length	Connection type (attached plug designed for 200 - 240 V ac input)	Part number
United States of America (Chicago), Canada, Mexico	1.8 m (6 ft)	NEMA L6-15P	39M5115
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	39M5116

Country or region	Length	Connection type (attached plug designed for 200 - 240 V ac input)	Part number
Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Macao S.A.R. of China, 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	39M5123
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	39M5151
Argentina	2.8 m (9 ft)	IRAM 2073	39M5068
Argentina, Australia, New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa	2.8 m (9 ft)	AS/NZS 3112/2000	39M5102
Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	2.8 m (9 ft)	SABS 164	39M5144
Chile, Ethiopia, Italy, Libya, Somalia	2.8 m (9 ft)	CEI 23-16	39M5165
People's Republic of China	2.8 m (9 ft)	GB 2099.1	39M5206
Denmark	2.8 m (9 ft)	DK2-5a	39M5130
Israel	2.8 m (9 ft)	SI 32	39M5172
Liechtenstein, Switzerland	2.8 m (9 ft)	IEC 60884 Stnd. Sheet 416534?2 (CH Type 12)	39M5158
Thailand	2.8 m (9 ft)	NEMA 6-15P	39M5095

2145 UPS parts

The 2145 UPS is assembled from four separate parts.

The 2145 UPS provides a SAN Volume Controller 2145-4F2 node with a secondary power source if you lose power from your primary power source. Figure 8 on page 20 displays the different parts that make up the 2145 UPS.

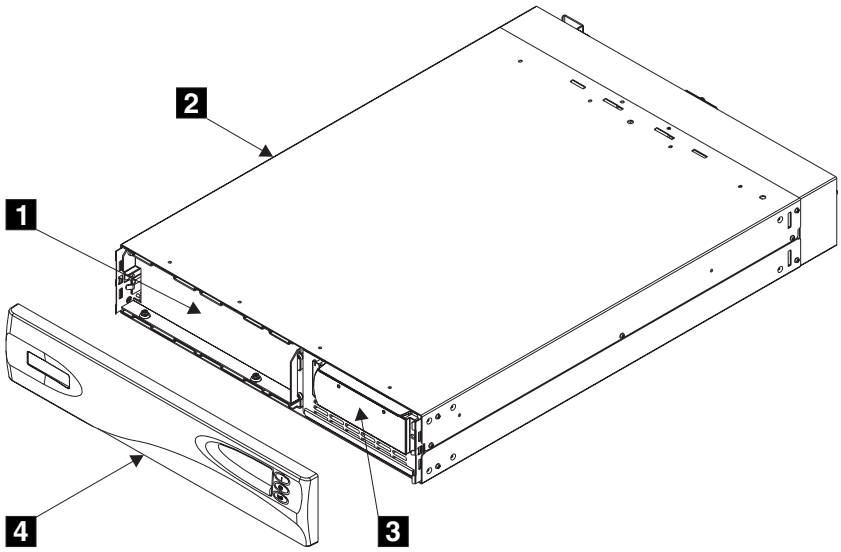


Figure 8. Exploded view of the 2145 UPS assembly

Table 15 lists the different parts that are labeled in Figure 8.

Table 15. 2145 UPS part numbers

Assembly index	Part number	Units	Description
	64P8103	1	2145 UPS assembly
-4	18P5865	1	Front panel
-3	64P8104	1	Electronics assembly
-1	18P5880	1	Battery assembly
-	21P7220	1	Support rail kit, contains rails, nut clips, and screws
-	18P5138	1	Input-power cable, power distribution unit to the 2145 UPS.
-	12J5119	1	Main power cable for the United States.

Power cables for the 2145 UPS

You must follow the power requirements of your country or region to choose the appropriate power cable for the 2145 UPS.

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

Country or region	Length	Connection type (attached plug designed for 200 - 240 V ac input)	Part number
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
Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Denmark, Dubai, Fiji, Ghana, Hong Kong S.A.R. of the PRC, 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
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
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
United States of America (Chicago), Canada, Mexico	1.8 m (6 ft)	NEMA L6-15P	14F1549

Chapter 2. Removing and replacing parts

You can remove and replace field replaceable units (FRUs) from the SAN Volume Controller, redundant ac-power switch, and uninterruptible power supply.

Each FRU has its own removal procedure. Sometimes you can find that a step within a procedure might refer you to a different remove/replace procedure. You might want to complete the new procedure before you continue with the first procedure that you started.

Remove or replace parts only when you are directed to do so by the *IBM System Storage SAN Volume Controller Troubleshooting Guide*. Start all problem determination and repair procedures with MAP 5000.

Related information

“Removing and replacing SAN Volume Controller parts” on page 24
The remove and replace procedures for the SAN Volume Controller field replaceable units are described in the topics that follow.

“Removing and replacing 2145 UPS-1U parts” on page 241
The remove and replace procedures for the 2145 UPS-1U field replaceable units are described in the topics which follow.

“Removing and replacing 2145 UPS parts” on page 260
The remove and replace procedures for the 2145 UPS field replaceable units are described in the topics which follow.

Enabling concurrent maintenance

To allow concurrent maintenance, SAN Volume Controllers must be configured in pairs.

While one SAN Volume Controller is being serviced, the other keeps the I/O group operational. With concurrent maintenance, all field replaceable units (FRUs) can be removed, replaced, and tested on one SAN Volume Controller while the SAN and host systems are powered on and doing productive work.

Attention: Do not remove the power from both SAN Volume Controllers unless the procedures instruct you to do so.

Preparing to remove and replace parts

Before you remove and replace parts, you must be aware of all safety issues.

First, read the safety precautions in the *IBM Systems Safety Notices*. These guidelines help you safely work with the SAN Volume Controller, redundant ac-power switch, and uninterruptible power supply.

Working inside the node with the power on

When you are servicing the SAN Volume Controller node, you might need to turn on the node while the cover is off.

Attention: Static electricity that is released to internal components when the node is turned on might cause the node to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the node with the power on.

You might be instructed to turn on the node and look at system-board LEDs while the cover is off. Follow these guidelines when you work inside a node that is turned on:

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the node.
- Do not allow your necktie or scarf to hang inside the node.
- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that could fall into the node as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the node.

Removing and replacing SAN Volume Controller parts

The remove and replace procedures for the SAN Volume Controller field replaceable units are described in the topics that follow.

Removing the cable retention bracket

The SAN Volume Controller Models 2145-8A4, 2145-8G4, and the 2145-8F4 provide a cable retention bracket, which ensures that the node does not mistakenly become unplugged from the uninterruptible power supply.

Removing the SAN Volume Controller 2145-8A4 cable retention bracket

The cable retention bracket attaches to the back of the SAN Volume Controller 2145-8A4 node. It is connected with one screw that already holds the rear plate of the power supply in place.

Remove the cable retention bracket before you remove the SAN Volume Controller 2145-8A4 node from the rack.

To remove the bracket from the node, perform the following steps:

1. With the node turned off, unscrew the retaining screw **1** , shown in Figure 9 on page 25, half a turn, but do not fully loosen or remove it.

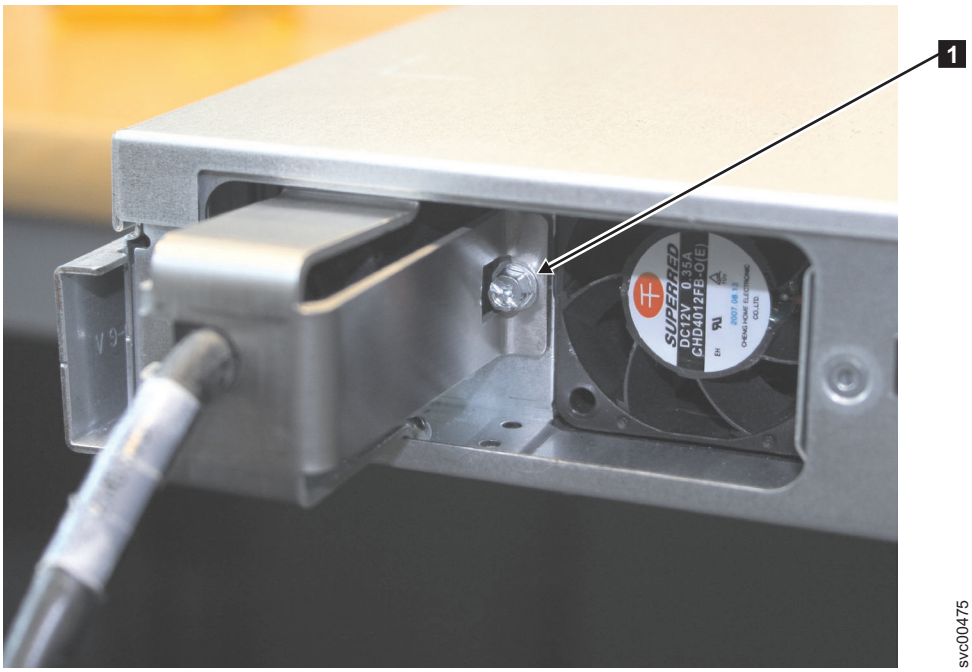


Figure 9. SAN Volume Controller 2145-8A4 with the cable retention bracket installed

2. Slide the bracket to the right just enough to disengage the screw.
3. Squeeze the top and bottom of the bracket together slightly and turn the bracket at a slight angle to remove both lips of the bracket from the node frame.
4. Slide the bracket back onto the power cable and then slide it off the cable.
5. Remove the power cable.

Removing the SAN Volume Controller 2145-8G4 cable retention bracket

The SAN Volume Controller 2145-8G4 uses one of two different cable retention brackets. Depending on which bracket you have, use the appropriate instructions to remove and replace the cable retention bracket.

- If your cable retention bracket looks like the following, go to “Removing the SAN Volume Controller 2145-8G4 cable retention bracket - option A” on page 26.

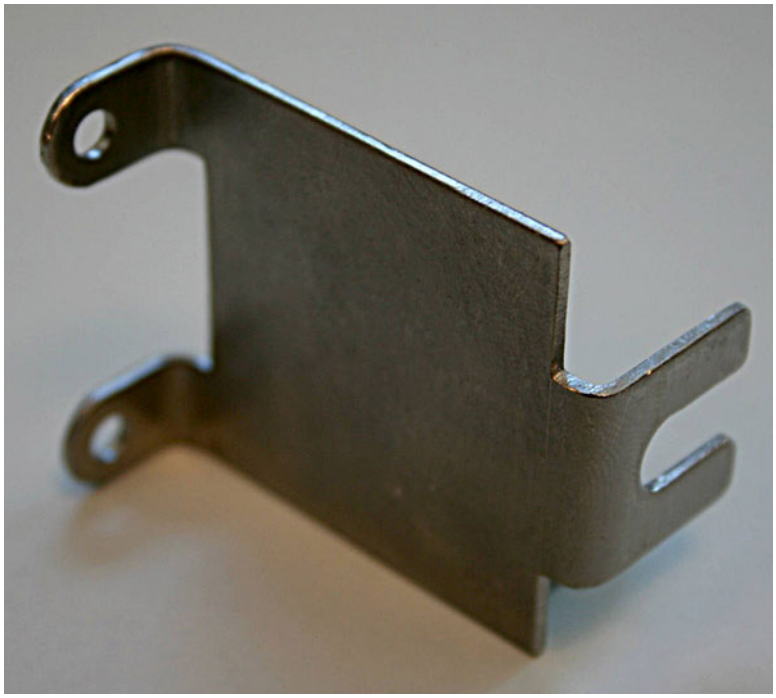


Figure 10. SAN Volume Controller 2145-8G4 cable retention bracket - type A

- If your cable retention bracket looks like the following, go to “Removing the SAN Volume Controller 2145-8G4 cable retention bracket - option B” on page 27.

Figure 11. SAN Volume Controller 2145-8G4 cable retention bracket - type B

Removing the SAN Volume Controller 2145-8G4 cable retention bracket - option A

The cable retention bracket attaches to the back of the SAN Volume Controller 2145-8G4 node. It is connected with the screws that already hold the rear plate of the power supply in place.

Remove the cable retention bracket before you remove the SAN Volume Controller 2145-8G4 node from the rack.

To remove the cable retention bracket, perform these steps:

1. Carefully remove the two retaining screws on the right side of the power supply rear plate.

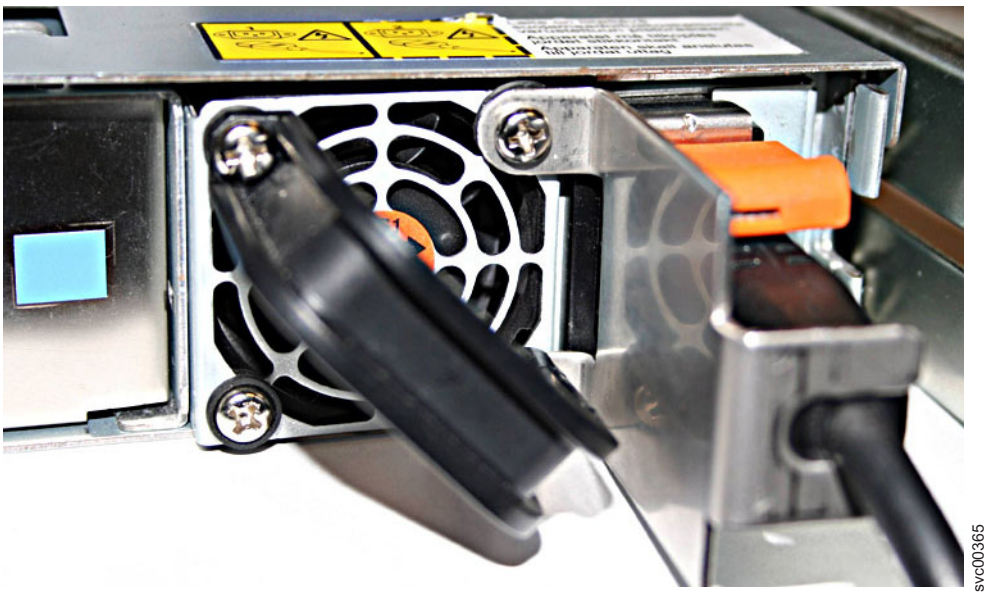


Figure 12. The SAN Volume Controller 2145-8G4 with the cable retention bracket attached

2. Remove the bracket.
3. Replace the screws in the power supply rear plate.

Removing the SAN Volume Controller 2145-8G4 cable retention bracket - option B

Remove the cable retention bracket before you remove the SAN Volume Controller 2145-8G4 from the rack.

To remove the cable retention bracket, perform these steps:

1. Remove the securing bolt from the node side rail (shown in Figure 13 on page 28) next to the power supply.

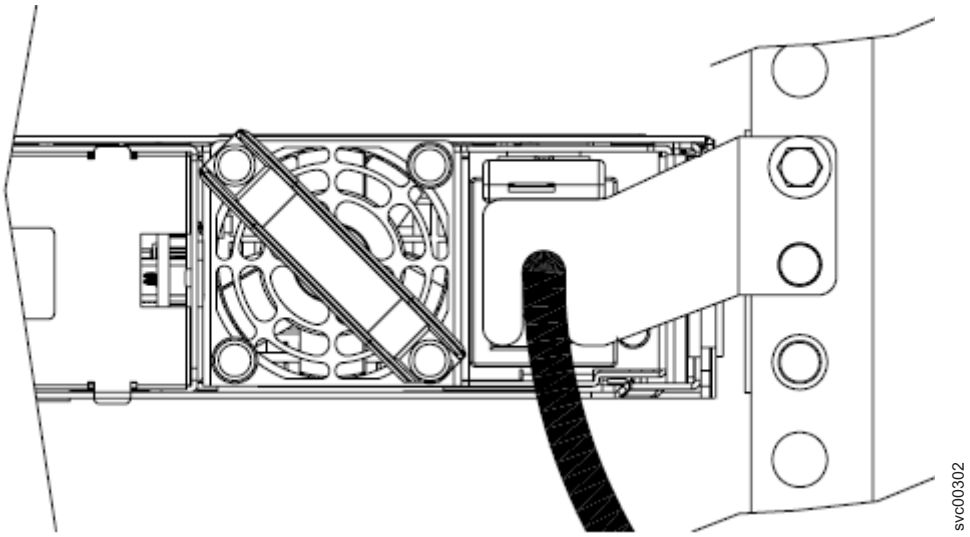


Figure 13. The SAN Volume Controller 2145-8G4 with cable retention bracket type B attached

2. Remove the bracket.
3. Replace the bolt in the node side rail.

Removing the SAN Volume Controller 2145-8F4 cable retention bracket:

The cable retention bracket attaches to the back of the SAN Volume Controller 2145-8F4 node. It is connected with one screw that already holds the rear plate of the power supply in place.

Remove the cable retention bracket before you remove the SAN Volume Controller 2145-8F4 node from the rack.

To remove the bracket from the node, perform the following steps:

1. With the node turned off, pull the cable retention bracket backward slightly to disengage the bracket from the slot at the rear of the support rail.
2. Slide the bracket out of the support rail and then move it to the right away from the cable.
3. Remove the power cable.

Replacing the cable retention bracket

Replace the cable retention bracket after you install SAN Volume Controller model 2145-8A4, 2145-8G4, or 2145-8F4 into the rack.

Replacing the SAN Volume Controller 2145-8A4 cable retention bracket

The cable retention bracket attaches to the back of the SAN Volume Controller 2145-8A4 node. It is connected to the back of the node with the screw that already holds the rear plate of the power supply in place.

To attach the bracket, perform the following steps:

1. Insert the power cable in the node.

2. Unscrew the retaining screw **1** that is located next to the power cable socket three full turns, but do not fully remove the screw, as shown in Figure 14.

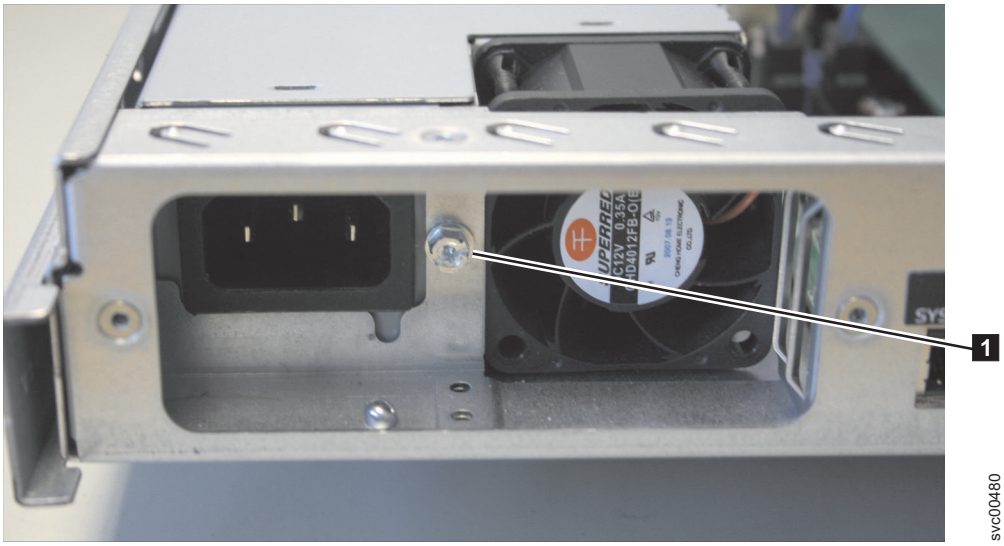


Figure 14. Retaining screw on the SAN Volume Controller 2145-8A4 node

3. Slide the bracket jaw over the power cable.
4. Slide the bracket down the cable until it is next to the power plug and slightly to the right of where it needs to be.
5. Place the bottom lip of the retention bracket in the node chassis as shown in Figure 15 on page 30. Turn the bracket at a slight angle, squeeze the top and bottom together, and position the top lip in place behind the chassis back plate.

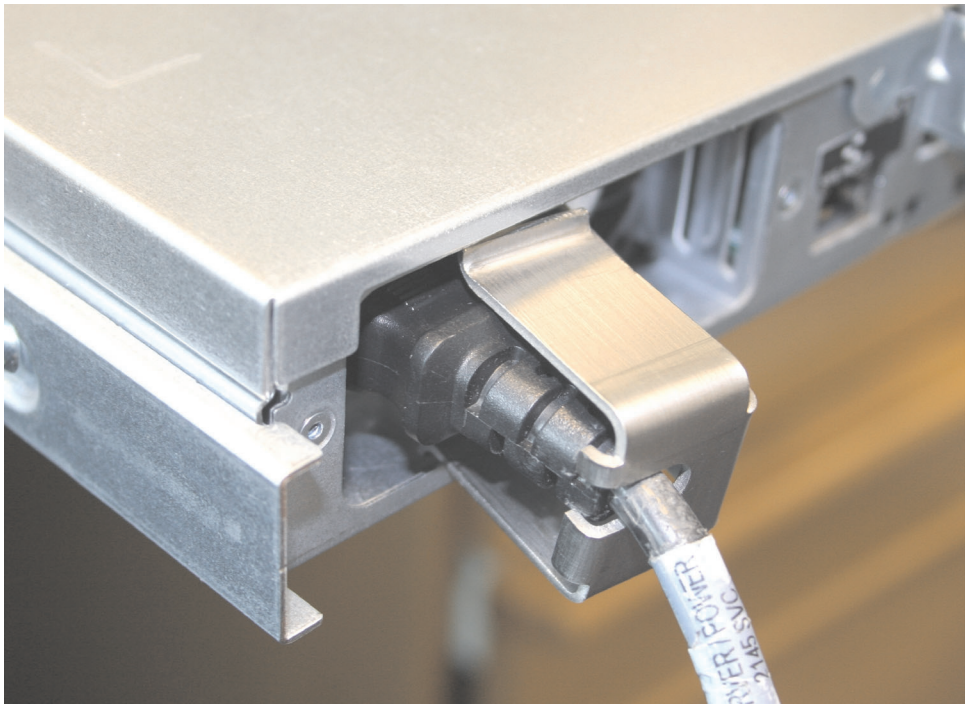


Figure 15. Installing the SAN Volume Controller 2145-8A4 cable retention bracket

6. Slide the bracket to the left until the side lip of the retention bracket goes behind the screw. Tighten the screw.

Replacing the SAN Volume Controller 2145-8G4 cable retention bracket

The SAN Volume Controller 2145-8G4 uses one of two different cable retention brackets. Depending on which bracket you have, use the appropriate instructions to remove and replace the cable retention bracket.

- If your cable retention bracket looks like the following, go to “Replacing the cable retention bracket - option A” on page 31.

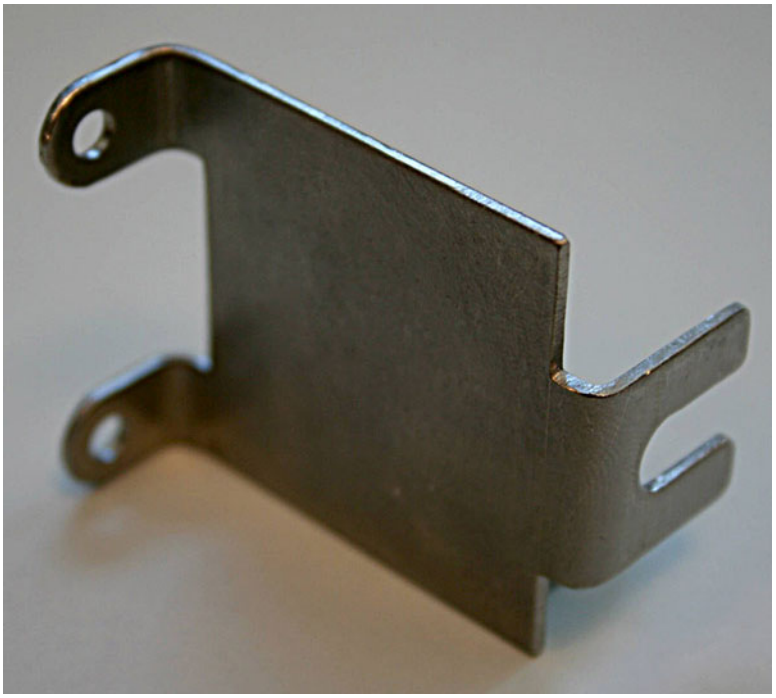


Figure 16. SAN Volume Controller 2145-8G4 cable retention bracket - type A

- If your cable retention bracket looks like the following, go to “Removing and replacing the cable retention bracket - option B” on page 32.

Figure 17. SAN Volume Controller 2145-8G4 cable retention bracket - type B

Replacing the cable retention bracket - option A:

The cable retention bracket attaches to the back of the SAN Volume Controller 2145-8G4 node. It is connected with the screws that already hold the rear plate of the power supply in place.

Replace the SAN Volume Controller 2145-8G4 cable retention bracket after you replace the node in the rack.

To attach the bracket to the rack rail, perform the following steps:

1. With the node powered off and the power cable removed, loosen and remove the two screws **1** on the right side of the rear plate that covers the power supply fan unit, as shown in Figure 18.

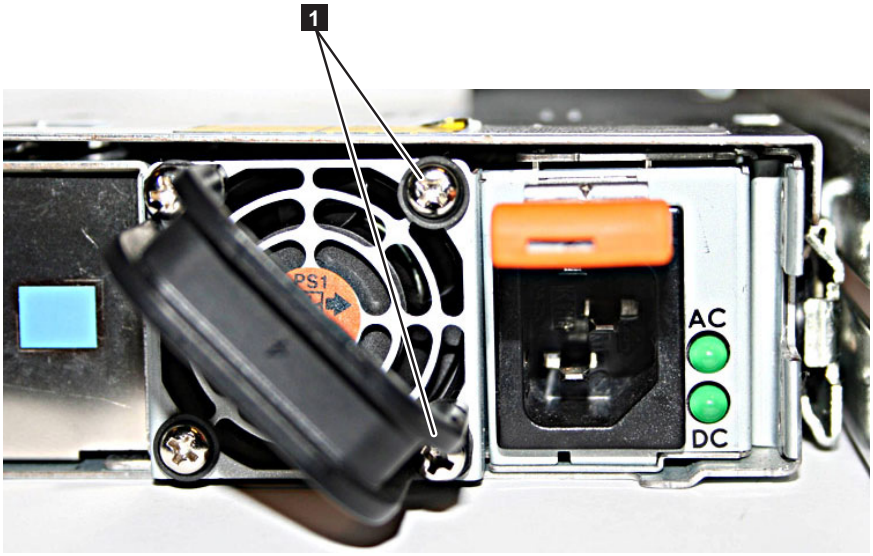


Figure 18. The SAN Volume Controller 2145-8G4 before you attach the cable retention bracket

2. Rotate the power supply handle out of the way.
3. Insert the power cable.
4. Position the cable retention bracket so that the power cable runs through the slot in the bracket. Align the screw holes in the bracket with the holes that are in the rear plate where you removed the two screws.
5. Replace the top screw.
6. Move the power supply handle back into place over the retention bracket, and replace the lower screw so that it holds the power supply handle, cable retention bracket, and power supply rear plate in place.

Removing and replacing the cable retention bracket - option B:

Replace the SAN Volume Controller 2145-8G4 cable retention bracket after you replace the node in the rack.

Install the SAN Volume Controller 2145-8G4 cable retention bracket after you install the node in the rack.

To attach the bracket to the rack rail, perform the following steps:

1. Install the power cable into the power supply.
2. At the back of the cabinet, remove the securing bolt from the node side rail next to the power supply, as shown in Figure 19 on page 33.

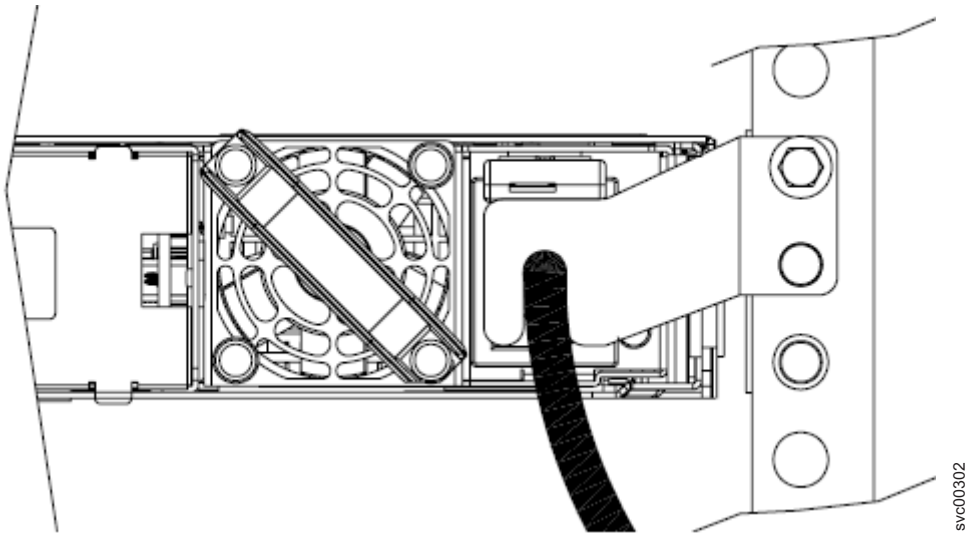


Figure 19. The SAN Volume Controller 2145-8G4 with cable retention bracket type B attached

3. Slide the cable retention bracket over the cable and position it over the side rail. Secure it in place using the original bolt.

Removing the SAN Volume Controller from a rack

During some service procedures, you might need to remove the SAN Volume Controller from a rack.

Related tasks

"Removing the fibre-channel adapter assembly" on page 155
Use the information in this topic when you need to remove a fibre channel adapter or fibre-channel adapter assemblies.

Related reference

"Handling static-sensitive devices" on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Turning off the SAN Volume Controller node

When instructed to do so, shut down and turn off the SAN Volume Controller node before you remove and replace parts.

For more information about how to turn off the SAN Volume Controller, see "MAP 5350" in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

Attention: Unless host systems or fibre-channel switches must be switched off for another reason, do not turn them off when you are servicing the SAN Volume Controller. Shut down the SAN Volume Controller before you remove the power cables. You can connect or disconnect Ethernet and fibre-channel cables at any time.

Removing the SAN Volume Controller 2145-8A4 from a rack

Use these instructions when you are prompted to remove a SAN Volume Controller 2145-8A4 from a rack.

If the SAN Volume Controller is not already turned off, see ″Turning off the SAN Volume Controller node″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

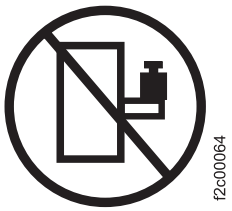
Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller nodes in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to turn off and make customer data inaccessible.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**



- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

DANGER

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- **(For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- **(For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

To remove the SAN Volume Controller 2145-8A4 from a rack, complete these steps:

1. Remove the cable retention bracket and disconnect the power cable from the node. See "Removing the cable retention bracket" on page 24.
2. Loosen the captive thumbscrews **1** that secure the node to the front mounting flanges.

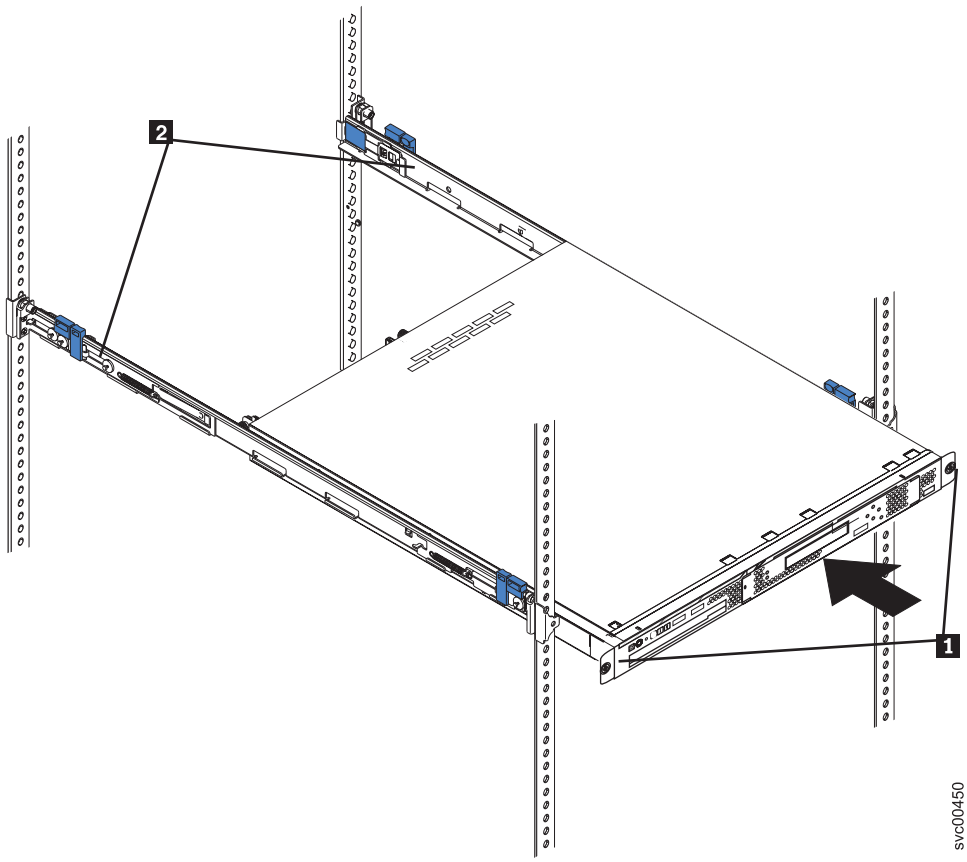


Figure 20. The captive thumbscrews that secure the node and the shipping brackets

3. Pull the SAN Volume Controller 2145-8A4 node completely out of the slides.

Removing the SAN Volume Controller 2145-8G4 from a rack

Use these instructions when you are prompted to remove a SAN Volume Controller 2145-8G4 from a rack.

If the SAN Volume Controller is not already turned off, see ″Turning off the SAN Volume Controller node″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

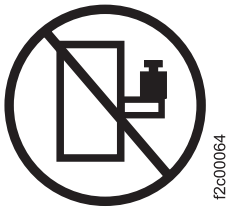
Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller nodes in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to turn off and make customer data inaccessible.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**



- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

DANGER

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- **(For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- **(For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

To remove the SAN Volume Controller 2145-8G4 from a rack, complete these steps:

1. Remove the cable retention bracket and disconnect the power cable from the node. See "Removing the cable retention bracket" on page 24.
2. Slide the SAN Volume Controller 2145-8G4 node forward until it latches in the service position.
3. Position yourself to support the weight of the node when it is no longer held by the slides and then press the rear slide release latches (**1** in Figure 21 on page 39) on both sides of the SAN Volume Controller 2145-8G4 node.
4. Pull the node forward and remove it from the rack.

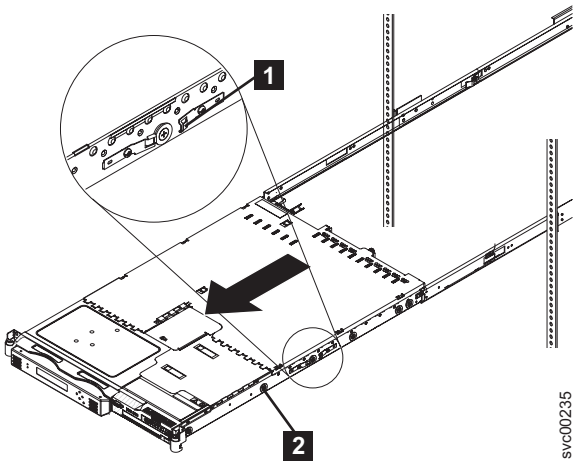


Figure 21. Removing the SAN Volume Controller 2145-8G4 from the rack

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 from a rack

Use these instructions when you are directed to remove a SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 from a rack.

If the SAN Volume Controller is not already turned off, see ″Turning off the SAN Volume Controller node″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

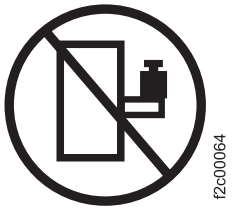
Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller nodes in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to turn off and make customer data inaccessible.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**



- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

DANGER

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- **(For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- **(For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

To remove the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 node from a rack, complete these steps:

1. Unlatch the two latches on the front of the rack.
2. Pull the node forward and remove it from the rack.

Removing the SAN Volume Controller 2145-4F2 from a rack

Use these instructions when you are directed to remove a SAN Volume Controller 2145-4F2 from a rack.

If the SAN Volume Controller is not already turned off, see ″Turning off the SAN Volume Controller node″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

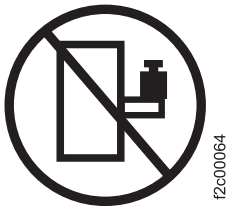
Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller nodes in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to turn off and make customer data inaccessible.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**



- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

To remove the SAN Volume Controller 2145-8F2 from a rack, complete these steps:

1. Unscrew the two front screws (**1** in Figure 22 on page 43).

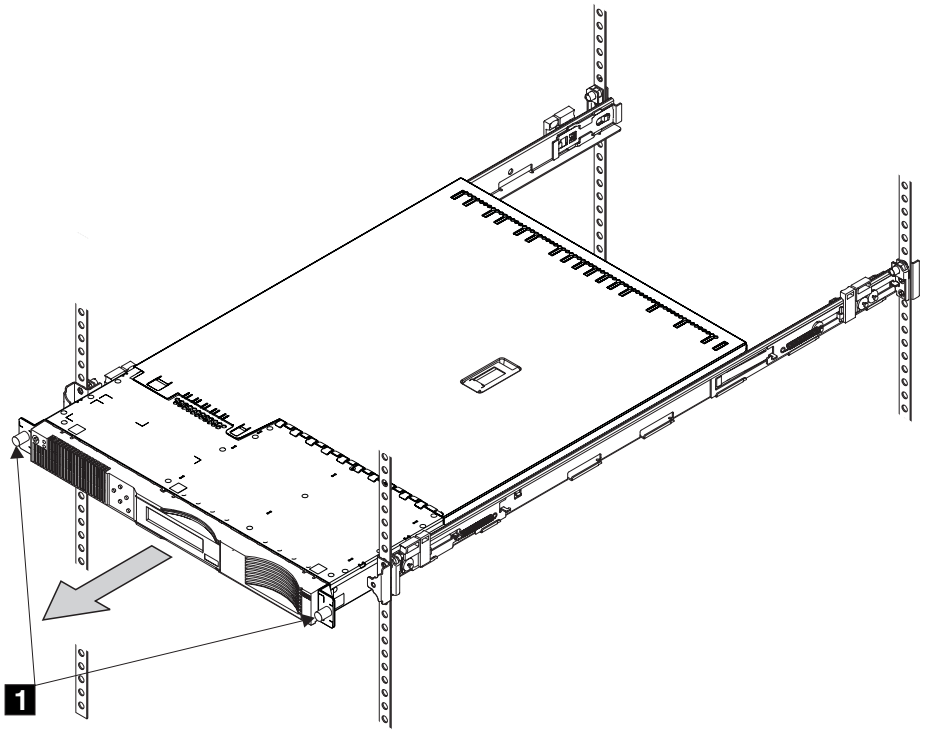


Figure 22. Loosening the front screws to remove the SAN Volume Controller 2145-4F2

2. Pull the node forward and remove it from the rack.

Replacing the SAN Volume Controller in a rack

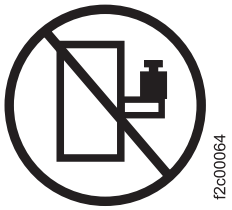
You must use caution when you replace the SAN Volume Controller in a rack.

Note: If you have recently replaced a field replaceable unit (FRU) in the node, the repaired node normally rejoins the cluster as soon as it is powered-on and has completed its self-tests. There are some exceptions to this, such as when a disk drive has been replaced, or when for some other reason the node has lost its identity or the integrity of its cluster metadata. Under these circumstances, the node goes offline. If you are performing this repair under directed maintenance procedures, those procedures will automatically restore the node to the cluster. If you are not performing the repair under directed maintenance procedures, you might be required to delete and add the node back into the cluster.

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**



- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

DANGER

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- **(For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- **(For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

Related tasks

"Replacing the disk cable assembly" on page 117
You might have to replace the disk cable assembly for a SAN Volume Controller 2145-8A4 or SAN Volume Controller 2145-8G4 service action.

Replacing the SAN Volume Controller 2145-8A4 in a rack

Follow these instructions when you are prompted to replace the SAN Volume Controller 2145-8A4.

Perform the following steps to replace the SAN Volume Controller 2145-8A4 node in a rack:

1. Align the node on the slide rails and push the node fully into the rack. Secure the node to the front mounting flanges with the captive thumbscrews (**1** in Figure 23 on page 46).

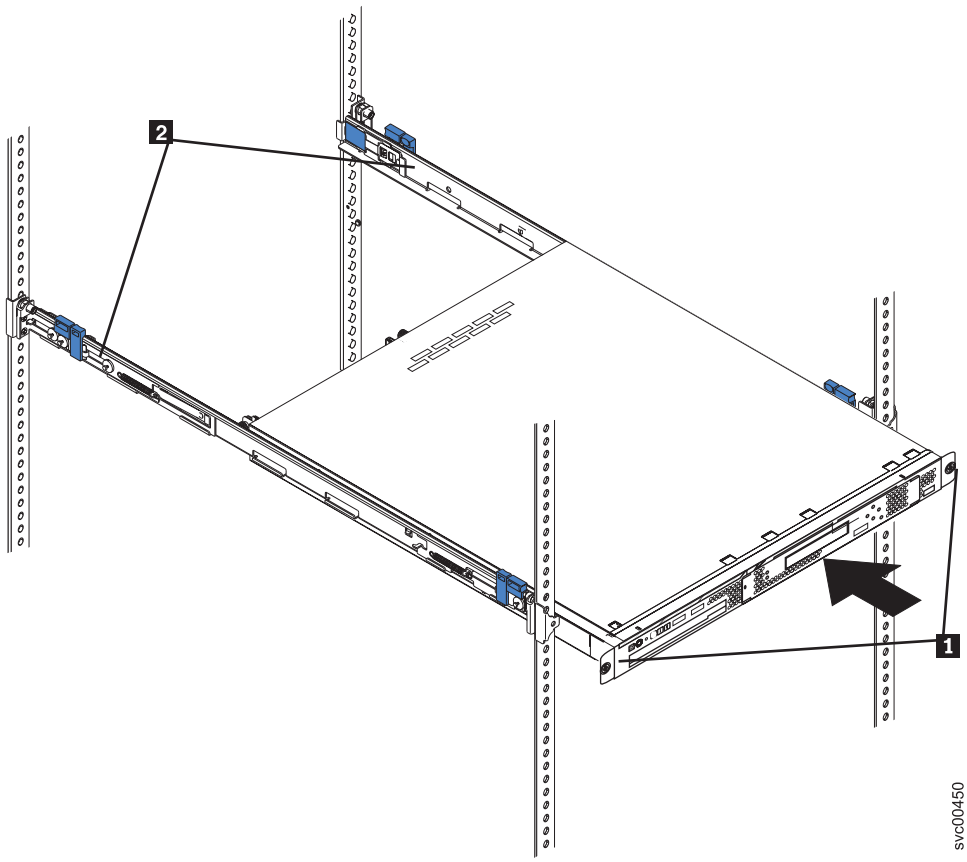


Figure 23. The captive thumbscrews that secure the node and the shipping brackets

2. Reconnect the four fibre-channel cables and the Ethernet cable on the back of the node.

   Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller nodes in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to turn off and make customer data inaccessible.

   Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.
3. Reconnect the external cables and then reconnect the power cable that was removed from the node. Ensure that you replace the fibre-channel cables in the same ports from which they were removed.
4. Replace the cable retention bracket. See “Replacing the cable retention bracket” on page 28.

Replacing the SAN Volume Controller 2145-8G4 in a rack

Follow these instructions when you are prompted to replace the SAN Volume Controller 2145-8G4.

Perform the following steps to replace the SAN Volume Controller 2145-8G4 in a rack:

1. Align the node on the slide rails and push the node fully into the rack. Secure the node to the front mounting flanges with the captive thumbscrews (**1** in Figure 23 on page 46).

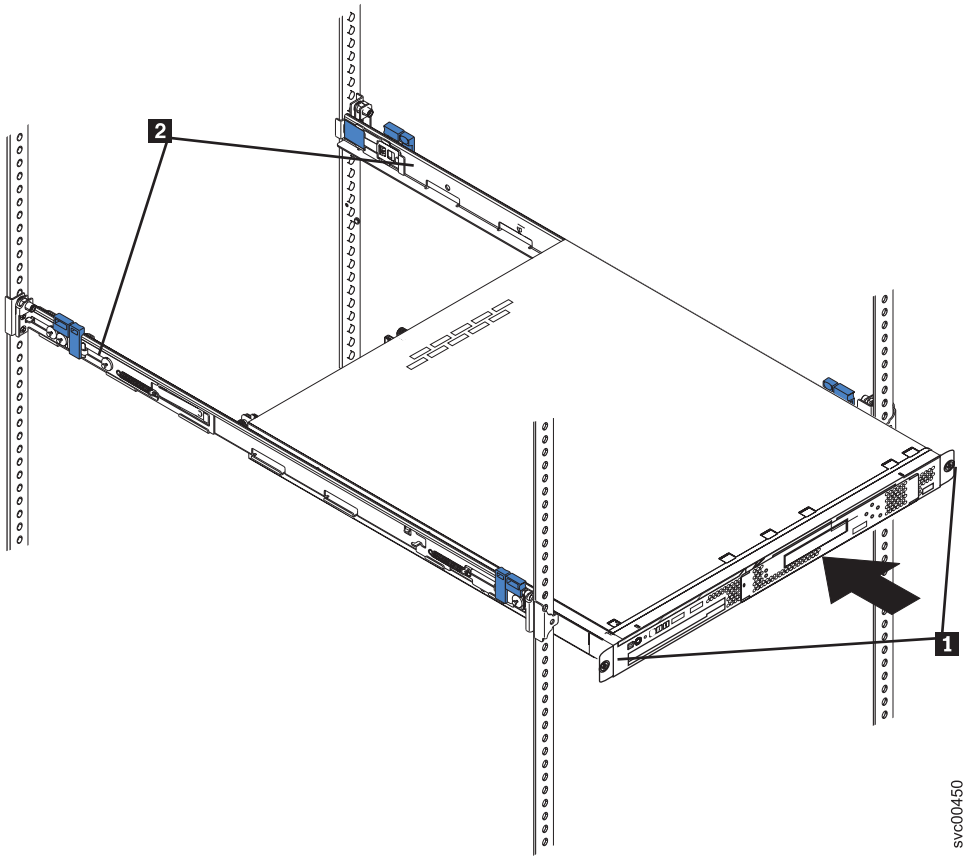


Figure 24. The captive thumbscrews that secure the node and the shipping brackets

2. Align the two rear wheels on the node with the opening in the slides and then push the node into the slides until the rear slide release latches (**2** in Figure 25 on page 48) click into place, locking the node in the slides.

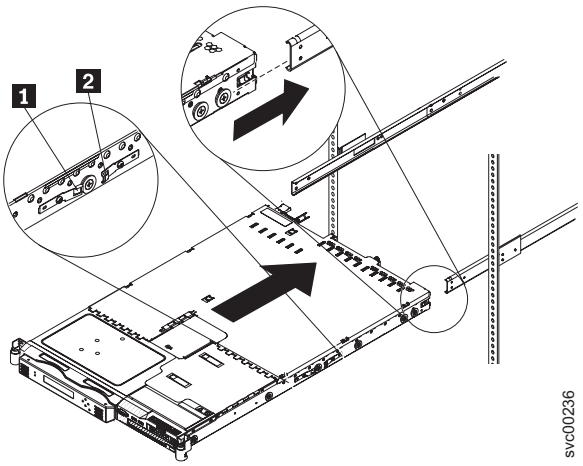


Figure 25. Aligning the SAN Volume Controller 2145-8G4 with the rack slides

3. Pull the node out of the rack so the slides are fully extended.
4. Reconnect the external cables and then reconnect the power cable that was removed from the node. Ensure that you replace the fibre-channel cables in the same ports from which they were removed.

   Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller nodes in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to turn off and make customer data inaccessible.

   Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.
5. Turn on the node.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 in a rack

Follow these instructions when you are prompted to replace the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 in a rack.

Perform the following steps to replace the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 in the rack:

1. Slide the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 node into the rack.
2. Latch the two latches on the front of the rack to attach the node to the rack. (**1** in Figure 26 on page 49).

   Note: The front of the rail assembly looks different from the front, as you can see in Figure 26 on page 49.
3. Reconnect the external cables and then reconnect the power cable that was removed from the node. Ensure that you replace the fibre-channel cables in the same ports from which they were removed.

   Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller nodes in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to turn off and make customer data inaccessible.

   Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems*

Safety Notices.

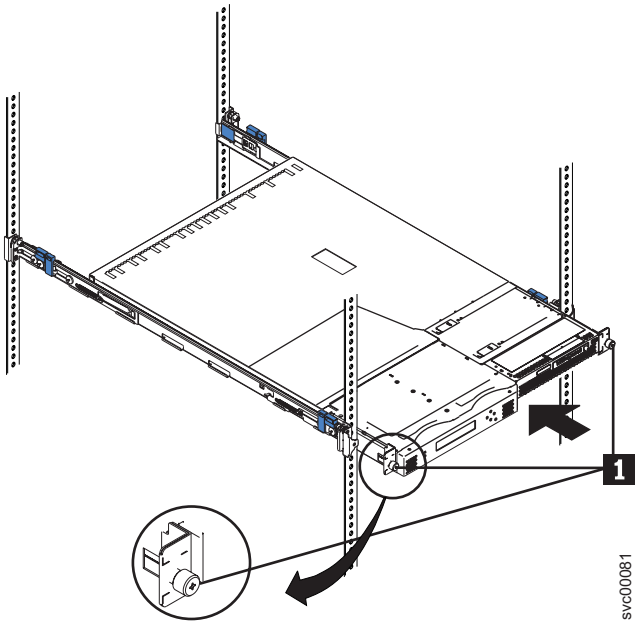


Figure 26. Sliding the SAN Volume Controller 2145-8F4 into the rack

4. Turn on the node.

Replacing the SAN Volume Controller 2145-4F2 in a rack

Follow these instructions when you are prompted to replace the SAN Volume Controller 2145-4F2 in a rack.

Perform the following steps to replace the SAN Volume Controller 2145-4F2 in the rack:

1. Slide the SAN Volume Controller 2145-4F2 node into the rack.
2. Screw in the two front screws (**1** in Figure 27 on page 50).

   Note: The front of the rail assembly looks different from the front, as you can see in Figure 27 on page 50.

3. Reconnect the external cables and then reconnect the power cable that was removed from the node. Ensure that you replace the fibre-channel cables in the same ports from which they were removed.

   Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller nodes in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to turn off and make customer data inaccessible.

   Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

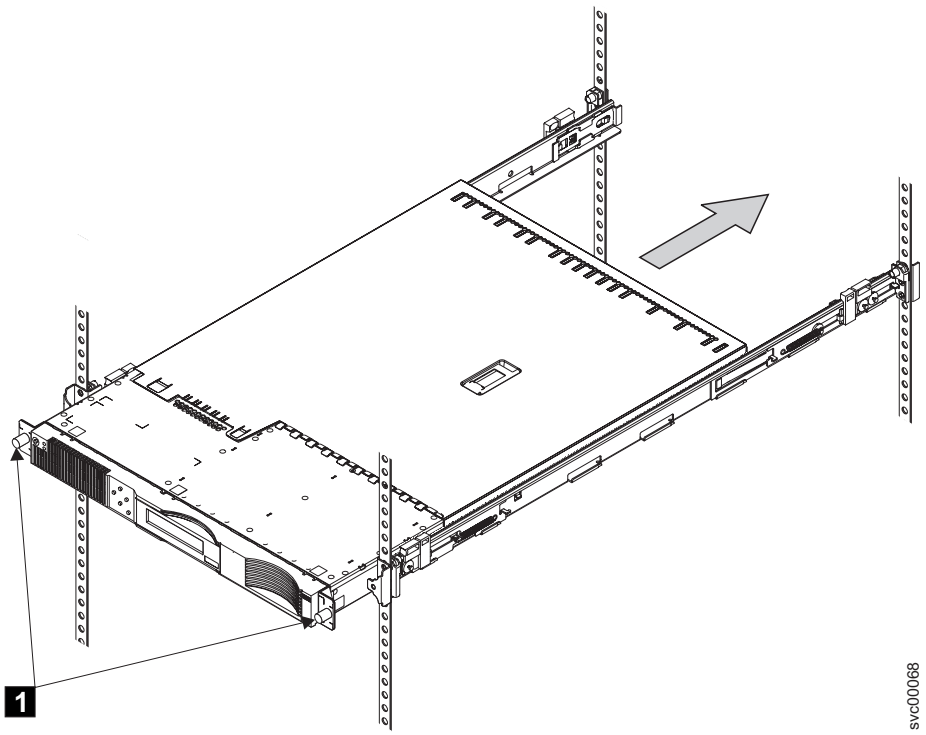


Figure 27. Attaching the SAN Volume Controller 2145-4F2 with the front screws

4. Turn on the node.

Removing the support rails for a SAN Volume Controller

The SAN Volume Controller support rails can be removed if you need to move the SAN Volume Controller.

Related tasks

"Installing the support rails for a SAN Volume Controller" on page 53
You must install the support rails that hold the SAN Volume Controller.

Removing the support rails for the SAN Volume Controller 2145-8A4

You can remove the support rails that hold the SAN Volume Controller 2145-8A4 node.

To remove the SAN Volume Controller 2145-8A4 support rails, perform the following steps:

1. Remove the M6 screw **1** from the front and rear brackets.

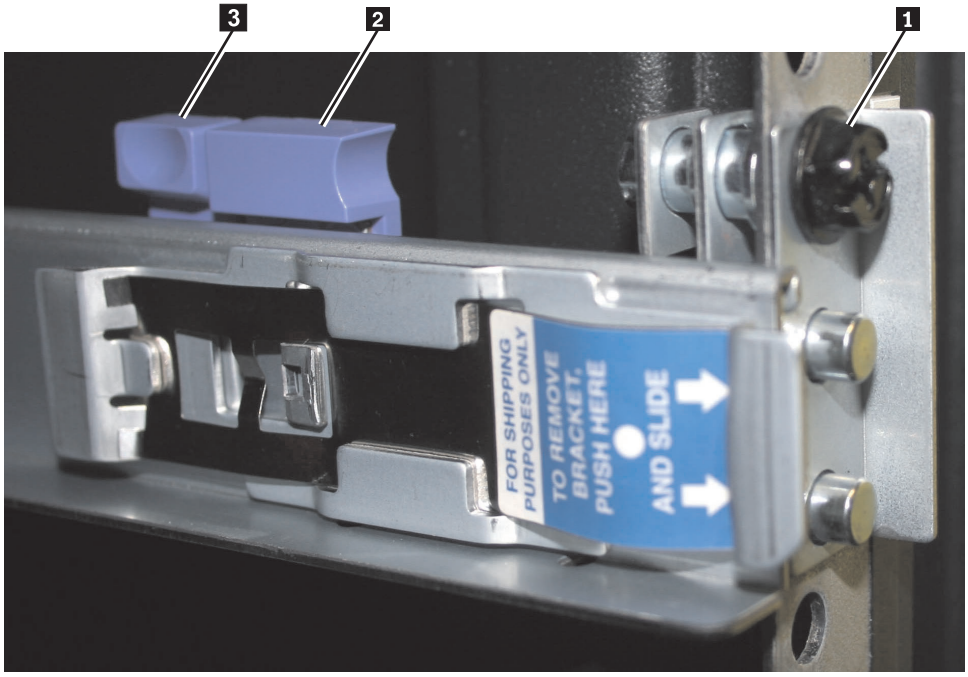


Figure 28. The rail-adjustment bracket and the release tab on the rear rail-locking carrier

2. Starting from the rear, press the release tab **3** backwards, away from the rail. Push the rail-adjustment bracket **2** toward the center of the rack until it snaps into place. Lift the tab that secures the rear of the slide rail to the rear mounting flange.
3. Repeat step 2 to remove the front bracket and then remove the support rail from the rack.
4. Repeat steps 1 through 3 for the other support rail.

Removing the SAN Volume Controller 2145-8G4 support rails

This topic describes how to remove the SAN Volume Controller 2145-8G4 support rails.

Perform the following steps to remove the SAN Volume Controller 2145-8G4 support rails:

1. Loosen and remove the captive screw **3** and latch strike **1** from the left rear mounting flange, as shown in Figure 29 on page 52, to release the slide rail **2**. Loosen and remove the captive screw from the right rear mounting flange and release the other slide rail in the same way.

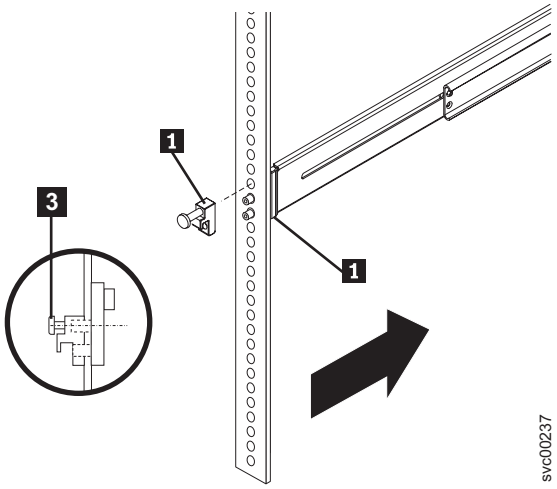


Figure 29. Removing the latch strike from the front of the slide rail

2. Loosen and remove the captive screw from the front of the right rail and then remove the latch strike. Remove the captive screw and latch strike from the front of the left rail in the same way.
3. Push the rail pins **1** out of the front rack mounting flange, as shown in Figure 30, to shorten the right slide rail and remove it from the front flange. Then pull the right slide rail forward to remove the slide rail from the rear rack mounting flange. Remove the left slide rail in the same way.

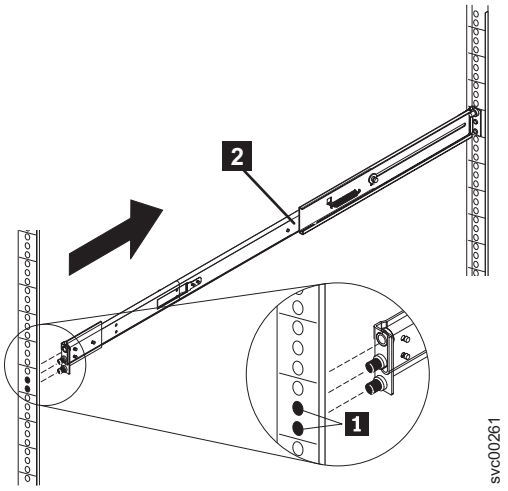


Figure 30. Removing the right slide rail from the front of the rack

Removing the SAN Volume Controller 2145-8F4, SAN Volume Controller 2145-8F2, or SAN Volume Controller 2145-4F2 support rails

This topic describes how to remove the SAN Volume Controller 2145-8F4, SAN Volume Controller 2145-8F2, or SAN Volume Controller 2145-4F2 support rails.

Perform the following steps to remove the SAN Volume Controller support rails:

1. Go to the front of the left support rail.

2. Put your left index finger onto the back edge of the latch lever 2 and your left thumb on the front edge of the latch lock 1, as shown in Figure 31.

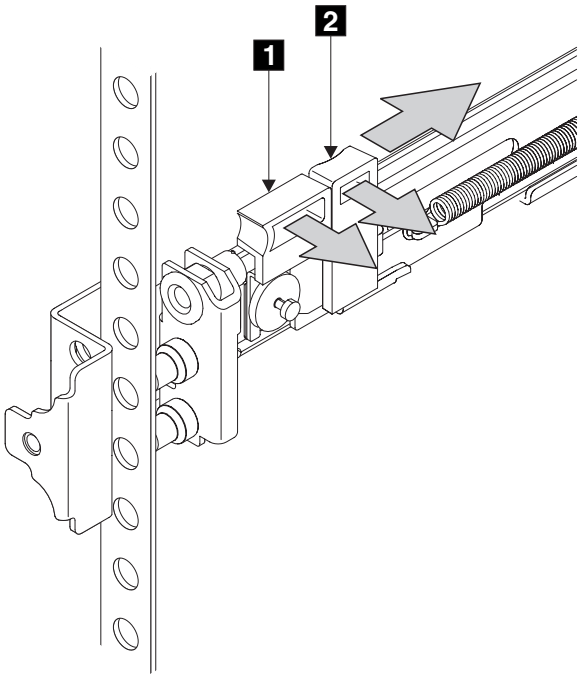


Figure 31. The left support rail for the SAN Volume Controller

3. Gently move the latch lock inward and push the latch-lock carrier toward the back of the rack until it latches onto the rail.
4. Pull the rail out from the front rack-mounting flange.
5. Repeat the action at the back of the rail.
6. Remove the rail from the rack.
7. Repeat steps 2 through 6 for the right support rail.

Installing the support rails for a SAN Volume Controller

You must install the support rails that hold the SAN Volume Controller.

The instructions for installing the SAN Volume Controller are found in the topics that follow.

Related tasks

"Removing the support rails for a SAN Volume Controller" on page 50
The SAN Volume Controller support rails can be removed if you need to move the SAN Volume Controller.

Installing the support rails for the SAN Volume Controller 2145-8A4

You must install the support rails that hold the SAN Volume Controller 2145-8A4 node.

When you are ready to install the support rails, perform the following tasks:

1. Determine where the SAN Volume Controller node is to be installed in the rack. For details, see the Hardware Location Chart.

2. Decide where you are going to install the support rails. For more information, see the Electronic Industries Alliance (EIA) markings on the rack.

Figure 32 shows the items that you need to install the SAN Volume Controller 2145-8A4 node in a rack.

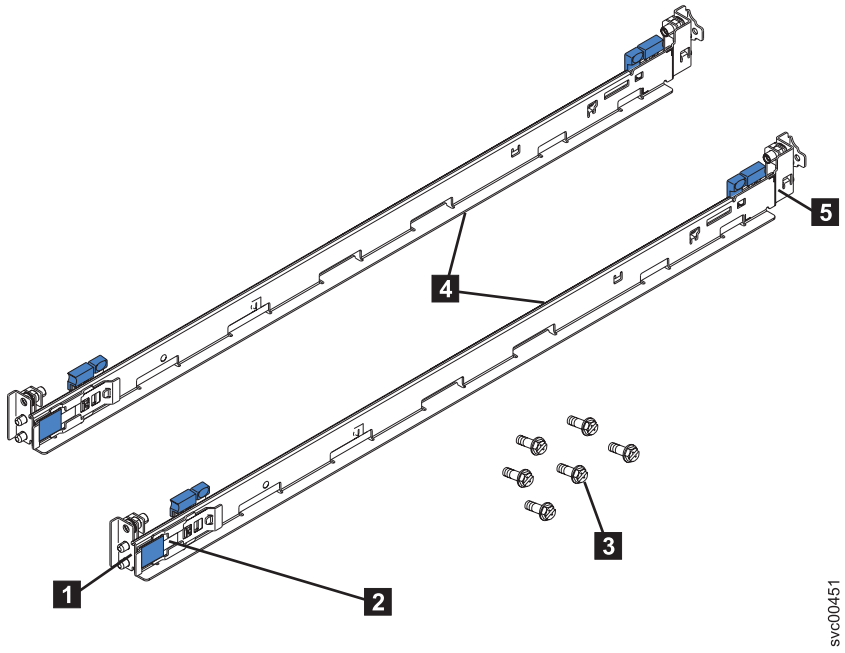


Figure 32. SAN Volume Controller 2145-8A4 support-rails installation kit

1. Rear of rail
2. Shipping bracket
3. M6 screws (6)
4. Rack mounting rails
5. Front of rail

Notes:

- With some types of racks, you might find it helpful to remove the rack doors and side panels to provide easier access during installation.
- The slide rails are marked (RIGHT / FRONT and LEFT / FRONT) for proper placement on the rack flanges.
- The front and back of each rail has a spring-loaded rail-locking carrier, which can be locked in the open position and then released when the rail is in the rack.

Perform the following steps to install the support rails:

1. Ensure that the rail-locking carrier at the front end of the support rail is in the open position.
   a. Start with the left rail. If the front rail-locking carrier 1 is closed, as shown in Figure 33 on page 55, push the small tab 3 back away from the rail.
   b. While you hold the tab back, slide the larger tab 2 toward the center of the slide rail.

c. Slide the rail-locking carrier approximately 15 mm toward the front of the slide rail until the rail-locking carrier locks in the open position.

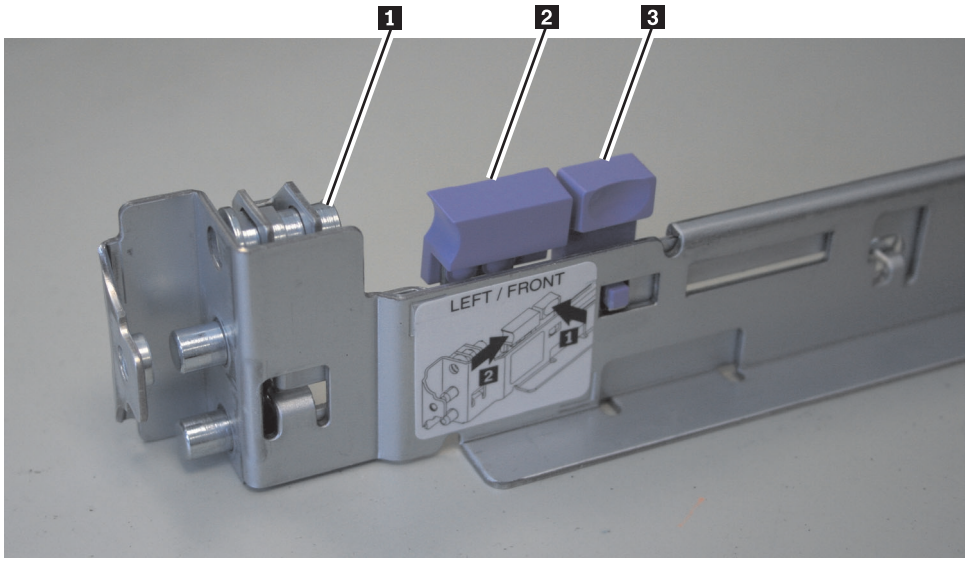


Figure 33. A closed rail-locking carrier at the front of the support rail for the SAN Volume Controller 2145-8A4

2. Ensure that the rail-locking carrier at the rear of the support rail is in the open position.
   a. If the rear rail-locking carrier (**1** in Figure 34 on page 56) is closed, push the small tab **3** away from the rail.
   b. While holding the tab back, slide the larger tab **2** toward the center of the slide rail.
   c. Slide the rail-locking carrier approximately 15 mm toward the rear of the slide rail until the rail-locking carrier locks in the open position, as shown in Figure 34 on page 56. Do not remove the shipping bracket.

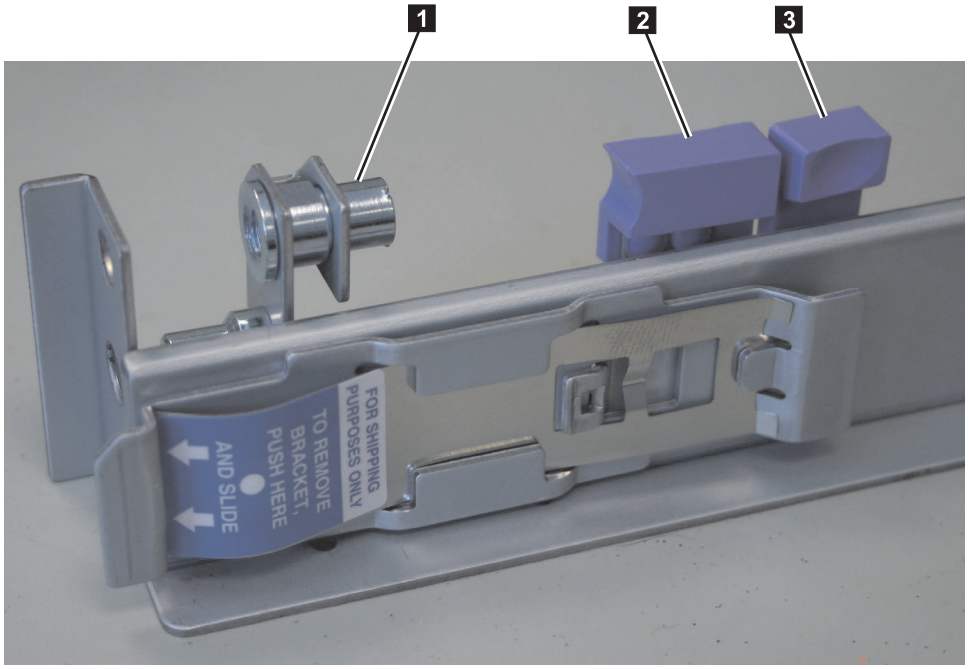


Figure 34. An open rail-locking carrier at the rear of the support rail for the SAN Volume Controller 2145-8A4

3. Position the rail at the correct height in the rack.
   a. Start from the front and align the pins **1** (in Figure 35 on page 57) on the front rail-locking carrier with the holes on the rack mounting flange **2**.
   b. Release the rail-locking latch by pushing the smaller blue tab **3** away from the rail. The pins spring into the closed position. Ensure that the pins go fully through the holes in the mounting flange, as shown in Figure 35 on page 57.
   c. At the rear of the rack, align the pins on the rear rail-locking carrier with the holes on the rack mounting flange.
   d. Release the rail-locking latch by pushing the smaller blue tab away from the rail. The pins spring into the closed position. Ensure that the pins go fully through the holes in the mounting flange.

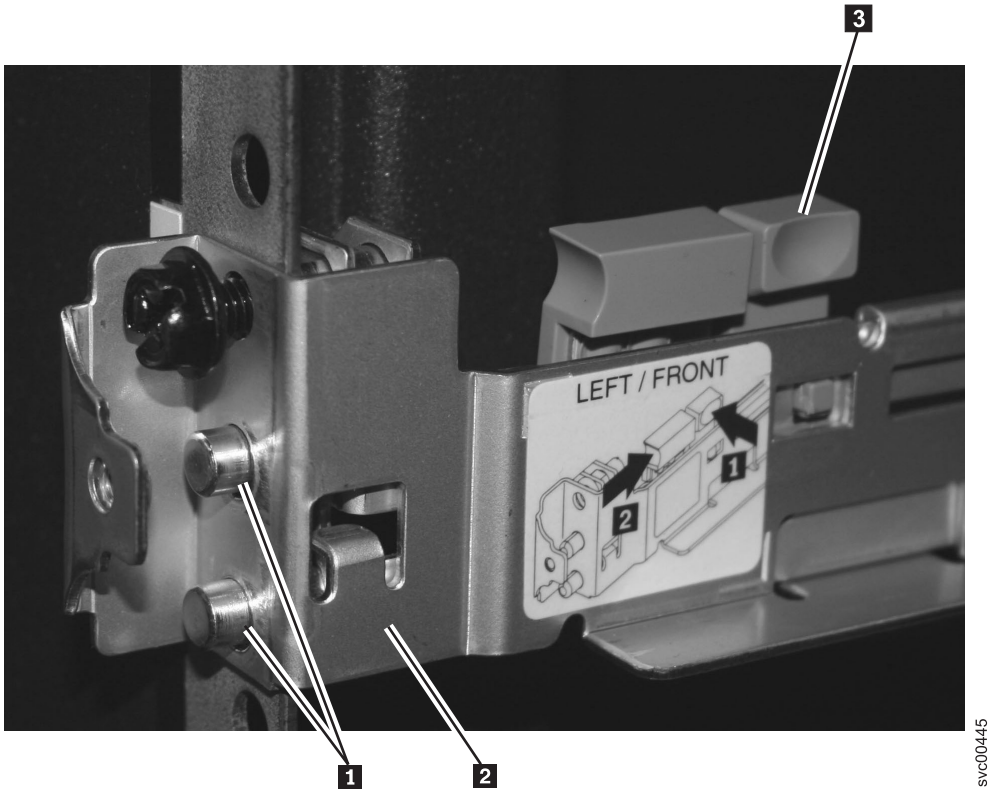


Figure 35. Aligning the pins on the left front support rail for the SAN Volume Controller 2145-8A4 with the front mounting flange

4. Insert one of the M6 screws into the front and rear locking latches and tighten.
5. Repeat the instructions in step 1 on page 54 through step 4 with the right support rail.
6. On each side of the node, reposition the rail that is attached to the side of the node. By doing this, the node is more secure if the rack is moved.
7. Remove the larger screw **1** shown in Figure 36 on page 58. Remove and save screw **2**. Loosen screws **3** and **4**. Slide the rail toward the back of the node and insert the screw that you saved into the position where the large screw **1** had been located. Tighten the three screws **2**, **3**, and **4**.

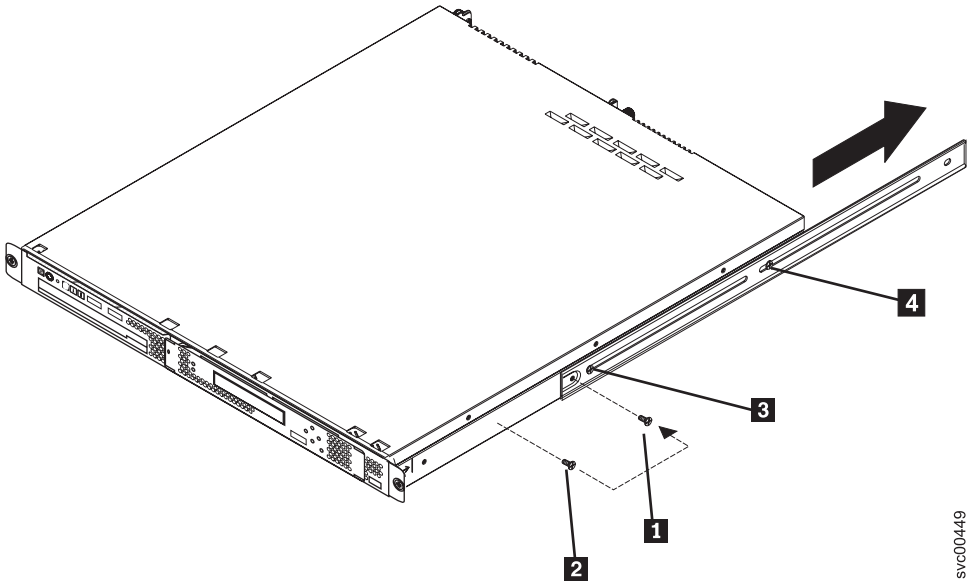


Figure 36. Securing the SAN Volume Controller 2145-8A4 node to the slide rail

Installing the support rails for the SAN Volume Controller 2145-8G4

You must install the support rails that hold the SAN Volume Controller 2145-8G4.

When you are ready to install the support rails, perform the following tasks:

- Refer to the Hardware Location Chart to determine where the SAN Volume Controller is to be installed in the rack.
- Refer to the Electronic Industries Alliance (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 (shown in Figure 37) for the SAN Volume Controller 2145-8G4:

1. Make sure you have all the items that you need for installing the support rails.

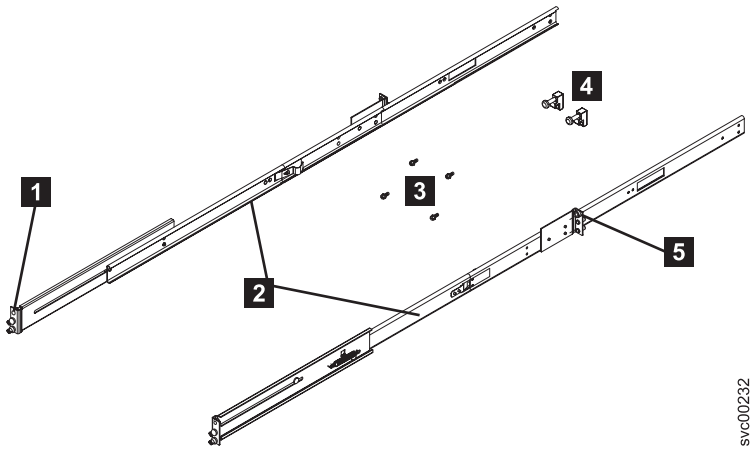


Figure 37. SAN Volume Controller 2145-8G4 support rails installation kit

1 Rear of rail

2 Rack mounting rails

3 M6 screws

4 Latches

5 Front of rail

Note: You might find it helpful, with some types of racks, to remove the rack doors and side panels to provide easier access during installation.

2. 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.
3. Insert the right slide rail 2 into the rear rack mounting flange, as shown in Figure 38, with the rail pins 1 protruding through the flange.

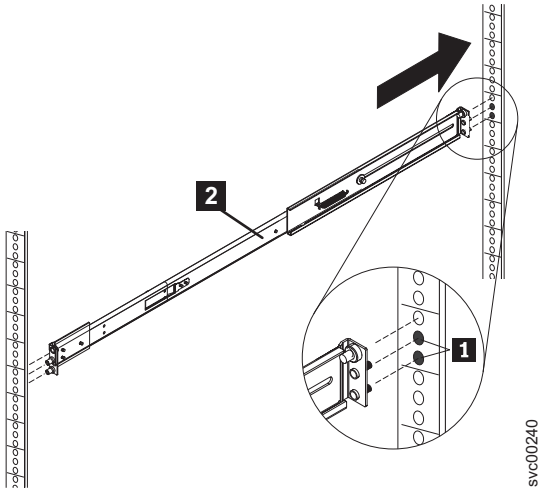


Figure 38. Inserting the right slide rail into the rear rack mounting flange

4. Extend the right slide rail 2 and insert it into the front rack mounting flange, as shown in Figure 39, with the rail pins 1 protruding through the flange. Insert the left slide rail in the same way.

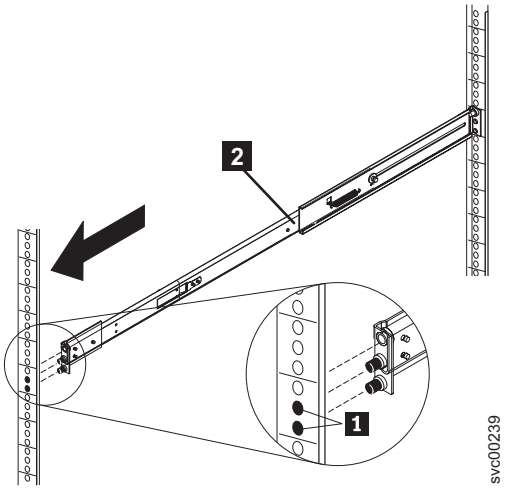


Figure 39. Extending the right slide rail

5. Attach one latch strike 1 to the front of the right rail 2, as shown in Figure 40, using the captive screw 3. Turn the screw only finger tight. Attach the other latch strike to the front of the left rail in the same way.

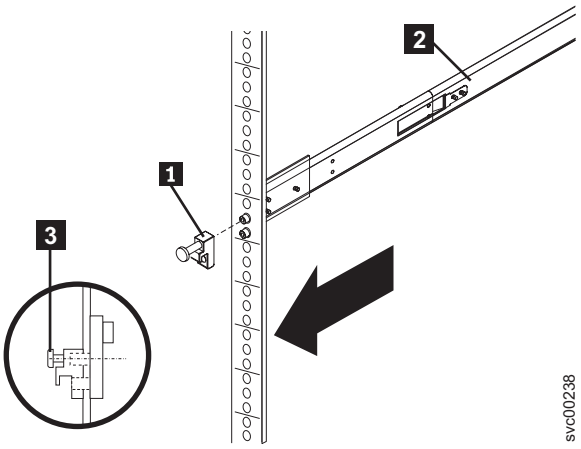


Figure 40. Attaching the latch strike to the front of the slide rail

6. Attach the slide rail to the left rear mounting flange with a single screw and latch strike. The screw should be only finger tight. Likewise, attach the other slide rail to the right rear mounting flange. The installation of the support rails for the SAN Volume Controller 2145-8G4 is complete.

Installing the support rails for the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2

You must install the support rails that hold the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2.

When you are ready to install the support rails, perform the following tasks:

- Refer to the Hardware Location Chart to determine where the SAN Volume Controller is to be installed in the rack.
- Refer to the Electronic Industries Alliance (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 41 on page 61, and put your thumb against the front of the latch-lock 2.

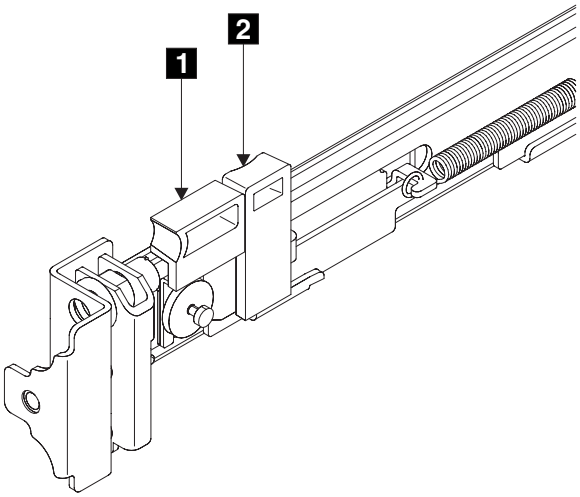


Figure 41. Retracting the latch lock carrier

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

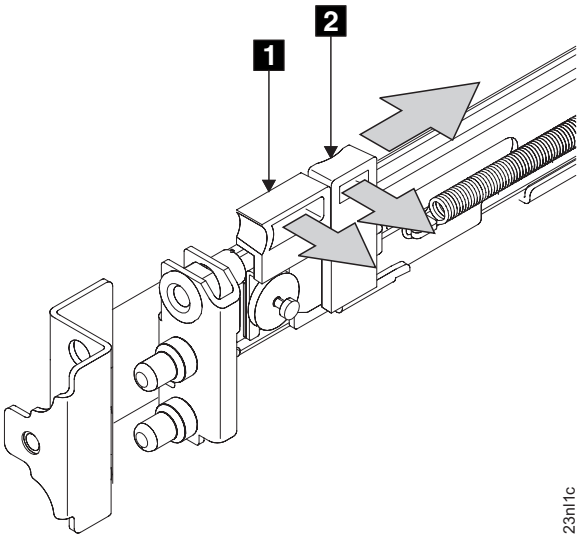


Figure 42. Opening the front latch-lock carrier assembly

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 43 on page 62) toward the front of the rail until it stops. The rail is now at its shortest adjustment.

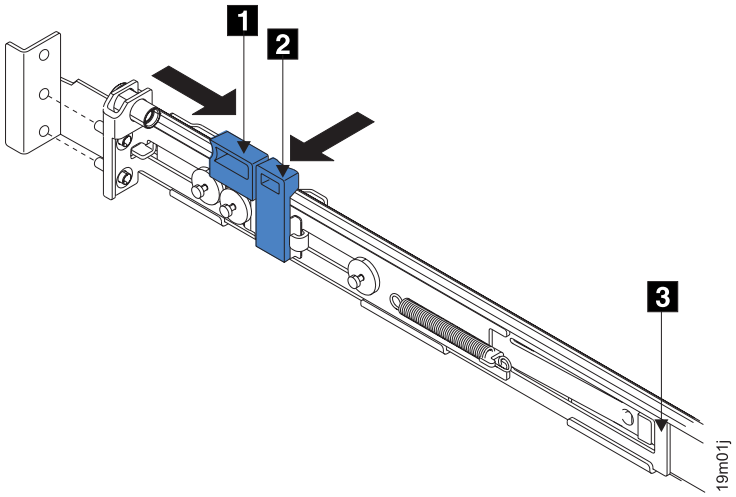


Figure 43. Opening the back latch-lock carrier assembly

1 Latch-lever

2 Latch-lock

3 Back rail bracket

6. Place the front end of the left rail in the rack cabinet. Align the top of the front bracket 1 (Figure 44) with the required EIA marking that is on the rack.

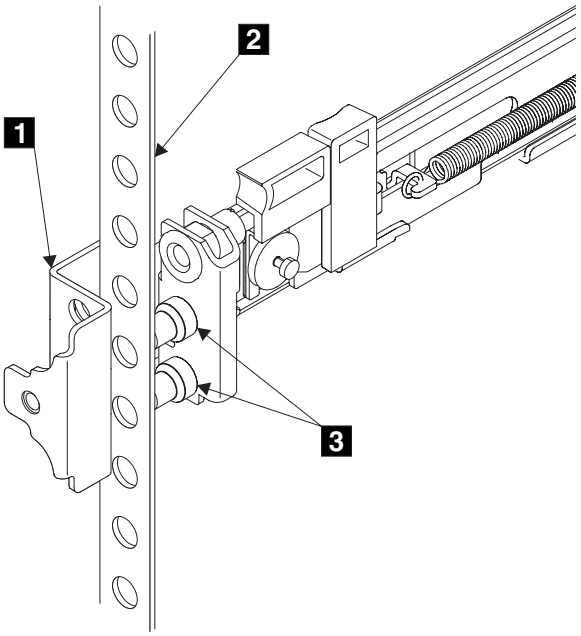


Figure 44. Installing the front end of the rail

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 45) 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.

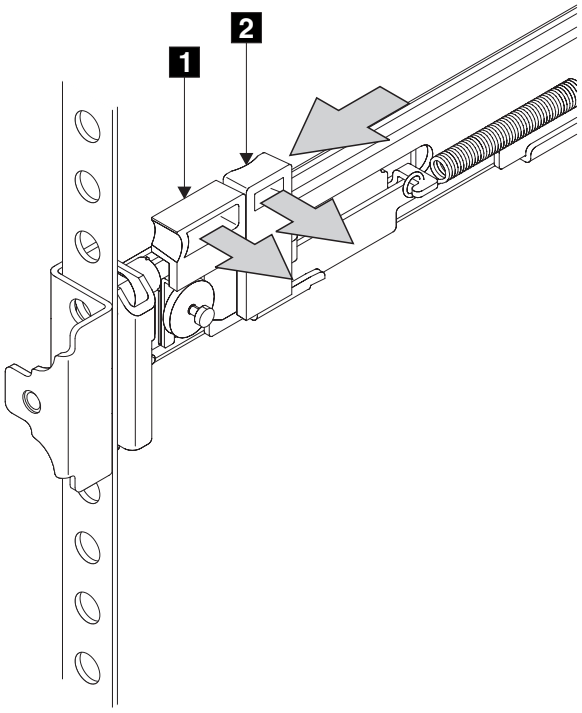


Figure 45. Closing the latch-lock carrier assembly

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.

Installing the support rails for the SAN Volume Controller 2145-4F2

You must install the support rails that hold the SAN Volume Controller 2145-4F2.

When you are ready to install the support rails, perform the following tasks:

- Refer to the Hardware Location Chart to determine where the SAN Volume Controller 2145-4F2 is to be installed in the rack.

- Refer to the Electronic Industries Alliance (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 46, and put your thumb against the front of the latch-lock **2** .

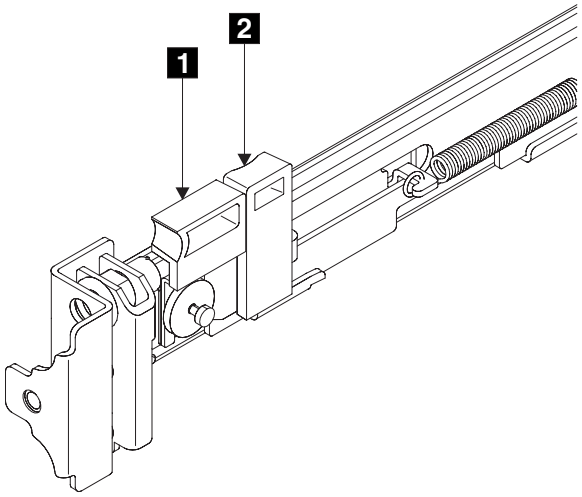


Figure 46. Retracting the latch lock carrier

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 47 on page 65). The latch-lock carrier assembly slides against the spring tension.

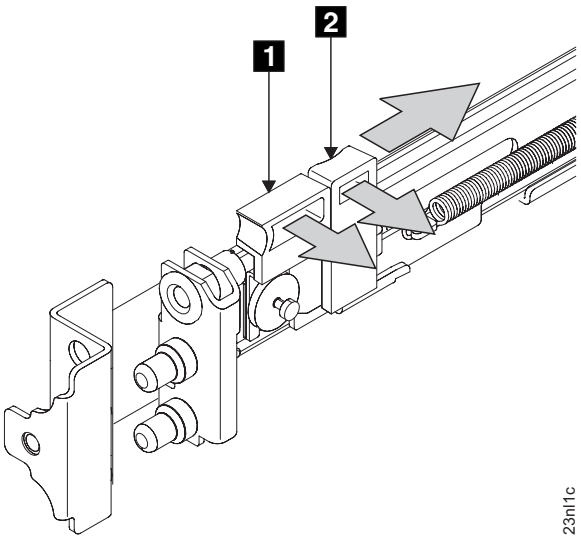


Figure 47. Opening the front latch-lock carrier assembly

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

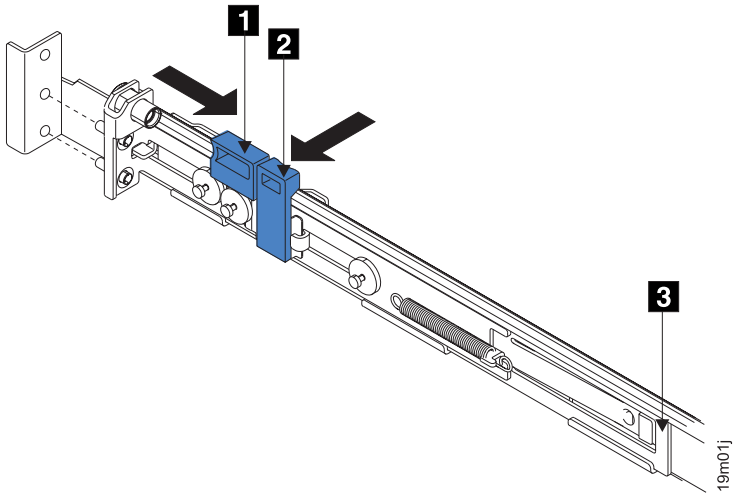


Figure 48. Opening the back latch-lock carrier assembly

1 Latch-lever

2 Latch-lock

3 Back rail bracket

6. Place the front end of the left rail in the rack cabinet. Align the top of the front bracket 1 (Figure 49 on page 66) with the required EIA marking that is on

the rack.

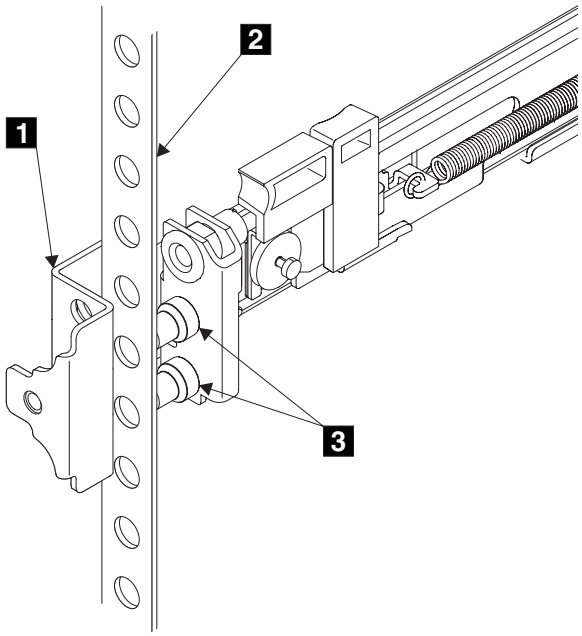


Figure 49. Installing the front end of the rail

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 50 on page 67) 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.

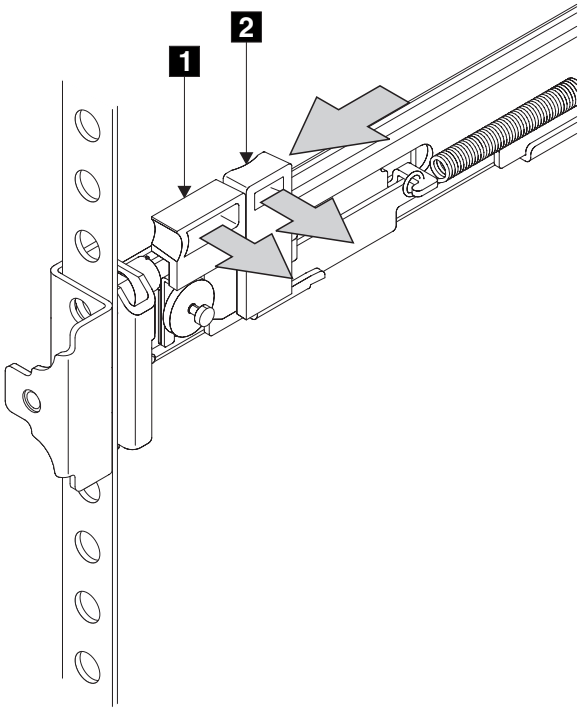


Figure 50. Closing the latch-lock carrier assembly

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.

Removing the top cover

You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

Related tasks

"Removing the SAN Volume Controller from a rack" on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the power cable from the 2145 UPS-1U" on page 255
You can remove the power cable from the 2145 UPS-1U if you are having problems with the power supply and suspect that the power cable is defective.

"Replacing the top cover" on page 71
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the fibre-channel adapter assembly" on page 155
Use the information in this topic when you need to remove a fibre channel adapter or fibre-channel adapter assemblies.

Removing the SAN Volume Controller 2145-8A4 top cover

This topic describes how to remove the top cover of the SAN Volume Controller 2145-8A4 node.

Attention: Never remove the top cover with power applied. To remove all power from the node, see MAP 5350 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

To remove the SAN Volume Controller 2145-8A4 cover, complete the following steps.

1. Read the safety information that is referenced in "Preparing to remove and replace parts" on page 23.
2. Remove the node from the rack and place it on a flat, static-protective surface. See "Removing the SAN Volume Controller from a rack" on page 33.
3. Press the cover-release button **1** , which is shown in "Removing the SAN Volume Controller 2145-8A4 top cover."

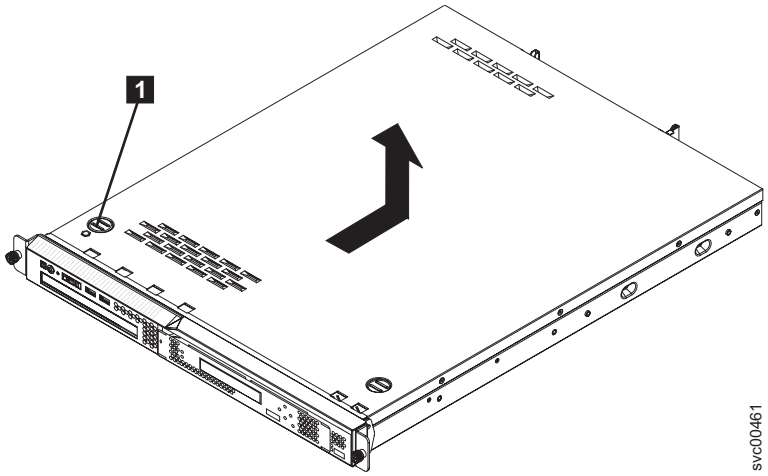


Figure 51. Removing the SAN Volume Controller 2145-8A4 cover

4. Slide the cover back approximately 1.3 cm (0.5 in); then, lift it off the node.

Removing the SAN Volume Controller 2145-8G4 top cover

This topic describes how to remove the SAN Volume Controller 2145-8G4 top cover.

To remove the SAN Volume Controller 2145-8G4 cover, complete the following steps.

Attention: Never remove the top cover with power applied. To remove all power from the node, see MAP 5350 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

1. Read the safety information that is referenced in “Preparing to remove and replace parts” on page 23.
2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
3. Loosen the thumbscrew (**1** in Figure 52) that secures the cover at the rear of the SAN Volume Controller 2145-8G4.

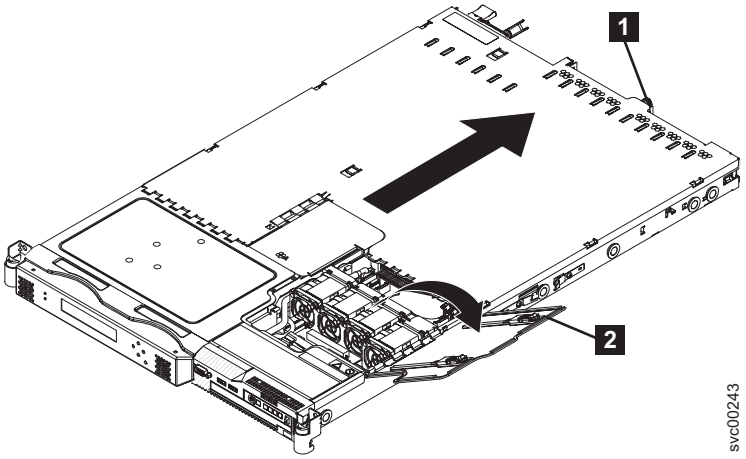


Figure 52. The SAN Volume Controller 2145-8G4 with fan door open

4. Open the fan door **2**. To open the fan door, slide the two latches to the right, and raise the door panel.
5. Remove the SAN Volume Controller 2145-8G4 cover:
   a. Slide the cover slightly toward the rear of the SAN Volume Controller 2145-8G4 until it comes free. Make sure that the cover tabs all slide away from the insets that are on the front, rear, and sides of the SAN Volume Controller 2145-8G4.
   b. Lift the cover off the SAN Volume Controller 2145-8G4 and set the cover aside.

      Important: Before you turn on the node, replace the cover for proper cooling and airflow. Operating the node for extended periods of time (more than 30 minutes) with the cover removed might damage components.

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 top cover

This topic describes how to remove the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 top cover.

Before you remove the cover, you must remove all power from the node. To remove all power from the node, see MAP 5350 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

Perform the following steps to remove the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 top cover:

1. Remove the server from the rack:
   a. Pull the node out, about a third of the way, until it stops.
   b. Slide both side release latches (left and right) toward the front of the node. Make sure that both rail-lock pins (**2** in Figure 53) are in a vertical position, pull the node out, and remove it from the rack.

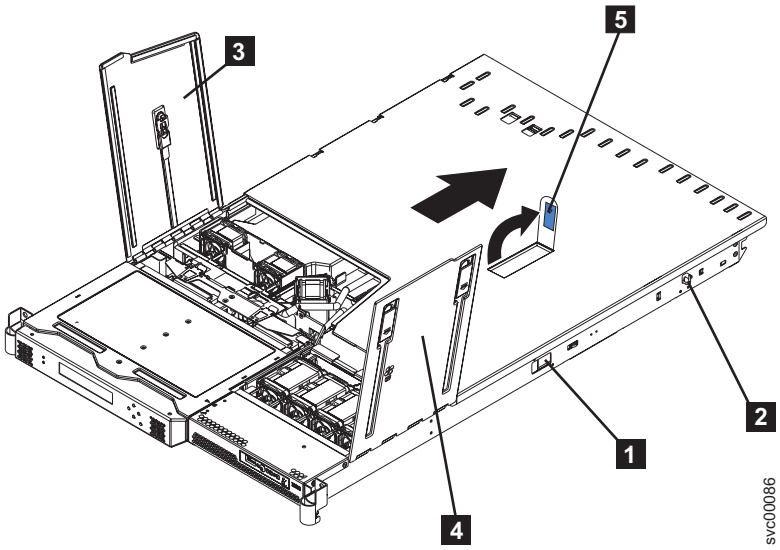


Figure 53. SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 with fan doors open

1 Side release latch

2 Rail lock pin

3 Fan door A

4 Fan door B

5 Cover release latch

2. Open fan door A **3** and fan door B **4**. To open fan door A, slide the slide latch to the left and lift up the door panel. To open fan door B, slide the two slide latches to the right and lift up the door panel.
3. Perform the following steps to remove the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 cover:
   a. Lift up the cover release latch **5** and slide the cover to the rear of the node.
   b. Make sure that the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 cover slides away from the insets that are on the front, rear, and sides of the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 cover.
   c. Lift the cover off the node and set the cover aside.

Important: Before you turn on the node, replace the cover for proper cooling and airflow. Operating the node for extended periods of time (more than 30 minutes) with the cover removed might damage components.

Removing the SAN Volume Controller 2145-4F2 top cover

Before you can replace the top cover, you must remove it.

Perform the following steps to remove the top cover from the SAN Volume Controller 2145-4F2:

1. Remove all power from the SAN Volume Controller 2145-4F2. See MAP 5350 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Lift the lever (**1** in Figure 54). This action moves the top cover rearward approximately 13 mm (0.5 in).

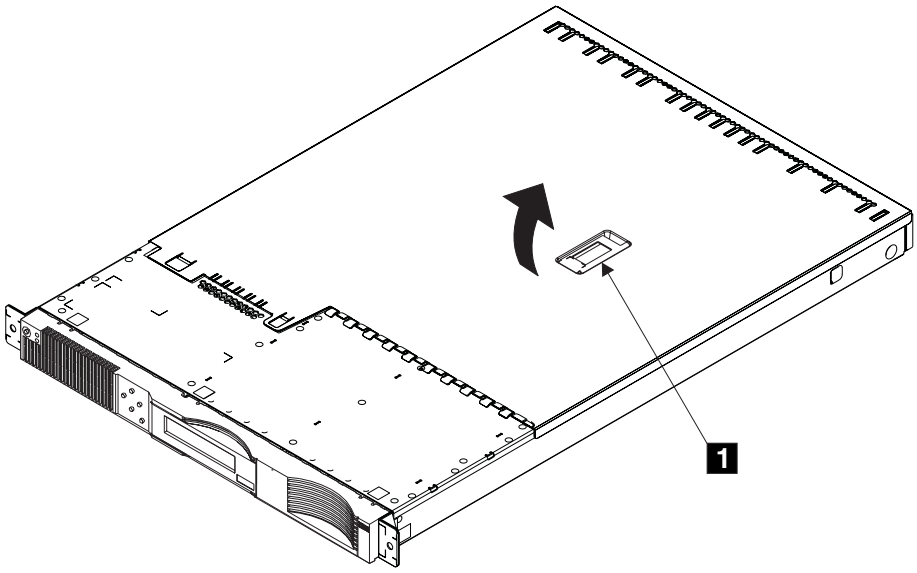


Figure 54. Removing the SAN Volume Controller 2145-4F2 cover

4. Lift the front of the cover, and lift the cover away from the SAN Volume Controller 2145-4F2 and set it aside.

Important: Before you turn on the node, replace the cover for proper cooling and airflow. Operating the node for extended periods of time (more than 30 minutes) with the cover removed might damage components.

Replacing the top cover

You must replace the top cover on the SAN Volume Controller after maintenance is completed.

Related tasks

“Removing the top cover” on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

“Replacing the SAN Volume Controller in a rack” on page 43
You must use caution when you replace the SAN Volume Controller in a rack.

Replacing the SAN Volume Controller 2145-8A4 top cover

This topic describes how to replace the SAN Volume Controller 2145-8A4 top cover.

To replace the top cover on the SAN Volume Controller 2145-8A4, complete the following steps:

1. Make sure that all internal cables are correctly routed so that they do not interfere with the cover installation.
2. Set the cover on top of the node so that approximately 1.3 cm (0.5 in) extends from the rear.
3. Slide the cover forward and into position.
4. Replace the SAN Volume Controller 2145-8A4 node in the rack.

Replacing the SAN Volume Controller 2145-8G4 top cover

This topic describes how to replace the SAN Volume Controller 2145-8G4 top cover.

To replace the top cover on the SAN Volume Controller 2145-8G4, complete the following steps:

1. Position the internal cables so that they do not interfere with the cover installation.

   Important: Before you slide the cover forward, make sure that all the tabs on both the front, rear, and side of the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be very difficult to remove the cover later.
2. Position the cover on top of the SAN Volume Controller 2145-8G4 and open the fan door.
3. Tighten the thumbscrew **1**, which is shown in Figure 55 on page 73, until the cover correctly engages all the inset tabs on the SAN Volume Controller 2145-8G4.

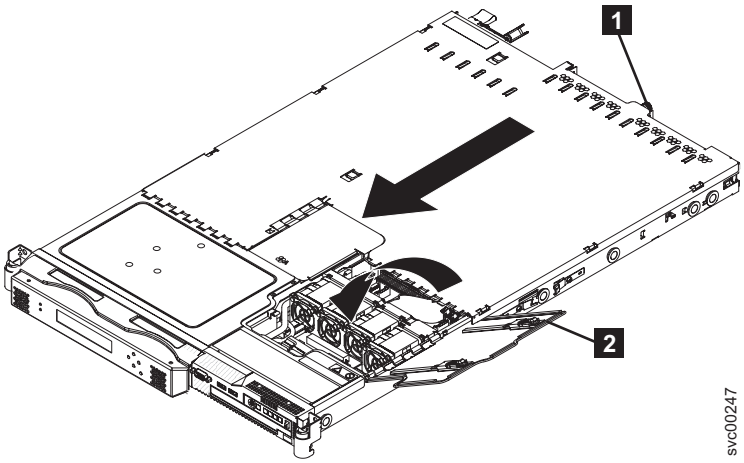


Figure 55. SAN Volume Controller 2145-8G4 with the fan door open

4. Close the fan door **2** .
5. Replace the SAN Volume Controller 2145-8G4 in the rack.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 top cover

This topic describes how to replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 top cover.

Before you turn on the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2, replace the node cover for proper cooling and airflow. Operating the node for extended periods of time (more than 30 minutes) with the cover removed might damage components.

Perform the following steps to replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 top cover:

1. Position the internal cables so that they do not interfere with the cover installation.

   Important: Before you slide the cover forward, make sure that all the tabs on both the front, rear, and side of the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be very difficult to remove the cover later.
2. Position the cover on top of the node and slide it forward.
3. Press down on the cover release latch **3** , which is shown in Figure 56 on page 74, until the cover properly engages all the inset tabs on the SAN Volume Controller 2145-8F2.

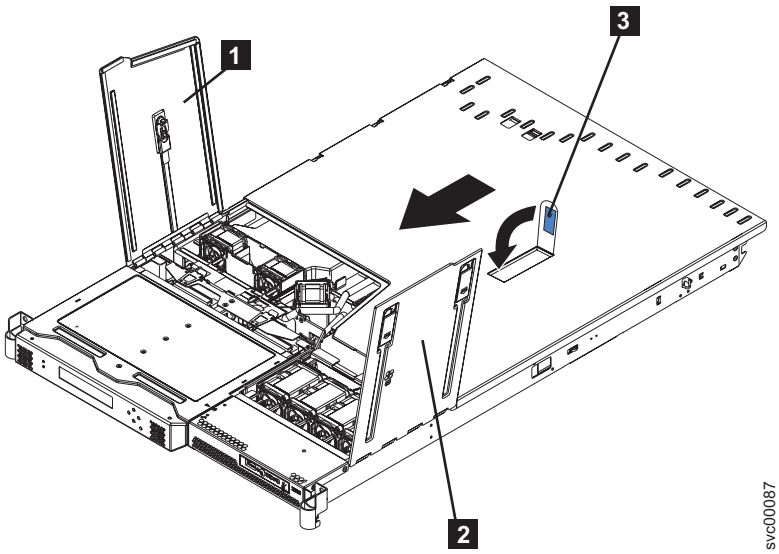


Figure 56. SAN Volume Controller 2145-8F2 with the fan doors open

1. Fan door A
2. Fan door B
3. Cover release latch

4. Close the fan doors.
5. Install the node in the rack.

Replacing the SAN Volume Controller 2145-4F2 top cover

Before moving the top cover into place, position the internal cables so that they do not interfere with the cover.

Important: Before you slide the cover forward, make sure that all the tabs on both the front, rear, and side of the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be very difficult to remove the cover later.

Perform the following steps to replace the top cover on the SAN Volume Controller 2145-4F2:

1. Ensure that the lever 1 is fully up, as shown in Figure 57 on page 75.

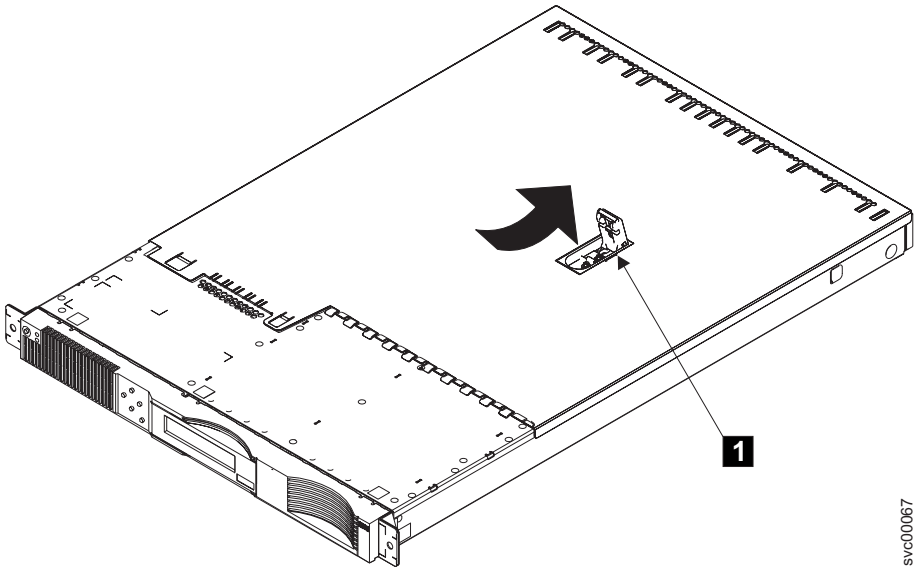


Figure 57. SAN Volume Controller 2145-4F2 with the fan door open

2. Place the cover onto the SAN Volume Controller 2145-4F2 so that about 13 mm (0.5 in.) of the cover protrudes over the back edge of the SAN Volume Controller 2145-4F2 frame.
3. Press the lever downward. The top cover moves toward the front of the SAN Volume Controller 2145-4F2.
4. Ensure that top fingers and back lugs of the cover correctly engage the frame of the SAN Volume Controller 2145-4F2.
5. Press the lever until it fully engages.

Removing the front panel from the SAN Volume Controller 2145-4F2

You can remove the front panel to perform maintenance on the SAN Volume Controller 2145-4F2.

Perform the following steps to remove the front panel from the SAN Volume Controller 2145-4F2:

1. Verify that all operations between the SAN Volume Controller 2145-4F2 and the host system have stopped.
2. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
3. Slide the SAN Volume Controller 2145-4F2 out from the rack approximately 5 cm (2 in).
4. Press the seven latches that are on the top, sides, and bottom of the front panel to release the assembly.
5. Carefully pull the assembly and its attached cable away from the node. First pull one end of the assembly, and then clear the other latches one by one by slowly pulling the end of the front panel toward you.

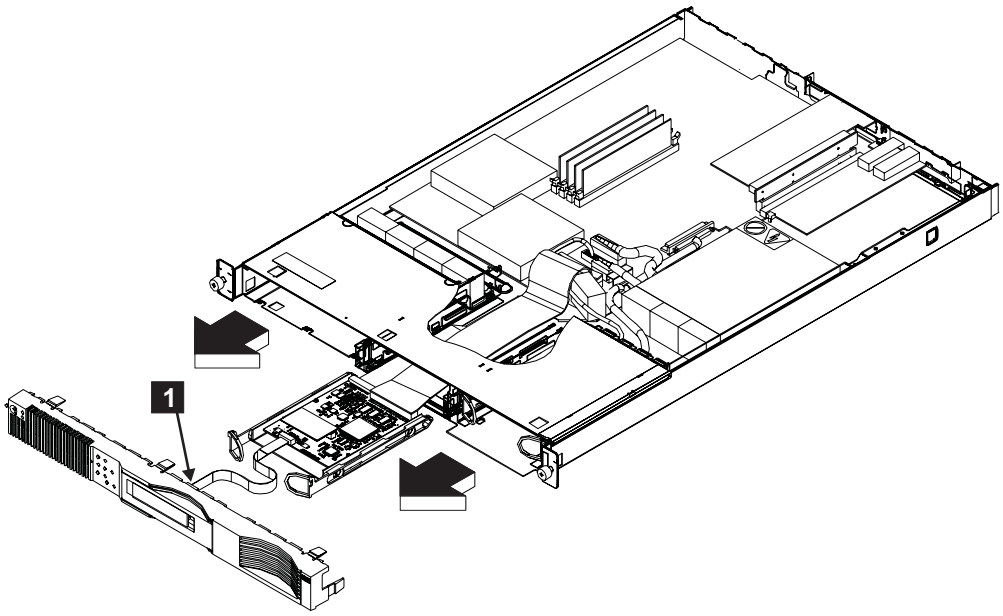


Figure 58. Removing the front panel of the SAN Volume Controller 2145-4F2

6. Disconnect the connector (**1** in Figure 58).

Related tasks

"Replacing the front panel on the SAN Volume Controller 2145-4F2"
You can remove the front panel of the SAN Volume Controller 2145-4F2 in order to replace it.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the power cable from the 2145 UPS" on page 268
You can replace the power cable from the 2145 UPS if you are having problems with the power supply and suspect that the power cable is defective.

"Removing the SAN Volume Controller from a rack" on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

Replacing the front panel on the SAN Volume Controller 2145-4F2

You can remove the front panel of the SAN Volume Controller 2145-4F2 in order to replace it.

Perform the following steps to remove the SAN Volume Controller 2145-4F2 front panel:

1. Connect the cable **1** to the front panel. See Figure 59 on page 77.

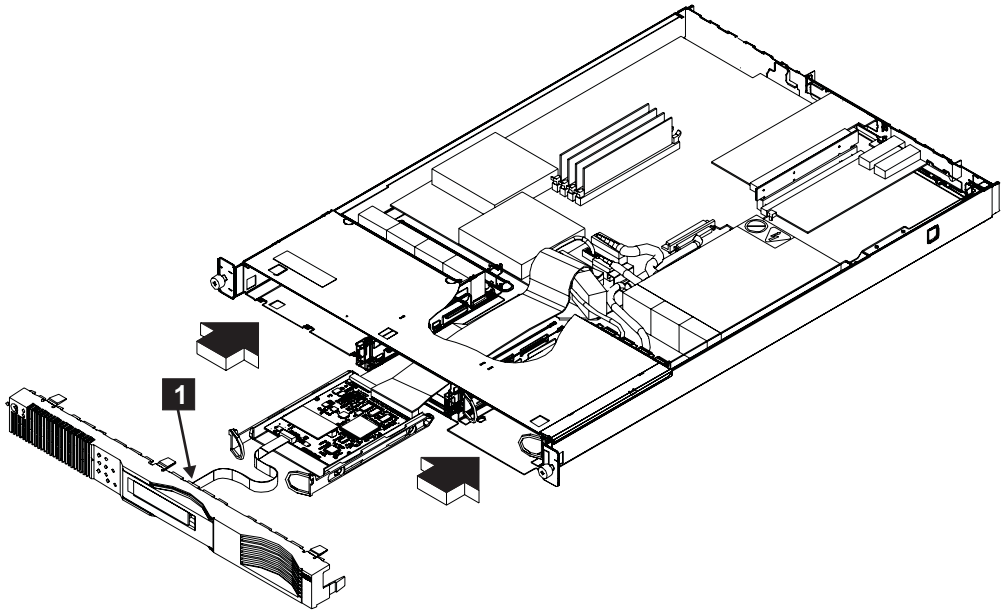


Figure 59. Replacing the front panel of the SAN Volume Controller 2145-4F2

2. Fold the cable into the front of the SAN Volume Controller 2145-4F2.
3. Insert the assembly and its attached cable into the front of the SAN Volume Controller 2145-4F2.
4. Align the front panel with the front of the SAN Volume Controller 2145-4F2 and ensure that the latches enter the frame of the SAN Volume Controller 2145-4F2. Push the front panel until you hear the latches click into place.

   Note: If you replaced the front panel field replaceable unit (FRU) with a new FRU, go to the front panel maintenance analysis procedure (MAP) to perform the steps for the replacement of the front panel.

Related tasks

"Removing the front panel from the SAN Volume Controller 2145-4F2" on page 75
You can remove the front panel to perform maintenance on the SAN Volume Controller 2145-4F2.

Removing the service controller

You can remove the service controller from the SAN Volume Controller.

Related tasks

"Removing the SAN Volume Controller from a rack" on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the front panel from the SAN Volume Controller 2145-4F2" on page 75
You can remove the front panel to perform maintenance on the SAN Volume Controller 2145-4F2.

"Removing the top cover" on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

Related reference

"Replacing a disk drive and a service controller on the SAN Volume Controller" on page 95
When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the "new" service controller does not contain the operating system software required to do so.

Removing the SAN Volume Controller 2145-8A4 service controller

To remove the service controller, perform the following steps:

1. Turn off the node. See "MAP 5350" in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the cable retention bracket and disconnect the power cable from the node. See "Removing the cable retention bracket" on page 24.
3. Locate the recessed service controller release button on the left side of the controller, which is marked in blue, as shown in Figure 60.

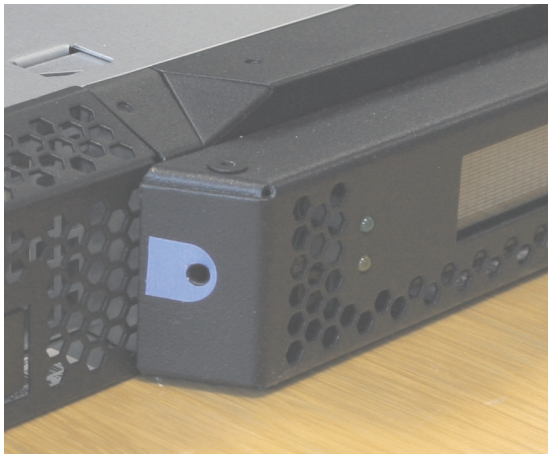


Figure 60. SAN Volume Controller 2145-8A4 service controller release button

4. Use a small screwdriver to gently press the release button and release the catch while pulling gently forward on the service controller. The service controller will move slightly forward.

Note: If you meet any resistance, do not press harder, or you might damage the release mechanism.

5. You can stop pressing the release button and pull the service controller fully out of the frame

Note: When you replace a service controller, it is normal to change the worldwide node name (WWNN) of the new service controller to match the one that is being replaced. In this case, you will have two service controllers with the same WWNN. Clearly label the service controller that you are removing and indicate that its WWNN is now a duplicate and that it must not be connected to a SAN before its WWNN is reset.

Removing the SAN Volume Controller 2145-8G4 service controller

To remove the service controller, perform the following steps:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information..
2. Remove the cable retention bracket and disconnect the power cable from the node. See “Removing the cable retention bracket” on page 24.
3. After ensuring that there is enough slack in the cables connected to the rear of the SAN Volume Controller 2145-8G4 node, slide the node forward in the rack by approximately 10 cm (4 in).
4. Locate the recessed service controller release button on the left side of the controller, which is marked in blue, as shown in Figure 61.

Figure 61. SAN Volume Controller 2145-8G4 service controller release button

5. Use a small screwdriver to gently press the release button and release the catch while pulling gently forward on the service controller. The service controller will move slightly forward.

Note: If you meet any resistance, do not press harder, or you might damage the release mechanism.

6. You can stop pressing the release button and pull the service controller fully out of the frame, as shown in Figure 62 on page 80

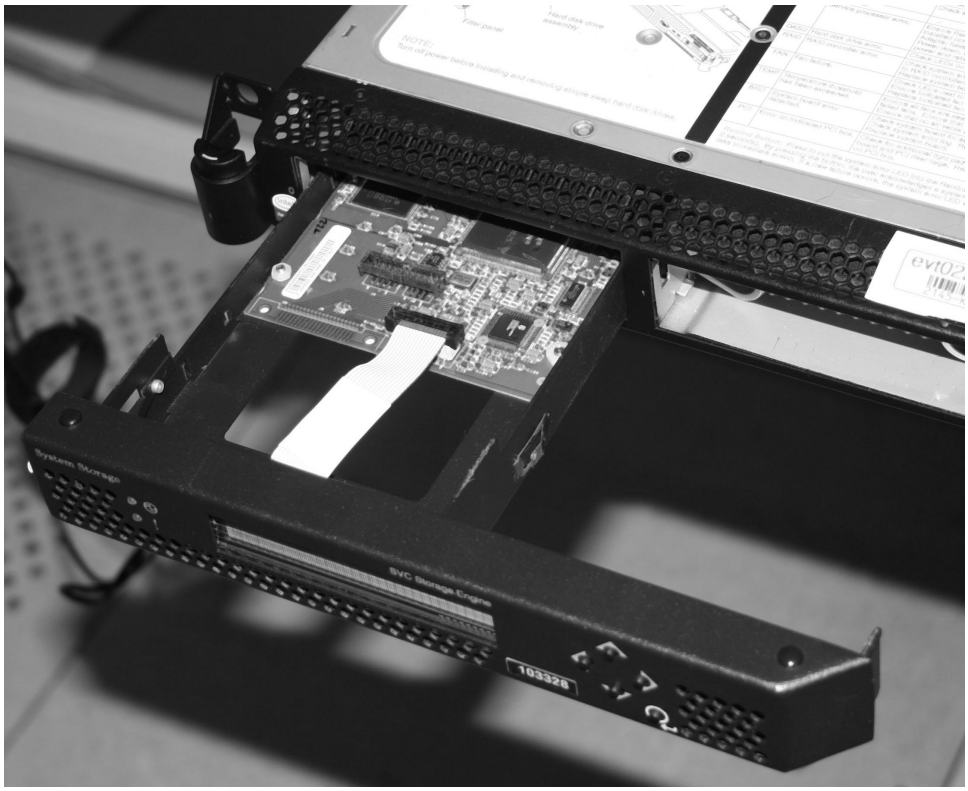


Figure 62. Removing the service controller from the SAN Volume Controller 2145-8G4

Note: When you replace a service controller, it is normal to change the worldwide node name (WWNN) of the new service controller to match the one that is being replaced. In this case, you will have two service controllers with the same WWNN. Clearly label the service controller that you are removing and indicate that its WWNN is now a duplicate and that it must not be connected to a SAN before its WWNN is reset.

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 service controller

To remove the service controller, perform the following steps:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
3. Open fan door A (**1** in Figure 63 on page 81) of the node.

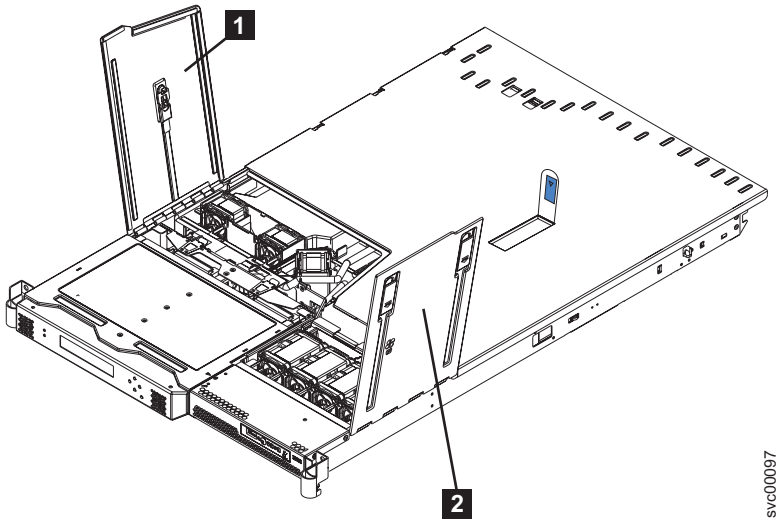


Figure 63. SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 with fan doors open

1 Fan door A

2 Fan door B

4. Lift the two blue levers on the rear of the cage assembly to release it from the frame.
5. Lift the cage assembly until the blue release latch (**1** in Figure 64) on the left side of the service controller assembly is accessible.

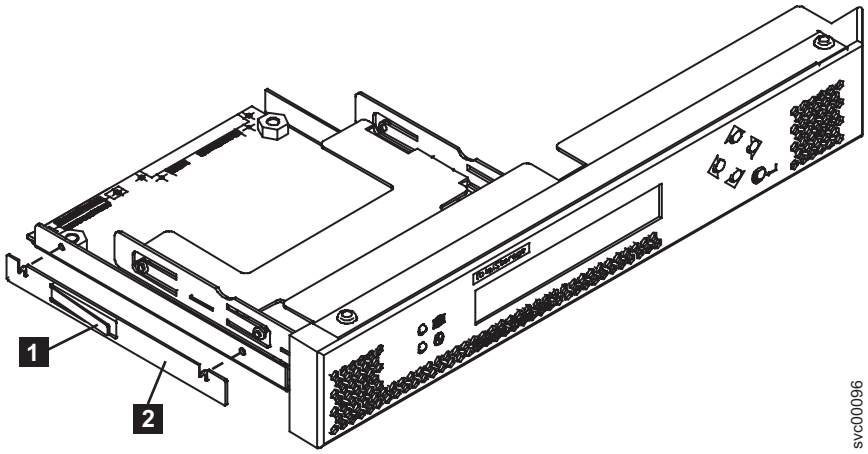


Figure 64. SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 service controller

1 Release latch

2 Retention clip

6. Press the release latch **1** and then pull the service controller forward and out of the cage assembly.

   Note: When you replace a service controller, it is normal to change the worldwide node name (WWNN) of the new service controller to match the one that is being replaced. In this case, you will have two service controllers with the same WWNN. Clearly label the service controller that you are removing and indicate that its WWNN is now a duplicate and that it must not be connected to a SAN before its WWNN is reset.

7. Remove the retention clip **2** . Make sure to save the retention clip for when you reinstall the node.

Removing the SAN Volume Controller 2145-4F2 service controller

Attention: If you are replacing the service controller and the disk drive as part of the same repair operation, see “Replacing a disk drive and a service controller on the SAN Volume Controller” on page 95.

To remove the service controller, perform the following steps:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information..
2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
3. Remove the top cover. See “Removing the top cover” on page 67.
4. Remove the front panel of the node.
5. Pull the two handles (**2** in Figure 65) to release the latches.

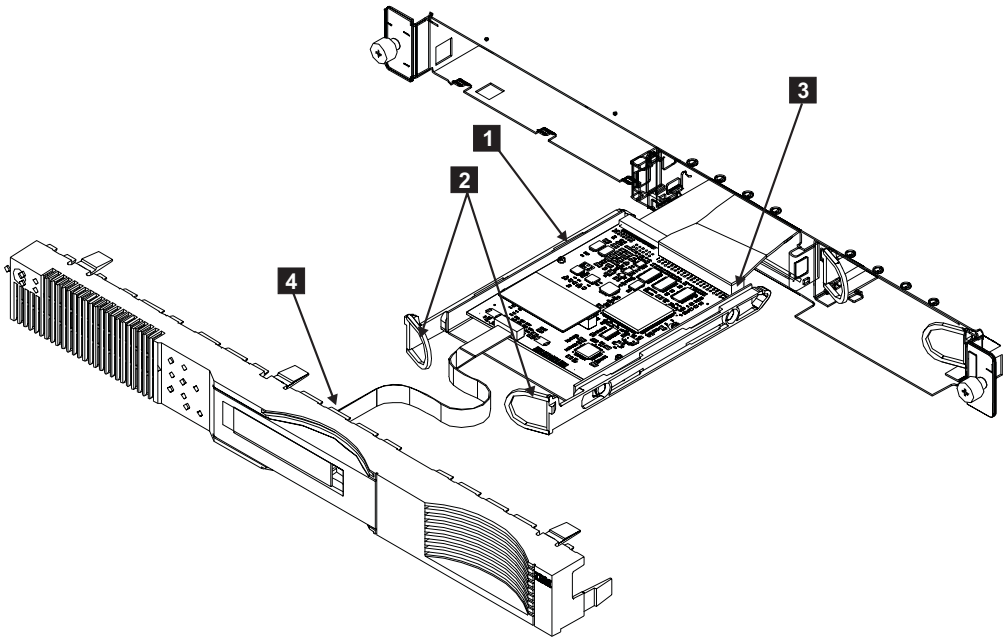


Figure 65. SAN Volume Controller 2145-4F2 service controller

6. Carefully pull the service controller **1** out of the node to avoid damaging the attached cables.

Note: When you replace a service controller, it is normal to change the worldwide node name (WWNN) of the new service controller to match the one that is being replaced. In this case, you will have two service controllers with the same WWNN. Clearly label the service controller that you are removing and indicate that its WWNN is now a duplicate and that it must not be connected to a SAN before its WWNN is reset.

Removing and replacing the SAN Volume Controller 2145-4F2 service controller cables

You can remove the SAN Volume Controller 2145-4F2 service controller cables from the SAN Volume Controller 2145-4F2.

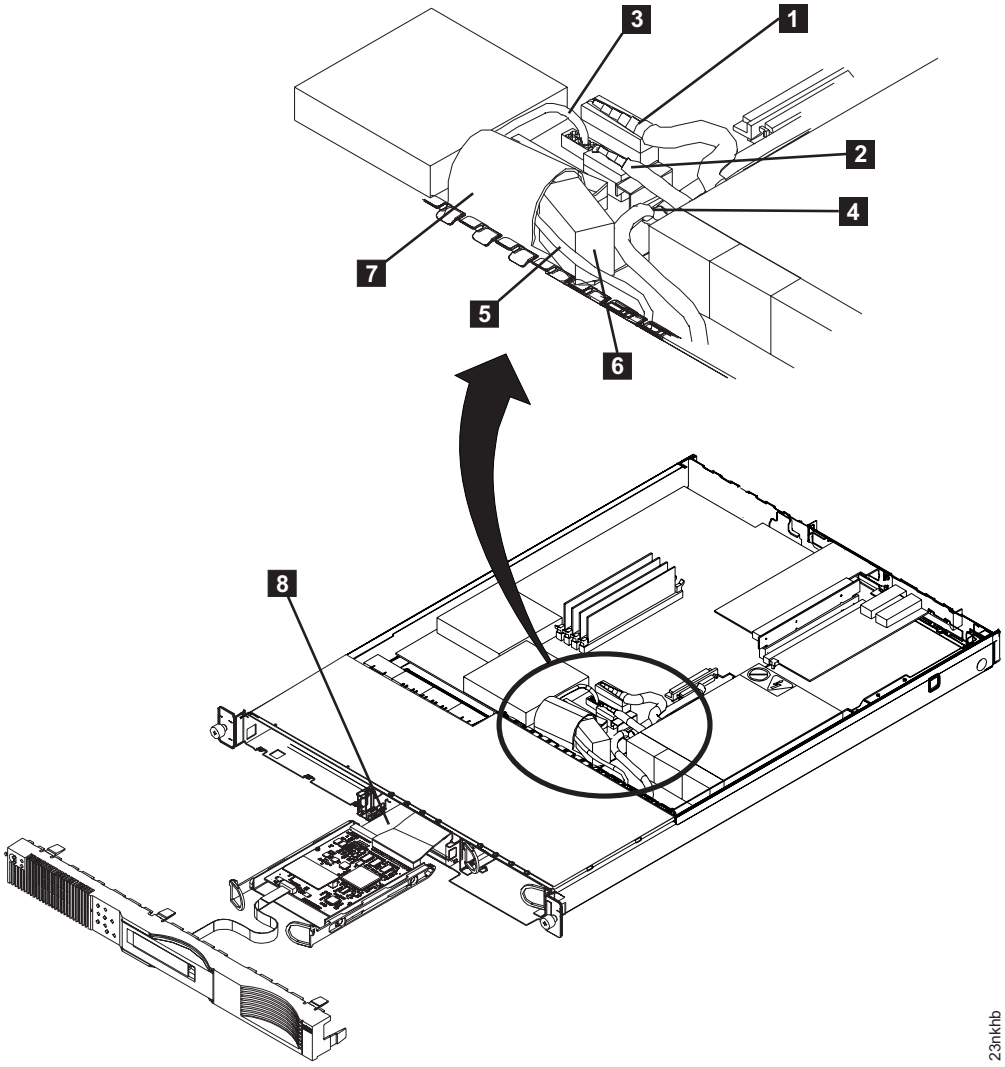


Figure 66. Service controller cables for the SAN Volume Controller 2145-4F2

1. Power connector P1
2. Power connector P2
3. Fan cable
4. SCSI signal cable

5 ATA (Advanced Technology Attachment) cable

6 Fan

7 Fan clip

8 Ribbon cable

Perform the following steps to remove the service controller cables:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
3. Remove the top cover. See “Removing the top cover” on page 67.
4. Remove the service controller and the front panel cable from the front of the service controller.
5. Press the latch on power connector P1 **1** and power connector P2 **2**, and disconnect them from the system board. See Figure 66 on page 83.
6. Disconnect the fan cable **3**.
7. Disconnect the ATA cable **5**.
8. Lift the SCSI signal cable **4** away from the fan bracket.
9. Slide the right-hand side of the fan **6** forward, and pull the fan away from the clip **7**.
10. Lift the ribbon cable **8** out from the connector.

    Notes:

    a. The ribbon cable is labeled System Planar.
    b. The ribbon cable is pre-folded so that it automatically follows the correct route inside the SAN Volume Controller 2145-4F2.
11. To reinstall the cables, *carefully* install the one end of the ribbon cable (marked `System Planar`) to the system board being sure to install the cable straight in. See Figure 67 on page 85.
12. Route the flat cable and feed it through the opening where the service controller is to be installed and bring the other end of the cable (marked `Controller Card`) out of the front end of the SAN Volume Controller 2145-4F2 chassis. *Carefully* install this other end of the cable to the rear of the service controller, being sure to install the cable straight in with no rocking or twisting during installation.
13. Install the ATA cable to the rear of the service controller.
14. Carefully install the service controller while ensuring the cables do not get damaged as they slide into the chassis.
15. Verify that the blue line on each of the cable connector ends is not visible. This ensures that it is fully seated. For more information, see the documentation on removing the service controller from the SAN Volume Controller 2145-4F2.

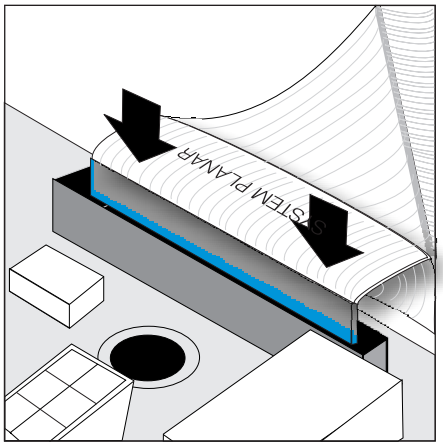


Figure 67. Installing the service controller cable into the SAN Volume Controller 2145-4F2 system board

Related tasks

"Removing and replacing the SAN Volume Controller power cable assembly" on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the SAN Volume Controller from a rack" on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

"Removing the service controller" on page 77
You can remove the service controller from the SAN Volume Controller.

Related reference

"Fitting the service controller ATA cable" on page 94
You must position the ATA (Advanced Technology Attachment) cable correctly when you fit it in the SAN Volume Controller 2145-4F2 to avoid damaging the cable.

Replacing the service controller

You can replace the SAN Volume Controller service controller.

Related tasks

"Replacing the SAN Volume Controller in a rack" on page 43
You must use caution when you replace the SAN Volume Controller in a rack.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Replacing the front panel on the SAN Volume Controller 2145-4F2" on page 76
You can remove the front panel of the SAN Volume Controller 2145-4F2 in order to replace it.

"Replacing the top cover" on page 71
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Replacing the disk cable assembly" on page 117
You might have to replace the disk cable assembly for a SAN Volume Controller 2145-8A4 or SAN Volume Controller 2145-8G4 service action.

Related reference

"Handling static-sensitive devices" on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

"Replacing a disk drive and a service controller on the SAN Volume Controller" on page 95
When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the "new" service controller does not contain the operating system software required to do so.

Replacing the SAN Volume Controller 2145-8A4 service controller

Use the following information to replace the SAN Volume Controller 2145-8A4 service controller.

To replace the service controller, perform the following steps:

1. Gently push the service controller (shown in Figure 68 on page 87) into the frame until the rear connectors are fully seated and the service controller front metal work is up to the frame.

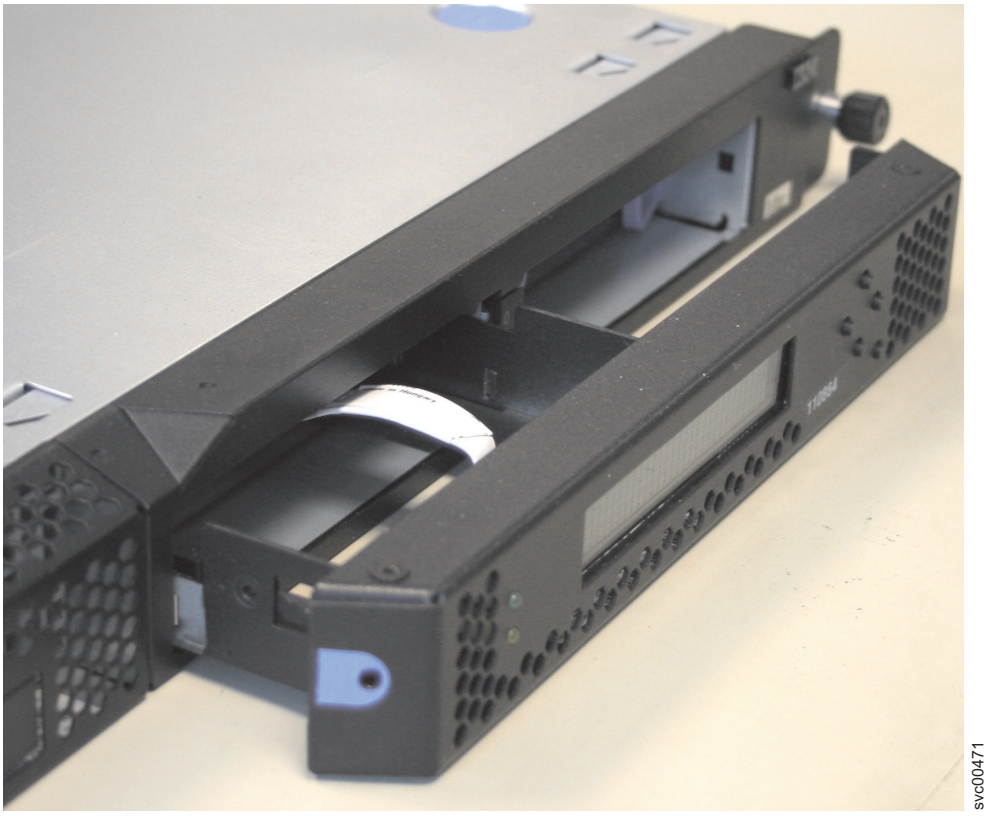


Figure 68. SAN Volume Controller 2145-8A4 service controller

2. Connect the power cable to the node and replace the cable retention bracket.

   Note: If you replaced the service controller as part of concurrent maintenance, you must rewrite the WWNN on the new service controller. If you do not, and the fibre-channel switch zoning uses WWPNs, you cannot add the node back into the cluster until the fibre-channel switches in the SAN are re-zoned. Also, the host systems cannot access the fibre-channel ports on that node until the host systems are rebooted.

   To restore the WWNN, perform the following steps:

   a. Determine the WWNN for the node by examining the VPD of the node or the zoning that is defined in the SAN switch. Record the last five numbers of the WWNN for the node that you are working on.

   b. Start the node by performing a node rescue.

   c. Change the node WWNN by performing the following steps:

      1) On the front-panel display, press and release the down button until the Node panel is displayed. Then press and release the right button until the Node WWNN: panel is displayed.

      2) Press and hold the down button, press and release the select button, and then release the down button. The display switches into edit mode. `Edit WWNN` is displayed on line 1. Line 2 of the display shows the last five numbers of the WWNN that is currently set. The first number is highlighted.

      3) Change the highlighted number to match the number from the VPD or from customer zoning. Use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.

4) When the displayed value matches the numbers in the VPD or customer zoning, press and release the select button to accept the numbers. The Node WWNN: panel is displayed and the second line shows the last five numbers of the restored WWNN.

Wait one minute. If `Cluster:` is displayed on the front panel, this indicates that the node is ready to be added to the cluster. If `Cluster:` does not display, see “MAP 5000” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* to determine how to solve this problem or contact the IBM support center.

Replacing the SAN Volume Controller 2145-8G4 service controller

Use the following information to replace the SAN Volume Controller 2145-8G4 service controller.

To replace the service controller, perform the following steps:

1. Gently push the service controller (shown in Figure 69) into the frame until the rear connectors are fully seated and the service controller front metal work is up to the frame.

Figure 69. SAN Volume Controller 2145-8G4 service controller

2. Slide the SAN Volume Controller 2145-8G4 back into the rack and check that all cables are still firmly in place.
3. Connect the power cable to the node and replace the cable retention bracket.

   Note: The worldwide port names (WWPNs) of the fibre-channel ports are derived from the worldwide node name (WWNN) of the service controller. If you do not perform step 4, you might have to re-zone the fibre-channel switches if the switch zoning uses WWPN. You must restart the host systems before they are able to access disks through this node.
4. If you replaced the service controller as part of concurrent maintenance, you must rewrite the WWNN on the new service controller. If you do not, and the fibre-channel switch zoning uses WWPNs, you cannot add the node back into the cluster until the fibre-channel switches in the SAN are re-zoned. Also, the host systems cannot access the fibre-channel ports on that node until the host systems are rebooted.

   To restore the WWNN, perform the following steps:

a. Determine the WWNN for the node by examining the VPD of the node or the zoning that is defined in the SAN switch. Record the last five numbers of the WWNN for the node that you are working on.
b. Start the node by performing a node rescue.
c. Change the node WWNN by performing the following steps:
    1) On the front-panel display, press and release the down button until the Node panel is displayed. Then press and release the right button until the Node WWNN: panel is displayed.
    2) Press and hold the down button, press and release the select button, and then release the down button. The display switches into edit mode. `Edit WWNN` is displayed on line 1. Line 2 of the display shows the last five numbers of the WWNN that is currently set. The first number is highlighted.
    3) Change the highlighted number to match the number from the VPD or from customer zoning. Use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.
    4) When the displayed value matches the numbers in the VPD or customer zoning, press and release the select button to accept the numbers. The Node WWNN: panel is displayed and the second line shows the last five numbers of the restored WWNN.

Wait one minute. If `Cluster:` is displayed on the front panel, this indicates that the node is ready to be added to the cluster. If `Cluster:` does not display, see ″MAP 5000″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* to determine how to solve this problem or contact the IBM support center.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 service controller

Use the following information to replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 service controller.

To replace the service controller, perform the following steps:

1. Place the retention clip (**2** in Figure 70 on page 90) over the locating holes on the left side of the service controller.

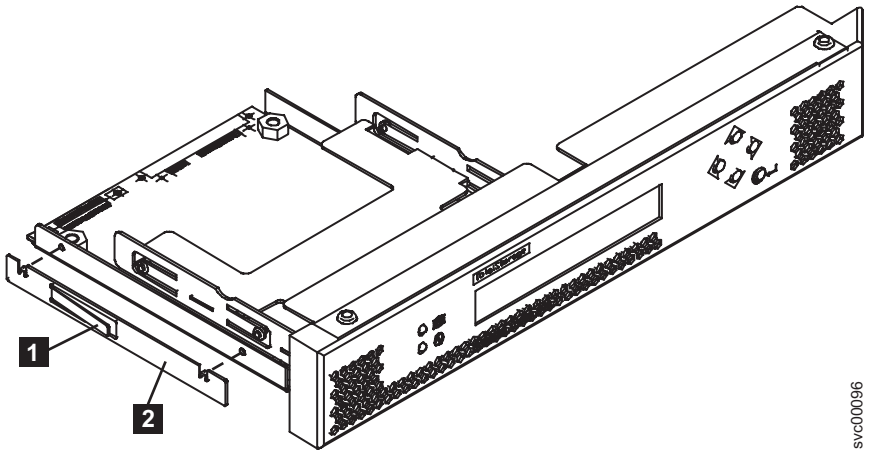


Figure 70. SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 service controller

2. Push the service controller into the cage until the retention clip engages.
3. Relocate the cage assembly and close the blue levers to secure the cage assembly to the frame.
4. Close the fan door (**1** in Figure 71) and replace the node in the rack.

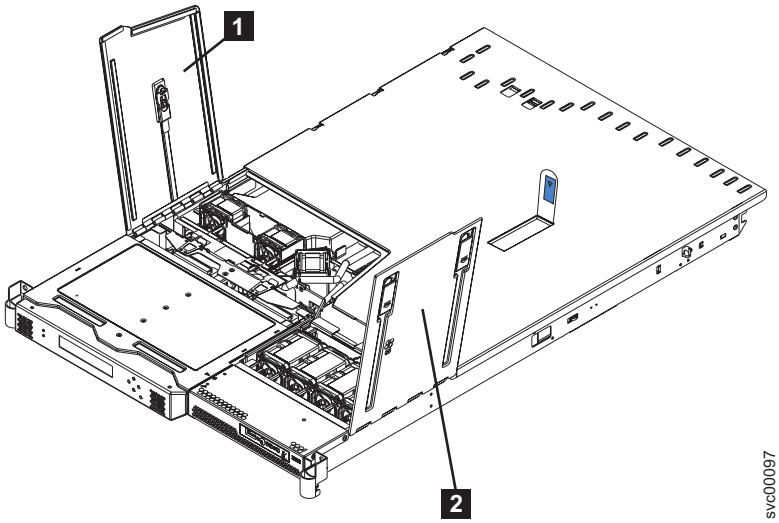


Figure 71. SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 with fan doors open

Note: The worldwide port names (WWPNs) of the fibre-channel ports are derived from the worldwide node name (WWNN) of the service controller. If you do not perform step 5 on page 91, you might have to re-zone the fibre-channel switches if the switch zoning uses WWPN. You must restart the host systems before they are able to access disks through this node.

5. If you replaced the service controller as part of concurrent maintenance, you must rewrite the WWNN on the new service controller. If you do not, and the fibre-channel switch zoning uses WWPNs, you cannot add the node back into the cluster until the fibre-channel switches in the SAN are re-zoned. Also, the host systems cannot access the fibre-channel ports on that node until the host systems are rebooted.

   To restore the WWNN, perform the following steps:

   a. Determine the WWNN for the node by examining the VPD of the node or the zoning that is defined in the SAN switch. Record the last five numbers of the WWNN for the node that you are working on.
   b. Start the node by performing a node rescue.
   c. Change the node WWNN by performing the following steps:
      1) On the front-panel display, press and release the down button until the Node panel is displayed. Then press and release the right button until the Node WWNN: panel is displayed.
      2) Press and hold the down button, press and release the select button, and then release the down button. The display switches into edit mode. `Edit WWNN` is displayed on line 1. Line 2 of the display shows the last five numbers of the WWNN that is currently set. The first number is highlighted.
      3) Change the highlighted number to match the number from the VPD or from customer zoning. Use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.
      4) When the displayed value matches the numbers in the VPD or customer zoning, press and release the select button to accept the numbers. The Node WWNN: panel is displayed and the second line shows the last five numbers of the restored WWNN.

Wait one minute. If `Cluster:` is displayed on the front panel, this indicates that the node is ready to be added to the cluster. If `Cluster:` does not display, see ″MAP 5000″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* to determine how to solve this problem or contact the IBM support center.

Replacing the SAN Volume Controller 2145-4F2 service controller

Use the following information to replace the SAN Volume Controller 2145-4F2 service controller.

Attention: If you are replacing the service controller as part of a problem determination procedure, you must also replace the cables that are supplied as part of the service controller field replaceable unit (FRU). If you are replacing the service controller *and* the disk drive as part of the same repair operation, see “Replacing a disk drive and a service controller on the SAN Volume Controller” on page 95.

To replace the service controller, perform the following steps:

1. Carefully push the service controller (**1** in Figure 72 on page 92) into the SAN Volume Controller 2145-4F2.

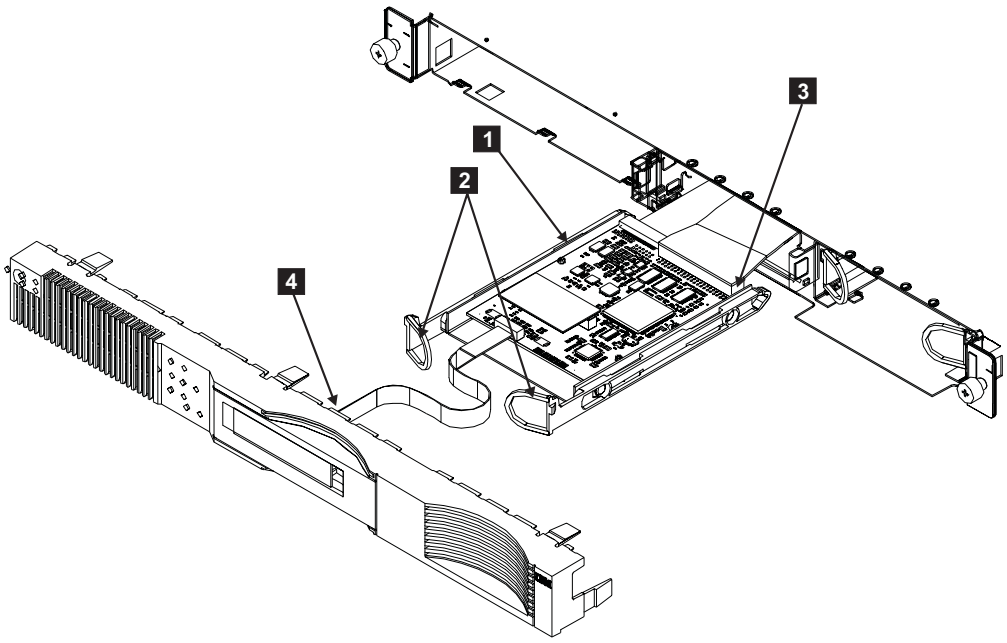


Figure 72. SAN Volume Controller 2145-4F2 service controller

Notes:

a. The 40-way cable connector is keyed.

b. Before you reconnect the ribbon cable, ensure that its contacts are downward. *Carefully* install the cable to the rear of the service controller, being sure to install the cable straight in with no rocking or twisting during installation. Be sure to verify that the dark blue line on each cable connector end is not visible. This ensures that the cable is fully seated. See Figure 73 for an example of the cable when it is installed properly and Figure 74 on page 93 for an example of the cable when it is not installed properly.

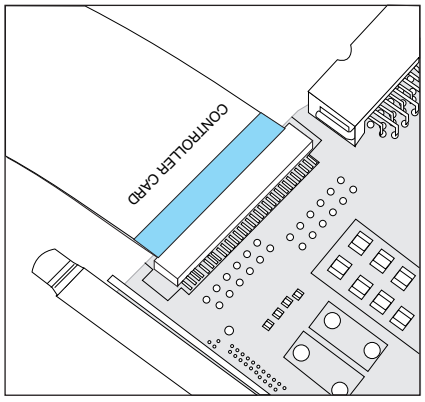


Figure 73. SAN Volume Controller 2145-4F2 service controller card cable installed properly

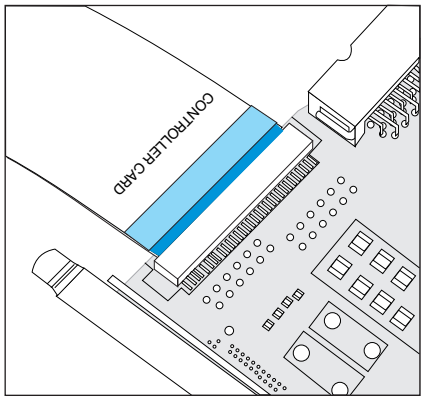


Figure 74. SAN Volume Controller 2145-4F2 service controller card cable that is not properly seated

c. When you install the service controller, ensure that the cables do not come in contact with the fan assembly that is mounted behind the service controller bay. Fold the cables under the service controller as you push the service controller into the SAN Volume Controller 2145-4F2. Keep pushing the service controller until the latches click into place.

d. From the inside of the SAN Volume Controller 2145-4F2, ensure that the cables are correctly attached to the service controller.

2. Place the front panel on the SAN Volume Controller 2145-4F2 node.
3. Replace the top cover. See “Replacing the top cover” on page 71.
4. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
5. Reconnect the external cables and then reconnect the power cable that was removed from the node. Ensure that you replace the fibre-channel cables in the same ports from which they were removed.

   Note: The worldwide port names of the fibre-channel ports are derived from the worldwide node name (WWNN) of the service controller. If you do not rewrite the WWNN on the new service controller, you must restart the host systems before they are able to access disks through this SAN Volume Controller 2145-4F2.

6. If you are replacing the service controller as part of concurrent maintenance, you must rewrite the WWNN on the new service controller. Failure to do so means the host systems cannot access the fibre-channel ports on that node until the host systems are rebooted.

   Perform the following steps to restore the WWNN:

   a. Determine the WWNN for the node by examining the VPD of the node or the zoning that is defined in the SAN switch. Record the last five numbers of the WWNN for the node that you are working on.

   b. Start the node by performing a node rescue.

   c. Change the node WWNN by performing the following steps:

      1) On the front-panel display, press and release the down button until the Node panel is displayed. Then press and release the right button until the Node WWNN: panel is displayed.

      2) Press and hold the down button, press and release the select button, and then release the down button. The display switches into edit mode.

`Edit WWNN` is displayed on line 1. Line 2 of the display shows the last five numbers of the WWNN that is currently set. The first number is highlighted.

3) Change the highlighted number to match the number from the VPD or from customer zoning. Use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.
4) When the displayed value matches the numbers in the VPD or customer zoning, press and release the select button to accept the numbers. The Node WWNN: panel is displayed and the second line shows the last five numbers of the restored WWNN.

Wait one minute. If `Cluster:` is displayed on the front panel, this indicates that the node is ready to be added to the cluster. If `Cluster:` does not display, see ″MAP 5000″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* to determine how to solve this problem or contact the IBM support center.

Fitting the service controller ATA cable

You must position the ATA (Advanced Technology Attachment) cable correctly when you fit it in the SAN Volume Controller 2145-4F2 to avoid damaging the cable.

The ATA cable connects the service controller to the SAN Volume Controller 2145-4F2 system board. If you place the ATA cable incorrectly when installing, the disk drive fan rests against the ATA cable and, subsequently, damages the cable (see Figure 75).

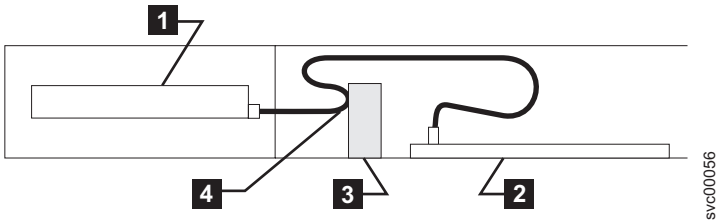


Figure 75. Incorrect placement of the ATA cable in the SAN Volume Controller 2145-4F2

1 Service controller

2 System board

3 Disk fan

4 ATA cable pushed into disk fan

To avoid damaging the ATA cable, ensure that it is routed in a loop under the service controller (see Figure 76 on page 95). This allows the excess cable to be positioned correctly when the service controller is pushed into position.

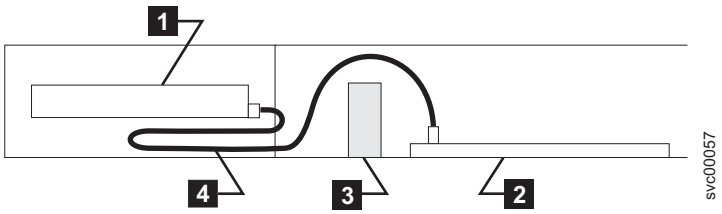


Figure 76. Proper placement of the ATA cable in the SAN Volume Controller 2145-4F2

1. Service controller
2. System board
3. Disk fan
4. ATA cable correctly positioned

Replacing a disk drive and a service controller on the SAN Volume Controller

When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the "new" service controller does not contain the operating system software required to do so.

Also, if you must replace the hard disk and the service controller at the same time, you cannot boot the node to perform node rescue. Perform the following step to be able to perform node rescue after replacing the disk drive *and* the service controller:

- Swap the service controller with a service controller from a working node. The results are the following:
  - The "new" service controller that is swapped into the working node has its nonvolatile memory updated when the node is booted from the hard disk.
  - The service controller that is swapped into the failed node from the working node contains the operating system that is required to perform node rescue on that failed node.
- When all updates are complete, swap the service controllers again, returning them to their original nodes.

Related tasks

"Removing the service controller" on page 77
You can remove the service controller from the SAN Volume Controller.

"Removing the disk drive" on page 103
You might have to remove the disk drive for a service action.

Removing and replacing the SAN Volume Controller power cable assembly

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

The power cable assembly comprises a power cable and a signal cable that are bound together. You can remove the power cable assembly if you have problems with the power supply and suspect that the power or signal cable are defective. When removing the power cable assembly, ensure that you also remove it from the uninterruptible power supply.

Perform the following steps to remove the power cable assembly:

1. Check the SAN Volume Controller models 2145-8A4, 2145-8G4, 2145-8F4, and 2145-8F2 power LED (**1** in Figure 77) or the SAN Volume Controller 2145-4F2 power light (**2** in Figure 77).
   - If the light is on, go to step 2.
   - If the light is either off or flashing, power has already been removed from the SAN Volume Controller. Go to step 5 on page 97.

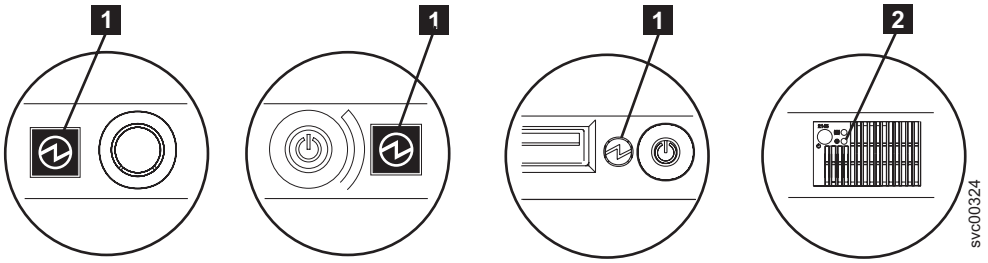


Figure 77. Power LED on the SAN Volume Controller models 2145-8A4, 2145-8G4, and 2145-8F4 or 2145-8F2 operator-information panel and the power light on the SAN Volume Controller 2145-4F2 front panel

1 SAN Volume Controller models 2145-8A4, 2145-8G4, 2145-8F4, and 2145-8F2 Power LED

2 SAN Volume Controller 2145-4F2 power light

Important: SAN Volume Controller nodes operate in pairs. Both SAN Volume Controller nodes are in the same I/O group. One SAN Volume Controller must be operational if you are servicing the other SAN Volume Controller. If both SAN Volume Controller nodes are not functioning, you cannot access any of the disks in that I/O group.

2. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.

   Attention: If both SAN Volume Controller nodes are online, removing the power from one SAN Volume Controller causes some performance degradation because I/O operations are automatically rerouted through the other SAN Volume Controller. You must obtain the customer’s agreement before you continue with this procedure.

3. Press and release the SAN Volume Controller models 2145-8A4, 2145-8G4, 2145-8F4, and 2145-8F2 power control button **1** or the SAN Volume Controller 2145-4F2 power switch **2** (shown in Figure 78 on page 97). Wait one minute for the SAN Volume Controller to turn off. The other SAN Volume Controller nodes in the cluster might display an error code indicating that a node is missing from the cluster. Ignore this error code; it is automatically resolved when the repair is complete.

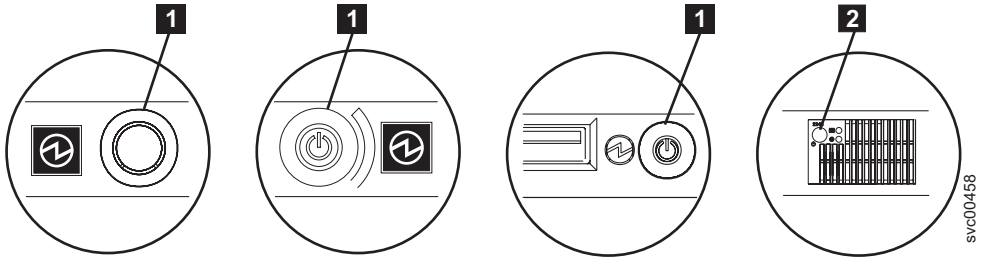


Figure 78. SAN Volume Controller models 2145-8A4, 2145-8G4, and 2145-8F4 or 2145-8F2 power control button and the SAN Volume Controller 2145-4F2 power switch

4. For the SAN Volume Controller model 2145-8A4, 2145-8G4, or 2145-8F4, remove the cable retention bracket.
5. Remove the power cable from the back of the SAN Volume Controller node.
6. Replace the power cable and make sure it is seated.
7. Replace the SAN Volume Controller model 2145-8A4, 2145-8G4, or 2145-8F4 cable retention bracket and the 2145 UPS-1U cable retention bracket.
8. If the SAN Volume Controller does not turn on automatically, press and release the power control button or switch.

   Note: If the SAN Volume Controller 2145-4F2 is turned off and it is the only SAN Volume Controller 2145-4F2 node that is connected to the 2145 UPS, the 2145 UPS also turns off within five minutes. Before you turn on the SAN Volume Controller 2145-4F2, you must press the power-on button on the 2145 UPS. The 2145 UPS-1U turns off only when its power button is pressed, input power has been lost for more than five minutes, or the SAN Volume Controller node has shut it down following a reported loss of input power.

Related tasks

"Removing the fibre-channel adapter assembly" on page 155
Use the information in this topic when you need to remove a fibre channel adapter or fibre-channel adapter assemblies.

Removing the memory modules (DIMM)

You might need to remove one or more faulty memory modules.

The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing the SAN Volume Controller from a rack” on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

“Removing the top cover” on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Locating the memory modules

If you do not need to remove all of the memory modules, use this information to locate a specific memory module for the SAN Volume Controller model.

After you find the location of the faulty memory module, go to “Removing memory modules” on page 100.

- SAN Volume Controller 2145-8A4: These modules are numbered **1** through **4**, as shown in Figure 79.

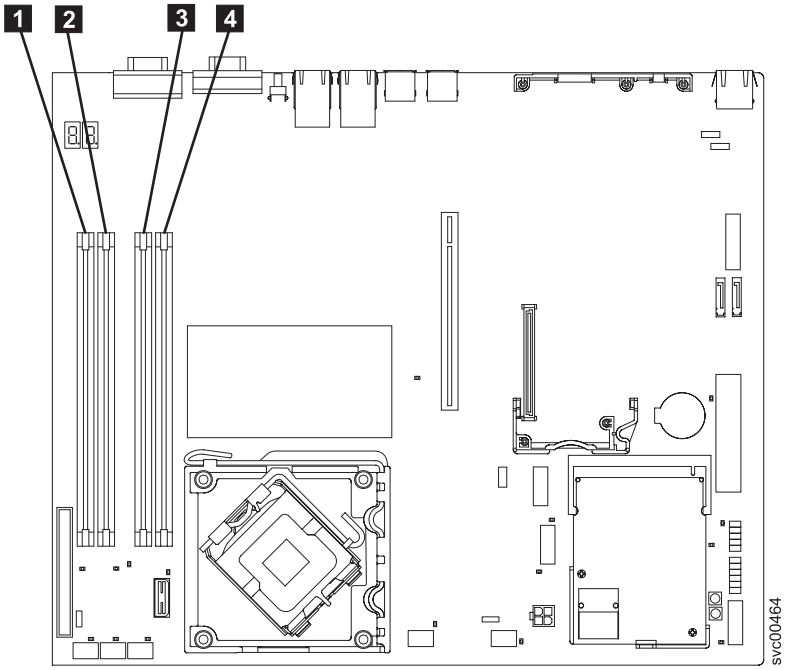


Figure 79. Locating the SAN Volume Controller 2145-8A4 memory modules

- SAN Volume Controller 2145-8G4: There are two versions of this node.
  - The original version (Rev 1) uses eight 1 GB memory modules in slots **1** through **8**, which are shown in Figure 80 on page 99.

– The second version of this node (Rev 2) uses four 2 GB memory modules in slots **1** , **3** , **5** , and **7** .

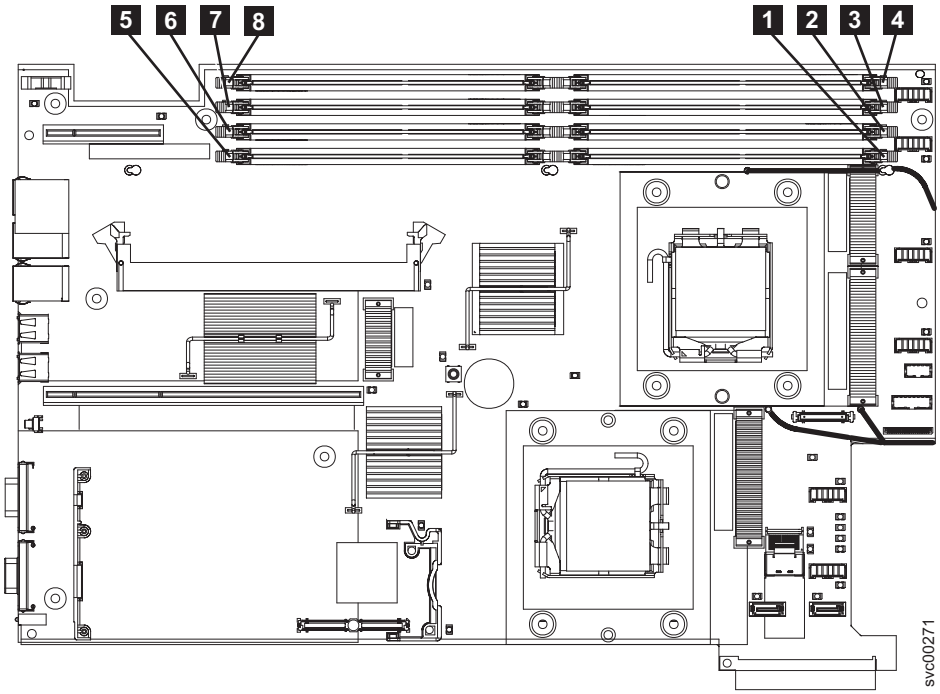


Figure 80. Locating the SAN Volume Controller 2145-8G4 memory modules

- SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2: These modules are numbered **1** through **8** , as shown in Figure 81 on page 100.

  Note: If more than one SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or SAN Volume Controller 2145-8F2 DIMM is indicated by the light path diagnostics, replace the DIMMs one-at-a-time, starting at the lowest numbered DIMM slot that is indicated by the diagnostics.

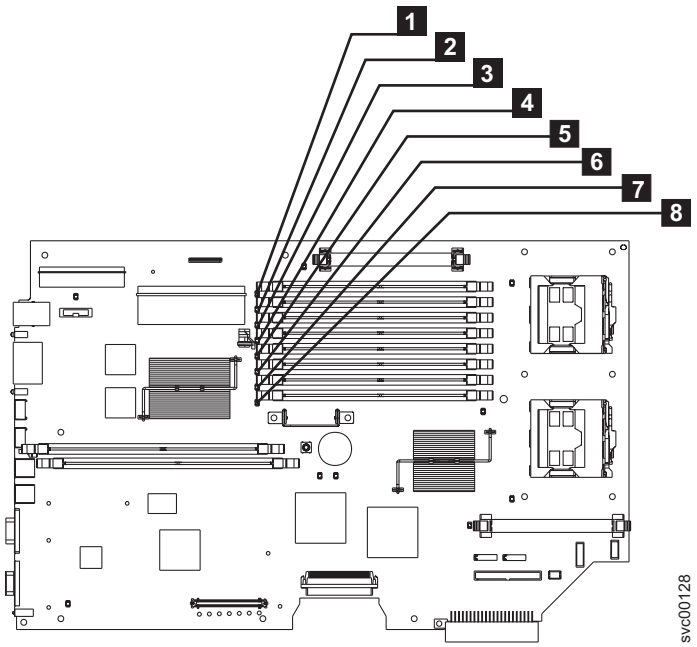


Figure 81. Locating the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 memory modules

- SAN Volume Controller 2145-4F2: When these memory modules are viewed from the front of the node, as shown in Figure 82, the modules are numbered **4** through **1**, from left to right. Modules **4** and **3** are in bank 2; modules **2** and **1** are in bank 1.

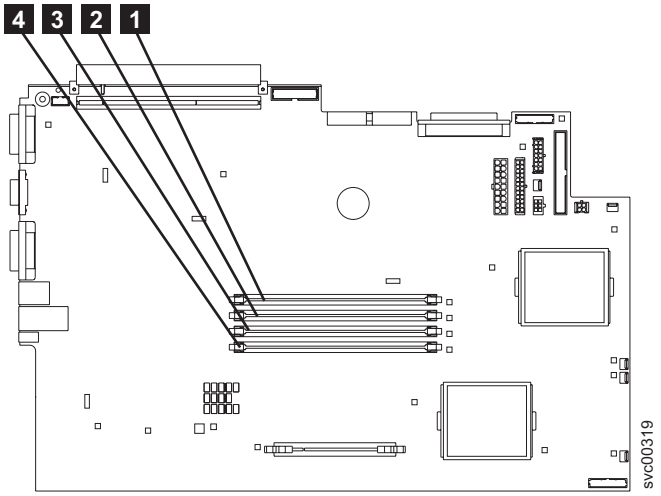


Figure 82. Locating the SAN Volume Controller 2145-4F2 memory modules

Removing memory modules

This topic describes how to remove the memory modules.

Perform the following steps to remove the memory modules:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.

2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
3. Remove the top cover. See “Removing the top cover” on page 67.

   Attention: If the fault has been isolated only to the bank of modules instead of to a particular module, exchange both modules of the bank. Otherwise, if you need to remove fewer memory modules, see “Locating the memory modules” on page 98. If more than one SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or SAN Volume Controller 2145-8F2 DIMM is indicated by the light path diagnostics, replace the DIMMs one-at-a-time, starting at the lowest numbered DIMM slot that is indicated by the diagnostics.
4. Open the clips **2** by pressing them outward, as shown in Figure 83. This action pulls the memory module **3** out of the connector.

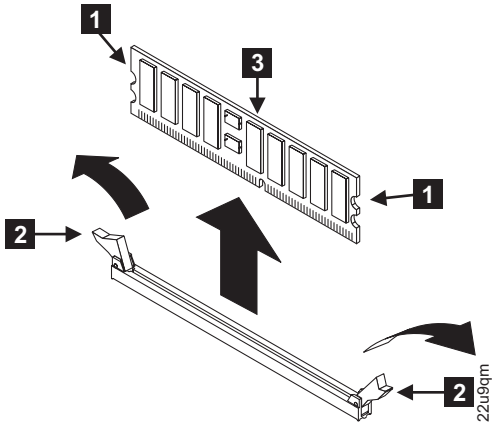


Figure 83. Removing the memory modules

1 Side connector latch

2 Memory clips

3 Memory module

5. If you have other tasks to complete inside the SAN Volume Controller, do those tasks now.

Replacing the memory modules (DIMM)

The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

There are two versions of the SAN Volume Controller 2145-8G4 node: Rev 1 and Rev 2. One difference between these two versions is in the memory configuration. The original version (Rev 1) has eight 1 GB memory modules, while the second version (Rev 2) has four 2 GB memory modules. The label on the Rev 1 node does not include a version number. An additional label on the front of the Rev 2 node includes the version number. Ensure that you have the correct memory modules for the node that you are servicing.

Perform the following steps to replace the memory modules:

Attention: To avoid breaking the retaining clips or damaging the memory module connectors, open and close the clips gently.

1. With the clips **2** open, lower the memory module **3** into the connector, as shown in Figure 84. Close the clips by pressing them inward.

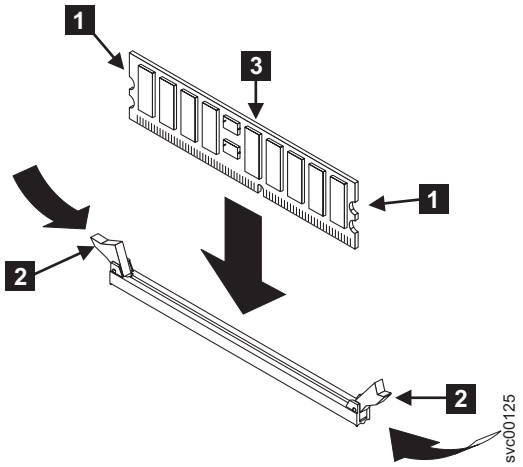


Figure 84. Replacing a memory module

2. Replace the top cover on the node.
3. Replace the node in the rack.
4. Restore all power to the node.

   If a node error between 511 and 515 displays on the SAN Volume Controller model 2145-8G4, 2145-8F4, 2145-8F2, or 2145-4F2 front panel, complete the following steps:

   a. Use the power button to turn off the node.
   b. Remove the power cable from the node.
   c. Wait 20 seconds and then replace the power cable.
   d. Turn on the node.
   e. If the error displays again, the memory bank might be disabled.
      - For the SAN Volume Controller 2145-8G4, 2145-8F4, or 2145-8F2 node, complete the following steps to enable a disabled memory bank:
        1) Use the power button to turn off the node.
        2) Attach the display and keyboard to the rear panel connectors. No special cables are required.
        3) Turn on the node and press F1 until you the setup menu displays.
        4) Go to the configuration menu, select **Memory**, and enable the disabled memory bank.
        5) Save the settings, exit the configuration program, and then restart the node.
      - For the SAN Volume Controller 2145-4F2 node, complete the following steps to enable a disabled memory bank:
        1) Order a CT2 cable (part number 00N7004). The cable is a 3-in-1 keyboard, display, and mouse cable that plugs into the C2T OUT port **2** on the rear of the node, as shown in Figure 85 on page 103.

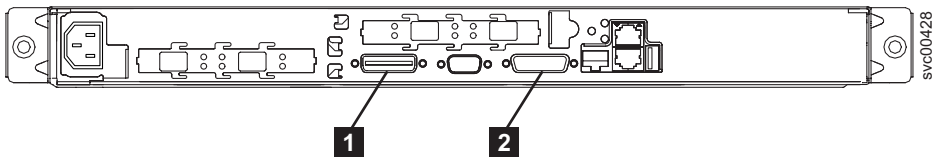


Figure 85. SAN Volume Controller 2145-4F2 CT2 IN and CT2 OUT ports

1 C2T IN

2 C2T OUT

2) Connect the C2T cable to the C2T OUT port with the display and keyboard attached.
3) Power on the node and press F1 on the keyboard during restart. This takes you into the server BIOS. A message displays that memory bank *x* is disabled.
4) Go to the configuration menu in BIOS, select **Memory**, and use the Tab key to toggle memory bank *x* from `disabled` to `enabled`.
5) Save the settings and restart the node.

f. If the error displays again, remove and replace the memory module again to ensure that it is seated correctly. If that does not resolve the error, the memory module connector might be the problem. Replace the system board on the SAN Volume Controller models 2145-8G4 and 2145-4F2 or the frame assembly on the SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2.

Related reference

"Handling static-sensitive devices" on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the disk drive

You might have to remove the disk drive for a service action.

Related tasks

“Replacing the disk drive” on page 107
You might have to replace the disk drive for a service action.

“Removing the service controller” on page 77
You can remove the service controller from the SAN Volume Controller.

“Removing and replacing the SAN Volume Controller power cable assembly” on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Related reference

“Replacing a disk drive and a service controller on the SAN Volume Controller” on page 95
When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the “new” service controller does not contain the operating system software required to do so.

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SATA disk drive for the SAN Volume Controller 2145-8A4 and the SAN Volume Controller 2145-8G4

This topic describes how to remove the SATA disk drive for the SAN Volume Controller 2145-8A4 and the SAN Volume Controller 2145-8G4.

You can remove the disk drive after you shut down the node.

To remove the SAN Volume Controller 2145-8A4 or the SAN Volume Controller 2145-8G4 disk drive, perform the following steps:

1. Make sure that the cover is in place and fully closed.

   Attention: To avoid damage to the hard disk drive connectors, make sure that the cover is in place and fully closed whenever you install or remove a hard disk drive.
2. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
3. Remove the cable retention bracket and disconnect the power cable from the node. See “Removing the cable retention bracket” on page 24.
4. Remove the service controller. See “Removing the service controller” on page 77.
5. Pull the loops of the drive tray (shown in Figure 86 on page 105) toward each other and pull the tray out of the bay.

Figure 86. SAN Volume Controller 2145-8A4 SATA disk drive

Removing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 SATA disk drive

You can remove the disk drive after you shut down the node.

To remove the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 disk drive, perform the following steps:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the SAN Volume Controller 2145-8F4 cable retention bracket.
3. Disconnect all power cords and external cables from the back of the node.
4. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
5. Open fan door A (**1** in Figure 87 on page 106).
6. Remove the service controller. See “Removing the service controller” on page 77.
7. Pull the disk drive out of the bay.

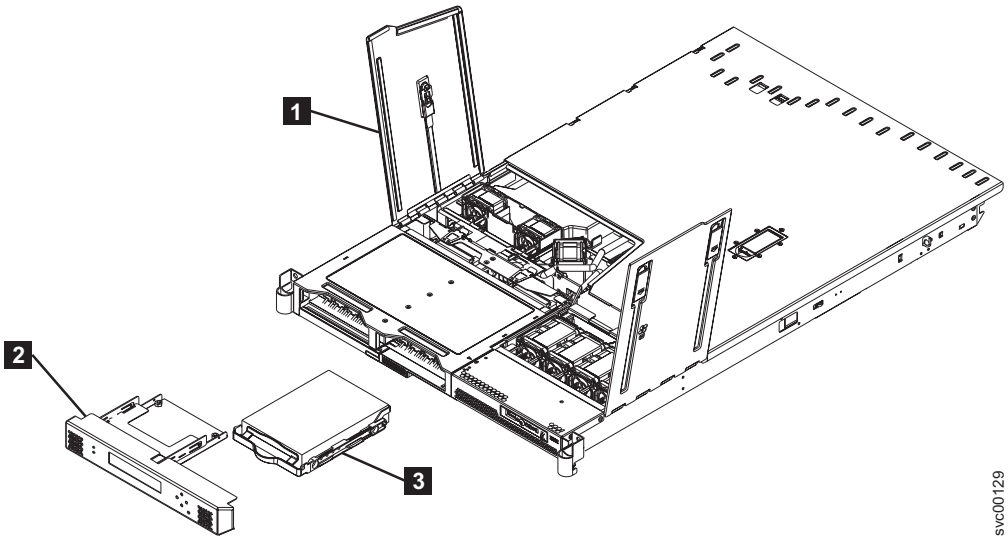


Figure 87. Removing the SATA disk drive

1 Fan door A

2 Service controller

3 SATA disk drive

You can now replace the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 disk drive.

Removing the SAN Volume Controller 2145-4F2 disk drive

Attention:

- Handle the disk drive with care and keep it away from strong magnetic fields.
- The disk drive is electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

To remove the disk drive and cables, perform the following steps:

1. Verify that all operations between the node and the host system have been stopped.
2. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
3. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
4. Remove the top cover. See “Removing the top cover” on page 67.
5. Disconnect the SCSI signal connector 1 and the power connector 2 from the back of the disk drive.

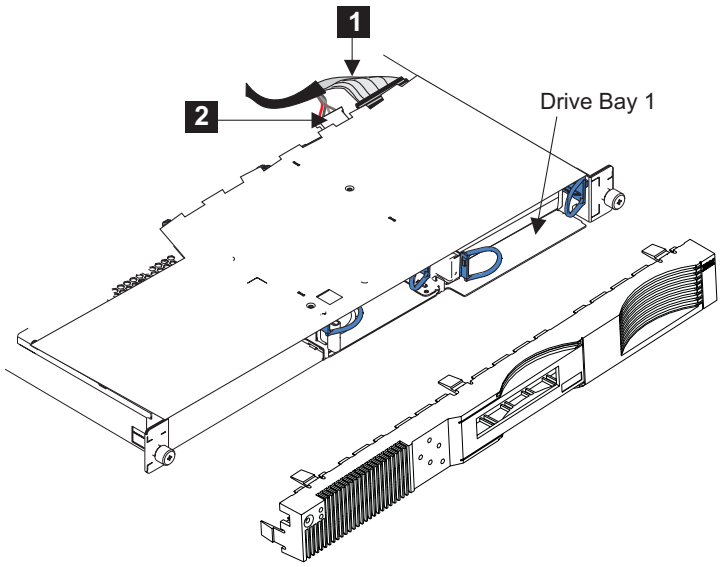


Figure 88. SAN Volume Controller 2145-4F2 disk drive and front panel

6. Remove the front panel.
7. Remove the service controller. See “Removing the service controller” on page 77.
8. Pull the two handles to release the latches, and pull the disk drive forward and out of the node.
9. If you are exchanging the disk drive for another, locate the rails and screws that are shipped with the new disk drive. Attach the rails to the disk drive, as shown in Figure 89.

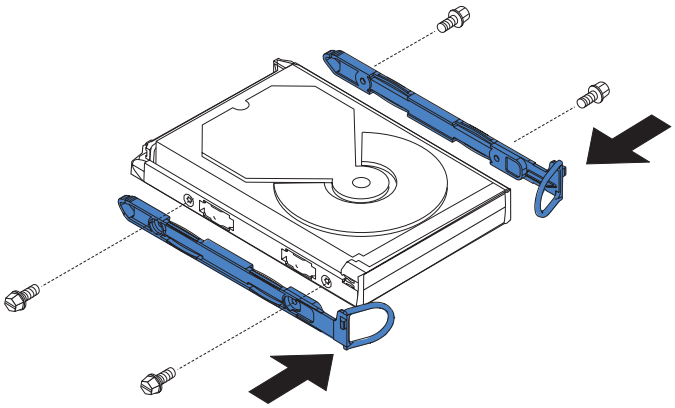


Figure 89. Attaching the rails to the SAN Volume Controller 2145-4F2 disk drive

10. Keep the disk drive that you removed if it has any jumpers installed, because you will need to set the same jumpers on the replacement disk drive.

    If you have any tasks that you need to perform while the service controller is removed, do them now.

You can now replace the SAN Volume Controller 2145-4F2 disk drive.

Replacing the disk drive

You might have to replace the disk drive for a service action.

Related tasks

"Removing the disk drive" on page 103
You might have to remove the disk drive for a service action.

"Replacing the top cover" on page 71
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Replacing the service controller" on page 85
You can replace the SAN Volume Controller service controller.

"Replacing the SAN Volume Controller in a rack" on page 43
You must use caution when you replace the SAN Volume Controller in a rack.

"Replacing the disk cable assembly" on page 117
You might have to replace the disk cable assembly for a SAN Volume Controller 2145-8A4 or SAN Volume Controller 2145-8G4 service action.

Replacing the SAN Volume Controller 2145-8A4 and the SAN Volume Controller 2145-8G4 SATA disk drive

This topic describes how to replace the SATA disk drive for the SAN Volume Controller 2145-8A4 and the SAN Volume Controller 2145-8G4 nodes.

You can replace the SATA (serial advanced technology attachment) disk drive after you remove the existing disk drive.

To replace the SAN Volume Controller 2145-8A4 and the SAN Volume Controller 2145-8G4 disk drive, perform the following steps:

1. Make sure that the node cover is in place and fully closed.

   Attention: To avoid damage to the hard disk drive connectors, make sure that the node cover is in place and fully closed whenever you remove or replace a hard disk drive.
2. Find the rails assembly and screws that are shipped with the new disk drive. Attach the rails assembly to the disk drive with four screws, as shown in Figure 90 on page 109, using two on each side of the disk.

Figure 90. Attaching the rails assembly to the SATA disk drive for the SAN Volume Controller 2145-8A4 and the SAN Volume Controller 2145-8G4

3. Pull the loops of the rails toward each other and slide the drive into the node until the drive connects to the backplate.
4. Release the loops of the drive tray.
5. Install the service controller. See “Replacing the service controller” on page 85.
6. Reconnect the power cords and all external signal cables.
7. Turn on the node. When you turn on the node, use the node rescue procedure to install the SAN Volume Controller software on the new disk. Then add the node back into the cluster. See ″Performing the node rescue″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

   Note: If you must replace the hard disk and the service controller at the same time, you cannot start the node to perform node rescue. See “Replacing a disk drive and a service controller on the SAN Volume Controller” on page 95.

Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 SATA disk drive

This topic describes how to replace the SATA (serial advanced technology attachment) disk drive for the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-8F4 nodes.

The SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 SATA disk drive can be replaced after you remove the existing disk drive.

To replace the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 disk drive, perform the following steps:

1. Slide the disk drive into the bay until the rear of the drive snaps into place with the rear panel-mount connector.
2. Install the service controller. See “Replacing the service controller” on page 85.
3. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.

4. Reconnect the power cords and all external signal cables.
5. Turn on the node. When you turn on the node, use the node rescue procedure to install the SAN Volume Controller software on the new disk. Then add the node back into the cluster. See ″Performing the node rescue″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

   Note: If you must replace the hard disk and the service controller at the same time, you cannot start the node to perform node rescue. See “Replacing a disk drive and a service controller on the SAN Volume Controller” on page 95.

Replacing the SAN Volume Controller 2145-4F2 disk drive

This topic describes how to replace the disk drive for the SAN Volume Controller 2145-4F2 node.

Attention:

- Handle the disk drive with care and keep it away from strong magnetic fields.
- The disk drive is electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

To replace the disk drive and cables, perform the following steps:

1. Check whether the old disk drive has any jumpers installed. If it does, install matching jumpers onto the new disk drive. Figure 91 on page 111 shows the location of the jumpers.

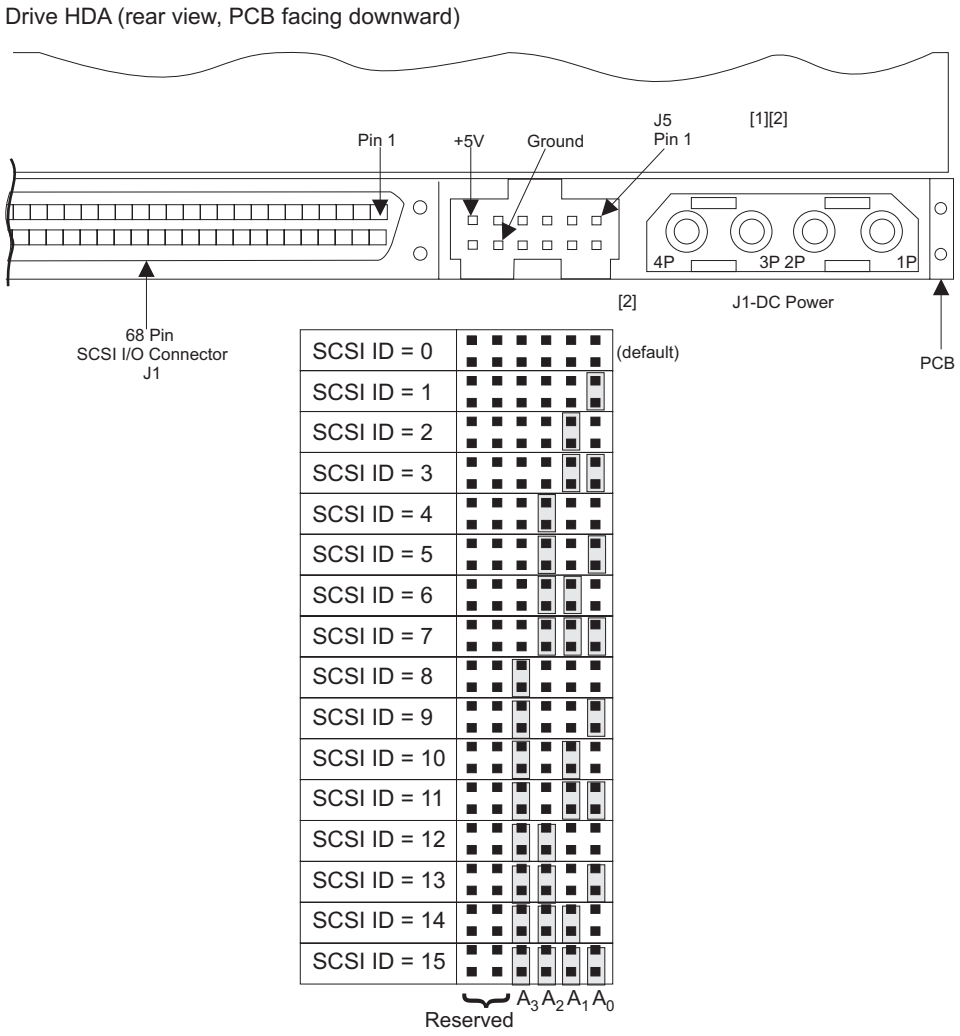


Figure 91. SAN Volume Controller 2145-4F2 disk drive jumpers

2. Find the rails and screws that are shipped with the new disk drive and attach the rails to the disk drive, as shown in Figure 92.

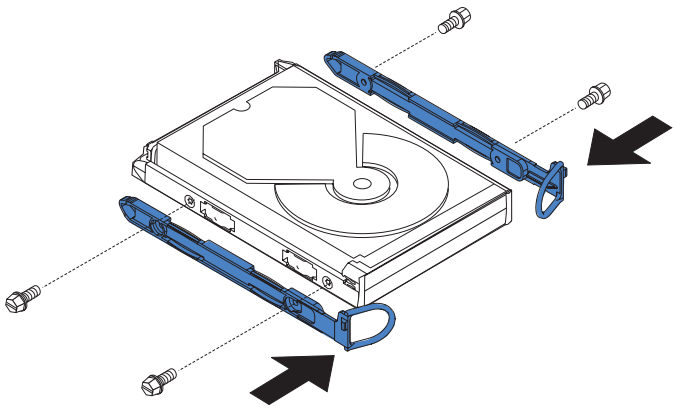


Figure 92. Attaching the rails to the SAN Volume Controller 2145-4F2 disk drive

3. Push the disk drive forward and into the SAN Volume Controller 2145-4F2.

Note: When you install the disk drive, push it into the SAN Volume Controller 2145-4F2 until the latches click into place.

4. Restore the front panel.
5. Connect the SCSI signal connector **1** and the power connector **2**, which are shown in Figure 93, to the back of the disk drive.

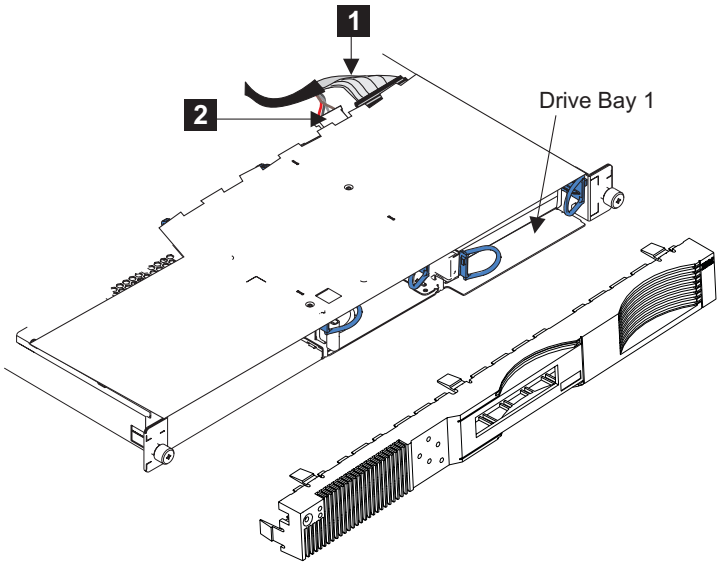


Figure 93. SAN Volume Controller 2145-4F2 disk drive and front panel

6. Replace the top cover. See “Replacing the top cover” on page 71.
7. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
8. Reconnect the power cords and all external signal cables.
9. Turn on the node. When you turn on the node, use the node rescue procedure to install the SAN Volume Controller software on the new disk. Then add the node back into the cluster. See ″Performing the node rescue″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

   Note: If you must replace the hard disk and the service controller at the same time, you cannot start the node to perform node rescue. See “Replacing a disk drive and a service controller on the SAN Volume Controller” on page 95.

Removing the disk cable assembly

You might have to remove the disk cable assembly, which includes the simple-swap SATA back plate, for a SAN Volume Controller 2145-8A4 or SAN Volume Controller 2145-8G4 service action.

Related tasks

"Replacing the disk cable assembly" on page 117
You might have to replace the disk cable assembly for a SAN Volume Controller 2145-8A4 or SAN Volume Controller 2145-8G4 service action.

"Removing the SAN Volume Controller from a rack" on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the service controller" on page 77
You can remove the service controller from the SAN Volume Controller.

Removing the SAN Volume Controller 2145-8A4 disk cable assembly

Use the following information to remove the SAN Volume Controller 2145-8A4 disk cable assembly.

To remove the SAN Volume Controller 2145-8A4 disk cable assembly, including the SATA back plate, complete the following steps.

1. Read the safety precautions in "Safety and environmental notices" on page ix.
2. Turn off the node. See "MAP 5350" in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
3. Remove the cable retention bracket and disconnect the power cable from the node. See "Removing the cable retention bracket" on page 24.
4. Remove the node from the rack and place it on a flat, static-protective surface. See "Removing the SAN Volume Controller from a rack" on page 33.
5. Remove the service controller. See "Removing the service controller" on page 77.
6. Pull the hard disk drive out of the node slightly to disengage it from the back plate.
7. Remove the top cover. See "Removing the top cover" on page 67.
8. Notice where the two SATA cables that are connected to the back plate are connected to the system board, as shown in Figure 94 on page 114. Then disconnect the two SATA cables from the system board.

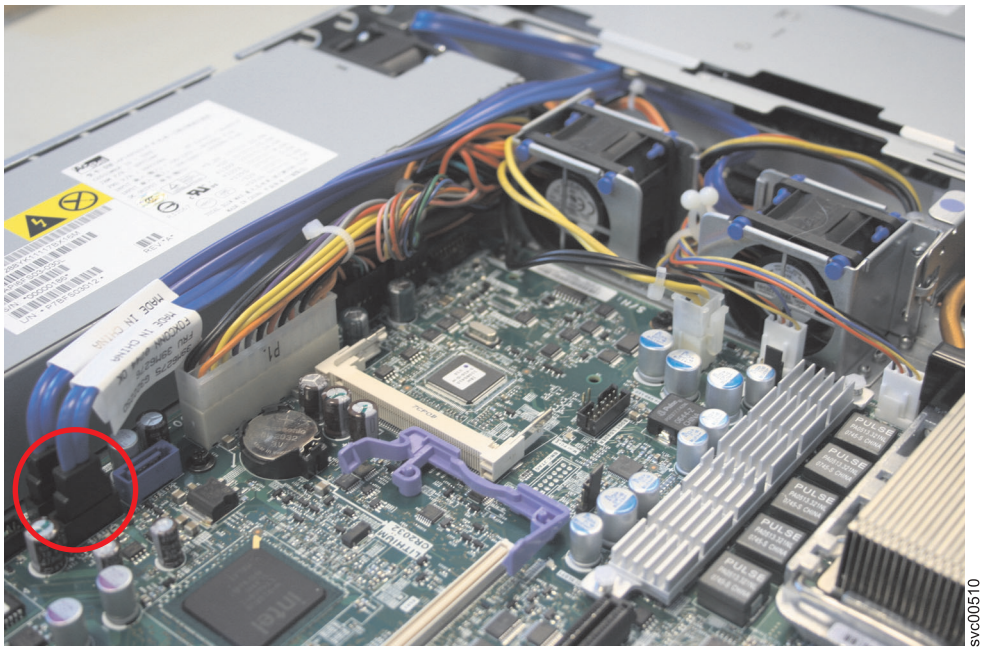


Figure 94. SAN Volume Controller 2145-8A4 SATA cable connectors

9. Rotate (lift) the air deflector **1** out of the way, as shown in Figure 95.

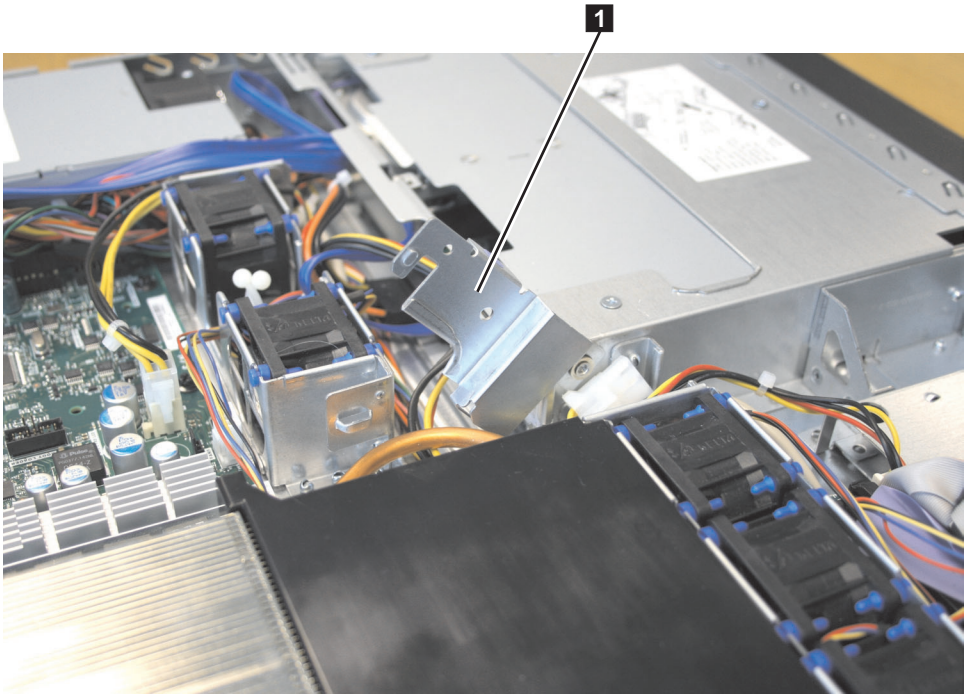


Figure 95. Air deflector for the SAN Volume Controller 2145-8A4 power supply

10. Slightly lift the back plate out of the node. Disconnect power cable connectors P2 **1** and P3 **2**, shown in Figure 96 on page 115, and remove the back plate.

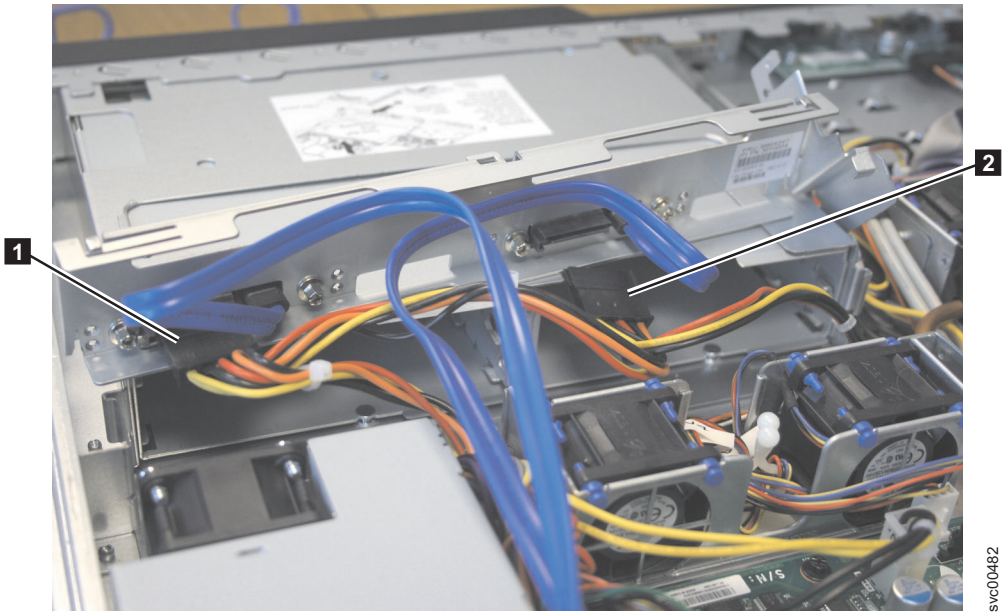


Figure 96. SAN Volume Controller 2145-8A4 power supply connectors

Removing the SAN Volume Controller 2145-8G4 disk cable assembly

Use the following information to remove the SAN Volume Controller 2145-8G4 disk cable assembly.

To remove the SAN Volume Controller 2145-8G4 disk cable assembly, including the SATA back plate, complete the following steps:

1. Read the safety precautions in “Safety and environmental notices” on page ix.
2. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
3. Remove the cable retention bracket and disconnect the power cable from the node. See “Removing the cable retention bracket” on page 24.
4. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
5. Remove the service controller. See “Removing the service controller” on page 77.
6. Pull the hard disk drive out of the node slightly to disengage it from the back plate.
7. Remove the top cover. See “Removing the top cover” on page 67.
8. Disconnect the two blue signal cables from the system board, shown in Figure 97 on page 116, and disconnect the power cable from the power supply backplane card.

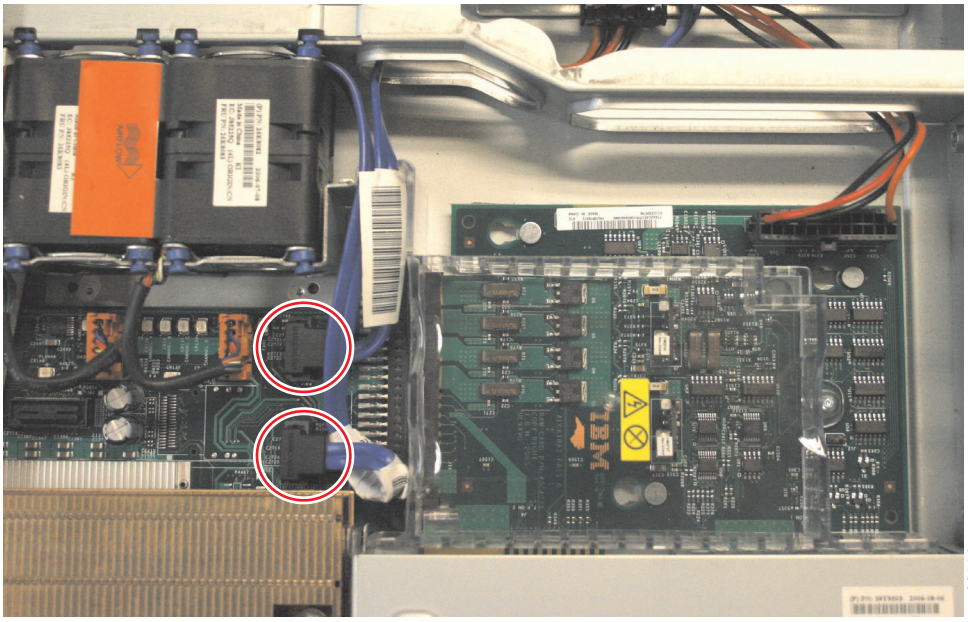


Figure 97. The SAN Volume Controller 2145-8G4 disk cable assembly connectors

9. Press the locking tab **1** , which is shown in Figure 98, and lift the back plate out of the node slightly. Disconnect the power cable and remove the back plate.

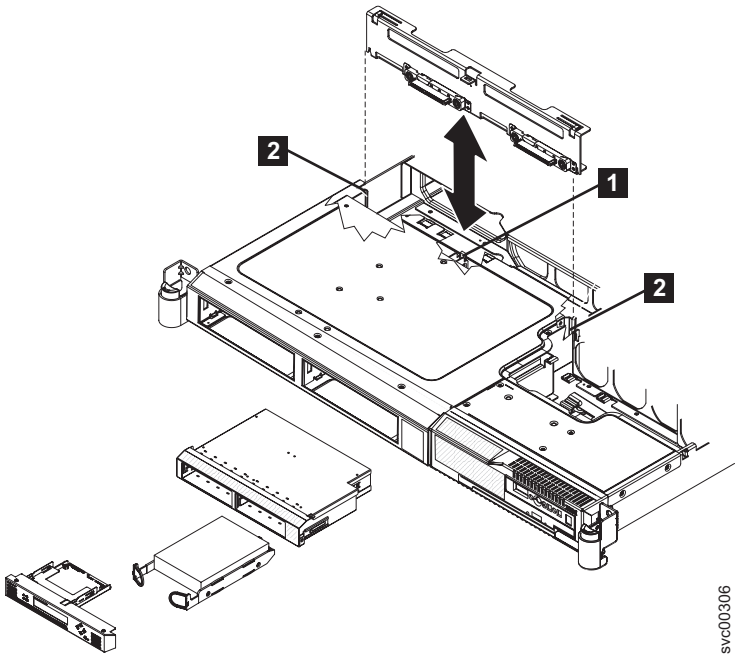


Figure 98. The SAN Volume Controller 2145-8G4 SATA disk drive and back plate

1 Locking tab

2 Mounting channel

Replacing the disk cable assembly

You might have to replace the disk cable assembly for a SAN Volume Controller 2145-8A4 or SAN Volume Controller 2145-8G4 service action.

Related tasks

"Removing the disk cable assembly" on page 112
You might have to remove the disk cable assembly, which includes the simple-swap SATA back plate, for a SAN Volume Controller 2145-8A4 or SAN Volume Controller 2145-8G4 service action.

"Replacing the SAN Volume Controller in a rack" on page 43
You must use caution when you replace the SAN Volume Controller in a rack.

"Replacing the service controller" on page 85
You can replace the SAN Volume Controller service controller.

Replacing the SAN Volume Controller 2145-8A4 disk cable assembly

To replace the SAN Volume Controller 2145-8A4 disk cable assembly, including the SATA back plate, complete the following steps.

1. Make sure that the air deflector **1**, which is shown in Figure 99, is in the open position.

   Note: The air deflector also functions as the back plate latch. In this procedure, you must lift the air deflector to access some of the cables.

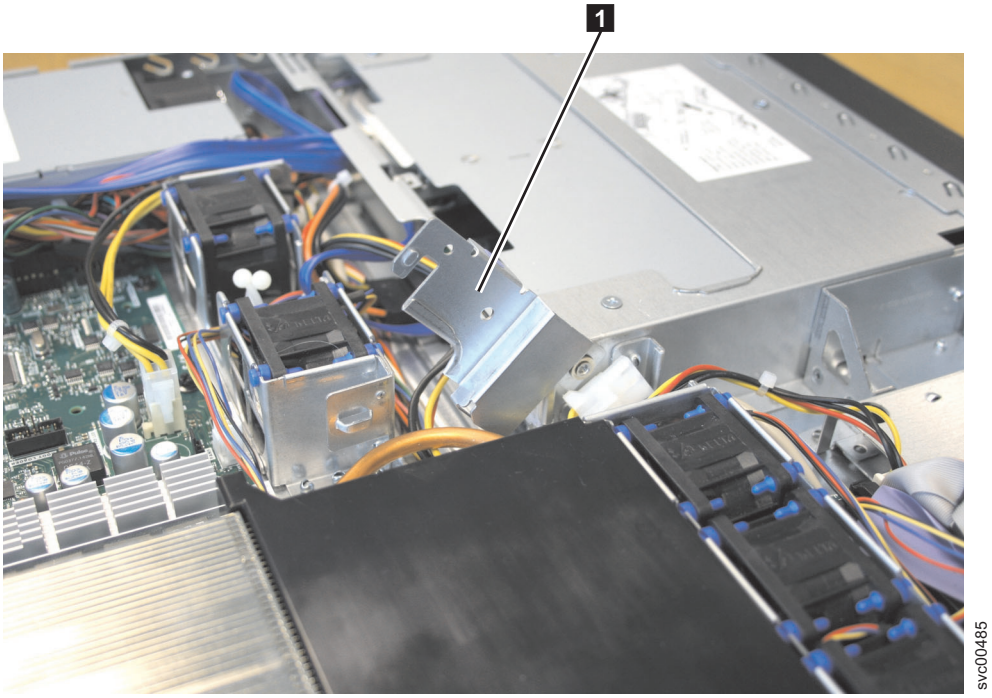


Figure 99. Air deflector for the SAN Volume Controller 2145-8A4 power supply

2. Connect power cable connectors P2 **1** and P3 **2** to the replacement back plate, as shown in Figure 100 on page 118.

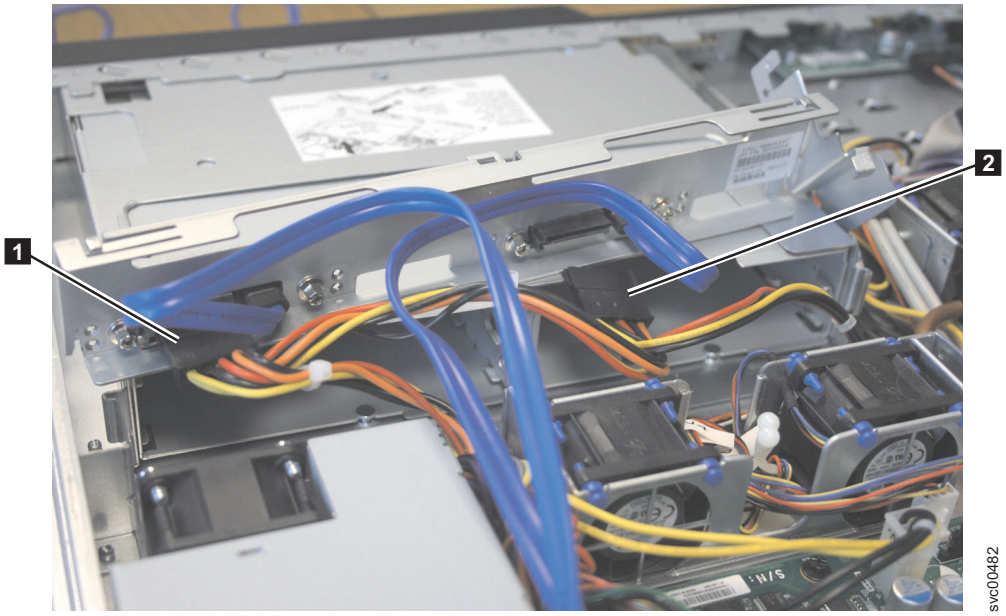


Figure 100. SAN Volume Controller 2145-8A4 power supply connectors

3. Slide the back plate into the card guides, making sure not to trap or pinch any nearby wires or cables.
4. Press firmly until the back plate is fully seated.
5. Rotate the air deflector (**1** in Figure 99 on page 117) into place, making sure not to pinch any cables beneath it, and press it down firmly.
6. Reconnect the SATA cables to the system board. When you look from the front, SATA 0 is the drive number for the left bay and SATA 2 is the drive number for the right bay.

   Note: Make sure that the cable drive number matches the connector number on the system board. The cables will cross over each other, as shown in Figure 101 on page 119.

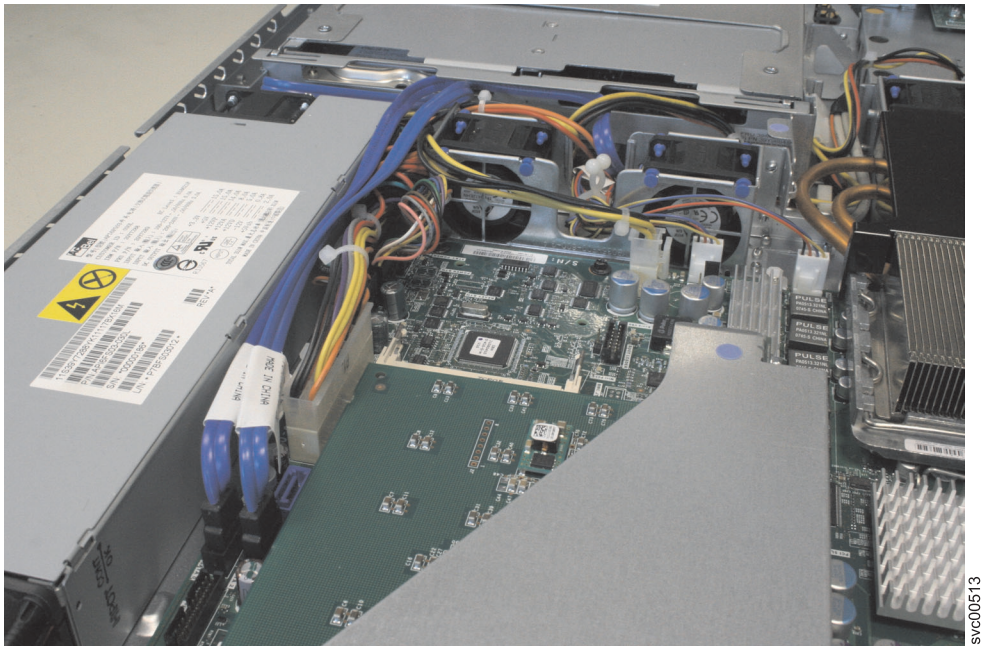


Figure 101. SAN Volume Controller 2145-8A4 SATA cables

7. Install the hard disk drive. See “Replacing the disk drive” on page 107.
8. Install the service controller. See “Replacing the service controller” on page 85.
9. Replace the top cover. See “Replacing the top cover” on page 71.
10. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
11. Reconnect the external cables and then reconnect the power cable that was removed from the node. Ensure that you replace the fibre-channel cables in the same ports from which they were removed.
12. Turn on the node.

Replacing the SAN Volume Controller 2145-8G4 disk cable assembly

To replace the SAN Volume Controller 2145-8G4 disk cable assembly, including the SATA back plate, complete the following steps.

1. Connect the power cable to the replacement back plate.
2. Slide the back plate into the mounting channels **2**, which are shown in Figure 102 on page 120, making sure not to trap or pinch any nearby wires or cables.

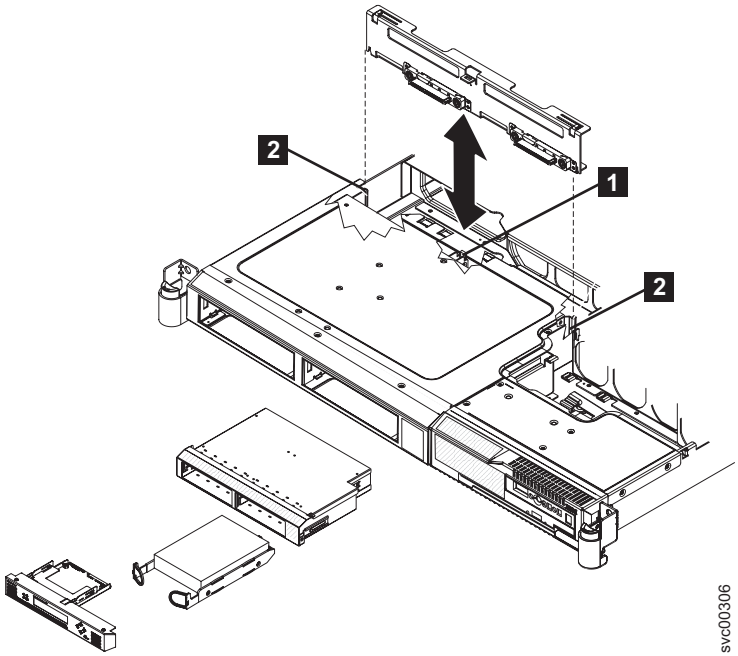


Figure 102. The SAN Volume Controller 2145-8G4 SATA disk drive and back plate

3. Press firmly until the back plate is fully seated and the locking tab **1** snaps into place.
4. Reconnect the power cable to the power supply backplane card. Then reconnect the two blue signal cables to the system board. The left cable goes to the front system board connector and the right cable goes to the rear system board connector, as shown in Figure 103.

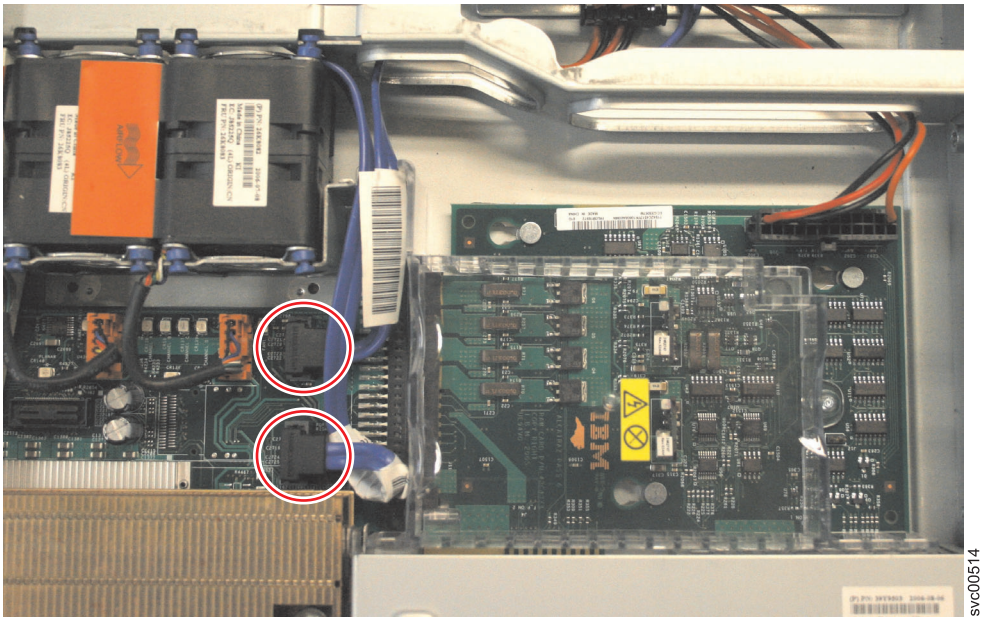


Figure 103. The SAN Volume Controller 2145-8G4 disk cable assembly connectors

5. Install the hard disk drive. See “Replacing the disk drive” on page 107.
6. Install the service controller. See “Replacing the service controller” on page 85.

7. Replace the top cover. See “Replacing the top cover” on page 71.
8. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
9. Reconnect the external cables and then reconnect the power cable that was removed from the node. Ensure that you replace the fibre-channel cables in the same ports from which they were removed.
10. Turn on the node.

Removing the SAN Volume Controller 2145-4F2 disk drive cables

The disk drive cables must be removed if they become defective or if you want to replace them.

Perform the following steps to remove the disk drive cables from the SAN Volume Controller 2145-4F2 node:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
3. Remove the top cover. See “Removing the top cover” on page 67.
4. Disconnect the SCSI signal connector **1** and the power connector **2** from the back of the disk drive, as shown in Figure 104, and then remove the cable.

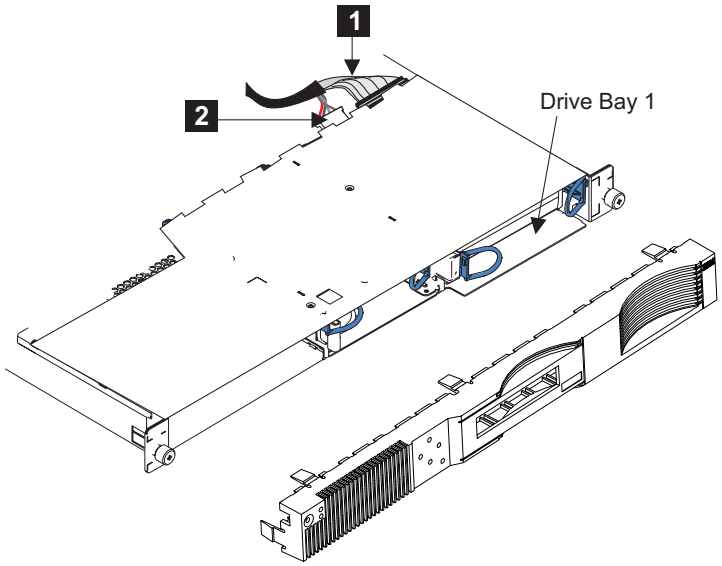


Figure 104. SAN Volume Controller 2145-4F2 disk drive and front panel

If you have any other tasks to do inside the node, do those tasks now.

Related tasks

"Removing and replacing the SAN Volume Controller power cable assembly" on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the SAN Volume Controller from a rack" on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

Replacing the SAN Volume Controller 2145-4F2 disk drive cables

The disk drive cables must be replaced if they are removed.

Perform the following steps to replace the SAN Volume Controller 2145-4F2 disk drive cables:

1. Connect the SCSI signal connector **1** and the power connector **2** to the back of the disk drive, as shown in Figure 105, and then replace the cable.

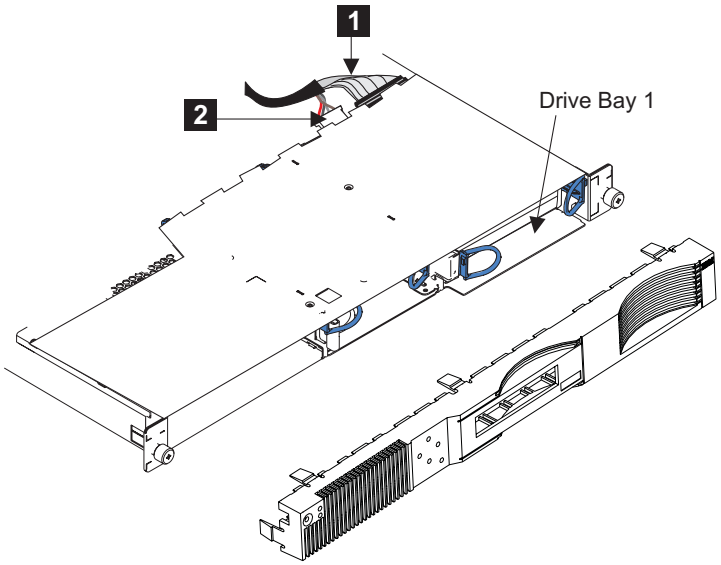


Figure 105. SAN Volume Controller 2145-4F2 disk drive and front panel

2. Replace the top cover on the SAN Volume Controller 2145-4F2 node.
3. Place the SAN Volume Controller 2145-4F2 node in the rack.
4. Return power to the SAN Volume Controller 2145-4F2 node.

Replacing the SAN Volume Controller 2145-4F2 disk drive fan

The disk drive fan must be removed if it is defective or if it needs to be replaced.

Perform the following steps to replace the disk drive fan:

1. Remove all power from the SAN Volume Controller 2145-4F2.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-4F2.

4. Unplug the power cables connected to the system board.
5. Remove the entire fan assembly **1** , as shown in Figure 106, by sliding the right-hand side of the disk drive fan forward. Then, pull the assembly away from the clip.

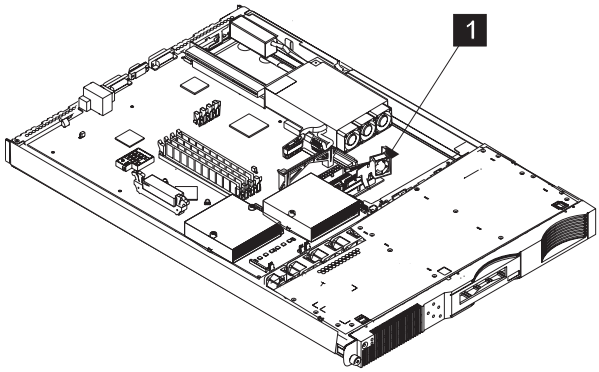


Figure 106. Removing a SAN Volume Controller 2145-4F2 disk drive fan

6. Remove the fan from the bracket by pulling the sides of the bracket apart.
7. Insert the new fan into the bracket by pulling the sides of the bracket apart.
8. If you have any other tasks that you need to perform while the fan is removed, do those tasks now. Otherwise, reinstall the parts in the reverse sequence.

Note:

- The airflow is from the front to the back of the SAN Volume Controller 2145-4F2.
- The fan cable comes out of the back of the fan. When you install a fan, ensure that the back of the fan is facing the back of the SAN Volume Controller 2145-4F2.

Related tasks

"Removing and replacing the SAN Volume Controller power cable assembly" on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the SAN Volume Controller from a rack" on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

Removing the CMOS battery

You must remove the system board complementary metal-oxide semiconductor (CMOS), or system-board, battery to replace it or to perform routine maintenance.

This product was designed with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to all safety instructions.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

Related tasks

"Removing the top cover" on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the SAN Volume Controller from a rack" on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

Related reference

"Handling static-sensitive devices" on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8A4 CMOS battery

This topic describes how to remove the SAN Volume Controller 2145-8A4 CMOS battery.

CAUTION:
The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

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

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

To remove the CMOS battery, perform the following steps:

1. Read the safety precautions in "Safety and environmental notices" on page ix.
2. Turn off the node. See "MAP 5350" in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
3. Remove the node from the rack and place it on a flat, static-protective surface. See "Removing the SAN Volume Controller from a rack" on page 33.
4. Remove the top cover. See "Removing the top cover" on page 67.
5. Lift the riser-card assembly out of the way. You do not need to separate the riser-card assembly and the fibre-channel adapter. See "Removing the PCI express riser card assembly" on page 165.
6. Locate the battery on the system board.
7. Remove the CMOS battery, as shown in Figure 107 on page 125:

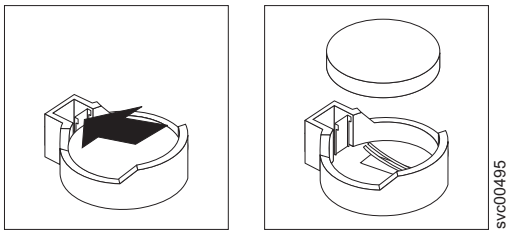


Figure 107. Removing the SAN Volume Controller 2145-8A4 CMOS battery

a. Use a fingernail to press the top of the battery clip away from the battery. The battery pops up when released.
b. Use your thumb and index finger to lift the battery from the socket.

Removing the SAN Volume Controller 2145-8G4 CMOS battery

This topic describes how to remove the SAN Volume Controller 2145-8G4 CMOS battery.

To remove the CMOS battery, perform the following steps:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the cable retention bracket and disconnect the power cable from the node. See “Removing the cable retention bracket” on page 24.
3. Remove the top cover. See “Removing the top cover” on page 67.
4. Locate the battery **1** on the system board. Figure 108 shows the location of the battery.

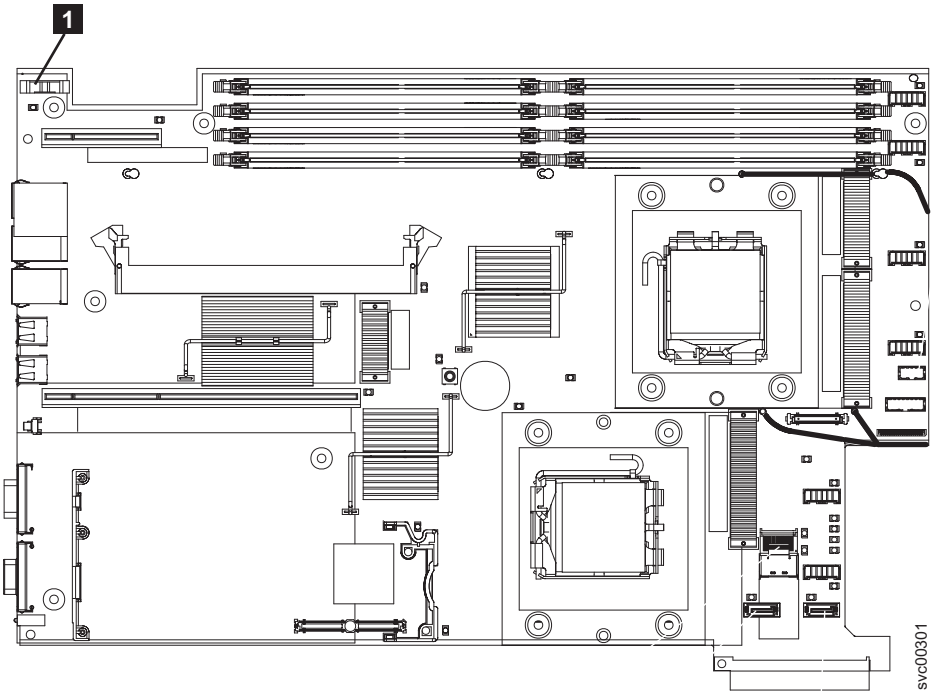


Figure 108. Location of the SAN Volume Controller 2145-8G4 CMOS battery holder

5. Remove the CMOS battery, as shown in Figure 109:

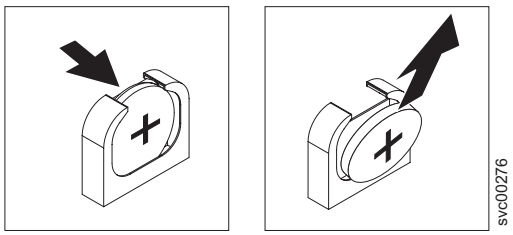


Figure 109. SAN Volume Controller 2145-8G4 CMOS battery holder

   a. Use a fingernail to press the top of the battery clip away from the battery. The battery pops up when released.
   b. Use your thumb and index finger to lift the battery from the socket.

CAUTION:
The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

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

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 CMOS battery

This topic describes how to remove the SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 CMOS battery.

The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to all safety instructions.

CAUTION:
The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

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

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

To remove the CMOS battery, perform the following steps:

1. Follow any special handling and installation instructions supplied with the battery.

2. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
3. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
4. Remove the top cover. See “Removing the top cover” on page 67.
5. Locate the battery **1** on the system board. Figure 110 shows the location of the battery.

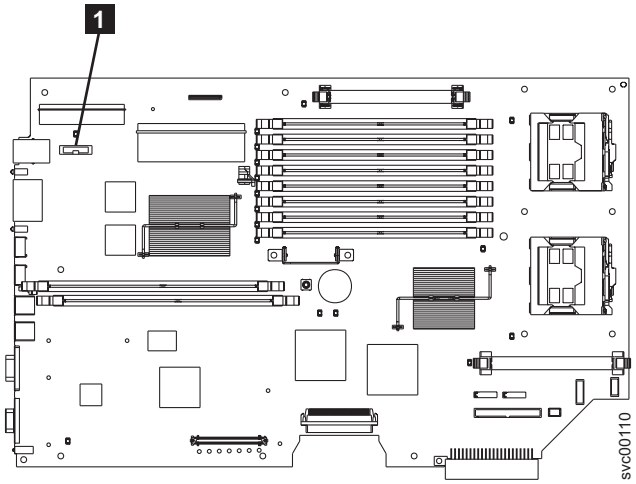


Figure 110. Location of the CMOS battery on the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4

6. Remove the battery:
   a. Use one finger to pull the retainer tab, which is shown in Figure 111, that secures the battery to its housing.

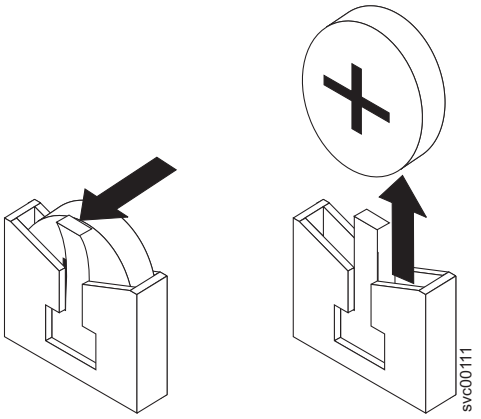


Figure 111. SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4 CMOS battery holder

   b. Use one finger to slide the battery up and out from its socket.

Removing the SAN Volume Controller 2145-4F2 system-board CMOS battery

This topic describes how to remove the SAN Volume Controller 2145-4F2 CMOS battery.

CAUTION:
The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

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

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

To remove the system-board CMOS battery, perform the following steps:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
3. Remove the top cover. See “Removing the top cover” on page 67.
4. Use a finger to lift the battery clip above the battery, which is shown in Figure 112.

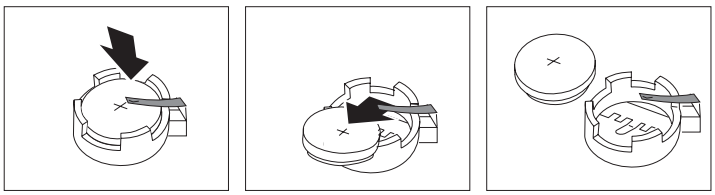


Figure 112. Removing the SAN Volume Controller 2145-4F2 system-board CMOS battery

5. Use one finger to slightly slide the battery out from its socket. The spring mechanism pushes the battery out toward you as you slide it from the socket.
6. Use your thumb and index finger to pull the battery out from under the battery clip.
7. Ensure that the battery clip is touching the base of the battery socket by pressing gently on the clip.

Replacing the CMOS battery

You must replace the system board complementary metal-oxide semiconductor (CMOS) battery after you perform routine maintenance.

The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to all safety instructions.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

Related tasks

"Replacing the top cover" on page 71
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Replacing the SAN Volume Controller in a rack" on page 43
You must use caution when you replace the SAN Volume Controller in a rack.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Related reference

"Handling static-sensitive devices" on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8A4 system-board CMOS battery

This topic describes how to replace the system-board SAN Volume Controller 2145-8A4 CMOS battery.

Consider the following notice when you replace the battery in the node:

CAUTION:
The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

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

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

To replace the SAN Volume Controller 2145-8A4 system-board CMOS battery, perform the following steps:

1. Follow any special handling and installation instructions that come with the replacement battery.
2. Insert the new battery:
   a. Orient the battery so that the positive side faces up.
   b. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
   c. Press the battery down into the socket, as shown in Figure 113 on page 130, until it clicks into place. Make sure that the battery clip holds the battery securely.

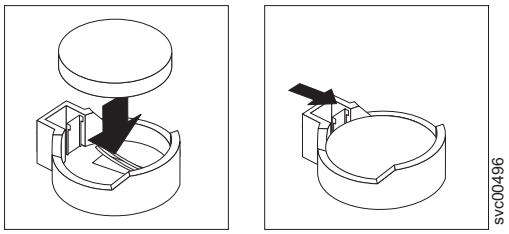


Figure 113. Installing the SAN Volume Controller 2145-8A4 CMOS battery

3. Replace the riser-card assembly and ensure that it is fully seated in the connectors on the system board. See “Replacing the PCI express riser card assembly” on page 166.
4. Replace the top cover. See “Replacing the top cover” on page 71.
5. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
6. Reconnect the external cables, and then reconnect the power cords and the node.

   Note: You must wait approximately 20 seconds after you connect power to the node before the power-control button becomes active.
7. Turn on the node.
8. If there is a problem restarting the node, see “MAP 5900” and then connect a monitor and keyboard to the system and reset the system date and time.

Replacing the SAN Volume Controller 2145-8G4 system-board CMOS battery

This topic describes how to replace the system-board SAN Volume Controller 2145-8G4 CMOS battery.

If you are exchanging the battery for a new one, use only IBM Part Number 33F8354 or a similar type of battery that the manufacturer recommends.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

CAUTION:
The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

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

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

Perform the following steps to replace the SAN Volume Controller 2145-8G4 system-board CMOS battery:

1. Follow any special handling and installation instructions that come with the replacement battery.
2. Locate the battery on the system board. Figure 114 shows the location (**1**) of the battery.

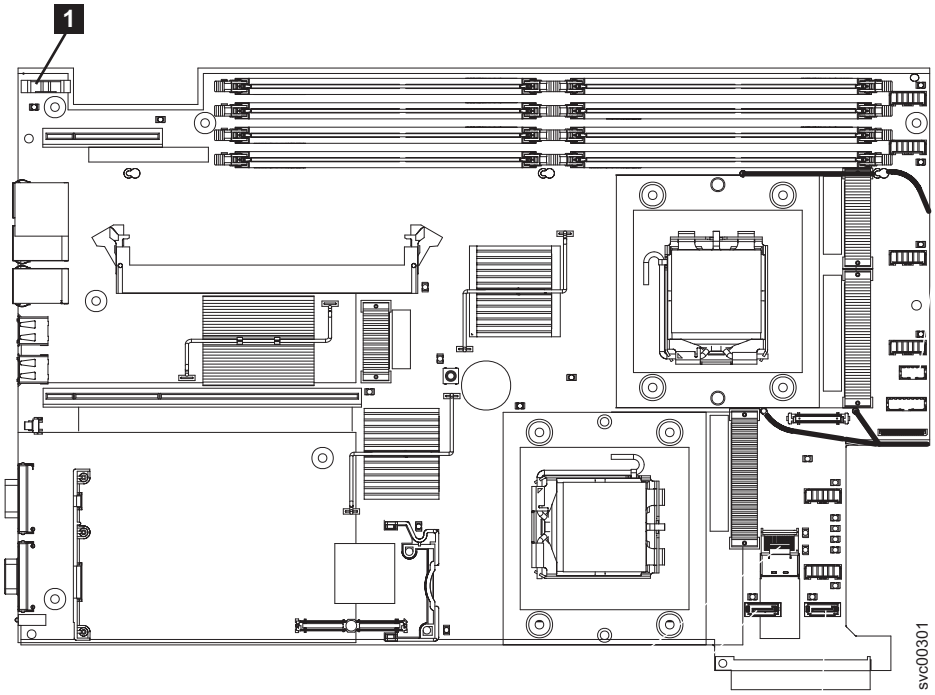


Figure 114. Location of the SAN Volume Controller 2145-8G4 CMOS battery holder

3. Insert the new battery:
   a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
   b. Press the battery down into the socket until it clicks into place. Make sure that the battery clip holds the battery securely, as shown in Figure 115.

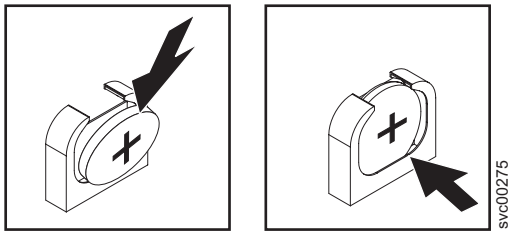


Figure 115. SAN Volume Controller 2145-8G4 CMOS battery holder

4. Replace the top cover. See “Replacing the top cover” on page 71.
5. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
6. Reconnect the external cables, and then reconnect the power cords and the node.

7. If there is a problem restarting the node, see MAP 5900 and then connect a monitor and keyboard to the system and reset the BIOS date and time.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 CMOS battery

This product was designed with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to all safety instructions.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

CAUTION:
Only trained service personnel may replace this battery. The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

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

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C002)

Perform the following steps to replace the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 CMOS battery:

1. Insert the new battery in the battery socket. Figure 116 shows the location (**1** of the battery socket.

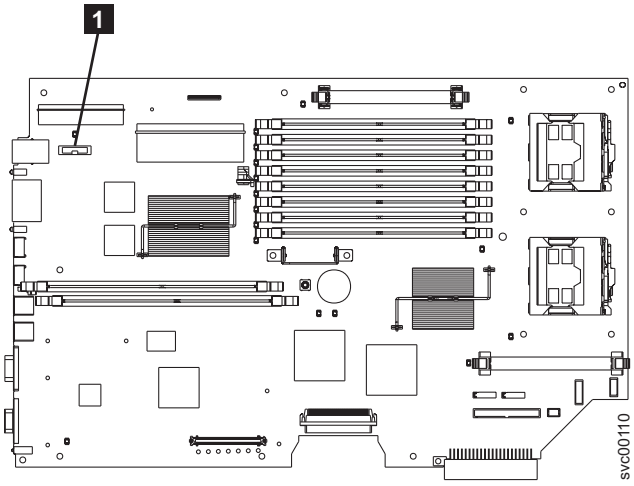


Figure 116. Location of the CMOS battery on the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4

   a. Hold the battery so that the positive (+) side of the battery is facing toward the center of the server.

b. Pull the retainer tab out of the way so that you can slide the battery into its socket.
c. Slide the battery down until it snaps into place, as shown in Figure 117.

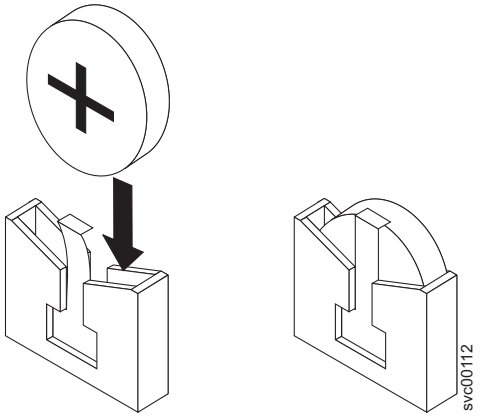


Figure 117. CMOS battery socket

2. Replace the top cover. See “Replacing the top cover” on page 71.
3. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.

Replacing the SAN Volume Controller 2145-4F2 system-board CMOS battery

If you are exchanging the battery for a new one, use only IBM Part Number 33F8354 or a similar type of battery that the manufacturer recommends.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

CAUTION:
Only trained service personnel may replace this battery. The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

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

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C002)

CAUTION:
The battery is a lithium ion battery. To avoid possible explosions, do not burn. Exchange only with the approved part. Recycle or discard the battery as instructed by local regulations. (C007a)

Perform the following steps to replace the system board CMOS battery.

1. Tilt the battery so that you can insert it into the socket under the battery clip.
2. As you slide it under the battery clip, press the battery down into the socket, as shown in Figure 118.

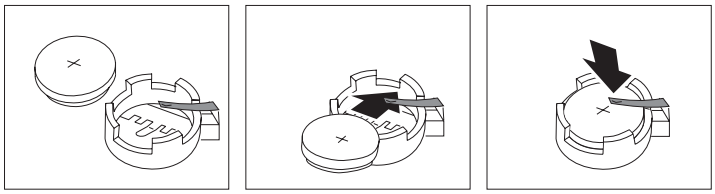


Figure 118. Replacing the SAN Volume Controller 2145-4F2 system board CMOS battery

3. Replace the top cover. See “Replacing the top cover” on page 71.
4. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
5. Turn on the node.

If this SAN Volume Controller 2145-4F2 was the configuration node when the CMOS battery failed, the cluster date and time might not be correct. After replacing the CMOS battery, check the cluster time from the IBM System Storage Productivity Center or master console server and correct it if necessary.

Removing the power supply

You must remove the SAN Volume Controller power supply if you intend to replace it.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

DANGER

Do not open or service any power supply assembly. (D005a)

Related tasks

“Removing the SAN Volume Controller from a rack” on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

“Removing the top cover” on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

“Replacing the SAN Volume Controller 2145-4F2 disk drive fan” on page 122
The disk drive fan must be removed if it is defective or if it needs to be replaced.

Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing a SAN Volume Controller 2145-8A4 power supply

This topic describes how to remove a SAN Volume Controller 2145-8G4 power supply.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

To remove the power supply, perform the following steps:

Notes:

- The air deflector also functions as the back plate latch. In this procedure, you must lift the air deflector to access some of the cables.
- Notice the routing of all power-supply cables. You will route the power-supply cables the same way when you install the power supply.

1. Read the safety precautions in “Safety and environmental notices” on page ix.
2. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
3. Remove the cable retention bracket and disconnect the power cable from the node. See “Removing the cable retention bracket” on page 24.
4. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
5. Remove the top cover. See “Removing the top cover” on page 67.
6. Remove the SATA back plate far enough to disconnect the two power cables from it. See “Removing the disk cable assembly” on page 112.
7. Disconnect the power-supply cables from the 24 PIN POWER connector **1** and the POWER connector **2** on the system board, as shown in Figure 119.

Figure 119. SATA connectors on the SAN Volume Controller 2145-8A4 system board

8. Disconnect the power cable, connector P5, which is shown in Figure 120 on page 136, from the CD/DVD interface card.

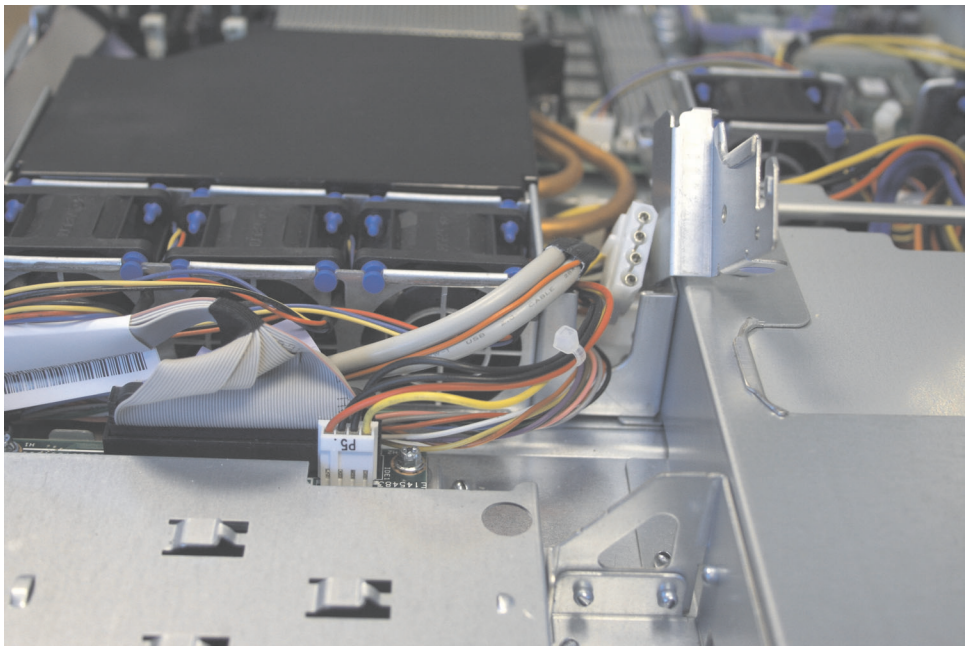


Figure 120. Power P5 connector on the SAN Volume Controller 2145-8A4 power supply

9. Disengage the power cable, which terminates in connector P5, from the retention-clip **1** , which is shown in Figure 121.

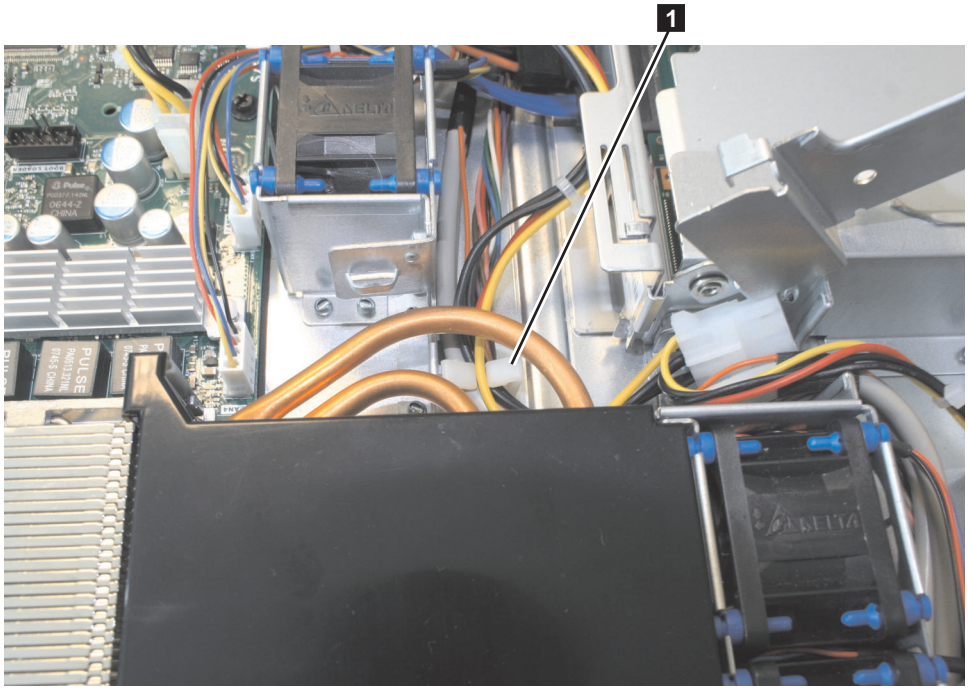


Figure 121. The retention clip for the SAN Volume Controller 2145-8A4 power-supply cables

10. Remove the screw **3** , shown in Figure 122 on page 137, that holds the power supply to the rear of the chassis.

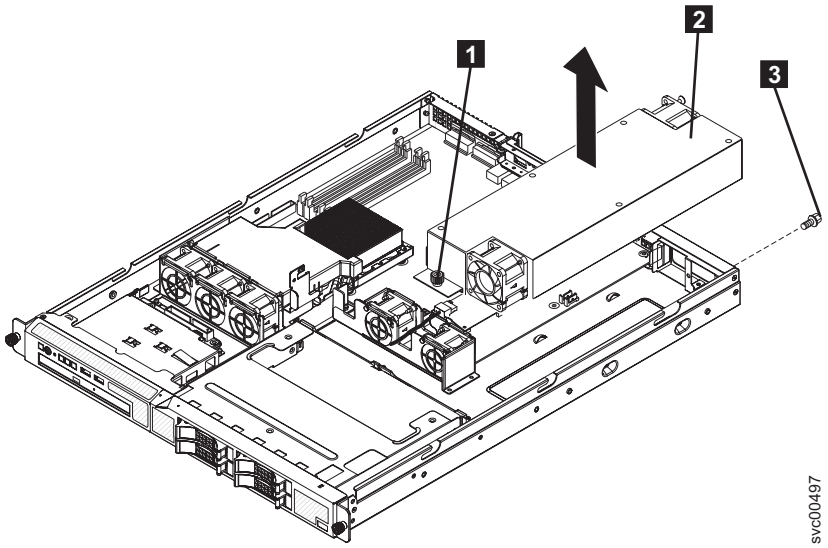


Figure 122. The SAN Volume Controller 2145-8A4 power-supply

11. Loosen the captive thumbscrew **1** that secures the rear of the power supply to the chassis bottom.
12. Lift the power supply **2** out of the bay.

Removing a SAN Volume Controller 2145-8G4 power supply

This topic describes how to remove a SAN Volume Controller 2145-8G4 power supply.

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the SAN Volume Controller 2145-8G4 power supply.

Perform the following steps to remove the power supply:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. At the back of the node, remove the cable restraint bracket to gain access to the rear of the node and the power supply **1** .
3. Press and hold down the orange release tab **2** , which is shown in Figure 123 on page 138, and pull the power supply out of the node.

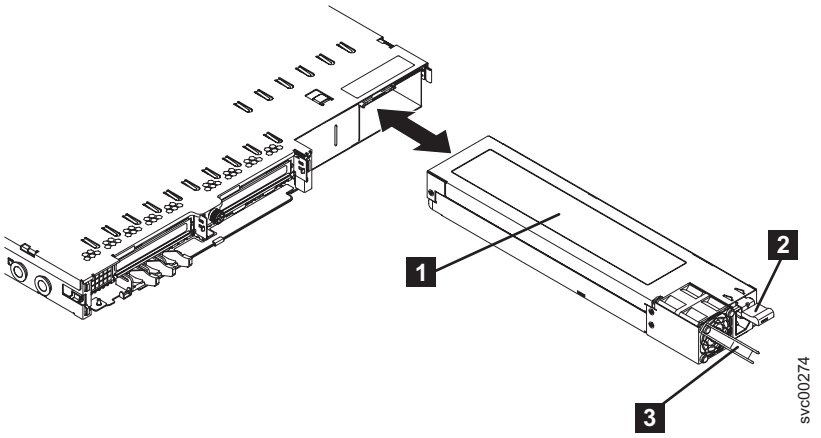


Figure 123. Removing the SAN Volume Controller 2145-8G4 power supply

1. Power supply
2. Power supply release tab
3. Power supply handle

Removing a SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 power supply

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 power supply.

Perform the following steps to remove the power supply:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Turn off the 2145 UPS-1U that is supplying this node.
3. Remove the SAN Volume Controller 2145-8F4 cable retention bracket.
4. From the rear of the node, as shown in Figure 124 on page 139, push the orange release lever to the left and then push down on it to release the power-supply assembly. This will move the power supply back, slightly, for easy removal.

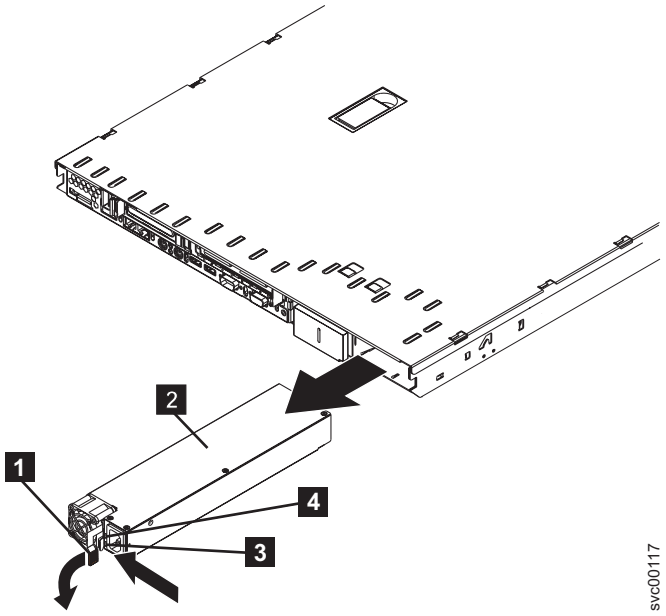


Figure 124. Removing the SAN Volume Controller 2145-8F2 power supply

1. Handle
2. Power supply
3. dc power LED
4. ac power LED

5. Pull the power supply out of the power-supply bay.

Removing the SAN Volume Controller 2145-4F2 power supply

Perform the following steps to remove the power supply:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
3. Remove the top cover. See “Removing the top cover” on page 67.
4. Remove the disk drive fan.
5. Press down on the clip **1** at the front of the power-cable module, as shown in Figure 125 on page 140, and slide the module toward the front of the SAN Volume Controller 2145-4F2 until the alignment tab is free of the slot that is on the side of the SAN Volume Controller 2145-4F2.

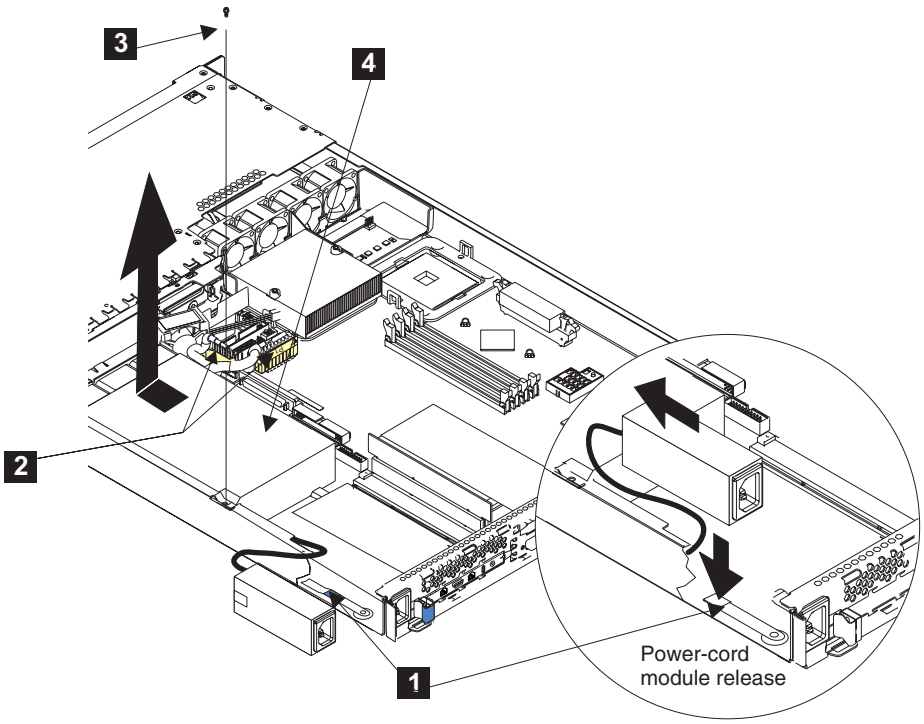


Figure 125. Removing the SAN Volume Controller 2145-4F2 power supply

6. Lift the power-cable module out from the SAN Volume Controller 2145-4F2 as far as its cable allows, and put it to one side.
7. Disconnect the power connector **2** .
8. Remove the screw **3** .
9. Slide the power supply **4** forward, and then lift it from the SAN Volume Controller 2145-4F2.

   The power supply is a complete FRU. Do not try to repair or exchange any part of it.

   Note: For a translation of the following notice, see *IBM Systems Safety Notices*.

   DANGER

   Do not open or service any power supply assembly. (D005a)
10. If you have any other tasks to perform while the power supply is removed, do those tasks now.

Replacing the power supply

You might need to replace the SAN Volume Controller power supply for a service action.

Note: For a translation of the following notice, see *IBM Systems Safety Notices*.

DANGER

Do not open or service any power supply assembly. (D005a)

Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing a SAN Volume Controller 2145-8A4 power supply

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

To replace the SAN Volume Controller 2145-8A4 power supply, perform the following steps:

1. Place the new power supply into the bay.
2. Tighten the captive thumbscrew that secures the rear of the power supply to the chassis bottom.
3. Replace the screw that holds the power supply to the rear of the chassis.
4. Make sure that the air deflector 1 is in the open position, as shown in Figure 126.

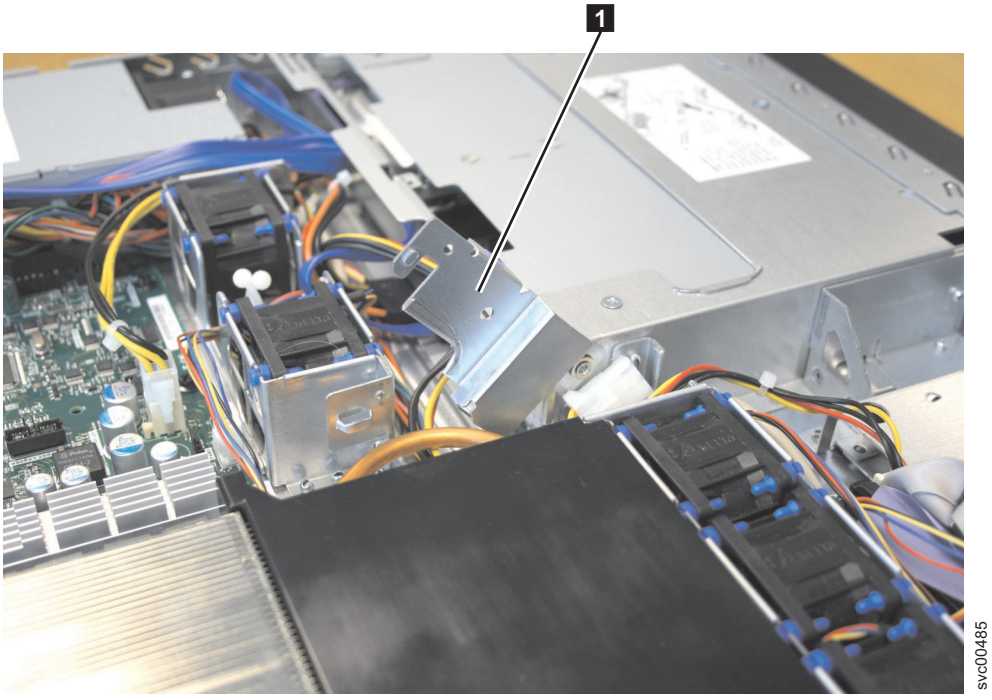


Figure 126. Air deflector for the SAN Volume Controller 2145-8A4 power supply

5. There are two cables to connect to the system board, as shown in Figure 127 on page 142. Connect the cable labeled P1 1 to the position marked 24 PIN POWER CONN. Connect the cable labeled P6 2 to the position marked POWER.

Figure 127. SATA connectors on the SAN Volume Controller 2145-8A4 system board

6. Route the power-supply cable with the P5 connector to the CD/DVD interface card and secure it under the retention-clip **1** , as shown in Figure 128, on the chassis.

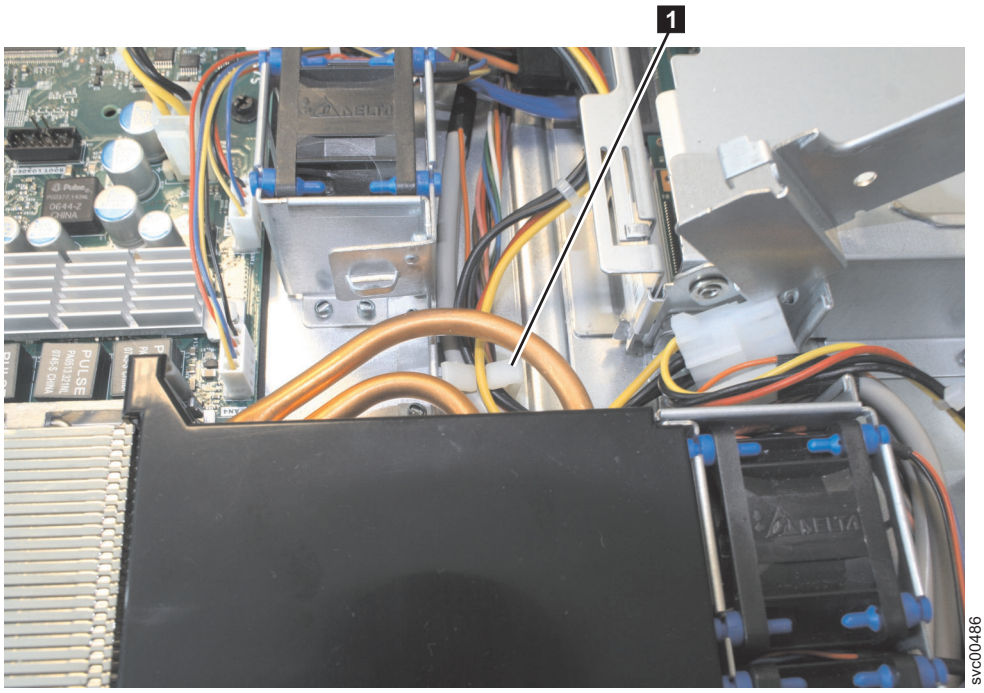


Figure 128. The retention clip for the SAN Volume Controller 2145-8A4 power-supply cables

7. Reconnect the cable to the CD/DVD interface card.

8. Connect the power connectors P2 and P3 to the SATA disk back plate and slide the back plate back into position.
9. Rotate the air deflector into place, making sure that no cables are pinched beneath it, and press it down firmly.
10. Test the power supply:
    a. For testing on the bench, only connect the ac power cord from the connector on the back of the power supply to a properly grounded electrical outlet. If you are using the combined power/serial cable, do not connect the serial port.
    b. Make sure that the standby power LED on the system board is lit. If the standby power LED is not lit, discontinue this procedure and obtain a new power supply.
    c. Press the power-control button. Make sure that the power LED on the front of the node is lit.
        - If the node starts, it will go through the boot sequence and then stop and display boot code `Failed 181`. This is expected, because the uninterruptible power supply is not connected. Proceed to the next step.
        - If the node does not start, disconnect the ac power cord and contact the IBM Support Center.
    d. Turn off the node using the power-control button and then disconnect the ac power cord.
11. Replace the top cover. See “Replacing the top cover” on page 71.
12. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
13. Reconnect the ac power cord into the connector on the back of the power supply, being sure to route the cable through the cable retention bracket in order to minimize mechanical strain on the cable.
14. Connect all external cables that you disconnected before you could remove the power supply.
15. Reconnect the power cord and turn on the 2145 UPS-1U.
16. Turn on the node.
17. Make sure that the power LED on the front of the node is lit.

Replacing a SAN Volume Controller 2145-8G4 power supply

This topic describes how to replace a SAN Volume Controller 2145-8G4 power supply.

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the power supply.

To replace the SAN Volume Controller 2145-8G4 power supply, perform the following steps:

1. Grasp the handle on the rear of the power supply (shown in Figure 129 on page 144) and slide the power supply forward fully into the node until it clicks in place.

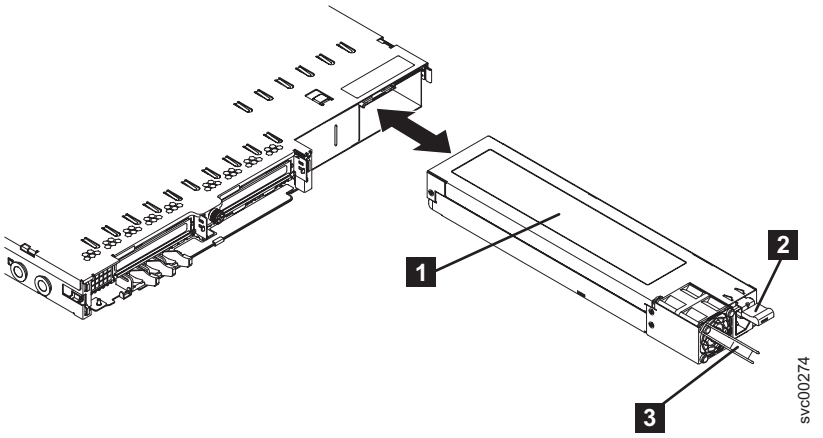


Figure 129. SAN Volume Controller 2145-8G4 power supply

1. Power supply
2. Power supply release tab
3. Power supply handle

2. Connect the power cord to the power-cord connector on the power supply, being sure to route the cord through the cable restraint bracket in order to minimize mechanical strain on the cord.
3. Reconnect the power cord and turn on the 2145 UPS-1U.
4. Make sure that the ac power LED 1 and the dc power LED 2 (shown in Figure 130) on the power supply are lit, indicating that the power supply is operating correctly. The two green LEDs are next to the power-cord connector.

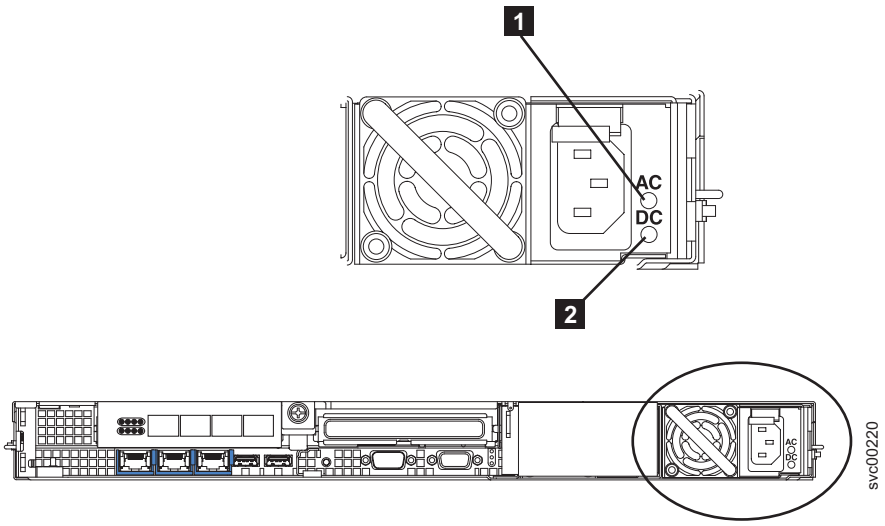


Figure 130. SAN Volume Controller 2145-8G4 ac and dc LEDs

5. Turn on the node.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 power supply

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the power supply.

To replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 power supply, perform the following steps:

1. Install the power supply in the empty power supply bay:
   a. Rotate the handle **1** down on the rear of the power supply to the open position, and then slide the power supply forward into the power-supply bay, as shown in Figure 131.

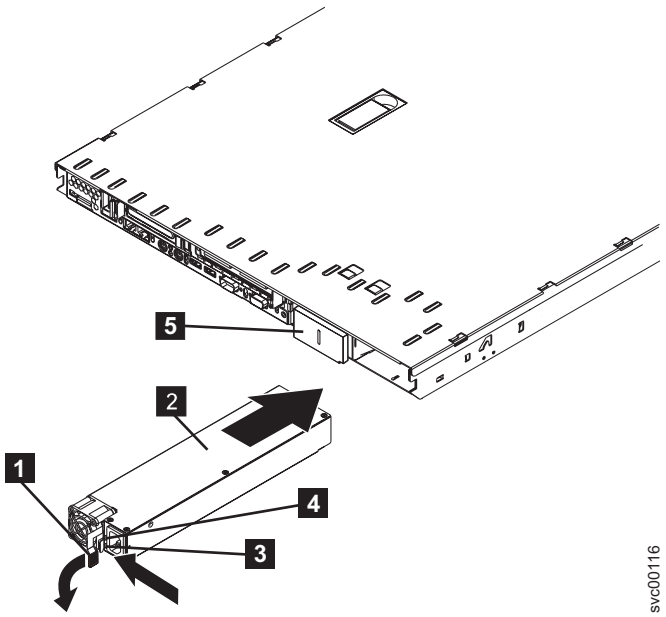


Figure 131. SAN Volume Controller 2145-8F2 power supply

1 Handle

2 Power supply

3 Dc power LED

4 Ac power LED

   b. Gently lift the handle up until it clicks. This signals that the power supply is securely seated in the bay.
2. Connect the power cord for the new power supply to the power-cord connector on the power supply.
3. Reconnect the power cord and turn on the 2145 UPS-1U.
4. Turn on the node.
5. Make sure that the power-supply fan starts and the ac power LED **1** and dc power LED **2** (shown in Figure 132 on page 146) on the power supply are lit, indicating that the power supply is operating correctly.

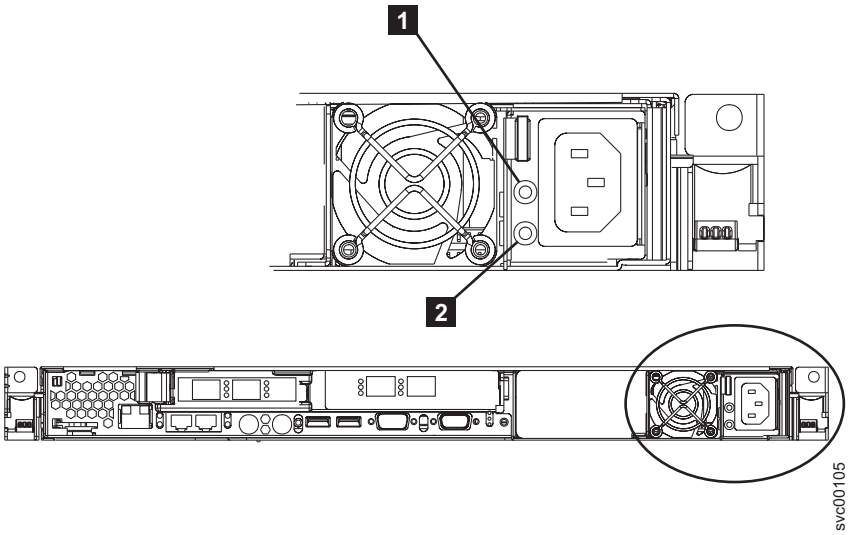


Figure 132. SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 ac and dc power LEDs

Replacing the SAN Volume Controller 2145-4F2 power supply

Perform the following steps to replace the power supply:

1. Slide the power supply **4** into the SAN Volume Controller 2145-4F2, as shown in Figure 133.

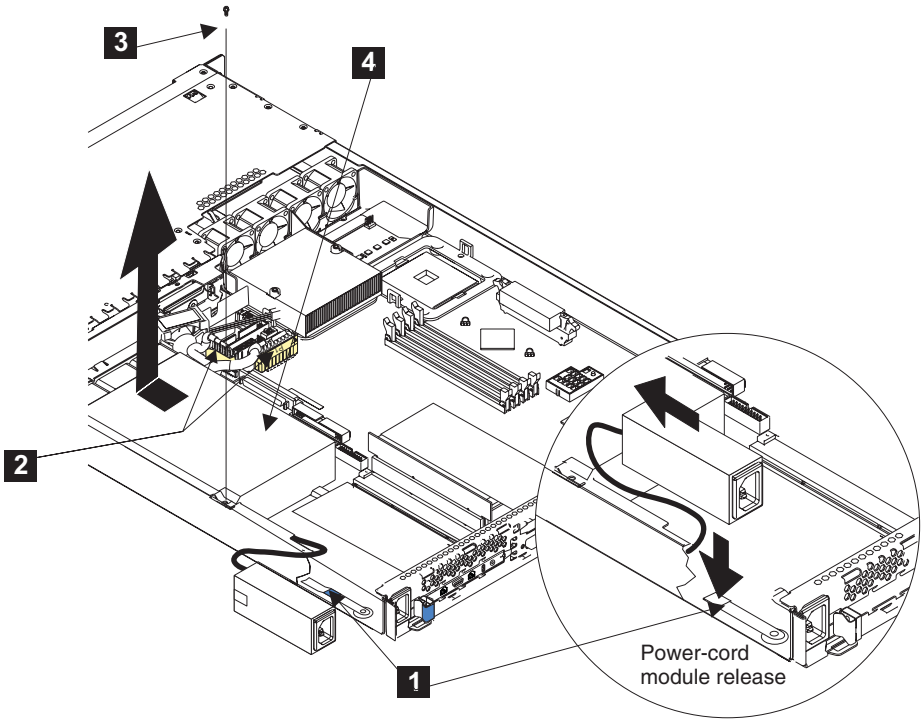


Figure 133. Replacing the SAN Volume Controller 2145-4F2 power supply

Note: For a translation of the following notice, see *IBM Systems Safety Notices*.

DANGER

Do not open or service any power supply assembly. (D005a)

2. Replace the screw **3** .
3. Connect the power connector **2** .
4. Place the power-cable module into the SAN Volume Controller 2145-4F2.
5. Slide the module toward the back of the SAN Volume Controller 2145-4F2 until the alignment tab snaps into the slot that is on the side of the SAN Volume Controller 2145-4F2.
6. Replace the disk drive fan.
7. Replace the top cover. See “Replacing the top cover” on page 71.
8. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
9. Turn on the node.

Removing the power backplane

The SAN Volume Controller power backplane might have to be removed.

Related tasks

“Removing the SAN Volume Controller from a rack” on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

“Removing the top cover” on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

“Removing the power supply” on page 134
You must remove the SAN Volume Controller power supply if you intend to replace it.

Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8G4 power backplane

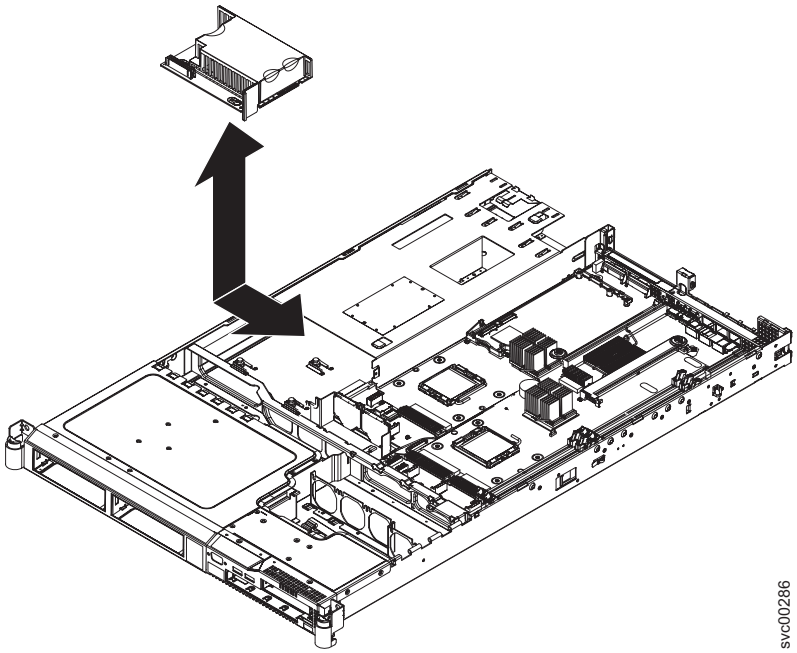
This topic describes how to remove the SAN Volume Controller 2145-8G4 power backplane.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

Perform the following steps to remove the power backplane:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the cable retention bracket and disconnect the power cable from the node. See “Removing the cable retention bracket” on page 24.
3. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.

4. Remove the top cover. See “Removing the top cover” on page 67.
5. Disconnect the power supplies from the power-supply backplane.



6. Disconnect the cable connected to the power-supply backplane.
7. Slide the power-supply backplane to the left, disconnecting it from the system board.
8. Lift the power-supply backplane to remove it from the node.

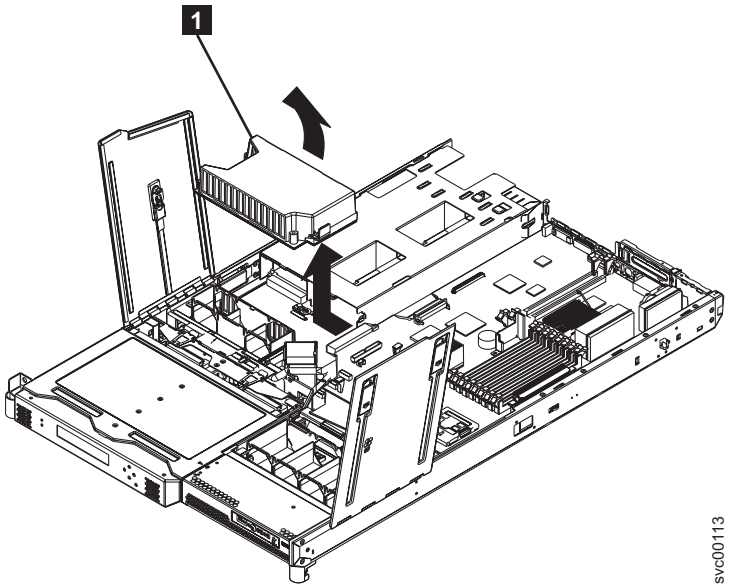
Removing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 power backplane

The SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 power backplane might have to be replaced.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

Perform the following steps to remove the power backplane:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the SAN Volume Controller 2145-8F4 cable retention bracket.
3. Disconnect all power cords and external cables from the back of the node.
4. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
5. Remove the top cover. See “Removing the top cover” on page 67.
6. Disconnect the power supply from the power backplane.
7. Slide the power backplane to the left and disconnect it from the system board.



8. Remove the power backplane from the node.

Replacing the power backplane

The power backplane might have to be replaced for a service action.

Related tasks

"Replacing the power supply" on page 140
You might need to replace the SAN Volume Controller power supply for a service action.

"Replacing the SAN Volume Controller in a rack" on page 43
You must use caution when you replace the SAN Volume Controller in a rack.

"Replacing the top cover" on page 71
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

Related reference

"Handling static-sensitive devices" on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8G4 power backplane

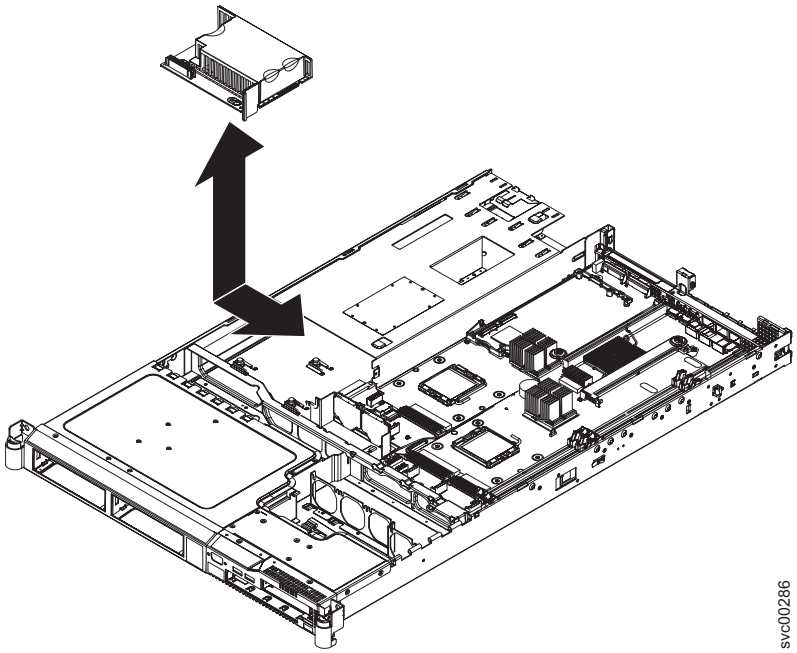
This topic describes how to replace the SAN Volume Controller 2145-8G4 power backplane.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see "Handling static-sensitive devices" on page xxx.

Perform the following steps to replace the power backplane:

1. Align the keyhole slots in the power-supply backplane with the mounting pins in the node.
2. Slide the power-supply backplane toward the right side of the node until the edge-connectors are fully connected.
3. Reconnect the cables to the power-supply backplane.

4. Install the power supply into the power-supply bay.



5. Replace the top cover. See “Replacing the top cover” on page 71.
6. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
7. Reconnect the external cables and then reconnect the power cable that was removed from the node. Ensure that you replace the fibre-channel cables in the same ports from which they were removed.
8. Turn on the node.

Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 power backplane

The SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 power backplane might have to be replaced.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

Perform the following steps to replace the power backplane:

1. Lower the power backplane into position on the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 and slide it to the right to connect it to the system board. See Figure 134 on page 151.

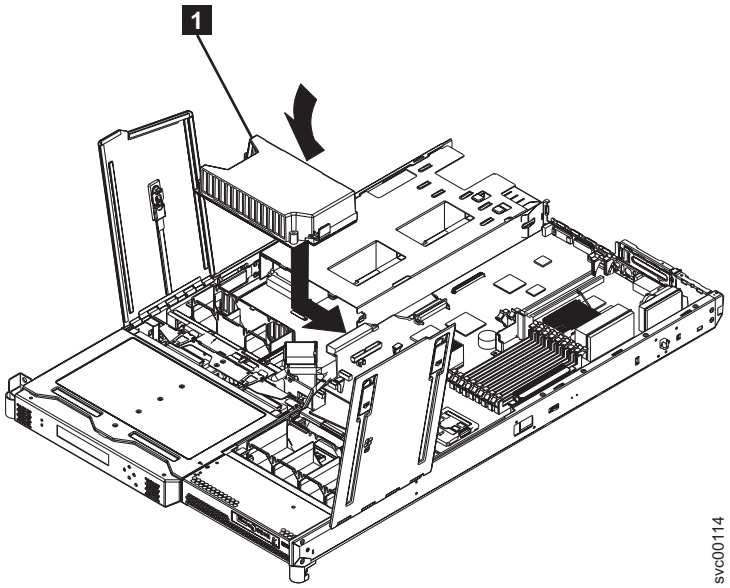


Figure 134. Replacing the power backplane

2. Connect the power supply to the power backplane.
3. Replace the top cover. See “Replacing the top cover” on page 71.
4. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
5. Reconnect the external cables and then reconnect the power cable that was removed from the node. Ensure that you replace the fibre-channel cables in the same ports from which they were removed.
6. Turn on the node.

Removing and replacing the frame assembly

This topic describes how to replace the SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-8F4 frame assembly.

The SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-8F4 frame assembly must be replaced when the system board fails or when replacing other system board components does not isolate the error.

Note: If you are replacing the frame assembly after you replaced the service controller, you must ensure that the node can be added back to the cluster. Use the following choices, which are based on the actions that you must take or have already taken, to determine how the node can be added back to the cluster:

- If you are replacing the node because the new service controller did not fix the original problem and you could not update the WWNN of the service controller, use the original service controller when you perform the frame replacement. This ensures that the WWNN is correct.
- If you have already made any required updates to the worldwide node name (WWNN) and the updates are stored in the service controller, continue with the following instructions to replace the frame assembly.

- If you must use a new service controller when you replace the frame assembly, use the following instructions to replace the frame assembly and make sure that you follow the special instructions in step 11.

Perform the following steps to replace the frame assembly:

1. Write down the 7-character serial number from the serial number label that is on the front of the node.

   For the SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-8F4 models only: If you cannot read the serial number or if you want to verify that it is correct, you can also find it on the node vital product data (VPD).

   Perform the following steps to find the serial number in the VPD:

   a. Start the SAN Volume Controller Console application.
   b. Display the VPD for the failed node.
   c. Note the system serial number.
2. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
3. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
4. Remove the top cover. See “Removing the top cover” on page 67.
5. Remove the fibre-channel adapter cards from the frame assembly that you are replacing.
6. Remove the service controller from the frame assembly you are replacing.
7. Install the fibre-channel adapter cards into the new frame assembly.
8. Install the service controller into the new frame assembly.
9. Replace the top cover. See “Replacing the top cover” on page 71.
10. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
11. Start the node using the node rescue procedure.

    Note: If you have to install a new service controller in the frame assembly, you must perform the next steps to allow the node rescue to find a suitable donor node.

    a. Turn on the node. Use your SAN monitoring tools to determine the WWNN of the node.
    b. Rezone the switch to allow at least one port of the replaced node to connect to at least one port of an existing node.
    c. Perform a node rescue.
    d. Set the WWNN of the replacement node to match the node that it replaced. See ″Node WWNN″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
    e. Rezone the switch to its original settings.
    f. Add the node back into the cluster.
    g. Clearly label the original service controller to indicate that its WWNN has been re-used, and that the part cannot be used without first changing the WWNN.

    Attention: It is essential that you perform all the stages of the next step to ensure that the replacement system is set to the serial number of the original machine.

12. If you are performing this repair as part of a directed maintenance procedure, you will be prompted to type the machine serial number that you noted above. Otherwise, perform the following steps:
    a. Delete the failed node from the cluster.
    b. Add the repaired node to the cluster.
    c. Start the command-line interface (CLI). See ″Accessing the SAN Volume Controller CLI″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.
    d. Issue the following command:

       `svcservicetask writesernum -sernum` *`nodeserialnumber nodename`*

       where *nodeserialnumber* is the number that you noted previously and *nodename* is the name of the repaired node that you added in this step.

       For example, to write the machine serial number to the system board when the serial number is “13-FEDCB” and the node name is “ZYXW3,” you would issue the following command:

       `svcservicetask writesernum –sernum` *`13FEDCB ZYXW3`*

       Note: The node will restart as soon as the serial number has been written to it.
    e. Write the serial number that you noted previously on the blank serial number label on the front of the node.

Related tasks

“Removing the SAN Volume Controller from a rack” on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

“Replacing the SAN Volume Controller in a rack” on page 43
You must use caution when you replace the SAN Volume Controller in a rack.

“Removing the top cover” on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

“Replacing the top cover” on page 71
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

“Removing the fibre-channel adapter assembly” on page 155
Use the information in this topic when you need to remove a fibre channel adapter or fibre-channel adapter assemblies.

“Replacing the fibre-channel adapter assembly” on page 161
Use these instructions when you need to replace the adapter assemblies.

“Removing the service controller” on page 77
You can remove the service controller from the SAN Volume Controller.

“Replacing the service controller” on page 85
You can replace the SAN Volume Controller service controller.

Removing and replacing the fibre-channel SFP connector on a SAN Volume Controller node

When a failure occurs on a single fibre-channel link, the SFP connector might need to be replaced.

The SFP connector is designed to be hot-plugged, so that you do not need to power off the SAN Volume Controller node.

CAUTION:
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information: laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)

Perform the following steps to remove and then replace the SFP connector:

1. Carefully determine the failing physical port connection. See the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for illustrations of the fibre-channel port locations.

   Note: Removing the wrong SFP connector could result in loss of data access.
2. Remove the fibre-channel cable by pressing the release tab and pulling the SFP connector out. Be careful to exert pressure only on the SFP connector and do not pull on the fibre-channel cables.
3. Remove the SFP connector. There are a number of different handling or locking mechanisms that are used on the SFP connectors. Table 16 describes the usual type of mechanisms that are found on a SAN Volume Controller model. It is possible, however, that the installed SFP connectors have a different mechanism than is indicated.

Table 16. Instructions for removing the SFP connector

SAN Volume Controller model	Removal instructions
SAN Volume Controller models 2145-8A4, 2145-8G4, and 2145-8F4	Locate the release handle that is incorporated into the SFP connector, unclip the handle, and then use the handle to pull out the SFP connector.
SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-4F2	Locate the small black locking tag on the bottom of the SFP connector, push it back, and then pull out the SFP connector.
Note: Other SFP connectors might have a plastic tag. If so, pull the tag to remove the SFP connector.	

4. Push the new SFP connector into the aperture and ensure it is securely pushed home. Swing the release handle up until it locks flush with the SFP connector. Figure 135 illustrates an SFP connector and its release handle.

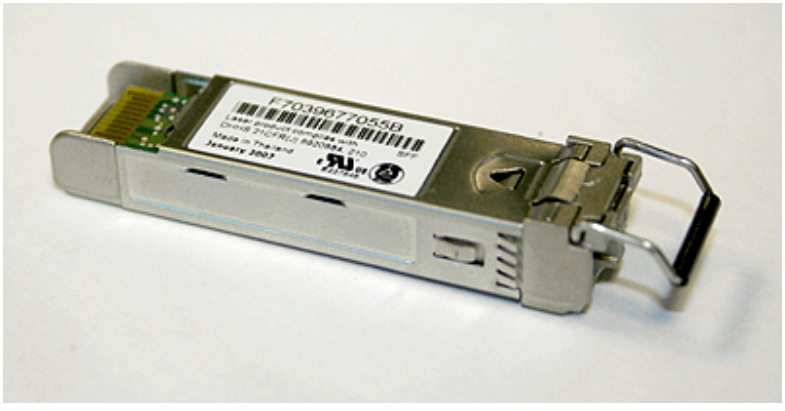


Figure 135. Fibre-channel SFP connector

5. Reconnect the fibre-channel cable.

6. Confirm that the error is now fixed. Check the fibre-channel port status using the front-panel display. If possible, check the status given by the customer's SAN monitoring tools. Either mark the error as fixed or restart the node depending on the failure indication that you originally noted.

Removing the fibre-channel adapter assembly

Use the information in this topic when you need to remove a fibre channel adapter or fibre-channel adapter assemblies.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see "Handling static-sensitive devices" on page xxx.

Related tasks

"Removing the SAN Volume Controller from a rack" on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Related reference

"Handling static-sensitive devices" on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8A4 fibre-channel adapter assembly

You need to remove the riser-card assembly from the SAN Volume Controller 2145-8A4 node and then remove the fibre-channel adapter assembly from the riser-card assembly.

Perform the following steps to remove a fibre-channel adapter assembly:

1. Turn off the node. See "MAP 5350" in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the cable retention bracket and disconnect the power cable from the node. See "Removing the cable retention bracket" on page 24.
3. Remove the node from the rack and place it on a flat, static-protective surface. See "Removing the SAN Volume Controller from a rack" on page 33.
4. Remove the top cover. See "Removing the top cover" on page 67.
5. Grasp the riser-card assembly at the front and rear edges and lift to remove it from the node. Place the riser-card assembly shown in Figure 136 on page 156 on a flat, static-protective surface.

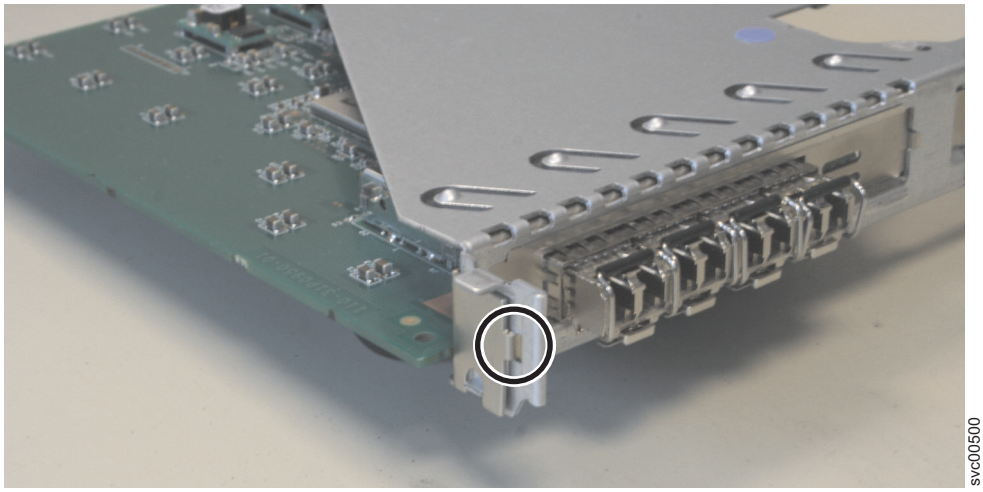


Figure 136. SAN Volume Controller 2145-8A4 riser-card assembly

6. Remove the four SFP connectors from the adapter. To do this, unclip the release handle shown in Figure 137 and then use the handle to pull out each SFP connector.

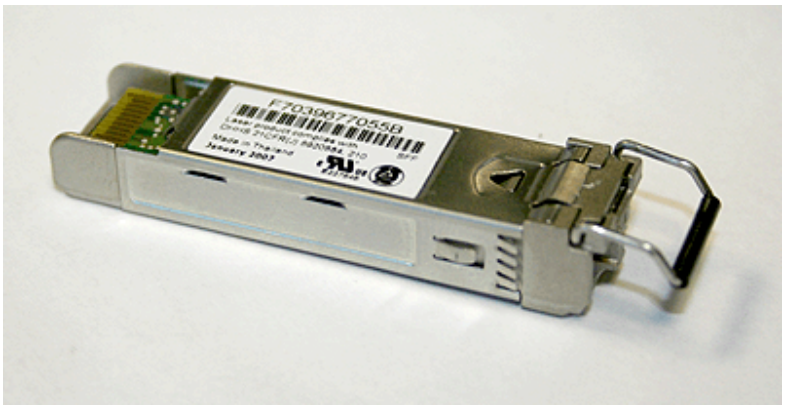


Figure 137. Fibre-channel SFP connector

7. Slide the adapter straight back from the connector and out of the riser-card assembly. Do not try to slide the adapter at an angle.

Removing the SAN Volume Controller 2145-8G4 fibre-channel adapter assembly

Perform the following steps to remove the SAN Volume Controller 2145-8G4 fibre-channel adapter assembly:

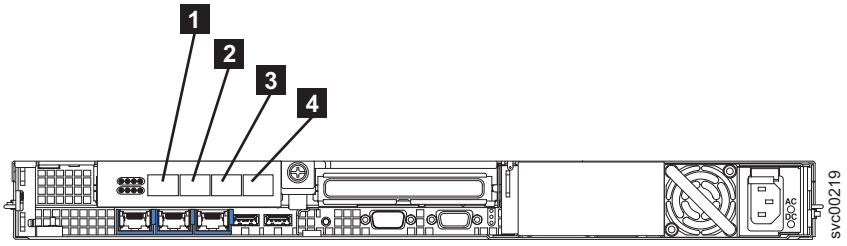


Figure 138. The physical port numbers for the SAN Volume Controller 2145-8G4

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.

   Attention: When you install an adapter, make sure that the adapter is correctly seated in the connector before you turn on the server. An incorrectly seated adapter might cause damage to the system board, the riser-card assembly, or the adapter.
2. When the node is completely turned off, remove the main power cable retention bracket and remove the power cable from the rear of the node.
3. After writing down their locations, remove all other cables from the node.
4. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
5. Remove the top cover. See “Removing the top cover” on page 67.
6. Grasp the riser-card assembly (**2** in Figure 139) at the rear edge and lift to remove the riser-card assembly.

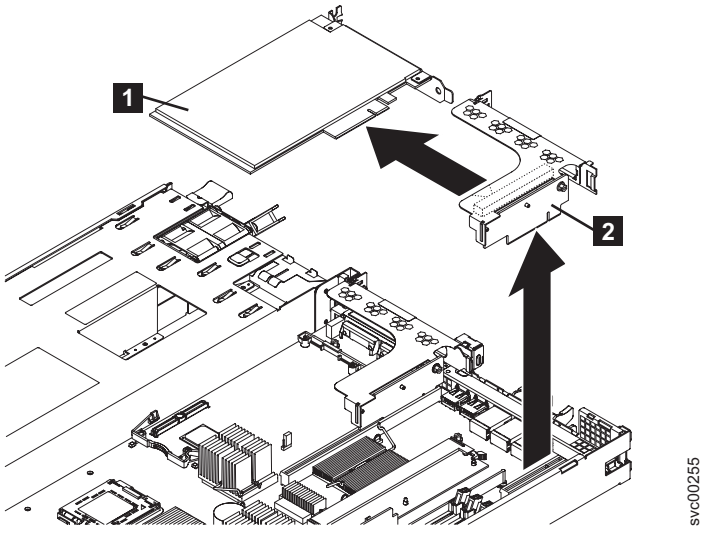


Figure 139. Removing the riser-card assembly from the SAN Volume Controller 2145-8G4

7. Place the riser-card assembly on a flat, static-protective surface.
8. Carefully grasp the adapter **1** by its top edge or upper corners, and pull the adapter from the riser-card assembly **2**.

Removing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 adapter assemblies

The SAN Volume Controller 2145-8F2 contains two types of fibre-channel adapters that are functionally identical but not interchangeable. The SAN Volume Controller 2145-8F4 contains a single 4-Port adapter in PCI slot 2.

Figure 140 shows the rear view of the SAN Volume Controller 2145-8F2 with the two fibre-channel ports identified:

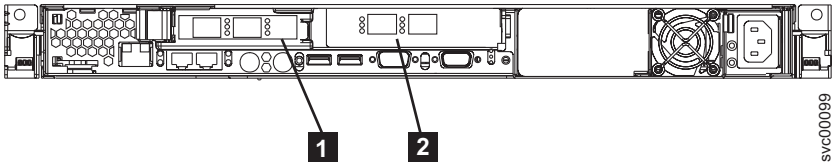


Figure 140. Rear view of the SAN Volume Controller 2145-8F2 with fibre-channel ports indicated

1 PCI slot 1 - contains a dual port fibre-channel host bus adapter (HBA) in a low profile

2 PCI slot 2 - contains a dual port fibre-channel HBA at full height

Figure 141 shows the rear view of the SAN Volume Controller 2145-8F4 with the 4-port fibre-channel HBA identified:

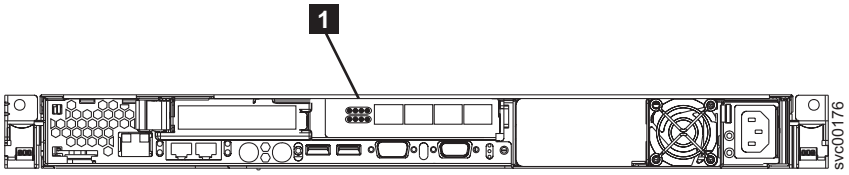


Figure 141. Rear view of the SAN Volume Controller 2145-8F4

1 PCI slot 2 - contains a 4-port fibre-channel HBA

Perform the following steps to remove a fibre-channel adapter assembly:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
3. Remove the top cover. See “Removing the top cover” on page 67.
4. Perform the following steps to remove the PCI card from PCI slot 1 (low profile):
   a. Pull the blue PCI card retainer **1** from the rear of the node, shown in Figure 142 on page 159.

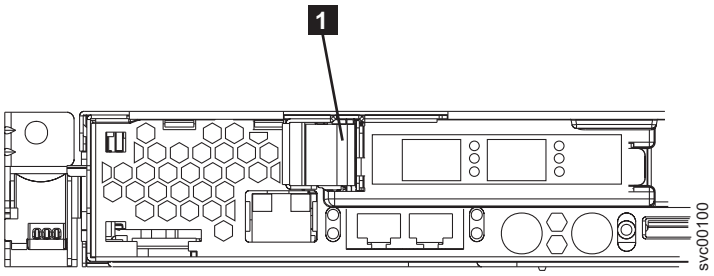


Figure 142. SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 PCI slot 1 card retainer

1 Slot 1 card retainer

b. Hold the blue adapter support away from the card and pull it away from the edge connector on the riser card assembly, as shown in Figure 143.

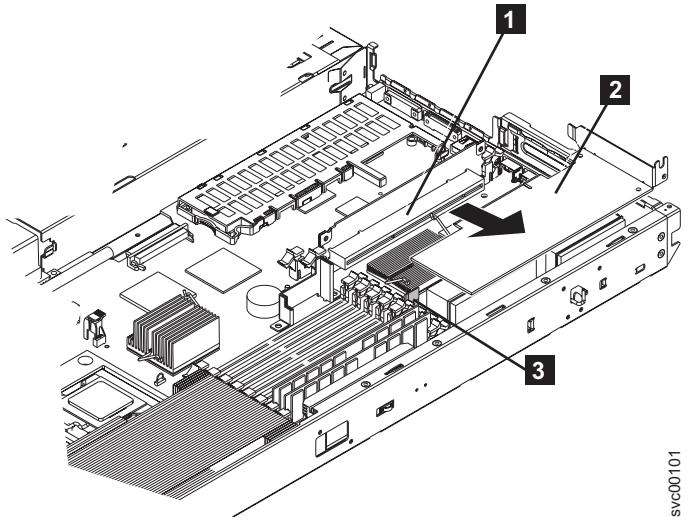


Figure 143. SAN Volume Controller 2145-8F2 riser card and low profile adapter

1 Riser card

2 Low-profile adapter

3 Low-profile adapter support

5. Perform the following steps to remove the PCI card from PCI slot 2:

   a. Open the retaining clips on both sides of the slot 2 riser card (**2** in Figure 144 on page 160) by pushing the clips down and away from the riser card until the clips are no longer attached to the riser card.

      Note: Insert your finger into the access hole on the slot 2 adapter cover to open the retention latch at the rear of the node.

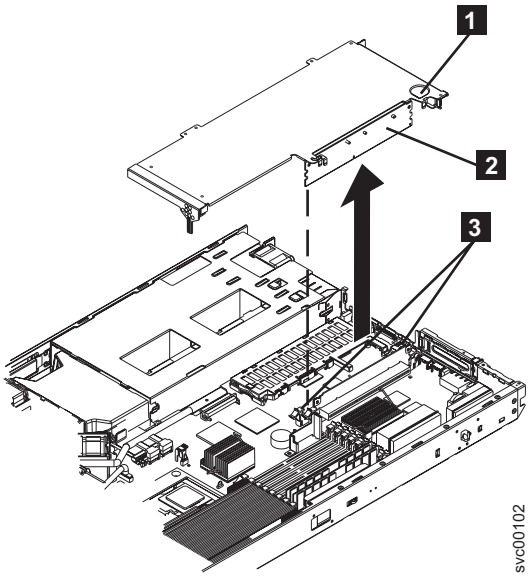


Figure 144. SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 slot 2 adapter

1 Access hole to retention latch

2 Riser card

3 Riser-card retention latches

b. Unlatch the PCI slot 2 riser card **2** and pull it clear of the system-board edge connector.

c. Lift the riser card clear of the frame and pull the fibre-channel card from the riser card edge connector.

Removing a SAN Volume Controller 2145-4F2 adapter

Perform the following steps to remove an adapter:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Disconnect all power cords and external cables from the back of the node.
3. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
4. Remove the top cover. See “Removing the top cover” on page 67.
5. For the adapter that you are going to remove, press the sides of the expansion-slot clip (**3** or **4** in Figure 145 on page 161) together to unlock the clip, and then pivot the expansion-slot clip away from the adapter. The expansion-slot clip remains loosely attached to the SAN Volume Controller 2145-4F2.

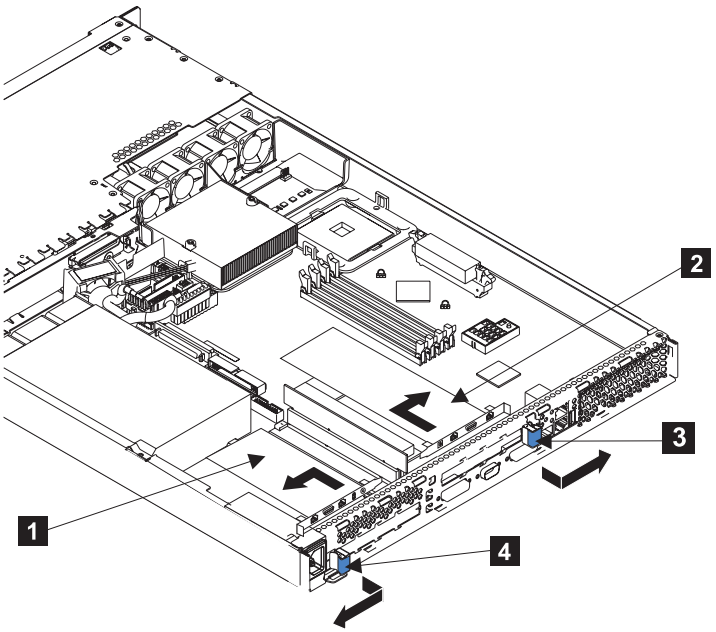


Figure 145. SAN Volume Controller 2145-4F2 before removing an adapter

1 Adapter 1

2 Adapter 2

3 Adapter 2 expansion-slot clip

4 Adapter 1 expansion-slot clip

Attention: Do not touch the components and gold-edge connectors of the adapter.

6. Unplug the adapter (1 or 2) from the connector.
7. Remove the adapter from the SAN Volume Controller 2145-4F2.

Replacing the fibre-channel adapter assembly

Use these instructions when you need to replace the adapter assemblies.

Related tasks

"Replacing the SAN Volume Controller in a rack" on page 43
You must use caution when you replace the SAN Volume Controller in a rack.

"Removing the fibre-channel adapter assembly" on page 155
Use the information in this topic when you need to remove a fibre channel adapter or fibre-channel adapter assemblies.

Related reference

"Handling static-sensitive devices" on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8A4 fibre-channel adapter assembly

Before you can replace the fibre-channel adapter assembly, it must be installed in the riser-card assembly.

Perform the following steps to replace the SAN Volume Controller 2145-8A4 fibre-channel adapter assembly:

1. Remove the SFP connectors if they are in the new fibre-channel adapter assembly. To do this, unclip the release handle and then use the handle to pull out each SFP connector.
2. Slide the fibre-channel adapter into position, keeping it close and parallel to the back edge of the riser card. Push the adapter securely into the connector. Ensure that the positioning clip on the adapter goes into the locating hole on the riser card, as shown in Figure 146.

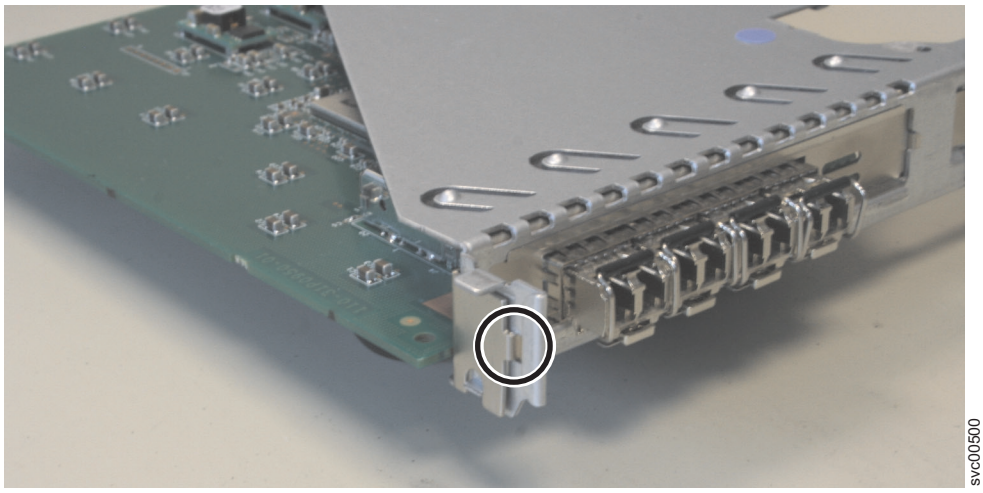


Figure 146. SAN Volume Controller 2145-8A4 riser-card assembly

3. Replace the SFP connectors in the fibre-channel adapter assembly.
4. Carefully align the riser-card assembly with the guides on the rear of the node and with the riser-card connectors on the system board. Press down on the assembly and make sure that the riser-card assembly is fully seated in the riser-card connectors on the system board.
5. Replace the top cover. See “Replacing the top cover” on page 71.
6. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
7. Replace the cables that were removed from the node, and make sure that you replace the fibre-channel cables in the same ports from which they were removed.
8. Replace the cable retention bracket. See “Replacing the cable retention bracket” on page 28.

Replacing the SAN Volume Controller 2145-8G4 fibre-channel adapter assembly

Perform the following steps to replace the SAN Volume Controller 2145-8G4 fibre-channel adapter assembly:

1. As you start inserting the adapter, align the edge connector on the low-profile adapter **1** with the connector **3** on the riser-card assembly **4** Make sure that the adapter snaps into the riser-card securely. Press the riser-card edge connector firmly into the system-board connector. **5** , as shown in Figure 147 on page 163.

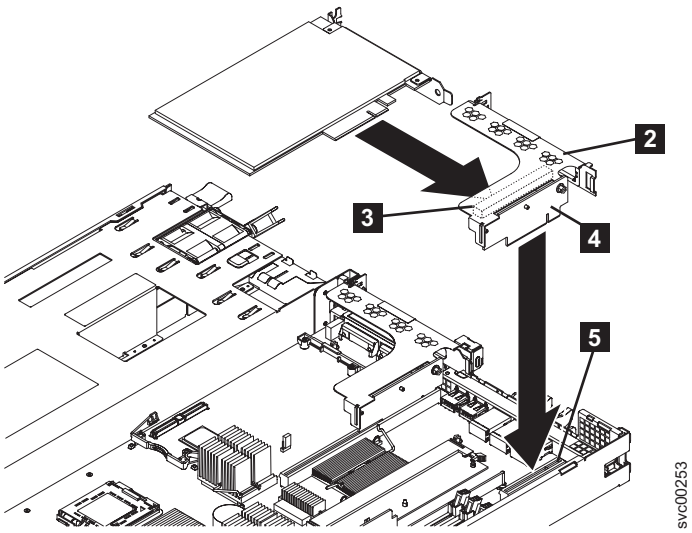


Figure 147. Replacing the riser-card assembly for the SAN Volume Controller 2145-8G4

1. Fibre-channel adapter
2. Adapter support bracket
3. Riser-card-adapter connector
4. Riser-card assembly
5. System-board-riser-card connector

2. Replace the top cover. See “Replacing the top cover” on page 71.
3. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
4. Replace the cables that were removed from the node, and make sure that you replace the fibre-channel cables in the same ports from which they were removed.
5. Replace the cable retention bracket. See “Replacing the cable retention bracket” on page 28.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 adapter assemblies

Perform the following steps to install the fibre-channel card into the riser-card assembly:

Note: The adapter assemblies are electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

1. Install the fibre-channel card in slot 1, which is shown in Figure 148 on page 164.

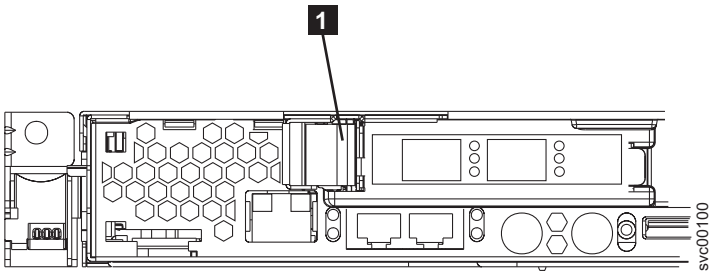


Figure 148. SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 PCI slot 1 card retainer

a. Slide the I/O connector portion of the adapter through the slot 1 opening and align the edge connector on the low-profile adapter with the connector on the riser card. Press the edge connector firmly into the riser-card connector. Make sure that the adapter snaps into the riser card securely and the adapter is lying on top of the low-profile adapter support.
b. Push the adapter down past the tab so that the adapter snaps into place on the support.
c. Check the retention latches on the riser card and make sure that they are still securely in place.
d. Close the fibre-channel card retainer to secure the card.

2. Install the fibre-channel card in slot 2.
   a. Align the edge connector on the fibre-channel adapter with the connector on the riser card. Press the edge connector firmly into the riser-card connector. The card is fully installed when the gold connectors on the edge of the fibre-channel cards are no longer visible.
   b. Grasp the riser card assembly by its top edge or upper corners and align the riser card with the guides for the riser-card connector.
   c. Press the riser card edge connector firmly into the slot 2 riser-card edge connector on the system board. Make sure that the retention latches snap into place to secure the riser card into the slot 2 riser-card connector.
3. Replace the top cover. See “Replacing the top cover” on page 71.
4. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.

Replacing a SAN Volume Controller 2145-4F2 adapter

Perform the following steps to replace an adapter assembly:

Attention: Do not touch the components and gold-edge connectors of the adapter. When you install the adapter, ensure that it is correctly seated in the connector before you turn on the node. Adapters that are seated incorrectly might cause damage to the system board, the riser card for slot 1, or the adapter.

1. If you are installing a new adapter, remove it from its static-protective package.
2. Hold the adapter by its top edge or upper corners and align it with the connector. Support the riser card and press the adapter fully into the connector.
3. Pivot the expansion-slot clip (**3** or **4** in Figure 149 on page 165) toward the adapter and press it into place.

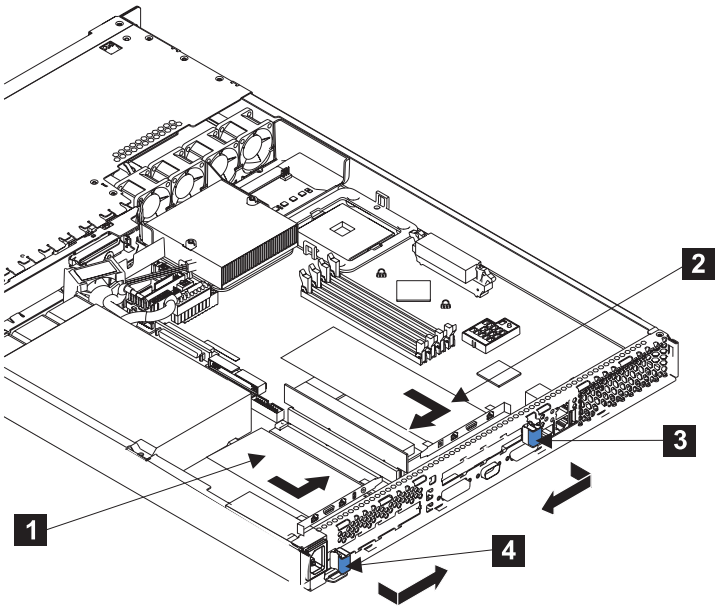


Figure 149. SAN Volume Controller 2145-4F2 with its adapters installed

1. Adapter 1
2. Adapter 2
3. Adapter 2 expansion-slot clip
4. Adapter 1 expansion-slot clip

Removing the PCI express riser card assembly

Use these instructions when you are prompted to remove the SAN Volume Controller PCI express riser card assembly.

Removing the SAN Volume Controller 2145-8A4 PCI express riser card assembly

Use these instructions when you are prompted to remove the SAN Volume Controller 2145-8A4 PCI express riser card assembly.

Note: Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

To remove the SAN Volume Controller 2145-8A4 PCI express riser card assembly, follow the instructions in “Removing the SAN Volume Controller 2145-8A4 fibre-channel adapter assembly” on page 155.

Removing the SAN Volume Controller 2145-8G4 PCI express riser card assembly

Use these instructions when you are prompted to remove the SAN Volume Controller 2145-8G4 PCI express riser card assembly.

Note: Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

To remove the SAN Volume Controller 2145-8G4 PCI express riser card assembly, follow the instructions in “Removing the SAN Volume Controller 2145-8G4 fibre-channel adapter assembly” on page 156.

Replacing the PCI express riser card assembly

Use these instructions when you are prompted to replace the SAN Volume Controller PCI express riser card assembly.

Replacing the SAN Volume Controller 2145-8A4 PCI express riser card assembly

Use these instructions when you are prompted to replace the SAN Volume Controller 2145-8A4 PCI express riser card assembly.

Follow the instructions in “Replacing the SAN Volume Controller 2145-8A4 fibre-channel adapter assembly” on page 161.

Replacing the SAN Volume Controller 2145-8G4 PCI express riser card assembly

Use these instructions when you are prompted to replace the SAN Volume Controller 2145-8G4 PCI express riser card assembly.

Follow the instructions in “Replacing the SAN Volume Controller 2145-8G4 fibre-channel adapter assembly” on page 162.

Removing the operator-information panel assembly

You might be prompted to remove the SAN Volume Controller operator-information panel.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

Related tasks

“Removing the top cover” on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

“Replacing the top cover” on page 71
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8A4 operator-information panel

You might have to remove the operator-information panel on a SAN Volume Controller 2145-8A4 due to required maintenance.

Make careful note of the layout of the cables as you go through this procedure as they will need replacing in the same position when you replace the operator-information panel.

Perform the following steps to remove the operator-information panel:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the cable retention bracket and disconnect the power cable from the node. See “Removing the cable retention bracket” on page 24.
3. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
4. Remove the top cover. See “Removing the top cover” on page 67.
5. Remove the screws (**3** in Figure 150) that secure the operator-information panel to the CD/DVD bay housing.

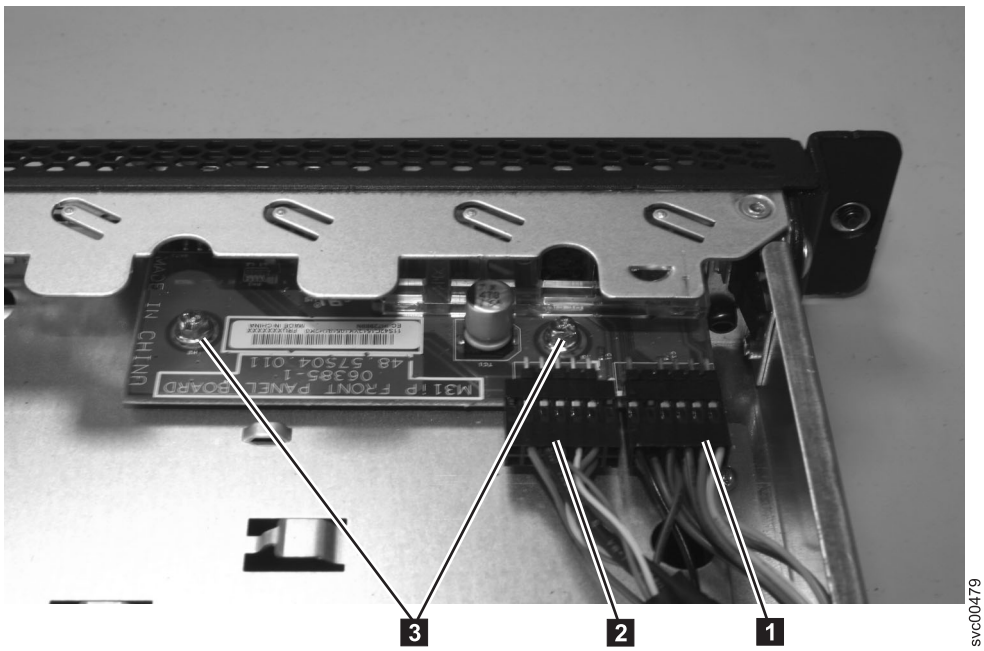


Figure 150. SAN Volume Controller 2145-8A4 operator-information panel

6. Lift the operator-information panel out of the node.
7. Disconnect the light-panel cable **1** and the USB cable **2** from the operator-information panel board, shown in Figure 150.

Removing the SAN Volume Controller 2145-8G4 operator-information panel assembly

You might have to remove the operator-information panel assembly on a SAN Volume Controller 2145-8G4 due to required maintenance.

Make careful note of the layout of the cables as you go through this procedure as they will need replacing in the same position when you replace the operator-information panel assembly.

Perform the following steps to remove the operator-information panel:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the cover and open the fan door. See “Removing the top cover” on page 67.
3. Release the dummy CD/DVD drive **2** by pressing the release button **1** and sliding the drive out approximately 2 cm (1 in), as shown in Figure 151 on page 168

page 168. It is possible to push the drive from the back to start it moving. Do not remove the drive from the casing.

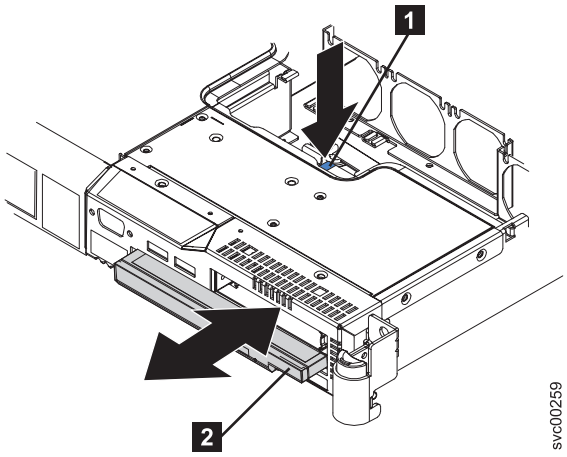


Figure 151. Releasing and sliding out the dummy CD/DVD drive

1. Release button
2. Dummy CD/DVD drive

4. Remove the CD interposer card (2 in Figure 152) by unscrewing it, lifting it slightly and then removing the cable from it.

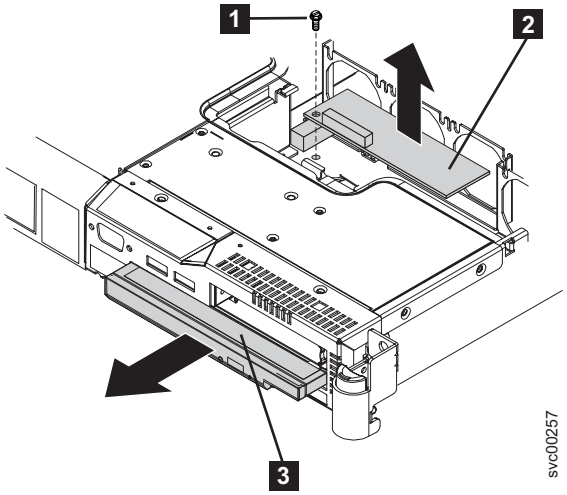


Figure 152. Removing the CD interposer card

1. Screw
2. Interposer card
3. Dummy CD/DVD drive

5. Remove fan 3, as shown in Figure 153 on page 169.

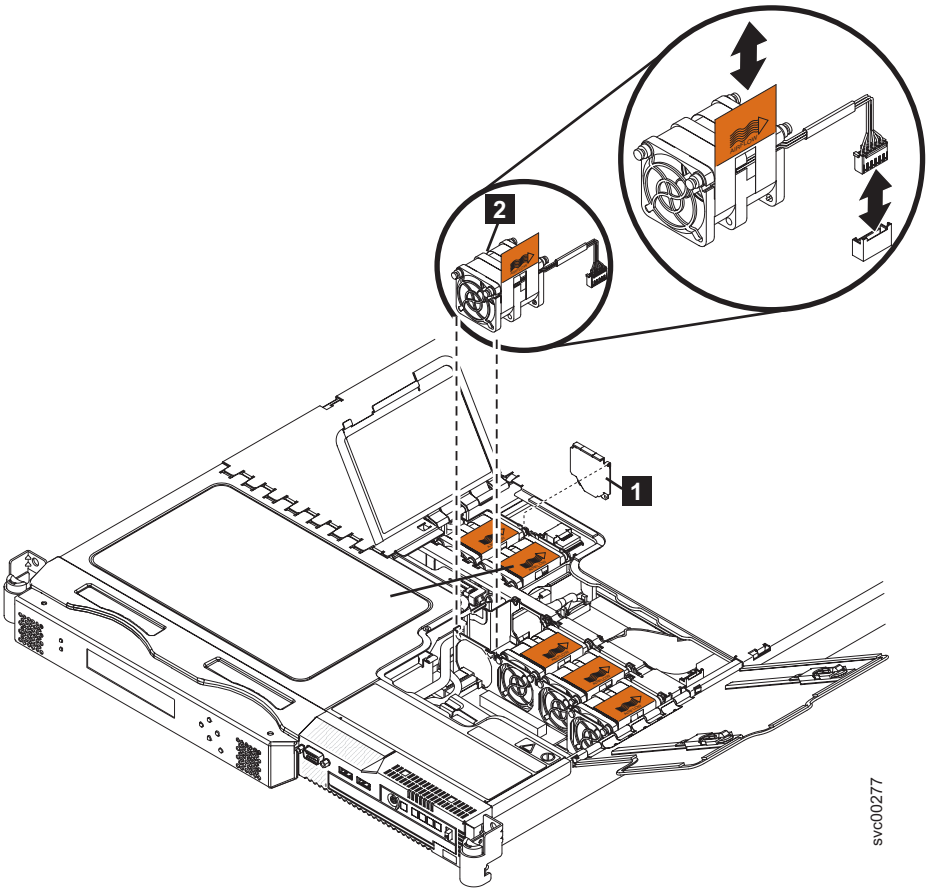


Figure 153. Removing fan 3

1 Air baffle

2 Fan 3

6. Remove the air baffle (**2** in Figure 154 on page 170).

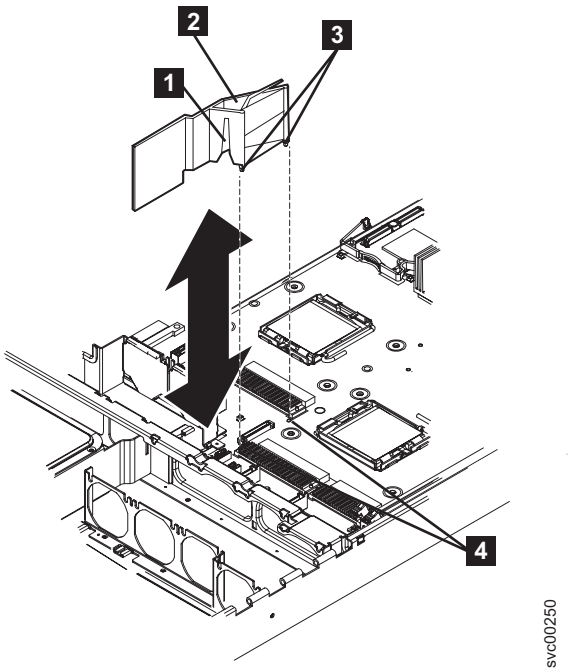


Figure 154. Removing the air baffle

1 Cable routing slot

2 Air baffle

3 Baffle pins

4 Baffle mounting holes

7. Unplug the video cable 8 , the USB cable 7 and the CD/DVD cable 9 from the system board. There is no need to completely remove these cables. Unplugging them makes it easier to maneuver the light path ribbon cable 4 . In Figure 155 on page 171, the front of the node is at the bottom of the illustration.

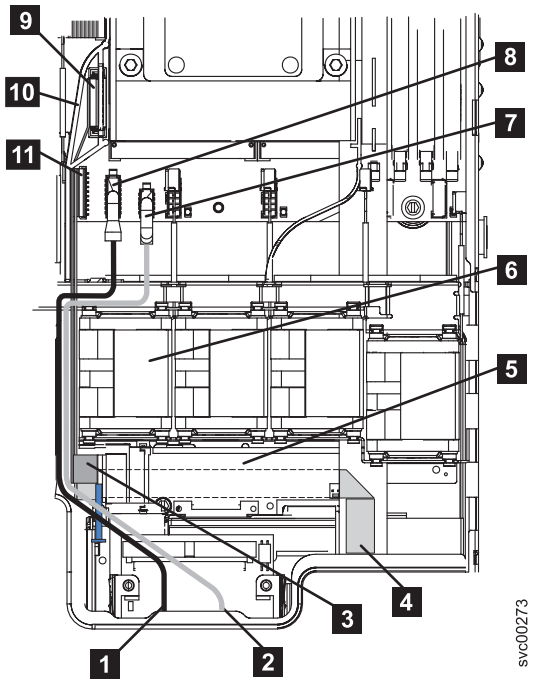


Figure 155. Unplugging the video, USB, and the CD/DVD cables

1. Video cable
2. USB cable
3. CD-RW cable
4. Light path cable
5. Interposer card
6. Fan 3
7. USB cable connector
8. Video cable connector
9. CD-RW connector
10. Air baffle
11. Light path cable connector

8. Unplug the light path ribbon cable 4 from the system board connector 11 and completely unthread the cable removing it from the three retaining brackets. Also release it from any tape holding it in place. The cable should be free to move forward with the operator-information panel.
9. Press the release button (1 in Figure 156 on page 172) on the front of the operator-information panel 2 and pull forward until it locks in place.

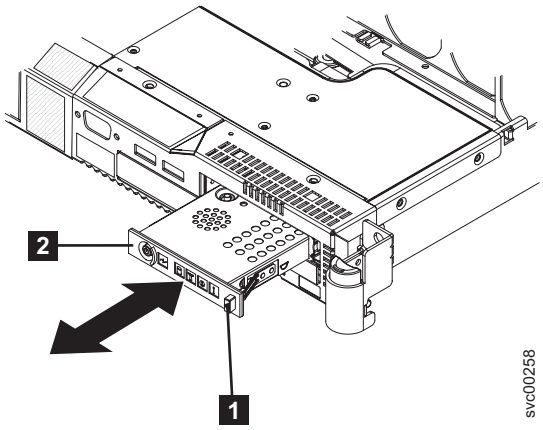


Figure 156. Releasing the operator-information panel

10. Press the two release buttons (**2** in Figure 157) that are visible through the top of the node and pull the assembly **3** completely out of the node. Carefully pull the attached light path ribbon cable **1** out of the server.

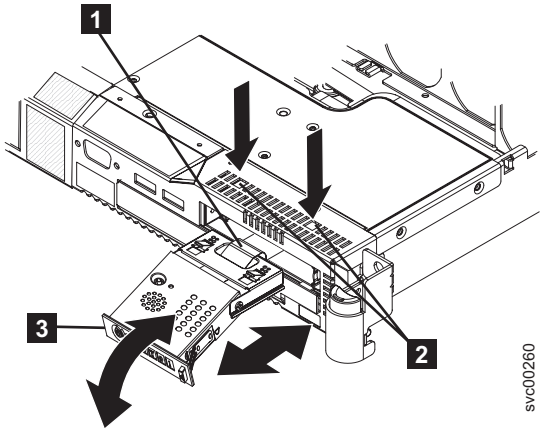


Figure 157. Removing the operator-information panel

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 operator-information panel

You might have to remove the operator-information panel on a SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 due to required maintenance.

Perform the following steps to remove the operator-information panel:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the SAN Volume Controller 2145-8F4 cable retention bracket.
3. Disconnect all power cords and external cables from the back of the node.
4. Remove the top cover. See “Removing the top cover” on page 67. If necessary, you might have to remove the node from the rack.
5. Press the operator-information panel release latch (**2** in Figure 158 on page 173) and slide the operator-information panel away from the SAN Volume

Controller 2145-8F2.

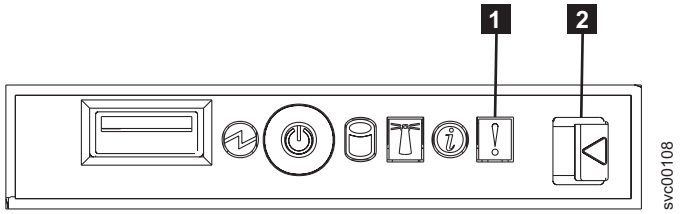


Figure 158. SAN Volume Controller 2145-8F4 operator-information panel

6. Use a small screwdriver to push in the retention springs (**1** in Figure 159) on the sides of the operator-information panel assembly.

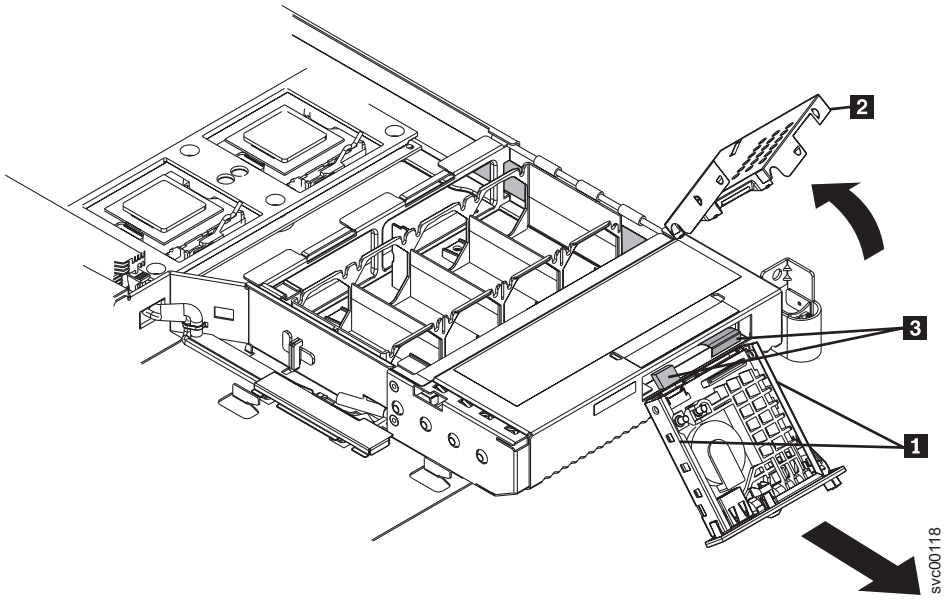


Figure 159. SAN Volume Controller 2145-8F2 with exposed operator-information panel

1 Retention springs

2 Operator-information panel assembly cover

3 Cables

7. Slide the assembly forward and out of the node.
8. Push out on the two sides of the assembly cover to flare it out.
9. Rotate the assembly cover (**2** in Figure 159) up and off of the operator-information panel assembly.
10. Unplug the two cables from the rear of the assembly (**3** in Figure 159).

Replacing the operator-information panel assembly

You might be prompted to replace the SAN Volume Controller operator-information panel assembly.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

Related tasks

“Removing the top cover” on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

“Replacing the top cover” on page 71
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8A4 operator-information panel

You might have to replace the operator-information panel assembly on a SAN Volume Controller 2145-8A4 due to required maintenance.

Perform the following steps to replace the operator-information panel:

1. Connect the light panel cable **1** and the front USB cable **2**, shown in Figure 160, to the operator-information panel board.

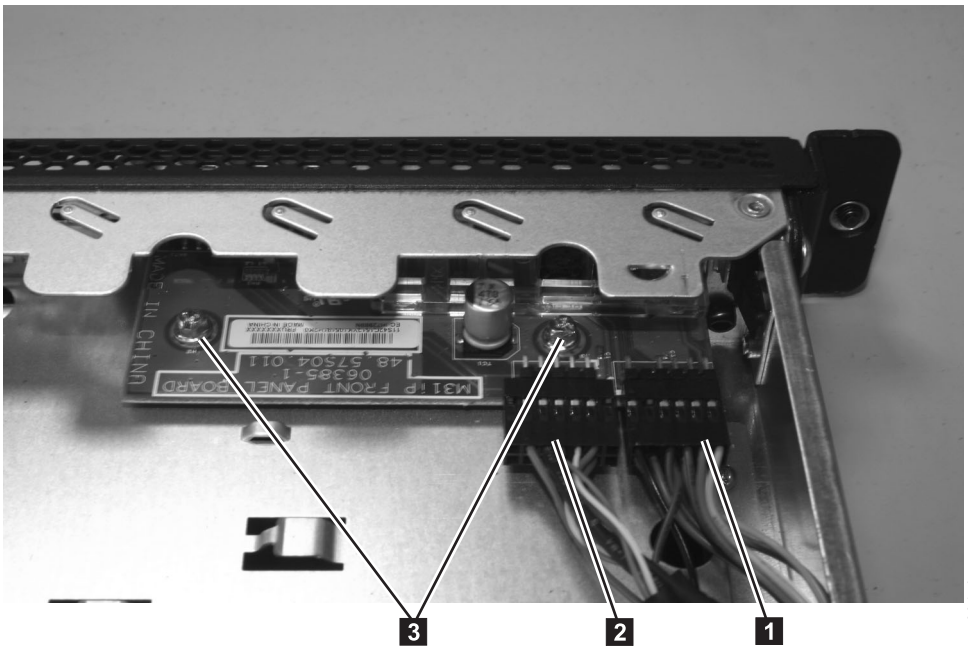


Figure 160. SAN Volume Controller 2145-8A4 operator-information panel

2. Guide the operator-information panel into position on top of the CD/DVD bay housing. Make sure that the LEDs and the USB connectors are aligned with the openings in the bezel and that the holes in the board align with the screw holes in the top of the bay housing.
3. Tighten the screws **3** to secure the operator-information panel onto the top of the CD/DVD bay housing.

4. Replace the top cover. See “Replacing the top cover” on page 71.
5. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
6. Connect the power cable to the node and replace the cable retention bracket.
7. Turn on the node.

Replacing the SAN Volume Controller 2145-8G4 operator-information panel assembly

You might have to replace the operator-information panel on a SAN Volume Controller 2145-8G4 due to required maintenance.

Perform the following steps to replace the operator-information panel:

1. From the front of the node, thread the light path ribbon cable through the panel housing in the node.
2. Slide the operator-information panel into its cage until it locks in place with a click (in the In position); gently pull the cable through at the back as you do this.

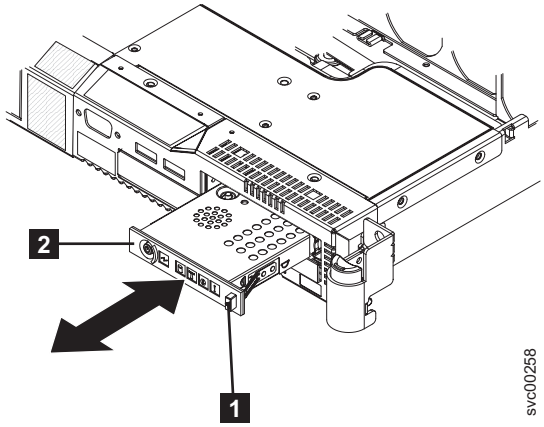


Figure 161. Installing the operator-information panel

1 Release button

2 Operator-information panel

3. Carefully thread the light path assembly ribbon cable **4** back under its retaining brackets and replace the tape securing it in place.
4. Thread the light path assembly ribbon cable **4** back to the system board. Reconnect the cable to the system board socket **11**. In Figure 162 on page 176, the front of the node is shown at the bottom of the illustration. The connectors on the cable plug go towards the center of the node and the blue side is towards the outside of the node.

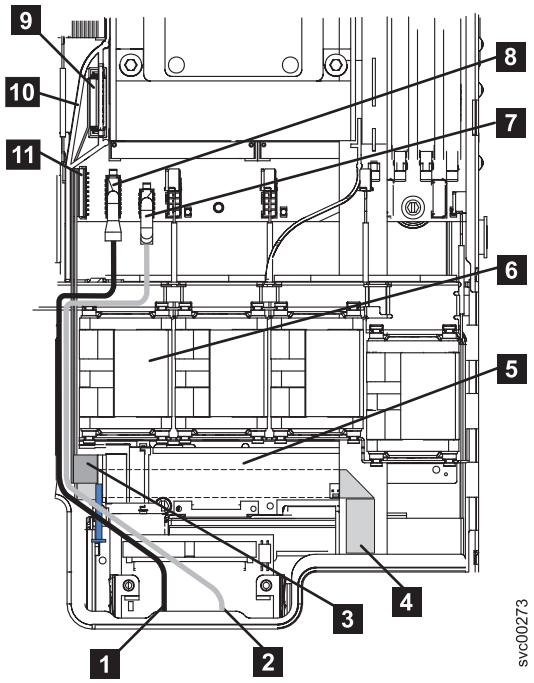


Figure 162. Threading the video, USB, and the CD/DVD cables

1. Video cable
2. USB cable
3. CD-RW cable
4. Light path cable
5. Interposer card
6. Fan 3
7. USB cable connector
8. Video cable connector
9. CD-RW connector
10. Air baffle
11. Light path cable connector

5. Reconnect the video cable 8, the USB cable 7 and the CD/DVD cable 9 to the system board.
6. Replace the air baffle 2. It is easier to do this if you remove fan 2. Ensure that all the cables are routed correctly and not obstructing the fan doors.

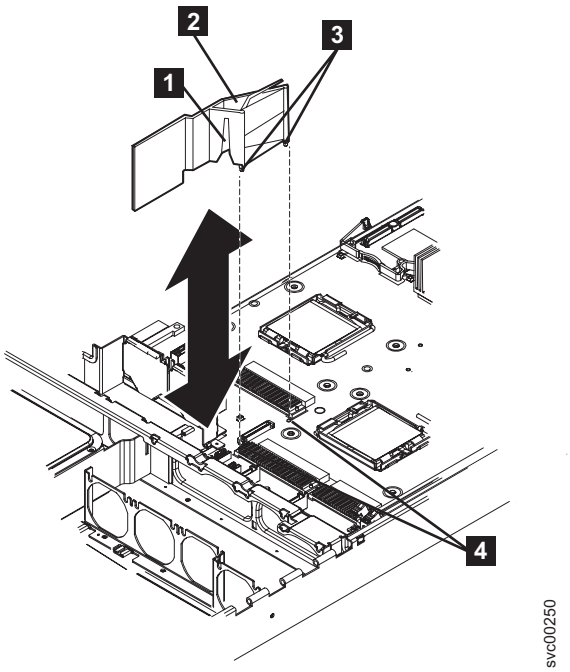


Figure 163. Replacing the air baffle

1. Cable routing slot
2. Air baffle
3. Baffle pins
4. Baffle mounting holes

7. Replace fan 3.

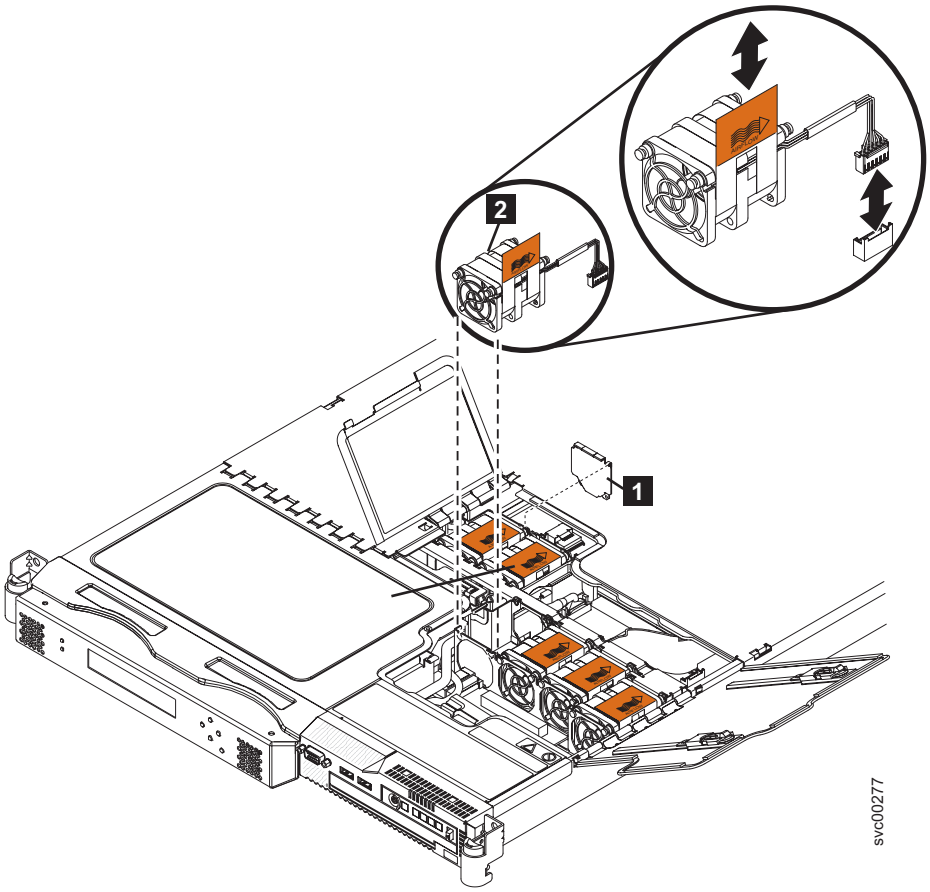


Figure 164. Replacing fan 3

1 Air baffle

2 Fan 3

8. Reconnect the CD cable to the interposer card, locating the pins on the right hand side; then, mount the card to the node with the screw that you removed.
9. Slide the dummy CD/DVD drive **2** back into its enclosure.

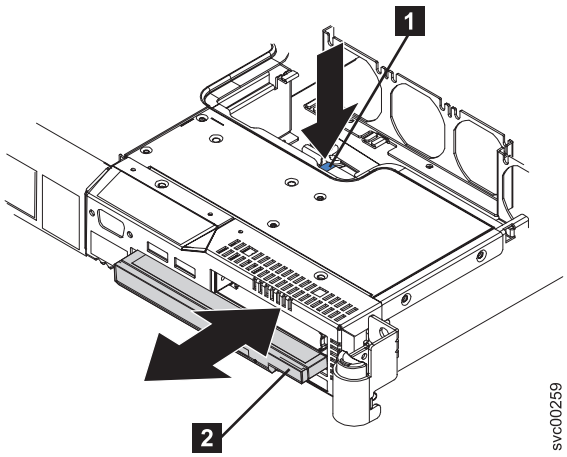


Figure 165. Replacing the dummy CD/DVD drive

1 Release button

2 Dummy CD/DVD drive

10. Ensure that the fan door still closes; realign the cable if it does not.
11. Reopen the fan door and replace the cover; close all doors.
12. Replace the node in the rack, reconnect all cables, and power on the node.

Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 operator-information panel

You might have to replace the operator-information panel on a SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 due to required maintenance.

Perform the following steps to replace the operator-information panel:

1. Plug in the two cables on the rear of the assembly 1 . See Figure 166.

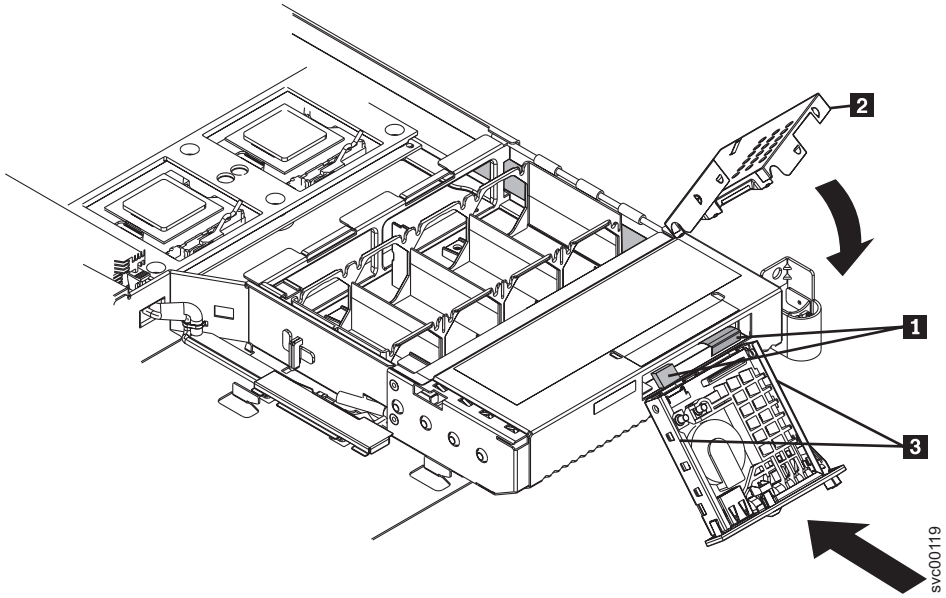


Figure 166. Replacing the operator-information panel

1 Cables

2 Operator-information panel assembly cover

2. Replace the assembly cover 2 onto the operator-information panel assembly.
3. Slide the assembly into the node until it is firmly anchored.
4. Replace the top cover and replace the node in the rack, if necessary.
5. Connect all power cords and external cables to the back of the server.
6. Turn on the node.

Removing the SAN Volume Controller 2145-8A4 operator-information panel cable

Use these instructions when you are prompted to remove the operator-information panel cable from the SAN Volume Controller 2145-8A4.

Make careful note of the layout of the cables as you go through this procedure as they will need replacing in the same position when you replace the operator-information panel cable.

Attention: It is easier to remove the operator-information panel cable if you first remove the service controller, disk drive, and the back plate. If you decide to do that, see “Removing the disk drive” on page 103 before using this procedure.

Perform the following steps to remove the operator-information panel cable:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the cable retention bracket and disconnect the power cable and other external cables from the node. See “Removing the cable retention bracket” on page 24.
3. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
4. Optionally, remove the service controller and pull the disk drive slightly out of the node to disengage it from the back plate. You can then lift the back plate out of the way when you remove the cable.
5. Remove the top cover. See “Removing the top cover” on page 67.
6. Disconnect the light-panel cable **1** and the USB cable **2** from the operator-information panel board shown in Figure 167.

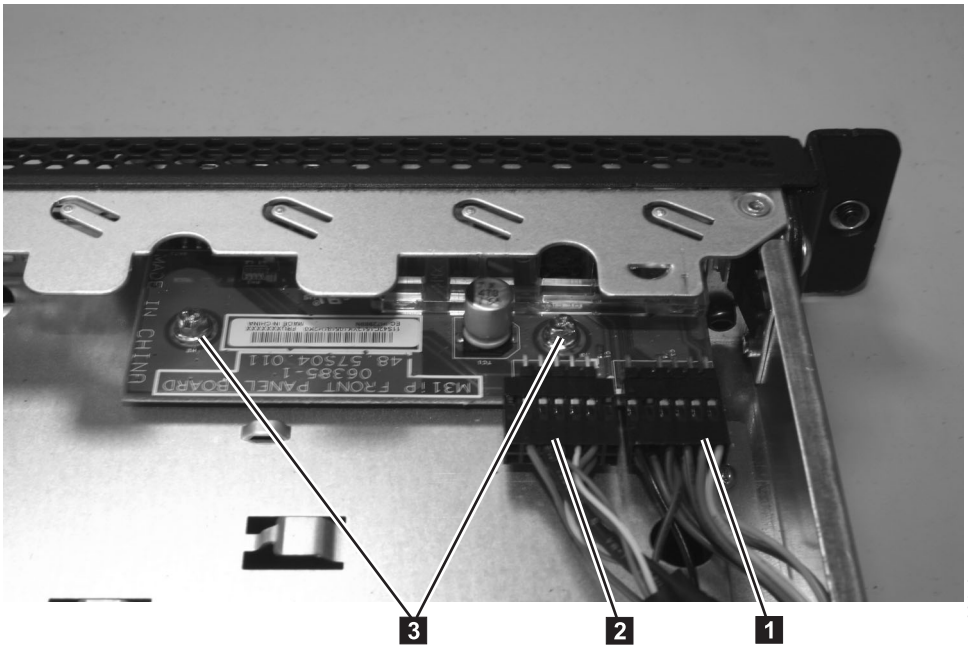


Figure 167. SAN Volume Controller 2145-8A4 operator-information panel

7. The operator-information panel cable consists of two thick cables and a number of thinner cables that are bundled together and routed through the chassis. It provides connectivity for the operator-information panel and the front USB ports. Trace this cable assembly through to the right side of the system board (next to the power supply) and disconnect the Front USB connector **1** and the operator-information panel connector **2** from the system board

shown in Figure 168.

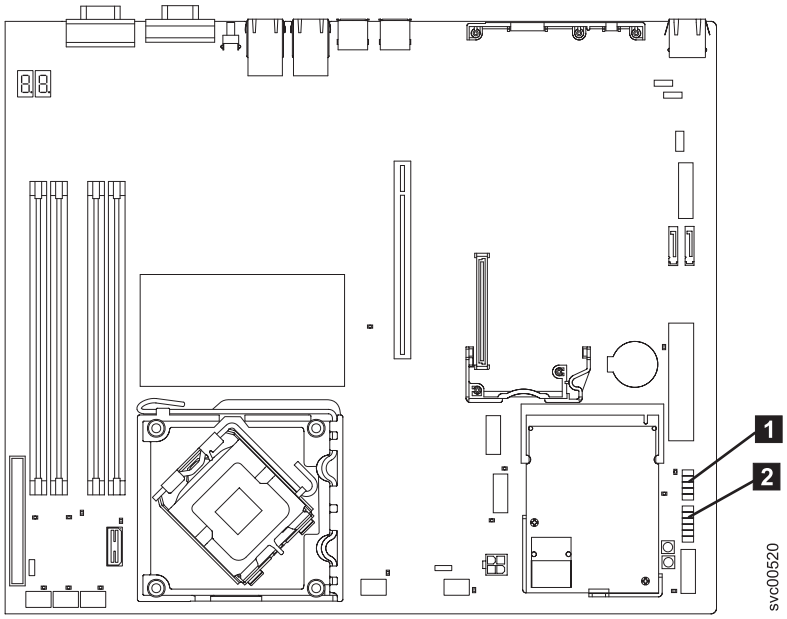


Figure 168. Connectors for the operator-information panel on the SAN Volume Controller 2145-8A4 system board

1 Front USB connector

2 Operator-information panel connector

8. Rotate (lift) the air deflector out of the way. It is easier to access the cable if you lift the back plate out of the way. You do not need to remove either SATA disk cable.
9. Remove the operator-information panel cable assembly from the retention-clip next to the air deflector, but leave the power-supply cable in the retention-clip.
10. A tie-wrap holds the cable assembly to the mounting bracket for the rightmost fan (when viewed from the front of the node and ignoring the fan on the power supply). Cut this tie-wrap to release the cable assembly.
11. Carefully extract the cable assembly from the node. To do this, you must displace other cables; particularly, the optical drive cables, power-supply cables, and the SATA cables. Minimize disruption to these cables as much as possible.

Replacing the SAN Volume Controller 2145-8A4 operator-information panel cable

Use these instructions when you are prompted to replace the operator-information panel cable for the SAN Volume Controller 2145-8A4.

Perform the following steps to replace the operator-information panel cable:

1. Connect the two connectors at one end of the operator-information panel cable assembly to the Front USB connector **1** and the Operator-information panel connector **2** on the system board. The connectors are keyed and it is important to insert the correct connector on the cable assembly onto the correct connector on the system board.

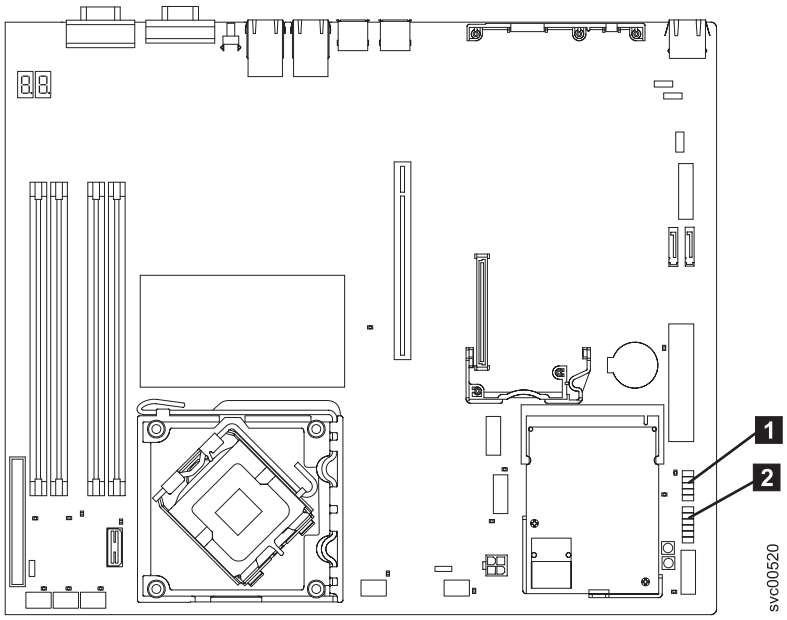


Figure 169. Connectors for the operator-information panel on the SAN Volume Controller 2145-8A4 system board

1 Front USB connector

2 Operator-information panel connector

2. Route the operator-information panel cable into position along the same path that it was removed from:
   a. Pass to the right of the mounting bracket for the rightmost fan (when viewed from the front of the node and ignoring the fan on the power supply).
   b. Go between the fans and the disk drive back plate, under the cable retention-clip, and around the processor fans to the left side of the node.
   c. Bring it forward to the operator-information panel.
3. Use a tie-wrap to hold the cable assembly to the lower right front corner of the mounting bracket for the rightmost fan.
4. Connect the two connectors on the other end of the cable to the connectors on the operator-information panel board. The connectors are keyed and it is important to insert the correct connector on the cable onto the correct connector on the operator-information panel board.
5. If the back plate was removed, replace the back plate, disk drive, and service controller. See “Removing the disk cable assembly” on page 112.
6. Rotate the air deflector back into place, making sure not to pinch any cables beneath it, and press it down firmly. Ensure that any other cable that was unplugged or moved is returned to its original position and does not obstruct the top cover of the node.
7. Replace the top cover. See “Replacing the top cover” on page 71.
8. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
9. Connect the power cable to the node and replace the cable retention bracket.

Removing the fans

The SAN Volume Controller fans might have to be replaced due to failure.

Related tasks

“Replacing the fans” on page 187
You might have to replace one or more SAN Volume Controller fans if they fail.

“Removing the SAN Volume Controller from a rack” on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

“Replacing the SAN Volume Controller in a rack” on page 43
You must use caution when you replace the SAN Volume Controller in a rack.

“Removing the top cover” on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

“Replacing the top cover” on page 71
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

“Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 VRM” on page 205
You might remove the voltage regulator module (VRM) to perform maintenance on the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4.

“Removing and replacing the SAN Volume Controller power cable assembly” on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8A4 fans

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

Perform the following steps to remove a failed fan:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the cable retention bracket and disconnect the power cable from the node. See “Removing the cable retention bracket” on page 24.
3. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
4. Remove the top cover. See “Removing the top cover” on page 67.
5. Reconnect the power cord and then turn on the node.

   Attention: Operating the node for extended periods of time (more than 30 minutes) with the cover removed might damage server components.
6. Determine which fan to replace by checking the LEDs on the system board. Each fan has an LED next to it. A lit LED indicates the fan to replace.
7. Turn off the node and then disconnect the power cord again.
8. Remove the failed fan.
   a. Disconnect the fan cable from the system board.

Note: Make a note of the routing of the fan cable to the connector. You will have to route the fan cable the same way when you install the fan.

b. Grasp the top of the fan with your index finger and thumb and lift the fan out of the server.

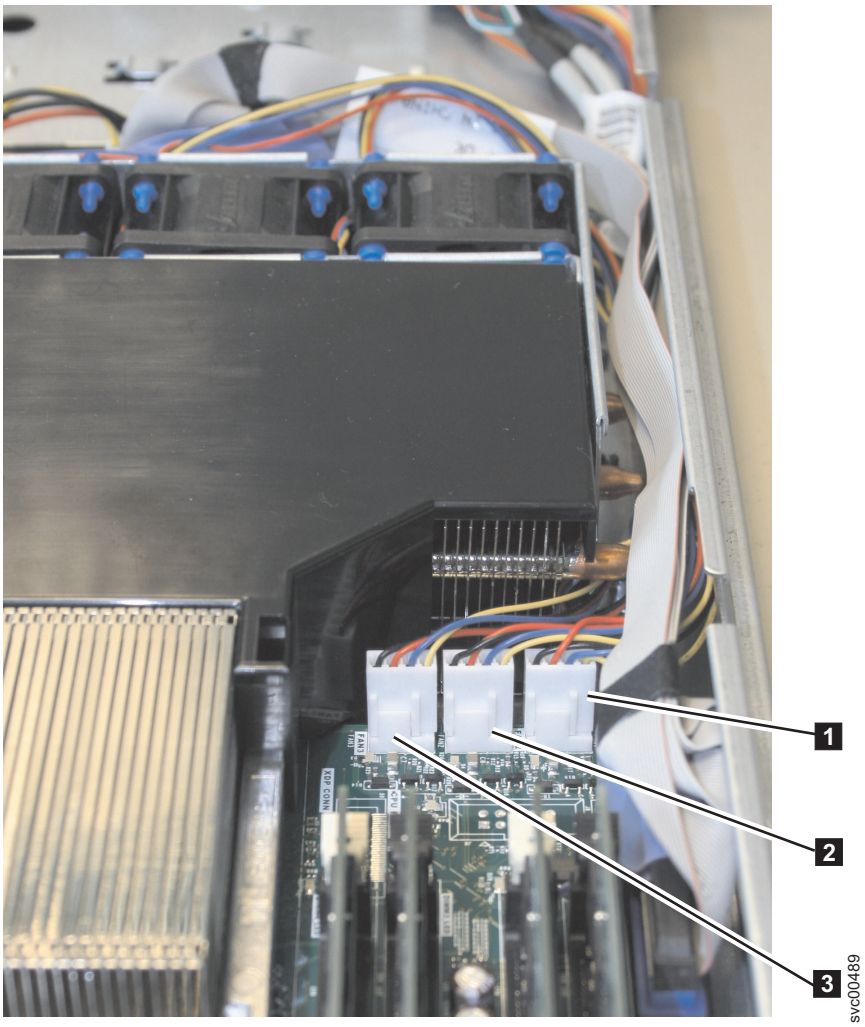


Figure 170. Connectors for the SAN Volume Controller 2145-8A4 heat exchange fans

1 Fan 3

2 Fan 2

3 Fan 1

Removing the SAN Volume Controller 2145-8G4 fans

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

Perform the following steps to remove a failed fan:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.

2. Slide the node forward to gain access to the fan doors (1 in Figure 171).
3. Open the fan door for the failing fan. The LED near the connector of the failing fan assembly is lit, unless you remove the power cable.

   Note: The node has six fan positions that are numbered left to right under the two fan doors.

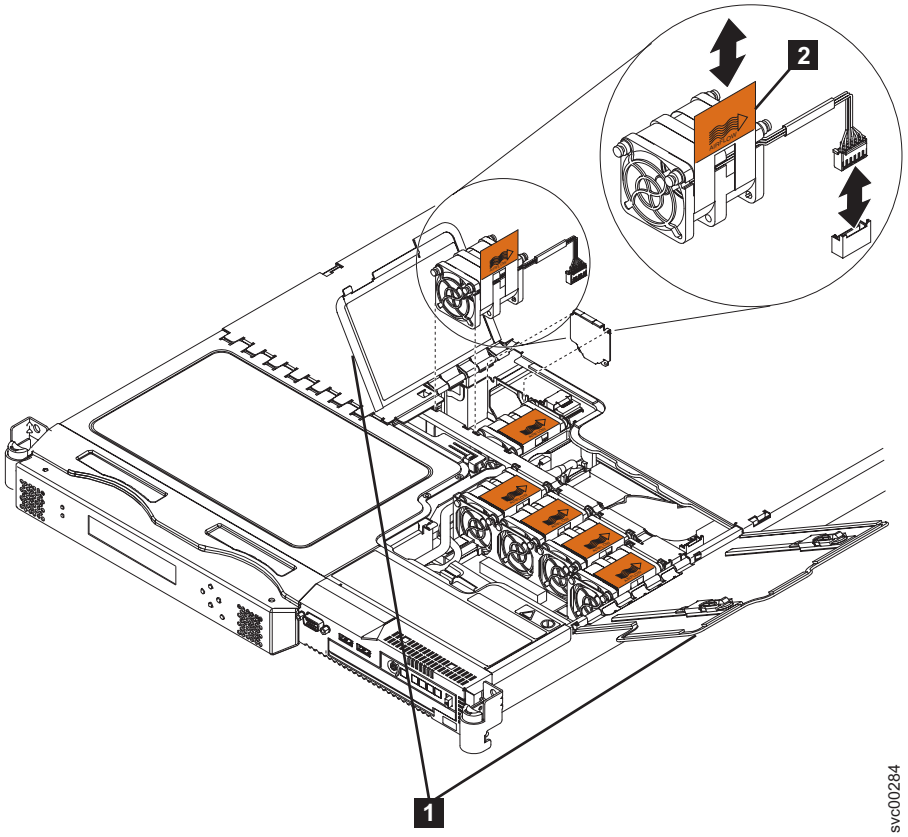


Figure 171. SAN Volume Controller 2145-8G4 fan doors, locations, and connectors

4. Disconnect the cable of the failing fan from the connector on the system board by pressing the release latch on the plug at the end of the cable.
5. Pull up on the orange tab (2 in Figure 171) of the failing fan to lift the fan out of the node.

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 fans

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 fans.

Perform the following steps to remove a failed fan:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.

3. Open the fan door where the failed fan resides. Fans 1, 2, and 3 are under fan door A 1 . Fans 4 through 7 are under fan door B 2 , as shown in Figure 172.

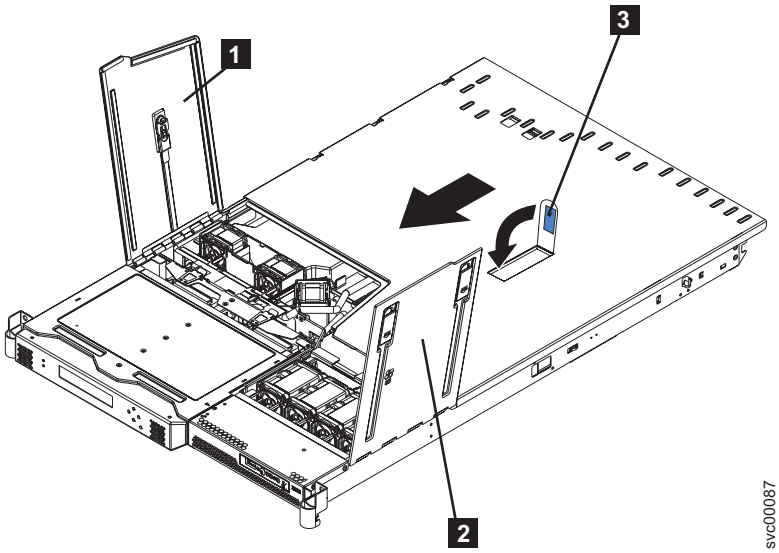


Figure 172. SAN Volume Controller 2145-8F2 with the fan doors open

1 Fan door A

2 Fan door B

4. Disconnect the cable of the failing fan from the connector.

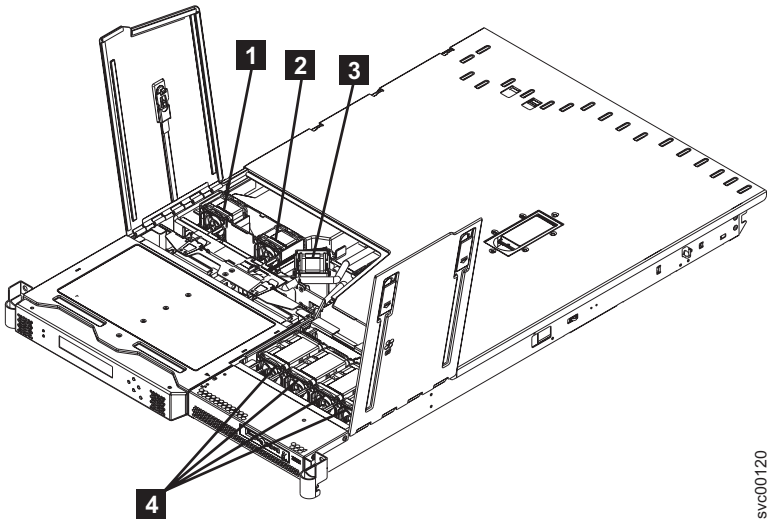


Figure 173. SAN Volume Controller 2145-8F2 with open fan doors

1 Fan 1

2 Fan 2

3 Fan 3

4 Fans 4, 5, 6, and 7

5. Pull up on the orange tab on the side of the failing fan.

6. Lift the fan out of the node.

You can now replace the failed fan.

Removing the SAN Volume Controller 2145-4F2 microprocessor fan

Perform the following steps to remove the microprocessor fan:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
3. Remove the top cover. See “Removing the top cover” on page 67.
4. Disconnect the fan cable from the system board.

   Note: The fans are numbered from one to four, from left to right, as shown in Figure 174.
5. Lift the fan upward out of the retaining clip.

   Note: To remove the fourth fan, first remove the third fan, then move the fourth fan to the left before lifting it.

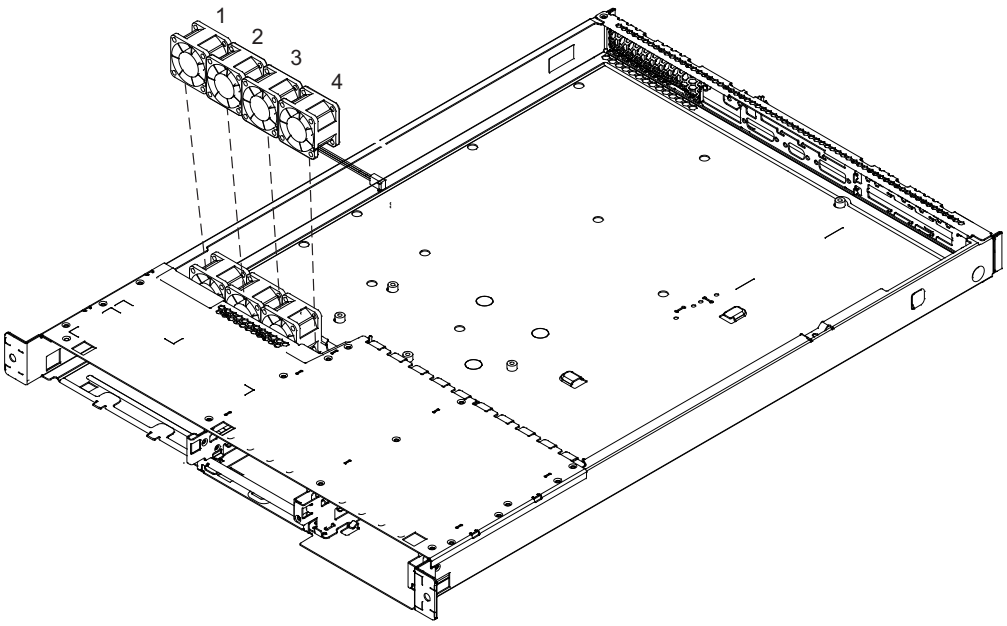


Figure 174. SAN Volume Controller 2145-4F2 microprocessor fan locations

6. If you have any other tasks to do inside the node, do those tasks now.

Replacing the fans

You might have to replace one or more SAN Volume Controller fans if they fail.

Related tasks

"Removing the fans" on page 182
The SAN Volume Controller fans might have to be replaced due to failure.

"Replacing the SAN Volume Controller in a rack" on page 43
You must use caution when you replace the SAN Volume Controller in a rack.

"Replacing the top cover" on page 71
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

Related reference

"Handling static-sensitive devices" on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8A4 fans

This topic describes how to replace the SAN Volume Controller 2145-8A4 fans.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see "Handling static-sensitive devices" on page xxx.

Perform the following steps to replace a failed fan:

1. Position the replacement fan, shown in Figure 175, so that the airflow arrow on the side of the fan points toward the rear of the node.

   Note: Correct airflow is from the front to the rear of the node.

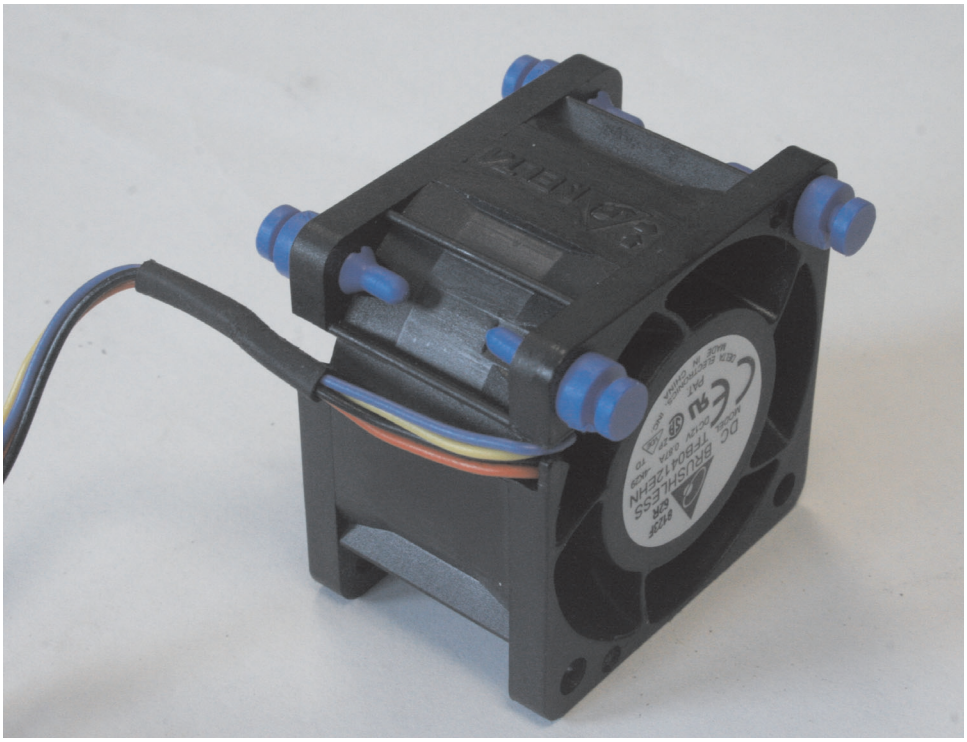


Figure 175. A close up of the SAN Volume Controller 2145-8A4 fan

2. Install the replacement fan in the bracket:

a. Make sure that the fan cable sits in the channel 1 , as shown in Figure 176, on the side of the fan.
b. Route the fan cable into its slot in the fan bracket top and then insert the fan into the bracket.
c. Make sure that each of the soft blue tabs on the fan is fully seated in its slot in the fan bracket.

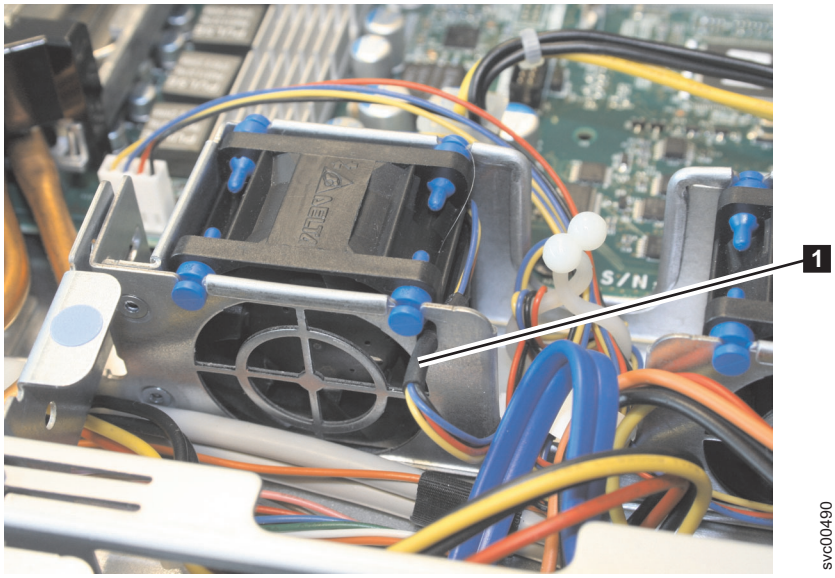


Figure 176. Routing the SAN Volume Controller 2145-8A4 fan cable

d. Rreconnect the fan cable to the system board, routing the cable in the same way as it was originally.

3. Connect the cable of the replacement fan into the system-board connector.
4. Replace the top cover. See “Replacing the top cover” on page 71.
5. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
6. Replace the cable retention bracket. See “Replacing the cable retention bracket” on page 28.
7. Turn on the node.

Replacing the SAN Volume Controller 2145-8G4 fans

This topic describes how to replace the SAN Volume Controller 2145-8G4 fans.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx. The replacement procedures in this topic assume that the following are true:

- The failed fan is removed
- The node power is turned off
- The node is removed from the rack

Perform the following steps to replace a failed fan:

1. Orient the new fan in the same position as the fan that you removed. Make sure that the airflow indicator on the orange tab, (2 in Figure 177 on page 190) is

pointing to the rear of the node.

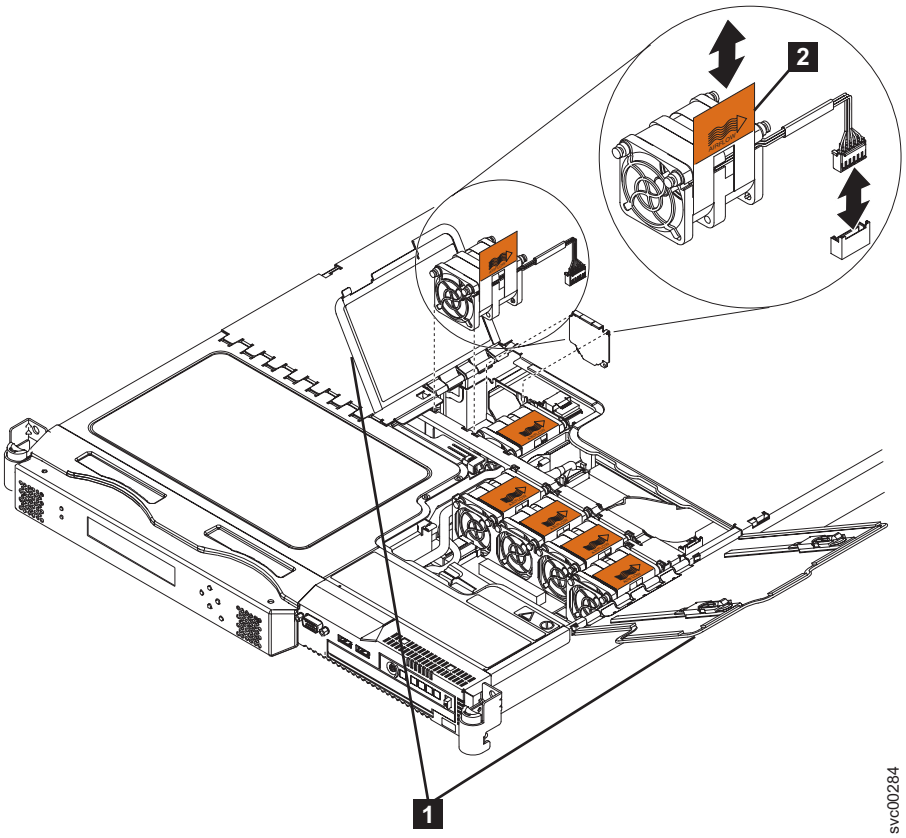


Figure 177. SAN Volume Controller 2145-8G4 fan doors, locations, and connectors

2. Push the fan assembly down into the server until the blue mounting grommets are correctly seated.
3. Connect the cable of the replacement fan into the system board connector.
4. Close the fan door **1** .
5. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
6. Turn on the node.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 fans

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx. The replacement procedures in this topic assume that the following are true:

- The failed fan is removed
- The node power is turned off
- The node is removed from the rack

Perform the following steps to replace the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 fans:

1. Orient the new fan in the same position as the fan you removed. Make sure that the airflow indicator, on top of the fan, is pointing to the rear of the server.

2. Push the fan assembly down into the server until the blue grommets are correctly seated.
3. Connect the cable of the replacement fan into the connector.
4. Close the fan door.
5. Replace the top cover. See “Replacing the top cover” on page 71.
6. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
7. Reconnect the cables and power cords that were removed.
8. Turn on the node.

Replacing the SAN Volume Controller 2145-4F2 microprocessor fans

Note:

- The airflow is from the front to the back of the SAN Volume Controller 2145-4F2 node.
- The fan cable comes out of the back of the fan. When you install the fan, ensure that the back of the fan is facing the back of the node.
- If you are installing a microprocessor fan, orient the fan in the retaining clip so that the cable can reach the connector on the system board.

Perform the following steps to replace the microprocessor fan:

1. Push the fan downward into the retaining clip. Figure 178 shows the location of the fans and the retaining clips.

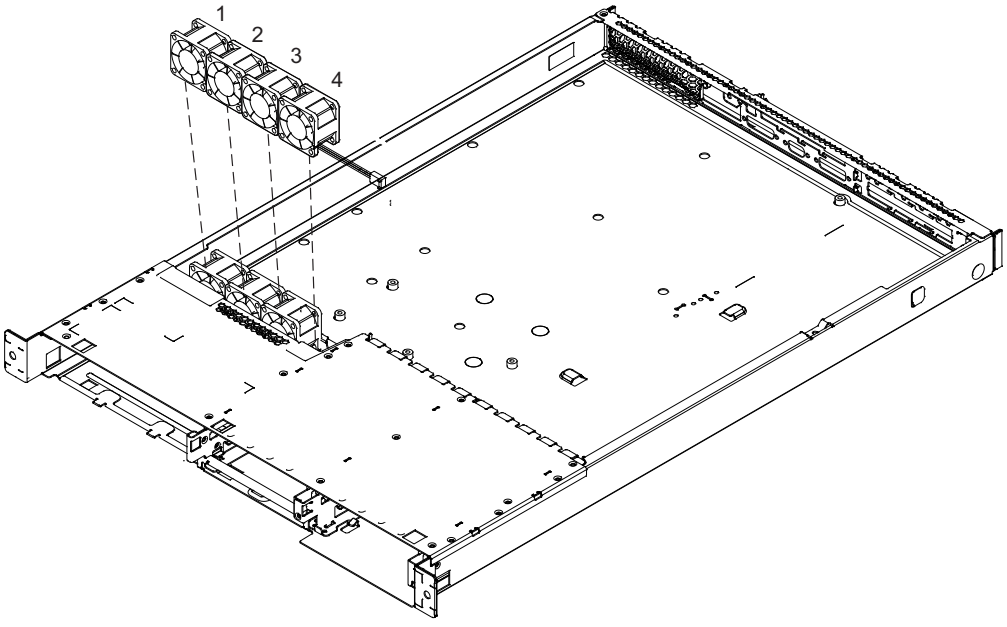


Figure 178. SAN Volume Controller 2145-4F2 microprocessor fan locations

2. Connect the fan cable to the system board.

   Note: The fans are numbered from one to four, from left to right.
3. Replace the top cover. See “Replacing the top cover” on page 71.
4. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.

5. Turn on the node.

Removing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 fan holder and fan backplanes

The fan holder with fan backplanes field replaceable unit (FRU) is supplied as a kit of parts. Replace only the failed assembly and discard any unused part.

Perform the following steps to remove the fan holder with fan backplane:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Disconnect all power cords and external cables from the back of the node.
3. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
4. Remove the top cover. See “Removing the top cover” on page 67.
5. Unplug the fans from the fan backplane.
6. Remove the screws and set them in a safe place.
7. Disconnect the fan cable.
8. Pull the fan bracket out of the node.

Related tasks

“Removing the SAN Volume Controller from a rack” on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

“Removing the top cover” on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 fan holder and fan backplanes

The fan holder with fan backplanes field replaceable unit (FRU) is supplied as a kit of parts. Replace only the failed assembly and discard any unused part.

Perform the following steps to replace the fan holder with fan backplane:

1. Place the fan bracket into the node.
2. Connect the fan cable.
3. Replace the screws that you had set aside.
4. Plug the fans into the fan backplane.
5. Replace the top cover.
6. Replace the node in the rack.
7. Connect all power cords and external cables into the back of the node.
8. Turn on the node.

Tip: When reinstalling the fan brackets on the front right side of the node, remove the cage assembly that holds the disk drive and service controller

and remove the fan cable cover. Pull the cable loose before plugging it into the fan backplane, then install the fan holder and backplane assembly in the node.

Related tasks

“Replacing the top cover” on page 71
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

“Replacing the SAN Volume Controller in a rack” on page 43
You must use caution when you replace the SAN Volume Controller in a rack.

Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the microprocessor

You can remove the microprocessor that is used in the SAN Volume Controller nodes.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

Related tasks

“Removing the SAN Volume Controller from a rack” on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

“Removing the top cover” on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

“Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 VRM” on page 205
You might remove the voltage regulator module (VRM) to perform maintenance on the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4.

“Replacing the microprocessor” on page 198
Use this topic when you are required to replace a microprocessor.

Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8A4 microprocessor

Use this information to remove the SAN Volume Controller 2145-8A4 microprocessor.

You must order alcohol wipes and thermal grease separately, if you do not already have them, to correctly perform this task.

To remove the microprocessor, complete the following steps:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the cable retention bracket and disconnect the power cable from the node. See “Removing the cable retention bracket” on page 24.

3. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
4. Remove the top cover. See “Removing the top cover” on page 67.
5. Remove the air baffle (**1** in Figure 179). Grasp the air baffle by the leftmost and rightmost rear corners and lift it up out of the node.

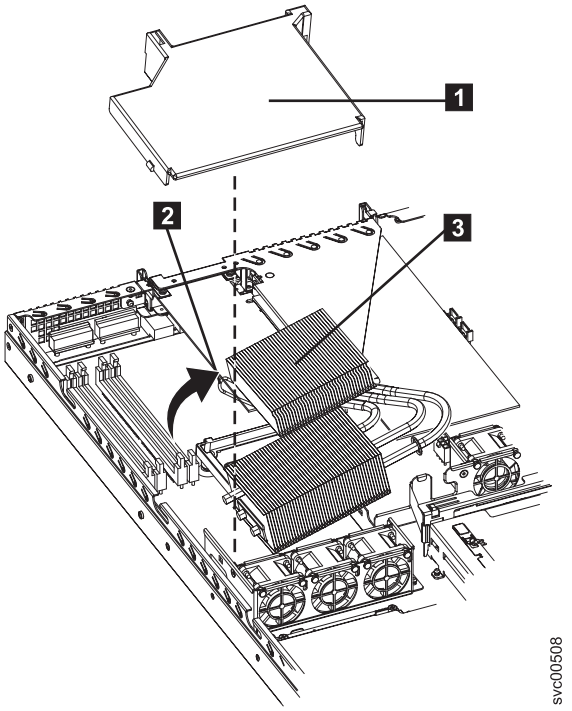


Figure 179. SAN Volume Controller 2145-8A4 air baffle and heat-exchanger assembly

6. Open the heat-exchanger-assembly release latch (**2** in Figure 179) to the fully open position.
7. Lift the side of the heat-exchanger assembly (**3** in Figure 179) that is closer to the middle of the node, slide it toward the middle of the node slightly, and lift the entire assembly out of the node.
8. Open the microprocessor release latch to the fully open position.

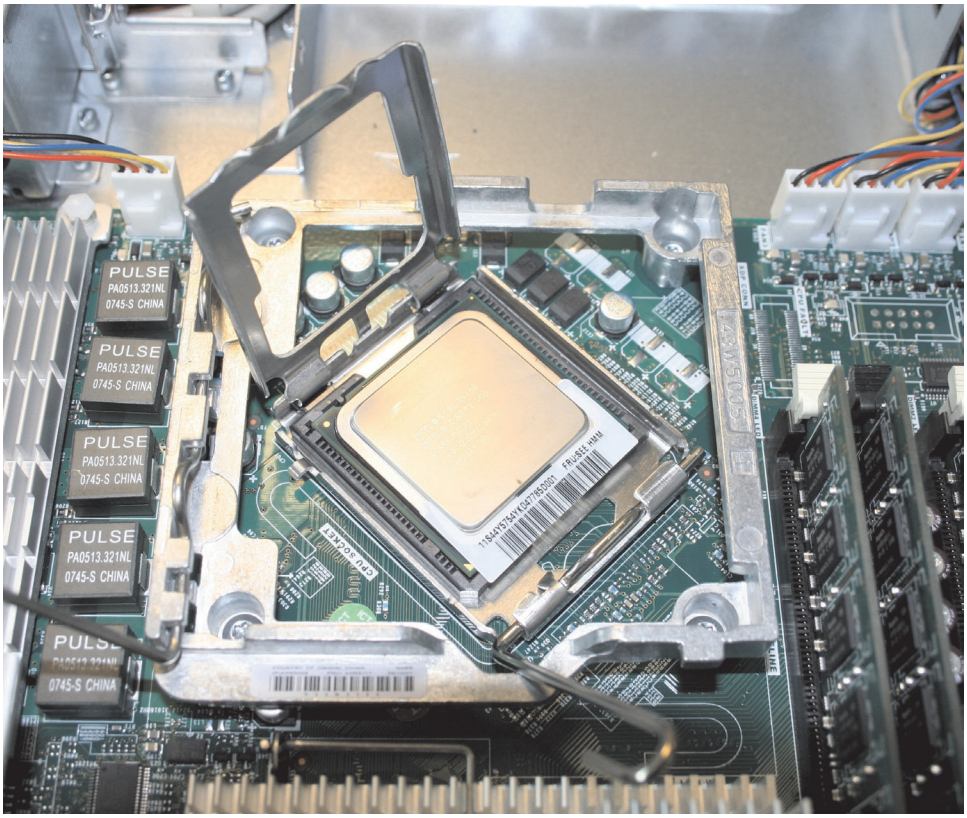


Figure 180. The SAN Volume Controller 2145-8A4 microprocessor bracket frame fully opened

9. Open the microprocessor bracket frame.

   Note: Handle the microprocessor carefully. Dropping the microprocessor during removal can damage the contacts. Also, contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.

10. Remove the microprocessor:
    a. Carefully lift the microprocessor straight up and out of the socket, without touching the microprocessor contacts.
    b. Place the microprocessor on a static-protective surface.

Removing the SAN Volume Controller 2145-8G4 microprocessor

Use this information to remove the SAN Volume Controller 2145-8G4 microprocessor and heat sink.

To correctly perform this task, you must have alcohol wipes and thermal grease available. If you do not already have them, order these separately.

Attention:

- Do not allow the thermal grease on the microprocessor and heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease and the microprocessor socket.
- Use great care when handling microprocessors. Dropping the microprocessor during installation or removal can damage the contacts.
- Do not touch the microprocessor contacts; handle the microprocessor by the edges only. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.

To remove a microprocessor and heat sink, complete the following steps:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the top cover. See “Removing the top cover” on page 67.
3. Remove the heat sink (**1** in Figure 181). Loosen two captive screws on alternate sides of the heat sink fully before loosening the other two captive screws. (This helps to break the bond between the heat sink and the microprocessor.) After the captive screws are loosened, remove the heat sink.

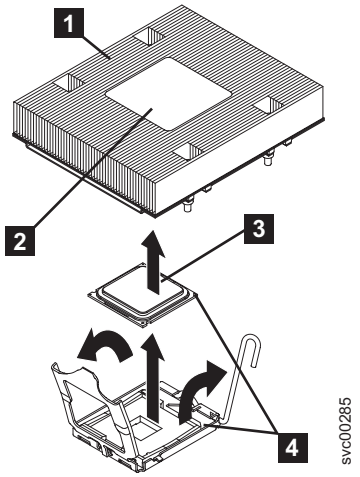


Figure 181. Removing the heat sink from the microprocessor

1 Heat sink

2 Heat sink installation label

3 Microprocessor

4 Alignment indicator

4. Open the microprocessor release lever (**1** in Figure 182 on page 197) to the fully open position.

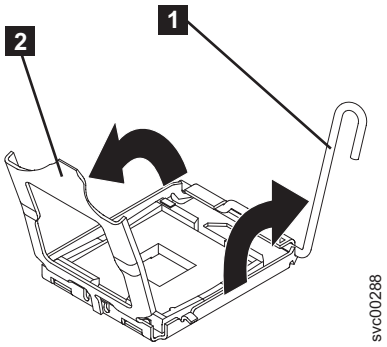


Figure 182. The microprocessor release lever and bracket frame fully opened

1 Microprocessor release lever

2 Microprocessor bracket frame

5. Open the microprocessor bracket frame (2 in Figure 182).
6. Carefully remove the microprocessor from the socket. Be careful to only touch the edges of the microprocessor.

Removing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 microprocessor

The SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 must always be fitted with both microprocessors to function correctly.

Figure 183 shows the microprocessors and voltage regulator modules (VRMs).

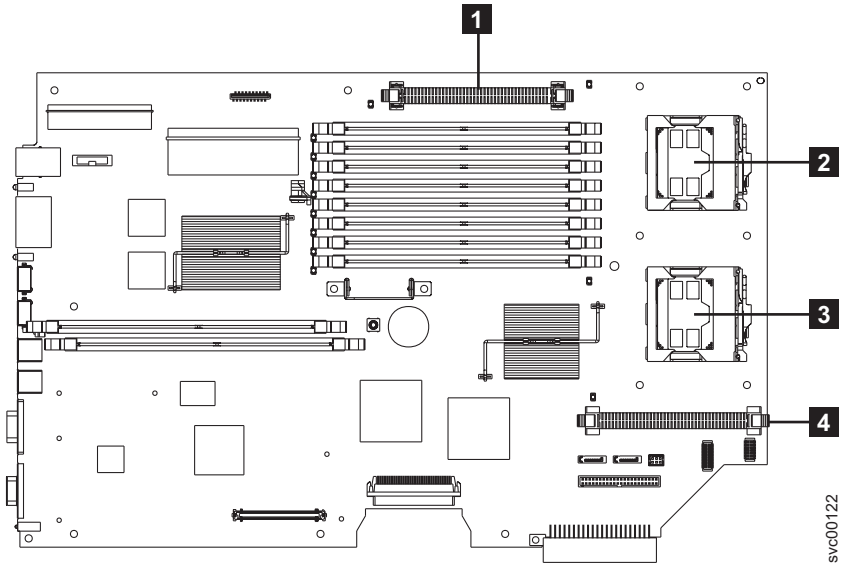


Figure 183. Location of the microprocessor and VRM sockets

1 VRM 1

2 Microprocessor 1

3 Microprocessor 2

4 VRM 2

Each microprocessor is matched with a VRM and a heat sink. When removing the microprocessor, you must first remove the heat sink.

Perform the following steps to remove a microprocessor:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Disconnect all power cords and external cables from the back of the node.
3. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
4. Remove the top cover. See “Removing the top cover” on page 67.
5. Fully loosen one captive screw before loosening the other captive screw. This helps to break the bond between the heat sink and the microprocessor.
6. Remove the heat sink.

   Important: Be careful when handling the microprocessor and heat sink. If you wish to reuse the thermal grease between the heat sink and the microprocessor, do not contaminate it. If thermal grease is supplied with your replacement microprocessor, remove all traces of the used thermal grease before applying the new grease.
7. Rotate the microprocessor socket lever arm upward to its maximum vertical position.
8. Remove the microprocessor from the socket.

Replacing the microprocessor

Use this topic when you are required to replace a microprocessor.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

Related tasks

“Replacing the top cover” on page 71
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

“Replacing the SAN Volume Controller in a rack” on page 43
You must use caution when you replace the SAN Volume Controller in a rack.

“Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 VRM” on page 207
Before you replace the microprocessor, you must replace the voltage regulator module (VRM).

“Removing the microprocessor” on page 193
You can remove the microprocessor that is used in the SAN Volume Controller nodes.

Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8A4 microprocessor

This topic describes how to replace the microprocessor.

Perform the following steps to replace the microprocessor:

1. Make sure that the microprocessor bracket frame **1** and release latch **4**, shown in Figure 184, are both fully open.

   Attention:

   - The microprocessor contacts are fragile; handle the microprocessor very carefully. Do not touch the microprocessor contacts with your skin.
   - The microprocessor fits only one way on the socket.

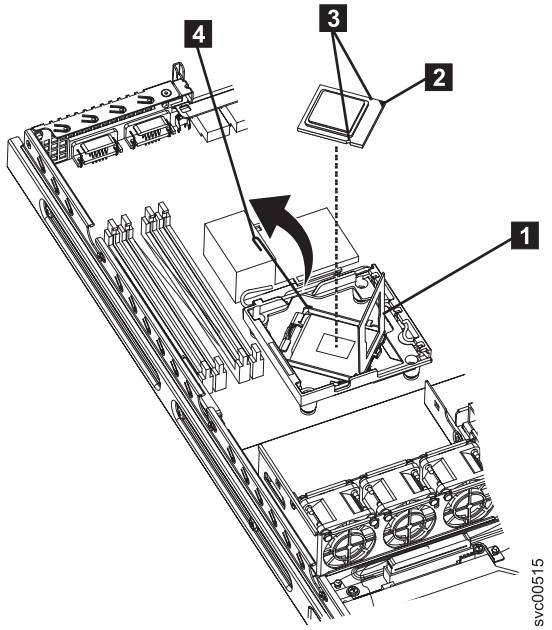


Figure 184. SAN Volume Controller 2145-8A4 microprocessor

2. Align the microprocessor with the socket as shown in Figure 184. (Note the alignment mark **2** and the position of the notches **3**.)
   Then, carefully place the microprocessor on the socket, close the microprocessor bracket frame **1**, and close the microprocessor release latch **4**.
3. Install the heat-exchanger assembly.
   - If you are installing a new heat-exchanger assembly, peel off the protective backing from the thermal material that is on the underside of the new heat exchanger.
   - If you are reinstalling a heat-exchanger assembly that was previously removed, replace the contaminated or missing thermal grease:
     a. Place the heat-exchanger assembly on a clean work surface.
     b. Remove the cleaning pad from its package and unfold it completely.
     c. Use the cleaning pad to wipe the thermal grease from the bottom of the heat exchanger. Make sure that all of the thermal grease is removed.
     d. Apply thermal grease to the top of the microprocessor, as shown in Figure 185 on page 200. Apply nine dots of thermal grease in three rows of three dots each with the outer rows approximately 5 mm from the

edge of the microprocessor. The diameter of the cap from the thermal grease syringe is 5 mm, so you can use it to judge the required position of the dots of thermal grease

Note: 0.01mL is one tick mark on the syringe. If the grease is properly applied, approximately half (0.22 mL) of the grease will remain in the syringe.

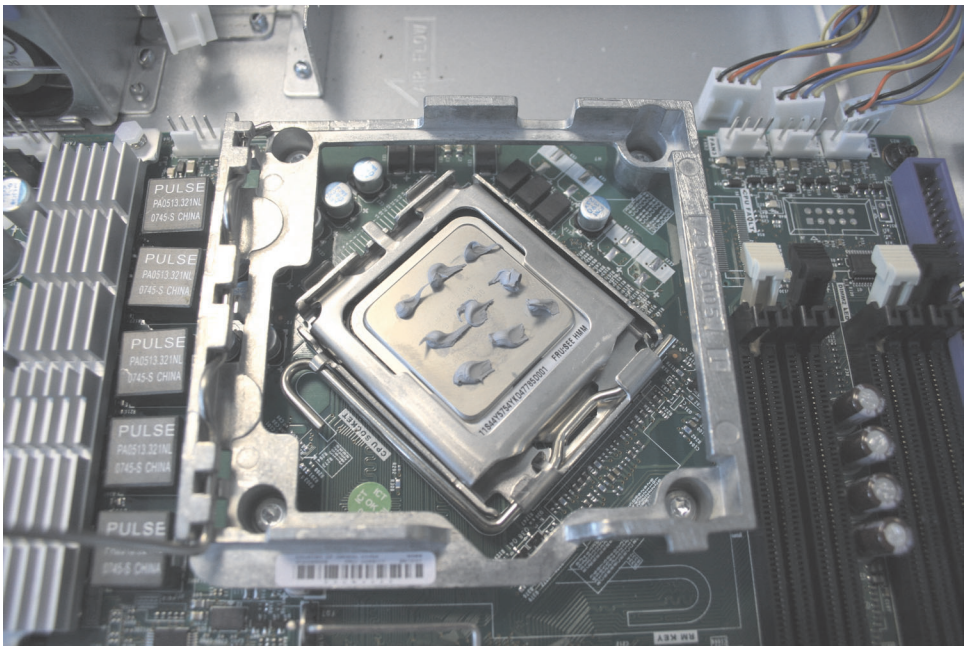


Figure 185. Complete set of nine thermal grease dots on the SAN Volume Controller 2145-8A4 microprocessor

4. Make sure that the heat-exchanger assembly release latch is fully opened.
5. With the heat-exchanger assembly at an angle, carefully align the heat-exchanger assembly with the microprocessor and the heat exchanger retention module (socket) on the system board. Make sure that the alignment pins **1**, shown in Figure 186 on page 201, protrude through the alignment hole (the opening in the side of the heat-exchanger bracket) and that the flange of the heat sink rests under the lip of the heat-exchanger socket.

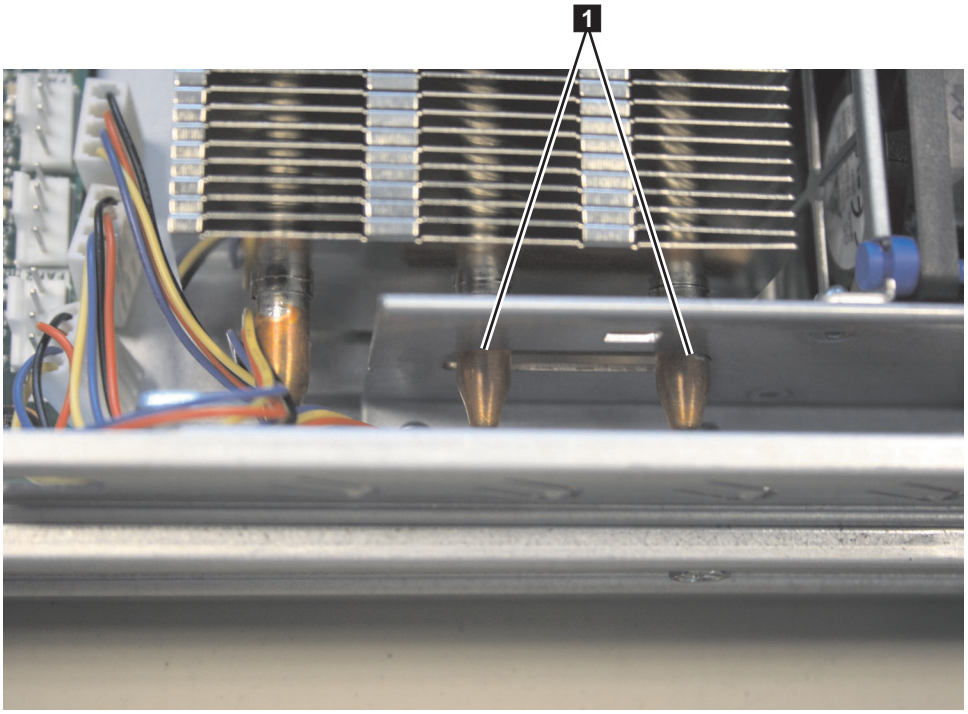


Figure 186. Alignment pins on the SAN Volume Controller 2145-8A4 heat-exchanger assembly

6. Gently press the assembly into place.
7. Close the heat-exchanger-assembly release latch, catching it under the hook on the socket.
8. Replace the air baffle. Align the air baffle and then press the air baffle into position until it clicks into place.
9. Replace the top cover. See “Replacing the top cover” on page 71.
10. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
11. Reconnect the power cords and any cables that were removed.
12. Turn on the node.

Replacing the SAN Volume Controller 2145-8G4 microprocessor

This topic describes how to replace the microprocessor.

There are two versions of the SAN Volume Controller 2145-8G4 node: Rev 1 and Rev 2. One difference between these two versions is in the processor configuration. The original version (Rev 1) has two microprocessors, while the second version (Rev 2) has one microprocessor. The label on the Rev 1 node does not include a version number. An additional label on the front of the Rev 2 node includes the version number. Ensure that you have the correct microprocessor for the node that you are servicing.

You need 1 alcohol wipe and 1 thermal grease syringe for each microprocessor that you will replace. If you do not already have these, order them before you begin to replace the part.

The documented steps to replace the SAN Volume Controller 2145-8G4 microprocessor assume that you:

- Removed all power from the node
- Removed the node from the rack
- Removed the top cover of the node
- Removed the microprocessor that is being replaced

Perform the following steps to replace the microprocessor:

1. Rotate the release lever from the closed and locked position to the open position.
2. Touch the static-protective package that contains the new microprocessor to any *unpainted* metal surface on the node.
3. Remove the microprocessor from the package.

   Attention: Be careful how you handle the microprocessor. Do not touch the microprocessor contacts; handle the microprocessor by the edges only. Dropping the microprocessor during installation or removal can damage the contacts. Also, contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.
4. Position the microprocessor **1** over the microprocessor socket, as shown in Figure 187. Use the triangular alignment cutout on the microprocessor socket and the triangular alignment mark **2** on the microprocessor to assist you in aligning the microprocessor to the socket. Then, carefully place the microprocessor onto the socket. Do not force the microprocessor. It only fits one way onto the socket.

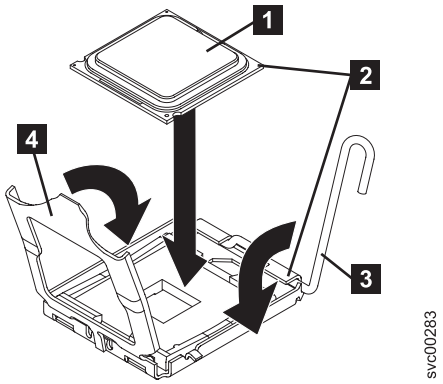


Figure 187. Aligning the microprocessor with the socket

1 Microprocessor

2 Alignment marks

3 Microprocessor release lever

4 Microprocessor bracket frame

5. Place the microprocessor bracket frame **4** down over the microprocessor and the microprocessor socket to secure the microprocessor position in the socket.
6. Rotate the microprocessor release lever **3** into a closed position.
7. Place the heat sink **1** on top of the microprocessor **3** with the thermal grease **2** side down, as shown in Figure 188 on page 203. Tighten the captive screws to secure the heat sink to the system board. Alternate among

the screws on either side of the heat sink until they are snug, and then alternate again until they are tight, making sure that you do not overtighten any of them.

Attention: If you are working on a Rev 1 node, do not touch the thermal grease on the bottom of the heat sink after you remove the plastic cover. Touching the thermal grease contaminates it.

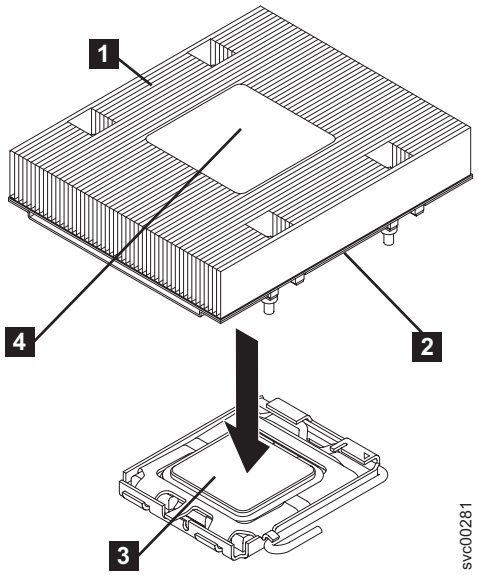


Figure 188. Installing the heat sink

1. Heat sink
2. Thermal grease
3. Microprocessor
4. Heat sink installation label

8. Replace the top cover. See “Replacing the top cover” on page 71.
9. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
10. Reconnect the power cable and any other cables that were removed.
11. Turn on the node.

Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 microprocessor

The SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 must always be fitted with both microprocessors in order to function correctly.

The documented steps to replace the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 microprocessor assume that you:

- Removed all power from the node
- Removed the node from the rack
- Removed the top cover of the node
- Removed the microprocessor that is being replaced

Perform the following steps to replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 microprocessor:

1. Touch the static-protective package that contains the new microprocessor to any *unpainted* metal surface on the node.
2. Remove the microprocessor from the package.
3. Rotate the locking lever **3** from the closed position to the open position, as shown in Figure 189.

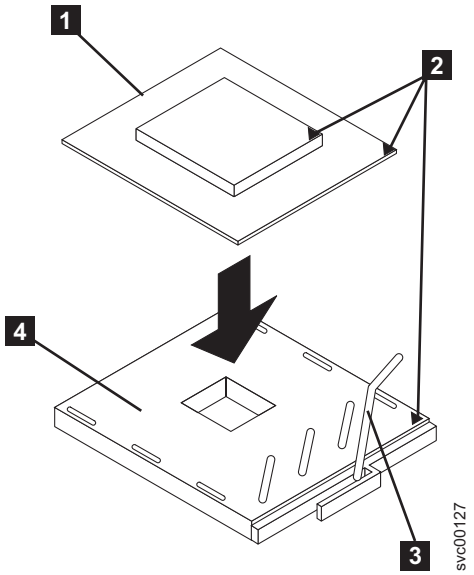


Figure 189. Microprocessor locking lever in open position

1 Microprocessor

2 Corner marks

3 Locking lever

4 Microprocessor socket

4. Center the microprocessor **1** over the microprocessor socket **4** .
5. Align the triangle **2** on the corner of the microprocessor with the triangle on the corner of the socket and carefully press the microprocessor into the socket.

   Attention: Do not use excessive force when pressing the microprocessor into the socket.
6. Close the lever.

Note: A voltage regulator module (VRM) and a heat sink are included in the microprocessor package.

- Do not set the heat sink down after removing it from the package.
- Do not touch or contaminate the thermal grease on the bottom of the heat sink. Doing so damages its heat-conducting capability and exposes the microprocessor to overheating.
- If you must remove the heat sink after installing it, note that the thermal grease might have formed a strong bond between the heat sink and the microprocessor. Do not force the heat sink and microprocessor apart; doing so causes damage to the microprocessor pins. Loosen one captive screw fully before loosening the other captive screw to help break the bond between the components without damaging them.

7. Install the heat sink **2** on top of the microprocessor **3**, as shown in Figure 190.

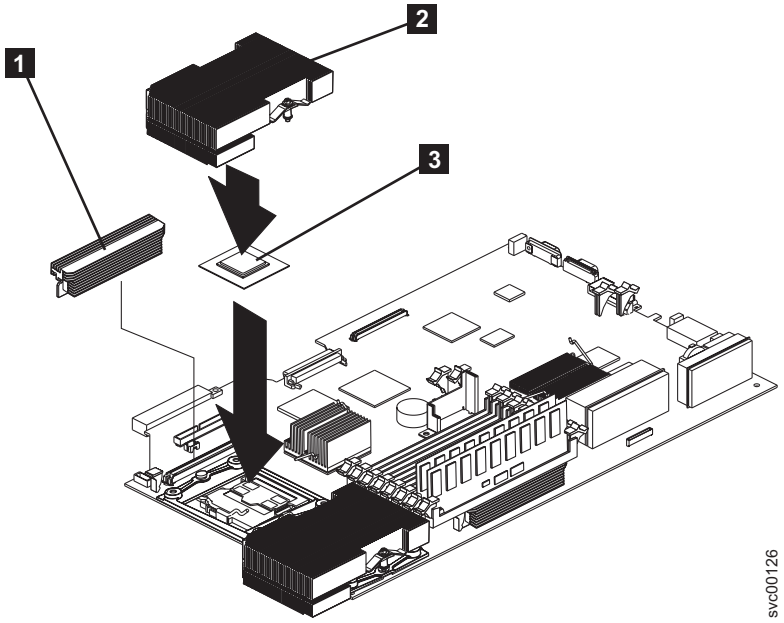


Figure 190. Microprocessor and heat sink locations

1 VRM

2 Heat sink

3 Microprocessor

8. Tighten the captive screws. Alternate between the screws until they are all tightened. Do not overtighten.
9. Replace the top cover. See “Replacing the top cover” on page 71.
10. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
11. Reconnect the power cords and any cables that were removed.
12. Turn on the node.

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 VRM

You might remove the voltage regulator module (VRM) to perform maintenance on the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4.

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

Figure 191 on page 206 shows the microprocessors and VRMs.

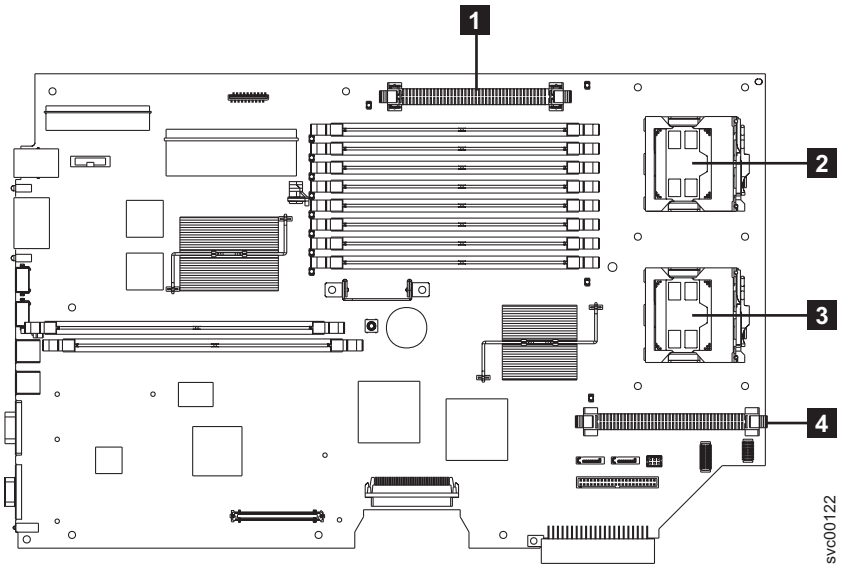


Figure 191. Location of the microprocessor and VRM sockets

1. VRM 1
2. Microprocessor 1
3. Microprocessor 2
4. VRM 2

Perform the following steps to remove the VRM:

1. Turn off the node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the SAN Volume Controller 2145-8F4 cable retention bracket.
3. Disconnect all power cords and external cables from the back of the node.
4. Remove the top cover. See “Removing the top cover” on page 67.
5. Press the latches on both sides of the VRM downward and outward.

The VRM is pulled out of the node and you can now replace the VRM.

Related tasks

"Removing the SAN Volume Controller from a rack" on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

"Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 VRM"
Before you replace the microprocessor, you must replace the voltage regulator module (VRM).

Related reference

"Handling static-sensitive devices" on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 VRM

Before you replace the microprocessor, you must replace the voltage regulator module (VRM).

Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see "Handling static-sensitive devices" on page xxx.

Perform the following steps to replace the VRM:

1. Align the VRM in the connector.
2. Press both sides of the VRM downward until the latches click into place.
3. If you are replacing the microprocessor, perform the steps required to do so. If not, replace the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 top cover.
4. Place the node in the rack. See "Replacing the SAN Volume Controller in a rack" on page 43.
5. Reconnect the external cables and then reconnect the power cable that was removed from the node. Ensure that you replace the fibre-channel cables in the same ports from which they were removed.
6. Turn on the node.

Removing the SAN Volume Controller system board

You must remove the system board if you are instructed to replace the SAN Volume Controller system board field replaceable unit (FRU).

Removing the SAN Volume Controller 2145-8A4 system board

You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8A4 system board field replaceable unit (FRU).

You must remove and replace the microprocessor when you replace the system board. Also, ensure that you have alcohol wipes and thermal grease available to correctly perform this task.

Before you proceed with the system board removal, ensure that you do the following:

- Identify and label all the cables that are attached to the SAN Volume Controller 2145-8A4 node so they can be replaced in the same port.
- Have a static-protected surface available to hold the components that you remove from the old system board.
- Follow all standard safety and handling instructions. The components that you will be handling are electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

Notes:

- You must remove a number of components before you can remove and replace the system board. You will reuse all the components that are removed with the new system board. Therefore, take care when you remove and store these components.
- Each connector on the system board has its use printed next to it on the board.

To remove the system board, perform the following steps:

1. Read the safety precautions in “Safety and environmental notices” on page ix.
2. Ensure that the node is turned off. If the node is an active member of a cluster, you must take care not to turn off the only node that services one or more VDisks, because the host applications will lose access to their data. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.
3. Remove the cable retention bracket and disconnect the power cable from the node. See “Removing the cable retention bracket” on page 24.
4. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
5. Remove the top cover. See “Removing the top cover” on page 67.
6. Remove the riser-card and fibre-channel adapter. Place them on a static-protective surface for reinstallation. You do not need to separate the riser-card and fibre-channel adapter assembly. See “Removing the fibre-channel adapter assembly” on page 155.
7. Mark the cables to ensure that you know where each one goes. Figure 192 on page 209 shows the connectors on the SAN Volume Controller 2145-8A4 system board.

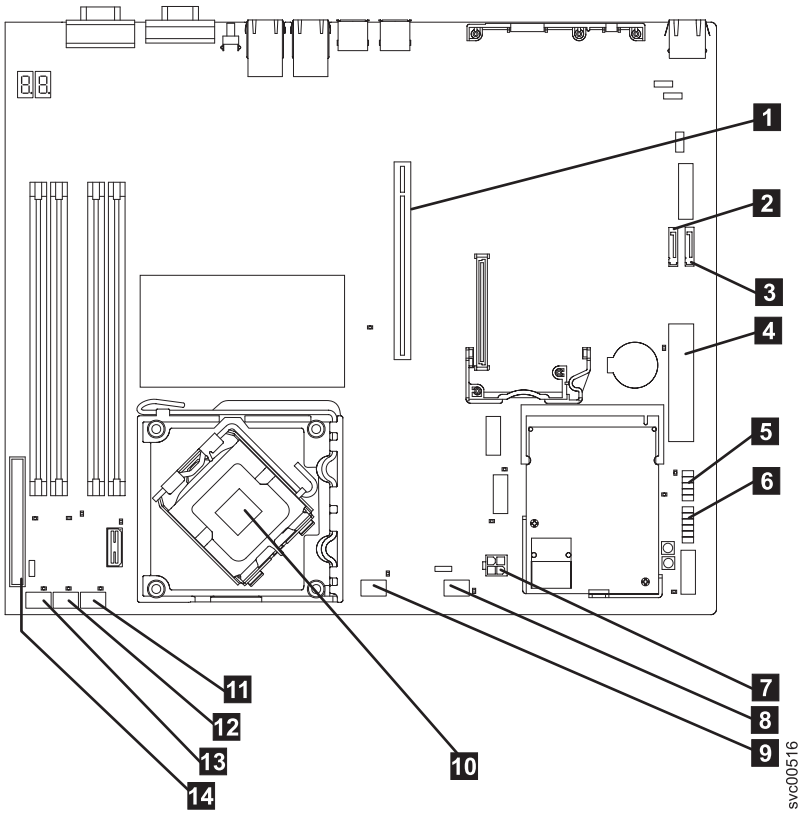


Figure 192. Connectors that are used on the SAN Volume Controller 2145-8A4 system board

1. PCI express riser card connector
2. SATA 2 connector
3. SATA 0 connector
4. Power connector P1
5. Front USB connector
6. Operator-information panel connector
7. Power connector P6
8. Fan 5 connector
9. Fan 4 connector
10. Microprocessor connector
11. Fan 3 conector
12. Fan 2 connector
13. Fan 1 connector
14. IDE connector

8. Disconnect and remove both SATA disk cables from sockets SATA 0 and SATA from the system board, as shown in Figure 193 on page 210.

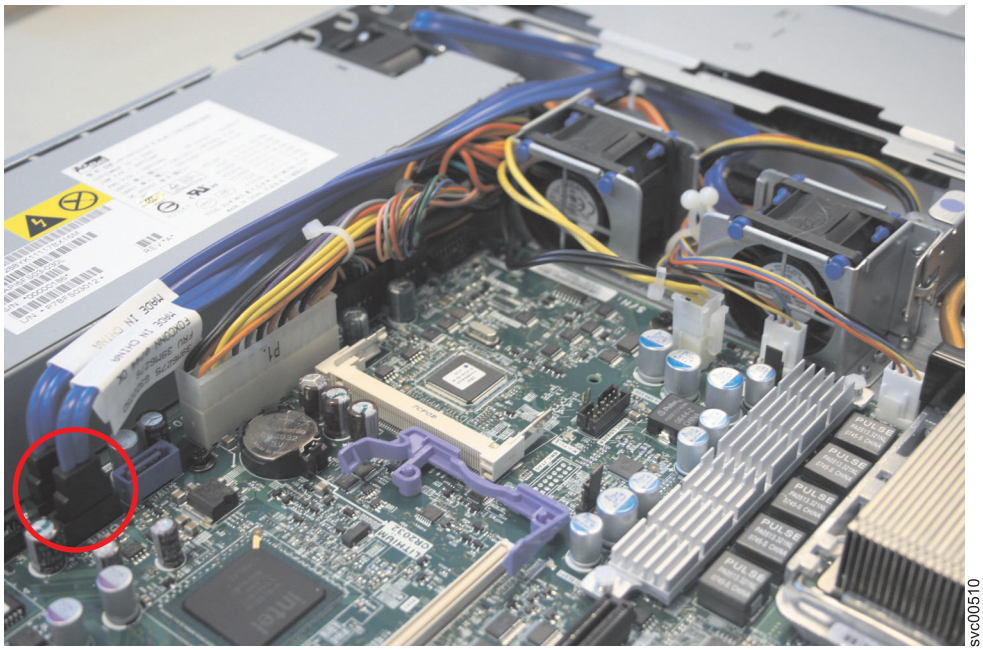


Figure 193. SAN Volume Controller 2145-8A4 SATA cable connectors

9. Remove power connectors P1 **1** and P6 **2**, as shown in Figure 194.

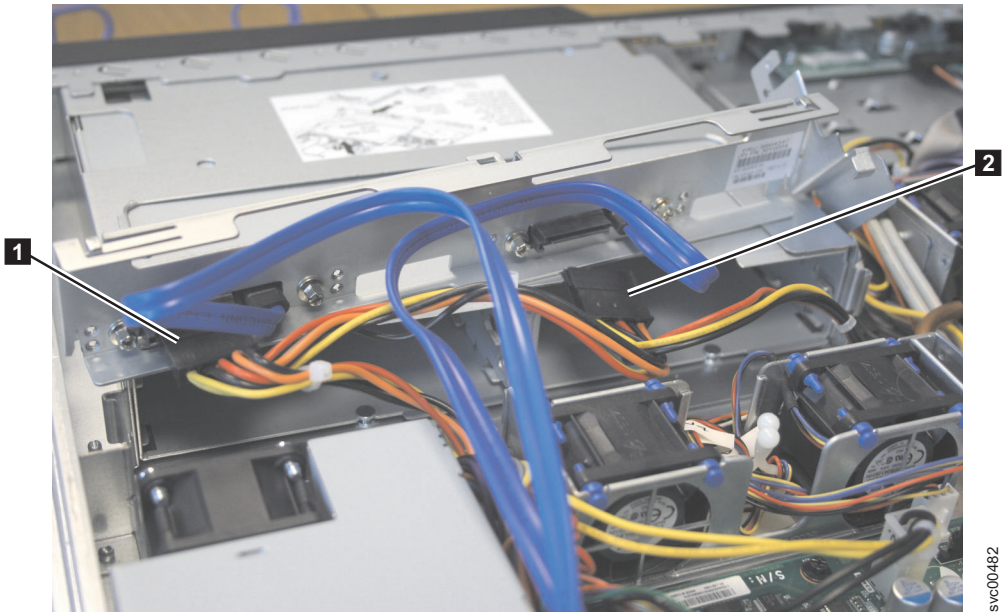


Figure 194. SAN Volume Controller 2145-8A4 power supply connectors

10. Remove the cables from the Front USB and the Front panel sockets.
11. Remove the cable from the IDE connector, which is identified in Figure 195 on page 211.

Figure 195. The IDE connector on the SAN Volume Controller 2145-8A4 system board

12. Remove the five fan connectors along the front edge of the system board. Figure 196 on page 212 shows three of the fan connectors.

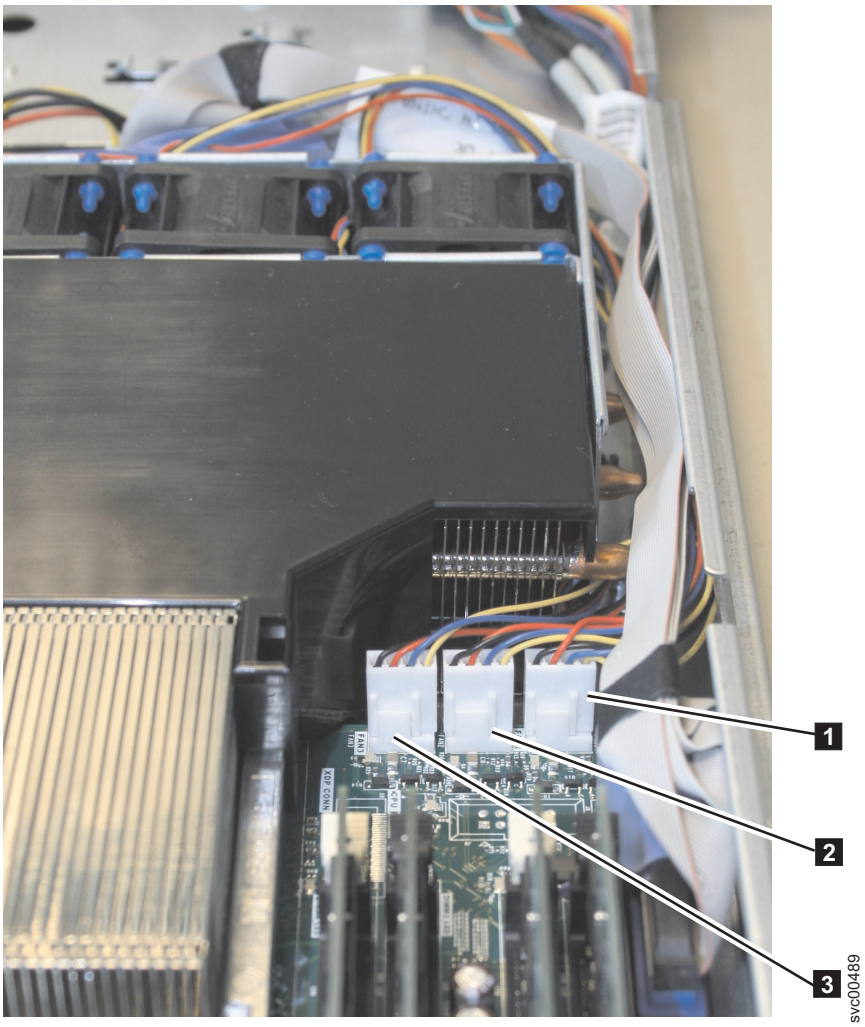


Figure 196. Connectors for the SAN Volume Controller 2145-8A4 heat exchange fans

13. Remove the four memory modules and place them on a static-protective surface for reinstallation. See “Removing the memory modules (DIMM)” on page 97.
14. Remove the heat-sink air baffle and the heat sink. Clean the thermal grease from the microprocessor before you remove it. You can also clean the heat sink now.
15. Remove the microprocessor. See “Removing the microprocessor” on page 193.
16. Notice the orientation of the microprocessor retention module and then remove the four screws (**1** in Figure 197 on page 213) that hold the microprocessor retention module to the system board. Then, lift the retention module out of the server.

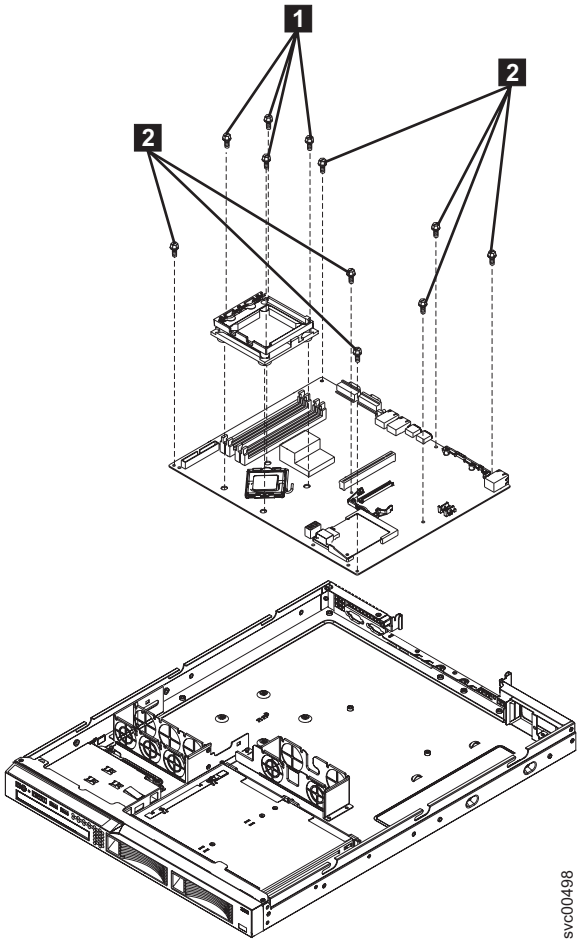


Figure 197. SAN Volume Controller 2145-8A4 system board and microprocessor retention module

17. Remove the remaining eight screws (**2** in Figure 197) that secure the system board to the chassis. Put the screws in a safe place.
18. Lift the system board out of the server.

Removing the SAN Volume Controller 2145-8G4 system board

You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

The system board field replaceable unit (FRU) consists of the planar. You must order alcohol wipes and thermal grease separately. There are two versions of the SAN Volume Controller 2145-8G4. The original version (Rev 1) has two microprocessors and eight 1 GB memory modules. The second version (Rev 2) has one microprocessor and four 2 GB memory modules.

Before you proceed with the system board removal, ensure that you do the following:

- Identify and label all the cables that are attached to the SAN Volume Controller 2145-8G4 node so they can be replaced in the same port.
- Have a static-protected surface available to hold the components that you removed from the old system board.

You must follow all standard safety and handling instructions. The components that you will be handling are electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.

Notes:

1. All left or right observations are when you are looking at the front of the unit.
2. You must remove a number of components before you can remove and replace the system board. You will reuse all the components that are removed with the new system board. Therefore, take care when you remove and store these components.

Perform the following steps to remove the system board:

1. Ensure that the node is turned off. If the node is an active member of a cluster, you must take care not to turn off the only node servicing one or more VDisks, because the host applications will lose access to their data. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
3. Remove the top cover. See “Removing the top cover” on page 67.
4. Remove the fibre-channel adapter and riser card in slot 1. Set the adapter and riser card aside on the static-protected surface. See “Removing the fibre-channel adapter assembly” on page 155.
5. Remove the riser card in slot 2.
6. Disconnect the first set of cables from the system board, which are shown in Figure 198 on page 215. From the left front side of the system board, remove the following:
   a. The right disk signal cable connector **1**.
   b. The left disk signal cable connector **2**.
   c. The fan 1 connector **3**. To remove the fan connectors, press the release latch in the center and then pull up.
   d. The fan 2 connector **4**.

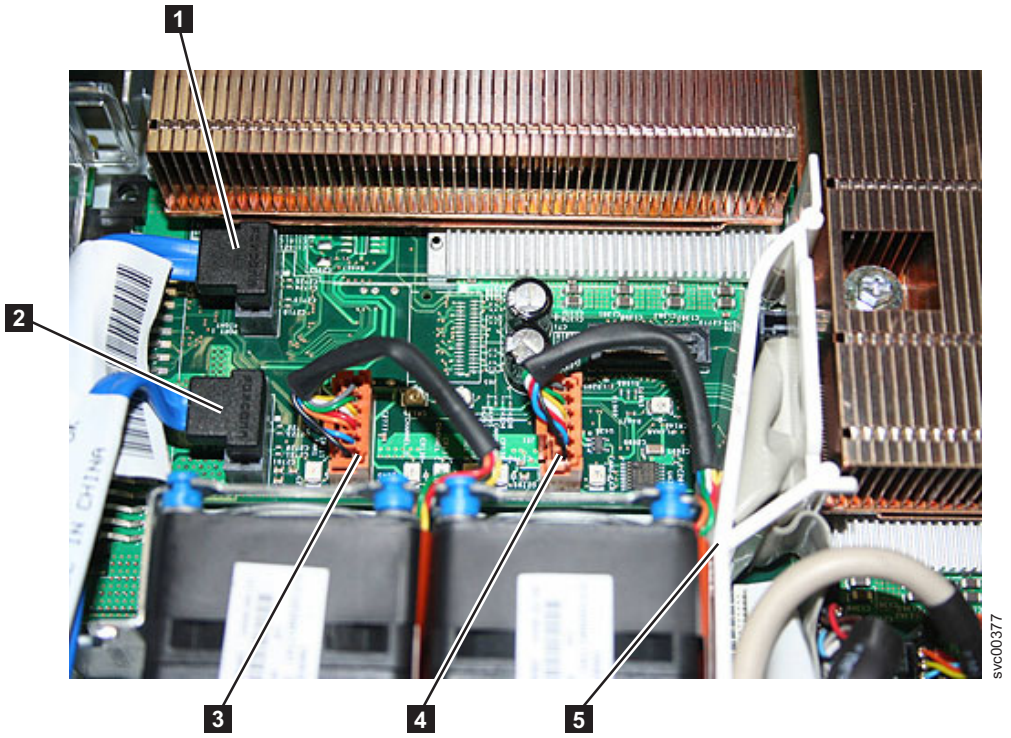


Figure 198. Connectors on the SAN Volume Controller 2145-8G4 system board

7. To ease other tasks, remove fan 2.
8. Notice how the cables are arranged within and beside the left air baffle **5** . Then remove the left air baffle by pulling up gently.

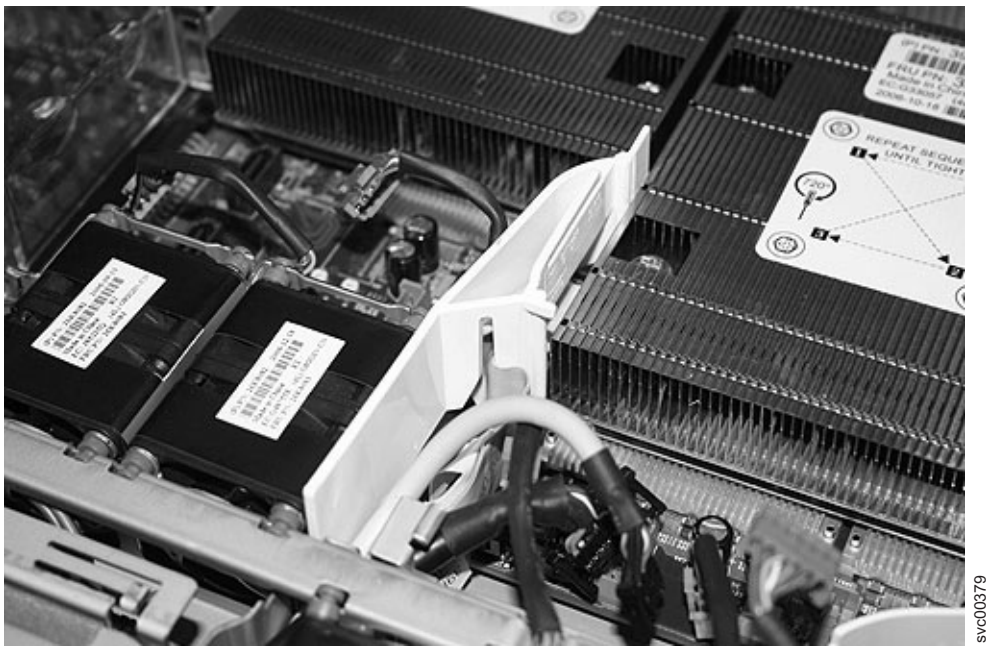


Figure 199. Left air baffle on the SAN Volume Controller 2145-8G4

9. Disconnect the connectors from the system board, which are shown in Figure 200. From the right front side of the system board, remove the following:
   a. The fan 3 connector **5** by pressing the release latch in the center and then pulling up.
   b. The fan 4 connector **6** by pressing the release latch in the center and then pulling up.
   c. The fan 5 connector **7** by pressing the release latch in the center and then pulling up.
   d. The fan 6 connector **8** by pressing the release latch in the center and then pulling up.
   e. The uninterruptible power supply cable connector **4** .
   f. The video cable connector **3** .

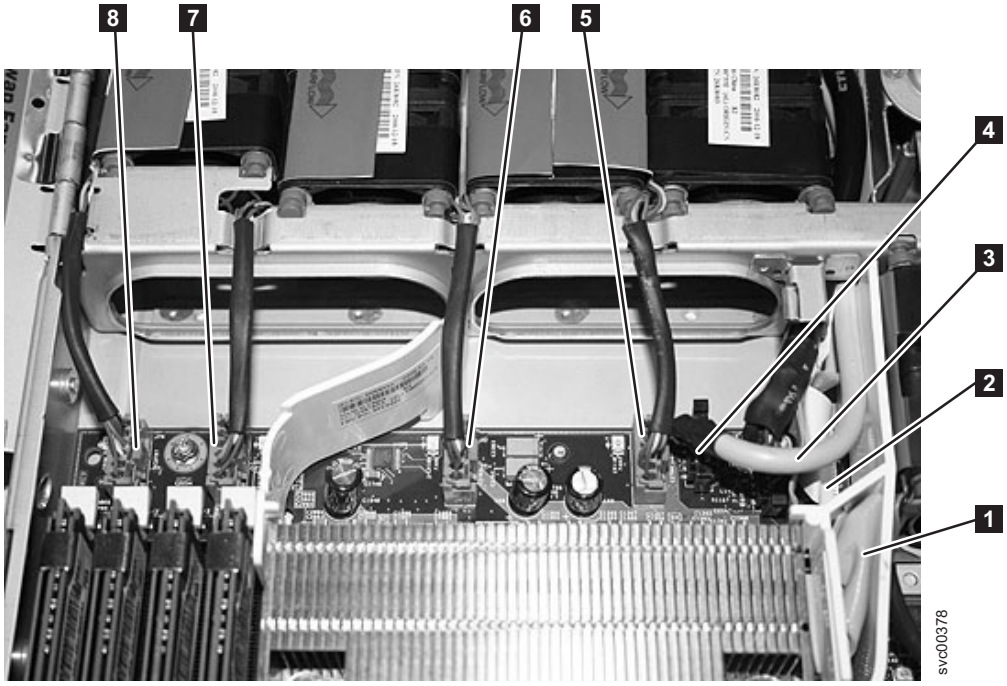


Figure 200. Connectors on the right front side of the SAN Volume Controller 2145-8G4 system board

10. Remove the remaining cables from the system board:
    a. The CD-RW ribbon cable connector **1** by gently pulling the connector upward.
    b. The light path ribbon cable connector **2** by gently pulling the connector upward.

    All cables should now have been removed from the system board. You do not need to disconnect the disk power cable connector **1** on the power backplane **2** , which are shown in Figure 201 on page 217.

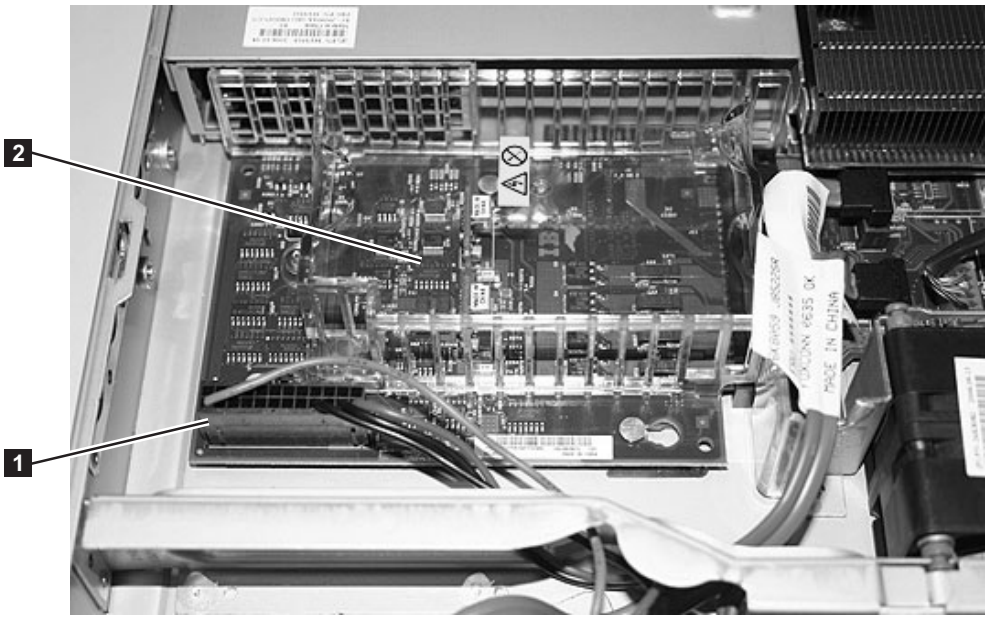


Figure 201. Disk power cable connector and power backplane on the SAN Volume Controller 2145-8G4 system board

11. Remove the right air baffle, which is shown in Figure 202. First, pull the air baffle to the right and then push the connector towards the back of the unit to release it from the support rail. Next, pull the baffle forward and then upward to release the clip from the system board. Finally, lift the baffle free.

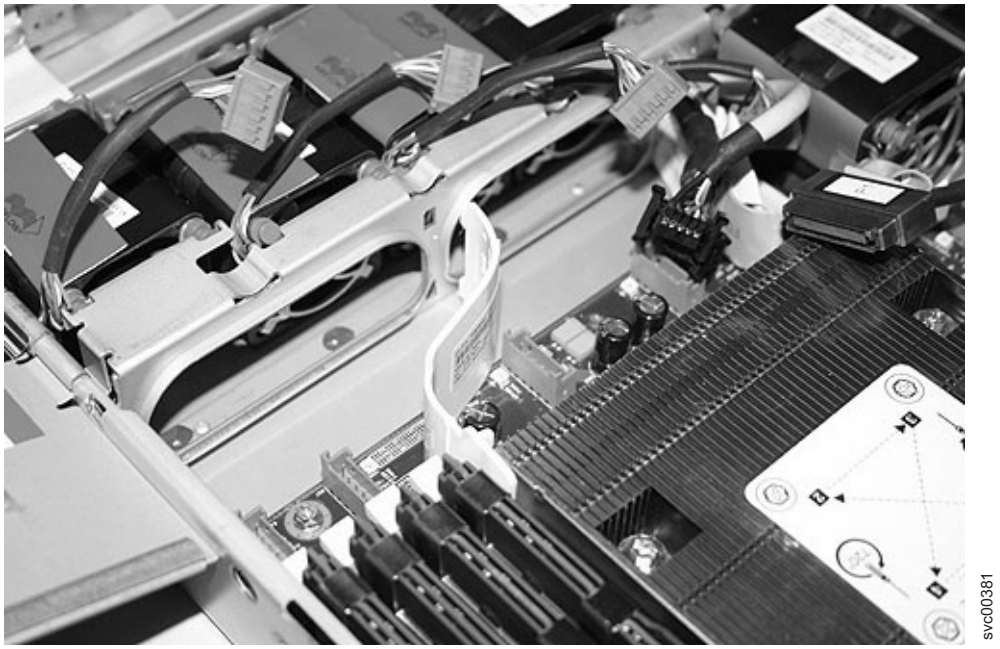


Figure 202. Right air baffle on the SAN Volume Controller 2145-8G4 system board

12. Carefully remove all the memory modules and set them aside on the static-protected surface. See “Removing the memory modules (DIMM)” on page 97.

13. Depending on the version of the SAN Volume Controller 2145-8G4 node, you must remove either one or two heat sinks. Remove the thermal grease from the heat sink, and set it aside on the static-protected surface.

    Tip: Fully loosen both screws from one side of the heat sink before you loosen either screw on the other side to help break the thermal grease seal between the microprocessor and the heat sink.

    Use an alcohol wipe to remove the thermal grease from the heat sink.

14. Clean the thermal grease from the top of each microprocessor with an alcohol wipe, as shown in Figure 203. Cleaning the microprocessor before it is removed reduces the amount of handling it is subjected to.

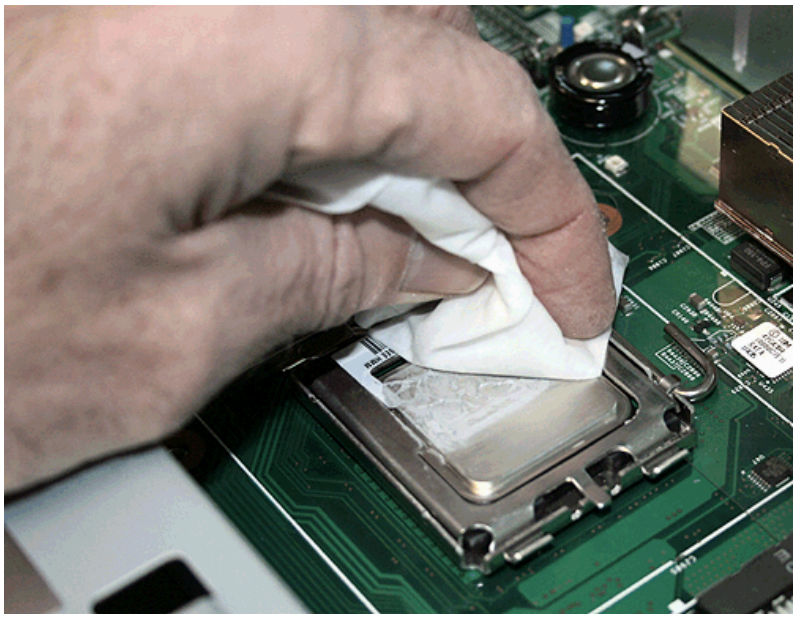


Figure 203. Removing thermal grease from the SAN Volume Controller 2145-8G4 microprocessor

15. Remove the microprocessors.
    a. Open the microprocessor release lever and then open the bracket frame.
    b. Carefully remove the microprocessor from the socket. Be careful to touch only the edges of the microprocessor.
    c. Set the microprocessors aside on a static-protected surface.
16. Push down the orange clip and pull the power supply approximately two inches out of the chassis so it disconnects with the power backplane.
17. Disconnect the power backplane from the system board by sliding it to the left. Move it far enough to the side so it does not obstruct the system board removal. See “Removing the power backplane” on page 147.
18. Remove the four stand-off screws from by the serial and video I/O ports at the rear of the node. Figure 204 on page 219 shows the location of the stand-off screws.

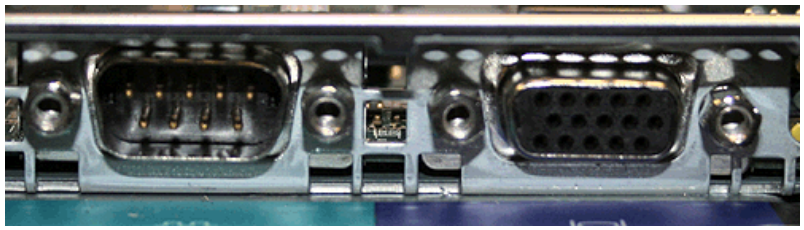


Figure 204. Serial and video ports on the SAN Volume Controller 2145-8G4

19. Remove the six screws on the system board, as shown in Figure 205, that secure the system board to the chassis.

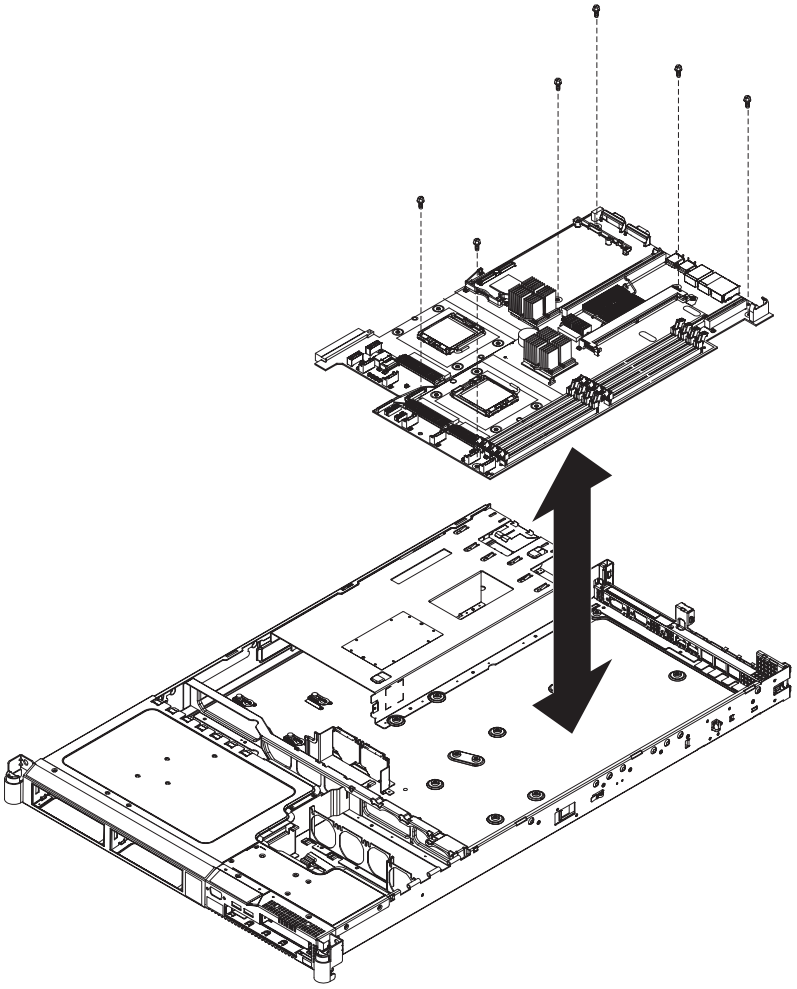


Figure 205. The placement of the screws that secure the SAN Volume Controller 2145-8G4 system board

20. Lift up the front edge of the system board slightly so that it disengages from the locator pin. Slide the system board slightly toward the front of the node so that the I/O ports are free of the chassis.
21. Lift up the left side of the system board.
22. Lift up the rest of the system board and carefully remove it from the node, being careful not to disturb any surrounding components.

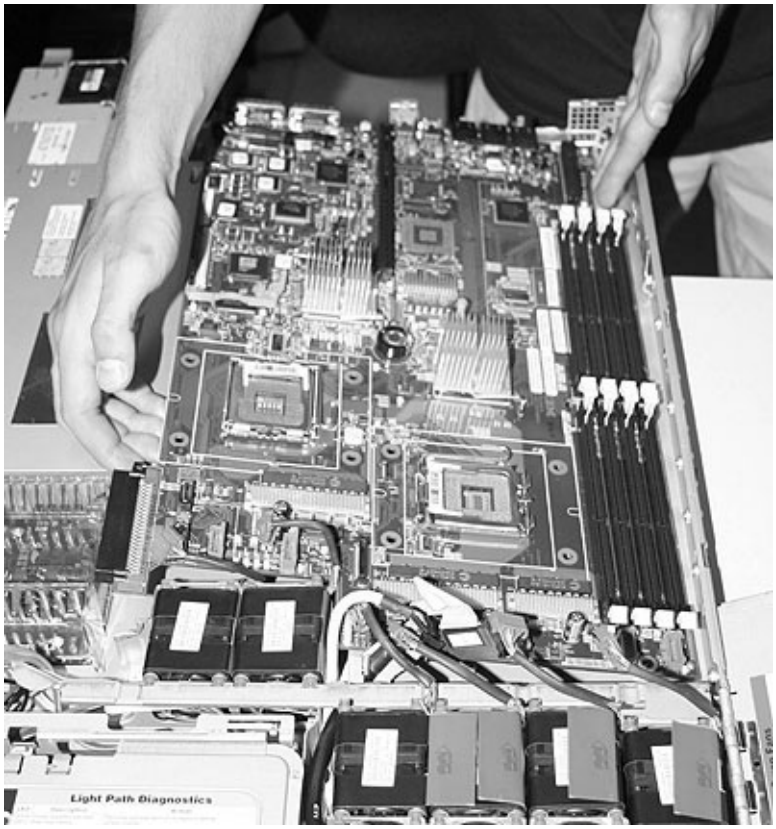


Figure 206. SAN Volume Controller 2145-8G4 system board

Related tasks

"Removing the microprocessor" on page 193
You can remove the microprocessor that is used in the SAN Volume Controller nodes.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 226
All the components that were removed when you removed the system board are reused during the installation of the new system board.

Removing the SAN Volume Controller 2145-4F2 system board

During routine maintenance, you may be required to remove and replace the system board.

The system board field replaceable unit (FRU) is a kit that includes the following parts:

- PCI riser card
- Two microprocessors
- Microprocessor voltage regulator module (VRM)
- Planar

Use all the parts in the kit when you replace the system board FRU.

The system board is electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity.

For information about working with static-sensitive devices, see the documentation about handling static-sensitive devices at the end of this topic.

Perform the following steps to remove the system board:

1. Ensure that the node is turned off. If the node is an active member of a cluster, you must take care not to turn off the only node servicing one or more VDisks, because the host applications will lose access to their data. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
2. Remove the node from the rack and place it on a flat, static-protective surface. See “Removing the SAN Volume Controller from a rack” on page 33.
3. Remove the top cover from the SAN Volume Controller (**1** in Figure 207).

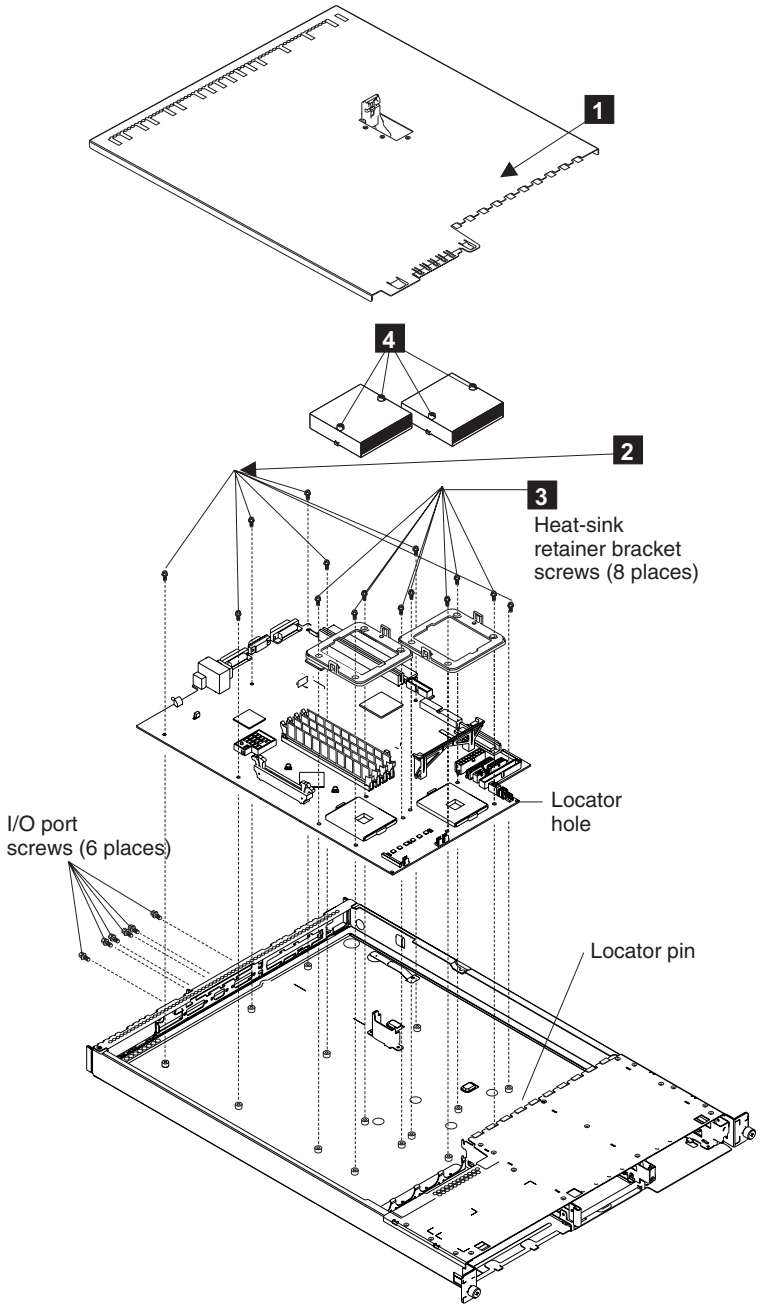


Figure 207. SAN Volume Controller 2145-4F2 system board

If you are going to exchange the system board for another system board, go to step 4. Otherwise, go to step 6.

4. Remove the adapter assemblies; however, keep the adapter assemblies—they must be installed onto the replacement system board.
5. Remove the memory modules; however, keep the memory modules—they must be installed onto the replacement system board.
6. Disconnect the following:
   - All fan connectors
   - Power connectors P1 and P2
   - SCSI power connector
   - ATA connector
   - Disk drive connectors
   - Service Controller connector
7. Lift out the air baffle.
8. Unscrew the heat sink captive screws (**4** in Figure 207 on page 221).
9. Move the heat sinks gently from side to side to break the seal formed by the thermal compound and then pull them off the processors.
10. Remove the screws from each of the heat sink retainer brackets (**3** in Figure 207 on page 221).
11. Remove the retainer brackets.
12. Remove the two screws from each of the three connectors.
13. Remove the seven screws (**2** in Figure 207 on page 221).
14. Remove the system board.

    At this time, if you have any tasks to do while the system board is removed, do them.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

“Removing the SAN Volume Controller from a rack” on page 33
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

“Removing the top cover” on page 67
You can remove the top cover of the SAN Volume Controller node if maintenance is necessary.

“Removing the fibre-channel adapter assembly” on page 155
Use the information in this topic when you need to remove a fibre channel adapter or fibre-channel adapter assemblies.

“Removing the memory modules (DIMM)” on page 97
You might need to remove one or more faulty memory modules.

Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller system board

You will reuse all the components from the system board that you are replacing with the new SAN Volume Controller system board field replaceable unit (FRU).

Replacing the SAN Volume Controller 2145-8A4 system board

All the components that were removed when you removed the system board are reused during the installation of the new system board.

Ensure that you have a monitor and USB keyboard available because they are required during this procedure. You also need a power cable so that you can turn on the node while it is out of the rack.

Note: When you reassemble the components in the server, be sure to route all cables carefully so that they are not exposed to excessive pressure.

Perform the following steps to install the system board:

1. Align the system board with the chassis, and replace the eight screws that you removed
2. Orient the microprocessor retention module as shown in Figure 208 on page 224.

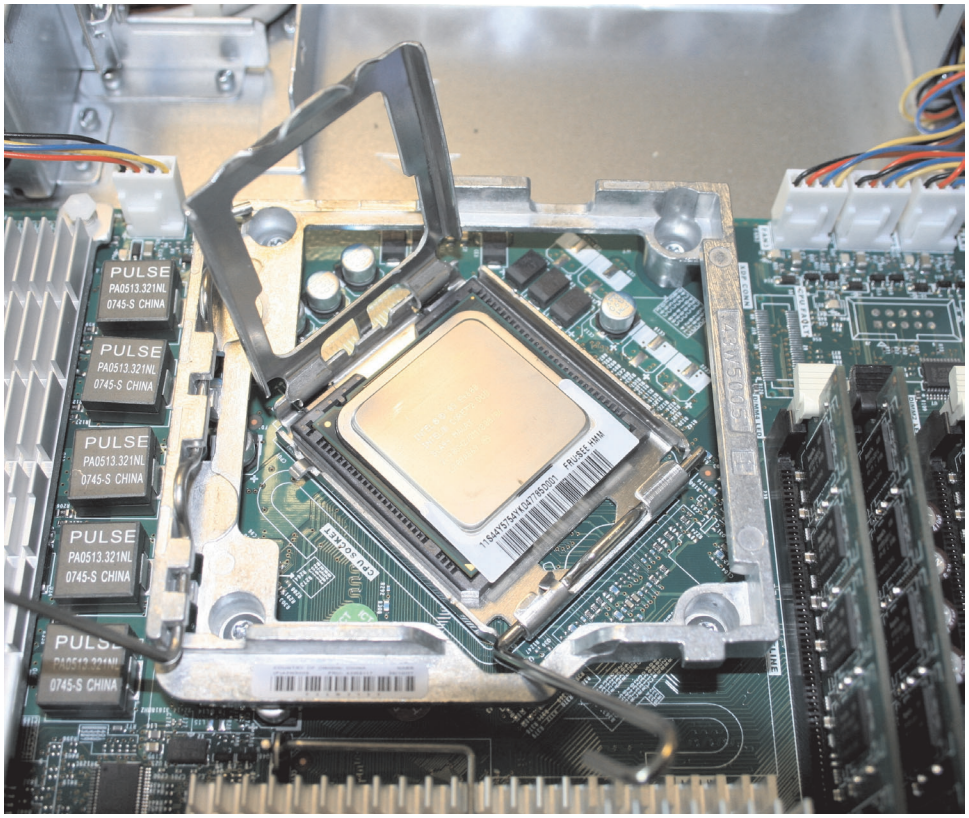


Figure 208. The SAN Volume Controller 2145-8A4 microprocessor bracket frame fully opened

Attention: In the following step, do not overtighten the screws or touch the system board with the screwdriver. Tighten the screws only until they are snug, and then tighten them an additional quarter turn.

3. Replace the microprocessor retention module. Gently secure it with the four screws that you removed.
4. Replace the microprocessor, heat sink, and air baffle. See “Replacing the microprocessor” on page 198.
5. Replace the memory modules. See “Replacing the memory modules (DIMM)” on page 101.
6. Replace the fan connectors. See “Replacing the fans” on page 187.
7. Reconnect the cable to the IDE connector.
8. Reconnect the cables to the front USB and the front panel sockets.
9. Replace power connectors P1 and P6.
10. Replace the riser-card and fibre-channel adapter, and place them on a static-protective surface for reinstallation. See “Replacing the fibre-channel adapter assembly” on page 161.
11. Replace the top cover. See “Replacing the top cover” on page 71.
12. You must change a BIOS configuration setting before SAN Volume Controller can operate. Ensure that you read and understand these next steps before you proceed because some panels time out when there is no input for 30 seconds.
    a. Connect a display and keyboard to the node.
    b. Connect a power cable (it does not need to be from the 2145 UPS-1U).
    c. Turn on the node.
13. A number of messages are displayed and then message 3001 is displayed:

```
ERROR
3001 SMART Failure Predicted on Hard Drive
```

This prediction is not correct. It is displayed because the SAN Volume Controller front panel attaches as a disk drive. After a short pause, the Setup Utility main menu is displayed, but the menu exits if you do not perform an action within 30 seconds.

Perform the following steps to change the BIOS configuration setting:

a. Press the down arrow key to move to the Start Options menu and press the Enter key to select it. The current start options settings are displayed.
b. Press the down arrow to move to the HDD S.M.A.R.T. Capability option and press the right arrow key to change it to **Disabled**.
c. Press the Esc key to return to the main menu and then press the down arrow key to move to the Save Settings option.
d. Press the Enter key to select it and then press the Enter key again to confirm that you want to save the settings.

14. After you have saved the settings, press the power button on the operator-information panel to turn off the node. Remove the power cable, keyboard, and monitor.
15. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
16. Reconnect the external cables and then reconnect the power cable that was removed from the node. Ensure that you replace the fibre-channel cables in the same ports from which they were removed.
17. Replace the cable retention bracket. See “Replacing the cable retention bracket” on page 28.
18. Turn on the node. Wait for the front-panel display to remain stable for at least five minutes before taking any further action.
    - If the repair has been successful and if the node was able to save its state data before shutting down, the node starts and rejoins the cluster. The front panel displays `Cluster:` and a cluster name if the node has rejoined a cluster.
    - If the repair has been successful but the node was not able to save its state data before shutting down, the node displays node error 578. Follow the procedures in ″Deleting a node from a cluster″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* to delete the node from the cluster and then add it back into the cluster. If more than one node has failed, ensure that the node is added back into its original I/O group. See ″Adding a node to a cluster″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
    - If any other message is shown on the front panel, use MAP 5000 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* to resolve the problem.

    Note: It is essential that you perform all the stages of the next step to ensure that the replacement system is set to the serial number of the original machine. Failure to do this might invalidate the customer’s warranty or service agreement.
19. After you make sure that the node is operating as part of the cluster, perform the following steps to restore the original machine serial number to the new system board:

a. Start the command-line interface (CLI). See ″Accessing the SAN Volume Controller CLI″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

b. Write down the 7-character serial number from the serial number label that is on the front of the node. Ignore any hyphens (-) in the serial number.

c. On the front-panel display, press and release the down button until the Node panel is displayed. Write down the node name that is shown on the bottom line.

d. Issue the following command, substituting the values for *nodeserialnumber* and *nodename* that you wrote in the previous steps:

   ```
   svcservicetask writesernum -sernum nodeserialnumber nodename
   ```

   where *nodeserialnumber* is the serial number on the front of the node and *nodename* is the name of the node.

   For example, to write the machine serial number to the system board when the serial number is “13-FEDCB” and the node name is “ZYXW3,” you would issue the following command:

   ```
   svcservicetask writesernum –sernum 13FEDCB ZYXW3
   ```

   Note: The node will restart as soon as the serial number has been written to it.

Replacing the SAN Volume Controller 2145-8G4 system board

All the components that were removed when you removed the system board are reused during the installation of the new system board.

There are two versions of the SAN Volume Controller 2145-8G4. The original version (Rev 1) has two microprocessors and eight 1 GB memory modules. The second version (Rev 2) has one microprocessor and four 2 GB memory modules.

Perform the following steps to install the system board:

1. Lower the right side into place with the system board positioned slightly towards the front of the box. Lower the left edge of the system board into place and then push the system board towards the back of the box until it engages in place and the screw holes line up. Take care to ensure that the Ethernet ports on the rear of the system board engage in the frame cutouts.

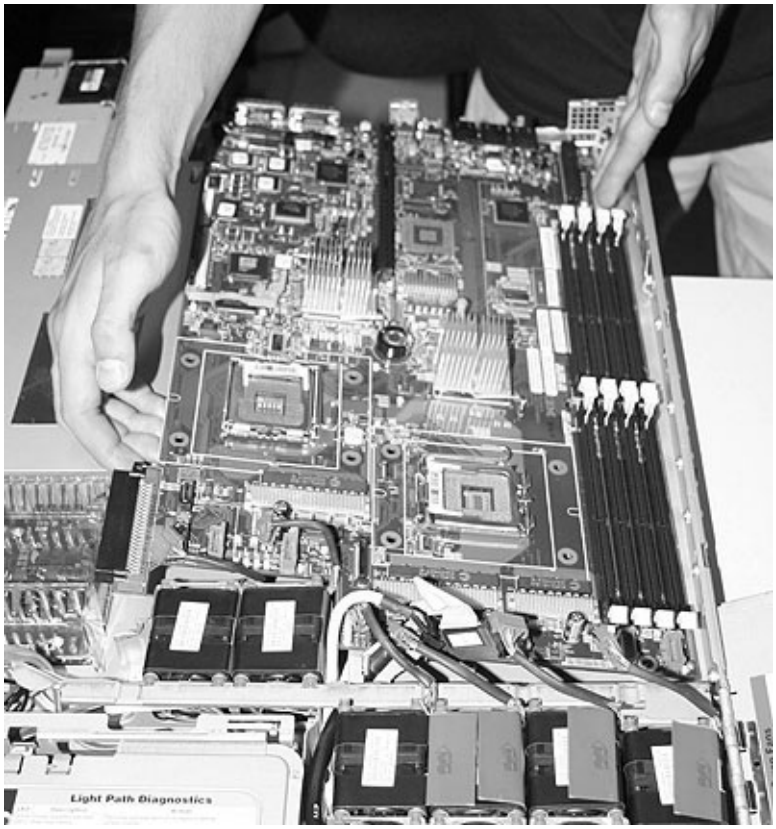


Figure 209. SAN Volume Controller 2145-8G4 system board

2. Replace the six screws on the system board, as shown in Figure 210 on page 228, to secure the system board to the chassis.

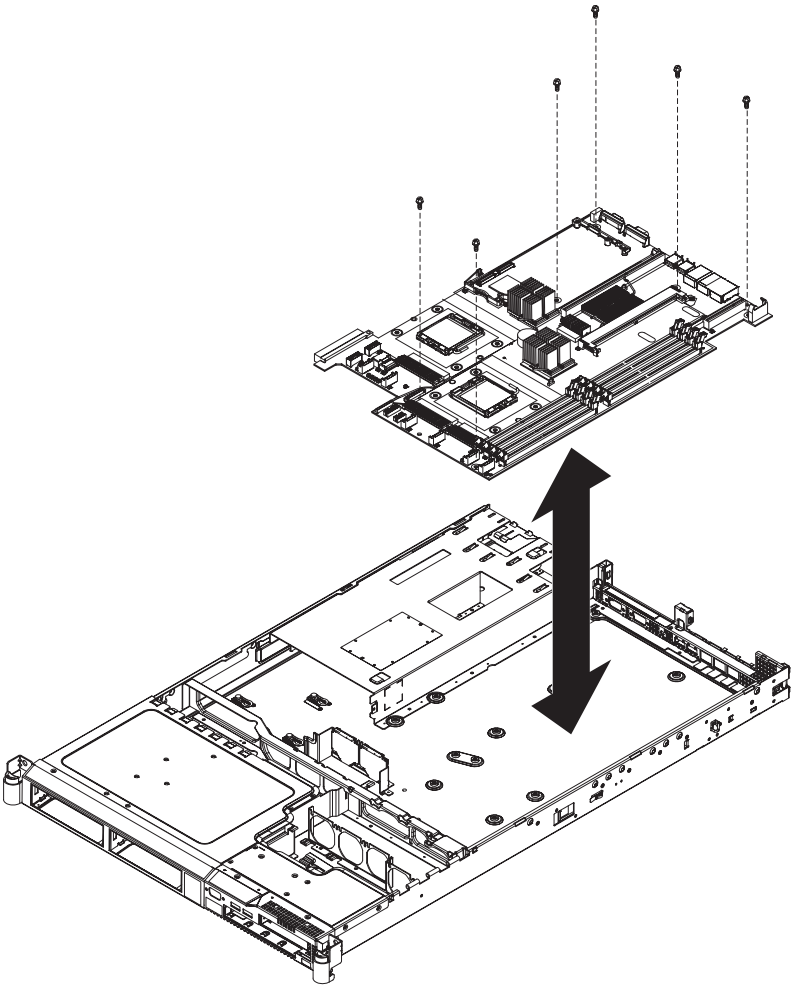


Figure 210. The placement of the screws that secure the SAN Volume Controller 2145-8G4 system board

3. Replace the four stand-off screws from beside the I/O ports at the rear of the server. Figure 211 shows the location of the stand-off screws.

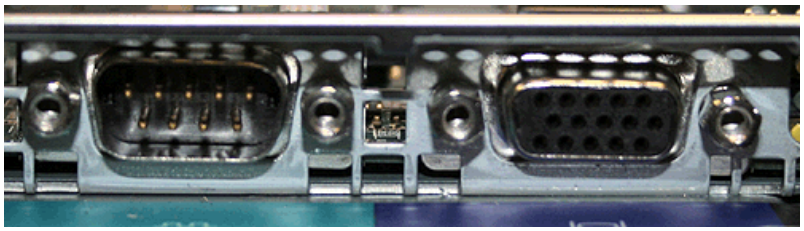


Figure 211. Serial and video ports on the SAN Volume Controller 2145-8G4

4. Replace the power backplane by pushing it right to connect it to the system board and pushing the power supply back in to connect to it. See “Replacing the power backplane” on page 149.
5. Install one of the microprocessors while carefully checking the orientation and remembering to close the release lever, which is shown in Figure 212 on page 229.

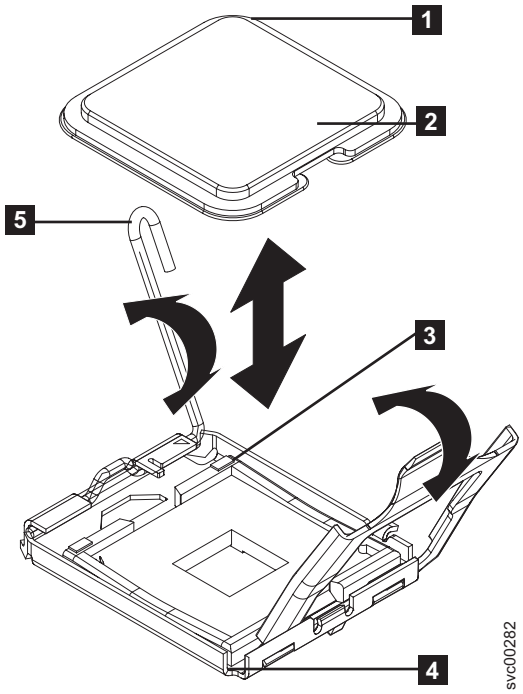


Figure 212. Installing the microprocessor

1. Microprocessor orientation indicator
2. Microprocessor
3. Microprocessor orientation indicator
4. Microprocessor connector
5. Microprocessor release lever

6. Install a heat sink. If this is an original version of the SAN Volume Controller 2145-8G4 node, you will install the other heat sink in step 7 on page 230.
   a. Apply thermal grease to the top of the microprocessor. Apply nine dots of thermal grease in three rows of three dots each with the outer rows approximately 5 mm from the edge of the microprocessor. The diameter of the cap from the thermal grease syringe is 5 mm, so you can use it to judge the required position of the dots of thermal grease, as shown in Figure 213 on page 230.

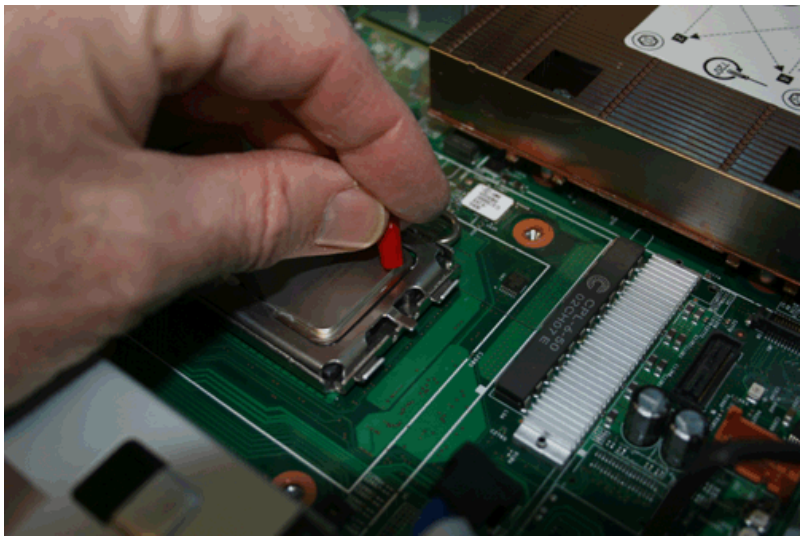


Figure 213. Estimating the position of the thermal grease dots

b. For each dot of thermal grease, use two divisions on the syringe scale, which is 0.02 ml of grease. You will use about half the syringe contents for the nine dots. Figure 214 shows how the microprocessor appears with the nine dots of grease.

Figure 214. Complete set of nine thermal grease dots on the microprocessor

c. Install the heat sink by gently squeezing it down onto the thermal grease and then tightening the four retaining screws alternately and evenly.

7. If this is a Rev 1 node, repeat steps 5 on page 228 and 6 on page 229 for the second microprocessor and heat sink. If this is a Rev 2 node, continue with the next step.
8. Replace either eight memory modules for the Rev 1 node or four memory modules for the Rev 2 node. See “Replacing the memory modules (DIMM)” on page 101.
9. Replace the right air baffle, which is shown in Figure 215 on page 231.

a. Locate the pin on the bottom of the air baffle in the locating hole on the system board.
b. Push the baffle backwards to locate it in place.
c. Pull the baffle slightly to the right to locate the two clips in the support rail.

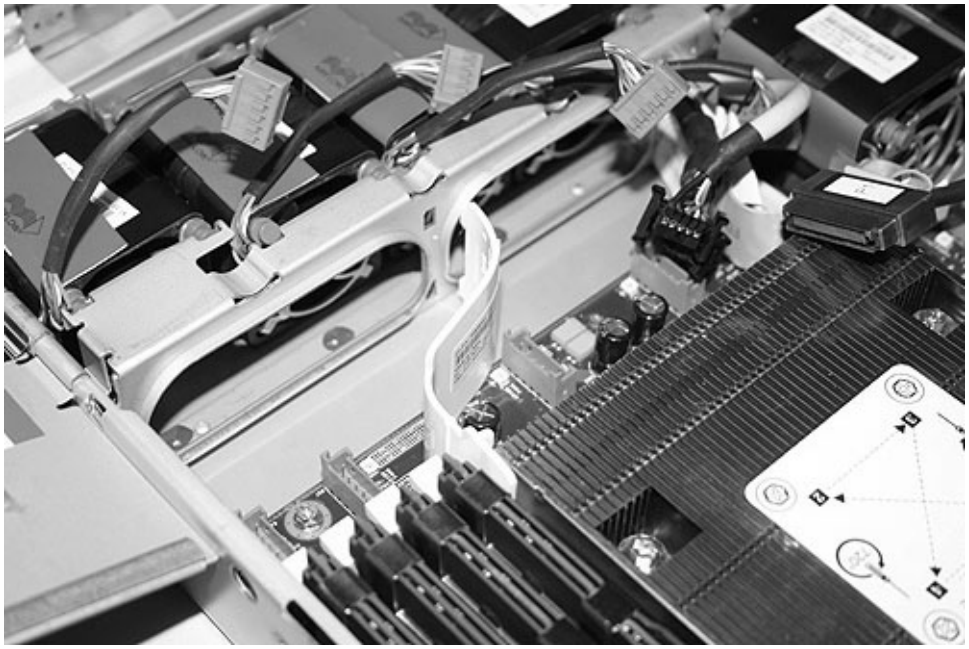


Figure 215. Right air baffle on the SAN Volume Controller 2145-8G4 system board

10. Reconnect the light path ribbon cable connector and the CD-RW ribbon cable connector, as shown in Figure 216 on page 232.
    a. Replace the video cable connector and the USB cable connector.
    b. Replace the cable connectors for fans 6, 5, 4 and 3.

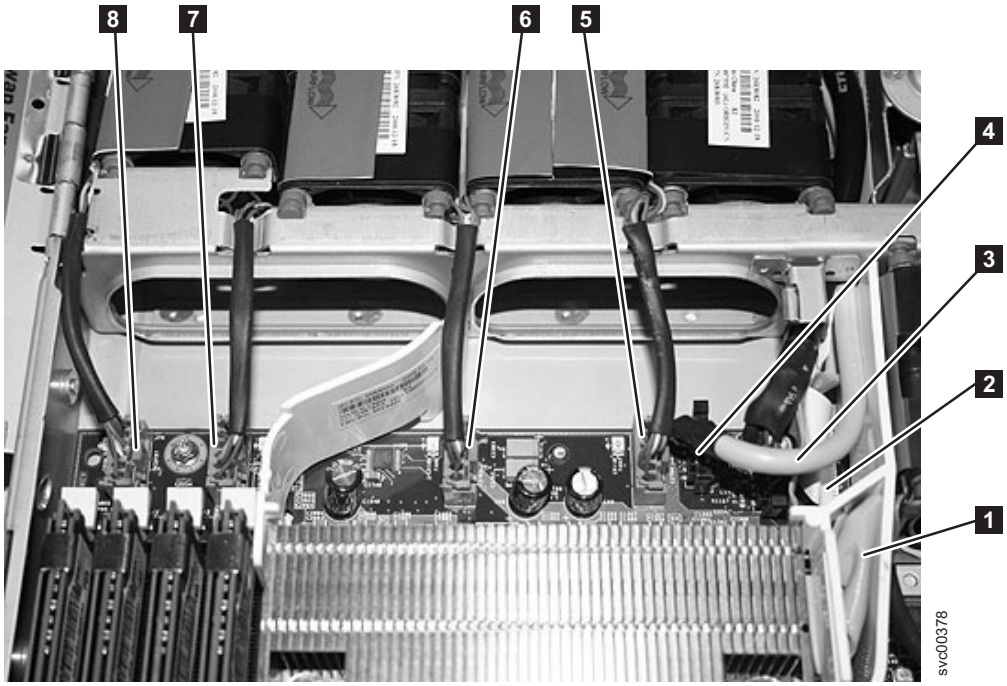


Figure 216. Connectors on the right front side of the SAN Volume Controller 2145-8G4 system board

1. CD-RW connector
2. Light path cable connector
3. Video cable connector
4. USB cable connector
5. Fan 3 connector
6. Fan 4 connector
7. Fan 5 connector
8. Fan 6 connector

11. Replace the left air baffle, which is shown in Figure 217 on page 233. You must position the CD-RW cable within the baffle.

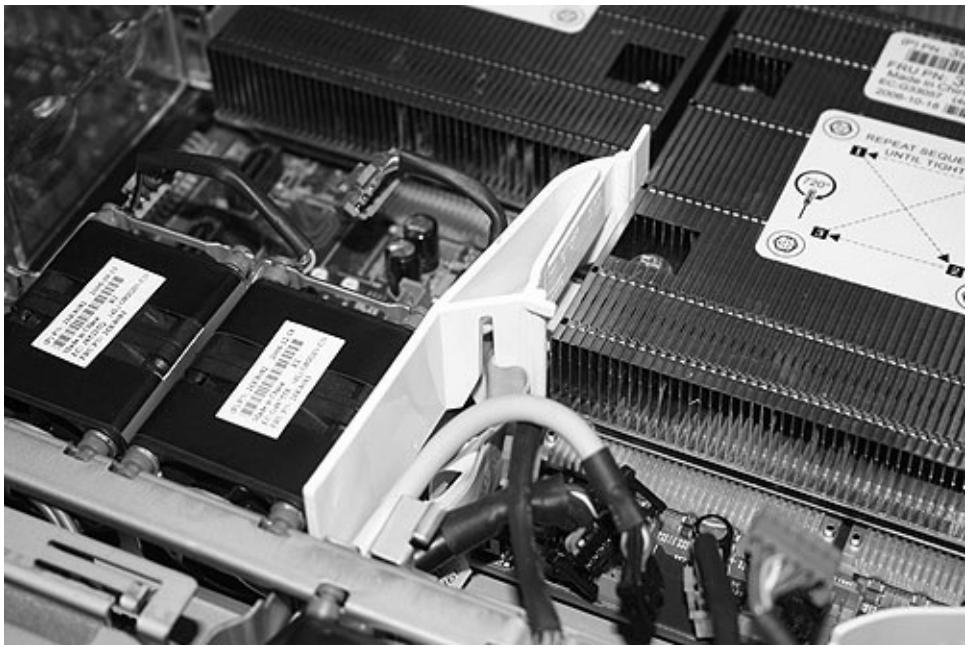


Figure 217. Left air baffle on the SAN Volume Controller 2145-8G4

12. Replace fan 2.
13. Replace the cable connectors for fans 2 and 1, as shown in Figure 218.

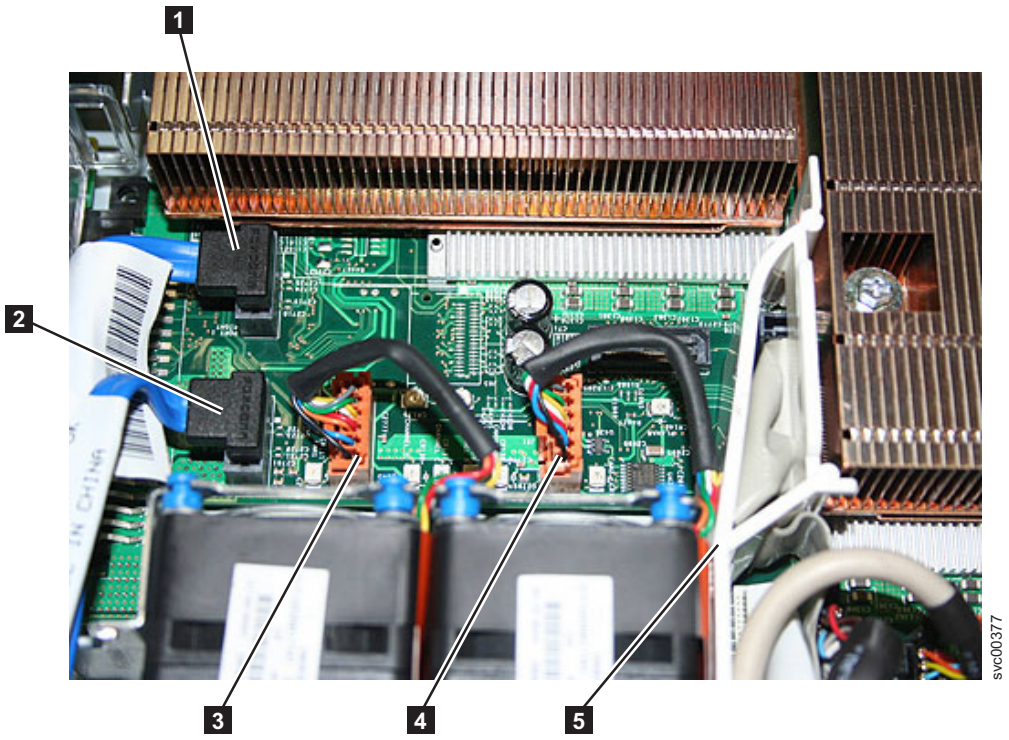


Figure 218. Connectors on the SAN Volume Controller 2145-8G4 system board

1 Right disk signal cable connector

2 Left disk signal cable connector

3 Fan 1 connector

4 Fan 2 connector

14. Replace the left disk drive cable in the front socket and the right disk drive cable in the rear socket.
15. Replace the riser card that you removed from adapter slot 2. Push it into its connector.
16. Replace the fibre-channel adapter and riser card. See “Replacing the fibre-channel adapter assembly” on page 161.
17. Replace the top cover. See “Replacing the top cover” on page 71.
18. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
19. Turn on the node. Wait for the front panel display to remain stable for at least five minutes before taking any further action.
    - If the repair has been successful and if the node was able to save its state data before shutting down, the node starts and rejoins the cluster. The front panel displays `Cluster:` and a cluster name if the node has rejoined a cluster.
    - If the repair has been successful but the node was not able to save its state data before shutting down, the node displays node error 578. Follow the procedures in ″Deleting a node from a cluster″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* to delete the node from the cluster and then add it back into the cluster. If more than one node has failed, ensure that the node is added back into its original I/O group. See ″Adding a node to a cluster″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.
    - If any other message is shown on the front panel, use MAP 5000 to resolve the problem.

    Note: It is essential that you perform all the stages of the next step to ensure that the replacement system is set to the serial number of the original machine. Failure to do this might invalidate the customer’s warranty or service agreement.
20. After you make sure that the node is operating as part of the cluster, perform the following steps to restore the original machine serial number to the new system board:
    a. Start the command-line interface (CLI). See ″Accessing the SAN Volume Controller CLI″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.
    b. Write down the 7-character serial number from the serial number label that is on the front of the node. Ignore any hyphens (-) in the serial number.
    c. On the front-panel display, press and release the down button until the Node panel is displayed. Write down the node name that is shown on the bottom line.
    d. Issue the following command, substituting the values for *nodeserialnumber* and *nodename* that you wrote in the previous steps:

       `svcservicetask writesernum -sernum nodeserialnumber nodename`

       where *nodeserialnumber* is the serial number on the front of the node and *nodename* is the name of the node.

       For example, to write the machine serial number to the system board when the serial number is “13-FEDCB” and the node name is “ZYXW3,” you would issue the following command:

```
svcservicetask writesernum –sernum 13FEDCB ZYXW3
```

Note: The node will restart as soon as the serial number has been written to it.

Replacing the SAN Volume Controller 2145-4F2 system board

During routine maintenance, you may be required to replace the system board.

The system board field replaceable unit (FRU) is a kit that includes the following parts:

- PCI riser card
- Two microprocessors
- Microprocessor voltage regulator module (VRM)
- Planar

Notes:

1. Use all the parts in the system board FRU kit (system board, processors [2], VRM, riser card). If you removed the system board and are replacing it, reuse only the four memory modules and the two adapter assemblies that you removed. See “Removing the SAN Volume Controller 2145-4F2 system board” on page 220.
2. Before you install the new system board, check whether the old system board has any jumpers installed. If it has, install matching jumpers onto the new system board.
3. Before you install the processors on the system board, remove the dust covers from the processor socket.
4. If you were not sent here from the directed maintenance procedures, rewrite the SAN Volume Controller 2145-4F2 serial number. If you were sent here from directed maintenance procedures, this step is performed from within the procedure.
5. The system board is electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface. For more information, see “Handling static-sensitive devices” on page xxx.
6. To force-restore the system board flash memory, you must run the node rescue procedure after all external cables are reconnected to the node and the node is first turned on.

Perform the following steps to replace the system board:

1. Replace the seven screws **2** shown in Figure 219 on page 236.
2. Replace the two screws from each of the three connectors.
3. Replace the retainer brackets.
4. Replace the screws from each of the heat sink retainer brackets **3** shown in Figure 219 on page 236.
5. Screw in the heat sink captive screws **4** .
6. Return the air baffle to its place.
7. Connect the following:
   - All fan connectors
   - Power connectors P1 and P2
   - SCSI power connector

- ATA connector
- Disk drive connectors
- Service controller connector

8. Replace the memory modules onto the replacement system board.
9. Replace the adapter assemblies onto the replacement system board.
10. Replace the top cover **1** of the node.

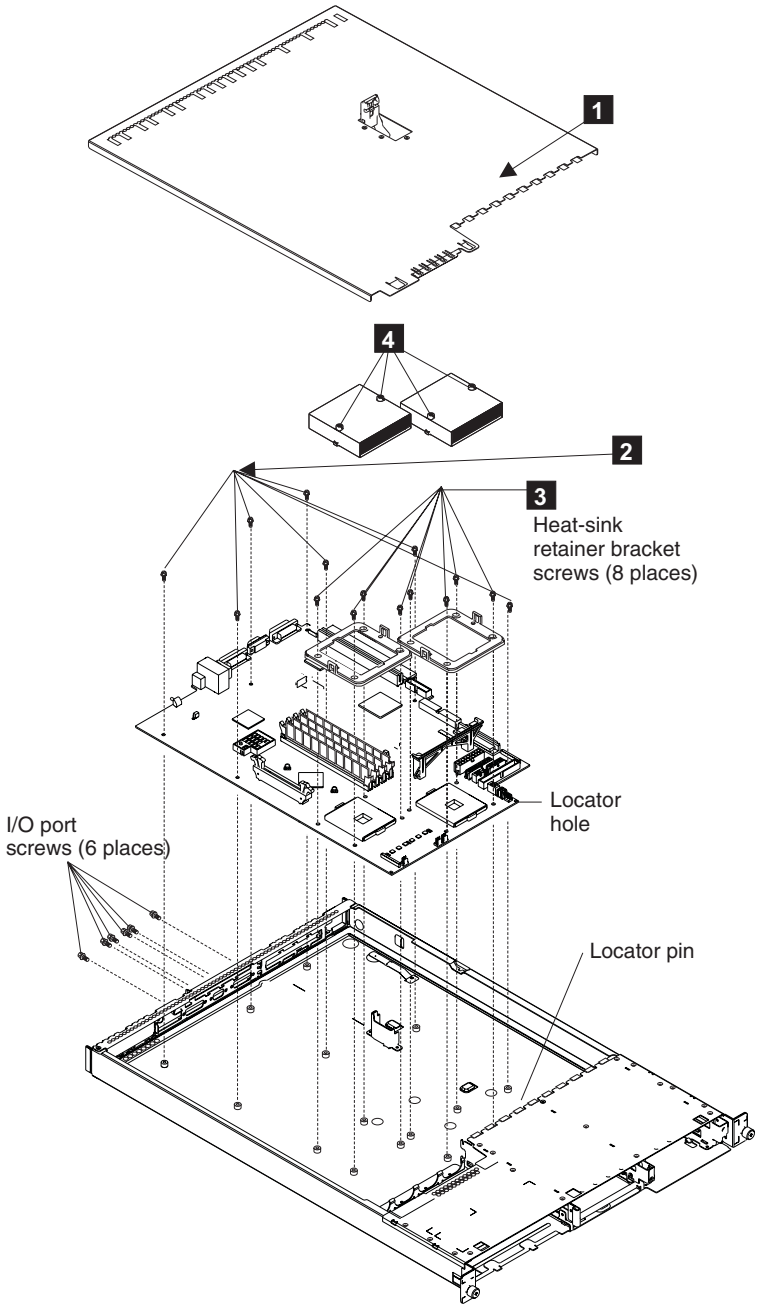


Figure 219. SAN Volume Controller 2145-4F2 system board

1 Top cover

2 Screws

3 Heat sink retainer brackets

4 Heat sink captive screws

11. Place the node in the rack. See “Replacing the SAN Volume Controller in a rack” on page 43.
12. *Carefully* install the end of the ribbon cable (marked `System Planar`) to the system board, being sure to install the cable straight in, as shown in Figure 220. Be sure to verify that the blue line on the cable connector end is not visible.

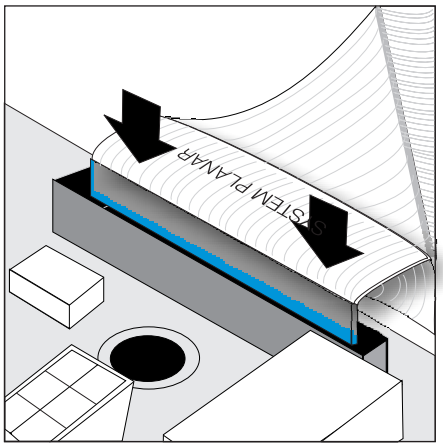


Figure 220. Installing the service controller cable into the SAN Volume Controller 2145-4F2 system board

13. Turn on the node.
14. If you are performing this repair as part of a directed maintenance procedure, you will be prompted to type the machine serial number. Otherwise, perform the following steps:
    a. Delete the failed node from the cluster.
    b. Add the repaired node to the cluster.
    c. Start the command-line interface (CLI). See ″Accessing the SAN Volume Controller CLI″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.
    d. Issue the following command:

       `svcservicetask writesernum -sernum` *`nodeserialnumber nodename`*

       where *nodeserialnumber* is the serial number on the node frame and *nodename* is the name of the repaired node that you added in this step.

       For example, to write the machine serial number to the system board when the serial number is “13-FEDCB” and the node name is “ZYXW3,” you would issue the following command:

       `svcservicetask writesernum –sernum` *`13FEDCB ZYXW3`*

       Note: The node will restart as soon as the serial number has been written to it.

Related tasks

“Removing the SAN Volume Controller 2145-4F2 system board” on page 220
During routine maintenance, you may be required to remove and replace the system board.

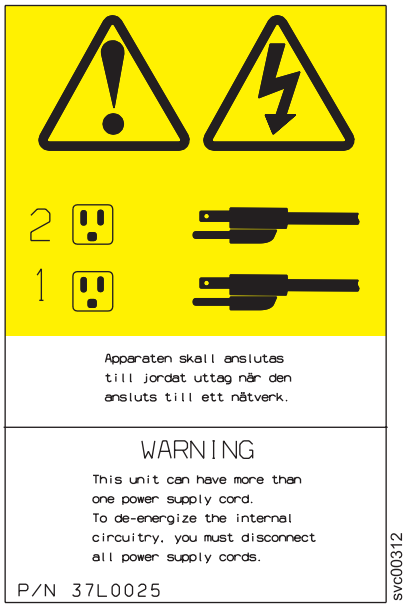
Related reference

“Handling static-sensitive devices” on page xxx
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the redundant ac-power switch

Use this topic when you need to remove a redundant ac-power switch.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.



To remove a redundant ac-power switch, complete the following steps:

1. Turn off each SAN Volume Controller node that is connected by an uninterruptible power supply to the redundant ac-power switch. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.
   a. One or two nodes might be connected to the redundant ac-power switch. If two nodes are connected to the redundant ac-power switch, you must ensure that both nodes are not in the same I/O group before you turn off the nodes. If the nodes are both turned off and they are in the same I/O group, the customer will lose access to the data that is managed by that I/O group.
   b. If both nodes that are powered by the redundant ac-power switch are in the same I/O group, turn off one node, disconnect it from the redundant ac-power switch, and connect it to a different power source. Then turn the node back on. When it has recovered and rejoined the I/O group, it can maintain the I/O access when the other node is turned off and when the redundant ac-power switch is removed. If you have had to perform this

operation, pay particular attention to checking when it is safe to turn off the second node. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

2. Remove both the redundant ac-power switch input-power cables from the site power distribution unit and un-thread them in the rack, so they will slide out when the redundant ac-power switch is removed. There might be enough access to disconnect them from the redundant ac-power switch while it is in the rack, but often it is more convenient to leave them attached and remove them with the redundant ac-power switch.
3. Remove the one or two redundant ac-power switches to 2145 UPS-1U power cables from the redundant ac-power switch. There is no need to disconnect them from the 2145 UPS-1U.
4. Remove the four screws that hold the redundant ac-power switch in the rack. Be careful to support the redundant ac-power switch during this procedure because the screws are the only support for the unit.
5. The redundant ac-power switch can be slid out of the rack along with the input-power cables if they are still attached.

Replacing the redundant ac-power switch

Use this topic when you need to replace a redundant ac-power switch.

The redundant ac-power switch FRU assembly includes the redundant ac-power switch and the input power cables. They should all be replaced together.

These instructions assume that a redundant ac-power switch has been removed and the one or two nodes that were connected to it are powered off.

To replace a redundant ac-power switch, complete the following steps:

1. Attach each of the two mounting plates to the redundant ac-power switch using three M3 Torx T8 head screws. Position the mounting face, as shown in Figure 221, on the side of the redundant ac-power switch that contains the output power sockets.

Figure 221. Attaching the mounting plates

2. Using the labels provided, label each end of the two redundant ac-power switch input power cables. Unless the configuration is changing, the labels are the same as those on the cables removed with the old redundant ac-power switch. Label the rack power distribution end “Power source *<name>*, outlet

<id>" to redundant ac-power switch *<location>* <MAIN | BACKUP> input. For example: "Power source D2, outlet 4 to redundant ac-power switch pos 7 MAIN input".

3. Label the redundant ac-power switch end" redundant ac-power switch *<location>* <MAIN | BACKUP> input from Power source *<name>*, outlet *<id>*".
4. Connect the input power cables to the redundant ac-power switch. You want to connect the cables now, because it is difficult to access the input power sockets on the redundant ac-power switch when it is installed in a rack.
5. Connect the main input power cable to the redundant ac-power switch.
6. Connect the backup input power cable to the redundant ac-power switch.
7. Secure both the redundant ac-power switch input cables, as shown in Figure 222, using the clips of the redundant ac-power switch.

Figure 222. Power cable clips

8. Install the redundant ac-power switch in the rack. The four "C" clips for mounting the unit should already be positioned in the rack mounting bar.
9. Position the redundant ac-power switch in the rack, pushing the cables through to the front of the rack. Mount in place using the four M6 screws.
10. Connect the redundant ac-power switch power input cables to the site power.
    a. Determine a suitable cable route from the redundant ac-power switch to the power distribution units.
    b. Route the main input power cable of the redundant ac-power switch to the specified power distribution unit, and connect it.
    c. Route the backup input power cable of the redundant ac-power switch to the specified power distribution unit, and connect it.
    d. Verify that the redundant ac-power switch power cables are tidy. Ensure that they do not obstruct other equipment and are tied in place where necessary.
11. Test the redundant ac-power switch before connecting it to the 2145 UPS-1U, using MAP 5340 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.
12. Connect the one or two 2145 UPS-1U units that are powered by this redundant ac-power switch. The power cables should still be plugged into the 2145 UPS-1U units.

a. Connect the other end into the output power sockets on the front of the redundant ac-power switch.
b. Check the labels on the cables to see which socket they should be connected to.
c. If the uninterruptible power supply units do not power on automatically, power them on by pressing the power button for five seconds.

13. Power on the one or two SAN Volume Controller nodes connected to this redundant ac-power switch.

Removing and replacing 2145 UPS-1U parts

The remove and replace procedures for the 2145 UPS-1U field replaceable units are described in the topics which follow.

Removing and replacing the 2145 UPS-1U power cable retention bracket

The 2145 UPS-1U power cable retention bracket prevents accidental removal of the power cable that connects the 2145 UPS-1U to the SAN Volume Controller node.

Note: The 2145 UPS-1U power cable retention bracket (shown in Figure 223) can be attached only to the most recent versions of the 2145 UPS-1U. Older versions do not have the correct mounting holes.

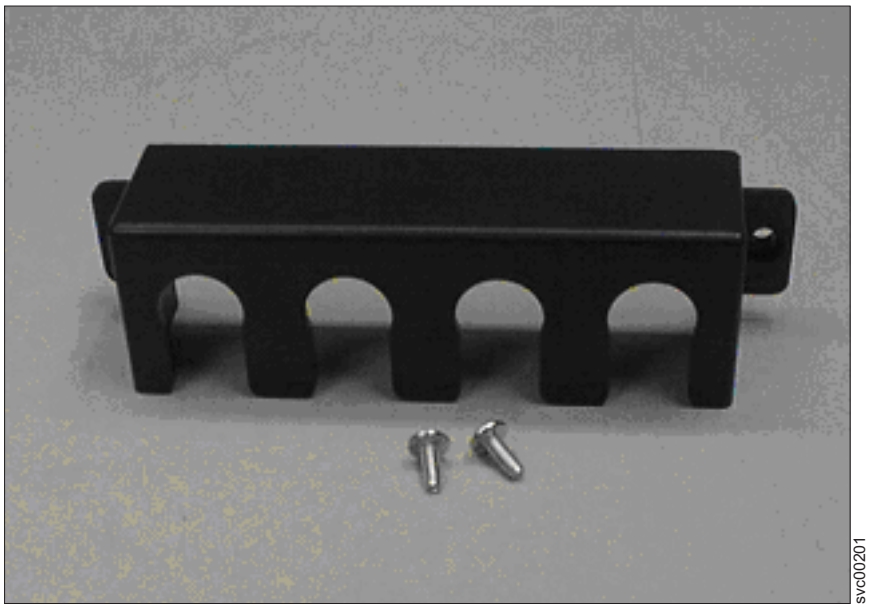


Figure 223. 2145 UPS-1U power cable-retention bracket hardware

Removing the 2145 UPS-1U power cable retention bracket

Perform the following steps to remove the 2145 UPS-1U power cable retention bracket:

1. Remove the retaining screw from each side of the bracket.

Figure 224. 2145 UPS-1U power cable-retention bracket

2. Lift the bracket off the cable.

Replacing the 2145 UPS-1U power cable retention bracket:

Perform the following steps to replace the 2145 UPS-1U power cable retention bracket:

1. Ensure that the output power cable is securely in place.
2. 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.
3. Ensure that the power cable runs through the rightmost slot in the bracket.
4. Secure the bracket in place with one screw on each side, as shown in Figure 225.

Figure 225. 2145 UPS-1U power cable-retention bracket

Removing the 2145 UPS-1U

Before you remove the 2145 UPS-1U, read all safety notices.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

DANGER

Uninterruptible power supply units contain specific hazardous materials. Observe the following precautions if your product contains an uninterruptible power supply:

- **The uninterruptible power supply contains lethal voltages. All repairs and service must be performed only by an authorized service support representative. There are no user serviceable parts inside the uninterruptible power supply.**
- **The uninterruptible power supply contains its own energy source (batteries). The output receptacles might carry live voltage even when the uninterruptible power supply is not connected to an ac supply.**
- **Do not remove or unplug the input cord when the uninterruptible power supply is turned on. This removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply.**
- **The uninterruptible power supply is heavy because of the electronics and batteries that are required. To avoid injury, observe the following precautions:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**
  - **Remove the battery, electronics assembly, or both from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton or installing or removing the uninterruptible power supply in the rack.**

(D007)

CAUTION:
This part or unit is heavy but has a weight smaller than 18 kg (39.7 lb). Use care when lifting, removing, or installing this part or unit. (C008)

Perform the following steps to remove the 2145 UPS-1U:

Attention: Check to make sure that the SAN Volume Controller that is powered by this 2145 UPS-1U is shut down and turned off, prior to step 1. See MAP 5350 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

1. At the front of the 2145 UPS-1U, press and hold the on/off button (**1** in Figure 226) until the power light is extinguished (approximately five seconds). On some versions of the 2145 UPS-1U, you need a pointed device, such as a screwdriver, to press the on/off button. The 2145 UPS-1U enters standby mode.

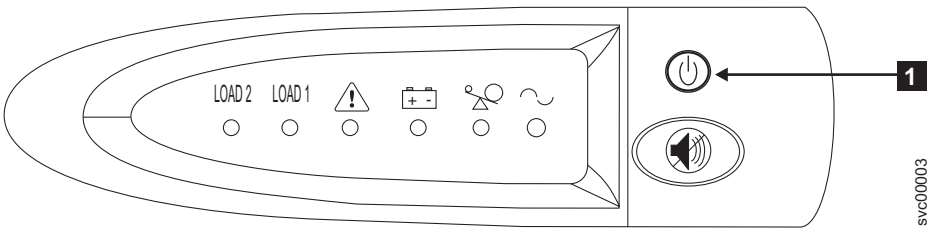


Figure 226. The 2145 UPS-1U front-panel assembly

2. At the back of the 2145 UPS-1U, remove the power cable retainer before disconnecting the SAN Volume Controller power cable from load segment receptacle 2 (**3** in Figure 227).
3. Disconnect the signal cable from the communication port (**2** in Figure 227).
4. Disconnect the main power cable from the main power source (**1** in Figure 227).

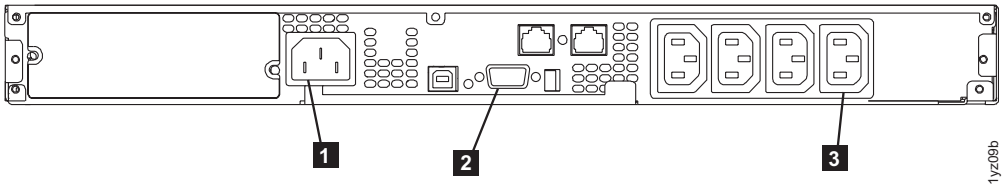


Figure 227. 2145 UPS-1U (rear view)

5. Remove the 2145 UPS-1U front panel, as shown in Figure 228.

   Note: If you are having difficulty pulling the right side of the panel free from the 2145 UPS-1U, insert a flat-blade screwdriver between the right side of the cover and the frame and gently pry it free.

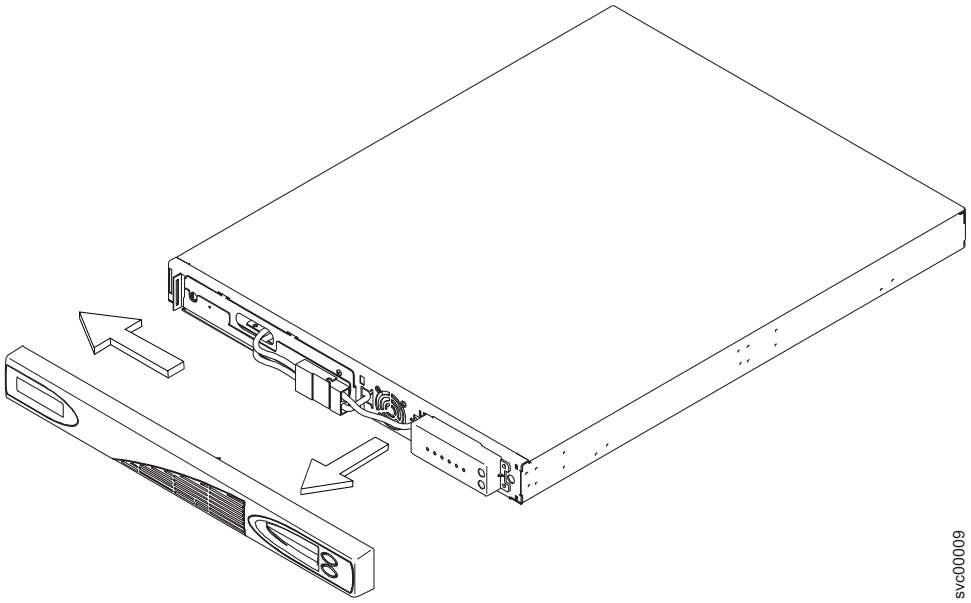


Figure 228. Removing the 2145 UPS-1U front panel

6. Disconnect the internal battery connector, which is circled in Figure 229 on page 245.

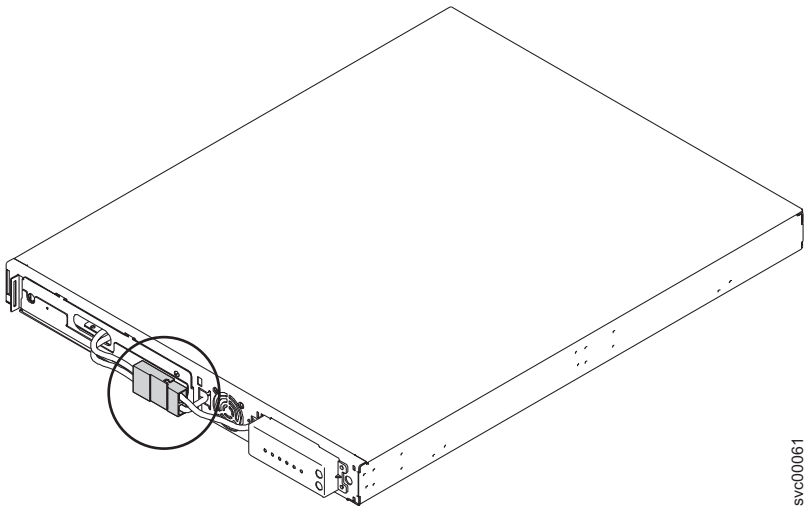


Figure 229. The 2145 UPS-1U internal-battery connector

7. After pulling the two connectors apart, cover the exposed battery connector (shown in Figure 230) with adhesive tape.

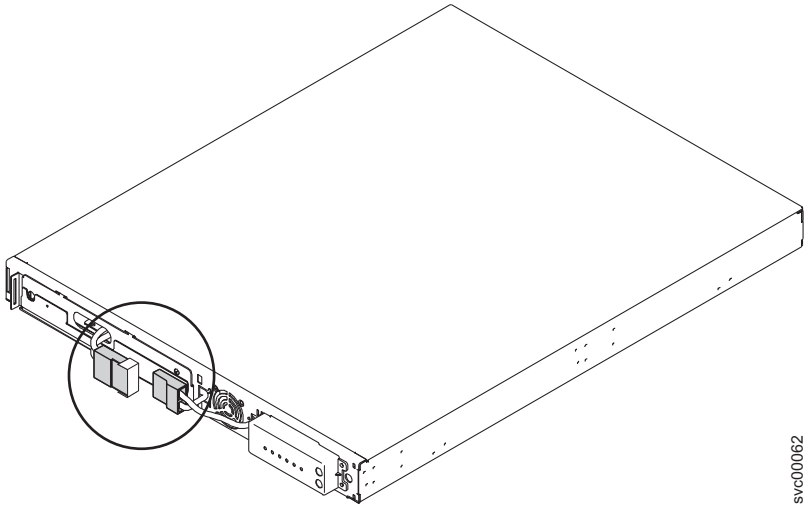


Figure 230. The 2145 UPS-1U internal battery connector with protective tape

8. Reinstall the front panel.
9. At the front of the 2145 UPS-1U, unscrew the two mounting screws **1** , as shown in Figure 231 on page 246.

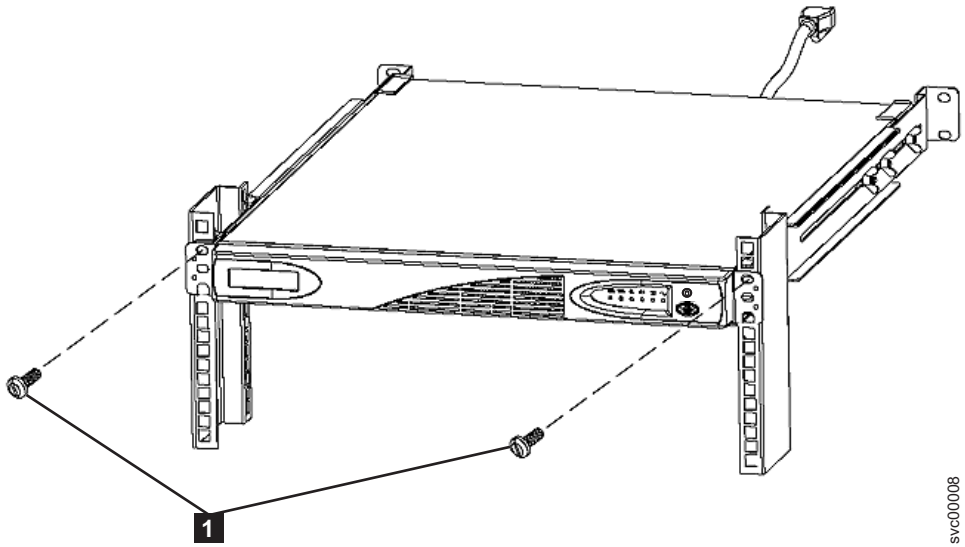


Figure 231. Mounting screws for the 2145 UPS-1U

10. From the back of the rack, push the 2145 UPS-1U forward approximately 5 cm (2 in) to enable you to pull it from the rack.
11. Go to the front of the rack.
12. Pull the 2145 UPS-1U forward and remove it from the rack.

Related tasks

"Removing the 2145 UPS-1U battery" on page 256
Follow all safety notices when you are removing the 2145 UPS-1U battery.

"Replacing the 2145 UPS-1U"
You can replace the 2145 UPS-1U only after you remove the previous uninterruptible power supply.

Replacing the 2145 UPS-1U

You can replace the 2145 UPS-1U only after you remove the previous uninterruptible power supply.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

DANGER

Uninterruptible power supply units contain specific hazardous materials. Observe the following precautions if your product contains an uninterruptible power supply:

- **The uninterruptible power supply contains lethal voltages. All repairs and service must be performed only by an authorized service support representative. There are no user serviceable parts inside the uninterruptible power supply.**
- **The uninterruptible power supply contains its own energy source (batteries). The output receptacles might carry live voltage even when the uninterruptible power supply is not connected to an ac supply.**
- **Do not remove or unplug the input cord when the uninterruptible power supply is turned on. This removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply.**
- **The uninterruptible power supply is heavy because of the electronics and batteries that are required. To avoid injury, observe the following precautions:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**
  - **Remove the battery, electronics assembly, or both from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton or installing or removing the uninterruptible power supply in the rack.**

(D007)

CAUTION:
This part or unit is heavy but has a weight smaller than 18 kg (39.7 lb). Use care when lifting, removing, or installing this part or unit. (C008)

Perform the following steps to replace the 2145 UPS-1U:

1. Place the 2145 UPS-1U on a flat, stable surface with the front of the 2145 UPS-1U facing toward you.
2. On each side of the 2145 UPS-1U, attach the long end of a mounting bracket to the 2145 UPS-1U using four of the supplied M3 × 6 screws (**2** in Figure 232).

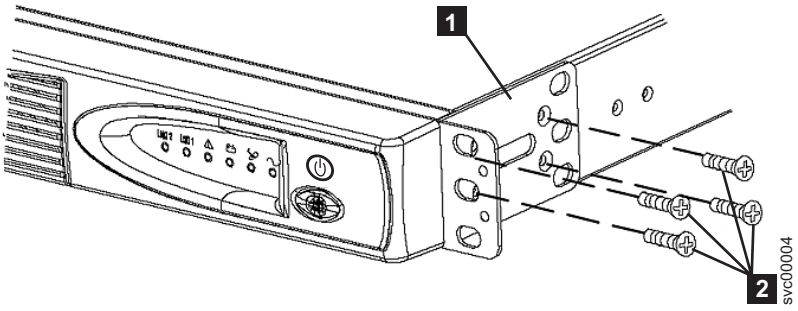


Figure 232. Installing the support rails for a 2145 UPS-1U into the rack

3. Stand at the front of the rack and place the back of the 2145 UPS-1U onto the support rails, and then slide the 2145 UPS-1U into the rack.

4. At the front of the 2145 UPS-1U, install the two mounting screws (**1** in Figure 233).

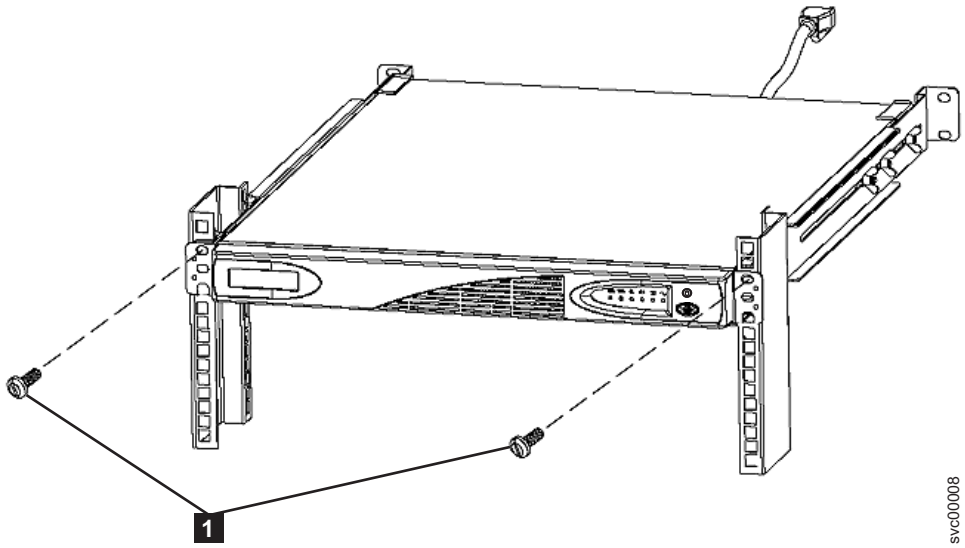


Figure 233. Mounting screws for the 2145 UPS-1U

5. Remove the 2145 UPS-1U front panel by pulling it towards you and to the left, as shown in Figure 234.

   Note: If you are having difficulty pulling the right side of the panel free from the 2145 UPS-1U, insert a flat-blade screwdriver between the right side of the cover and the frame and gently pry it free.

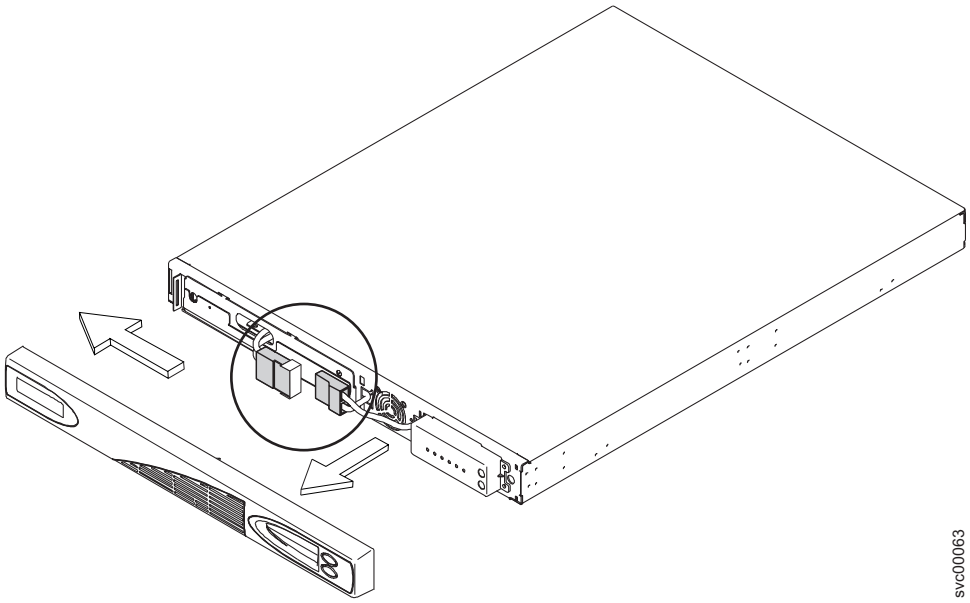


Figure 234. Removing the 2145 UPS-1U front panel

6. Remove the protective tape from the internal battery connector (circled in Figure 235 on page 249).

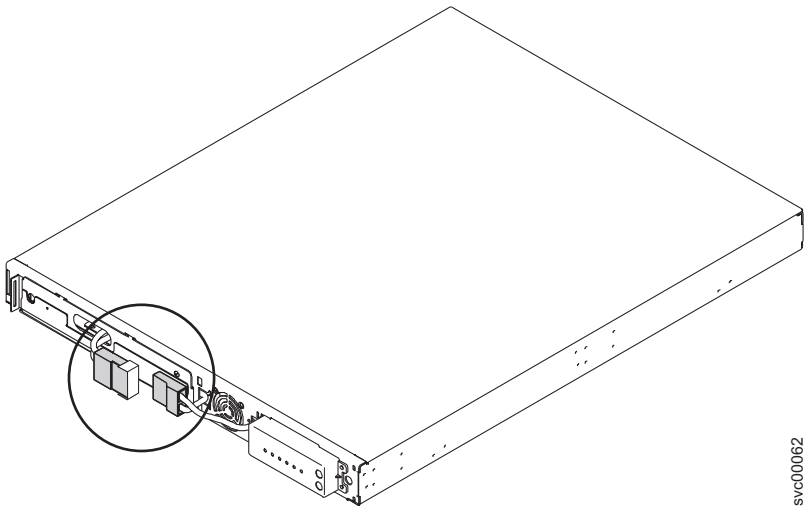


Figure 235. The 2145 UPS-1U internal battery connector with protective tape

7. Connect the internal battery connector (circled in Figure 236).

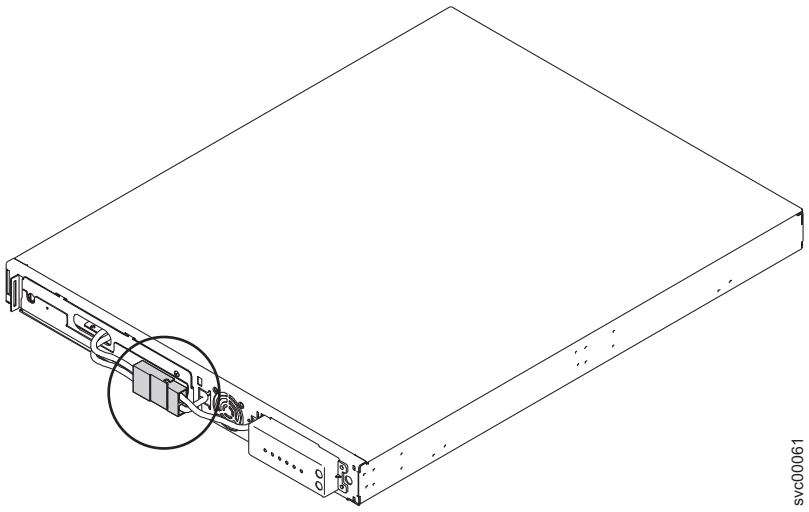


Figure 236. The 2145 UPS-1U with internal battery connectors in place

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

8. Reinstall the front panel.
9. At the back of the 2145 UPS-1U, connect the SAN Volume Controller power cable to load segment 2 receptacle (**3** in Figure 238 on page 250). If applicable, install the power cable retention bracket (shown in Figure 237 on page 250).

   Note: The 2145 UPS-1U is intended to maintain power on a single SAN Volume Controller node until data can be saved to the local hard disk drive. Only SAN Volume Controller nodes can be plugged in to the 2145 UPS-1U or else the SAN Volume Controller cluster malfunctions. You must attach only one SAN Volume Controller to the 2145 UPS-1U, and nothing else.

Figure 237. The 2145 UPS-1U cable retention bracket connected to the 2145 UPS-1U

10. Reconnect the SAN Volume Controller signal cable to the communication port (**2** in Figure 238).
11. Reconnect the 2145 UPS-1U main power cable, from either the power distribution unit or from the redundant ac-power switch, into the input connector (**1** in Figure 238).

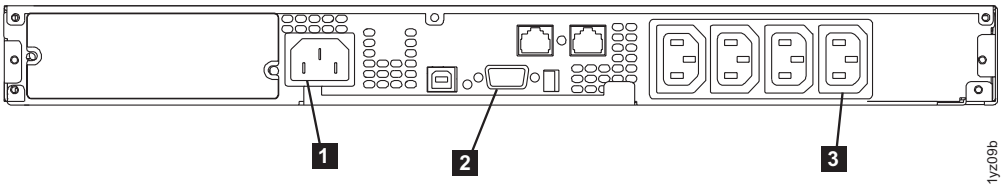


Figure 238. 2145 UPS-1U (rear view)

The 2145 UPS-1U is now in standby mode with the SAN Volume Controller offline. All indicators that are shown in Figure 238 are off.

12. To turn on the 2145 UPS-1U, press and hold the on/off button (**2** in Figure 239). On some versions of the 2145 UPS-1U, you need a pointed device, such as a screwdriver, to press the on/off button. The 2145 UPS-1U undergoes a self-test, taking approximately five seconds, before the power-on indicator **1** and the load indicators (**7** and **8**) light up permanently to indicate that the 2145 UPS-1U is supplying power to the SAN Volume Controller. The 2145 UPS-1U begins to charge its battery while in normal mode.

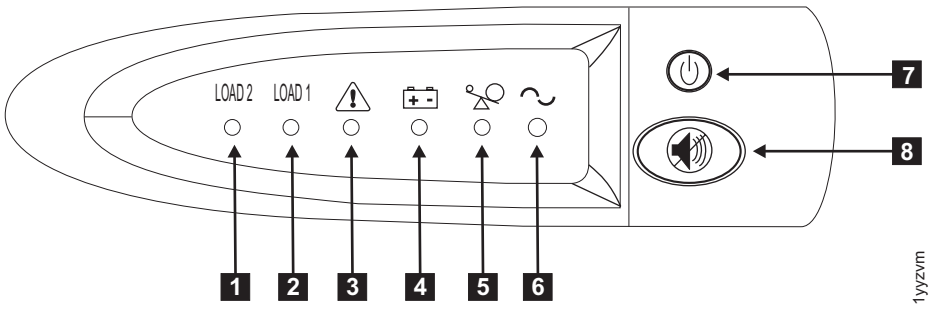


Figure 239. 2145 UPS-1U front-panel assembly

Note: If the 2145 UPS-1U battery is not sufficiently charged, the SAN Volume Controller node will not be able to join the cluster. The node will display `Charging` on its front panel until the 2145 UPS-1U battery has reached

sufficient charge, which could take an hour. When the SAN Volume Controller node rejoins the cluster, it might display `Recovering` on its front panel while the 2145 UPS-1U battery finalizes its charge.

Related tasks

"Removing the 2145 UPS-1U battery" on page 256
Follow all safety notices when you are removing the 2145 UPS-1U battery.

Removing the support rails for a 2145 UPS-1U

You can remove the support rails for the 2145 UPS-1U.

Perform the following steps to remove the support rails:

1. Loosen and remove the two M6 × 10 screws from each side of the 2145 UPS-1U. See **1** in Figure 240.

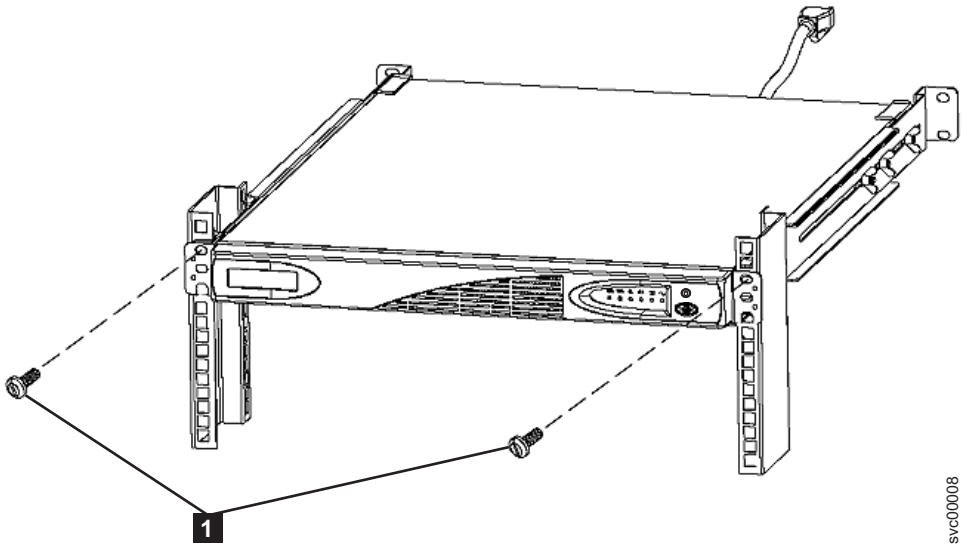


Figure 240. Removing the front screws from the 2145 UPS-1U

2. Remove the 2145 UPS-1U from the rack.
3. Remove the clip nut from the top hole of the rail (**3** in Figure 241 on page 252).

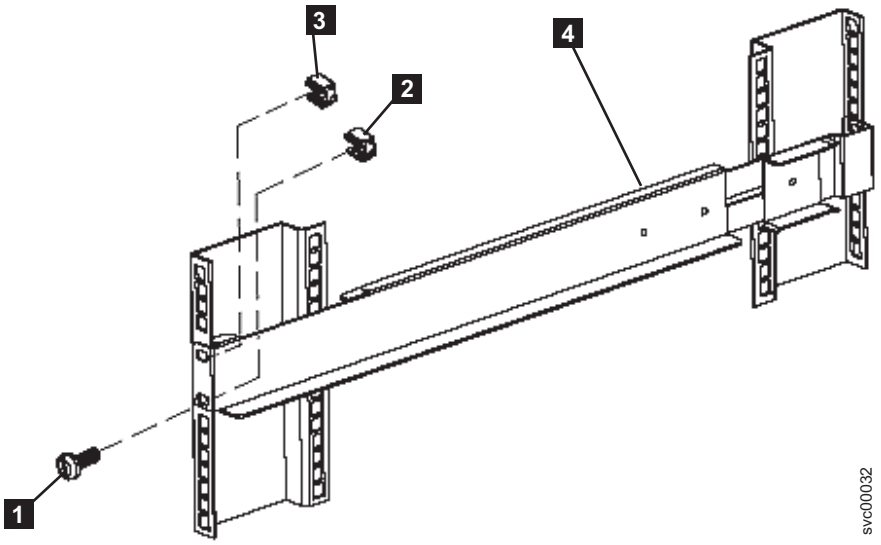


Figure 241. Removing the front rail on the 2145 UPS-1U

4. Detach the M6 × 10 screw **1** from the clip nut **2** in the bottom hole of the rail.
5. Remove the two M6 × 10 screws from the rear side of the rail (**1** in Figure 242) and the two clip nuts (**2**).

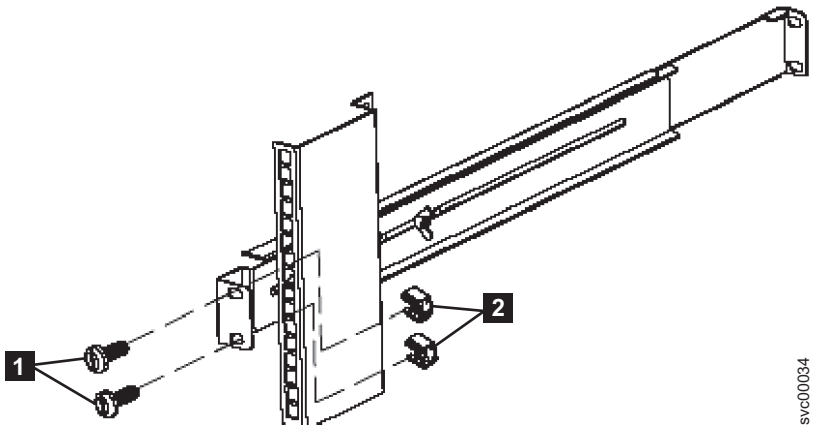


Figure 242. Removing the rear rail on the 2145 UPS-1U

6. Remove the rail from the rack.
7. Repeat step 3 on page 251 through step 6 to remove the other rail from the rack.

Installing the support rails for the 2145 UPS-1U

You must install the support rails in the rack before installing the 2145 UPS-1U.

Complete the following prerequisites before installing the support rails:

1. Use the customer's hardware-location chart to determine where in the rack that the 2145 UPS-1U is to be installed.

2. At the back of the rack, observe the Electronic Industries Alliance (EIA) positions and determine where you are going to install the 2145 UPS-1U. Because of its weight, position the 2145 UPS-1U where it is easy to handle in one of the lower positions in the rack.

Perform the following steps to install the support rails for the 2145 UPS-1U:

1. Open the top of the 2145 UPS-1U shipping carton. Grip the flaps on either side of the 2145 UPS-1U.
2. Lift the 2145 UPS-1U clear of the shipping carton and place it on a flat, stable surface with the front facing you.
3. 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, as shown in Figure 243.

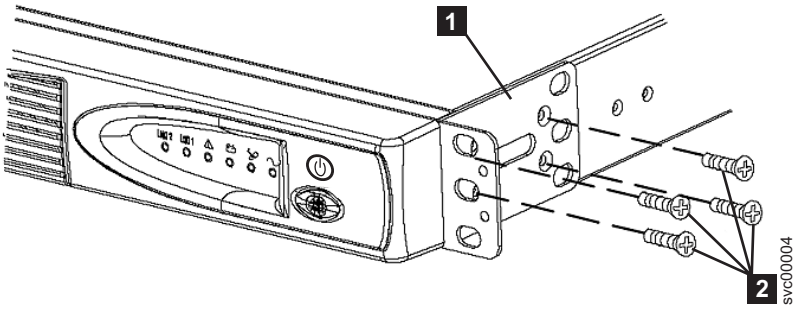


Figure 243. Installing the support rails for a 2145 UPS-1U into the rack

4. Loosen the assembly wing nuts (**1** in Figure 244) on both rail assemblies and adjust the rail size to the depth of your rack.

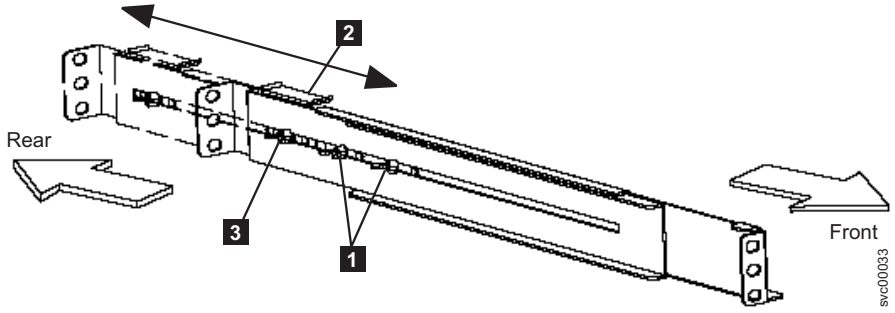


Figure 244. Adjusting the rail depth on the 2145 UPS-1U

1 Assembly wing nuts

2 Hold-down bracket

3 Wing nut

5. Position the rear, hold-down bracket (**2** in Figure 244) towards the end of the rail assemblies and tighten the wing nut (**3** in Figure 244).

6. 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.

7. Using two M6 × 10 screws (**1** in Figure 245) and two clip nuts **2**, attach the rail to the rear of the rack. The customer's rack might be different than the one shown here, and if so, might require different clip nuts or fasteners.

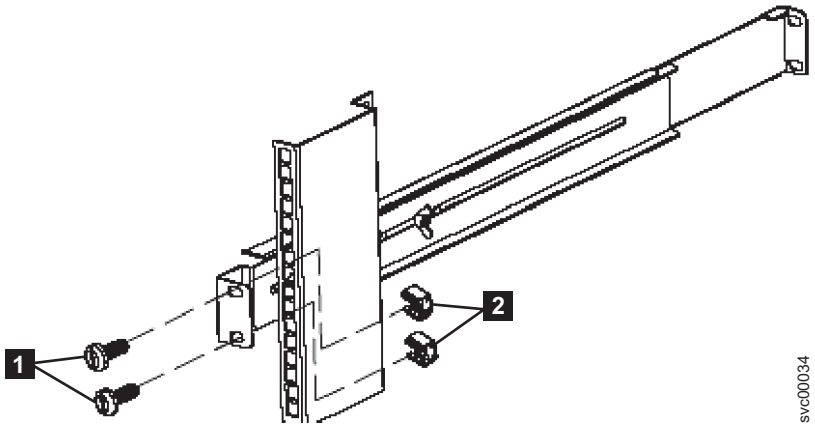


Figure 245. Securing the rear rail on the 2145 UPS-1U

8. Attach only the bottom hole of the rail to the front of the rack with one M6 × 10 screw and one clip nut (**1** in Figure 246).

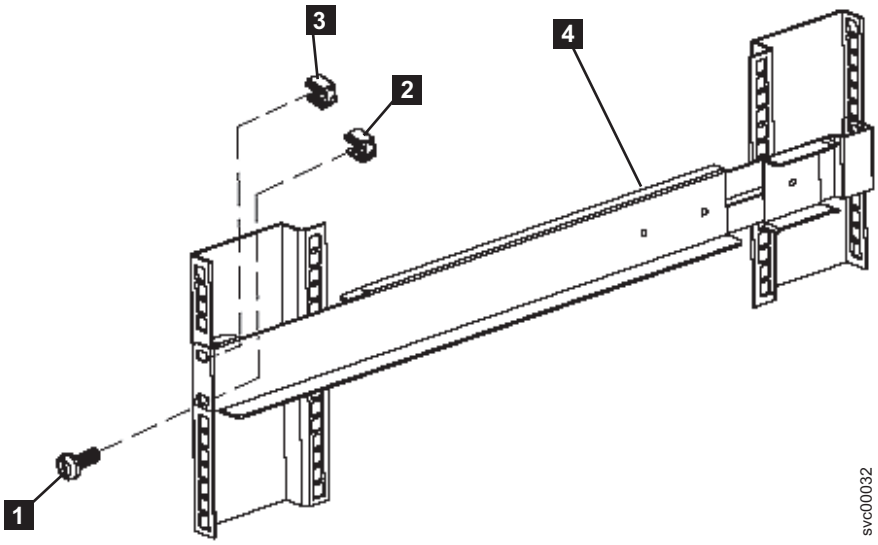


Figure 246. Securing the front rail on the 2145 UPS-1U

9. Install a clip nut in the top hole of the rail **3**.
10. Repeat step 7 through step 9 for the other rail.
11. Tighten the assembly wing nuts on both rail assemblies.

Removing the power cable from the 2145 UPS-1U

You can remove the power cable from the 2145 UPS-1U if you are having problems with the power supply and suspect that the power cable is defective.

Perform the following steps to remove the power cable:

1. Remove the power from each SAN Volume Controller node. See MAP 5350 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for information about removing the power cable from the SAN Volume Controller.
2. Press and hold the on/off button **2** until the power light **1** is extinguished (approximately five seconds). On some versions of the 2145 UPS-1U, you need a pointed device, such as a screwdriver, to press the on/off button. The 2145 UPS-1U enters standby mode, with all indicators off. Figure 247 illustrates the front and rear views of the 2145 UPS-1U.

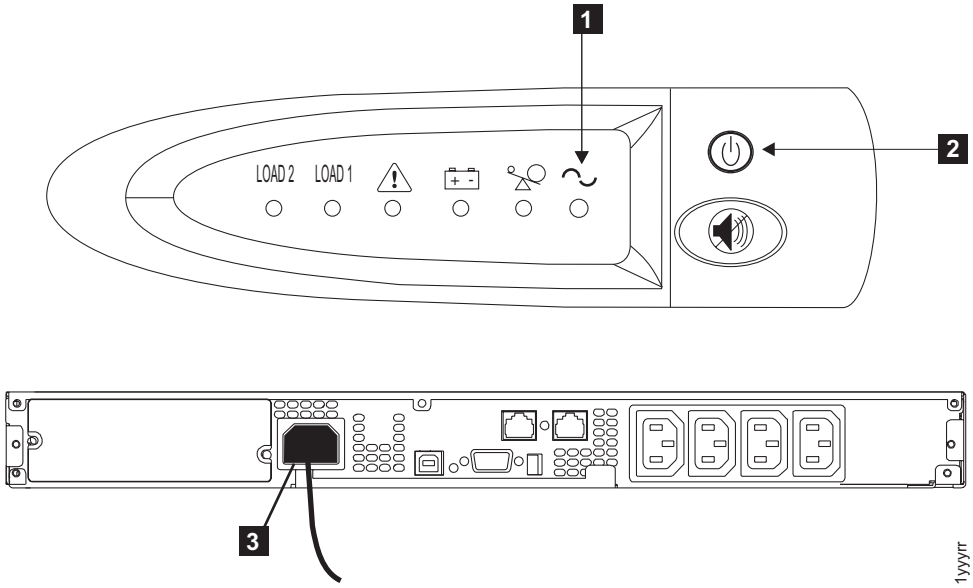


Figure 247. Front and back panels for the 2145 UPS-1U

1 Power-on indicator

2 On/off button

3 Power cable

3. Disconnect the power cable from the main power source **3** .
4. Replace the power cable and make sure it is seated. The 2145 UPS-1U enters standby mode. All indicators are off and power is not available to the SAN Volume Controller. The battery recharges when necessary.
5. To turn the 2145 UPS-1U on, press and hold the on/off button **2** until the 2145 UPS-1U power button **1** is illuminated (approximately five seconds). On some versions of the 2145 UPS-1U, you need a pointed device, such as a screwdriver, to press the on/off button. The front panel indicators then cycle through a startup sequence while the 2145 UPS-1U conducts a self-test. When the self-test completes, the power-on indicator and the load indicators illuminate to show that the 2145 UPS-1U is supplying power. The 2145 UPS-1U resumes service in normal mode.

Related tasks

"Removing and replacing the SAN Volume Controller power cable assembly" on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Removing the 2145 UPS-1U battery

Follow all safety notices when you are removing the 2145 UPS-1U battery.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

Perform the following steps to remove the 2145 UPS-1U battery:

1. Ensure the SAN Volume Controller that is connected to the 2145 UPS-1U is turned off. Use the instructions in "MAP 5350" in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* to turn off the node if it is not already off.

   Note: There is no need to turn off the 2145 UPS-1U or remove it from the rack.
2. Pull the front panel from the right side until the panel is released from the right and middle sections of the 2145 UPS-1U. Push the front panel to the left to release the catch on the left end of the panel, as shown in Figure 248.

   Note: If you are having difficulty pulling the right side of the panel free from the 2145 UPS-1U, insert a flat-blade screwdriver between the right side of the cover and the frame and gently pry it free.

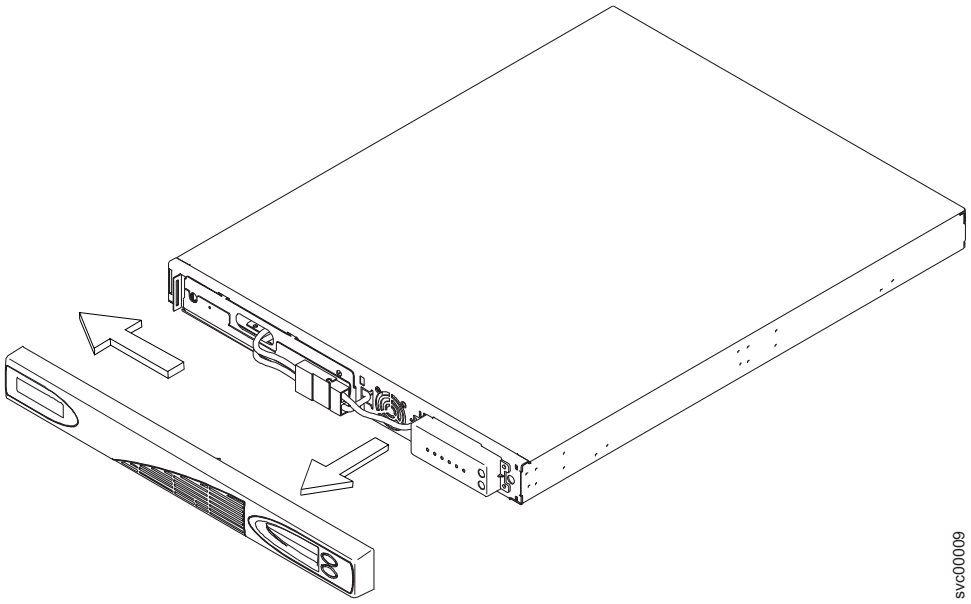


Figure 248. Removing the 2145 UPS-1U front panel

3. Disconnect the internal battery connector, circled in Figure 249 on page 257.

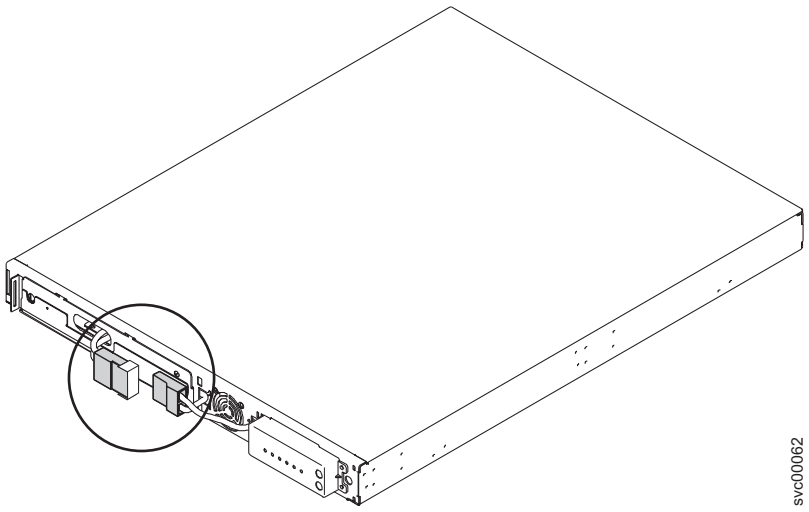


Figure 249. The 2145 UPS-1U internal battery connector with protective tape

4. Slide the battery cover to the right and remove it.
5. Slide the battery out of the 2145 UPS-1U, as shown in Figure 250, and remove it, laying it on a flat surface.

   CAUTION:
   Lead-acid batteries can present a risk of electrical burn from high, short-circuit current. Avoid battery contact with metal materials; remove watches, rings, or other metal objects, and use tools with insulated handles. To avoid possible explosion, do not burn.

   Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C004)

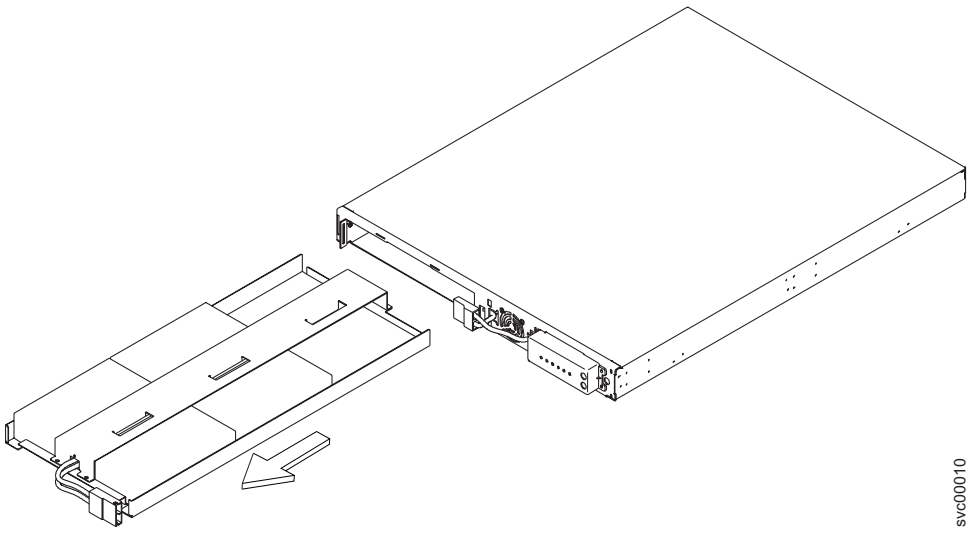


Figure 250. Removing the 2145 UPS-1U battery

Related tasks

"Removing the 2145 UPS-1U" on page 242
Before you remove the 2145 UPS-1U, read all safety notices.

"Replacing the 2145 UPS-1U" on page 246
You can replace the 2145 UPS-1U only after you remove the previous uninterruptible power supply.

Replacing the 2145 UPS-1U battery

Follow all safety notices when you are replacing the 2145 UPS-1U battery.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

This task assumes that you have disconnected the 2145 UPS-1U battery and have turned off the SAN Volume Controller. Perform the following steps to replace the 2145 UPS-1U battery:

1. Slide the battery into the 2145 UPS-1U, as shown in Figure 251.

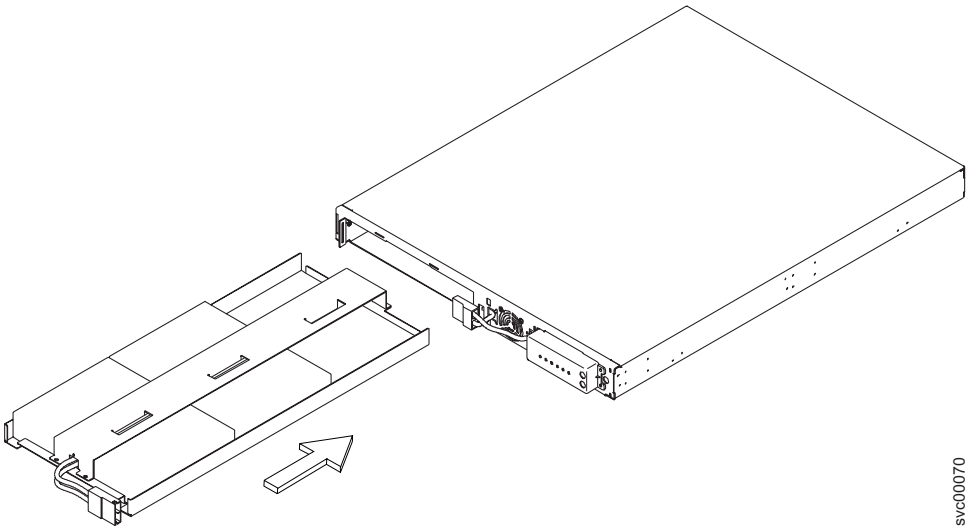


Figure 251. Replacing the 2145 UPS-1U battery

CAUTION:
Lead-acid batteries can present a risk of electrical burn from high, short-circuit current. Avoid battery contact with metal materials; remove watches, rings, or other metal objects, and use tools with insulated handles. To avoid possible explosion, do not burn.

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C004)

2. Thread the battery connector through the battery cover. Position the battery cover in place and slide it to the left to secure it.
3. Connect the internal battery connector, as shown in Figure 253 on page 259. Each end of the keyed connector has two wires: one red (+) and one black (–). Join the black wires and the red wires together.

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.

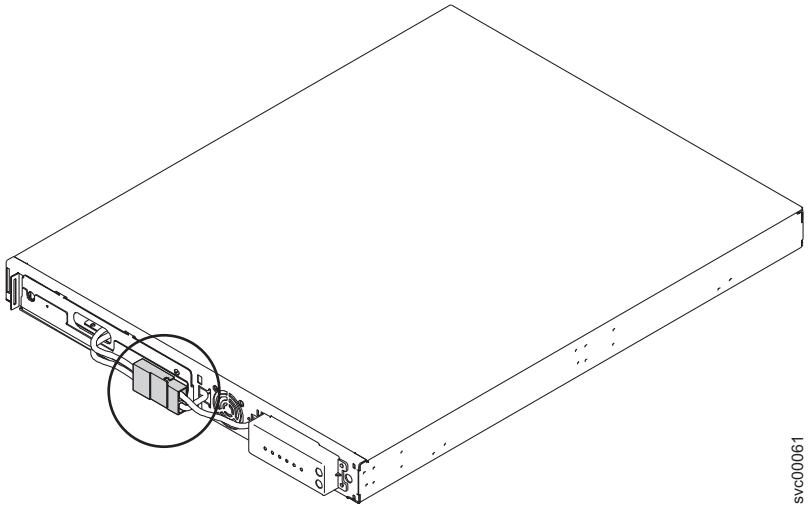


Figure 252. The 2145 UPS-1U internal-battery connector

4. Push the front panel to the right to catch on the left end of the panel. Push the front panel forward until the panel snaps into the right and middle sections of the 2145 UPS-1U, as shown in Figure 253.

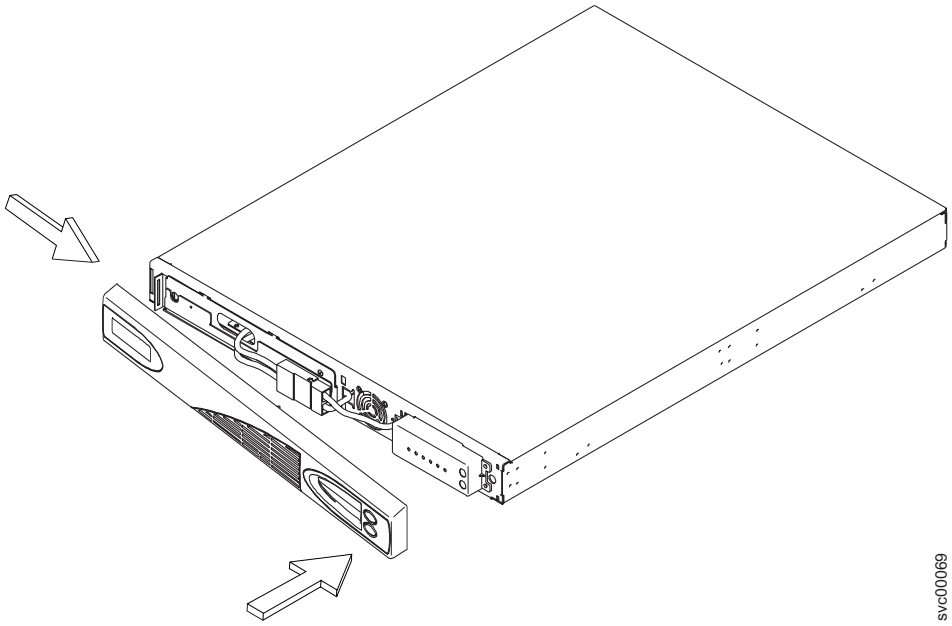


Figure 253. Replacing the 2145 UPS-1U front panel

5. Ensure that the 2145 UPS-1U is turned on. Press and hold the 2145 UPS-1U test button for three seconds to start the self-test. If any of the Alarm, Battery, or Overload indicators are on or the buzzer is sounding, go to MAP 5150 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* to resolve the problem.

   Note: Ignore all error indicators until the self-test has been run.

6. Turn on the SAN Volume Controller.

   Note: If the new battery does not have enough charge to support the actions that are required during a power failure, the SAN Volume Controller node pauses with `Charging` displayed on its front panel until a sufficient charge is available. If there is a sufficient charge to support the actions that are required during a single power failure but not sufficient charge to support two power failures, the node starts and joins the cluster but displays `Recovering` on its front panel.

Removing and replacing 2145 UPS parts

The remove and replace procedures for the 2145 UPS field replaceable units are described in the topics which follow.

Removing the 2145 UPS

Before you begin to remove the 2145 UPS, read all safety notices.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

DANGER

Uninterruptible power supply units contain specific hazardous materials. Observe the following precautions if your product contains an uninterruptible power supply:

- **The uninterruptible power supply contains lethal voltages. All repairs and service must be performed only by an authorized service support representative. There are no user serviceable parts inside the uninterruptible power supply.**
- **The uninterruptible power supply contains its own energy source (batteries). The output receptacles might carry live voltage even when the uninterruptible power supply is not connected to an ac supply.**
- **Do not remove or unplug the input cord when the uninterruptible power supply is turned on. This removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply.**
- **The uninterruptible power supply is heavy because of the electronics and batteries that are required. To avoid injury, observe the following precautions:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**
  - **Remove the battery, electronics assembly, or both from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton or installing or removing the uninterruptible power supply in the rack.**

(D007)

CAUTION:

The weight of this part or unit is between 32 and 55 kg (70.5 and 121.2 lb). It takes three persons to safely lift this part or unit. (C010)

Perform the following steps to remove the 2145 UPS:

Attention: Check to make sure that any SAN Volume Controller that is powered by this 2145 UPS is shut down and turned off, prior to step 1. See MAP 5350 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

1. At the front of the 2145 UPS, press and hold the off button (**1** in Figure 254) for approximately five seconds or until the long beep stops.

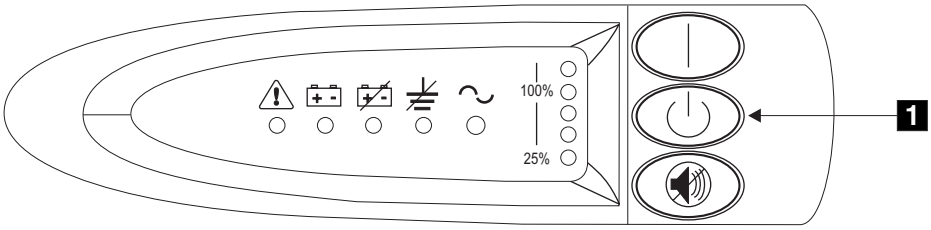


Figure 254. 2145 UPS front-panel assembly

2. At the back of the 2145 UPS (Figure 255), disconnect the power cables of the SAN Volume Controller **3** .
3. Disconnect the signal cables (**1** in Figure 255).
4. Disconnect the main power cable (**2** in Figure 255).

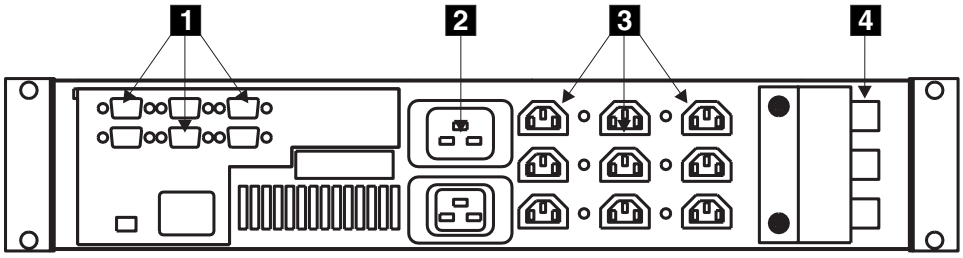


Figure 255. 2145 UPS connectors and circuit breakers

5. Remove the battery from the 2145 UPS. See “Removing the 2145 UPS battery” on page 272.
6. Remove the electronics assembly from the 2145 UPS. See “Removing the 2145 UPS electronics” on page 269.
7. At the front of the 2145 UPS, unscrew the mounting screws (**1** in Figure 256 on page 262).

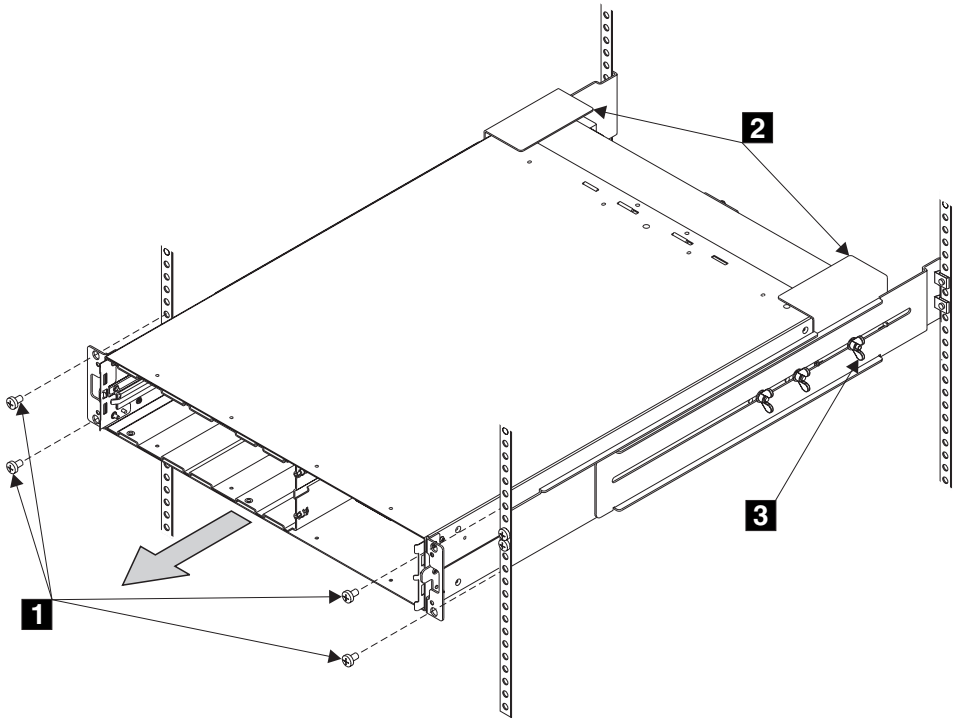


Figure 256. Removing the 2145 UPS

8. At the back of the rack, push the 2145 UPS forward approximately 5 cm (2 in) to enable you to pull it from the rack.
9. Go to the front of the rack.
10. With aid from another service representative, pull the 2145 UPS forward and remove it from the rack.
11. Replace the 2145 UPS. See “Replacing the 2145 UPS.”

Related tasks

“Removing the 2145 UPS electronics” on page 269
During routine maintenance, you might have to remove the 2145 UPS electronics assembly.

“Removing the 2145 UPS battery” on page 272
Follow all safety notices when you are removing the 2145 UPS battery.

“Replacing the 2145 UPS”
You can replace the 2145 UPS after first removing the current 2145 UPS.

Replacing the 2145 UPS

You can replace the 2145 UPS after first removing the current 2145 UPS.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

DANGER

Uninterruptible power supply units contain specific hazardous materials. Observe the following precautions if your product contains an uninterruptible power supply:

- **The uninterruptible power supply contains lethal voltages. All repairs and service must be performed only by an authorized service support representative. There are no user serviceable parts inside the uninterruptible power supply.**
- **The uninterruptible power supply contains its own energy source (batteries). The output receptacles might carry live voltage even when the uninterruptible power supply is not connected to an ac supply.**
- **Do not remove or unplug the input cord when the uninterruptible power supply is turned on. This removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply.**
- **The uninterruptible power supply is heavy because of the electronics and batteries that are required. To avoid injury, observe the following precautions:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**
  - **Remove the battery, electronics assembly, or both from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton or installing or removing the uninterruptible power supply in the rack.**

(D007)

Perform the following steps to replace the 2145 UPS:

1. Reduce the weight of the 2145 UPS by removing the battery assembly first before removing the unit from the shipping carton. Perform the following steps to remove the battery assembly:
   a. Open the top of the shipping carton and then, with the assistance of another service representative, grip the flaps on either side of the 2145 UPS. See Figure 257 on page 264.

Figure 257. Two persons unboxing a 2145 UPS

b. Slide the 2145 UPS to the end of the carton and rest its front edge on the edge of the carton as shown. See Figure 258.

Figure 258. Slide the 2145 UPS to the edge of the carton

c. Remove the two bolts **1** and additional nut **2** on the left side of the bracket. See Figure 259 on page 265.

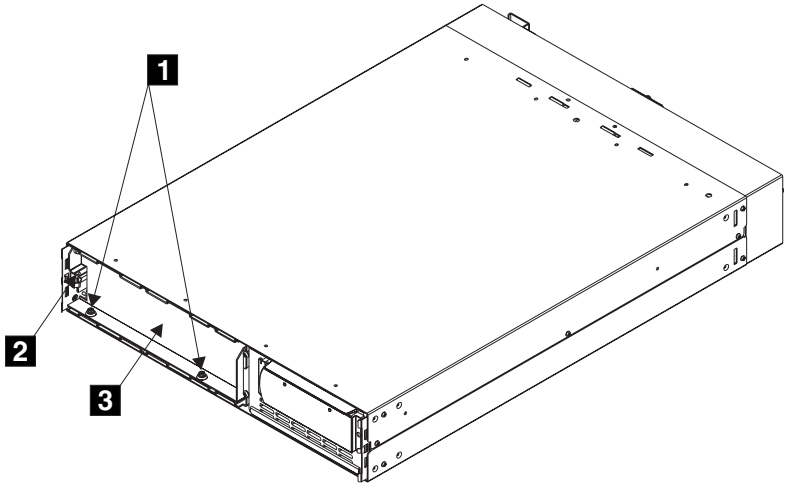


Figure 259. Remove the battery retaining bracket

d. Remove the battery retaining bracket **3** .

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

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

Note: The cover for the 2145 UPS is not installed: it is included in the box with the 2145 UPS. Install the front cover after you have completed the other installation steps.

2. With the assistance of another service representative, lift the 2145 UPS onto a flat, stable surface.
3. Remove the electronic assembly from the 2145 UPS:
   a. Remove the two screws **1** (see Figure 260).

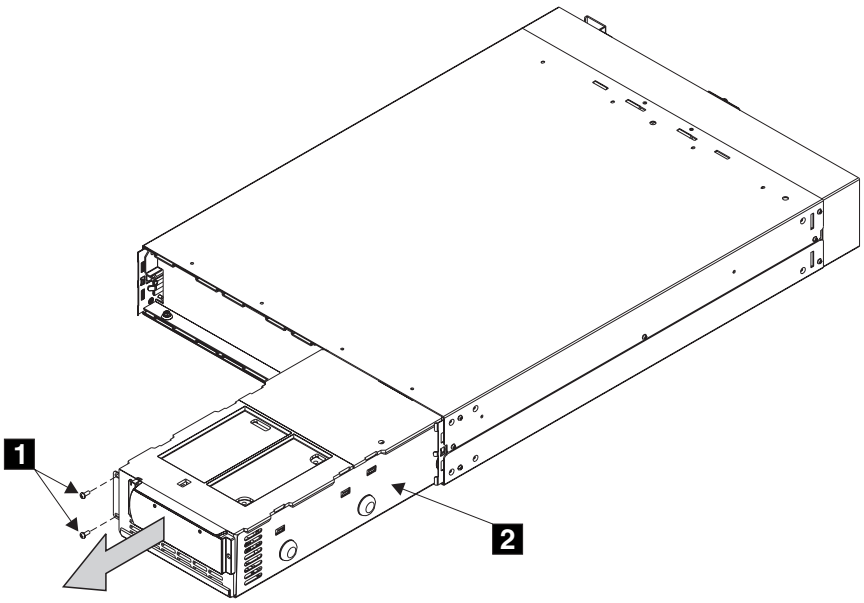


Figure 260. Removing the 2145 UPS electronics assembly

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

4. Stand at the front of the rack and, with aid from another service representative, place the back of the 2145 UPS onto the support rails, and then slide the 2145 UPS into the rack.
5. Install the front flathead screws **1** (see Figure 261).

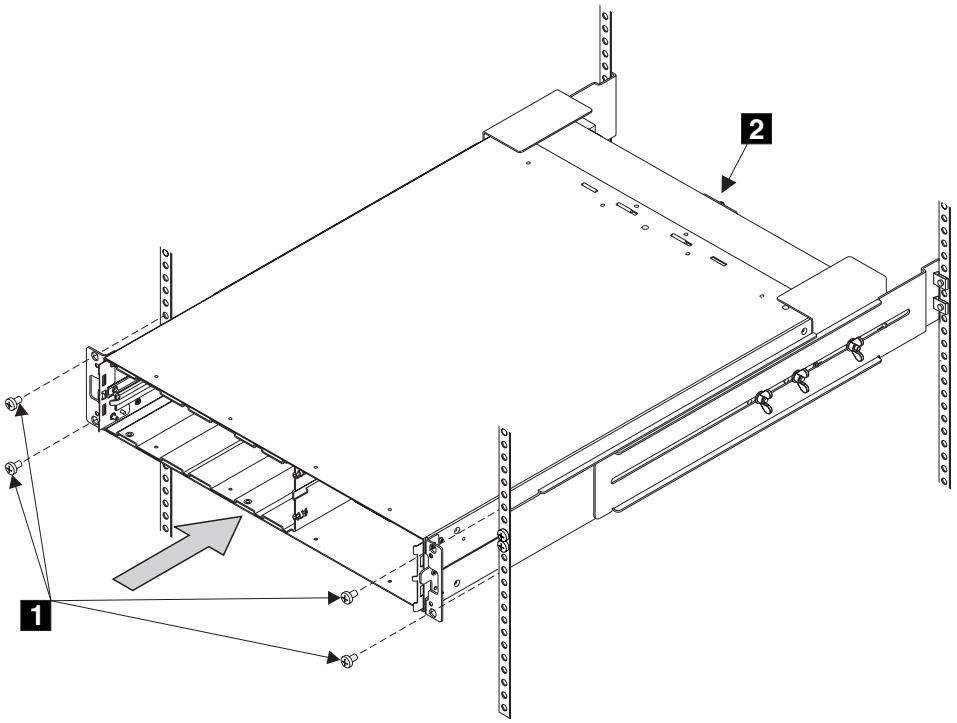


Figure 261. Replacing the 2145 UPS into a rack

6. With aid from another service representative, perform the following steps:
   a. Install the battery.
   b. Install the electronics assembly.

   Note: A grounding screw feature is provided on the back of the 2145 UPS so that you can attach a ground bonding wire if required by local wiring codes. Since the safety of the 2145 UPS chassis is maintained through the input line power cord, you are usually not required to use this additional grounding screw feature.
7. Reconnect the signal cables.

   Attention: When reinstalling the signal cables, use only the top row of serial connectors. Installing signal cables in the bottom row of serial connectors causes the 2145 UPS to malfunction.
8. Install the front panel.
9. At the back of the 2145 UPS, plug the 2145 UPS main power cable into the power socket, **1** in Figure 262 on page 267.

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

SAN Volume Controller cluster malfunctions.

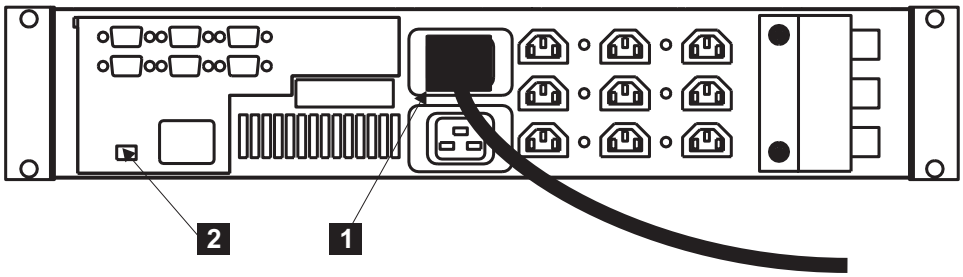


Figure 262. Installing the 2145 UPS power cable

Attention: If possible, ensure that the two uninterruptible power supply unis are not connected to the same power source.

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

- One 15 A circuit breaker in each branch circuit supplies the power to a 2145 UPS
- Single-phase
- 50 or 60 Hz
- 200 – 240 Volt

10. All the front panel indicators (see Figure 263) flash for a short time while the 2145 UPS runs a self test. When the test is complete, the mode indicator flashes to show that the 2145 UPS is in standby mode.

    Press and hold the on button until you hear the 2145 UPS beep (approximately one second). The mode indicator stops flashing and the load level indicators display the percentage of load that is being supplied by the 2145 UPS. The 2145 UPS is now in normal mode and is charging its battery.

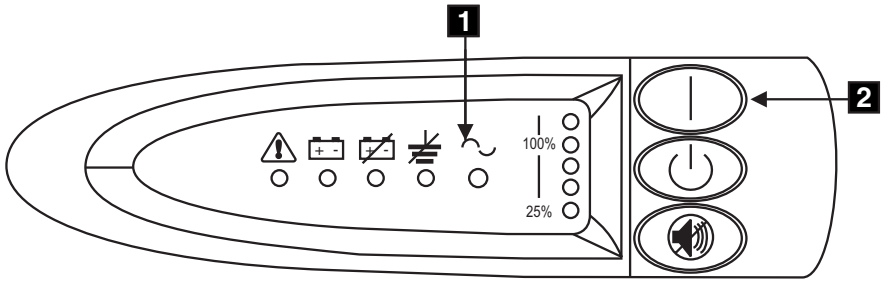


Figure 263. Power switch and indicators of the 2145 UPS

1 Mode indicator

2 On button

11. Install the front cover.

Related tasks

"Removing the 2145 UPS electronics" on page 269
During routine maintenance, you might have to remove the 2145 UPS electronics assembly.

"Removing the 2145 UPS battery" on page 272
Follow all safety notices when you are removing the 2145 UPS battery.

Removing the power cable from the 2145 UPS

You can replace the power cable from the 2145 UPS if you are having problems with the power supply and suspect that the power cable is defective.

Perform the following steps to remove the power cable:

1. Remove the power from each SAN Volume Controller node. See MAP 5350 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for information about removing the power cable from the SAN Volume Controller.
2. Press and hold the off switch **2** . A long beep sounds for approximately five seconds. When the beep stops, release the switch. The mode indicator **1** , shown in Figure 264, flashes and the 2145 UPS enters standby mode.

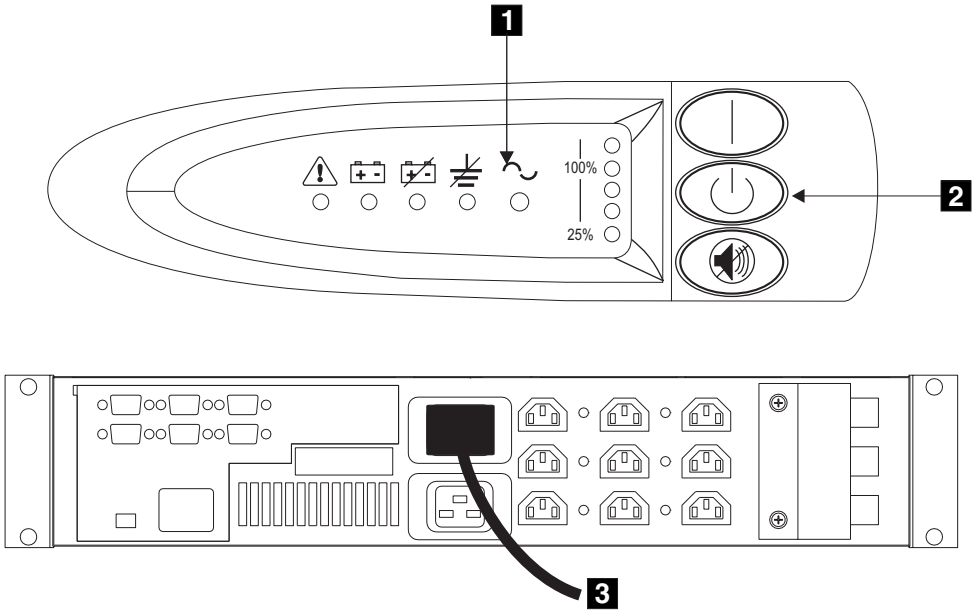


Figure 264. Front and back view of the 2145 UPS

1 Mode indicator

2 Off switch

3 Power cable

3. Unplug the power cable **3** from the main power source.
4. Reinstall the power cable (or replace it) to return power to the 2145 UPS. The 2145 UPS runs a self-test and enters standby mode.
5. Press and hold the on switch until, after approximately one second, the 2145 UPS beeps. The mode indicator stops flashing and the load-level indicators show the percentage of load that the 2145 UPS supplies.

Related tasks

“Removing and replacing the SAN Volume Controller power cable assembly” on page 95
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Removing the 2145 UPS electronics

During routine maintenance, you might have to remove the 2145 UPS electronics assembly.

Follow all safety notices when removing the 2145 UPS electronics assembly.

Important: Check to make sure that any SAN Volume Controller that is powered by this 2145 UPS is shut down and turned off, prior to step 1. See MAP 5350 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

Perform the following steps to remove the 2145 UPS electronic assembly:

1. At the front of the 2145 UPS, press and hold the off button for approximately five seconds, or until the long beep stops. See “Removing the 2145 UPS” on page 260.
2. At the back of the 2145 UPS, disconnect the signal cables **1** , which are shown in Figure 265.

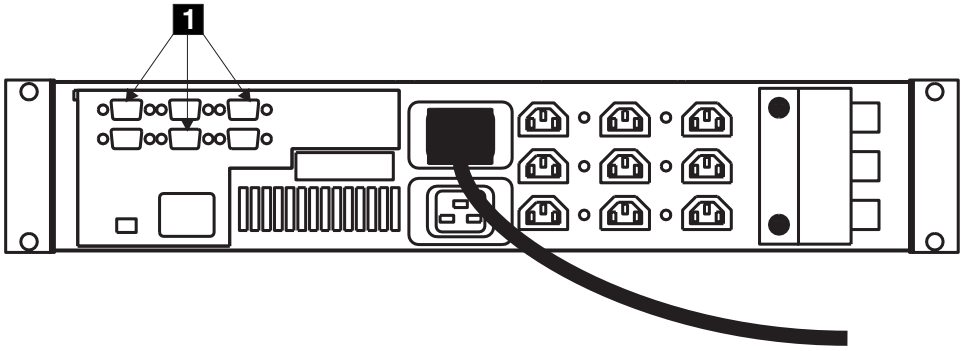


Figure 265. Disconnecting the 2145 UPS signal cables

3. Remove the front panel by pressing the sides inward and pulling both ends towards you, as shown in Figure 266 on page 270.

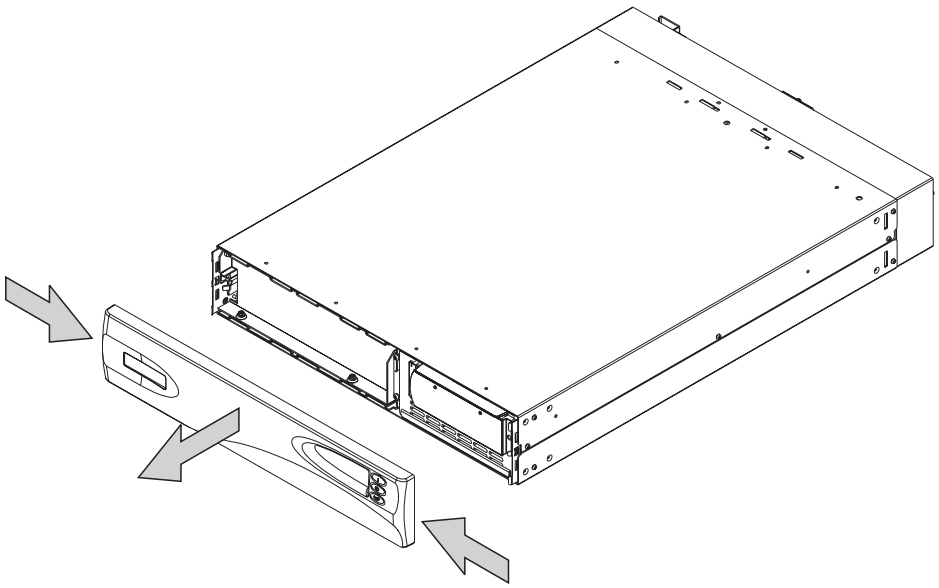


Figure 266. Removing the front panel of the 2145 UPS

4. Remove the two screws (**1** in Figure 267).

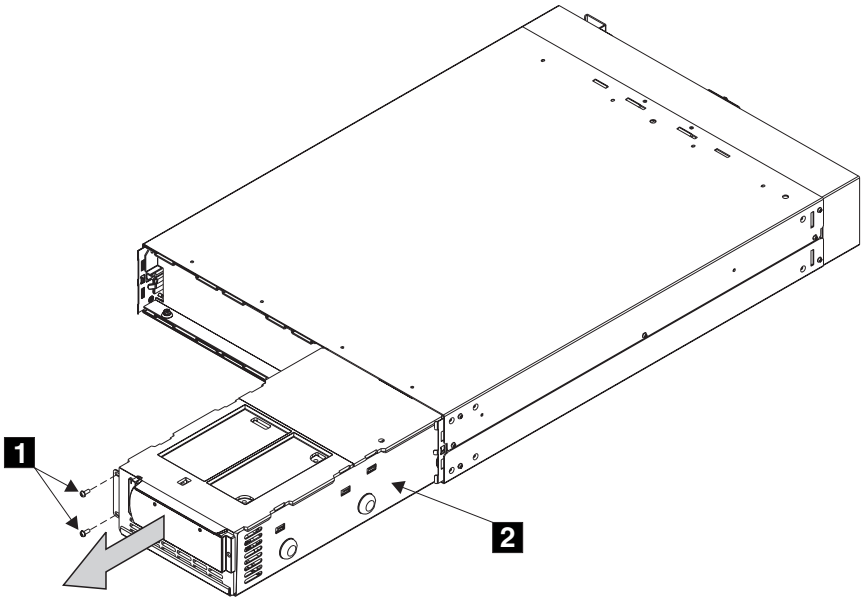


Figure 267. Removing the electronics unit from the 2145 UPS

5. Pull the electronics assembly (**2** in Figure 267) out from the 2145 UPS.

Related tasks

"Removing the 2145 UPS" on page 260
Before you begin to remove the 2145 UPS, read all safety notices.

Replacing the 2145 UPS electronics

During routine maintenance, you might have to replace the 2145 UPS electronics assembly.

Follow all safety notices when replacing the 2145 UPS electronics assembly.

Attention: When reinstalling the signal cables, use only the top row of serial connectors. Installing signal cables in the bottom row of serial connectors causes the 2145 UPS to malfunction.

Important: Check to make sure that any SAN Volume Controller that is powered by this 2145 UPS is shut down and powered off, prior to step 1.

Perform the following steps to replace the 2145 UPS electronic assembly:

1. Replace the two screws in the front of the 2145 UPS. (**1** in Figure 268).

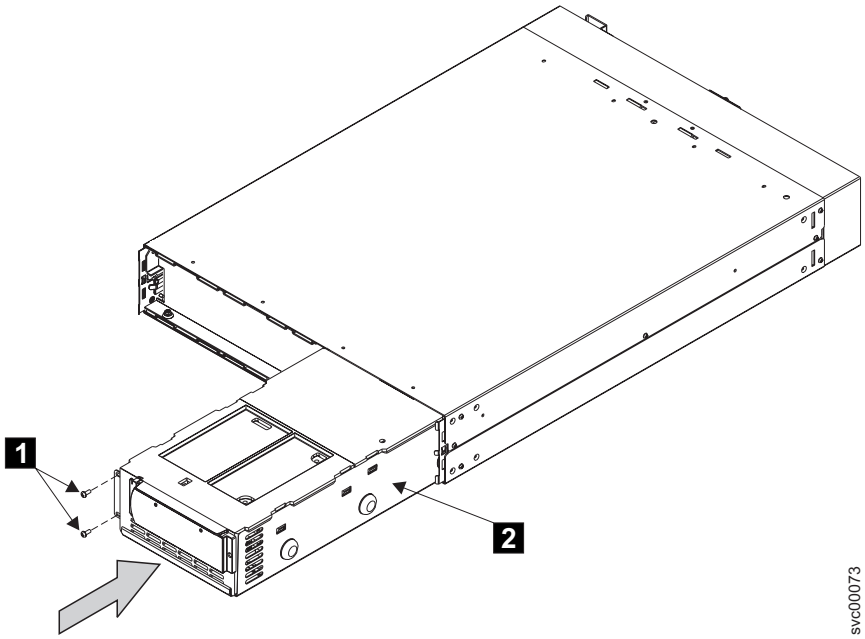


Figure 268. Replacing the electronics unit from the 2145 UPS

2. Insert the electronics assembly (**2** in Figure 268) into the 2145 UPS.
3. Replace the front panel by pressing the sides inward and pushing both ends towards the 2145 UPS, as shown in Figure 269 on page 272.

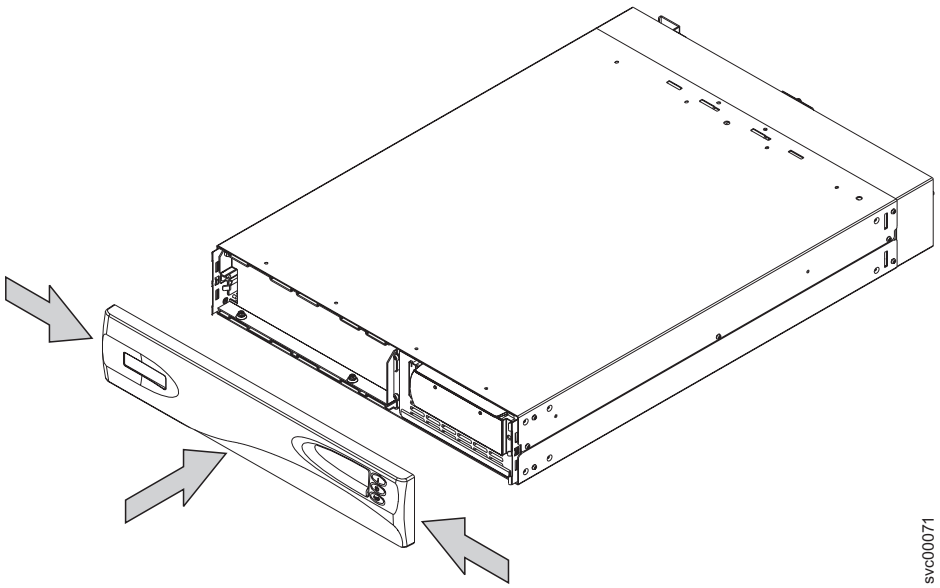


Figure 269. Replacing the 2145 UPS front panel

4. At the back of the 2145 UPS, connect the signal cables (**1** in Figure 270).

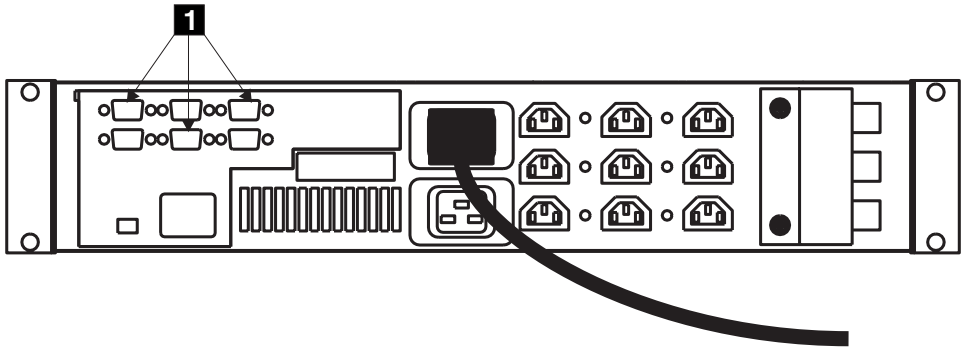


Figure 270. Connecting the 2145 UPS signal cables

5. At the front of the 2145 UPS, press and hold the on button until you hear a beep (approximately one second). The mode indicator stops flashing, and the load-level indicators display the percentage of load that is being applied to the 2145 UPS. See the related documentation at the end of this topic for information about the 2145 UPS controls and indicators.

Removing the 2145 UPS battery

Follow all safety notices when you are removing the 2145 UPS battery.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

Important: Before you perform step 1, check to make sure that any SAN Volume Controller that is powered by this 2145 UPS is shut down and turned off. See “MAP 5350” in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

Perform the following steps to remove the 2145 UPS battery assembly:

1. At the front of the 2145 UPS, press and hold the off button (**1** in Figure 271) for approximately five seconds or until the long beep stops.

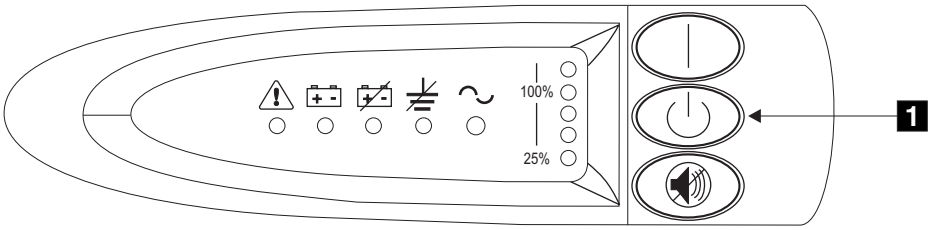


Figure 271. 2145 UPS front-panel assembly

2. Remove the front panel by pressing the sides inward, and pulling on both ends towards you, as shown in Figure 272.

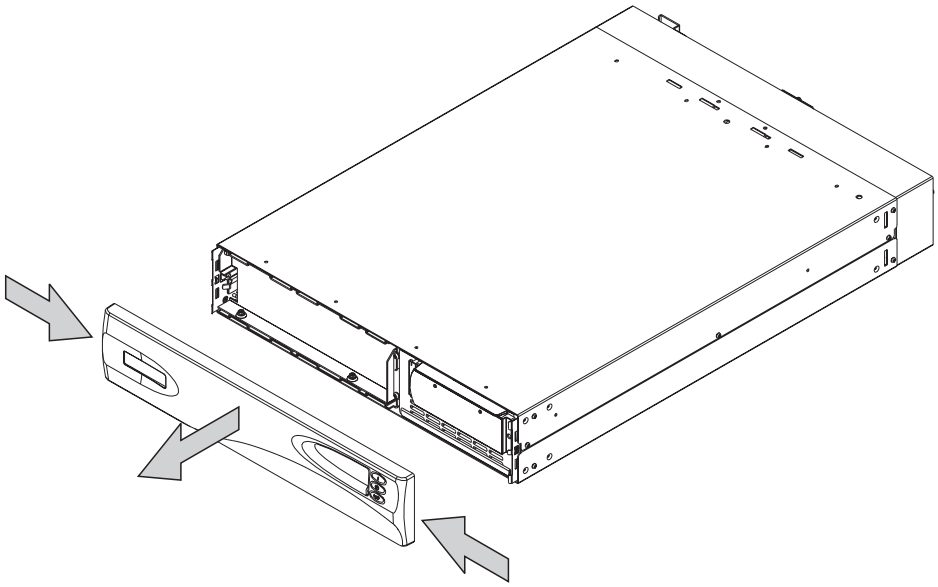


Figure 272. Removing the 2145 UPS front panel

3. Perform the following steps to remove the battery retaining bracket, which is shown in Figure 273 on page 274:
   a. Remove the two bolts **1** .
   b. Remove the hex nut **2** .
   c. Remove the battery retaining bracket **3** .

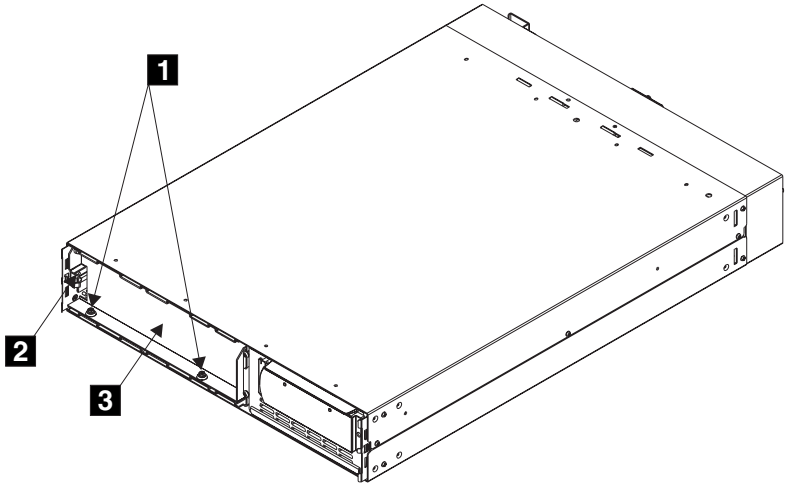


Figure 273. Fastening the battery retaining bracket

4. Remove the battery plate to access to the battery, as shown in Figure 274.

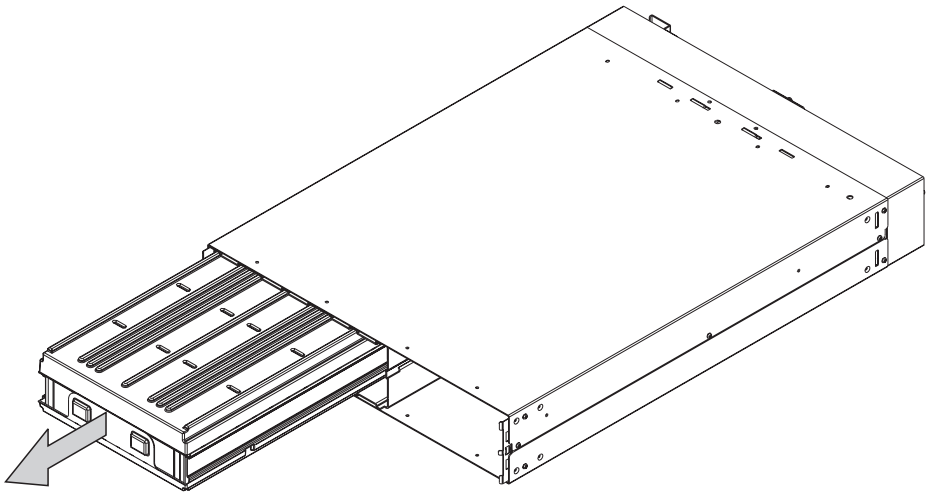


Figure 274. Removing the 2145 UPS battery

5. Grab the tabs on the battery assembly and pull the battery outward to allow two people to access it for removal.

DANGER

Uninterruptible power supply units contain specific hazardous materials. Observe the following precautions if your product contains an uninterruptible power supply:

- **The uninterruptible power supply contains lethal voltages. All repairs and service must be performed only by an authorized service support representative. There are no user serviceable parts inside the uninterruptible power supply.**
- **The uninterruptible power supply contains its own energy source (batteries). The output receptacles might carry live voltage even when the uninterruptible power supply is not connected to an ac supply.**
- **Do not remove or unplug the input cord when the uninterruptible power supply is turned on. This removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply.**
- **The uninterruptible power supply is heavy because of the electronics and batteries that are required. To avoid injury, observe the following precautions:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**
  - **Remove the battery, electronics assembly, or both from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton or installing or removing the uninterruptible power supply in the rack.**

(D007)

CAUTION:

The weight of this part or unit is between 32 and 55 kg (70.5 and 121.2 lb). It takes three persons to safely lift this part or unit. (C010)

6. With the help from another service support representative, pull the battery out onto a flat, stable surface.

Related tasks

"Removing the 2145 UPS" on page 260
Before you begin to remove the 2145 UPS, read all safety notices.

"Removing the 2145 UPS electronics" on page 269
During routine maintenance, you might have to remove the 2145 UPS electronics assembly.

"Replacing the 2145 UPS" on page 262
You can replace the 2145 UPS after first removing the current 2145 UPS.

Replacing the 2145 UPS battery

Follow all safety notices when you are replacing the 2145 UPS battery.

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

DANGER

Uninterruptible power supply units contain specific hazardous materials. Observe the following precautions if your product contains an uninterruptible power supply:

- **The uninterruptible power supply contains lethal voltages. All repairs and service must be performed only by an authorized service support representative. There are no user serviceable parts inside the uninterruptible power supply.**
- **The uninterruptible power supply contains its own energy source (batteries). The output receptacles might carry live voltage even when the uninterruptible power supply is not connected to an ac supply.**
- **Do not remove or unplug the input cord when the uninterruptible power supply is turned on. This removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply.**
- **The uninterruptible power supply is heavy because of the electronics and batteries that are required. To avoid injury, observe the following precautions:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**
  - **Remove the battery, electronics assembly, or both from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton or installing or removing the uninterruptible power supply in the rack.**

(D007)

Perform the following steps to replace the 2145 UPS battery assembly:

1. Make sure that the 2145 UPS is powered off and unplugged.
2. With the help from another service support representative, grab the tabs on the battery assembly and gently push the battery in to the 2145 UPS.

   CAUTION:
   Lead-acid batteries can present a risk of electrical burn from high, short-circuit current. Avoid battery contact with metal materials; remove watches, rings, or other metal objects, and use tools with insulated handles. To avoid possible explosion, do not burn.

   Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C004)
3. Replace the battery plate, as shown in Figure 275 on page 277.

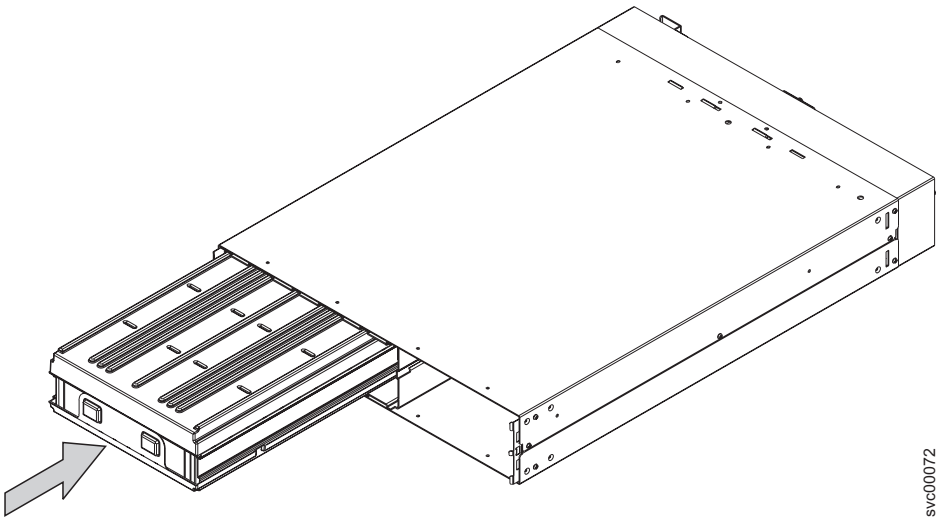


Figure 275. Replacing the 2145 UPS battery plate

4. Perform the following steps to replace the battery retaining bracket:
   a. Replace the battery retaining bracket (**3** in Figure 276).
   b. Replace the hex nut **2** .
   c. Replace the two bolts **1** .

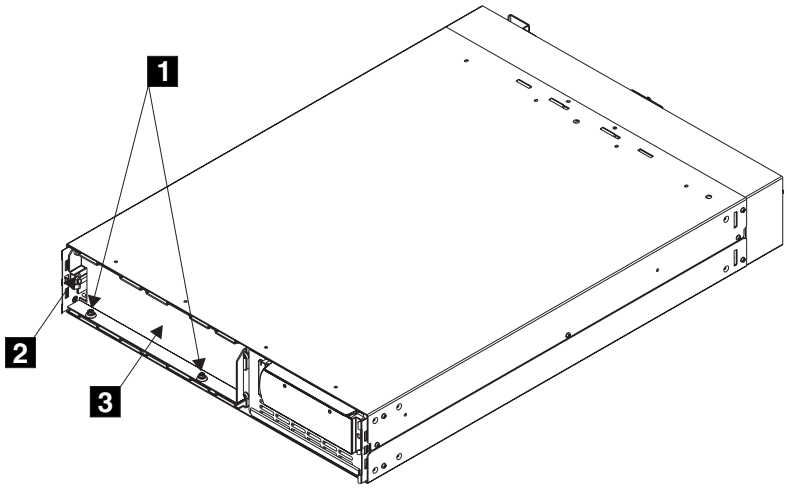


Figure 276. Fastening the battery retaining bracket

5. If the battery has two red cables that are disconnected, perform the following steps to connect the internal battery connector:
   a. Remove the protective tape from the internal battery connector (shown in Figure 277 on page 278).

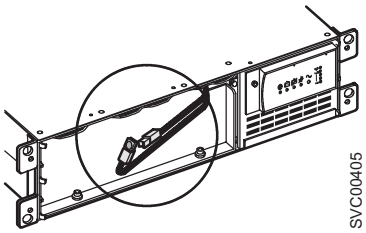


Figure 277. The 2145 UPS internal battery connector with protective tape

b. Connect the internal battery connector (shown in Figure 278).

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.

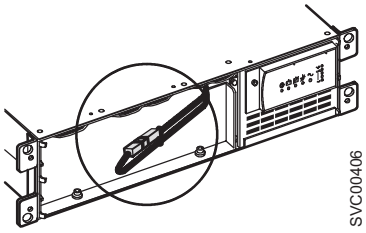


Figure 278. Connecting the 2145 UPS internal battery connectors

6. Replace the front panel by pressing the sides inward, and pushing on both ends towards the 2145 UPS, as shown in Figure 279).

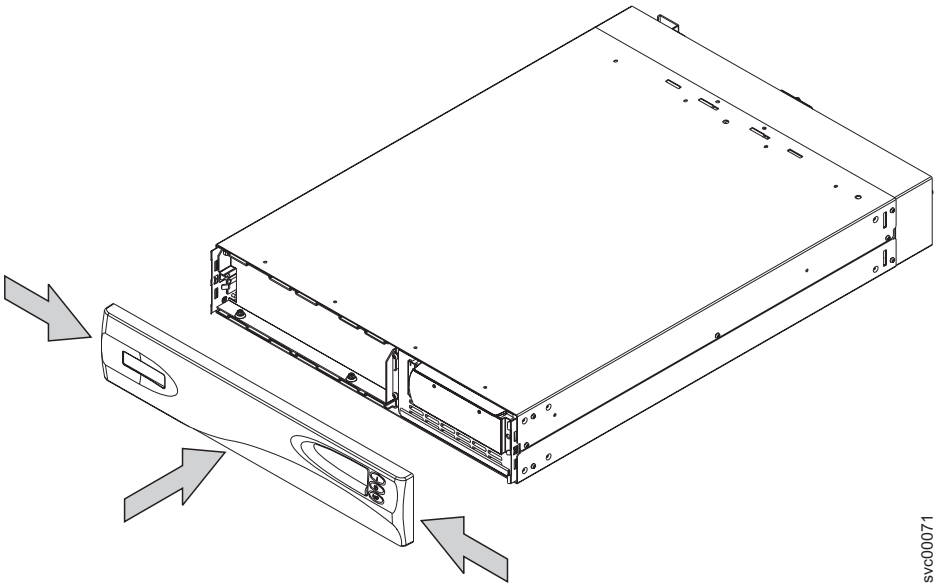


Figure 279. Replacing the 2145 UPS front panel

7. At the front of the 2145 UPS, press and hold the on button until you hear a beep (approximately one second). The mode indicator stops flashing, and the load-level indicators display the percentage of load that is being applied to the 2145 UPS. See ″2145 UPS controls and indicators″ in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* for more information.

Removing the support rails for a 2145 UPS

You might be required to remove the support rails for the 2145 UPS.

To remove the support rails for a 2145 UPS, perform the following steps:

1. Start with the left support rail.
2. Loosen the two adjustment wing nuts **2** (Figure 280).

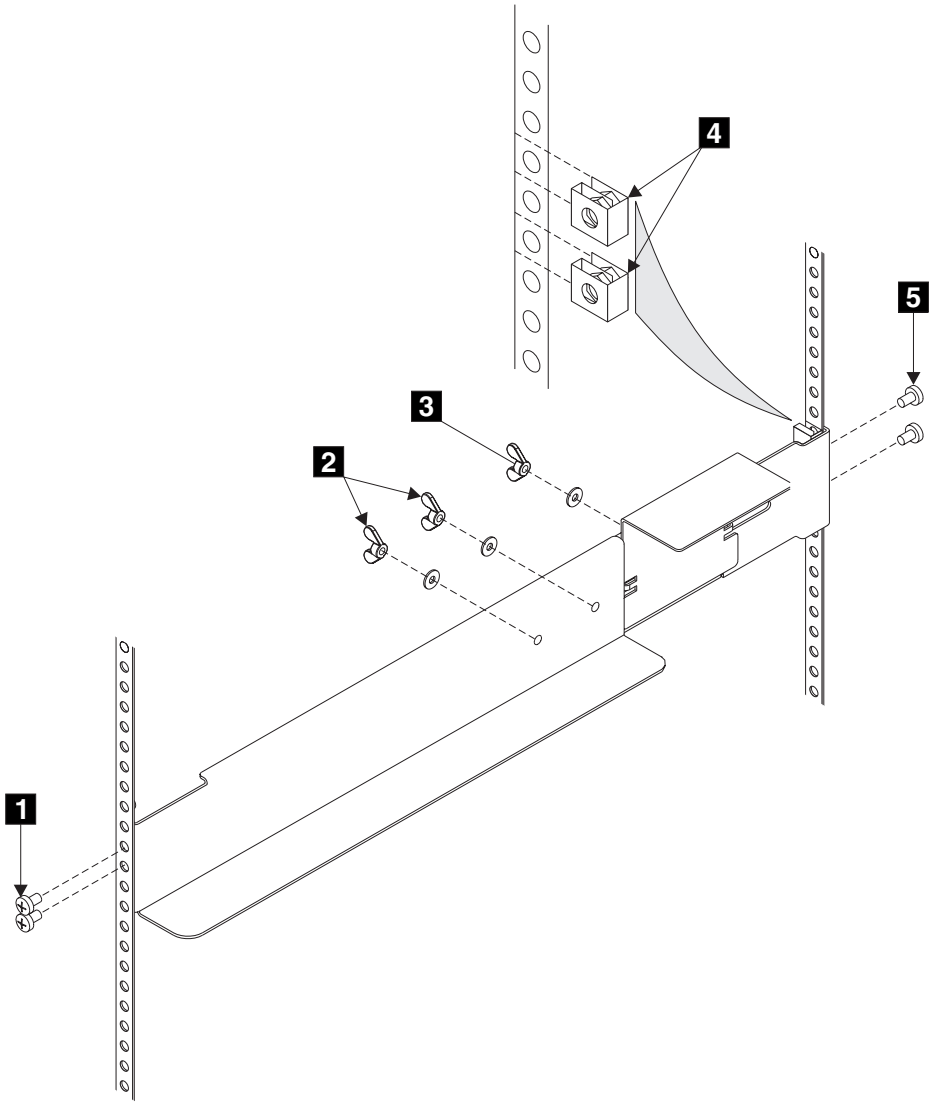


Figure 280. Support rail components for placing the 2145 UPS in the rack

3. Remove the back screws **5** .
4. Remove the front screws **1** .
5. Remove the rail from the rack.
6. Remove the two clip nuts **4** .

Related tasks

"Installing the support rails for a 2145 UPS"
You must install the support rails in the rack before installing the 2145 UPS.

Installing the support rails for a 2145 UPS

You must install the support rails in the rack before installing the 2145 UPS.

Before you install the support rails, determine where the 2145 UPS units are to be installed in the rack. Complete the following prerequisites before you install the support rails:

- Use the user's hardware location chart, which you downloaded from www.ibm.com/storage/support/2145, to determine where in the rack that you want to install the 2145 UPS.
- Discard the two handles and their associated nuts that are shipped with the support rails.
- At the back of the rack, observe the Electronic Industries Alliance (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 uninterruptible power supply. 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 281 on page 281). These nut clips must align with the second and fourth holes of the support rail flange.

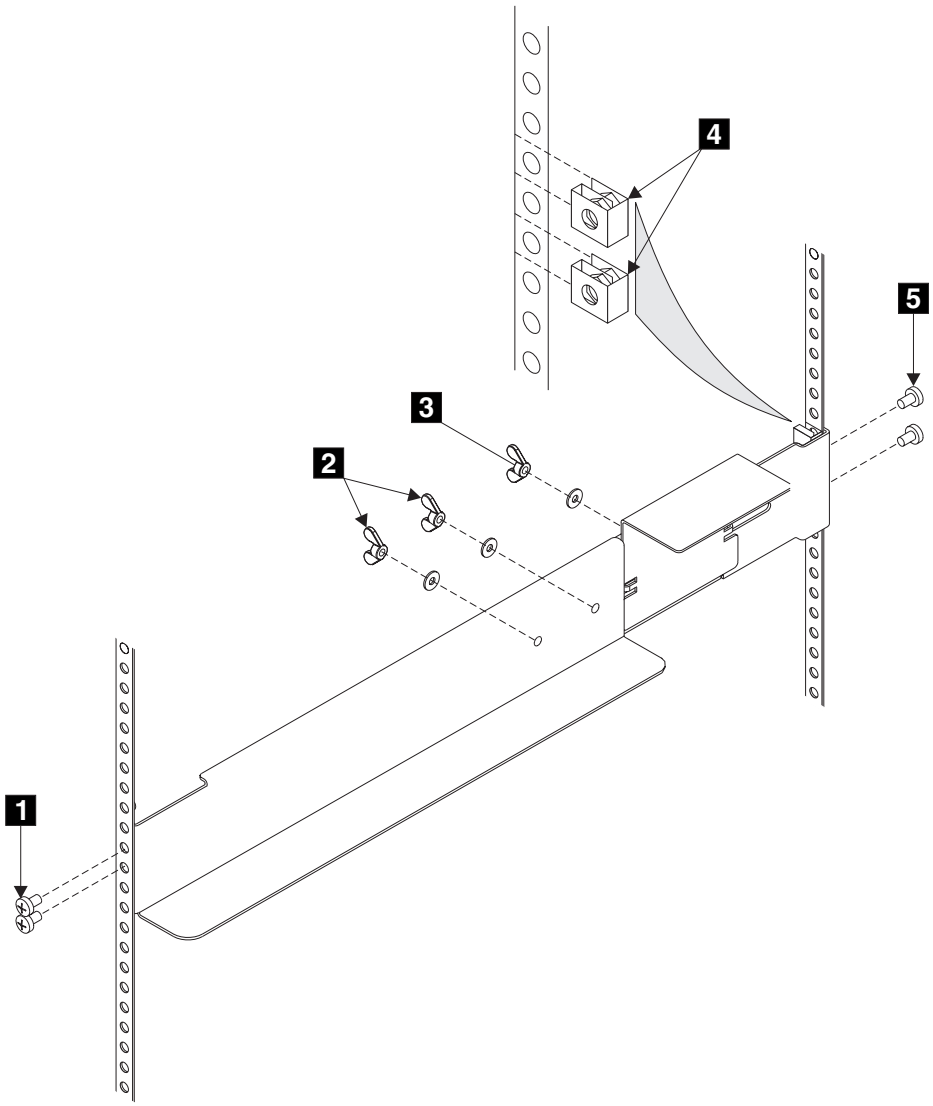


Figure 281. Support rail components for placing the 2145 UPS in the rack

2. Loosen the two wing nuts **2** .
3. Loosen the wing nut **3** and slide the bracket toward the back of the rail.
4. Remain at the back of the rack holding the support rail in position in the rack, and then install and fully tighten the two mounting screws **5** .
5. Go to the front of the rack.
6. Extend the support rail toward the front of the rack.

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

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

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

Related tasks

“Removing the support rails for a 2145 UPS” on page 279
You might be required to remove the support rails for the 2145 UPS.

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 Console:

- You can use screen-reader software and a digital speech synthesizer to hear what is displayed on the screen. The following screen reader has been tested: Window-Eyes v6.1.
- You can operate all features using the keyboard instead of the mouse.
- You can change the initial delay and repeat rate of the up and down buttons to two seconds when you use the front panel of the SAN Volume Controller to set or change an IPv4 address. This feature is documented in the applicable sections of the SAN Volume Controller publications.

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:

www.ibm.com/storage/support/2145

Related reference

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

Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation
Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106-0032, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:
INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATIONS ″AS IS″ WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation
Almaden Research
650 Harry Road
Bldg 80, D3-304, Department 277
San Jose, CA 95120-6099
U.S.A.

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurement may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products may be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs.

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

Trademarks

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol (® or ™), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Web at ″Copyright and trademark information″ at www.ibm.com/legal/copytrade.shtml.

Adobe and the Adobe logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.

Intel, Intel logo, Intel Xeon, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Java and all Java-based trademarks and logos are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Other company, product, or service names may be trademarks or service marks of others.

Electronic emission notices

The following electronic emission statements apply to this product. The statements for other products that are intended for use with this product are included in their accompanying documentation.

Federal Communications Commission (FCC) statement

Ensure that you are familiar with the Federal Communications Commission (FCC) statement.

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

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Neither the provider nor the manufacturer is responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device might not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

Industry Canada compliance statement

This Class A digital apparatus complies with IECS-003.

Avis de conformité à la réglementation d'Industrie Canada

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

New Zealand compliance statement

Ensure that you are familiar with the New Zealand compliance statement.

This is a Class A product. In a domestic environment this product might cause radio interference, in which event the user might be required to take adequate measures.

European Union EMC Directive conformance statement

Ensure that you are familiar with the European Union (EU) statement.

This product is in conformity with the protection requirements of EU council directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Ensure that you use properly shielded and grounded cables and connectors in order to reduce interference to radio and TV communications and to other electrical or electronic equipment. Such cables and connectors are available from IBM authorized dealers. IBM cannot accept responsibility for any interference caused by using other than recommended cables and connectors.

European community contact:

IBM Technical Regulations
Pascalstr. 100, Stuttgart, Germany 70569

Telephone: 0049 (0)711 785 1176
Fax: 0049 (0)711 785 1283
E-mail: tjahn@de.ibm.com

Germany compliance statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: “Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen.“

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem “Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)“. Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Konformitätserklärung des EMVG ist die IBM Deutschland GmbH, 70548 Stuttgart.

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 vcci

People’s Republic of China Class A Electronic Emission Statement

中华人民共和国“A类”警告声明

声 明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

International Electrotechnical Commission (IEC) statement

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

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.

Korean Class A Electronic Emission Statement

이기기는 업무용으로 전자파 적합등록을 받은 기기이오니, 판매자 또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에서 비업무용으로 교환하시기 바랍니다.

Taiwan Class A compliance statement

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

European Contact Information

This topic contains the product service contact information for Europe.

European Community contact:
IBM Technical Regulations
Pascalstr. 100, Stuttgart, Germany 70569
Tele: 0049 (0)711 785 1176
Fax: 0049 (0)711 785 1283
e-mail: mailto:tjahn@de.ibm.com

Taiwan Contact Information

This topic contains the product service contact information for Taiwan.

IBM Taiwan Product Service Contact Information:
IBM Taiwan Corporation
3F, No 7, Song Ren Rd., Taipei Taiwan
Tel: 0800-016-888

台灣IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

Glossary

This glossary includes terms for the IBM System Storage SAN Volume Controller.

This glossary includes selected terms and definitions from A Dictionary of Storage Networking Terminology (www.snia.org/education/dictionary), copyrighted 2001 by the Storage Networking Industry Association, 2570 West El Camino Real, Suite 304, Mountain View, California 94040-1313. Definitions derived from this book have the symbol (S) after the definition.

The following cross-references are used in this glossary:

See Refers the reader to one of two kinds of related information:

- A term that is the expanded form of an abbreviation or acronym. This expanded form of the term contains the full definition.
- A synonym or more preferred term.

See also
Refers the reader to one or more related terms.

Contrast with
Refers the reader to a term that has an opposite or substantively different meaning.

Numerics

2145 A hardware machine type for the IBM System Storage SAN Volume Controller. Models of the SAN Volume Controller are expressed as the number 2145 followed by ″-xxx″, such as 2145-8G4. Hardware models for the 2145 include 2145-4F2, 2145-8F2, 2145-8F4, 2145-8G4, and 2145-8A4.

A

access mode
One of three different modes in which a logical unit (LU) in a disk controller system can operate. See also *image mode*, *managed space mode*, and *unconfigured mode*.

Address Resolution Protocol (ARP)
A protocol that dynamically maps an IP address to a network adapter address in a local area network.

agent code
An open-systems standard that interprets Common Information Model (CIM) requests and responses as they transfer between the client application and the device.

application server
A host that is attached to the storage area network (SAN) and that runs applications.

ARP See *Address Resolution Protocol*.

array An ordered collection, or group, of physical storage devices that are used to define logical volumes or devices.

association
A class that contains two references that define a relationship between two referenced objects.

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*.

auxiliary virtual disk
The virtual disk that contains a backup copy of the data and that is used in disaster recovery scenarios. See also *master virtual disk*.

availability
The ability of a system to continue working, with perhaps a decrease in performance, after individual components fail.

B

bandwidth
The range of frequencies an electronic system can transmit or receive. The greater the bandwidth of a system, the more information the system can transfer in a given period of time.

bitmap
A coded representation in which each bit, or group of bits, represents or corresponds to an item; for example, a configuration of bits in main storage in which each bit indicates whether a peripheral device or a storage block is available or in which each group of bits corresponds to one pixel of a display image.

blade One component in a system that is designed to accept some number of components (blades). Blades could be individual servers that plug into a multiprocessing system or individual port cards that add connectivity to a switch. A blade is typically a hot-swappable hardware device.

block A unit of data storage on a disk drive.

block virtualization
The act of applying virtualization to one or more block-based (storage) services for the purpose of providing a new aggregated, higher-level, richer, simpler, or secure block service to clients. Block virtualization functions can be nested. A disk drive, RAID system, or volume manager all perform some form of block-address to (different) block-address mapping or aggregation. See also *virtualization*.

Boolean
Pertaining to the processes used in the algebra formulated by George Boole.

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.

Call Home
In SAN Volume Controller, a communication service that sends data and event notifications to a service provider. The machine can use this link to place a call to IBM or to another service provider when service is required.

capacity licensing
A type of licensing that grants you the use of a number of terabytes (TB) for virtualization, a number of terabytes for Metro Mirror and Global Mirror relationships, and a number of terabytes for FlashCopy® mappings.

cascading
The process of connecting two or more fibre-channel hubs or switches together to increase the number of ports or extend distances.

CIM See *Common Information Model*.

CIM object manager (CIMOM)
The common conceptual framework for data management that receives, validates, and authenticates the CIM requests from the client application. It then directs the requests to the appropriate component or service provider.

CIMOM
See *CIM object manager*.

class The definition of an object within a specific hierarchy. A class can have properties and methods and can serve as the target of an association.

CLI See *command line interface*.

client A computer system or process that requests a service of another computer system or process that is typically referred to as a server. Multiple clients can share access to a common server.

client application
A storage management program that initiates Common Information Model (CIM) requests to the CIM agent for the device.

cluster
In SAN Volume Controller, up to four pairs of nodes that provide a single configuration and service interface.

command line-interface (CLI)
A type of computer interface in which the input command is a string of text characters.

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.

concurrent maintenance
Service that is performed on a unit while it is operational.

In SAN Volume Controller, the ability for one node in the cluster to be turned off for maintenance without interrupting access to the VDisk data provided by the cluster.

configuration node
A node that acts as the focal point for configuration commands and manages the data that describes the cluster configuration.

connected
In a Global Mirror relationship, pertaining to the status condition that occurs when two clusters can communicate.

consistency group
A group of copy relationships between virtual disks that are managed as a single entity.

consistent copy
In a Metro or Global Mirror relationship, a copy of a secondary virtual disk (VDisk) that is identical to the primary VDisk from the viewpoint of a host system, even if a power failure occurred while I/O activity was in progress.

consistent-stopped
In a Global Mirror relationship, the state that occurs when the secondary virtual disk (VDisk) contains a consistent image, but the image might be out-of-date with respect to the primary VDisk. This state can happen when a relationship was in the consistent-synchronized state when an error occurred that forced a freeze of the consistency group. This state can also happen when a relationship is created with the create-consistent flag set to `TRUE`.

consistent-synchronized
In a Global Mirror relationship, the status condition that occurs when the primary virtual disk (VDisk) is accessible for read and write I/O operations. The secondary VDisk is accessible for read-only I/O operations. See also *primary virtual disk* and *secondary virtual disk*.

container
A data storage location; for example, a file, directory, or device.

A software object that holds or organizes other software objects or entities.

contingency capacity
Initially, a fixed amount of unused real capacity that is maintained on a space-efficient virtual disk that is configured to automatically expand its real capacity. It is also the difference between the used capacity and the new real capacity when the real capacity is changed manually.

copied
In a FlashCopy mapping, a state that indicates that a copy has been started after the copy relationship was created. The copy process is complete and the target disk has no further dependence on the source disk.

copying
A status condition that describes the state of a pair of virtual disks (VDisks) that have a copy relationship. The copy process has been started but the two virtual disks are not yet synchronized.

Copy Services
The services that enable you to copy virtual disks (VDisks): FlashCopy, Metro, and Global Mirror.

counterpart SAN
A nonredundant portion of a redundant storage area network (SAN). A counterpart SAN provides all the connectivity of the redundant SAN but without the redundancy. Each counterpart SANs provides an alternate path for each SAN-attached device. See also *redundant SAN*.

cross-volume consistency
In SAN Volume Controller, a consistency group property that guarantees consistency between virtual disks when an application issues dependent write operations that span multiple virtual disks.

D

data migration
The movement of data from one physical location to another without disrupting I/O operations.

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.

dense wavelength division multiplexing (DWDM)
A technology that places many optical signals onto one single-mode fiber using slightly different optical frequencies. DWDM enables many data streams to be transferred in parallel.

dependent write operations
A set of write operations that must be applied in the correct order to maintain cross-volume consistency.

destage
A write command initiated by the cache to flush data to disk storage.

device
In the CIM Agent, the storage server that processes and hosts client application requests.

IBM definition: A piece of equipment that is used with the computer and does not generally interact directly with the system, but is controlled by a controller.

HP definition: In its physical form, a magnetic disk that can be attached to a SCSI bus. The term is also used to indicate a physical device that has been made part of a controller configuration; that is, a physical device that is known to the controller. Units (virtual disks) can be created from devices after the devices have been made known to the controller.

device provider
A device-specific handler that serves as a plug-in for the Common Information Model (CIM); that is, the CIM object manager (CIMOM) uses the handler to interface with the device.

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 *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

disconnected
In a Metro or Global Mirror relationship, pertains to two clusters when they cannot communicate.

discovery
The automatic detection of a network topology change, for example, new and deleted nodes or links.

disk controller
A device that coordinates and controls the operation of one or more disk drives and synchronizes the operation of the drives with the operation of the system as a whole. Disk controllers provide the storage that the cluster detects as managed disks (MDisks).

disk drive
A disk-based, nonvolatile, storage medium.

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.

Distributed Management Task Force (DMTF)
An organization that defines standards for the management of distributed systems. See also *Common Information Model*.

DMP See *directed maintenance procedures*.

DMTF See *Distributed Management Task Force*.

domain name server
In the Internet suite of protocols, a server program that supplies name-to-address conversion by mapping domain names to IP addresses.

DRAM See *dynamic random access memory*.

DWDM
See *dense wavelength division multiplexing*.

dynamic random access memory (DRAM)
A storage in which the cells require repetitive application of control signals to retain stored data.

E

EC See *engineering change.*

EIA See *Electronic Industries Alliance*.

Electronic Industries Alliance (EIA)
An alliance of four trade associations: The Electronic Components, Assemblies & Materials Association (ECA); the Government Electronics and Information Technology Association (GEIA); the JEDEC Solid State Technology Association (JEDEC); and the Telecommunications Industry Association (TIA). Prior to 1998, EIA was the Electronic Industries Association and the group dates back to 1924.

empty In a Global Mirror relationship, a status condition that exists when the consistency group contains no relationships.

engineering change (EC)
A correction for a defect of hardware or software that is applied to a product.

error code
A value that identifies an error condition.

ESS See *IBM TotalStorage Enterprise Storage Server®*.

exclude
To remove a managed disk (MDisk) from a cluster because of certain error conditions.

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

fabric In fibre-channel technology, a routing structure, such as a switch, that receives addressed information and routes it to the appropriate destination. A fabric can consist of more than one switch. When multiple fibre-channel switches are interconnected, they are described as cascading. See also *cascading*.

fabric port (F_port)
A port that is part of a fibre-channel fabric. An F_port on a fibre-channel fabric connects to the node port (N_port) on a node.

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.

FCIP See *Fibre Channel over IP*.

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.

fibre-channel extender
A device that extends a fibre-channel link over a greater distance than is supported by the standard, usually a number of miles or kilometers. Devices must be deployed in pairs at each end of a link.

Fibre Channel over IP (FCIP)
A network storage technology that combines the features of the Fibre Channel Protocol and the Internet Protocol (IP) to connect distributed SANs over large distances.

Fibre Channel Protocol (FCP)
A protocol that is used in fibre-channel communications with five layers that define how fibre-channel ports interact through their physical links to communicate with other ports.

field replaceable unit (FRU)
An assembly that is replaced in its entirety when any one of its components fails. An IBM service representative performs the replacement. In some cases, a field replaceable unit might contain other field replaceable units.

FlashCopy mapping
A relationship between two virtual disks.

FlashCopy relationship
See *FlashCopy mapping*.

FlashCopy service
In SAN Volume Controller, a copy service that duplicates the contents of a source virtual disk (VDisk) to a target VDisk. In the process, the original contents of the target VDisk are lost. See also *point-in-time copy.*

F_port
See *fabric port*.

FRU See *field replaceable unit*.

G

gateway
An entity that operates above the link layer and translates, when required, the interface and protocol used by one network into those used by another distinct network.

GB See *gigabyte*.

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.

gigabyte (GB)
In decimal notation, 1 073 741 824 bytes.

Global Mirror
An asynchronous copy service that enables host data on a particular source virtual disk (VDisk) to be copied to the target VDisk that is designated in the relationship.

grain In a FlashCopy bitmap, the unit of data represented by a single bit.

graphical user interface (GUI)
A type of computer interface that presents a visual metaphor of a real-world scene, often of a desktop, by combining high-resolution graphics, pointing devices, menu bars and other menus, overlapping windows, icons and the object-action relationship.

GUI See *graphical user interface*.

H

hardcoded
Pertaining to software instructions that are statically encoded and not intended to be altered.

HBA See *host bus adapter*.

HLUN See *virtual disk*.

hop One segment of a transmission path between adjacent nodes in a routed network.

host An open-systems computer that is connected to the SAN Volume Controller through a fibre-channel interface.

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.

hub A fibre-channel device that connects nodes into a logical loop by using a

physical star topology. Hubs will automatically recognize an active node and insert the node into the loop. A node that fails or is powered off is automatically removed from the loop.

A communications infrastructure device to which nodes on a multi-point bus or loop are physically connected. Commonly used in Ethernet and fibre-channel networks to improve the manageability of physical cables. Hubs maintain the logical loop topology of the network of which they are a part, while creating a “hub and spoke” physical star layout. Unlike switches, hubs do not aggregate bandwidth. Hubs typically support the addition or removal of nodes from the bus while it is operating. (S) Contrast with *switch*.

I

IBM System Storage Productivity Center (SSPC)
An integrated hardware and software solution that provides a single point of entry for managing SAN Volume Controller clusters, IBM System Storage DS8000™ systems, and other components of a data storage infrastructure.

IBM TotalStorage Enterprise Storage Server (ESS)
An IBM product that provides an intelligent disk-storage system across an enterprise.

ID See *identifier*.

identifier (ID)
A sequence of bits or characters that identifies a user, program device, or system to another user, program device, or system.

idle In a FlashCopy mapping, the state that occurs when the source and target virtual disks (VDisks) act as independent VDisks even if a mapping exists between the two. Read and write caching is enabled for both the source and the target.

idling The status of a pair of virtual disks (VDisks) that have a defined copy relationship for which no copy activity has yet been started.

In a Metro or Global Mirror relationship, the state that indicates that the master virtual disks (VDisks) and auxiliary VDisks are operating in the primary role. Consequently, both VDisks are accessible for write I/O operations.

idling-disconnected
In a Global Mirror relationship, the state that occurs when the virtual disks (VDisks) in this half of the consistency group are all operating in the primary role and can accept read or write I/O operations.

illegal configuration
A configuration that will not operate and will generate an error code to indicate the cause of the problem.

image mode
An access mode that establishes a one-to-one mapping of extents in the managed disk (MDisk) with the extents in the virtual disk (VDisk). See also *managed space mode* and *unconfigured mode*.

image VDisk
A virtual disk (VDisk) in which there is a direct block-for-block translation from the managed disk (MDisk) to the VDisk.

IML See *initial microcode load*.

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

inconsistent-copying
In a Global Mirror relationship, the state that occurs when the primary virtual disk (VDisk) is accessible for read and write input/output (I/O) operations, but the secondary VDisk is not accessible for either. This state occurs after a **start** command is issued to a consistency group that is in the inconsistent-stopped state. This state also occurs when a **start** command is issued, with the force option, to a consistency group that is in the idling or consistent-stopped state.

inconsistent-disconnected
In a Global Mirror relationship, a state that occurs when the virtual disks (VDisks) in the half of the consistency group that is operating in the secondary role are not accessible for either read or write I/O operations.

inconsistent-stopped
In a Global Mirror relationship, the state that occurs when the primary virtual disk (VDisk) is accessible for read and write input/output (I/O) operations, but the secondary VDisk is not accessible for either read or write I/O operations.

indication
An object representation of an event.

initial microcode load (IML)
In SAN Volume Controller, the process by which the run-time code and data for a node are loaded into memory and initialized.

initiator
The system component that originates an I/O command over an I/O bus or network. I/O adapters, network interface cards, and intelligent controller device I/O bus control ASICs are typical initiators. (S) See also *logical unit number*.

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.

instance
An individual object that is a member of some class. In object-oriented programming, an object is created by instantiating a class.

integrity
The ability of a system to either return only correct data or respond that it cannot return correct data.

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. IPv4 is the dominant network layer protocol on the Internet, and IPv6 is designated as its successor. IPv6 provides a much larger address space, which enables greater flexibility in assigning addresses and simplifies routing and renumbering.

interswitch link (ISL)
The physical connection that carries a protocol for interconnecting multiple routers and switches in a storage area 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.

I/O throttling rate
The maximum rate at which an I/O transaction is accepted for this virtual disk (VDisk).

IP See *Internet Protocol*.

IP address
The unique 32-bit address that specifies the location of each device or workstation in the Internet. For example, 9.67.97.103 is an IP address.

ISL See *interswitch link*.

ISL hop
A hop on an interswitch link (ISL). Considering all pairs of node ports (N-ports) in a fabric and measuring distance only in terms of interswitch links (ISLs) in the fabric, the number of ISLs traversed is the number of ISL hops on the shortest route between the pair of nodes that are farthest apart in the fabric.

J

JBOD (just a bunch of disks)
IBM definition: See *non-RAID*.

HP definition: A group of single-device logical units not configured into any other container type.

L

LBA See *logical block address*.

least recently used (LRU)
An algorithm used to identify and make available the cache space that contains the least-recently used data.

line card
See *blade*.

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.

local/remote fabric interconnect
The storage area network (SAN) components that are used to connect the local and remote fabrics together.

logical block address (LBA)
The block number on a disk.

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)

longitudinal redundancy check (LRC)
A method of error checking during data transfer that involves checking parity.

LRC See *longitudinal redundancy check*.

LRU See *least recently used*.

LU See *logical unit*.

LUN See *logical unit number*.

LUN masking
A process that allows or prevents I/O to the disk drives through the host-bus-adapter (HBA) device or operating-system device driver.

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).

Managed Object Format (MOF)
A language for defining Common Information Model (CIM) schemas.

managed space mode
An access mode that enables virtualization functions to be performed. See also *image mode* and *unconfigured mode*.

Management Information Base (MIB)
Simple Network Management Protocol (SNMP) units of managed information that specifically describe an aspect of a system, such as the system name, hardware number, or communications configuration. A collection of related MIB objects is defined as a MIB.

mapping
See *FlashCopy mapping*.

master console
A single point from which to manage the IBM System Storage SAN Volume Controller. For SAN Volume Controller version 4.2.1 and earlier, the master console was purchased either as software that was installed and configured on a server or as a hardware platform with preinstalled operating system and master console software. See *IBM System Storage Productivity Center*.

master virtual disk
The virtual disk (VDisk) that contains a production copy of the data and that an application accesses. See also *auxiliary virtual disk.*

MB See *megabyte*.

MDisk See *managed disk*.

megabyte (MB)
In decimal notation, 1 048 576 bytes.

mesh configuration
A network that contains a number of small SAN switches configured to create a larger switched network. With this configuration, four or more switches are connected together in a loop with some of the paths short circuiting the loop. An example of this configuration is to have four switches connected together in a loop with ISLs for one of the diagonals.

method
A way to implement a function on a class.

Metro Mirror
A synchronous copy service that enables host data on a particular source virtual disk (VDisk) to be copied to the target VDisk that is designated in the relationship.

MIB See *Management Information Base*.

migration
See *data migration*.

mirrored virtual disk
A virtual disk (VDisk) with two VDisk copies.

mirrorset
IBM definition: See *RAID-1*.

HP definition: A RAID storageset of two or more physical disks that maintain a complete and independent copy of the data from the virtual disk. This type of storageset has the advantage of being highly reliable and extremely tolerant of device failure. Raid level 1 storagesets are referred to as mirrorsets.

MOF See *Managed Object Format (MOF)*.

N

namespace
The scope within which a Common Information Model (CIM) schema applies.

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

node name
A name identifier associated with a node. (SNIA)

node port (N_port)
A port that connects a node to a fabric or to another node. N_ports connect to fabric ports (F_ports) or to other N_ports of other nodes. N_ports handle creation, detection, and flow of message units to and from the connected systems. N_ports are end points in point-to-point links.

node rescue
In SAN Volume Controller, the process by which a node that has no valid software installed on its hard disk drive can copy the software from another node connected to the same fibre-channel fabric.

non-RAID
Disks that are not in a redundant array of independent disks (RAID). HP definition: See *JBOD*.

N_port
See *node port*.

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.

object model
A representation, such as a diagram, of objects in a given system. Using symbols similar to standard flowchart symbols, an object model depicts the classes the objects belong to, their associations with each other, the attributes that make them unique, and the operations that the objects can perform and that can be performed on them.

object name
An object that consists of a namespace path and a model path. The namespace path provides access to the Common Information Model (CIM) implementation managed by the CIM Agent, and the model path provides navigation within the implementation.

object path
An object that consists of a namespace path and a model path. The namespace path provides access to the Common Information Model (CIM) implementation managed by the CIM Agent, and the model path provides navigation within the implementation.

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.

operating set
In SAN Volume Controller, the set of nodes that are operating together to deliver storage services.

overallocated volume
See *space-efficient virtual disk*.

oversubscription
The ratio of the sum of the traffic that is on the initiator N-node connections to the traffic that is on the most heavily loaded interswitch links (ISLs), where more than one ISL is connected in parallel between these switches. This definition assumes a symmetrical network and a specific workload that is applied equally from all initiators and sent equally to all targets. See also *symmetrical network*.

P

partition
IBM definition: A logical division of storage on a fixed disk.

HP definition: A logical division of a container represented to the host as a logical unit.

partner node
The other node that is in the I/O group to which this node belongs.

partnership
In Metro or Global Mirror operations, the relationship between two clusters. In a cluster partnership, one cluster is defined as the local cluster and the other cluster as the remote cluster.

paused
In SAN Volume Controller, the process by which the cache component quiesces all ongoing I/O activity below the cache layer.

pend To cause to wait for an event.

petabyte (PB)
In decimal notation, 1 125 899 906 842 624 bytes.

PDU See *power distribution unit*.

physical disk licensing
A type of licensing that grants you the use of a number of physical disks for virtualization. You can also license the use of the Metro Mirror and Global Mirror feature, the use of the FlashCopy feature, or both of these features.

PLUN See *managed disk*.

point-in-time copy
The instantaneous copy that the FlashCopy service makes of the source virtual disk (VDisk). In some contexts, this copy is known as a T_0 *copy*.

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.

port ID
An identifier associated with a port.

power distribution unit (PDU)
A device that distributes electrical power to multiple devices in the rack. It typically is rack-mounted and provides circuit breakers and transient voltage suppression.

power-on self-test
A diagnostic test that servers or computers run when they are turned on.

prepared
In a Global Mirror relationship, the state that occurs when the mapping is ready to start. While in this state, the target virtual disk (VDisk) is offline.

preparing
In a Global Mirror relationship, the state that occurs when any changed write data for the source virtual disk (VDisk) is flushed from the cache. Any read or write data for the target VDisk is discarded from the cache.

primary virtual disk
In a Metro or Global Mirror relationship, the target of write operations issued by the host application.

property
In the Common Information Model (CIM), an attribute that is used to characterize instances of a class.

PuTTY
A client program that allows you to run remote sessions on your computer through specific network protocols, such as SSH, Telnet, and Rlogin.

Q

qualifier
A value that provides additional information about a class, association, indication, method, method parameter, instance, property, or reference.

quorum
A set of nodes that operates as a cluster. Each node has a connection to every other node in the cluster. If a connection failure causes the cluster to split into two or more groups of nodes that have full connection within the group, the quorum is the group that is selected to operate as the cluster. Typically, this is the larger group of nodes, but the quorum disk serves as a tiebreaker if the groups are the same size.

queue depth
The number of I/O operations that can be run in parallel on a device.

quorum disk
A managed disk (MDisk) that contains a reserved area that is used exclusively for cluster management. The quorum disk is accessed in the event that it is necessary to determine which half of the cluster continues to read and write data.

quorum index
A number that can be either: 0, 1 or 2

R

rack A free-standing framework that holds the devices and card enclosure.

RAID See *redundant array of independent disks*.

RAID 0
IBM definition: RAID 0 allows a number of disk drives to be combined and presented as one large disk. RAID 0 does not provide any data redundancy. If one drive fails, all data is lost.

HP definition: A RAID storageset that stripes data across an array of disk drives. A single logical disk spans multiple physical disks, allowing parallel data processing for increased I/O performance. While the performance characteristics of RAID level 0 is excellent, this RAID level is the only one that does not provide redundancy. Raid level 0 storagesets are referred to as stripesets.

RAID 1
SNIA dictionary definition: A form of storage array in which two or more identical copies of data are maintained on separate media. (S)

IBM definition: A form of storage array in which two or more identical copies of data are maintained on separate media. Also known as mirrorset.

HP definition: See *mirrorset*.

RAID 5
SNIA definition: A form of parity RAID in which the disks operate independently, the data strip size is no smaller than the exported block size, and parity check data is distributed across the array's disks. (S)

IBM definition: See the SNIA definition.

HP definition: A specially developed RAID storageset that stripes data and parity across three or more members in a disk array. A RAIDset combines the best characteristics of RAID level 3 and RAID level 5. A RAIDset is the best choice for most applications with small to medium I/O requests, unless the application is write intensive. A RAIDset is sometimes called parity RAID. RAID level 3/5 storagesets are referred to as RAIDsets.

RAID 10
A type of RAID that optimizes high performance while maintaining fault

tolerance for up to two failed disk drives by striping volume data across several disk drives and mirroring the first set of disk drives on an identical set.

real capacity
The amount of storage that is allocated to a virtual disk copy from a managed disk group.

redundant ac-power switch
A device that provides input power redundancy by attaching a SAN Volume Controller to two independent power sources. If the main source becomes unavailable, the redundant ac-power switch automatically provides power from a secondary (backup) source. When power is restored, the redundant ac-power switch automatically changes back to the main power source.

redundant array of independent disks (RAID)
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.

redundant SAN
A storage area network (SAN) configuration in which any one single component might fail, but connectivity between the devices within the SAN is maintained, possibly with degraded performance. This configuration is normally achieved by splitting the SAN into two, independent, counterpart SANs. See also *counterpart SAN.*

reference
A pointer to another instance that defines the role and scope of an object in an association.

rejected
A status condition that describes a node that the cluster software has removed from the working set of nodes in the cluster.

relationship
In Metro or Global Mirror, the association between a master virtual disk (VDisk) and an auxiliary VDisk. These VDisks also have the attributes of a primary or secondary VDisk. See also *auxiliary virtual disk, master virtual disk, primary virtual disk, and secondary virtual disk.*

reliability
The ability of a system to continue to return data even if a component fails.

remote fabric
In Global Mirror, the storage area network (SAN) components (switches and cables) that connect the components (nodes, hosts, and switches) of the remote cluster.

roles Authorization is based on roles that map to the administrator and service roles in an installation. The switch translates these roles into SAN Volume Controller administrator and service user IDs when a connection is made to the node for the SAN Volume Controller.

S

SAN See *storage area network*.

SAN Volume Controller fibre-channel port fan in
The number of hosts that can see any one SAN Volume Controller port.

SATA See *Serial Advanced Technology Attachment*.

schema
A group of object classes defined for and applicable to a single namespace. Within the CIM Agent, the supported schemas are the ones that are loaded through the managed object format (MOF).

SCSI See *Small Computer Systems Interface*.

SCSI back-end layer
The layer in a Small Computer Systems Interface (SCSI) network that performs the following functions: controls access to individual disk controller systems that are managed by the cluster; receives requests from the virtualization layer, processes them, and sends them to managed disks; addresses SCSI-3 commands to the disk controller systems on the storage area network (SAN).

SCSI front-end layer
The layer in a Small Computer Systems Interface (SCSI) network that receives I/O commands sent from hosts and provides the SCSI-3 interface to hosts. SCSI logical unit numbers (LUNs) are mapped to virtual disks (VDisks) in this layer as well. Thus, the layer converts SCSI read and write commands that are addressed to LUNs into commands that are addressed to specific VDisks.

SDD See *subsystem device driver (SDD)*.

secondary virtual disk
In Metro or Global Mirror, the virtual disk (VDisk) in a relationship that contains a copy of data written by the host application to the primary VDisk.

Secure Shell (SSH)
A program to log in to another computer over a network, to run commands in a remote machine, and to move files from one machine to another.

Secure Sockets Layer (SSL)
A security protocol that provides communication privacy. With SSL, client/server applications can communicate in a way that is designed to prevent eavesdropping, tampering, and message forgery.

sequential VDisk
A virtual disk that uses extents from a single managed disk.

Serial Advanced Technology Attachment (SATA)
The evolution of the ATA interface from a parallel bus to serial connection architecture. (S)

Serial ATA
See *Serial Advanced Technology Attachment*.

server In a network, the hardware or software that provides facilities to other stations; for example, a file server, a printer server, a mail server. The station making the request of the server is usually called the client.

Service Location Protocol (SLP)
In the Internet suite of protocols, a protocol that identifies and uses network hosts without having to designate a specific network host name.

fibre-channel SFP connector
See *small form-factor pluggable connector*.

Simple Mail Transfer Protocol (SMTP)
An Internet application protocol for transferring mail among users of the

Internet. SMTP specifies the mail exchange sequences and message format. It assumes that the Transmission Control Protocol (TCP) is the underlying protocol.

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).

SLP See *Service Location Protocol*.

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

small form-factor pluggable (SFP) connector
A compact optical transceiver that provides the optical interface to a fibre-channel cable.

SMI-S See *Storage Management Initiative Specification*.

SMTP See *Simple Mail Transfer Protocol*.

SNIA See *Storage Networking Industry Association*.

SNMP See *Simple Network Management Protocol*.

space-efficient VDisk
See *space-efficient virtual disk*.

space-efficient virtual disk
A virtual disk that has different virtual capacities and real capacities.

SSH See *Secure Shell*.

SSPC See *IBM System Storage Productivity Center (SSPC)*.

SSL See *Secure Sockets Layer*.

stand-alone relationship
In FlashCopy, Metro Mirror, and Global Mirror, relationships that do not belong to a consistency group and that have a null consistency group attribute.

stop A configuration command that is used to stop the activity for all copy relationships in a consistency group.

stopped
The status of a pair of virtual disks (VDisks) that have a copy relationship that the user has temporarily broken because of a problem.

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)

Storage Management Initiative Specification (SMI-S)
A design specification developed by the Storage Networking Industry Association (SNIA) that specifies a secure and reliable interface that allows storage management systems to identify, classify, monitor, and control physical and logical resources in a storage area network. The interface is

intended as a solution that integrates the various devices to be managed in a storage area network (SAN) and the tools used to manage them.

Storage Networking Industry Association (SNIA)
An association of producers and consumers of storage networking products whose goal is to further storage networking technology and applications. See www.snia.org.

striped
Pertains to a virtual disk (VDisk) that is created from multiple managed disks (MDisks) that are in the MDisk group. Extents are allocated on the MDisks in the order specified.

stripeset
See *RAID 0*.

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

superuser authority
Can issue any command-line interface (CLI) command. A superuser can view and work with the following panels: View users, Add cluster, Remove cluster, Add users, and Modify users. Only one Superuser role is available.

suspended
The status of a pair of virtual disks (VDisks) that have a copy relationship that has been temporarily broken because of a problem.

switch
A network infrastructure component to which multiple nodes attach. Unlike hubs, switches typically have internal bandwidth that is a multiple of link bandwidth, and the ability to rapidly switch node connections from one to another. A typical switch can accommodate several simultaneous full link bandwidth transmissions between different pairs of nodes. (S) Contrast with *hub*.

symmetrical network
A network in which all the initiators are connected at the same level and all the controllers are connected at the same level.

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*.

synchronized
In Metro or Global Mirror, the status condition that exists when both virtual disks (VDisks) of a pair that has a copy relationship contain the same data.

system
A functional unit, consisting of one or more computers and associated software, that uses common storage for all or part of a program and also for all or part of the data necessary for the execution of the program. A computer system can be a stand-alone unit, or it can consist of multiple connected units.

T

terabyte
In decimal notation, 1 099 511 628 000 bytes.

thinly provisioned volume
See *space-efficient virtual disk*.

topology
The logical layout of the components of a computer system or network and their interconnections. Topology deals with questions of what components are directly connected to other components from the standpoint of being able to communicate. It does not deal with questions of physical location of components or interconnecting cables. (S)

trigger
To initiate or reinitiate copying between a pair of virtual disks (VDisks) that have a copy relationship.

U

UID See *unique identifier*.

unconfigured mode
A mode in which I/O operations cannot be performed. See also *image mode* and *managed space mode*.

uninterruptible power supply
A device that is 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.

unique identifier (UID)
An identifier that is assigned to storage system logical units when they are created. It is used to identify the logical unit regardless of the logical unit number (LUN), status of the logical unit, or whether alternate paths exist to the same device. Typically, a UID is only used once.

unmanaged
An access mode that pertains to a managed disk (MDisk) that is not used by the cluster.

V

valid configuration
A configuration that is supported.

VDisk See *virtual disk (VDisk)*.

VDisk copy
See *virtual disk copy*.

virtual capacity
The amount of storage that is available to a server on a virtual disk (VDisk) copy. In a space-efficient virtual disk, the virtual capacity can be different from the real capacity. In a standard virtual disk, the virtual capacity and real capacity are the same.

virtual disk copy
A physical copy of the data that is stored on a virtual disk (VDisk). Mirrored VDisks have two such copies. Nonmirrored VDisks have one copy.

virtual disk (VDisk)
A device that host systems in a 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.

virtual storage area network (VSAN)
A fabric within the SAN.

vital product data (VPD)
Information that uniquely defines system, hardware, software, and microcode elements of a processing system.

VLUN See *managed disk*.

VPD See *vital product data*.

VSAN See *virtual storage area network*.

W

WBEM
See *Web-Based Enterprise Management*.

Web-Based Enterprise Management (WBEM)
A tiered, enterprise-management architecture that was developed by the Distributed Management Task Force (DMTF). This architecture provides the management design framework that consists of devices, device providers, the object manager, and the messaging protocol for the communication between client applications and the object manager.

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 that is associated with a fibre-channel adapter port. The WWPN is assigned in an implementation- and protocol-independent manner.

WWNN
See *worldwide node name*.

WWPN
See *worldwide port name*.

Z

zoning
In fibre-channel environments, the grouping of multiple ports to form a virtual, private, storage network. Ports that are members of a zone can communicate with each other, but are isolated from ports in other zones.

Index

Numerics

A

B

C

J

K

L

M

N

O

P

R

S

T

U

V

W

Readers' Comments — We'd Like to Hear from You

IBM System Storage SAN Volume Controller
Hardware Maintenance Guide
Version 4.3.1

Publication No. GC27-2226-00

We appreciate your comments about this publication. Please comment on specific errors or omissions, accuracy, organization, subject matter, or completeness of this book. The comments you send should pertain to only the information in this manual or product and the way in which the information is presented.

For technical questions and information about products and prices, please contact your IBM branch office, your IBM business partner, or your authorized remarketer.

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you. IBM or any other organizations will only use the personal information that you supply to contact you about the issues that you state on this form.

Comments:

Thank you for your support.

Send your comments to the address on the reverse side of this form.

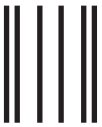
If you would like a response from IBM, please fill in the following information:

Name	Address
Company or Organization	
Phone No.	E-mail address

Readers' Comments — We'd Like to Hear from You
GC27-2226-00

Cut or Fold
Along Line

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



NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

International Business Machines Corporation
Information Development
Department 61C
9032 South Rita Road
Tucson, Arizona
USA 85775-4401

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

Cut or Fold
Along Line

Part Number: 31P1219

Printed in USA

(1P) P/N: 31P1219

GC27-2226-00

Spine information:

IBM System Storage SAN Volume Controller

SAN Volume Controller Hardware Maintenance Guide Version 4.3.1