Fibre Channel Storage Hub
IBM 2103 Model H07

Installation, Service, and User's Guide

SC26-7289-00

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First Edition (February 1999)

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This section contains information about:

- Safety notices used in this guide
- Environmental notices and statements for this product

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Warranty Period:	One Year*

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About This Book

This book provides the instructions for installing the Fibre Channel Storage Hub and associated Gigabit Interface Converters (GBICs), for use in Fibre Channel Arbitrated Loop applications.

Frequently Used Terms

The following terms are used throughout this publication to describe the Fibre Channel Storage Hub:

Term	Definition
GBIC	Gigabyte Interface Converter.
PECL	Positive Emitter Coupled Logic
FC-AL	Fibre Channel-Arbitrated Loop.
service representative	Also referred to in this book as a service provider. An individual or a company that you have authorized to service your Fibre Channel Storage Hub.

Who Should Use This Book

This publication is for storage administrators, system programmers, and performance and capacity analysts.

Related Publications

Additional information that is related to the subsystem is available in the following publications:

- *Fibre Channel RAID Storage Server, Introduction and Planning Guide, IBM 2102*, GC26-7281
- *Fibre Channel Storage Manager, Installation Guide for Microsoft Windows NT*, SC26-7283
- *StorWatch Fibre Channel RAID Specialist, Installation Guide for Microsoft Windows NT and Windows 95*, SC26-7284
- *Fibre Channel Storage Manager and StorWatch Fibre Channel RAID Specialist, User's Guide*, SC26-7285
- *Fibre Channel Storage Manager, Installation Guide for Sun Solaris Operating System*, SC26-7286
- *Fibre Channel Storage Manager, Installation Guide for Hewlett Packard HP-UX Operating System*, SC26-7287
- *Fibre Channel RAID Storage Server and Expandable Storage Unit, User's Guide, IBM 2102 Model F10 and Model D00*, SC26-7288
- *Fibre Channel RAID Storage Server and Expandable Storage Unit, Service Guide, IBM 2102 Model F10 and Model D00*, SY27-7604
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Web Site

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Chapter 1. Hub Description and Features

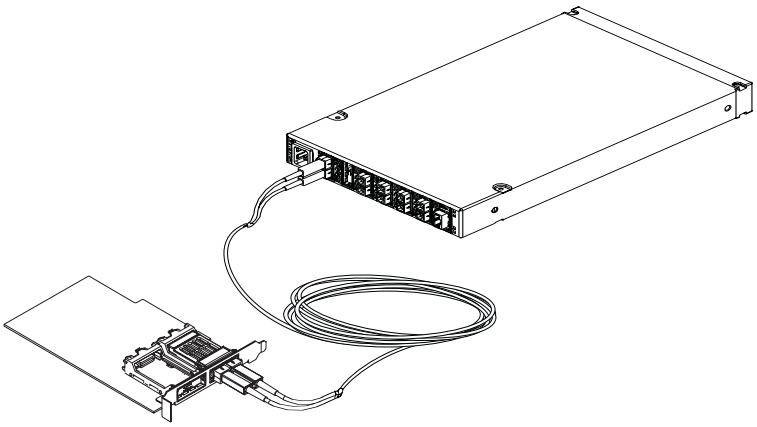


Figure 1. Fibre Channel Hub and Interface Connector

The IBM Fibre Channel Storage Hub is a 7-port central interconnection for Fibre Channel Arbitrated Loops that follow the ANSI FC-AL standard (see Figure 1). Each Fibre Channel Storage Hubport receives serial data from an attached node and retransmits the data out of the next hub port to the next node attached in the loop. Each reception includes data regeneration (both signal timing and amplitude) supporting full-distance optical links.

The Fibre Channel Storage Hub detects any loop node that is missing or is inoperative and automatically routes the data to the next operational port and attached node in the loop. LED indicators provide status information to indicate whether the port is active or bypassed.

Each port requires a Gigabit Interface Converter (GBIC) to connect it to each attached node. The Fibre Channel Storage Hub supports any combination of short-wave or long-wave optical GBICs. The GBICs are *hot-pluggable* into the Fibre Channel Storage Hub, which means you can add host computers, servers, and storage modules to the arbitrated loop dynamically without powering off the Fibre Channel Storage Hub or any connected devices. If you remove a GBIC from a Fibre Channel Storage Hub port, that port is automatically bypassed. The remaining hub ports continue to operate normally with no degradation of system performance. Conversely, if you plug a GBIC into the Fibre Channel Storage Hub, it will automatically be inserted and become a node on the loop if valid Fibre Channel data is received from the device.

Data transfer within the Fibre Channel Storage Hub is implemented in serial differential Positive Emitter Coupled Logic (PECL) AC coupled logic. Each Fibre Channel Storage Hub port monitors the serial data input stream as well as the GBIC connected to it.

The following conditions will cause the Fibre Channel Storage Hub to bypass a port:

- `TX_FAULT`: Detects a GBIC transmitter fault.
- `RX_LOS`: Detects a loss of received signal amplitude from the device.
- `MOD_DEF`: Detects the absence of a GBIC.

The Fibre Channel Storage Hub circuitry detects off-frequency data, excessive jitter, or inadequate edge transition density on a per-port basis. The Fibre Channel Storage Hub uses the standardized AMP SCA2 20-pin connector to implement hot plugging. Surge currents, caused by hot plugging, are minimized by slow-start circuitry and a pin-sequencing procedure on the GBIC. Electrostatic discharge (ESD) transients are minimized by means of sequenced connector contacts.

The Fibre Channel Storage Hub includes a universal power supply that can operate from 95 to 250 Vac and from 50 to 60 Hz.

Note: The fiber optic cables do not come with the hub and must be ordered separately. To order, call your IBM reseller or IBM marketing representative.

Fibre Channel Arbitrated Loop

The Fibre Channel Arbitrated Loop (FC-AL) is an ANSI standard (X3T11) product designed to provide shared bandwidth over low-cost media. Early adapters primarily use the SCSI protocol transported over Fibre Channel for distributed server and storage-cluster applications. The Fibre Channel Storage Hub is a central point of interconnection designed to maintain a fault-tolerant physical loop topology. The Fibre Channel Storage Hub can also be used to implement configurations which extend the size of the FC-AL loop to its maximum size of 127 active loop ports (includes one optional Fabric-Loop port).

Features at a Glance

The following list summarizes the features of the hub:

- Seven configurable media-interface optical ports provide a high performance and distance alternative.
- Plug and Play provides fault tolerance for online system configuration changes.
- Modular Gigabit Interface Converter (GBIC) transceiver design allows you to use ports when needed.
- Cascadable ports allows up to 127 connections (where one port is reserved for connection to fabric or switch active ports) or support of multiple loop implementations.
- Simplified cable management can be used for centralized storage management applications.
- Hot pluggable GBIC provides an optimal solution for entry storage interconnect needs.
- Half-rack width (1U = 1.75 in.) low profile hub packaging offers highest port density in single 1 unit height rack mount.
- Auto-sensing power-supply - supports 95 to 250 VAC and 50 to 60 Hz.

Chapter 2. Introduction to Applications and Configurations

The Fibre Channel Storage Hub is designed to provide a centralized point of connectivity, to provide loop fault tolerance, and to simplify configuration management. Specifically designed for FC-AL applications, the hub provides considerable flexibility in configuring loops and segmenting them for performance or high-profile availability applications.

Applications and Configurations

The Fibre Channel Storage Hub modular interface provides flexibility and is upgradable to available short-wave and long-wave optical Fibre Channel product port interfaces (see Figure 2). Fibre Channel products that are commonly interconnected to the Fibre Channel Storage Hub are Fibre Channel host bus adapters, FC-AL storage devices, and FC-AL storage arrays. Initiators (workstations and servers) set up and initiate the transfer of data to or from the storage devices. The storage devices that receive the requests made by the initiators are the targets. Initiators and targets represent individual nodes that are linked by the shared FC-AL.

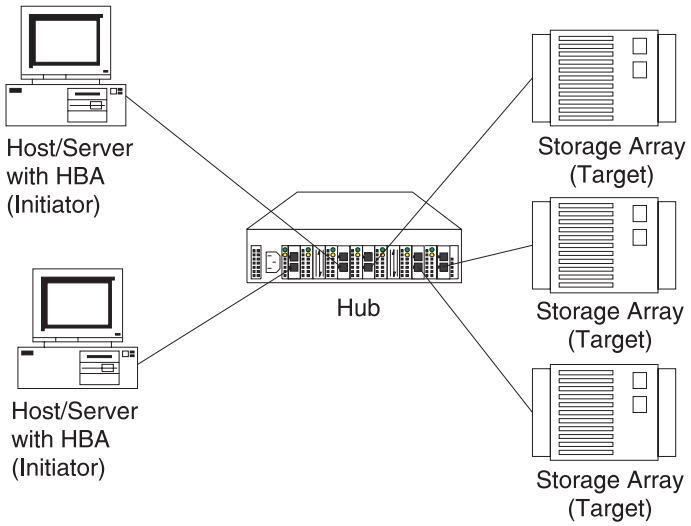


Figure 2. Fibre Channel Storage Hub Applications and Configurations

In some circumstances, redundancy for loop fail-over protection requires the implementation of dual loops, as shown in Figure 3 on page 4.

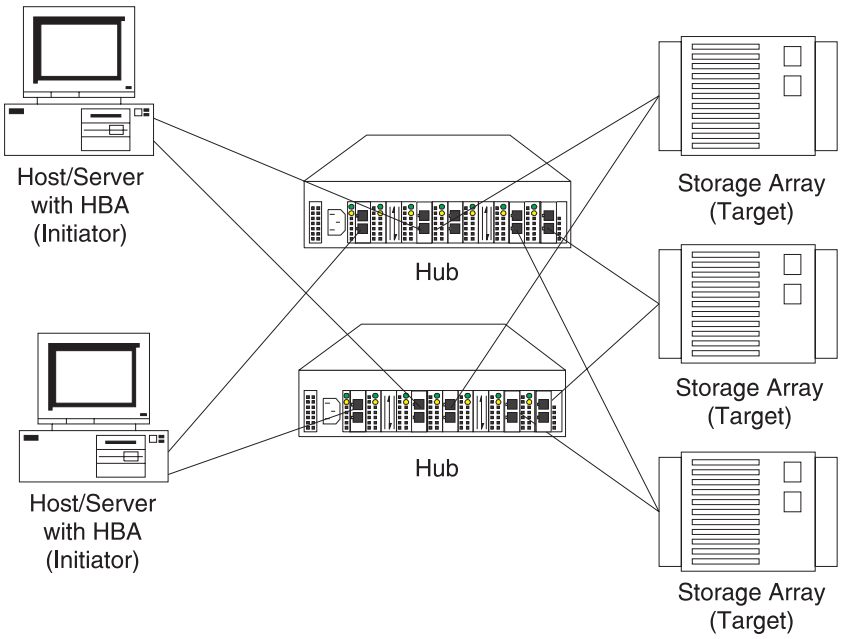


Figure 3. Fibre Channel Storage Hub Dual Loops Application

Gigabit Interface Converters (GBICs) Choices

The Fibre Channel Storage Hub is designed with seven modular user configurable interface ports. These seven ports comply with the Gigabit Interface Converters (GBICs) Specification. GBICs are currently available in two media types. You can select the appropriate media for a particular application or topology:

- Short-wave optical
- Long-wave optical

Short-Wave Optical GBIC Features

Some features of the short-wave optical GBIC include:

- Compliant with Fibre Channel FC-PH-2 physical layer option 100-M5-SN-I
- Full-speed: 1.0625 Gbps
- Wavelength: 780 nm
- Non-OFC laser
- Supports multimode 50 µm fiber (2 meters minimum, 500 meters maximum)
- Uses dual SC fiber optic connectors

Long-wave Optical GBIC Features

Some features of the long-wave optical GBIC include:

- Full-speed: 1.0625 Gbps
- Uses single-mode 9 µm fiber
- Wavelength: 1310 nm
- Non-OFC laser
- Uses dual SC fiber optic connectors
- Fiber lengths: 2 meters minimum, 10 kilometers maximum

Chapter 3. Assembling A Fibre Channel Storage Hub

This chapter lists the contents of your Fibre Channel Storage Hub package and includes assembly instructions. Be sure to review the contents of your package and compare it with the items listed. If you are missing any items, contact your IBM marketing representative or IBM reseller.

Installing the Fibre Channel Storage Hub

Install the Fibre Channel Storage Hub in a rack, on a desktop, or install a second hub on an existing tray, using the information in this chapter.

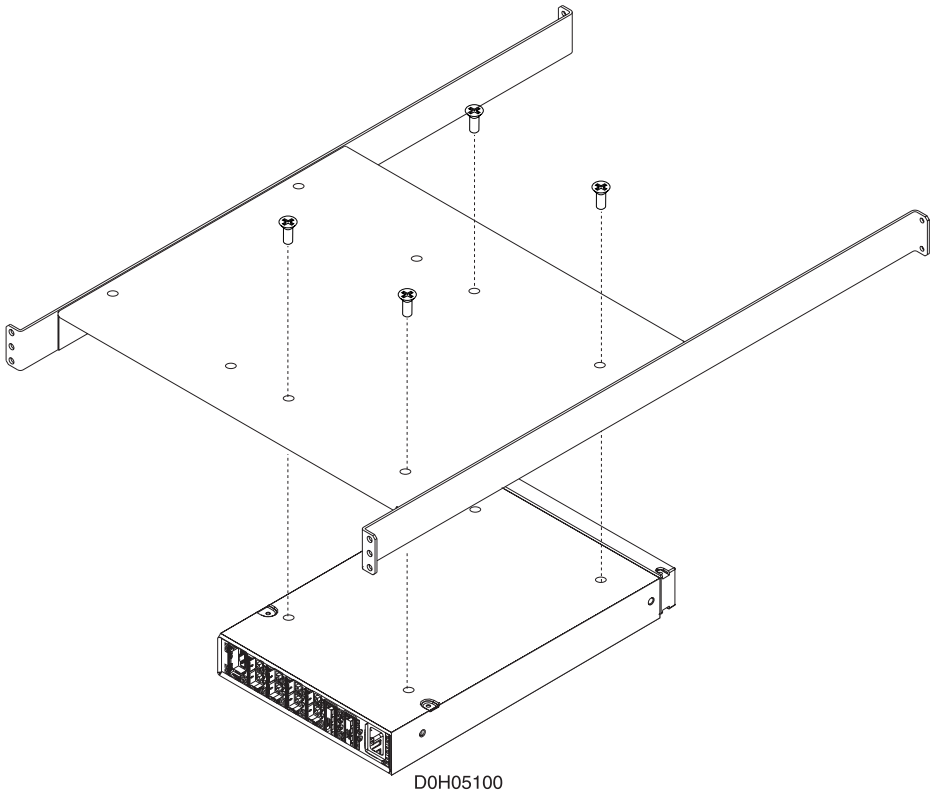
Installing the Fibre Channel Storage Hub in a Rack

The Fibre Channel Storage Hub comes with a tray and bezel to enable you to install it in a rack.

To install the Fibre Channel Storage Hub in the rack, follow these instructions:

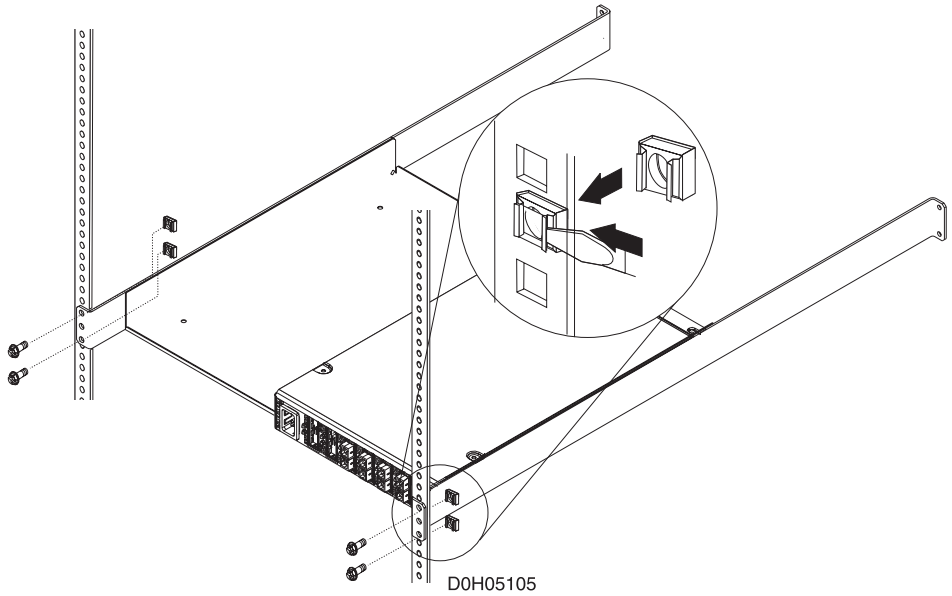
1. Turn the hub upside down and place it on a flat surface.
2. Turn the tray upside down and place it on the hub.
3. Align the four holes in the tray with the holes in the hub. Line up the back lip of the tray with the back side of the hub.
4. Using a Phillips head screw driver, install the four smaller screws in the aligned holes.

   If you are installing a second hub at this time, repeat steps 1-4 to install the second hub in the tray.



5. Turn the tray over so that the hub is on top of the tray.
6. Find the rack position into which you are installing the Fibre Channel Storage Hub; then, take four clip nuts and install them in the rear of the rack. Make sure you have installed one in each screw hole you will be using for the tray installation.

   If your rack has square holes, snap the M6 clip nuts into place on the rear of the rack.



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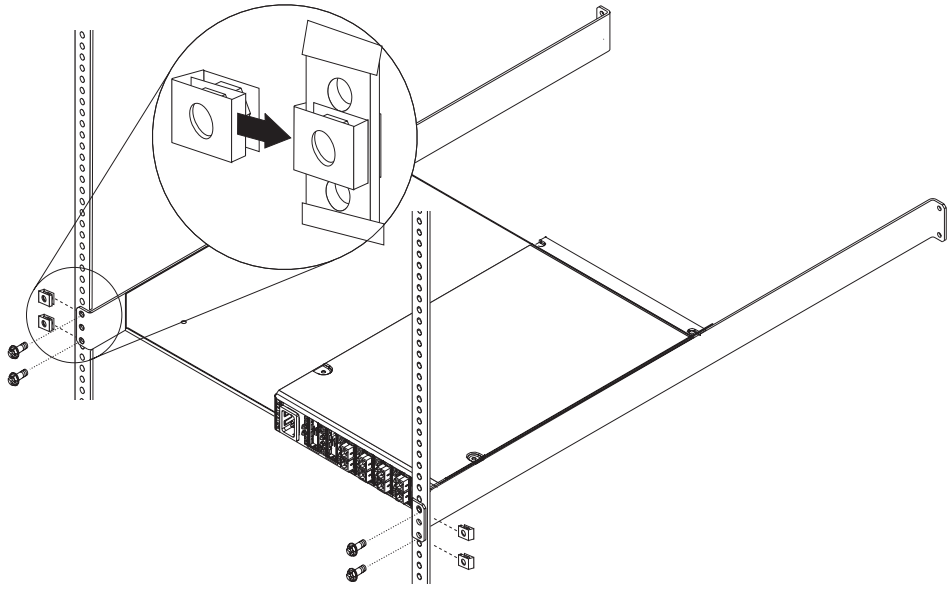
   If your rack has round holes, slide the 10-32 clip nuts into place on the rear of the rack.



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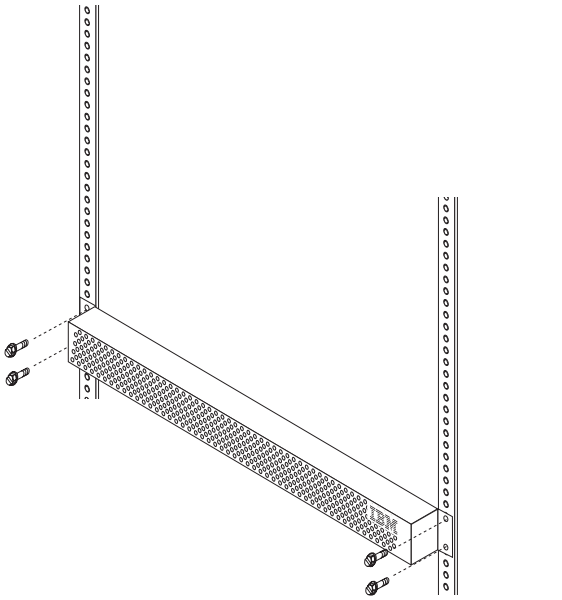
7. Pick up the tray and line up the top and bottom screw holes with the clip nuts on the rack. While holding the tray in place, install four of the larger screws.

If your rack has square holes and you used the M6 clip nuts, use the M6 hex washer headed screws.

If your rack has round holes and you used the 10-32 clip nuts, use the 10-32 hex washer headed screws.

8. Line up the top and bottom bezel screw holes with the threaded holes in the rack tray. While holding the bezel in place, install four of the larger screws.



9. See “Setting Up and Configuring the FC-AL” on page 8 to complete the installation.

Installing a Second Fibre Channel Storage Hub on an Existing Tray

To install a second Fibre Channel Storage hub onto an existing tray (that already contains a single hub), follow these instructions:

1. Slide the new hub onto the tray and align the four holes in the tray with the holes in the hub. Line up the back lip of the tray with the back side of the hub.
2. Using a Phillips head screw driver, install the four smaller screws in the aligned holes.
3. See “Setting Up and Configuring the FC-AL” on page 8 to complete the installation.

Installing the Fibre Channel Storage Hub on a Desktop

The Fibre Channel Hub is shipped with four self-adhesive rubber pads. These rubber pads are designed to prevent damage to your desk surface. To install the rubber pads:

1. Place the hub upside down so the case bottom is facing up.
2. Remove the wrapping and install one self-adhesive pad on each scribed area close to the corners of the hub.
3. Turn the hub over and place it on your desk.

4. Continue with “Setting Up and Configuring the FC-AL” to complete the installation.

Setting Up and Configuring the FC-AL

The following sections contain the information necessary to initially set up or make configuration changes to an FC-AL using the Fibre Channel Storage Hub.

Installation tips:

- The GBIC housing has an integral guide key that is designed to prevent improper insertion.
- Use minimal pressure when inserting a GBIC into a port. Forcing a GBIC into a port might cause damage to the GBIC or the port.
- GBICs are hot pluggable. You can insert or remove a GBIC while the hub is powered on.
- The operational loop performance is not affected when you install or remove a GBIC.
- If you insert a GBIC without media attached, it will remain in the **bypassed** state. When you attach media to the GBIC and it detects a valid receive signal, the Fibre Channel Storage Hub will allow the GBIC and the attached devices to join the loop.
- Unused ports, improperly seated GBICs, or GBICs that do not receive a valid input signal will remain in the bypass state and will not affect the operation of the FC-AL.
- For cable management information, go to **http://www.ibm.com/storage/fcss** on the World Wide Web.

Attention: To avoid damage to your fibre optic cables, follow these guidelines:

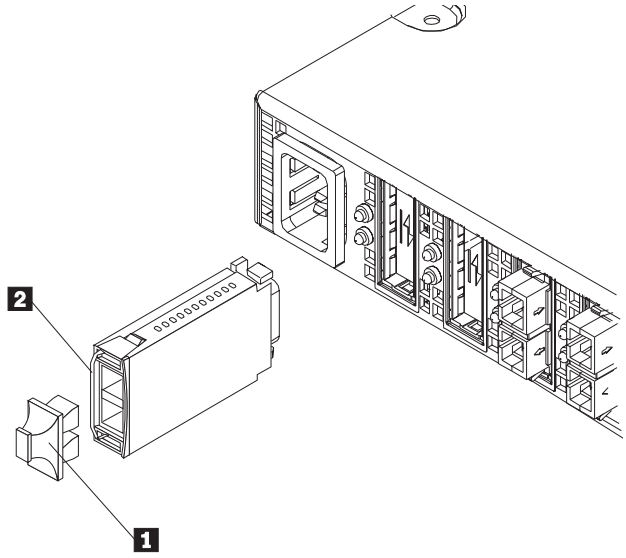
- Do not route the cable along a folding cable management arm.
- When attaching to a device on slides, leave enough slack in the cable so that it does not bend to a radius smaller than 3 inches when extended or become pinched when retracted.
- Route the cable away from places where it can be snagged by other devices in the rack.
- Do not over tighten the cable ties or bend the cables to a radius smaller than 3 inches.
- Do not put excess weight on the cable at the connection point and be sure it is well supported.

Installing the GBIC

There are several different types of GBICs available. You can insert any type of GBIC into any available hub port.

CAUTION:
Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

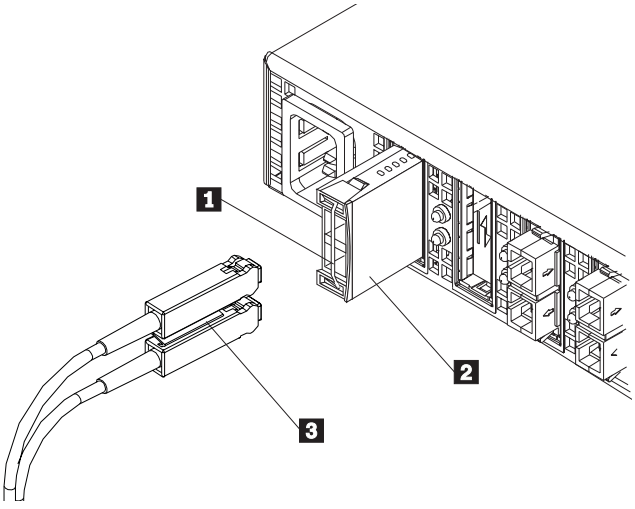
1. Remove the plastic cover **1** from the GBIC **2** .



2. Insert the cables into the GBIC.

   If the GBIC you are installing has a metal latch, move the latch to the unlocked (center) position **1** . Slide the GBIC **2** into the port, then move the GBIC latch back to the locked position (flush with the rear of the GBIC). Connect the fibre optic cable **3** to the installed GBIC.

   If the GBIC you are installing does not have a metal latch, slide the GBIC **2** into the port. Connect the fibre-optic cable **3** to the installed GBIC.



Removing Gigabit Interface Converters (GBICs)

To remove a GBIC that does not have a metal latch from the hub port:

CAUTION:
Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

1. Press the opposing tabs on the GBIC toward each other while slowly removing the module from the hub (with the fiber optic cables still installed).
2. Remove the cable assembly from the GBIC.

To remove a GBIC that has a metal latch from the hub port: (If necessary, refer to the artwork shown “Installing the GBIC” on page 9.)

1. Remove the fiber optic cable assembly from the GBIC.
2. Move the latch to the unlocked (center) position.
3. Press the opposing tabs on the GBIC toward each other while slowly removing it from the port.

Attaching a GBIC to Initiators and Targets

You must attach the cable assembly to the node or loop of nodes that the particular port supports. Figure 4 shows examples of host bus adapters with a GBIC attached:

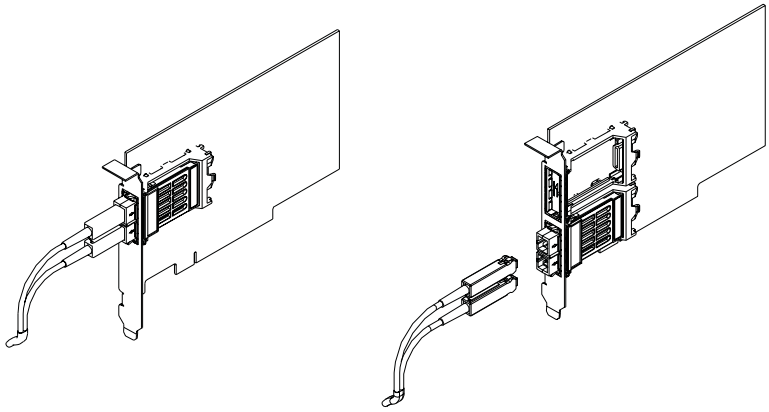


Figure 4. Host Bus Adapters with Gigabit Interface Converters (GBICs) Attached

Power Up Systems Check

Once you have installed all the appropriate cabling, the FC-AL is operational. Power on the storage modules first, then the controller and the Fibre Channel Storage Hub, then everything else. Make sure you power on the host adapter after the hub has been powered on to insure proper loop initialization.

To insure proper operation:

1. Connect the power cord to the Fibre Channel Storage Hub, then to the electrical outlet.

DANGER

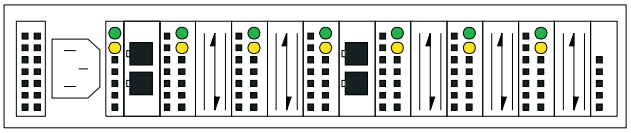
An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.

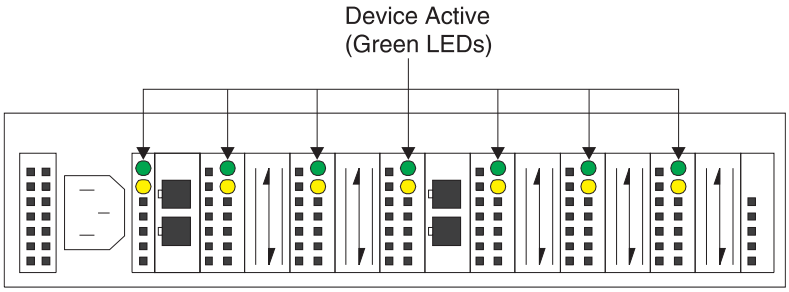
When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communication lines.



2. Turn on the attached FC-AL compatible nodes.
3. Check the Device Active (green) LEDs on the Fibre Channel Storage Hub ports.



LED On

This indicates that a GBIC is present and functioning properly.

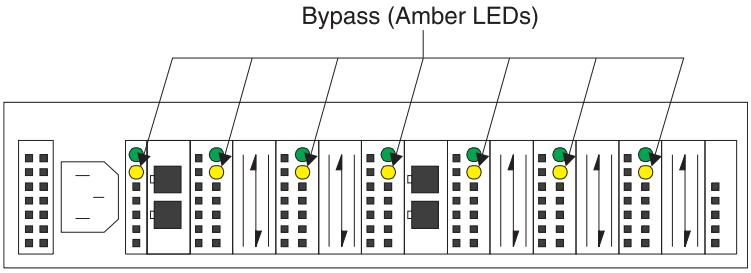
LED Off

This indicates a fault condition. Examples of a fault condition include: a GBIC transmitter fault, an improperly seated GBIC, an absent GBIC, or another failed device. The port will be in the bypass state, which precludes the port from participating in the FC-AL. This is the normal status of operation for Fibre Channel Storage Hub ports in which GBICs are not installed.

Note: FC-AL compatible nodes must perform loop initialization procedures at power-up to function properly on the loop. The Fibre Channel driver

software on FC-AL nodes performs the loop initialization or re-initialization depending on its prior state of operation.

4. Check the Port Bypass (amber) LEDs.



LED On

If the Active (green) LED of the port is off, the port is nonoperational and the Bypass (amber) LED for the port is on. If a properly functioning port (the Active green LED is on) with a GBIC present also has the Bypass LED on, either the loss of signal or poor signal integrity has caused the port to go into the bypass state. When the port is in this state, it cannot participate in the FC-AL.

The bypass state is also the normal status condition when no GBIC is present in the port, a GBIC is present but not attached to a FC-AL node, or a GBIC is attached to a cable assembly with nothing attached at the opposite end. Replacing such a port (or removing and reinserting the GBIC into the same port twice) is considered to be a loop configuration change which invokes the Loop Initialization Procedure.

LED Off

This indicates that the Fibre Channel Storage Hub port and device are fully operational and actively participating in the FC-AL.

5. The FC-AL should be fully operational at this point. However, it is a good idea to check that proper loop discovery has taken place and all required devices are participating in the loop. Some host bus adapters might provide this level of functionality or it might be resident in the application software on the host operating system.

Redundant Fibre Channel-Arbitrated Loop Configurations

Use a dual loop configuration design for applications requiring loop redundancy for maximum uptime (see Figure 5 on page 13). A second, independent Fibre Channel Storage Hub is required for the redundant loop. Many host bus adapters and storage modules have dual ports to support dual-loop configurations.

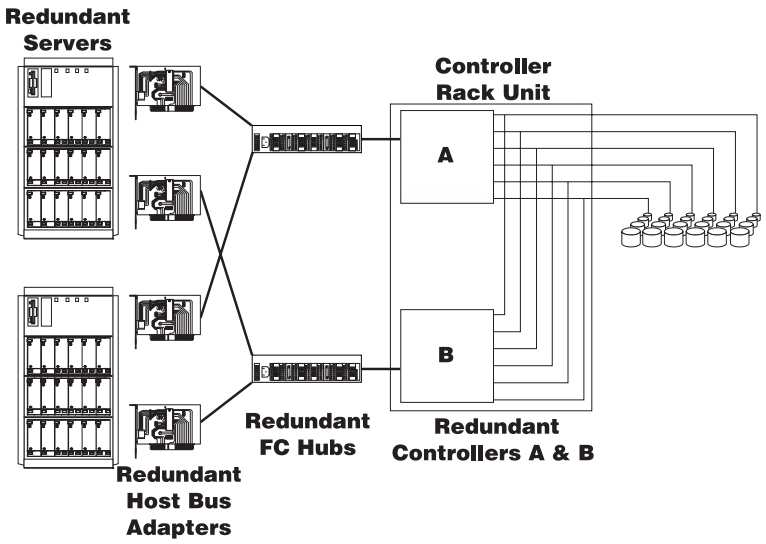


Figure 5. Redundant Fibre Channel-Arbitrated Loop Configurations

Chapter 4. Troubleshooting

Installation and operational problems in an arbitrated loop environment are typically caused by one of the following:

- Faulty cabling or cable connector
- Incorrect cable length
- Faulty GBIC
- Invalid Fibre Channel signaling from the host bus adapter (HBA) or disk array
- Device driver or microcode conflicts between the HBAs and other devices.

The following information will help you to isolate and correct the physical layer problems. For protocol-related problems, such as inoperability between devices, see the documentation that came with the individual devices.

Port Status LEDs

The hub provides two status LEDs for each port. Use these LEDs to help you quickly diagnose and recover from problems.

The upper, green LED is lit when you install an operational GBIC. The lower, amber LED is lit when the port is in the bypass mode. In the bypass mode, a port is disabled, which prevents erratic signals or data from disrupting loop activity. The bypass mode could be triggered by the loss of valid signal or by a GBIC fault. The combination of green and amber LEDs indicate the four following states.

Green LED	Amber LED	Port State
Off	Off	No GBIC Installed
On	Off	Operational GBIC; Valid Signal
Off	On	Faulty GBIC; Port Bypassed
On	On	Operational GBIC; No Valid Signal; Port Bypassed

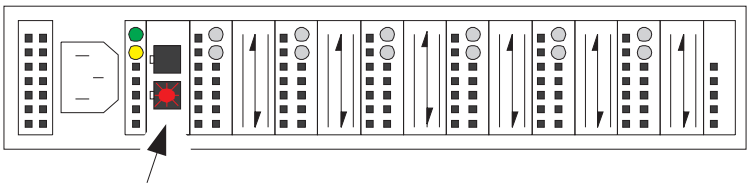
Verifying GBIC and Cable Signal Presence

DANGER

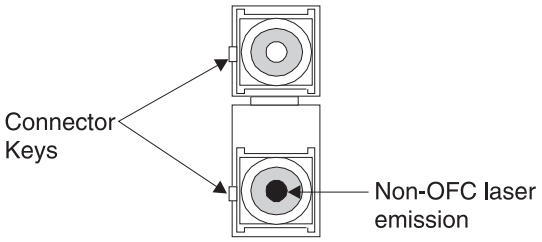
Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

In addition to verifying port LED status, you can verify signal presence by using a mirror to look for a light at the fiber-optic cable ends and the GBIC transmitter. To verify signal presence at the hub end of a link, insert a GBIC into the hub and place a mirror at the bottom of the SC connector. If a signal is present, you will see a low

intensity red light in the mirror reflecting from the GBIC transmitter.



To verify the integrity of the fiber optic cable at the node end of a link, make sure the cable is attached to the GBIC at the hub and the hub is turned on. Dual SC fiber-optic cable connectors are keyed and will insert into a GBIC in one direction only. Place a mirror at the node end of the link. A low intensity red light is visible in the mirror reflection of one of the SC leads, as shown in the following illustration.



If a fiber-optic cable has good transmitter throughput but a broken or degraded receiver lead, the end node might sense a *loop down* state. Because the transmitter is good, the hub responds to the end node valid Fibre Channel signal and adds the device to the loop. But, because the end node is not receiving Fibre Channel signals, it will stream loop-down sequences onto the loop. This prevents all data communications among the devices on the loop and will continue to do so until the condition is corrected.

To verify the integrity of the fiber-optic cable at the hub end, make sure the fiber-optic cable is plugged into the host bus adapter at the host or into a disk-array controller and that the device is turned on. Using a mirror, examine the cable SC leads to verify that a low-intensity red light is visible on the receiver lead.

Some fiber optic cables are marked with an ″A″ on the receiver lead and a ″B″ on the transmitter lead. Some multimode cables plugged into a GBIC, HBA, or disk array controller are key-oriented with the ″B″ lead inserted into the device transmitter. Place a mirror on the opposite end of the cable to see the low-intensity red light on the ″A″ receiver lead.

Troubleshooting Chart

Refer to the following chart to perform troubleshooting.

Problem	Action
GBICs installed in one or more ports but no LED is lit.	Verify that the power cord is firmly seated into the hub and is connected to a powered circuit.
GBIC is installed but only an amber light is lit.	Reseat the GBIC. If the same condition occurs, replace the GBIC.

Problem	Action
GBIC is installed and both green and amber lights are lit.	The hub is not receiving a valid Fibre Channel signal from the end node (HBA or disk array). Do the following: 1. Unplug the fiber cable from the node and, using a mirror, verify that an optical signal is present on the cable receiver lead. If no red light is visible, replace the cable. 2. Using a mirror, examine the SC connectors on the HBA or disk controller. If no red light is visible on the transmitter lead, do one of the following: • Restart the device. • Reinstall the device drivers. • Have the HBA or disk controller serviced. 3. If a light is present on both the cable lead and the end node, have the HBA or the disk controller serviced.
GBIC is installed, only the green LED is lit, but no communication occurs between the devices.	The hub is receiving a valid Fibre Channel signal from the end device (HBA or disk), but no upper-level protocols are active. • Verify that the proper HBA device drivers are loaded for the appropriate operating system and that the host has been configured to recognize the attached disk devices. • Unplug the fiber cable from the end node and verify that an optical signal is present on the cable receiver lead. If no signal is present, the receiver lead of the cable might be defective and the device is streaming loop-down sequences to the hub. Replace the cable.

Chapter 5. Getting Help and Information

If you need help, service, technical assistance, or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you.

For an example, IBM maintains pages on the World Wide Web where you can find information about IBM products and services, the latest technical information, and download device drivers and software updates. Bring up http://www.ibm.com in your favorite web browser, to access this information and software.

Help is also available from bulletin board services on-line, as well as by fax and telephone. This chapter provides information about these services.

Note: Please note that this information is subject to change without notice.

Service Support

With the original purchase of an IBM hardware product, you have access to extensive support coverage. During the IBM hardware product warranty period, you may call IBM Support (1-800-IBM-SERV in the US) for hardware product assistance covered under the terms of the IBM Statement of Limited Warranty. The following services are available during the warranty period:

- **Problem Determination:**

  Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is needed to fix the problem.
- **IBM Hardware Repair:**

  If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service.

Be sure to retain your proof of purchase to obtain warranty service.

Please have the following information ready when you call:

- Machine Type and Model
- Serial numbers of your IBM hardware products
- Description of your problem
- Exact wording of any error messages
- Hardware and software configuration information

Refer to the IBM Statement of Limited Warranty for a full explanation of IBM's warranty terms.

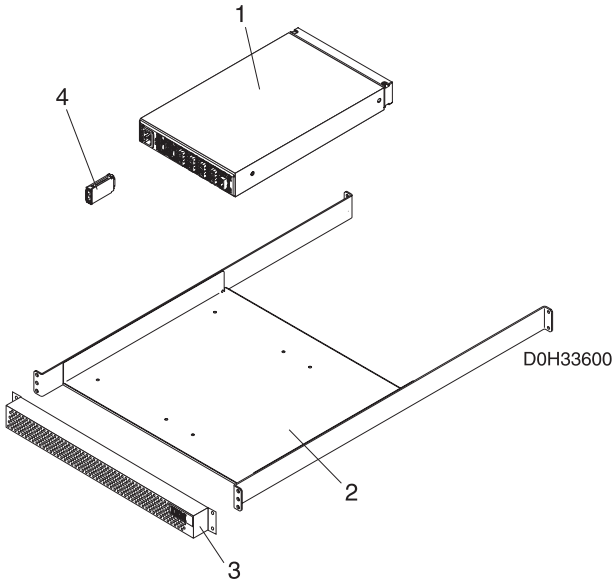
Before You Call for Service

Many problems can be solved without outside assistance, by using on-line help or by referring to the documentation that has been included with the product.

Be sure to read any README files that may be included, for the latest information.

Appendix A. Fibre Channel Storage Hub Parts Catalog

FRU List



The following items are included in your Fibre Channel Storage Hub FRU listing:

Index	Fibre Channel Storage Hub Part	FRU #
1	Seven-port Fibre Channel Storage Hub assembly	01K6738
2	Rack Tray	09L1274
3	Tray Bezel	10L7041
4	Short Wave GBIC	03K9206
4	Long Wave GBIC	03K9208
n/a	Table Top Power Cord - USA	08L8038
n/a	Table Top Power Cord - various countries[1]	6952299
n/a	Table Top Power Cord - Thailand	1838573
n/a	Table Top Power Cord - Israel	14F0088
n/a	Table Top Power Cord - various countries[2]	14F0070
n/a	Table Top Power Cord - various countries[3]	13F9980
n/a	Table Top Power Cord - various countries[4]	13F9998
n/a	Table Top Power Cord - various countries[5]	6952290
n/a	Table Top Power Cord - various countries[6]	14F0052
n/a	Table Top Power Cord - various countries[7]	13F9941
n/a	Table Top Power Cord - various countries[8]	14F0016
n/a	Table Top Power Cord - various countries[9]	14F0034

[1] Aruba, Bahamas, Barbados, Bermuda, Bolivia, Canada, Cayman Is., Columbia, Costa Rica, Curacao, Dominican Republic, El Salvador, Equador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea, Liberia, Mexico, Netherlands, Nicaragua, Panama, Peru, Philippines, China, Saudi Arabia, Suriname, Trinidad Tobago, Venezuela.

Index	Fibre Channel Storage Hub Part	FRU #
[2] Chile, Ethiopia, Italy, Libya, Somalia.		
[3] Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bosnia Herzegovina, Bulgaria, Burundi, Cameroon, Central African Republic, Chad, Congo Brazzaville, Croatia, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guiana, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Kenya, Lebanon, Luxemburg, Macau, Malagasy, Mali, Martinique, Mauritania, Mauritinus, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Slovenia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, Upper Volta, Russia, Vietnam, Yugoslavia, Zaire, Zimbabwe.		
[4] Denmark		
[5] Argentina, Brazil, Paraguay, Uruguay.		
[6] Liechtenstein, Switzerland.		
[7] Australia, China, New Zealand, Papua New Guinea, Western Samoa.		
[8] Bangladesh, Burma, Pakistan, South Africa, Sri Lanka.		
[9] Antigua, Bahrain, Brunei, Channel Is., Cyprus, Fiji, Ghana, Hong Kong, India, Ireland, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Oman Polenisia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Arab Emirates, United Kingdom, Yemen, Zambia.		

Appendix B. Safety Notices – Translations

The following section contains the safety information that you need to know before servicing the IBM Fibre Channel Hub, Fibre Channel Adapter, Fibre Channel RAID Controller, or Fibre Channel GBICs.

Laser Compliance Statement

Some IBM Server products are equipped from the factory with a Gigabit Interface Converter (GBIC). GBICs are also sold separately as options. The GBIC is a laser product. The GBIC is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, the GBIC is certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 and CENELEC EN 60 825 for Class 1 laser products.

When a GBIC is installed, note the following.

CAUTION:
Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

Removing the covers of the GBIC could result in exposure to hazardous laser radiation. There are no serviceable parts inside the GBIC. **Do not remove the GBIC covers.**

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

DANGER

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Declaração de Conformidade do Laser

Alguns produtos do Servidor IBM são equipados de fábrica com um conversor GBIC (Gigabit Interface Converter). Os conversores GBICs também são vendidos separadamente como opcionais. O conversor GBIC é um produto a laser. O conversor GBIC foi testado nos Estados Unidos segundo os critérios do departamento DHHS 21 CFR (Department of Health and Human Services 21 Code of Federal Regulations), Subcapítulo J, para produtos a laser da Classe 1. Em

outros países, o conversor GBIC é testado segundo os critérios da comissão IEC 825 (International Electrotechnical Commission 825) e da CENELEC EN 60 825 para produtos a laser da Classe 1.

Quando um conversor GBIC for instalado, observe o seguinte.

CUIDADO

A utilização de controles ou ajustes, ou a realização de procedimentos que não sejam os especificados neste documento podem resultar na exposição perigosa à radiação.

A remoção de tampas do conversor GBIC pode resultar na exposição à radiação perigosa do laser. Não existe nenhuma peça que possa ser consertada no interior do conversor GBIC. **Não remova as tampas do GBIC.**

Alguns conversores GBICs contêm diodo a laser da Classe 3A ou da Classe 3B. Observe o seguinte.

PERIGO

Radiação a Laser quando aberta. Não olhe fixamente no feixe, não visualize diretamente com instrumentos óticos e evite a exposição direta ao feixe.

激光适应性声明

一些 IBM 服务器产品出厂时装配了 Gigabit Interface Converter (千兆比特接口转换器，GBIC)。GBIC 也可作为选配件单独销售。GBIC 是一种激光产品。GBIC 被证明符合 Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J 对 1 类激光产品的要求。并且，GBIC 被证明符合 International Electrotechnical Commission (IEC) 825 以及 CENELEC EN 60 825 对 1 类激光产品的要求。

如果安装了 GBIC 设备，请注意下列内容：

注意：不遵循此处指定的控制、调整、或操作过程的操作将可能导致危险的辐射泄漏。

取下 GBIC 的外盖会导致危险的激光辐射泄漏。GBIC 内没有可使用的部件。**请不要取下 GBIC 的外盖。**

一些 GBIC 包含 3A 类或 3B 类激光二极管，请注意下列内容：

危险：打开时有激光辐射。不要直视或使用光学仪器观察激光束，并避免激光束直接照射。

雷射遵循聲明

雷射遵循聲明

有些 IBM 伺服器產品出廠時即安裝了 GBIC (Gigabit Interface Converter)。
但也可單獨選購 GBIC。
GBIC 是一種雷射產品。
GBIC 在美國經證明，係符合 DHHS 21 CFR (Department of Health and Human Services 21 Code of Federal Regulations) Subchapter J 需求的甲類雷射產品。
GBIC 經證明，係符合 IEC (International Electrotechnical Commission) 825 及 CENELEC EN 60 825 需求的甲類雷射產品。

安裝 GBIC 時，請注意下列事項：

注意：不依此處所指示的控制、調整或處理步驟，恐有遭致輻射之虞。

卸下 GBIC 蓋子，恐有遭致雷射輻射之虞。GBIC 中沒有需要維修的部分。
請勿卸下 GBIC 的蓋子。

有些 GBIC 含有內嵌式 Class 3A 或 Class 3B 雷射二極體。請注意下列事項：

危險：開啓時會產生雷射輻射。請勿凝視光束，不要使用光學儀器直接觀察，且應避免直接暴露在光束下。

Conformités aux normes relatives aux appareils à laser

Certains modèles de serveurs IBM sont équipés en standard d'un convertisseur GBIC (Gigabit Interface Converter). Ces convertisseurs GBIC sont également vendus séparément comme options. Le convertisseur GBIC est un appareil à laser. Aux États-Unis, le convertisseur GBIC est certifié conforme aux normes indiquées dans le sous-chapitre J du DHHS 21 CFR relatif aux produits à laser de classe 1. Dans les autres pays, il est certifié être un produit à laser de classe 1 conforme aux normes CEI 825 et CENELEC EN 60 825.

Si un convertisseur GBIC est installé, prenez connaissance des informations suivantes :

ATTENTION

Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent document.

Pour éviter une exposition directe au rayon laser, n'ouvrez pas le convertisseur GBIC. Vous ne pouvez effectuer aucune opération de maintenance à l'intérieur.

Certains convertisseurs GBIC contiennent une diode laser de classe 3A ou 3B. Prenez connaissance des informations suivantes :

DANGER

Rayonnement laser lorsque le carter est ouvert. Évitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques. Évitez une exposition directe au rayon.

Hinweise zur Lasersicherheit

Einige IBM Server sind werkseitig bereits mit einem Gigabit Interface Converter (GBIC) ausgestattet. GBICs sind auch separat als Systemerweiterungen erhältlich. Ein GBIC ist ein Laserprodukt.

Bei der Installation eines GBIC sind die nachfolgend aufgeführten Punkte zu beachten.

ACHTUNG

Werden Steuer- und Einstellelemente anders als hier festgelegt verwendet, kann gefährliche Laserstrahlung auftreten.

Die Abdeckungen des GBIC nicht entfernen, andernfalls kann gefährliche Laserstrahlung auftreten. Im GBIC sind keine zu wartenden Teile vorhanden. **Die Abdeckungen des GBIC niemals entfernen.**

Einige GBICs weisen eine integrierte Laserdiode der Klasse 3A oder 3B auf. Beachten Sie hierbei die nachfolgend aufgeführten Punkte.

VORSICHT

Laserstrahlung, wenn geöffnet. Nicht in den Laserstrahl schauen, nicht direkt mit optischen Instrumenten in den Laserstrahl blicken und den Strahlungsbereich meiden.

Informazioni relative al laser

Alcuni prodotti IBM Server sono forniti dalla casa produttrice con un dispositivo GBIC (Gigabit Interface Converter). I dispositivi GBIC sono venduti anche separatamente. Il dispositivo GBIC è un prodotto laser certificato negli U.S.A. in conformità ai requisiti del Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J per i prodotti laser di Classe 1. Negli altri paesi, il dispositivo GBIC è certificato in conformità ai requisiti della IEC (International Electrotechnical Commission) 825 e CENELEC EN 60 825 per i prodotti laser di Classe 1.

Quando si installa un dispositivo GBIC, prestare attenzione alle seguenti informazioni.

Attenzione

L'utilizzo di controlli e regolazioni o l'esecuzione di procedure diverse da quelle specificate potrebbe comportare rischi derivanti dall'esposizione a radiazioni pericolose.

La rimozione dei coperchi del dispositivo GBIC potrebbe comportare rischi derivanti dall'esposizione a radiazioni laser pericolose. All'interno del dispositivo GBIC non sono presenti componenti che richiedono manutenzione. **Non rimuovere i coperchi del dispositivo GBIC.**

Alcuni dispositivi GBIC contengono un diodo laser di Classe 3A o di Classe 3B. Prestare attenzione alle seguenti informazioni:

PERICOLO

Quando si apre un dispositivo GBIC, vengono emesse radiazioni laser. Non fissare il raggio laser nè osservarlo utilizzando strumenti ottici; evitare l'esposizione diretta al raggio.

레이저 사용 준칙

일부 IBM 서버 제품은 출고시부터 GBIC(기가비트 인터페이스 변환기)가 장착되어 있습니다.
또한 선택사양으로 GBIC를 별도로 판매하기도 합니다.
GBIC는 레이저 제품입니다.
미국 내에서 GIBC는 DHHS 21 CFR(Department of Health and Human Service 21 code of Federal Regulations) J장에 규정된 1등급 레이저에 관한 사항을 준수한다는 것을 승인받았습니다.
미국 외에서는 IEC(International Electrotechnical Commission) 825 및 CENELEC EN 60 825에 규정된 1등급 레이저에 관한 사항을 준수한다는 것을 승인받았습니다.

GBIC를 설치할 때 다음 사항에 주의하십시오.

주의: 본 사용 준칙에 명시된 것 이외의 제어 사용, 조정 또는 절차의 수행은 위험한 광선에 노출될 수 있습니다.

GBIC의 덮개를 제거하면 위험한 레이저 광선에 노출될 수 있습니다. GBIC 내부는 수리가 불가능합니다.

GBIC 덮개를 제거하지 마십시오.

일부 GBIC에는 3A 또는 3B 등급의 레이저 다이오드가 들어 있습니다. 다음 사항에 주의하십시오.

위험: 열면 레이저 광선이 나옵니다. 광선을 똑바로 보거나, 광학 도구를 이용하여 직접 보지 마십시오. 광선에 직접적으로 노출되지 않도록 하십시오.

Declaración de conformidad de láser

Algunos productos del IBM Server vienen equipados de fábrica con un GBIC (Convertidor de interfaz de Gigabit). Los GBIC se pueden adquirir por separado como opciones. El GBIC es un producto láser. El GBIC está certificado en los EE.UU conforme a los requisitos del Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subcapítulo J para productos láser de Clase 1. En los demás países, el GBIC tiene certificado de conformidad con los requisitos de la International Electrotechnical Commission (IEC) 825 y CENELEC EN 60 825 para productos láser de Clase 1.

Cuando un GBIC esté instalado, preste atención a la siguiente información:

Precaución

El uso de controles o ajustes, o la realización de procedimientos que no sean los aquí especificados, pueden producir una exposición peligrosa a las radiaciones.

Si extrae las cubiertas del GBIC, puede quedar expuesto a radiación láser perjudicial. Dentro del GBIC no existe ninguna pieza que requiera mantenimiento. **No retire las cubiertas del GBIC.**

Algunos GBIC contienen un diodo de láser incorporado de Clase 3A o de Clase 3B. Tenga en cuenta lo siguiente.

PELIGRO

Emisiones láser cuando está abierta. No mire fijamente el rayo, no lo examine con instrumentos ópticos y evite la exposición directa al rayo.

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Fibre Channel Storage Hub
IBM 2103 Model H07
Installation, Service, and
User's Guide

Publication No. SC26-7289-00

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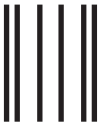

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