IBM Netfinity Fibre Channel   S10L-9845-00

Hardware Maintenance Manual

September 1998

**Use this manual with the
IBM Servers
Hardware Maintenance Manuals**

**We Want Your Comments!
(Please see page 72)**

This Manual Supports:

Fibre Channel HUB Type 3523
Fibre Channel Long-Wave GBIC
Fibre Channel Short-Wave GBIC
Fibre Channel PCI Adapter (FRU 01K7354)
Fibre Channel RAID Controller Type 3526

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First Edition (September 1998)

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About This Manual

This manual contains diagnostic and service information for the IBM Netfinity Fibre Channel products listed below:

- Fibre Channel HUB (Type 3523)
  - Fibre Channel Long-Wave GBIC
  - Fibre Channel Short-Wave GBIC
- Fibre Channel PCI Adapter
- Fibre Channel RAID Controller (Type 3526)

This manual should be used with the Hardware Maintenance Manual for the system you are servicing.

Important

This manual is intended for trained servicers who are familiar with IBM PC Server and IBM Netfinity Server products.

Important Safety Information

Be sure to read all caution and danger statements in this book before performing any of the instructions.

Leia todas as instruções de cuidado e perigo antes de executar qualquer operação.

注意和危险声明（简体中文）

重要事项：

本书中的所有注意和危险声明之前都有编号。该编号用于英语的注意或危险声明与 *Safety Information* 一书中可以找到的翻译版本的注意或危险声明进行交叉引用。

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例如，有一「危險」聲明以數字 1 開始，則該「危險」聲明的譯文將出現在「安全資訊」(Safety Information) 一書的「聲明」1 中。

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Prenez connaissance de toutes les consignes de type
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Danger avant de procéder aux opérations décrites par les
instructions.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine
Anweisung ausführen.

Accertarsi di leggere tutti gli avvisi di attenzione e di
pericolo prima di effettuare qualsiasi operazione.

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World Wide Web (WWW) to download Diagnostic, BIOS
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File download address is:

http://www.pc.ibm.com/us/files.html

The IBM BBS can be reached at (919) 517-0001.

IBM Online Addresses:

The HMM manuals online address is:

http://www.pc.ibm.com/us/cdt/hmm.html

The IBM Support Page is:

http:///www.pc.ibm.com/support/

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Related Publications

The following publications are available for IBM products. For more information, contact IBM or an IBM Authorized Dealer.

For Information About	See Publication
PC Servers	IBM PC Servers Hardware Maintenance Manual (S30H-2501)
PS/2 Computers	IBM Personal System/2 Hardware Maintenance Manual (S52G-9971)
PS/ValuePoint Computers	IBM PS/ValuePoint Hardware Maintenance Service and Reference (S61G-1423)
Laptop, Notebook, Portable, and ThinkPad Computers (L40, CL57, N45, N51, P70/P75, ThinkPad 300, 350, 500, 510, 710T, Expansion Unit, Dock I, Dock II)	IBM Mobile Systems Hardware Maintenance Manual Volume 1 (S82G-1501)
ThinkPad Computers (ThinkPad 340, 355, 360, 370, 700, 701, 720, 750, 755)	IBM Mobile Systems Hardware Maintenance Manual Volume 2 (S82G-1502)
ThinkPad Computers (ThinkPad 365, 760)	IBM Mobile Systems Hardware Maintenance Manual Volume 3 (S82G-1503)
Monitors (Displays) (February 1993)	IBM PS/2 Display HMM Volume 1 (SA38-0053)
Monitors (December 1993)	IBM Color Monitor HMM Volume 2 (S71G-4197)
IBM Monitors (P Series) (February 1996)	IBM Monitor HMM Volume 3 (S52H-3679)
IBM 2248 Monitor (February 1996)	IBM Monitor HMM Volume 4 (S52H-3739)
Disk Array technology overview and using the IBM RAID Configuration Program	Configuring Your Disk Array booklet (S82G-1506)
Installation Planning for Personal System/2 computers	Personal System/2 Installation Planning and Beyond (G41G-2927)
Installation Planning for Advanced Personal System/2 Servers	Advanced PS/2 Servers Planning and Selection Guide (GG24-3927)

Contents

IBM Netfinity Fibre Channel

Diagnostics and Test Information

> **Important**
>
> These service procedures are designed to help you
> isolate problems. They are written with the
> assumption that you have model-specific training on
> all computers, or that you are familiar with the
> computers, functions, terminology, and service-related
> information provided in this manual and the
> appropriate IBM Netfinity Server Hardware
> Maintenance Manual.

Start with the General Checkout in this HMM to assist you
in diagnosing the IBM Netfinity Fibre Channel products
listed within this manual.

For Error Codes/Error Messages, refer to the
Symptom-to-FRU Index of the server that the Fibre
Channel Hub, Adapter, or RAID Controller is connected to.

Type 3523 Fibre Channel Hub and GBIC

General Checkout

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 an operational GBIC is installed. 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

> **Note**
>
> Do **Not** look directly into any fiber cable or GBIC optical output. Read "Safety Information" on page 51. To view an optical signal, use a mirror to view the reflected light.

Verifying Signal Presence: In addition to verifying port LED status, you can verify signal presence by using a mirror to look for a reflected 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.
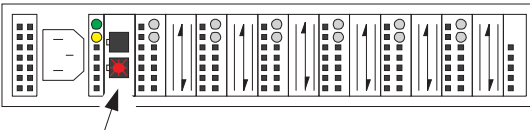
Verifying Node End: To verify the integrity of the fiber optic cable at the node end of a link, make sure the cable is attached to the GBIC at the hub and the hub is turned on. Dual SC fiber-optic cable connectors are keyed and will insert into a GBIC in one direction only. Place a mirror at the node 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.

Connector Keys
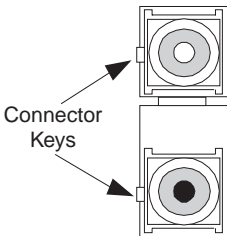
If a fiber-optic cable has good transmitter output but a broken or degraded receiver lead, the end node might sense a *loop down* state. Because the transmitter is good, the hub responds to the end node valid Fibre Channel signal and adds the device to the loop. But, because the end node is not receiving 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.

Verifying Hub End: 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 enabled on the loop. Using a mirror, examine the cable SC leads to verify that a low-intensity red light is visible on the receiver lead.

Note

Some fiber optic cables are marked with an "A" on the receiver lead and a "B" on the transmitter lead and are keyed. 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.

Features

The Fibre Channel Hub is designed with seven modular user configurable interface ports. These seven ports comply with the GigaBit Interface Converter (GBIC) Specification. GBICs are available in two media types:

- Long-Wave optical
- Short-Wave optical

This section covers both the Fibre Channel Hub and the GBICs.

The following list summarizes the features of the Fibre Channel Hub:

- Seven configurable media-interface optical ports providing high performance.
- 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 V ac and 50 to 60 Hz.

Description

The IBM Fibre Channel Hub is a 7-port central interconnection for Fibre Channel Arbitrated Loops that follow the ANSI FC-AL standard. Each Fibre Channel Hub port 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 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 Hub supports any combination of short-wave or long-wave optical GBICs. The GBICs are *hot-pluggable* into the Fibre

Channel Hub, which means you can add host computers, servers, and storage modules to the arbitrated loop dynamically without powering off the Fibre Channel Hub or any connected devices. If you remove a GBIC from a Fibre Channel 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 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 Hub is implemented in serial differential Positive Emitter Coupled Logic (PECL) AC coupled logic. Each Fibre Channel Hub port monitors the serial data input stream as well as the GBIC connected to it.

The following conditions will cause the Fibre Channel 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 Hub circuitry detects off-frequency data, excessive jitter, or inadequate edge transition density on a per-port basis. The Fibre Channel 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 Hub includes a universal power supply that can operate from 95 to 250 V ac and from 50 to 60 Hz.

Fibre Channel Long-Wave GBIC

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

Fibre Channel Short-Wave GBIC

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

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 Hub is a central point of interconnection designed to maintain a fault-tolerant physical loop topology. The Fibre Channel 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).

Additional Service Information

Applications and Configurations

The Fibre Channel Hub modular interface provides
flexibility and is upgradable to available short-wave and
long-wave optical Fibre Channel product port interfaces.
Fibre Channel products that are commonly interconnected
to the Fibre Channel Hub are Fibre Channel host bus
adapters, FC-AL storage devices, and FC-AL storage
arrays. SCSI 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 SCSI initiators are the SCSI targets. Initiators
and targets represent individual nodes that are linked by
the shared FC-AL.
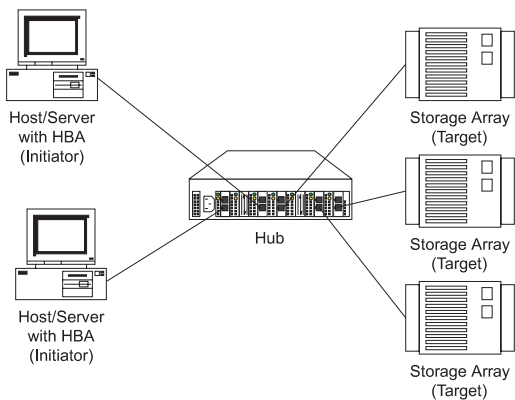
Power On Systems Check - Fibre Channel Hub

Power-on the storage modules first, then the controller and
the Fibre Channel Hub, then everything else.

- **Note**

  Make sure the Fibre Channel Hub is powered on
  before the host adapter to insure proper loop
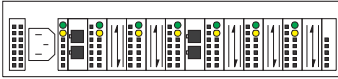 initialization.

To insure proper operation:

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

Power Connector
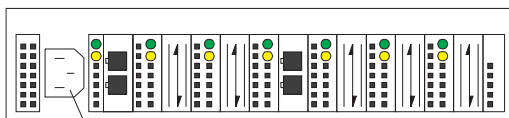
2. Power-on the attached FC-AL compatible nodes.

Type 3523 Fibre Channel Hub and GBIC **9**

3. Check the Device Active (green) LEDs on the Fibre Channel Hub ports.

Active On
Green LEDs on Top Row

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 Hub ports in which GBICs are not installed.

> **Note**
>
> FC-AL compatible nodes must perform loop initialization procedures at power-on 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.

Bypass
Amber LEDs on Bottom Row

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
                Hub port and device are fully
                operational and actively participating in
                the FC-AL.

5. The FC-AL should be fully operational. 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.

Locations

This section contains the following:

- "Fibre Channel Hub Rack Installation."
- "Installing the GBIC" on page 14.
- "Removing the GBIC" on page 15.

Fibre Channel Hub Rack Installation

The Fibre Channel Hub comes with a tray and bezel for installation in a rack.

> **Note**
>
> Also use this procedure to assist in removing the Fibre Channel Hub from a rack shelf.

To install the Fibre Channel Hub in the rack:

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 Philips head screw driver, install the four smaller screws in the aligned holes.
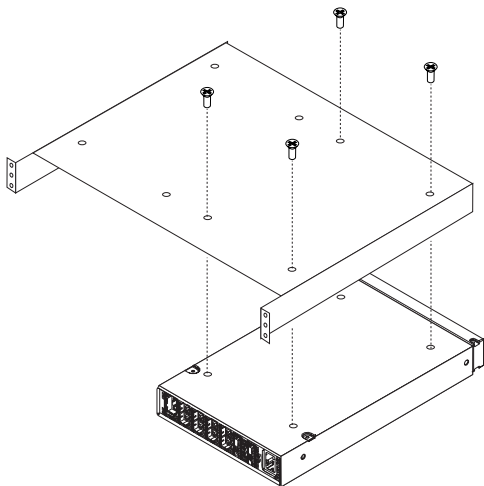
5. Turn the tray over so that the hub is on top of the tray.

6. Find the rack position into which you are installing the Fibre Channel 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 the rack has square holes, snap the M6 clip nuts into place on the rear of the rack.

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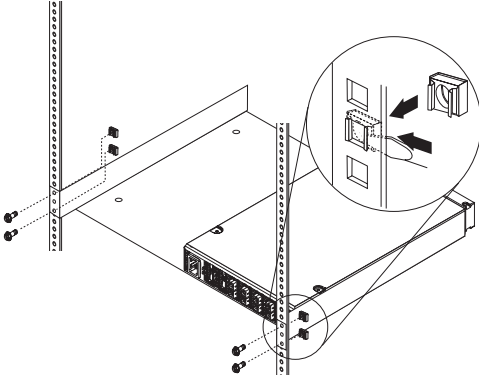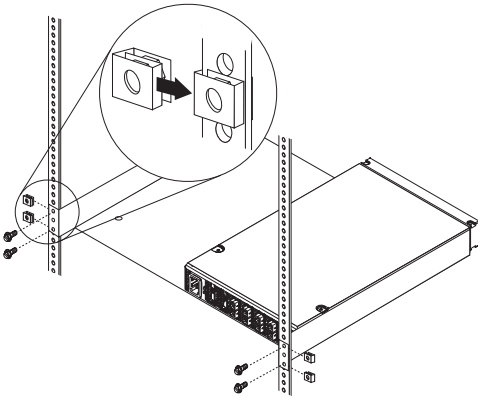

7. Pick up the tray and line up the top and bottom screw holes with the clip nuts on the rack. While holding the tray in place, install four of the larger screws.

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

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

8. Install the remaining four nut clips in the front of the rack. Be sure to line them up opposite the hub and tray.

9. Line up the top and bottom bezel screw holes with the clip nuts on the rack. While holding the bezel in place, install four of the larger screws.
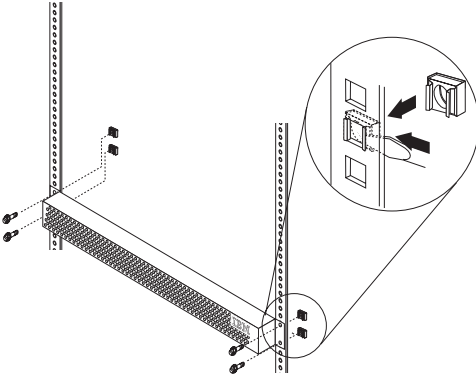
If the rack has round holes, use the 10-32 clip nuts and hex washer headed screws.

Installing the GBIC

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

1. Remove the plastic cover **1** from the GBIC **2** .
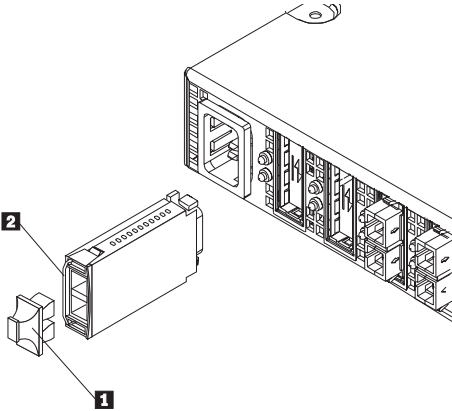
2. Insert the cables into the GBIC.

   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.
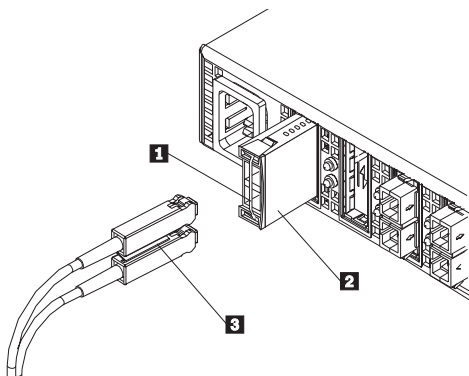
For cable management information, go to **http://www.pc.ibm.com/support/** on the World Wide Web.

Removing the GBIC

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

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: (Refer to the artwork shown in "Installing the GBIC" on page 14.)

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.

Symptom-to-FRU Index

This index supports Type 3523 Fibre Channel Hub and GBICs.

The Sympton-to-FRU lists symptoms, error, and the possible causes. The most likely cause is listed first.

> **Note**
>
> Always start with the "General Checkout" on page 3. For IBM devices not supported by this index, refer to the manual for that device.

> **Note**
>
> Do **Not** look directly into any fiber cable or GBIC optical output. Read "Safety Information" on page 51. To view an optical signal, use a mirror to view the reflected light.

Problem	FRU/Action
GBIC installed in one or more ports but no LED is lit.	1. **Power cord** 2. Power source
GBIC installed but only the amber LED is lit.	1. **Reseat GBIC** 2. GBIC
GBIC installed and both green and amber LEDs are lit.	**The hub is not receiving a valid Fibre Channel signal from the end node.** 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: a. Restart the device. b. Reinstall the device drivers. c. Check the HBA or disk controller. 3. If a light is present on both the cable lead and the end node, check the HBA or the disk controller.

Problem	FRU/Action
GBIC is installed, only the green LED is lit, but no communications occurs between the devices.	**The hub is receiving a valid Fibre Channel signal from the end device, but no upper-level protocols are active.**
	1. 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.
	2. 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.

Parts Listing (Type 3523 Fibre Channel Hub & GBIC)
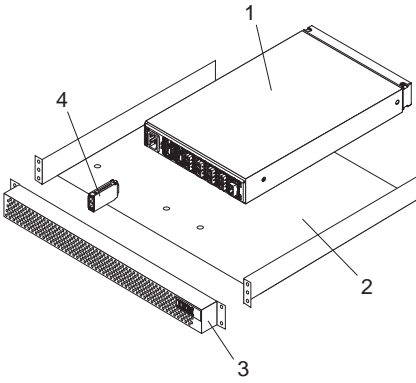
Type 3523 Fibre Channel Hub & GBIC

Index	Fibre Channel Hub (Type 3523)	FRU
1	Port Fiber Hub Assembly	01K6738
2	HUB Tray Assembly	10L7042
3	HUB Tray Bezel	10L7041
4	Short-Wave GBIC	03K9206
	Long-Wave GBIC (option)	03K9208
	Misc. Hardware Kit	01K6739

Fibre Channel Adapter (FRU 01K7354)

General Checkout

There are three basic types of problems that can cause the adapter to function incorrectly:

- Hardware problems
- System configuration problems
- Fibre Channel problems

Hardware Problems

The following is an itemized list to help you determine if a problem is caused by the hardware:

- Are all of the adapters installed securely in the computer?
- Are all of the cables connected securely to the correct connectors? Be sure that the SC connectors that attach from the J1 connector on the adapter to the device are connected correctly.
- Is the adapter installed correctly in the expansion slot? Is it seated firmly in the slot?
- Are all peripheral devices properly powered on? See "Scan Fibre Channel Devices" on page 26 for information about displaying attached devices.

System Configuration Problems

To find out if a problem was caused by system configuration, check the system board to make sure it is configured properly (see "Installation Procedures" on page 28).

Fibre Channel Problems

To verify if a problem is caused by the Fibre Channel, determine if all of the FC devices were powered on before you powered on the server.

Features

Fibre Channel adapter features include:

- Compliance with Fibre Channel Physical and Signaling Interface - 3 (PC-PH-3), revision 9.2
- Compliance with Fibre Channel Arbitrated Loop (FC-AL), revision 4.5
- Compliance with Intel® PCI version 2.1 specification
- Compliance with U.S. and international safety and emissions standards
- Support for bus master DMA
- Fast!UTIL basic input/output system (BIOS) utility program to customize the configuration parameters on

the Netfinity Fibre Channel PCI Adapter and attached drives

Mixed peripheral support includes:

- Simultaneous mixed-peripheral configurations and startable device support for FC devices that meet the following standards:
- FC-PLDA, revision 1.10, 17 February 1997
- FC-FLA, revision 2.1, 12 July 1997

Additional Service Information

Fast!UTIL

The adapter can be configured using Fast!UTIL. Access Fast!UTIL by pressing ALT + Q during the adapter BIOS initialization (it might take a few seconds for the Fast!UTIL menu to appear). If there are more than one Netfinity Fibre Channel PCI Adapter, Fast!UTIL asks you to select the adapter you want to configure. After changing the settings, Fast!UTIL restarts the system to load the new parameters.

- **Note**

If the configuration settings are incorrect, the Netfinity Fibre Channel PCI Adapter will not function properly.

Each host adapter has a unique serial number. Write down the serial number of the Netfinity Fibre Channel PCI Adapter in the event that the nonvolatile random access memory (NVRAM) is damaged (see "Scan Fibre Channel Devices" on page 26). If the NVRAM is damaged, you will be prompted for the PCI adapter serial number.

Fast!UTIL Options: The following section describes the Fast!UTIL options.

Configuration Settings: The first selection on the Fast!UTIL Options menu is Configuration Settings. These settings configure the FC devices and the PCI adapter to which they are attached.

Host Adapter Settings: From the Configuration Settings menu in Fast!UTIL, select Host Adapter Settings. The current default settings for the host adapter are listed in following table and described in the following paragraphs.

- **Note**

The host adapter settings and default values will vary based on the version of BIOS code installed for the adapter.

Setting	Options	Default
Host adapter BIOS	Enabled or Disabled	Disabled
Enable LUNs	Yes or No	Yes
Execution throttle	1, 4, 8, 16, 32, 64, 128, 255	255
Drivers load RISC code	Enabled or Disabled	Enabled
Frame size	512, 1024, 2048	2048
IOCB allocation	1–512 buffers	256 buffers
Loop reset delay	0–15 seconds	5 seconds
Extended error logging	Enabled or Disabled	Disabled
Port down retry count	0–255	0

- **Host adapter BIOS:** When this setting is disabled, the ROM BIOS on the Netfinity Fibre Channel PCI Adapter is disabled, freeing space in upper memory. The default is Disabled.
- **Enable LUNs:** When this setting is yes, multiple logical unit numbers (LUNs) are supported. When this setting is no, multiple LUNs are not supported. LUN support is typically required for CD-ROM changers or redundant array of independent disks (RAID) boxes that use LUNs to map drives. The default is Yes.
- **Execution throttle:** This setting specifies the maximum number of commands executing on any one port. When a port's execution throttle is reached, no new commands are executed until the current command finishes executing. The valid options for this setting are: 1, 4, 8, 16, 32, 64, 128, and 255. The default is 255.
- **Drivers load RISC code:** When this setting is enabled, the host adapter uses the RISC firmware that is embedded in the device driver. When this setting is disabled, the device driver loads the latest version of RISC firmware found on the system. The default is Enabled.

> **Note**
>
> In order for the embedded device driver software
> to be loaded, the driver being loaded must
> support this setting. If the driver does not
> support this setting, the result is the same as if
> the setting were disabled, regardless of the
> setting. Leaving this option enabled guaranties a
> certified combination of software driver and RISC
> firmware.

- **Frame size:** This setting specifies the maximum
  frame length supported by the Netfinity Fibre Channel
  PCI Adapter. The default size is 2048.
- **IOCB allocation:** This setting specifies the maximum
  number of buffers from the firmware buffer pool that
  are allocated to any one port. The default is 256
  buffers.
- **Loop reset delay:** After resetting the loops, the
  firmware refrains from initiating any loop activity for
  the number of seconds specified in this setting. The
  default is 5 seconds.
- **Extended error logging:** This setting provides
  additional error and debug information to the
  operating system. The default is Disabled.
- **Port down retry count:** This setting specifies the
  number of times the software retries a command to a
  port returning port down status. The default is 0
  retries.

Selectable Boot Settings: The Selectable Boot
Settings option is accessed from the Configuration Settings
menu. If you enable this option, you can select the node
name from which you want to start up (boot). Once
enabled, this option forces the system to start up from the
selected FC drive, ignoring any IDE drives attached to the
system. If you disable this option, the system looks for an
IDE drive from which to start. If an IDE drive is not found,
the system looks for the first startable FC drive. When this
setting is disabled, the boot ID and boot LUN parameters
have no effect.

> **Note**
>
> This option applies only to disk devices; it does not
> apply to CD-ROMs, tape drives, and other nondisk
> devices.

Adapter Hard ID Settings: The Adapter Hard ID
Settings option from the Configuration Settings menu
forces the Netfinity Fibre Channel PCI Adapter to use the
selected hard ID (0–125).

Restore Default Settings The Restore Defaults option from the Configuration Settings menu restores the PCI adapter default settings.

Raw NVRAM Data: This option displays the adapter nonvolatile random access memory (NVRAM) contents in hexadecimal format. Data cannot be modified.

Scan Fibre Channel Devices: This option scans the FC loop and lists all the connected devices by loop ID. Information about each device is listed, for example, vendor name, product name, and revision. This information is useful when configuring the Netfinity Fibre Channel PCI Adapter and attached devices.

Fibre Channel Disk Utility: This option scans the FC loop bus and lists all the connected devices by loop ID. You can select a disk device and perform a low-level format or verify the disk media.

> **Note**
>
> Performing a low-level format destroys all data on the disk.

Specifications

The Netfinity Fibre Channel PCI Adapter operating environment and specification information are as follows:

Environment	Minimum	Maximum
Operating temperature	0°C (32°F)	55°C (131°F)
Storage temperature	-20°C (-4°F)	70°C (158°F)
Relative humidity (noncondensing)	10%	90%
Storage humidity (noncondensing)	5%	95%

Type	Specification
Host bus	Conforms to PCI Local Bus Specification, revision 2.1
PCI signaling environment	3.3 V and 5.0 V buses supported
PCI transfer rate	264 MB per second maximum burst rate for 33 MHz operation (ISP2100 chip)

| Type	Specification
Fibre Channel specifications	Bus type: fibre optic media (QLA2100F) Bus transfer rate: 100 MB per second maximum
Central processing unit (CPU)	Single chip design that includes a RISC processor, Fibre Channel protocol manager, PCI DMA controller, and 1-gigabit transceivers
Host data transfer	64-bit, bus master DMA data transfers to 264 MB per second
RAM	128KB of SRAM
BIOS ROM	128KB of flash ROM in two 64KB, software selectable banks. The flash is field programmable.
NVRAM	256 bytes, field programmable
Onboard DMA	Three independent DMA channels: two data and one command. Integrated 4KB frame buffer FIFO for each data channel
Connectors (external)	SC-style connector that supports non-OFC, multimode fibre optic cabling using 1 x 9 fibre optic transceiver module. Total cable length cannot exceed 500 meters.
Form factor	17.78 cm x 10.67 cm (7.0 in. x 4.2 in.)
Operating power	Less than 15 watts

Locations

This section contains the following:

- "Adapter Layouts."

Adapter Layouts

The following figure identifies the adapter components referenced throughout this chapter.
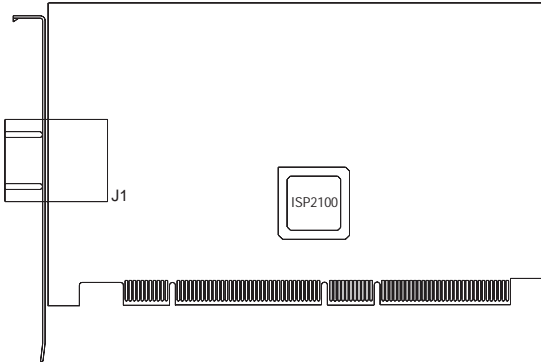
Installation Procedures

--- **Note** ---

To avoid damage to the fiber 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.

Follow these steps to install the Netfinity Fibre Channel PCI Adapter. Also refer to these steps for removal and replacement.

1. Check the system board and make any configuration changes necessary to accommodate the Netfinity Fibre Channel PCI Adapter if the system requires it.
2. Power-off the peripheral devices, then the computer.
3. Disconnect the power cords.
4. Remove the computer cover, saving the screws.
5. The adapter can be installed in any PCI bus slot that supports 32 or 64-bit adapters.

6. Line up the adapter with the expansion slot. Carefully press the adapter into the slot until it seats firmly.
7. Secure the adapter in place.
8. Connect one end of the fiber cable from the devices to the **J1** connector on the adapter.
9. Carefully reinstall the computer cover and secure it.
10. Connect the power cables.
11. Power-on all external FC devices; then, power-on the PC and observe the monitor. The BIOS lists all FC devices attached to the PCI adapter,

```
QLogic Corporation
QLA21xx PCI Fibre Channel ROM BIOS Version X.XX
Copyright (C) QLogic Corporation 1998 All rights
reserved.

Press <Alt-Q> for Fast!UTIL

ISP2100 Firmware Version X.XX
QLogic adapter using IRQ number X
```

Device Number	Device Type	Adapter Number	Loop ID	Loop LUN	Vendor ID	Product ID	Product Revision
81	Disk	0	0	0	SEAGATE	ST32550	7394

> **Note**
>
> If there is not a hard-disk drive attached to the computer, a read-only memory basic input/output system (ROM BIOS) NOT INSTALLED message displays after the device listing.

All installed devices should be listed on the monitor.

See the *Netfinity Fibre Channel PCI Adapter Software Installation Guide* for detailed instructions on how to install the device drivers.

If the information displayed is not correct and you have checked the adapter configuration, go to "General Checkout" on page 21.

Type 3526 Fibre Channel RAID Controller

General Checkout

Use the status LEDs, Symptom-to-FRU list, and the connected server HMM to diagnose problems.

Using the Status LEDs

The LEDs of the control unit indicate the hardware status:

- Green LED indicate normal operation
- Amber LED indicates a hardware problem

The LEDs on the controller unit indicate the status of the controller unit and its individual components. The green LEDs indicate a normal operating status; amber LEDs indicate a hardware fault. Check all of the LEDs on the front and back of the controller unit when it is powered on.

Notes

- If power was just applied to the controller unit, the green and amber LEDs might turn on and off intermittently. Wait until the controller unit finishes powering up before you begin checking for faults.
- To view the controller Customer Replaceable Unit (CRU) LEDs, the front cover must be removed from the controller unit. See "Front Cover Removal" on page 38.

Also use LEDs on the front cover, controller CRUs, and drive units (if applicable) to determine if the controllers and drives are responding to I/O transmissions from the host.

The list below describes LED activities:

- If a Fast Write Cache operation or other I/O activity is in progress to the controller unit (or attached drive units), you might see several green LEDs blinking, including: the Fast Write Cache LED (on the front cover), controller CRU status LEDs, or applicable drive activity LEDs.
- The green Heartbeat LEDs on the controller CRUs blink continuously. The number and pattern of green status LEDs lit on the controllers depend on how the system is configured. An active controller will not have the same status LEDs lit as a passive controller. See "Controller CRU and Battery LEDs" on page 41.

Features

The following list summarizes the features of the Type
3526 Fibre Channel RAID Controller:

- Redundant fail-over
- Hot Swap components
- 128 MB cache per controller CRU as shipped
- Supports up to six Netfinity EXP 15 Expansion Units
- Supports Ethernet, Fiber, and Serial communications
  to each controller CRU.

Additional Service information

Powering on the Controller

> **Note**
>
> All drive modules must be powered on before you power-on the Controller.

The controller might take from three to 10 seconds to power-up. During this time, the amber and green LEDs on the controller unit will flash.

After power-on, check all fault LEDs to make sure they are off. If a fault LED is on, refer to the "Symptom-to-FRU Index" on page 47.

Recovering from a Power Supply Shutdown

Both power supplies have a built-in temperature sensor designed to prevent the power supplies from overheating. If a temperature sensor detects an over-temperature condition, ambient air temperature of 70° C (158° F) or above, the "overheated" power supply will automatically shut down. The other power supply remains on as long as its temperature remains below 70° C (158° F). If not, the second power supply will shut down, which turns off all power to the controller unit.

Once the air temperature cools to below 70° C (158° F), the power supplies automatically restart. An automatic restart resets the controllers, attempts to spin up the drives (which has no effect on the drives if they are already running), and returns the controller unit to a normal operating state. Typically, you will not need to perform recovery procedures after an automatic power supply shutdown and restart.

After a power supply shutdown, check all controller LEDs.

If the power supply power LED is off, or the amber power supply LED on the front cover is on, go to "Symptom-to-FRU Index" on page 47.

Connectors and Host IDs

The host ID switches and connectors for interface cables are on the connector plate located on the back of the controller unit.

Host and Drive ID Numbers

Each controller must have a unique Fibre Host ID number. The host ID numbers assigned to each controller are based on two elements:

- Host ID numbers set through hardware switches on the controller unit. There are five Host ID switches

that allow you to set ID numbers 0 through 127 for each controller. The factory default settings are ID #5 for Controller A and ID #4 for controller B.

- Software algorithms that calculate the actual Fibre Channel address, based on the controller unit's hardware settings and position on the loop or hub.

Note

This is the preferred ID that will be assigned on the Fibre Channel loop unless it is already being used. If the ID is already in use, a soft ID will be assigned.
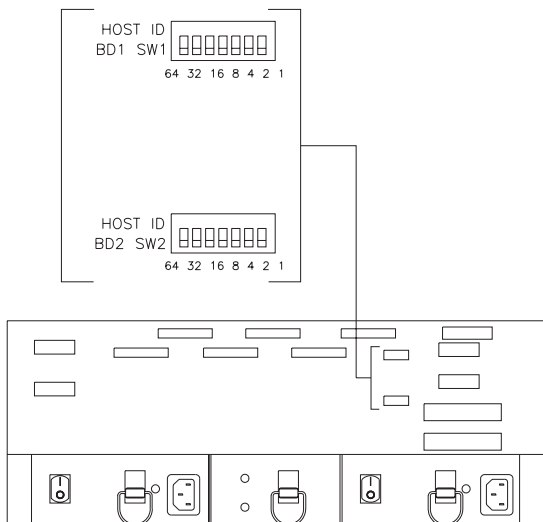
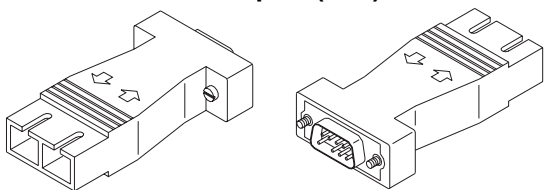## Fibre Channel Host Cable Requirements

For the Type 3526 Fibre Channel RAID Controller, you must use multi-mode, 50 micrometer fiber optic cable and a Media Interface Adapter (MIA).

Cable	Media Type	Data Size	Transfer Speed	Range
Fiber optic (multi-mode, 50 micrometer)	Short-wave laser	100 MB/sec	1062.5 Mbaud	up to 500 m

Media Interface Adapter (MIA)

LVD-SCSI Drive Cable Requirements

To connect the controller unit to a drive module, you must use 68-pin, VHDCI (very high density cable interface) LVD, Ultra 2 SCSI cables. The controller unit has six drive connectors that support 16-bit interface protocols. Each connector represents a single drive channel that supports up to 10 drives per channel for a total of 60 drives. Refer to "LVD-SCSI Drive Cable Routing Examples" on page 72 for examples of connecting the controller unit to one or more LVD-SCSI drive modules.

Specifications

Size

- With front panel:
  - Depth: 610 mm (24 in.)
  - Height: 174 mm (6.8 in.)
  - Width: 482 mm (19 in.)

Weight

- Controller unit maximum weight: 34.5 kg (76 lb)
- Controller unit empty: 14.3 kg (31.6 lb)
- Battery: 9.7 kg (21.4 lb)

Electrical Input

- Sign-wave input (50 to 60 Hz)
  - Low range:
    Minimum: 90 V ac
    Maximum: 127 V ac
  - High range:
    Minimum: 198 V ac
    Maximum: 257 V ac
- Input Kilovolt-amperes (kVA) approximately:
  - Minimum configuration:
    0.06 kVA
  - Maximum configuration:
    0.39 kVA

Environment

- Air temperature:
  - hub on:
    10° to 35° C
    (50° to 95° F)
    Altitude: 0 to 914 m (3000 ft.)
  - hub on:
    10° to 32° C
    (50° to 90° F)
    Altitude: 914 m (3000 ft.) to 2133 m (7000 ft.)
- Humidity:
  - 8% to 80%

Heat Output

- Approximate heat output in British Thermal Units
  (BTU) per hour:
  - Maximum configuration: 731.8 BTU (214 watts)

Acoustical Noise Emissions Values
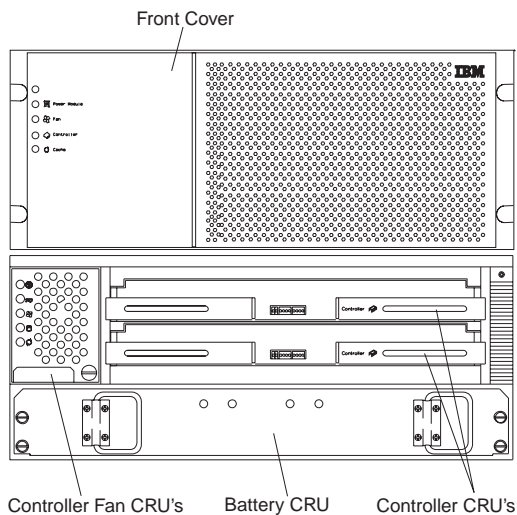
- Sound Power (idling and operating):
  - 6.4 bels
- Sound Pressure (idling and operating):
  - 50 dBA

Locations

This section contains the following:

Controller Unit Front View

Front Cover

Controller Fan CRU's   Battery CRU   Controller CRU's

Controller Unit Back View

Connector Plate

Power Supply CRUs   Power Supply CRU

Power Supply Fan CRU
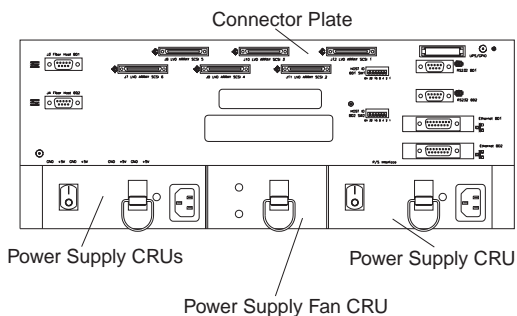
Air Flow
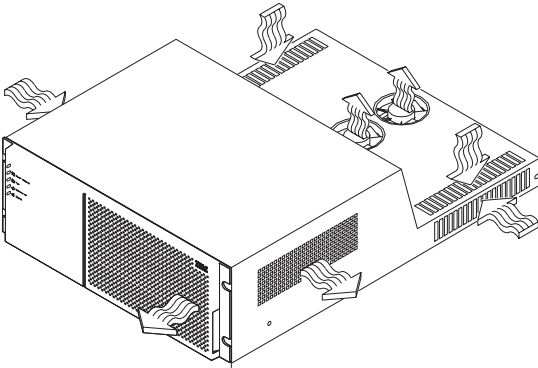
The controller unit must have proper air circulation throughout the chassis. To boost air circulation, the chassis has air vents along its top and sides. These vents serve as air intake and exhaust passages. Assure that vents are clean and free of obstruction.

Front Cover Removal
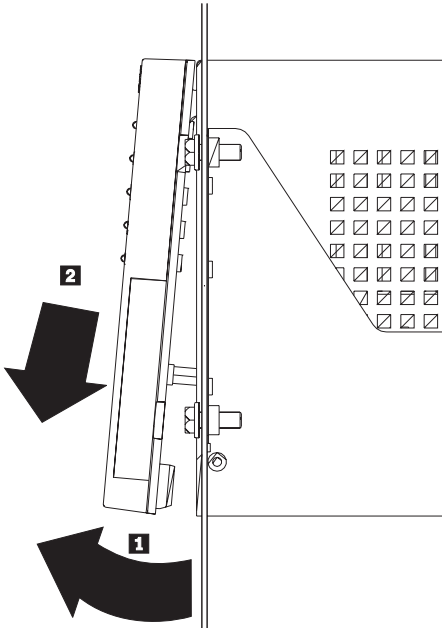
Removing the Front Cover:

1. Pull out on the bottom to release pins, then slide cover down.

2. To replace front cover, slide top edge of cover under lip of chassis, then push bottom of cover until pins snap into mounting holes.

Front LEDs

- Power
- Power Supply
- Fan
- Controller
- Fast Write Cache

Rear LEDs

Power   Power   Power

Fault
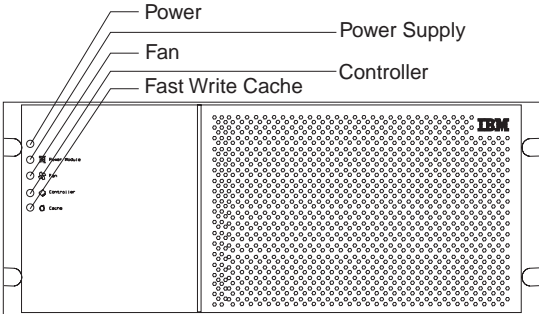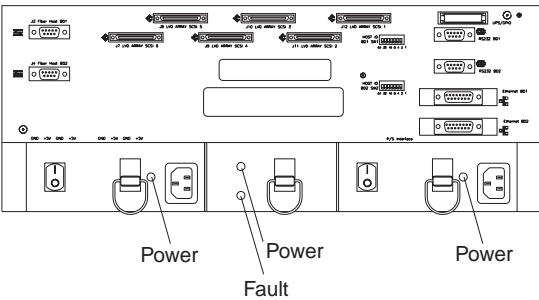
Controller CRU Removal
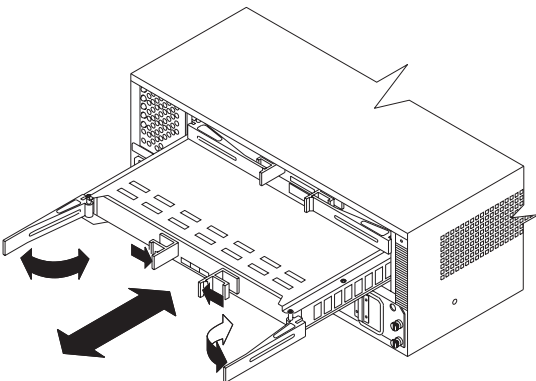
> **Note**
>
> Keep track of which controller CRU belongs in each slot. To prevent data loss, you must replace each controller (A or B) in their original slot.

Removing a Controller CRU:

1. Unlock the levers of the controller you want to remove.
2. Open both levers **at the same time**.
3. Pull out the controller.

Installing a Controller CRU:

1. Make sure both levers are straight out as shown above.
2. Carefully push the Controller CRU into the slot making sure both levers swing inward **at the same time**.
3. Close and lock both levers at the same time.

Controller CRU and Battery LEDs

Power
Fault
Status
Heartbeat

Controller LEDs

Battery LEDs

Fault-B
Full Charge-B

Fault-A
Full Charge-A

Latches

Controller Slot A
Controller Slot B

Handle

Controller CRU

Fault
Amber LED indicates
Power supply fault
Normal Status: Off
Problem Status: On

Power
Green LED indicates
Power is on
Normal Status: On
Problem Status: Off

Heartbeat (first status LED)
Green LED indicates controller
is working
Normal Status: On (blinking)
Problem Status: On

Status (8 LEDs including
Heartbeat)
Green LED indicates individual
status errors
Normal Status: On
Problem Status: Off

Controller Reset

Controller LEDs

Type 3526 Fibre Channel RAID Controller   **41**

Controller CRU Fan Removal
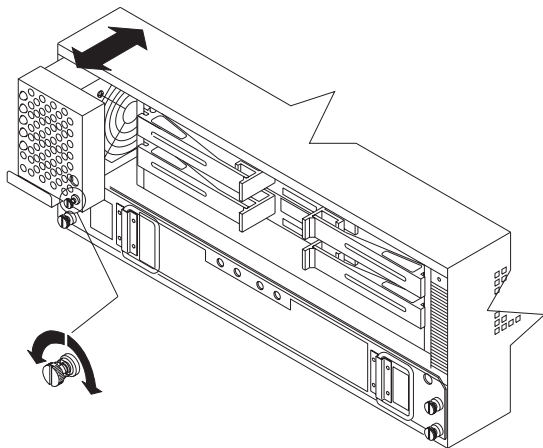
Removing the Controller CRU Fan:

1. Loosen captive screw.
2. Pull firmly on handle to remove CRU

Installing the Controller CRU Fan:

1. Push Controller CRU Fan firmly into slot and tighten the captive screw.

Interface Connections

Connect MIAs here

Connect LVD-SCSI drive cables here

Serial Ports

Connect Ethernet cables here
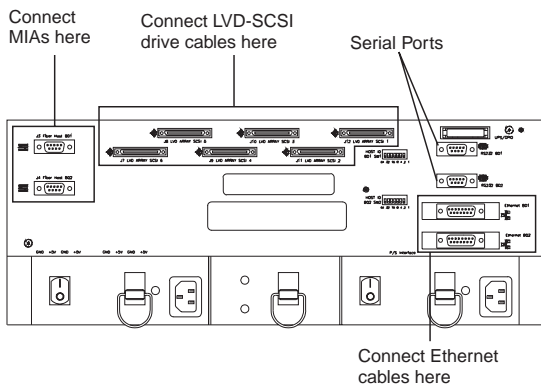
Power Supply Removal
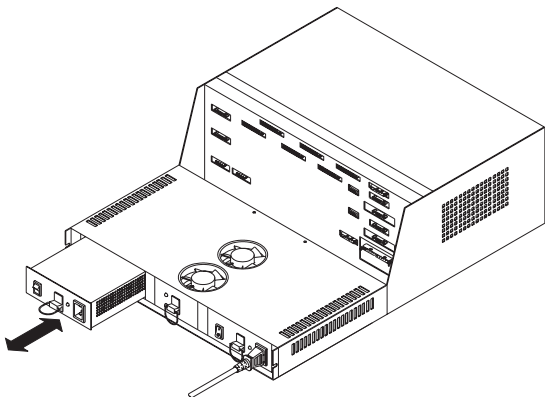
Removing the power supply CRU:

1. Power-off the power supply CRU.
2. Disconnect the power cord from the power supply CRU.
3. Pull the pull ring lever up to unlatch the CRU.
4. Pull the CRU out of the controller unit.

Installing the power supply CRU:

1. Install the new power supply CRU into the controller unit.
2. The lever will snap down when the CRU is seated properly in the chassis. If the lever remains up, push on the power supply CRU until the lever snaps into place.
3. Connect the power cord, power-on the controller unit and check all LEDs.

Power Supply Fan Removal
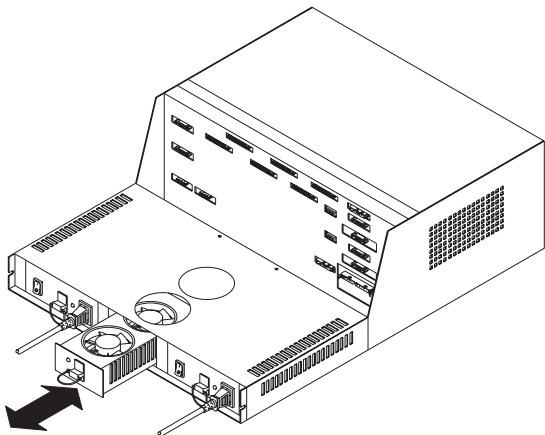
Removing the power supply fan:

1. Pull the pull ring lever up to unlatch the CRU.
2. Pull the CRU out of the controller unit.

Installing the power supply fan:

1. Install the new power supply fan CRU into the controller unit.
2. The lever will snap down when the CRU is seated properly in the chassis. If the lever remains up, push on the power supply fan CRU until the lever snaps into place.

Battery Replacement
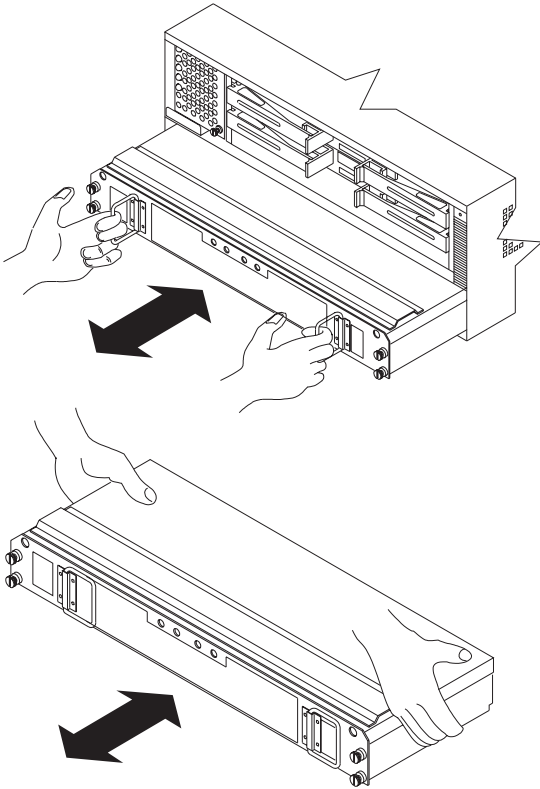
Removing the Battery CRU:

Unpack the battery CRU. Save the shipping material for transporting the used battery CRU. Find the "Battery Support Information" label on the front of the new battery CRU.

1. Record today's date on the blank line next to "Date of Installation".
2. Remove the front cover of the controller unit.

> **Important**
>
> The battery CRU weighs approximately 24 lb. Make sure you are prepared to support its weight when you remove it from the chassis.

3. Turn the captive screws on the battery CRU counterclockwise. If they are too tight, use a flat blade screwdriver to loosen the screws.
4. Pull battery CRU out about 2-inches.
5. Grasp the battery sides with **both hands** and slide out.

Installing the Battery CRU:

1. Slide the battery CRU into the slot and tighten all captive screws.
2. Replace the front cover.
3. Allow the system to run for at least 24 hours in order to properly charge the batteries.

When properly charged, both Full Charge LEDs will be lit on the front of the battery CRU.

> **Important**
>
> Dispose of the used battery CRU according to local and federal regulations, which may include hazardous material handling procedures.

> **Important**
>
> If the used battery CRU is leaking electrolyte gel, DO NOT ship it to a recycling center. Handle damaged batteries according to your local regulations, which may include procedures for handling batteries as hazardous waste.

Rack Installation
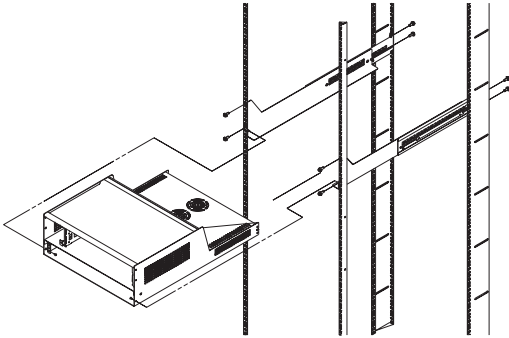
Note

Before removing or placing the controller unit in the rack, carefully remove the battery from the controller unit. See "Battery Replacement" on page 44.

1. Loosen the adjustment screws on both side rails and adjust to fit the rack.
2. Secure the side rails to the rack cabinet using eight M6 screws and eight rack mounting nuts. Make sure both side rails are parallel and level to one another in the rack cabinet.
3. Tighten the rail adjustment screws.
4. Once the side rails are secured to the rack, carefully slide the controller unit onto the side rails.
5. Secure the controller unit with two screws on the front sides of the battery compartment.

Symptom-to-FRU Index

This index supports Type 3526 Fibre Channel RAID Controller.

The Sympton-to-FRU lists symptoms and the possible causes. The most likely cause is listed first.

— **Note** —

Always start with the "General Checkout" on page 31. For IBM devices not supported by this index, refer to the manual for that device.

— **Note** —

Do **Not** look directly into any fiber cable or GBIC optical output. Read "Safety Information" on page 51. To view an optical signal, use a mirror to view the reflected light.

Problem	FRU/Action
Controller LED (front cover) is on.	1. **Reseat Controller CRU** 2. Controller CRU
Software issued a controller error message.	1. **Check Controller Fan** 2. Controller CRU
Software errors occur when attempting to access controllers or drives.	1. **Check appropriate software and documentation to make sure the system is set up correctly and the proper command was executed** 2. Power to the Controller 3. Interface cables 4. ID settings 5. Controller 6. Drive 7. Controller backpanel
Fan LED (front cover) is on.	1. **Power supply fan CRU** 2. Controller fan CRU
Controller and Fan fault LEDs (front cover) are on.	1. **Check both Fan and Controller CRUs for fault LED and replace faulty CRU**
Fault-A or Fault-B LED (battery CRU) is on.	1. **Battery CRU**

Problem	FRU/Action
Full Charge-A or Full Charge-B LED (battery CRU) is off.	1. **Power-on Controller and allow batteries to charge for 24 hours until the Full Charge LEDs are on.** 2. Battery CRU 3. Both power supplies
No power to controller (all power LEDs off)	1. **Check power switches and power cords** 2. Power supplies
Power Supply LED is off.	1. **Check and reseat power supply** 2. Check for overheating. Wait ten minutes for the power supply CRU to cool down. See "Recovering from a Power Supply Shutdown" on page 33. 3. Power supply CRU
Power Supply CRUs LED are on, but all other CRU LEDs are off.	1. **DC power harness**

Parts Listing (Type 3526 Fiber Channel RAID Controller)
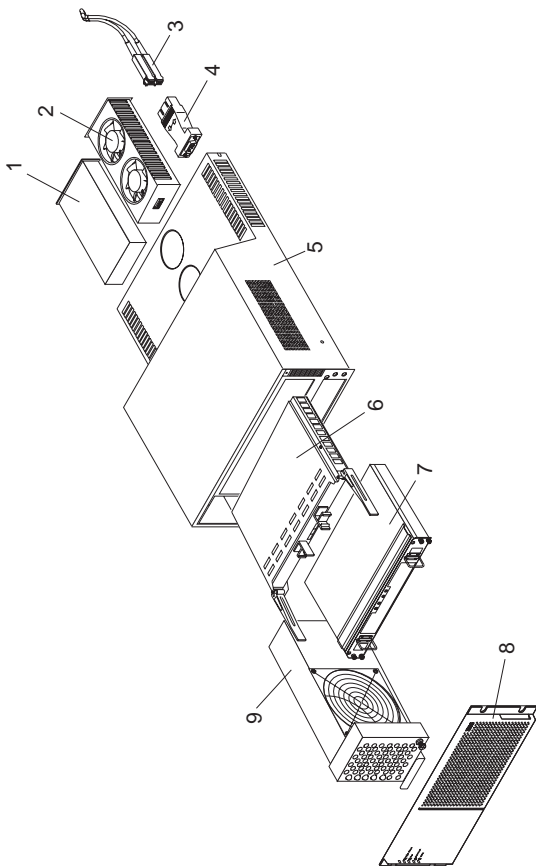
Index	Fibre Channel RAID Controller (Type 3526)	FRU
1	350-Watt Power Supply	01K6743
2	Rear Fan Assembly (Power Supply Fan)	01K6741
3	Optical Cable - 5 Meters (option)	03K9202
3	Optical Cable - 25 Meters (option)	03K9204
4	Media Interface Adapter (MIA)	03K9280
5	Frame Assembly with Midplane	10L6981
6	Controller Assembly with 32 MB memory/128 MB cache	10L6993
7	Battery Backup Assembly	01K6742
8	Bezel Assembly	10L7043
9	Front Fan Assembly (Controller CRU Fan)	01K6740
	128 MB cache module	10L5862
	Battery Cable	03K9285
	Fan Cable	03K9281
	Power Cable	03K9284
	Miscellaneous Hardware Kit	01K6739
	Rail Kit	10L6982

Related Service Information

Safety Information

The following section contains the safety information that you need to know before servicing the IBM Netfinity 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.

percaución:
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.

PELIGRO

> **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

　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：開啟時會產生雷射輻射。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 장착
되어 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.**

- Statement 1

DANGER

> **To avoid a shock hazard, do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
>
> **To avoid shock hazard:**
>
> - **The power cord must be connected to a properly wired and earthed receptacle.**
> - **Any equipment to which this product will be attached must also be connected to properly wired receptacles.**
>
> **When possible, use one hand to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.**
>
> **Electrical current from power, telephone, and communications cables is hazardous. To avoid shock hazard, connect and disconnect cables as described following when installing, moving, or opening covers of this product or attached devices.**

To Connect	To Disconnect
1. Turn Everything OFF.	1. Turn Everything OFF.
2. First, attach all cables to devices.	2. First, remove power cord(s) from outlet.
3. Attach signal cables to receptacles.	3. Remove signal cables from receptacles.
4. Attach power cord(s) to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

NOTE: In the UK, by law, the telephone cable must be connected after the power cord.	NOTE: In the UK, the power cord must be disconnected after the telephone cable.

- Instrução 1

PERIGO

> **Para evitar choques elétricos, não conecte ou desconecte nenhum cabo, nem efetue instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.**
>
> **Para evitar choques elétricos:**
>
> – **O cabo de alimentação deve ser conectado a um receptáculo corretamente instalado e aterrado.**
>
> – **Todos os equipamentos aos quais este produto será conectado devem também ser conectados a receptáculos corretamente instalados.**
>
> **Quando possível, utilize uma das mãos para conectar ou desconectar cabos de sinal, para evitar um possível choque ao tocar duas superfícies com potenciais elétricos diferentes.**
>
> **A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicação é perigosa. Para evitar choques elétricos, conecte e desconecte os cabos conforme descrito a seguir, ao instalar, movimentar ou abrir tampas deste produto ou de dispositivos conectados.**

Para Conectar	**Para Desconectar**
1. DESLIGUE tudo.	1. DESLIGUE tudo.
2. Conecte primeiro todos os cabos nos dispositivos.	2. Remova primeiro o(s) cabo(s) de alimentação das tomadas.
3. Conecte os cabos de sinal nos receptáculos.	3. Remova os cabos de sinal dos receptáculos.
4. Conecte o(s) cabo(s) de alimentação nas tomadas.	4. Remova todos os cabos dos dispositivos.
5. LIGUE o dispositivo.	

声明 1

危险！

为避免电击危险，请不要在暴风雨期间连接或断开任何电缆，
或是进行此产品的安装、维护或重新配置操作。

为避免电击危险：

– 电源线必须连接到适当的电线及接地插座。

– 此产品将要连接的所有设备也必须连接到正确接线的插座上。

如果可能，请使用一只手连接或断开连接信号电缆，以避免在
接触两个具有不同电势的表面时遭到电击。

电源线、电话线以及通信电缆中的电流非常危险。为避免电击，
请在安装、移动或打开本产品或连接设备的外盖时，按照下述
步骤连接或断开电缆。

要连接电缆	要断开电缆
1.关闭所有设备。	1.关闭所有设备。
2.首先将所有电缆与设备连接。	2.首先从电源插座拔下电源线。
3.将信号线连接到插座。	3.从插座拔下信号电缆。
4.将电源线连接到电源插座。	4.从设备上拔下所有电缆。
5.打开设备。	

• 聲明 1

危險

為了避免雷擊，在閃電期間，請勿連接或拔掉本裝置上的任
何電纜線，或請勿安裝、維修或重新架構本產品。

為了避免雷擊：

- 電源線必須連接到接線及接地正確的插座。
- 本產品所連接的設備也必須連接到接線正確的插座。

儘可能使用單手來連接或拔掉信號電纜，以避免因接觸兩不
同電位的平面，而受到電擊。

電源、電話及通信電纜上均有電流流通。為了避免電擊，在
安裝、移動本產品，或開啟本產品的蓋子或與本產品連接之
裝置的蓋子時，請依照下列「連接」及「拔掉」電纜線的步
驟操作。

連接	拔掉
1. 關掉所有開關。	1. 關掉所有開關。
2. 首先，將所有電纜線連接到裝置。	2. 首先，自電源插座拔掉電源線。
3. 將信號電纜連接到信號插座。	3. 拔掉信號插座上的所有信號電纜。
4. 將電源線連接到電源插座。	4. 拔掉裝置上的所有電纜線。
5. 開啟裝置電源。	

• Notice n¢ 1

PERIGO

> **Pour éviter tout risque de choc électrique, ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.**
>
> **Pour éviter tout risque de choc électrique :**
>
> – **Les cordons d'alimentation du présent produit et de tous les appareils qui lui sont connectés doivent être branchés sur des socles de prise de courant correctement câblés et mis à la terre.**
>
> **Afin d'éviter tout risque de choc électrique provenant d'une différence de potentiel de terre, n'utilisez qu'une main, lorsque cela est possible, pour connecter ou déconnecter les cordons d'interface.**
>
> **Le courant électrique passant dans les câbles de communication, ou les cordons téléphoniques et d'alimentation peut être dangereux. Pour éviter tout risque de choc électrique, lorsque vous installez ou que vous déplacez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.**

Connexion	**Déconnexion**
1. Mettez les unités hors tension.	1. Mettez les unités hors tension.
2. Commencez par brancher tous les cordons sur les unités.	2. Commencez pas débrancher les cordons alimentation des socles de prise de courant.
3. Branchez les câbles d'interface sur les prises.	3. Débranchez les câbles d'interface des prises.
4. Branchez les cordons d'alimentation sur un socle de prise de courant.	4. Débranchez tous les câbles des unités.
5. Mettez les unités sous tension.	

- Hinweis 1

VORSICHT

Aus Sicherheitsgründen bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.

Aus Sicherheitsgründen:

– **Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.**

– **Alle angeschlossenen Geräte ebenfalls an Schutzkontaktsteckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.**

Signalkabel möglichst einhändig anschließen oder lösen, um einen Stromschlag durch Berühren von Oberflächen mit unterschiedlichem elektrischem Potential zu vermeiden.

Elektrische Spannungen von Netz-, Telefon- und Datenübertragungsleitungen sind gefährlich. Um einen Stromschlag zu vermeiden, nur nach den Anweisungen arbeiten, die für Installation, Transport oder Öffnen von Gehäusen dieses Produkts oder angeschlossenen Einheiten gelten.

Kabel anschließen	**Kabel lösen**
1. Alle Geräte ausschalten und Netzstecker ziehen.	1. Alle Geräte ausschalten.
2. Zuerst alle Kabel an Einheiten anschließen.	2. Zuerst Netzstecker von Steckdose lösen.
3. Signalkabel an Anschlußbuchsen anschließen.	3. Signalkabel von Anschlußbuchsen lösen.
4. Netzstecker an Steckdose anschließen.	4. Alle Kabel von Einheiten lösen.
5. Gerät einschalten.	

- Avviso 1

PERICOLO

> **Per evitare il pericolo di scosse elettriche durante i temporali, non collegare o scollegare cavi, non effettuare l'installazione, la manutenzione o la riconfigurazione di questo prodotto.**
>
> **Per evitare il pericolo di scosse elettriche:**
>
> – **collegare il cavo di alimentazione ad una presa elettrica correttamente cablata e munita di terra di sicurezza;**
>
> – **collegare qualsiasi apparecchiatura collegata a questo prodotto ad una presa elettrica correttamente cablata e munita di terra di sicurezza.**
>
> **Quando possibile, collegare o scollegare i cavi di segnale con una sola mano per evitare il rischio di scosse derivanti dal contatto con due superfici a diverso potenziale elettrico.**
>
> **La corrente elettrica circolante nei cavi di alimentazione, del telefono e di segnale è pericolosa. Per evitare scosse elettriche, collegare e scollegare i cavi come descritto quando si effettuano l'installazione, la rimozione o l'apertura dei coperchi di questo prodotto o durante il collegamento delle unità.**

Per collegare	**Per scollegare**
1. SPEGNERE tutti i dispositivi.	1. SPEGNERE tutti i dispositivi.
2. Collegare prima tutti i cavi alle unità.	2. Rimuovere prima il(i) cavo(i) di alimentazione dalla presa elettrica.
3. Collegare i cavi di segnale alle prese.	3. Rimuovere i cavi di segnale dalle prese.
4. Collegare il(i) cavo(i) di alimentazione alla presa elettrica.	4. Rimuovere tutti i cavi dalle unità.
5. ACCENDERE le unità.	

⚠️
위험

전기 충격을 피하려면 날씨가 나쁠 때(예: 눈 또는 비가 오거나 천둥 번개가 칠
때)는 케이블을 연결하거나 끊지 않도록 하고 이 제품의 설치, 유지보수 또는 재구
성 등의 작업을 수행하지 않도록 하십시오.

전기 충격을 피하려면 다음과 같아야 합니다.

– 고압선은 적절한 배선 및 접지 상태의 콘센트로 연결되어야 합니다.

– 이 제품이 접속될 모든 장비도 적절한 배선 상태의 콘센트로 연결되어야 합니다.

다른 전위를 가진 두 표면을 만졌을 때 발생할 수 있는 전기 충격을 피하려면 한 손
으로 신호선을 연결하거나 끊으십시오.

전원, 전화 및 통신 케이블로부터 흘러 나오는 전류는 위험합니다. 전기 충격을 피
하려면 이 제품이나 접속 장치를 설치, 이동 및 덮개를 열 때 다음 설명에 따라 케
이블을 연결하고 끊도록 하십시오.

연결하려면	연결해제하려면
1. 모든 스위치를 켠다.	1. 모든 스위치를 끈다.
2. 먼저 모든 케이블을 장치에 연결한다.	2. 먼저 모든 케이블을 장치에 제거한다.
3. 신호선을 콘센트에 연결한다.	3. 신호선을 콘센트에서 제거한다.
4. 전원을 콘센트에 연결한다.	4. 장치에서 모든 케이블을 제거한다.
5. 장치 스위치를 켠다.	

• Declaración 1

⚠️

PELIGRO

> **Para evitar una posible descarga eléctrica, no conecte ni desconecte los cables ni lleve a cabo ninguna operación de instalación, de mantenimiento o de reconfiguración de este producto durante una tormenta eléctrica.**
>
> **Para evitar una posible descarga:**
>
> – **El cable de alimentación debe conectarse a un receptáculo con una instalación eléctrica correcta y con toma de tierra.**
>
> – **Los aparatos a los que se conecte este producto también deben estar conectados a receptáculos con la debida instalación eléctrica.**
>
> **Cuando sea posible, utilice una sola mano para conectar o desconectar los cables de señal a fin de evitar una posible descarga al tocar dos superficies con distinto potencial eléctrico.**
>
> **La corriente eléctrica de los cables de comunicaciones, teléfono y alimentación puede resultar peligrosa. Para evitar una posible descarga, siga las indicaciones de conexión y desconexión de los cables siempre que tenga que instalar, mover o abrir las cubiertas de este producto o de los dispositivos acoplados.**

Instrucciones de conexión

1. Apague todos los componentes (OFF).
2. En primer lugar, conecte todos los cables a los dispositivos.
3. Conecte los cables de señal a los receptáculos.
4. Conecte los cables de alimentación a las tomas.
5. Encienda el dispositivo (ON).

Instrucciones de desconexión

1. Encienda todos los componentes (ON).
2. En primer lugar, retire los cables de alimentación de las tomas.
3. Retire los cables de señal de los receptáculos.
4. Retire todos los cables de los dispositivos.

Safety Inspection Guide:

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power-off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. Disconnect the power cord.
3. Check the power cord for:
   a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
   b. The power cord should be the appropriate type as specified in the parts listings.
   c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling Electrostatic Discharge-Sensitive Devices:

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

  Note

  The use of a grounding system is desirable but not required to protect against ESD damage.

  – Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
  – Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
  – Use the round ground-prong of the AC plug on AC-operated computers.

Grounding Requirements:

Electrical grounding of the PC Server Rack and computers is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Problem Determination Tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Processor or hard disk upgrades
- Failure symptom
  - Do diagnostics fail?
  - What, when, where, single, or multiple systems?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - If it has been working, what changes were made prior to it failing?
  - Is this the original reported failure?
- Reference/Diagnostics Diskette Version
  - Type and version level
- Hardware configuration
  - Print (print screen) configuration currently in use
  - BIOS level
- Operating system software
  - Type and version level

Important

To eliminate confusion, identical systems are considered *identical* only if they:

1. Are the exact machine type and models
2. Have the same BIOS level
3. Have the same adapters/attachments in the same locations
4. Have the same address jumpers/terminators/cabling
5. Have the same software versions and levels
6. Have the same Reference/Diagnostics Diskette (version)
7. Have the same configuration options set in the system
8. Have the same setup for the operation system control files

Comparing the configuration and software set-up between "working and non-working" systems will often lead to problem resolution.

Phone Numbers, U.S. and Canada

> **Note**
>
> EMEA customers should contact their Dealer or IBM Service organization.

Before you place a call to the Support Center, refer to "Problem Determination Tips" on page 68.

Authorized Dealers or Servicers

Number	Information
919-517-0001	Bulletin Board Service - PC Company
800-528-7705	Bulletin Board Service - TSS Only
800-937-3737	IBM Business Partner Education
800-426-2472	IBM Customer Engineer Technical Support
800-IBM-DEAL	IBM Dealer Support Center
800-342-6672	IBM Direct Desktop Software Sales
303-924-4015	IBM Part Number ID and Look Up
800-426-7763	IBM PC HelpCenter
800-237-5511	IBM Software Defect Support (CSDs)
800-327-5711	IBM Software Ordering (Publications)
800-426-1484	IBM Supplies Technical Hotline
800-388-7080	IBM Warranty Parts Claims Center

U.S. Customers and Helpware Subscribers

Number	Information
919-517-0001	Bulletin Board Service - PC Company
800-426-8322	Customer Education Business Unit
800-999-0052	Customized Operational Services
800-237-4824	EduQuest (Educational Computers)
800-964-8523	End User HelpDesk Support
800-742-2493	IBM Anti-Virus Services
800-447-4700	IBM Authorized Dealer Referrals
800-426-2468	IBM Dealer Referral
800-426-3333	IBM Information Referral Service
800-IBM-SERV	IBM Service
800-772-2227	IBM PC HelpCenter and HelpDesk
800-426-7282	IBM Technical Manuals
800-426-9402 (Ext. 150)	Multimedia Information Center
800-241-1620	Multimedia HelpCenter
800-342-6672	OS/2 Information Line
800-237-5511	OS/2 Support Services
800-284-5933	Prodigy
914-962-0310	Prodigy User Questions
800-547-1283	Technical Coordinator Program SystemXtra for Personal Systems LAN Automated Distribution/2 OS/2 Bulletin Board OS/2 Application Assistance Center
800-551-2832	Technical Solutions Magazine

IBM Canada Customer and Servicer Support

Number	Information
800-661-PSMT	Business Partner Marketing Support
905-316-5556	Business Partner Marketing Support - Toronto
514-938-6048	Business Partner Marketing Support - French
800-465-6600	Customer Relations
905-316-6666	Customer Relations - Toronto
800-465-6666	Customer Service Dispatch
800-263-2769	Customer Service Parts
800-465-2222	Customer Support Center (ISC)
416-443-5701	Customer Service Repair Centre
800-465-7999	HelpClub Registration
800-465-7999	IBM Direct
905-513-3367	IBM Certification Administrator
905-316-2683	IBM Certification Coordinator Mail to: 50 Acadia Drive Markham, Ontario L3R 0B3
800-465-3299	IBM HelpFax
905-316-3299	IBM HelpFax - Toronto
800-565-3344	IBM HelpPC
800-268-3100	IBM Information Network Support
800-268-3100	IBM Information Network Support - Toronto
800-387-8343	IBM PC Service Partners
800-663-7662	Lexmark Product Information
800-263-2769	Parts Orders, Exchange or Emergency
416-443-5808 (Fax)	Parts Regular Orders, Exchange
416-443-5755	Parts Orders, Inquiries
514-938-3022	PC Co Bulletin Board - Montreal
905-316-4255	PC Co Bulletin Board - Toronto
604-664-6464	PC Co Bulletin Board - Vancouver
204-934-2735	PC Co Bulletin Board - Winnepeg
800-661-7768	PS Marketing Support (PSMT)
800-465-1234	Publications Ordering
905-316-4148	Service Management Support
905-316-4100 (Fax)	Service Management Support
905-316-4150	Service Manager
905-316-4100 (Fax)	Service Manager
905-316-4872	Service Quality Programs
905-316-4100 (Fax)	Service Quality Programs
800-661-2131	Skill Dynamics (Education)
800-565-3344	PS/1 Warranty Customer Helpline
800-387-8483	PS/1 Warranty Service (DOAs)
416-443-5835 (Fax)	Warranty Claim Fulfillment
905-316-2445	Warranty Claim Reimbursement
905-316-3515 (Fax)	Warranty Claim Reimbursement
416-443-5778	Warranty Claim Parts Inquiry
800-505-1855	Warranty Provider Support Hotline
800-267-7472	Warranty Service, ThinkPad

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Name _____

Phone Number _____

1. Do you like this manual?

   _____ Yes   _____ No

2. What would you like to see added, changed, or deleted in this manual?

3. What is your service experience level?

   _____ Less than five years

   _____ More than five years

4. Which computers do you service most?

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Part Number: 10L9845

Printed in U.S.A.