



System i and System p  
Managing adapters and devices







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**Note**

Before using this information and the product it supports, read the information in “Notices” on page 157 and the *IBM Systems Safety Information* manual, G229-9054.

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## Safety and environmental notices

Safety notices may be printed throughout this guide:

- **DANGER** notices call attention to a situation that is potentially lethal or extremely hazardous to people.
- **CAUTION** notices call attention to a situation that is potentially hazardous to people because of some existing condition.
- **Attention** notices call attention to the possibility of damage to a program, device, system, or data.

### World Trade safety information

Several countries require the safety information contained in product publications to be presented in their national languages. If this requirement applies to your country, a safety information booklet is included in the publications package shipped with the product. The booklet contains the safety information in your national language with references to the U.S. English source. Before using a U.S. English publication to install, operate, or service this product, you must first become familiar with the related safety information in the booklet. You should also refer to the booklet any time you do not clearly understand any safety information in the U.S. English publications.

### Laser safety information

IBM® System i® models and System p® servers can use I/O cards or features that are fiber-optic based and that utilize lasers or LEDs.

#### Laser compliance

All lasers are certified in the U.S. to conform to the requirements of DHHS 21 CFR Subchapter J for class 1 laser products. Outside the U.S., they are certified to be in compliance with IEC 60825 as a class 1 laser product. Consult the label on each part for laser certification numbers and approval information.

#### CAUTION:

**This product might contain one or more of the following devices: CD-ROM drive, DVD-ROM drive, DVD-RAM drive, or laser module, which are Class 1 laser products. Note the following information:**

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of the controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

(C026)

#### CAUTION:

**Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. (C027)**

#### CAUTION:

**This product contains a Class 1M laser. Do not view directly with optical instruments. (C028)**

#### CAUTION:

**Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information: laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)**

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

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

The equipment is suitable for installation in the following:

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

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

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

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

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

### Product recycling and disposal

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

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In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

## Battery return program

This product may contain sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to <http://www.ibm.com/ibm/environment/products/batteryrecycle.shtml> or contact your local waste disposal facility.

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

For Taiwan: Please recycle batteries.



For the European Union:



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

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

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, contact your local IBM representative.

For California: Perchlorate Material - special handling may apply. See [www.dtsc.ca.gov/hazardouswaste/perchlorate](http://www.dtsc.ca.gov/hazardouswaste/perchlorate).

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

### **IBM Cryptographic Coprocessor Card Return Program**

The following information applies only for systems originally sold prior to July 1, 2006:

This machine may contain an optional feature, the cryptographic coprocessor card, which includes a polyurethane material that contains mercury. Please follow local ordinances or regulations for disposal of this card. IBM has established a return program for certain IBM Cryptographic Coprocessor Cards. More information can be found at <http://www.ibm.com/ibm/environment/products/prp.shtml>.

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## About this publication

This topic contains reference information that describes the specifications, system requirements and maintenance of select adapters and devices. Features described include specified PCI adapters, host-channel adapters, removable media devices, and communications devices.

For information about the accessibility features of this product, for users who have a physical disability, see "Accessibility features," on page 155.



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## Managing adapters and devices

Learn about the features, requirements, and installation notes for adapters and devices.

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### PDF file for Managing adapters and devices

You can view and print a PDF file of the Managing adapters and devices topic.

To view or download the PDF version of this document, select Managing adapters and devices  (about 2100 KB).

The following subsection of Managing Devices is included in the Managing adapters and devices PDF, and it is also available as an individual PDF. If you only need information about this particular device, the individual PDF is the best choice.


Type 5714 and 5713, 1 Gigabit iSCSI TOE PCI-X Adapter (FC 5714, FC 5713) (about 700 KB)

### Saving PDF files

To save a PDF on your workstation for viewing or printing:

1. Right-click the PDF link in your browser.
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3. Navigate to the directory in which you want to save the PDF.
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## Managing PCI adapters

Learn about using and managing Peripheral Component Interconnect (PCI) adapters. Find specifications and instructions for specific adapters.

### PCI adapter use and operations

Learn about different types of PCI slots, connectivity versus performance, slot restrictions, and adapter labels.

#### Note:

- See the PCI adapters topic in Removing and Replacing parts for information about placement, installation and removal of PCI adapters.
- In some systems, you can install PCI adapters with the power on. These adapters are referred to as *hot-pluggable* PCI adapters.  
See the PCI adapters topic in Removing and Replacing parts to determine if your system unit supports the hot-plugging of adapters.
- Do not hot-plug any PCI adapter supporting the system's boot device or system console, with the following exception: in i5/OS® you can use Concurrent Maintenance (hot-plug) on the LS adapter (boot device adapter).

Select the appropriate information from this list:

- “PCI slots”
- “Secondary PCI bus”
- “Multiple primary PCI buses”
- “Hot-pluggable PCI slots” on page 3
- “Integrated adapters” on page 3
- “32-bit versus 64-bit PCI slots” on page 3
- “33 MHz versus 50/66 MHz 64-Bit PCI slots” on page 4
- “Connectivity versus performance” on page 4
- “Slot restrictions” on page 4
- “Adapter labels” on page 5

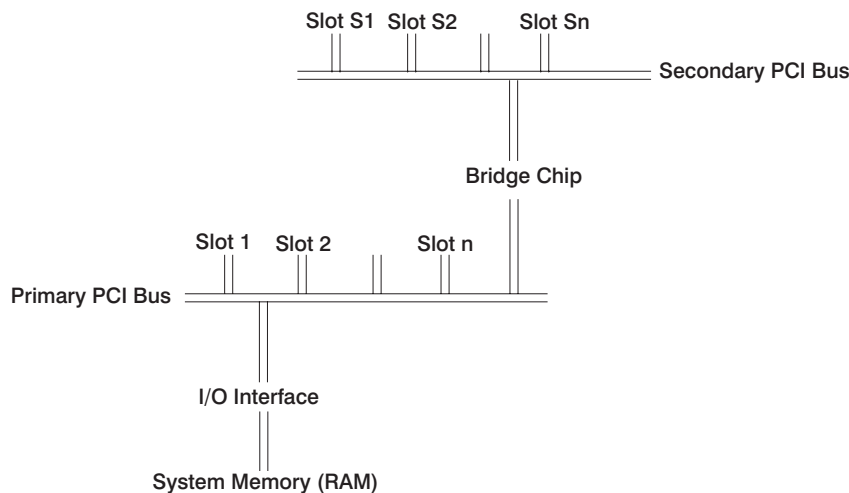
## PCI slots

Each PCI bus has a limit on the number of adapters it can support. Typically, this limit can range from two adapters to six adapters for each bus. To overcome this limit, the system design can implement multiple PCI buses. You can use either of the following methods to add PCI buses to your system:

- Adding secondary PCI buses from the primary PCI bus
- Implementing multiple primary buses

## Secondary PCI bus

To increase the number of PCI slots when designing a system, add a secondary PCI bus. A PCI-to-PCI bridge chip can connect a secondary bus to a primary bus. The following illustration shows how to use a primary PCI bus to increase the total number of PCI slots.



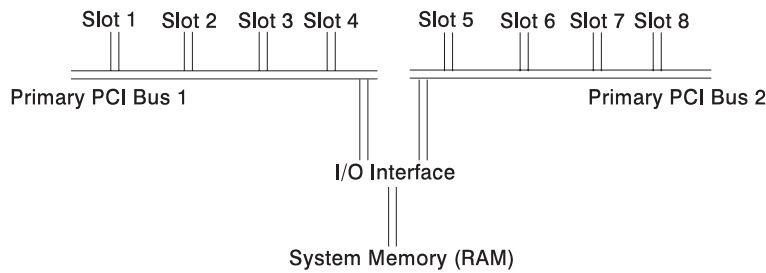
Because the slots on the secondary PCI bus must pass through the bridge chip, certain adapters on a secondary PCI bus might experience lower performance.

Some systems implement a secondary PCI bus. On these systems, place higher-speed adapters on the primary bus to optimize performance.

## Multiple primary PCI buses

Another way to add more PCI slots, design the system with two or more primary PCI buses. This design requires a more complex I/O interface with the system memory. The following illustration shows another

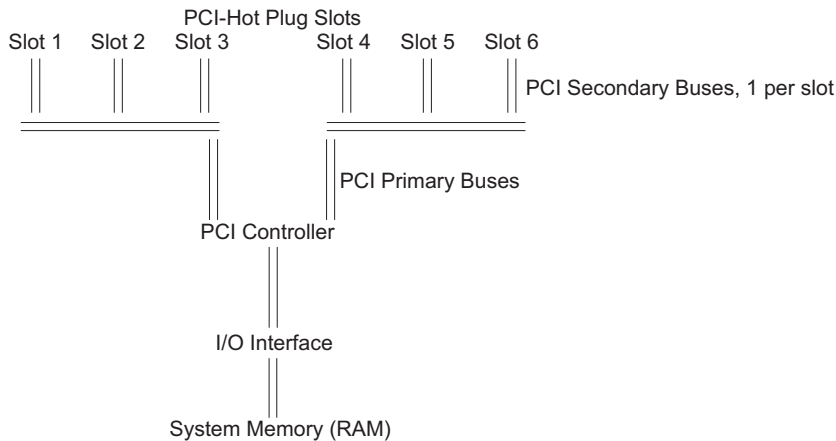
method of increasing the number of PCI slots.



This design can improve I/O performance over the secondary bus method because the I/O interface has created multiple parallel paths into the system memory.

### Hot-pluggable PCI slots

If your system contains hot-plug enabled PCI slots. These systems dedicate a PCI bus to each PCI slot, which allows the adapter to be removed or added without affecting other adapters. This architecture uses one or more PCI primary buses that are bridged to multiple PCI secondary buses. Each PCI secondary bus has a single PCI slot.



### Integrated adapters

The main processor board integrates a number of devices, but they physically connect to one of the PCI buses. For this reason, some of the buses might have only two or three slots available to install adapters. Integrated PCI adapters include SCSI adapters and Ethernet adapters.

### 32-bit versus 64-bit PCI slots

Choosing between 32-bit and 64-bit slots influences slot placement and affects performance. Higher-speed adapters use 64-bit slots because they can transfer 64 bits of data for each data-transfer phase.

The 32-bit adapters can typically function in 64-bit PCI slots. However, 32-bit adapters still operate in 32-bit mode and offer no performance advantage in a 64-bit slot. Likewise, most 64-bit adapters can operate in 32-bit PCI slots, but the 64-bit adapter operates in 32-bit mode and reduces performance potential.

## 33 MHz versus 50/66 MHz 64-Bit PCI slots

Some systems offer 50 MHz capability on 64-bit slots. Adapters capable of functioning at 50 MHz might take advantage of this available operating speed. If you plug a 33 MHz adapter into a 50 MHz 64-bit slot, the slot switches to 33 MHz and also switches the remaining slots on this PCI bus to 33 MHz. For systems with hot-plug PCI slots, adapters are not affected by the clock rate of other adapters because each adapter has its own PCI bus.

## Connectivity versus performance

You must consider some performance implications when configuring your system. Installing the maximum number of adapters might affect system performance.

Connectivity limits define how many specified adapters can be physically plugged into a system. This limit defines how many adapters the software and hardware can support. Connectivity limits define the maximum number of adapters for connecting to networks or disks. In many cases, a disk or network has a low duty cycle and the system needs additional adapters to retain the physical connection to all resources. In these cases, follow the connectivity limits.

This information also provides suggested performance limits, established to determine how many concurrently running adapters can provide good performance. As you add adapters (with each adapter performing at close to its rated speed), additional adapters continue to provide an incremental performance increase. After the system reaches its performance limit, adding more adapters does not provide an increase in I/O throughput.

Bus speed, memory speed, adapter design, or processor speed can influence performance. The system processor's speed can often limit how many adapters of a given type the system can support while maintaining maximum performance. After a system uses 90 percent of its system processor, adding more adapters only provides a minor throughput increase.

Because of the wide variety of workloads, this information provides performance-limit guidelines only. The guidelines are based on I/O streaming of large reads or writes to a disk or network. They are not based on small I/Os, which are more transaction-rate limited. Small I/O workloads probably use more system processor capacity and result in fewer supported adapters for maximum performance.

These guidelines are based on the maximum number of processors supported for multiprocessor systems. If your system runs fewer than the maximum number of processors supported, then typically you must reduce the maximum number of adapters by the same ratio. For example, if a system with a maximum of 12 processors can support 12 ATM adapters for maximum performance, the same system with eight processors can support only eight ATM adapters for maximum performance.

If your system uses disk and communication adapters concurrently, use a more conservative estimate of the number of supported adapters.

If your configured system runs close to its performance limits, ensure that your system type or configuration provides the desired performance. In these cases, you might need to contact your marketing support personnel for more detailed information.

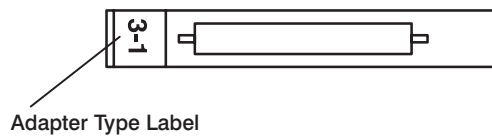
## Slot restrictions

You must install some adapters in specific PCI slots in various systems. Physical size limits, I/O address considerations, thermal limitations, and other factors influence these specifications.

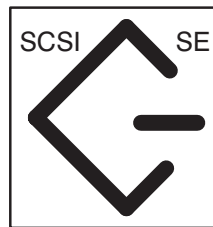


## Adapter labels

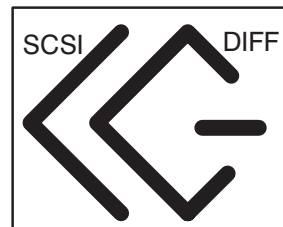
The following illustrations show how an adapter is labeled.



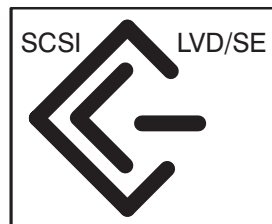
SCSI-1 or SCSI-2 single-ended, low-voltage differential, or differential adapters might carry one of the following ANSI icons:



*Single-Ended*



*Differential*



*Low Voltage Differential/  
Single-Ended*

---

## PCI adapter information by feature type

Use this topic to identify and find out technical information about specific adapters.

The adapter information shown here is used during nondirected service activities. This information is used to:

- Identify an adapter
- Find specific technical information about an adapter
- Where applicable, show special installation or cabling instructions
- Show signal names for the output pins of the adapter connectors
- Where applicable, show the settings for switches or jumpers

Adapters can be identified by their feature code (FC) or their custom card identification number (CCIN). The CCIN number is normally labeled on the adapter.

For information regarding System p adapters that are not listed here, and that were announced prior to October 2003, consult the *Adapters, Devices, and Cable Information for Multiple Bus Systems* manual SA38-0516 (last updated October 2003).

## 10 Gb Ethernet-SR PCI-X 2.0 DDR adapter (FC 5721; CCIN 573A)

Learn about the features, operating system requirements, and installation notes for the 10 Gb Ethernet-SR PCI-X 2.0 DDR Adapter.

### Overview

The 10 Gigabit Ethernet-SR PCI-X 2.0 DDR Adapter is designed to provide a PCI-X based server connection. The adapter conforms to the IEEE 802.3ae 10 Gigabit Ethernet standard and supports jumbo frames.

The 10 Gigabit Ethernet-SR PCI-X supports the following distances:

- Up to 33m using 62.5 um multimode fiber with 200 MHz\*km minimum modal bandwidth at 850 nm
- Up to 300m using 50 um multimode fiber with 2000 MHz\*km minimum modal bandwidth at 850 nm

The adapter is designed to run in standard PCI-X v2.0 and PCI-X v1.0a compliant systems with 64-bit PCI-X BusMaster slots at 133 Mode 1 or Mode 2. The adapter draws power from the PCI-X 3.3 V supplies and is keyed to fit only into a 3.3 V slot. The adapter supports 1M x 8 bit boot FLASH ROM and has a 240 KB on-chip TX packet buffer and a 32 MB on-chip RX packet buffer.

The FRU part numbers for the adapter are:

- Adapter, 03N4590 (Designed to comply with RoHS requirement.)
- Wrap plug, 11P3847
- Blind swap cassette, spacer bracket FRU number 10N8994. For use with generation 2.5 cassettes (16R0091), or earlier.

The adapter provides the following features:

- Single-slot, short form factor, 6.6 by 4.2 inch, half-length PCI cards
- 64-bit Direct Bus Mastering on the PCI-X bus
- Dual Address Cycle for access to 64-bit addresses
- PCI-X split transactions
- DMA engine for movement of command, status, and network data across PCI-X
- 240 KB on-chip TX packet buffer
- 32 MB on-chip RX packet buffer
- 1 MB Boot Flash ROM
- Jumbo frames (9 KB)
- Interrupts coalescing
- 802.1q VLAN tagging and stripping (IBM System i models do not support VLANs)
- Conforms to IEEE 802.3ae 10 Gigabit Ethernet standard

### Operating system or partition requirements

AIX 5L™ Version 5.3 with the 5300-04 Technology Level

AIX 5L Version 5.2 with the 5200-08 Technology Level

Red Hat Enterprise Linux® version 4 U2

SUSE Linux Enterprise Server 9 SP3

i5/OS V5R4

## Preparing for installation

This section helps you prepare to install your adapter. Preparing to install the adapter involves the following tasks:

- Verifying your hardware requirements
- Verifying your software requirements
- Gathering tools and documentation

If you are installing your operating system at this time, install your adapter before you install the operating system. See “Installing the adapter” on page 9 for instructions.

If you are installing only the device driver for this adapter, install your device driver software before you install the adapter. See “Installing the device driver software” for instructions.

### Verifying your hardware requirements

The 10 Gigabit Ethernet-SR PCI-X 2.0 DDR adapter requires the following hardware:

- A wrap plug for the multimode fiber connector, if you are running the total diagnostics package
- Shortwave (850 nm) 50/62.5 micron multimode fiber network attachment

The following table indicates the allowable cable lengths from the adapter to the gigabit Ethernet switch, including patch cables:

*Table 1. Adapter cable information*

| Cable type | Physical connector type | Maximum range (meters) |
|------------|-------------------------|------------------------|
| 62.5 m MMF | LC                      | 33                     |
| 50 m MMF   | LC                      | 300                    |

### Verifying your software requirements

Ensure that your operating system supports this adapter before you install it. See “Operating system or partition requirements” on page 6.

### Gathering tools and documentation

To install the adapter, make sure you have access to the following:

- The 10 Gigabit Ethernet-SR PCI-X 2.0 DDR adapter
- The operating system documentation
- The system unit documentation
- The PCI adapter placement information for the system unit
- Wrap plug
- A flat-blade screwdriver
- AIX 5L Base Operating System CD, which includes the device driver, or the AIX 5L device driver CD-ROM

## Installing the device driver software

This section explains how to install device driver software. The device driver is provided for the AIX 5L operating system.

Be sure you have read “Preparing for installation” to determine:

- If you should install your device driver software first, go to step 1 of this section.
- If you should install your adapter hardware first, go to “Installing the adapter” on page 9. When you install AIX 5L, your adapter device driver automatically installs.

If you already have a supported level of AIX 5L installed, the device driver is already installed and you can go to “Installing the adapter” on page 9. Otherwise, install the device driver.

To install device driver software, do the following:

1. Log in to the system unit as root user.
2. Insert the media containing the device driver software (for example; CD-ROM) into the appropriate media device.
3. Type the following System Management Interface Tool (SMIT) fast path: `smitty devinst`
4. Press Enter. The Install Additional Device Software screen highlights the INPUT device/directory for software option.
5. Select or type your input device:
  - Press F4 to display the input device list.
  - Select the name of the device (for example; CD-ROM) that you are using and press Enter.
 Or
  - In the entry field, type the name of the input device you are using and press Enter.
  - The Install Additional Device Software window highlights the SOFTWARE to install option.
6. Press F4 to display the SOFTWARE to install window.
7. Type the following to display the Find window: `/`
8. For the adapter, type the following device package name: `devices.pci.1410EB02`
9. Press Enter. The system finds and highlights this device driver software.
10. Press F7 to select the highlighted device driver software.
11. Press Enter. The INSTALL ADDITIONAL DEVICE SOFTWARE screen displays. The entry fields are automatically updated.
12. Press Enter to accept the information. The ARE YOU SURE window displays.
13. Press Enter to accept the information. The COMMAND STATUS screen displays.
  - The term RUNNING is highlighted to indicate that the installation and configuration command is in progress.
  - When RUNNING changes to OK, scroll to the bottom of the page and locate the Installation Summary.
  - After a successful installation, SUCCESS displays in the Result column of the Installation Summary at the bottom of the page.
14. Remove the installation media from the drive.
15. Press F10 to exit SMIT.
16. Go to the adapter installation procedure, “Installing the adapter” on page 9.

### Verify AIX software installation

To verify that the device driver for the adapter is installed, do the following:

1. If necessary, log in as root user.
2. At the command line, type: `lslpp -l devices.pci.1410EB02.rte`
3. Press Enter.

If the adapter device driver is installed, the following is an example of the data that displays on your screen:

| Fileset   | Level  | State     | Description               |
|---|--------|-----------|---------------------------|
| Path: /usr/lib/objrepos<br>devices.pci.1410EB02.rte | 5.2.xx | COMMITTED | Ethernet adapter software |

Verify that the **devices.pci.1410EB02.rte** filesets are installed at the AIX 5L version 5.2 with the 5200-08 Recommended Maintenance package or later level. If this information displays but you continue to have problems, go to “Installing the adapter.”

If no data displays on your screen, the adapter device driver did not install correctly. Try reinstalling the driver.

## Installing the adapter

Refer to the PCI adapters topic for instructions on placement and installation of PCI adapters.

### Verifying the adapter installation

To verify that your system unit recognizes the PCI adapter, do the following:

1. If necessary, log in as root user.
2. At the command line, type: `lsdev -Cs pci`
3. Press Enter.

A list of PCI devices displays. If the adapter is installed correctly, an Available status for each port indicates that the adapter is installed and ready to use. If the message on your screen indicates that any of the ports is DEFINED instead of AVAILABLE, shut down your server and verify that the adapter was installed correctly.

## Connecting to an Ethernet network

This section explains how to connect the adapter to the multimode fiber network. Refer to your local procedures for information about connecting the adapter to your Ethernet network.

**Note:** Only one type of network can be attached to the adapter at one time.

To connect the adapter to a multimode fiber network, do the following:

1. Insert the male fiber LC connector of the fiber cable into the adapter LC connector.
2. Insert the male fiber LC connector of the other end of the cable into the network switch.

**Note:**

- If your switch has an SC receptacle, you need an LC-SC converter cable.
- It is necessary to configure an IP network interface to enable the adapter to detect link and illuminate the LINK LED.

### Understanding the adapter LEDs

The LEDs on the adapter provide information about the card’s operation status. The LEDs are visible through the card’s mounting bracket and, when lit, indicate the following conditions:

*Table 2. Adapter LEDs*

| LED | Light          | Description       |
|-----|----------------|-------------------|
| TX  | Off            | No activity       |
|     | Blinking green | Transmit activity |

Table 2. Adapter LEDs (continued)

| LED  | Light          | Description      |
|------|----------------|------------------|
| RX   | Off            | No activity      |
|      | Blinking green | Receive activity |
| Link | Off            | No link          |
|      | Green          | Link established |

## 10 Gb Ethernet-LR PCI-X 2.0 DDR adapter (FC 5722; CCIN 576A)

Learn about the features, operating system requirements, and installation notes for the 10 Gb Ethernet-LR PCI-X 2.0 DDR adapter.

### Overview

The 10 Gigabit Ethernet-LR PCI-X 2.0 DDR adapter is designed to provide a PCI-X based server connection. The adapter conforms to the IEEE 802.3ae 10 Gigabit Ethernet standard and supports Jumbo frames.

The FRU part numbers for the adapter are:

- Adapter, 03N4588 (Designed to comply with RoHS requirement.)
- Wrap plug, 12R6249
- Blind swap cassette, spacer bracket FRU number 10N8994. For use with generation 2.5 cassettes (16R0091), or earlier.

The adapter provides the following features:

- Single-slot, short form factor, 6.6 by 4.2 inch, half-length PCI cards
- 64-bit Direct Bus Mastering on the PCI-X bus
- Dual Address Cycle for access to 64-bit addresses
- PCI-X split transactions
- DMA engine for movement of command, status, and network data across PCI-X
- 240 KB on-chip TX packet buffer
- 32 MB on-chip RX packet buffer
- 1 MB Boot Flash ROM
- Jumbo frames (9 KB)
- Interrupts coalescing
- 802.1q VLAN tagging and stripping (IBM System i models do not support VLANs)
- Conforms to IEEE 802.3ae 10 Gigabit Ethernet standard

### Operating system or partition requirements

AIX 5L Version 5.3 with the 5300-04 Technology Level

AIX 5L Version 5.2 with the 5200-08 Technology Level

Red Hat Enterprise Linux version 4 U2

SUSE Linux Enterprise Server 9 SP3

i5/OS V5R4

## Preparing for installation

This section helps you prepare to install your adapter. Preparing to install the adapter involves the following tasks:

- Verifying your hardware requirements
- Verifying your software requirements
- Gathering tools and documentation

If you are installing your operating system at this time, install your adapter before you install the operating system. See “Installing the adapter” on page 13 for instructions.

If you are installing only the device driver for this adapter, install your device driver software before you install the adapter. See “Installing the device driver software” for instructions.

### Verifying your hardware requirements

The 10 Gigabit Ethernet-LR PCI-X 2.0 DDR adapter requires the following hardware:

- A wrap plug for the single mode fiber connector, if you are running the total diagnostics package
- Longwave (1310 nm) 9/50 micron single-mode fiber network attachment

The following table indicates the allowable cable lengths from the adapter to the gigabit Ethernet switch, including patch cables:

*Table 3. Adapter cable information*

| Cable type | Physical connector type | Maximum range (meters) |
|------------|-------------------------|------------------------|
| 9 m SMF    | SC                      | 10 km                  |

### Verifying your software requirements

Ensure that your operating system supports this adapter before you install it. See Operating system or partition requirements.

### Gathering tools and documentation

To install the adapter, make sure you have access to the following:

- The 10 Gigabit Ethernet-LR PCI-X 2.0 DDR adapter
- The operating system documentation
- The system unit documentation
- The PCI adapter placement information for the system unit
- Wrap plug
- A flat-blade screwdriver
- AIX 5L Base Operating System CD, which includes the device driver, or the AIX 5L device driver CD-ROM

## Installing the device driver software

This section explains how to install device driver software. The device driver is provided for the AIX 5L operating system.

Be sure you have read “Preparing for installation” to determine:

- If you should install your device driver software first, go to step 1 of this section.

- If you should install your adapter hardware first, go to “Installing the adapter” on page 13. When you install AIX 5L, your adapter device driver automatically installs.

If you already have a supported level of AIX 5L installed, the device driver is already installed and you can go to “Installing the adapter” on page 13. Otherwise, install the device driver.

To install device driver software, do the following:

1. Log in to the system unit as root user.
2. Insert the media containing the device driver software (for example; CD-ROM) into the appropriate media device.
3. Type the following System Management Interface Tool (SMIT) fast path: `smitty devinst`
4. Press Enter. The Install Additional Device Software screen highlights the INPUT device/directory for software option.
5. Select or type your input device:
  - Press F4 to display the input device list.
  - Select the name of the device (for example; CD-ROM) that you are using and press Enter.
- OR
  - In the entry field, type the name of the input device you are using and press Enter.
  - The Install Additional Device Software window highlights the SOFTWARE to install option.
6. Press F4 to display the SOFTWARE to install window.
7. Type the following to display the Find window: `/`
8. For the adapter, type the following device package name: `devices.pci.1410EC02`
9. Press Enter. The system finds and highlights this device driver software.
10. Press F7 to select the highlighted device driver software.
11. Press Enter. The INSTALL ADDITIONAL DEVICE SOFTWARE screen displays. The entry fields are automatically updated.
12. Press Enter to accept the information. The ARE YOU SURE window displays.
13. Press Enter to accept the information. The COMMAND STATUS screen displays.
  - The term RUNNING is highlighted to indicate that the installation and configuration command is in progress.
  - When RUNNING changes to OK, scroll to the bottom of the page and locate the Installation Summary.
  - After a successful installation, SUCCESS displays in the Result column of the Installation Summary at the bottom of the page.
14. Remove the installation media from the drive.
15. Press F10 to exit SMIT.
16. Go to the adapter installation procedure, “Installing the adapter” on page 13.

### Verify AIX software installation

To verify that the device driver for the adapter is installed, do the following:

1. If necessary, log in as root user.
2. At the command line, type: `lslpp -l devices.pci.1410EC02.rte`
3. Press Enter.

If the adapter device driver is installed, the following is an example of the data that displays on your screen:

| Fileset | Level | State | Description |
|---------|-------|-------|-------------|
|---------|-------|-------|-------------|



|   |          |           |                           |
|---|----------|-----------|---------------------------|
| Path: /usr/lib/objrepos<br>devices.pci.1410EC02.rte | 5.2.0.85 | COMMITTED | Ethernet adapter software |
|---|----------|-----------|---------------------------|

Verify that the **devices.pci.1410EC02.rte** filesets are installed at the AIX 5L Version 5.2 with the 5200-08 Technology Level or later level. If this information displays but you continue to have problems, go to “Installing the adapter.”

If no data displays on your screen, the adapter device driver did not install correctly. Try reinstalling the driver.

## Installing the adapter

Refer to the PCI Adapters topic for instructions on placement and installation of PCI adapters. After you have installed the adapter, continue on to Verifying the adapter Installation .

### Verifying the adapter installation

To verify that your system unit recognizes the PCI adapter, do the following:

1. If necessary, log in as root user.
2. At the command line, type: `lsdev -Cs pci`
3. Press Enter.

A list of PCI devices displays. If the adapter is installed correctly, an Available status for each port indicates that the adapter is installed and ready to use. If the message on your screen indicates that any of the ports is DEFINED instead of AVAILABLE, shut down your server and verify that the adapter was installed correctly.

## Connecting to an Ethernet network

This section explains how to connect the adapter to the multimode fiber network. Refer to your local procedures for information about connecting the adapter to your Ethernet network.

**Note:** Only one type of network can be attached to the adapter at one time.

To connect the adapter to a multimode fiber network, do the following:

1. Insert the male fiber SC connector of the fiber cable into the adapter SC connector.
2. Insert the male fiber SC connector of the other end of the cable into the network switch.

**Note:** It is necessary to configure an IP network interface to enable the adapter to detect link and illuminate the LINK LED.

### Understanding the adapter LEDs

The LEDs on the adapter provide information about the card’s operation status. The LEDs are visible through the card’s mounting bracket and, when lit, indicate the following conditions:

*Table 4. Adapter LEDs*

| LED | Light          | Description       |
|-----|----------------|-------------------|
| TX  | Off            | No activity       |
|     | Blinking green | Transmit activity |
| RX  | Off            | No activity       |
|     | Blinking green | Receive activity  |

Table 4. Adapter LEDs (continued)

| LED  | Light | Description      |
|------|-------|------------------|
| Link | Off   | No link          |
|      | Green | Link established |

## 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter (FC 1983, 1990, 5706; CCIN 5706)

Learn about the specifications and LEDs for the 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter.

The 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter is a full duplex, dual ported, gigabit Ethernet adapter that can be configured to run each port at 10, 100, or 1000 Mbps data rates. The adapter connects to the system using a PCI or PCI-X bus and connects to a network using standard unshielded twisted pair (UTP) cable for distances of up to 100 meters. AIX Network Installation Management (NIM) boot capability is supported with this adapter. The adapter conforms to the IEEE 802.3ab 1000 Base-T standard. The adapter also supports jumbo frames when running at the 1000 Mbps speed.

### Adapter LED status

The LEDs on the adapter provide information about the card's operation status. The LEDs are visible through the adapter's mounting bracket and, when lit, indicates the following conditions:

| LED        | Light    | Description   |
|------------|----------|---|
| Link Speed | Off      | 10 Mbps   |
|            | Green    | 100 Mbps  |
|            | Orange   | 1000 Mbps   |
| Link       | Green    | Good link   |
|            | Off      | No link: could indicate a bad cable, bad connector, configuration mismatch, or not selected |
|            | Blinking | Indicates data activity   |

The following figure shows the adapter LEDs and RJ-45 connector.

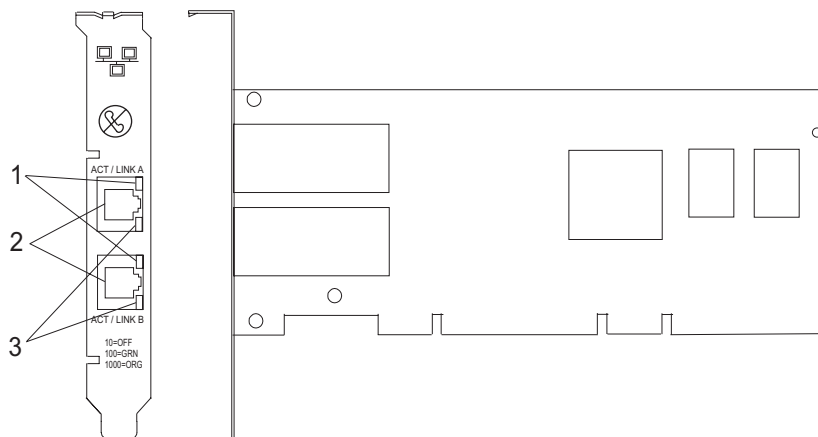


Figure 1. 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter

1 ACT/LNK LED

- 2 RJ-45 connector
- 3 Link Speed LED

## Adapter Specifications

### Item Description

#### FRU number

5706 is 03N5297\* or 00P6131\*\*

1983 is 03N5298\* or 80P6450\*\*

1990 is 03N5531\* or 03N4701\*\* (low profile bracket)

\* Designed to comply with RoHS requirement.

\*\* Not designed to comply with the RoHS requirement.

#### I/O bus architecture

PCI 2.2 and PCI-X V1.0a compliant

#### Busmaster

Yes

#### Maximum number

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic.

#### Adapter size

PCI short form

#### Connector information

RJ-45

#### Wrap plug

RJ-45, part number 03N6070

#### Blind swap cassette, spacer bracket FRU number

10N8972

For use with generation 2.5 cassettes (16R0091), or earlier

#### Cables

Customers supply the cables. For best performance, use cables that meet Cat 5e cabling standards, or higher.

## Dual port gigabit Ethernet-SX PCI-X adapter (FC 5707; CCIN 5707)

Learn about the specifications and LEDs for the dual port gigabit Ethernet-SX PCI-X adapter.

The dual port gigabit Ethernet-SX PCI-X adapter is a high-performance, highly integrated, universal, Ethernet LAN adapter for PCI-X and PCI systems. The adapter presents one electrical load but appears as two independent devices to software. The adapter provides 1000 Mbps throughput on a standard shortwave (850nm) 50/62.5 micron multimode optical cable and conforms to the IEEE 802.3z standard and supports distances of 260m for 62.5u MMF and 550m for 50.0u MMF.

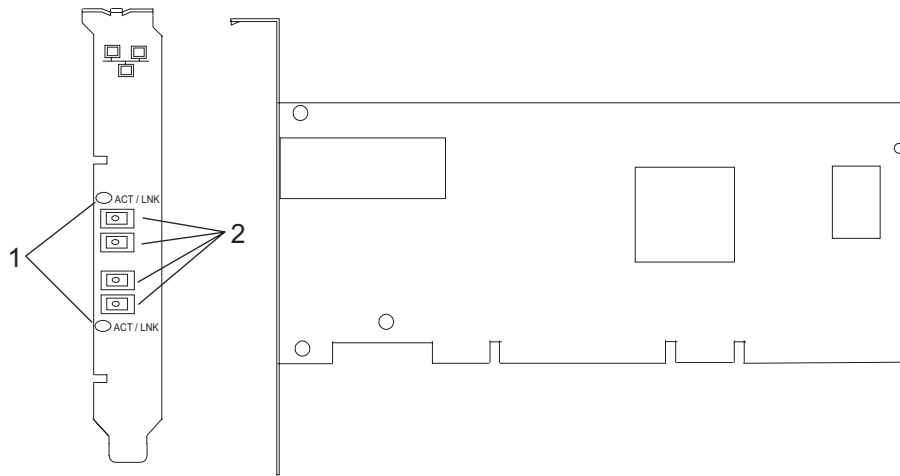


Figure 2. Feature 5707

- 1 LED
- 2 Multimode Fiber LC Receptacle

## Understanding the adapter LED

The LED on the Dual Port Gigabit Ethernet-SX PCI-X Adapter provides information about the card's operation status. The LED is visible through the card's mounting bracket and, when lit, indicates the following conditions:

| LED              | Status              |
|------------------|---------------------|
| Off              | No Link/No Activity |
| On (Green)       | Link, No Activity   |
| Flashing (Green) | Link, Activity      |

## Specifications

### Item Description

#### FRU number

03N6973\* or 80P6451\*\*

\* Designed to comply with RoHS requirement.

\*\* Not designed to comply with the RoHS requirement.

#### I/O bus architecture

PCI 2.2 and PCI-X V1.0a compliant

#### Busmaster

Yes

#### Maximum number

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

#### Adapter size

PCI short form

#### Connector information

LC fiber optic

#### Wrap plug

LC fiber optic, part number 12R9314

#### Blind swap cassette, spacer bracket FRU number

10N8972

For use with generation 2.5 cassettes (16R0091), or earlier

## Cables

Customer supplied. Optional LC-SC converter cables are available.

- LC-SC 62.5 micron converter cable , part number 12R9322, FC 2459
- LC-SC 50 micron use converter cable, part number 12R9321, FC 2456

## Gigabit Ethernet-SX PCI-X adapter (FC 6800, 5700; CCIN 5700)

Learn about the specifications and LEDs for the Gigabit Ethernet-SX PCI-X adapter.

The Gigabit Ethernet-SX PCI-X adapter is a high-performance, highly integrated, universal, Ethernet LAN adapter for PCI-X and PCI systems. The adapter provides 1000 Mbps throughput on a standard shortwave (850 nm) 50 or 62.5 micron multimode optical cable and conforms to the IEEE 802.3z standards and supports distances of 260 meters for 62.5u MMF and 550 meters for 50.0u MMF. The adapter is designed to run in standard PCI-X V1.0a compliant systems with 32 or 64-bit PCI-X Bus Master slots at 66 or 133 MHz, and in PCI 2.2 compliant systems with 32 or 64-bit PCI bus master slots at 33 or 66 MHz. The adapter runs on 5.0 V.

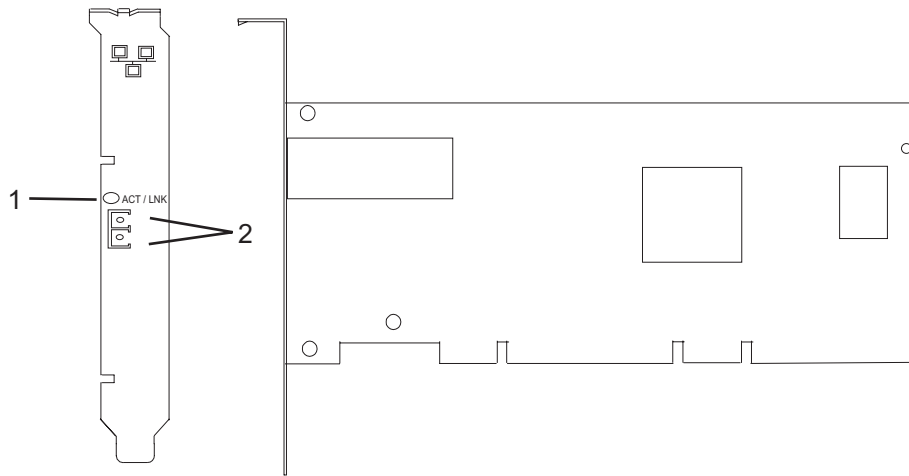


Figure 3. Feature 5700

- 1 LED
- 2 Multimode Fiber LC Receptacle

The LED on the Gigabit Ethernet-SX PCI-X Adapter provides information about the adapter's operation status. The LED is visible through the adapter's mounting bracket and, when lit, indicates the following conditions:

| LED              | Status              |
|------------------|---------------------|
| Off              | No Link/No Activity |
| On (Green)       | Link, No Activity   |
| Flashing (Green) | Link, Activity      |

## Gigabit Ethernet-SX PCI-X adapter specifications

### Item Description

#### FRU number

10N8586 (Designed to comply with RoHS requirement.)

#### I/O bus architecture

PCI 2.2 and PCI-X V1.0a compliant

#### Busmaster

Yes

**Maximum number**

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic.

**Adapter size**

PCI short form

**Connector information**

LC fiber optic

**Wrap plug**

LC fiber optic, part number 12R9314

**Cables**

Customer supplied. Optional LC-SC converter cables are available:

- LC-SC 62.5 micron converter cable , part number 12R9322, FC 2459
- LC-SC 50 micron use converter cable, part number 12R9321, FC 2456

## 4-Port 10/100 Base-TX Ethernet PCI adapter (FC 4961)

Learn about specifications and LEDs for the 4-Port 10/100 Base-TX Ethernet PCI adapter..

The 4-Port 10/100 Base-TX Ethernet PCI adapter provides attachment at 10 Mbps or 100 Mbps to a carrier sense multiple access/collision detection (CSMA/CD) Ethernet local area network (LAN) for systems designed to operate with the PCI bus interface. The adapter uses the IEEE-802.3u standard for communications. The adapter will occupy a single slot but will appear to the system to be four unique 10/100 Ethernet adapters.

The adapter supports connections to 10BaseT or 100BaseTx on unshielded twisted pair networks through an RJ-45 connector.

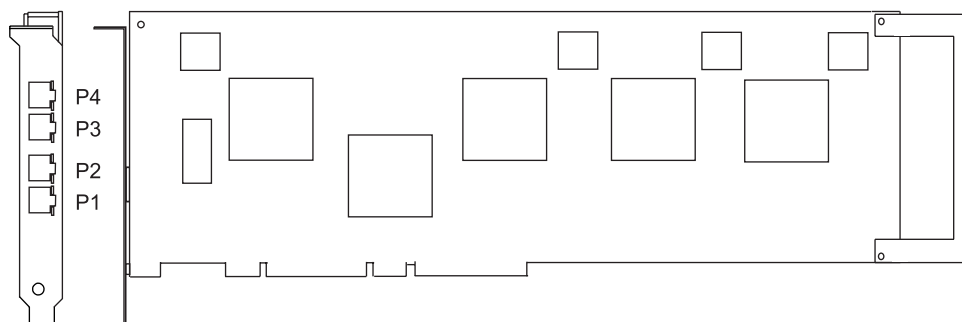


Figure 4. Feature 4961

## 4-Port 10/100 Base-TX Ethernet PCI adapter specifications

| Item                         | Description   |
|------------------------------|---|
| <b>FRU number</b>            | 09P1421 (Not designed to comply with RoHS requirement.) |
| <b>I/O bus architecture</b>  | PCI   |
| <b>Busmaster</b>             | Yes   |
| <b>Connector information</b> | 8-position RJ-45  |
| <b>Cables:</b>               | Customer supplied (use Y type connection)               |
| <b>For 10 Mbps</b>           | Use category 3, 4, or 5 unshielded twisted pair         |
| <b>For 100 Mbps</b>          | Use category 5 only unshielded twisted pair             |

## Wrap plug

Twisted-pair, part number 00G2380

## Viewing the LEDs

The adapter has two LEDs for each port to provide status on the adapter's operation. The LEDs are visible on the mounting bracket at each port's connector. They indicate the following conditions when lit:

- Green LED (1) - indicates 100 Mbps operation
- Yellow LED (2) - indicates transmit or receive activity

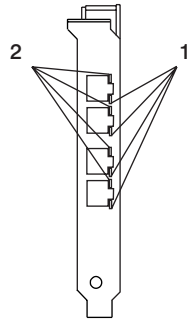


Figure 5. Adapter LEDs

## 4-Port 10/100/1000 Base-TX PCI-X adapter (FC 5740, 1954)

Learn about the features, operating system requirements, and installation notes for the 4-Port 10/100/1000 Base-TX PCI-X adapter.

### Overview

The 4-Port 10/100/1000 Base-TX PCI-X adapter is a 64-bit Ethernet card. It is a full height PCI-X 1.0a adapter, which supports four gigabit ports on a single adapter delivering increased bandwidth for PCI-X slot-constrained systems. It provides high connectivity and reliability using two integrated, dual-port gigabit Ethernet controllers and a PCI-X bridge chip. The adapter connects the system to an Ethernet LAN at speeds of 10, 100, or 1000 Mbps.

The FRU part numbers for the adapter are:

- FC 5740, 03N5444\* or 03N5446\*\*
- FC 1954, 03N5444\* or 03N5446\*\*

\* Designed to comply with RoHS requirement.

\*\* Not designed to comply with the RoHS requirement.

The 4-Port 10/100/1000 Base-TX PCI-X adapter provides the following features:

- 3.3 volts, 64-bit, 133 MHz with 64-bit Direct Bus Mastering on the PCI-X bus
- IEEE 802.3ab 1000Base-T compliant
- IEEE 802.3u 100Base-TX compliant
- IEEE 802.3 10Base-T compliant
- 802.1q VLAN tagging
- Two Intel® 82546GB Gigabit Controllers
- Interrupt Moderation
- TCP Segmentation offload and encapsulation in hardware
- Checksum offloading of IP, TCP, and UDP frame

- Remote Management Support (WfM, RIS, SNMP/DMI)
- Increased connectivity while significantly reducing CPU utilization
- Four RJ-45 ports
- Two LED adapter status indicators per port for link activity and speed
- Boot ROM on two ports
- Advanced cable diagnostics
- Compliant with European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

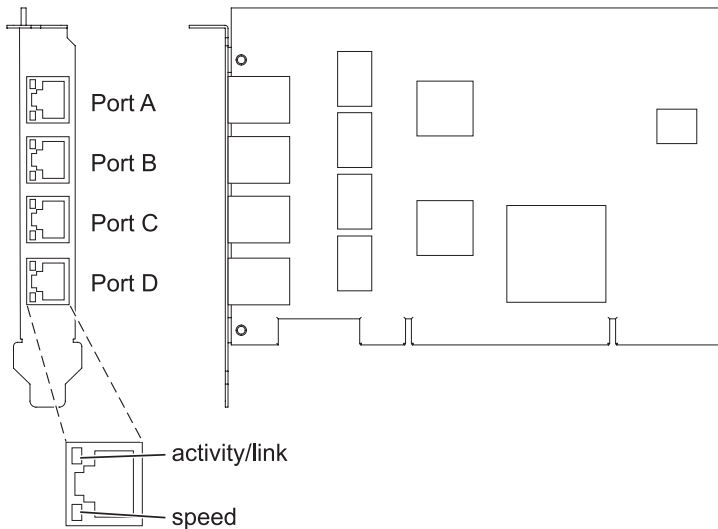


Figure 6. 4-Port 10/100/1000 Base-TX PCI-X adapter

## Operating system or partition requirements

AIX 5L Version 5.3 with the 5300-04 Technology Level, or later

AIX 5L Version 5.2 with the 5200-08 Technology Level, or later

Red Hat Enterprise Linux version 4 U2, or later

SUSE Linux Enterprise Server 9 SP3, or later

## Preparing for installation

This section helps you prepare to install your 4-Port 10/100/1000 Base-TX PCI-X adapter. Preparing to install the adapter involves the following tasks:

- Verifying your hardware requirements
- Verifying your software requirements
- Gathering tools and documentation

### Note:

- If you are installing your operating system at this time, install your adapter before you install the operating system. See “Installing the adapter” on page 23 for instructions.
- If you are installing only the device driver for this adapter, install your device driver software before you install the adapter. See “Installing the device driver software” on page 21 for instructions.



## Verifying Your Hardware Requirements

The 4-Port 10/100/1000 Base-TX PCI-X adapter requires the following hardware:

- A wrap plug for the RJ-45 connector, if you are running the total diagnostics package
- Customer-supplied, unshielded twisted pair (UTP) cables:
  - Cat 5e (or higher) cables for 1000 Mbps network attachment
  - Cat 5 or Cat 3 cables for 100 Mbps or 10 Mbps network attachment

**Restriction:** The cable can be no longer than 100 meters (including patch cables) from the adapter to the local switch.

## Verifying Your Software Requirements

Ensure that your operating system supports this adapter before you install it. See “Operating system or partition requirements” on page 20.

## Gathering tools and documentation

To install the 4-Port 10/100/1000 Base-TX PCI-X adapter, make sure you have access to the following:

- The 4-Port 10/100/1000 Base-TX PCI-X adapter
- The operating system documentation
- The system unit documentation
- The PCI adapter placement information for the system unit.
- Wrap plug
- A flat-blade screwdriver
- AIX<sup>®</sup> Base Operating System CD, which includes the device driver, or the AIX device driver CD-ROM

## Installing the device driver software

This chapter explains how to install device driver software. The device driver is provided for the AIX operating system.

Be sure you have read “Preparing for installation” on page 20 to determine:

- If you should install your device driver software first, go to step 1 of this section.
- If you should install your adapter hardware first, go to “Installing the adapter” on page 23. When you install AIX, your adapter device driver automatically installs.

If your installed AIX operating system (AIX 5.2.0.85 or later; AIX 5.3.0.40 or later) supports the 4-Port 10/100/1000 Base-TX PCI-X adapter and you already have this adapter installed, the device driver is already installed and you can install the adapter. Go to “Installing the adapter” on page 23 for instructions. Otherwise, install the device driver.

To install device driver software, do the following:

1. Log in to the system unit as root user.
2. Insert the media containing the device driver software (for example; CD-ROM) into the appropriate media device. If your system does not have a CD-ROM drive, refer to your system documentation for performing a NIM (Network Installation Management) installation.
3. Type the following System Management Interface Tool (SMIT) fast path: `smitty devinst`
4. Press Enter. The Install Additional Device Software screen highlights the INPUT device/directory for software option.
5. Select or type your input device:

- Press F4 to display the input device list.
  - Select the name of the device (for example; CD-ROM) that you are using and press Enter.
- OR
- In the entry field, type the name of the input device you are using and press Enter.
  - The Install Additional Device Software window highlights the SOFTWARE to install option.
6. Press F4 to display the SOFTWARE to install window.
  7. Type the following to display the Find window: /
  8. For the 4-Port 10/100/1000 Base-TX PCI-X adapter, type the following device package name: `devices.pci.14101103`
  9. Press Enter. The system finds and highlights this device driver software.
  10. Press F7 to select the highlighted device driver software.
  11. Press Enter. The INSTALL ADDITIONAL DEVICE SOFTWARE screen displays. The entry fields are automatically updated.
  12. Press Enter to accept the information. The ARE YOU SURE window displays.
  13. Press Enter to accept the information. The COMMAND STATUS screen displays.
    - The term RUNNING is highlighted to indicate that the installation and configuration command is in progress.
    - When RUNNING changes to OK, scroll to the bottom of the page and locate the Installation Summary.
    - After a successful installation, SUCCESS displays in the Result column of the Installation Summary at the bottom of the page.
  14. Remove the installation media from the drive.
  15. Press F10 to exit SMIT.
  16. Go to the adapter installation procedure, “Installing the adapter” on page 23.

### Verify AIX software installation

To verify that the device driver for the adapter is installed, do the following:

1. If necessary, log in as root user.
2. At the command line, type: `lslpp -l devices.pci.14101103.rte`
3. Press Enter.

If the 4-Port 10/100/1000 Base-TX PCI-X adapter device driver is installed, the following is an example of the data that displays on your screen:

| Fileset   | Level   | State     | Description   |
|---|---------|-----------|---|
| Path: /usr/lib/objrepos<br>devices.pci.14101103.rte | 5.2.0.0 | COMMITTED | 4-Port 10/100/1000<br>Base-TX PCI-X Adapter<br>Software |

Verify that the **devices.pci.14101103.rte** filesets are installed at the AIX 5.2.0.0 (or later level) or AIX 5L 5.3.0.0 (or later level). If this information displays but you continue to have problems, go to “Installing the adapter” on page 23.

If no data displays on your screen, the 4-Port 10/100/1000 Base-TX PCI-X adapter device driver did not install correctly. Try reinstalling the driver.

## Installing the adapter

Refer to the PCI adapters topic for instructions on placement and installation of PCI adapters.

After you have installed the adapter, continue on to Verifying the adapter Installation .

### Verifying the adapter installation

To verify that your system unit recognizes the PCI adapter, do the following:

1. If necessary, log in as root user.
2. At the command line, type: `lsdev -Cs pci`
3. Press Enter.

A list of PCI devices displays. If the 4-Port 10/100/1000 Base-TX PCI-X adapter is installed correctly, an available status for each port indicates that the adapter is installed and ready to use. If the message on your screen indicates that any of the ports is DEFINED instead of AVAILABLE, shut down your server and verify that the adapter was installed correctly.

### Connecting to an Ethernet network

This section explains how to connect the adapter to the UTP network. Refer to your local procedures for information about connecting the 4-Port 10/100/1000 Base-TX PCI-X adapter to your Ethernet network.

To connect the adapter to an unshielded twisted-pair (UTP) network, do the following:

1. Insert the RJ-45 jack of the UTP cable into one of the RJ-45 connectors on the adapter.
2. Insert the RJ-45 jack of the other end of the UTP cable into the network switch.

### Understanding the adapter LEDs

The LEDs on the 4-Port 10/100/1000 Base-TX PCI-X adapter provide information about the card's operation status. The LEDs are visible through the card's mounting bracket and, when lit, indicate the following conditions:

Table 5.

| LED        | Light    | Description  |
|------------|----------|--|
| ACT/LNK    | Green    | Good link  |
|            | Off      | No link (The absence of a link could be the result of a bad cable, a bad connector, or a configuration mismatch) |
|            | Blinking | Data activity  |
| Link Speed | Off      | 10 Mbps  |
|            | Green    | 100 Mbps   |
|            | Orange   | 1000 Mbps  |

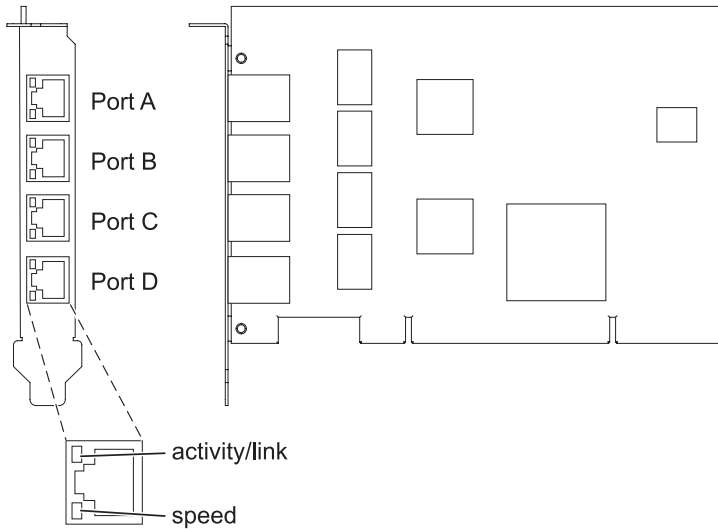
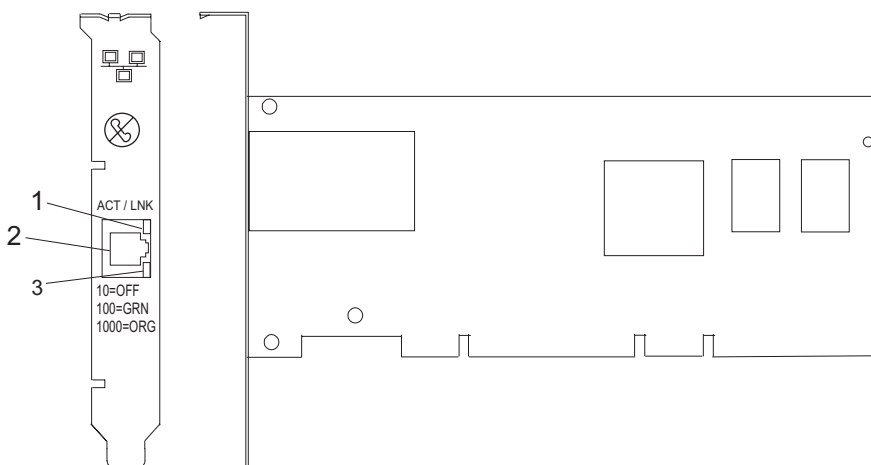


Figure 7. 4-Port 10/100/1000 Base-TX PCI-X adapter

## 10/100/1000 Base-TX Ethernet PCI-X adapter (FC 1959, 1979, 5701, 6801; CCIN 5701)

Learn about the specifications and LEDs for 10/100/1000 Base-TX Ethernet PCI-X adapter.

The 10/100/1000 Base-TX Ethernet PCI-X adapter is a high-performance, highly integrated, universal Ethernet LAN adapter for PCI-X and PCI systems. The adapter provides 10/100/1000 Mbps connectivity using standard unshielded twisted pair (UTP) cable for distances of up to 100 meters. It conforms to IEEE 802.3ab 1000 Base-T standard. The adapter is designed to run in standard PCI-X V1.0a compliant systems with 32 or 64-bit PCI-X Bus Master slots at 66 or 133 MHz, and in PCI 2.2 compliant systems with 32 or 64-bit PCI bus master slots at 33 or 66 MHz. The adapter runs on 5.0 V and 3.3 V aux.



- 1 ACT/LNK LED
- 2 RJ-45 Connector
- 3 Link Speed LED

The LEDs on the 10/100/1000 Base-TX Ethernet PCI-X Adapter provide information about the adapter's operation status. The LEDs are visible through the adapter's mounting bracket and, when lit, indicate the

following conditions:

| LED        | Light    | Description   |
|------------|----------|---|
| Link Speed | Off      | 10 Mbps   |
|            | Green    | 100 Mbps  |
|            | Orange   | 1000 Mbps   |
| Link       | Green    | Good link   |
|            | Off      | No link: could indicate a bad cable, bad connector, configuration mismatch, or not selected |
|            | Blinking | Indicates data activity   |

## 10/100/1000 Base-TX Ethernet PCI-X adapter specifications

### Item Description

#### FRU number

5701 is 03N6524\* or 00P6130\*\*

1979 is 03N6525\* or 80P6445\*\*

1959 is 03N6526\* or 03N4700\*\*

\* Designed to comply with RoHS requirement.

\*\* Not designed to comply with the RoHS requirement.

#### I/O bus architecture

PCI 2.2 and PCI-X V1.0a compliant

#### Busmaster

Yes

#### Maximum number

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic.

#### Adapter size

PCI short form

#### Connector information

RJ-45

#### Wrap plug

RJ-45, part number 03N6070\* or 00G2380\*\*

#### Blind swap cassette, spacer bracket FRU number

10N8972

For use with generation 2.5 cassettes (16R0091), or earlier

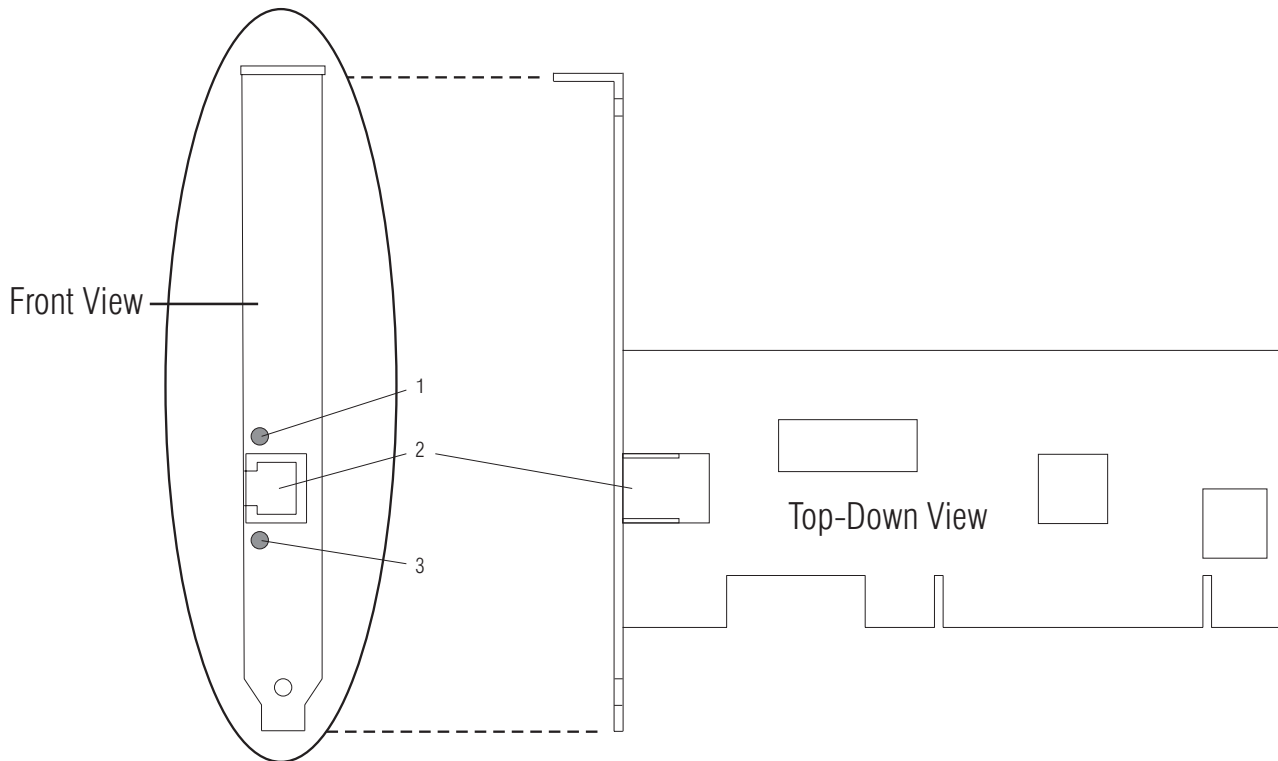
#### Cables

For best performance, use cables that meet Cat 5e cabling standards, or higher. Customers supply the cables.

## 10/100 Mbps Ethernet PCI adapter II (FC 4962; CCIN 4962)

Learn about the specifications and LEDs for the 10/100 Mbps Ethernet PCI adapter II.

The 10/100 Mbps Ethernet PCI adapter II is a 32-bit, 33 MHz high performance expansion adapter for systems adhering to the Peripheral Component Interconnect (PCI) and IEEE 802.3 standards. The adapter connects the system to an Ethernet LAN at either 10 Mbps or 100 Mbps data rate.



- 1 ACT/LINK LED
- 2 RJ-45 connector
- 3 100 TX LED

## 10/100 Mbps Ethernet PCI adapter II specifications

### Item Description

#### FRU number

09P5023 (Not designed to comply with RoHS requirement.)

#### I/O bus architecture

PCI 2.2 compliant

#### Busmaster

Yes

#### Maximum number

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

#### Connector

RJ-45

#### Wrap plug

RJ-45, part number 00G2380

#### Cables

Customers supply the cables. For best performance, use cables that meet Cat 5e cabling standards, or higher.

## 2 Gigabit Fibre Channel PCI-X Adapter (FC 1957, 1977, 5716)

Learn about the specifications and operating system requirements for the 2 Gigabit Fibre Channel PCI-X Adapter.

The 2 Gigabit Fibre Channel PCI-X Adapter is a 64-bit address/data, short form factor PCI-X adapter with an LC type external fiber connector that provides single or dual initiator capability over an optical

fiber link or loop. With the use of appropriate optical fiber cabling, this adapter provides the capability for a network of high speed local and remote located storage. The 2 Gigabit Fibre Channel PCI-X Adapter will auto-negotiate for the highest data rate (either 1 Gbps or 2 Gbps) of which the device or switch is capable. Distances of up to 500 meters running at 1 Gbps data rate and up to 300 meters running at 2 Gbps data rate are supported between the adapter and an attaching device or switch. When used with IBM Fibre Channel storage switches supporting long-wave optics, distances of up to 10 kilometers are capable of running at either 1 Gps or 2 Gps data rates.

The 2 Gigabit Fibre Channel PCI-X Adapter can be used to attach devices either directly, or by means of fibre channel switches. If attaching a device or switch with a SC type fiber connector, use of an LC-SC 50 micron fiber converter cable (#2456) or a LC-SC 62.5 micron fiber converter cable (#2459) is required.

## Adapter specifications

Table 6. Feature codes (FC), custom card identification numbers (CCIN) and field replaceable unit (FRU) part numbers

| FC   | CCIN | FRU                   |
|--|------|-----------------------|
| 1957   | 1957 | 03N7068* or 03N6440** |
| 1977   | 197E | 03N7067* or 0H14096** |
| 5716   | 280B | 03N7069* or 03N6441** |
| * Designed to comply with RoHS requirement.          |      |                       |
| ** Not designed to comply with the RoHS requirement. |      |                       |

### Item Description

#### Blind swap cassette, spacer bracket FRU number

12R6966

For use with generation 2.5 cassettes (16R0091), or earlier

#### Wrap plug FRU number

12R9314

#### I/O bus architecture

PCI 32 and 64-bit data and 33/66 MHz clock frequency

PCI-X 64-bit data and 66/100/133 MHz clock frequency

#### Slot requirement

One available 3.3 volt PCI or PCI-X slot (5 volt tolerant)

#### FC compatibility

1, 2, 4 Gigabit

#### Cables

Multimode 50/125 micron fiber with LC connectors:

1.0625Gb/sec: 2m – 500m

2.125Gb/sec: 2m – 300m

Multimode 62.5/125 micron fiber with LC connectors:

1.0625Gb/sec: 2m – 300m

2.125Gb/sec: 2m – 150m

#### Maximum number

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

#### Operating system or partition requirements

AIX 5L Version 5.2 with the 5200-04 Technology Level

AIX 5L Version 5.3 with the 5300-03 Technology Level

Red Hat Enterprise Linux version 3 U3

## 2 Gigabit Fibre Channel PCI and PCI-X Adapters (FC 6228, 6239)

Learn about the specifications and operating system requirements for the 2 Gigabit Fibre Channel PCI and PCI-X adapters.

The 2 Gigabit Fibre Channel PCI and PCI-X Adapters are 64-bit address/data, short form factor PCI and PCI-X adapters with an LC type external fiber connector that provides single or dual initiator capability over an optical fiber link or loop. With the use of appropriate optical fiber cabling, this adapter provides the capability for a network of high speed local and remote located storage. The 2 Gigabit Fibre Channel PCI and PCI-X Adapters will auto-negotiate for the highest data rate (either 1 Gbps or 2 Gbps) of which the device or switch is capable. Distances of up to 500 meters running at 1 Gbps data rate and up to 300 meters running at 2 Gbps data rate are supported between the adapter and an attaching device or switch. When used with IBM Fibre Channel storage switches supporting long-wave optics, distances of up to 10 kilometers are capable of running at either 1 Gps or 2 Gps data rates.

### PCI adapter (FC 6228)

The 2 Gigabit Fibre Channel Adapter for 64-bit PCI Bus can be used to attach devices either directly, or by means of fibre channel switches. If attaching a device or switch with a SC type fiber connector, use of an LC-SC fibre channel conversion cable (#2456) is required.

### PCI-X adapter (FC 6239)

The 2 Gigabit Fibre Channel PCI-X Adapter can be used to attach devices either directly, or by means of Fibre Channel Switches. If attaching a device or switch with a SC type fiber connector, use of an LC-SC 50 micron fiber converter cable (#2456) or a LC-SC 62.5 micron fiber converter cable (#2459) is required.

## Adapter specifications

Table 7. Feature codes (FC), custom card identification numbers (CCIN) and field replaceable unit (FRU) part numbers

| FC   | CCIN | FRU      |
|------|------|----------|
| 6228 | 4-W  | 80P4384* |
| 6239 | 5704 | 80P6415* |

\*Not designed to comply with RoHS requirement.

### Item Description

#### Wrap plug FRU number

11P3847

#### I/O bus architecture

PCI 32 and 64-bit data and 33/66 MHz clock frequency

PCI-X 64-bit data and 66/100/133 MHz clock frequency

#### Slot requirement

One available 3.3 volt PCI or PCI-X slot

#### FC compatibility

1, 2, 4 Gigabit

#### Cables

Multimode 50/125 micron fiber with LC connectors:

1.0625Gb/sec: 2m – 500m

2.125Gb/sec: 2m – 300m



Multimode 62.5/125 micron fiber with LC connectors:

1.0625Gb/sec: 2m – 300m

2.125Gb/sec: 2m – 150m

**Maximum number**

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

**Operating system or partition requirements**

AIX 5L Version 5.2 with the 5200-04 Technology Level

AIX 5L Version 5.3 with the 5300-03 Technology Level

Red Hat Enterprise Linux version 3 U3

SUSE Linux Enterprise Server 9

## **4 Gb Single-Port Fibre Channel PCI-X 2.0 DDR adapter (FC 1905, 5758, 5761; CCIN 1910, 280D)**

Learn about the specifications and operating system requirements for the 4 Gb Single-Port Fibre Channel PCI-X 2.0 DDR adapter.

The 4 Gigabit Single-Port Fibre Channel PCI-X 2.0 DDR Adapter is a 64-bit address/data, short form factor PCI-X adapter with an LC type external fiber connector that provides single initiator capability over an optical fiber link or loop. With the use of appropriate optical fiber cabling, this adapter provides the capability for a network of high-speed local and remote located storage. The 4 Gigabit Single-Port Fibre Channel PCI-X Adapter will auto-negotiate for the highest data rate between adapter and an attaching device at 1 Gbps, 2 Gbps or 4 Gbps of which the device or switch is capable. Distances of up to 500 meters running at 1 Gbps data rate, up to 300 meters running at 2 Gbps data rate, and 4 Gbps data rate up to 150 meters are supported between the adapter and an attaching device or switch. When used with IBM Fibre Channel storage switches supporting long-wave optics, distances of up to 10 kilometers are capable running at either 1 Gbps, 2 Gbps, or 4 Gbps data rates.

The 4 Gigabit Single-Port Fibre Channel PCI-X Adapter can be used to attach devices either directly, or by means of fibre channel switches. If attaching a device or switch with a SC type fiber connectors, use of an LC-SC 50 micron fiber converter cable (#2456) or a LC-SC 62.5 micron fiber converter cable (#2459) is required.

### **Adapter specifications**

**Item Description**

**Adapter FRU number**

03N5014\* or 03N5005\*\*

\* Designed to comply with RoHS requirement.

\*\* Not designed to comply with the RoHS requirement.

**Wrap plug FRU number**

11P3847 (FC 1905, 5758, 5761)

**I/O bus architecture**

PCI-X 2.0a, PCI 3.0, PCI-X Mode 2 - 266MHz, PCI-X Mode 1 - 133 MHz, PCI - 66 MHz

**Slot requirement**

One available 3.3 volt PCI or PCI-X slot

**FC compatibility**

1, 2, 4 Gigabit

**Cables**

50/125 micron Fibre

1.0625Gb/sec 2m-500m

2.125Gb/sec 2m – 300m

4.25Gb/sec 2m – 150m  
6.25/125 micron fibre  
1.0625 Gb/sec 2m – 300m  
2.125 Gb/sec 2m – 150m  
4.25 Gb/sec 2m – 70m

#### Maximum number

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

#### Operating system or partition requirements


AIX 5L Version 5.2 with the 5200-08 Technology Level

AIX 5L Version 5.3 with the 5300-04 Technology Level

Red Hat Enterprise Linux version 4 U2

SUSE Linux Enterprise Server 9 SP3

i5/OS V5R3M0 with PTFs, V5R3M5 with PTFs, V5R4M0 base.

**Note:** If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing PTF prerequisites. To do this, use the IBM Prerequisite Web site at [http://www-912.ibm.com/e\\_dir/eServerPrereq.nsf](http://www-912.ibm.com/e_dir/eServerPrereq.nsf) 

## 4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR adapter (FC 1910, 5759; CCIN 1910, 5759)

Learn about the specifications and operating system requirements for the 4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR adapter.

The 4 Gigabit Dual-Port Fibre Channel PCI-X 2.0 DDR Adapter is a 64-bit address/data, short form factor PCI-X adapter with an LC type external fiber connector that provides single or dual initiator capability over an optical fiber link or loop. With the use of appropriate optical fiber cabling, this adapter provides the capability for a network of high-speed local and remote located storage. The adapter will auto-negotiate for the highest data rate between adapter and an attaching device at 1 Gbps, 2 Gbps or 4 Gbps of which the device or switch is capable. Between the adapter and an attaching device or switch, the distances supported are up to: 500 meters running at 1 Gbps data rate, 300 meters running at 2 Gbps data rate, and 150 meters running at 4 Gbps data rate. When used with IBM fibre channel storage switches supporting long-wave optics, distances of up to 10 kilometers are capable running at either 1 Gbps, 2 Gbps, or 4 Gbps data rates.

The 4 Gb Dual-Port Fibre Channel PCI-X Adapter can be used to attach devices either directly, or by means of fibre channel switches. If attaching a device or switch with a SC type fiber connectors, use a LC-SC 50 micron fiber converter cable (#2456) or a LC-SC 62.5 micron fiber converter cable (#2459).

### Adapter specifications

#### Item Description

##### Adapter FRU number

03N5029\* or 03N5020\*\*

\* Designed to comply with RoHS requirement.

\*\* Not designed to comply with the RoHS requirement.

##### Wrap plug FRU number

11P3847 (FC 1910, 5759)

##### I/O bus architecture

PCI-X 2.0a, PCI 3.0, PCI-X Mode 2 - 266MHz, PCI-X Mode 1 - 133 MHz, PCI - 66 MHz

**Slot requirement**

One available 3.3 volt PCI or PCI-X slot

**FC compatibility**

1, 2, 4 Gigabit

**Cables**

50/125 micron Fibre

1.0625Gb/sec 2m-500m

2.125Gb/sec 2m – 300m

4.25Gb/sec 2m – 150m

6.25/125 micron fibre

1.0625 Gb/sec 2m – 300m

2.125 Gb/sec 2m – 150m

4.25 Gb/sec 2m – 70m

**Maximum number**

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

**Operating system or partition requirements**

AIX 5L Version 5.2 with the 5200-08 Technology Level

AIX 5L Version 5.3 with the 5300-04 Technology Level

Red Hat Enterprise Linux version 4 U2

SUSE Linux Enterprise Server 9 SP3

## PCI-X Ultra RAID Disk Controller (FC 2757; CCIN 2757)

Learn about the specifications for the PCI-X Ultra RAID Disk Controller.

This adapter is a PCI-X SCSI controller with a maximum compressed write cache of 757 MB. The 2757 provides RAID-5 protection for internal disks and also supports internal tape units, internal CD/DVD-ROM and internal DVD-RAM units. The 2757 has four LVD SCSI buses. Hardware data compression is not supported.

### Specifications

**Item Description****FRU number**

039J5057 \*\*

\*\*Not designed to comply with RoHS requirement.

**I/O bus architecture**

PCI 2.2 compliant

**Slot requirement**

One available 3.3 volt PCI or PCI-X slot

**Maximum number**

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

**Operating system or partition requirements**

i5/OS V5R3 or later

**Tools** None**Cables**

Attachment cables are included with the attaching subsystem or device.

## PCI-X Ultra4 RAID Disk Controller (FC 0627, 0641, 2780; CCIN 2780)

Learn about the specifications for the PCI-X Ultra RAID Disk Controller.

This adapter is a Ultra4 (Ultra320) SCSI controller with a maximum compressed write cache of 757 MB and a maximum compressed read cache size of 1 GB, that provides RAID-5 protection for internal disks and also supports internal tape units, CD-ROM and DVD units. The 2780 has four Ultra4 (Ultra320) SCSI buses. In addition to providing RAID-5 protection for disks, it is also designed to work as a high performance controller for disks protected by system mirroring or disks with no protection. This controller also uses a Cache Battery Pack, which can be replaced concurrently with system operation.

The 0627 is a direct attach 2780 for use with Linux or AIX.

The 0641 is a direct attach 2780 with a CCIN 574F auxiliary-write cache IOA.

### Specifications

#### Item Description

FRU number  
042R7704 \*

\*Designed to comply with RoHS requirement.

#### I/O bus architecture

PCI 2.2 compliant

#### Slot requirement

One available 3.3 volt PCI or PCI-X slot

#### Maximum number

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

#### Operating system or partition requirements

i5/OS V5R3 or later

AIX 5L Version 5.2 with the 5200-10 Technology Level, or later

AIX 5L Version 5.3 with the 5300-06 Technology Level, or later

Red Hat Enterprise Linux version 4 U4 , or later

SUSE Linux Enterprise Server 10, or later

Tools None

#### Cables

Attachment cables are included with the attaching subsystem or device.

## PCI-X quad-channel Ultra320 SCSI RAID adapter (FC 0649, 5582, 5583, 5738, 5777; CCIN 571E)

Learn about the features and specifications for the PCI-X quad-channel Ultra320 SCSI RAID adapter for IBM System i models.

### Feature codes


- 571E is the Custom Card Identification Number (CCIN) on the adapter.
- 0649 is direct-attach feature code for the adapter on AIX and Linux partitions.
- 5738 is the IOP-based feature code for the adapter for i5/OS.
- 5777 is the IOPless feature code for the adapter for i5/OS.
- The 5582 includes an IOP-based 5738 PCI-X quad-channel Ultra320 SCSI RAID adapter and a CCIN 574F auxiliary-write cache IOA.
- The 5583 includes an IOPless, 5777 PCI-X quad-channel Ultra320 SCSI RAID adapter and a CCIN 574F auxiliary-write cache IOA

## Adapter features

- 64-bit, 3.3 volt
- Address support for up to 60, 16-bit SCSI physical disk drives on 4 independent internal SCSI buses. (The actual number of drives is limited by physical device placement limitations.)
- Four internal (only) U320 SCSI ports. Internally attached Ultra320 devices are designed to run at a data rate of up to 320 MB per second on systems that have internal backplanes that are capable of supporting Ultra320 speeds.
- Utilizes Low Voltage Differential (LVD) drivers and receivers. It can support single ended (SE) and LVD devices on SCSI bus 1, but LVD devices only on other SCSI busses.
- Up to 1.5 GB of compressed write cache, and up to 1.6 GB of compressed read cache
  - 390 MB/1.5 GB compressed write cache.
  - 415 MB/1.6 GB compressed read cache.
- Removable cache card with a concurrently maintainable battery. The removable transportable cache card can be used by service providers for cache data recovery procedures.
- PCI-X support
- RAID capability:
  - Supports RAID and non-RAID DASD, tape, and optical devices.
  - 0649 provides RAID 0, 10, 5, 6 capability.
  - 5582 and 5583 provide RAID-5 or RAID-6 capability.
    - A minimum of 3 disk drives is required for RAID-5.
    - A minimum of 4 disk drives is required for RAID-6.
    - 574F Auxiliary Cache IOA is required for either RAID level.

For information about using an auxiliary-write cache IOA, see “Auxiliary-write cache IOA (FC 0641, 0649, 5582, 5583, 5590; CCIN 574F)” on page 44.

## Specifications

| Item                                       | Description  |
|--|--|
| Adapter FRU number                         | 42R5130  |
| Cache battery FRU number                   | 39J5554  |
| Cables                                     | Attachment cables are included with the attaching subsystem or device.   |
| I/O bus architecture                       | PCI-X compliant  |
| Slot requirement                           | One available 3.3 volt PCI or PCI-X slot when the disk controller adapter is used by itself.<br><br>Two available 3.3 volt PCI or PCI-X slot when the disk controller adapter is used with an auxiliary-write cache adapter.   |
| Operating system or partition requirements | <p>i5/OS:</p> <ul style="list-style-type: none"> <li>• V5R3, V5R3m5, and V5R4 with PTFs</li> <li>• To determine if there are any existing PTF prerequisites, see the IBM Prerequisite Web site at <a href="http://www-912.ibm.com/e_dir/eServerPrereq.nsf">http://www-912.ibm.com/e_dir/eServerPrereq.nsf</a> .</li> </ul> <p>AIX</p> <ul style="list-style-type: none"> <li>• AIX 5L Version 5.2 with the 5200-10 Technology Level, or later</li> <li>• AIX 5L Version 5.3 with the 5300-06 Technology Level, or later</li> </ul> <p>Linux</p> <ul style="list-style-type: none"> <li>• Red Hat Enterprise Linux version 4 U4 , or later</li> <li>• SUSE Linux Enterprise Server 10, or later</li> </ul> |

| Item                     | Description  |
|--------------------------|--|
| Installation Information | For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic. |

## Adapter side view, end view, and SCSI connectors

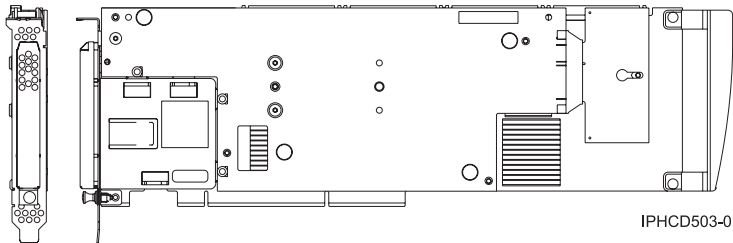


Figure 8. Adapter side view and end view

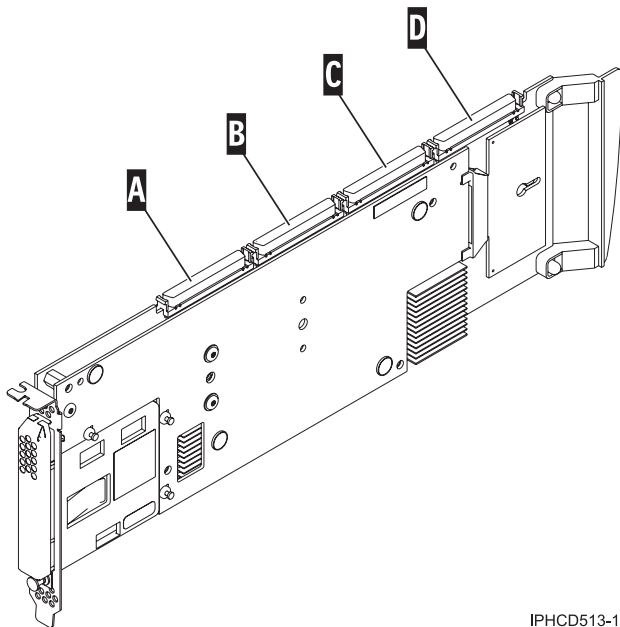


Figure 9. Adapter SCSI connectors

- A** SCSI connector 1 = bus 0
- B** SCSI connector 2 = bus 1
- C** SCSI connector 3 = bus 2
- D** SCSI connector 4 = bus 3

## PCI-X double-wide, quad-channel Ultra320 SCSI RAID controller (FC 5739, 5778, 5781, 5782; CCIN 571F, 575B)

Learn about the features, specifications and installation notes for the PCI-X double-wide, quad-channel Ultra320 SCSI RAID controller for IBM System i models.

The PCI-X double-wide, quad-channel Ultra320 SCSI RAID controller is a high-performance SCSI adapter combined with an auxiliary-write cache adapter to form a double-wide, adapter pair. The two adapters are screwed together. This topic contains the following sections:

- “Features”
- “Specifications”
- “Placement information” on page 36
- “Logical partitioning (LPAR)” on page 36
- “Replacing the light pipe assembly” on page 36
- “Installing the adapter in a cassette” on page 37
- “Adapter dividers” on page 38
- “Power LED” on page 38
- “Concurrent maintenance procedure” on page 38

## Features

- 3 external U320 SCSI ports
- 1 internal U320 SCSI port dedicated to connecting the controller to the auxiliary-write cache adapter
- Up to 36 Direct Access Storage Devices (DASD) can be externally attached per adapter
- 320 MB/s data rate per SCSI bus
- Supports low voltage differential (LVD) disk devices only
- Supports RAID 5 and 6 (3–18 drive sets)
- 390 MB/1.5 GB compressed write cache
- 415 MB/1.6 GB compressed read cache
- PCI-X DDR support (storage adapter side)
- IOP or IOPless (5739 requires an IOP. 5778 does not.)

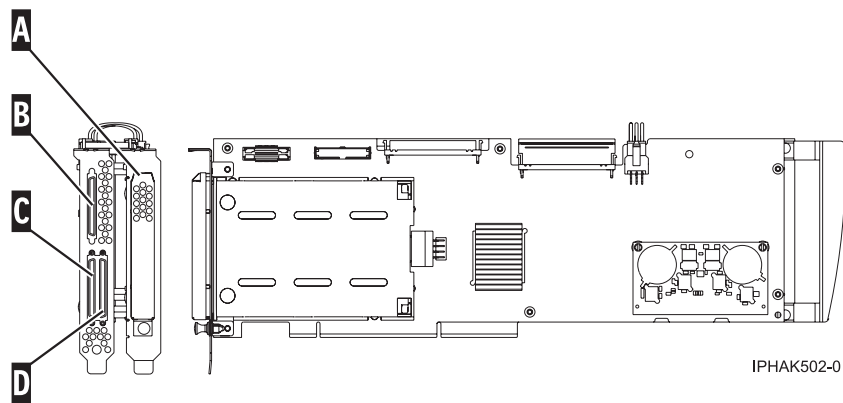



Figure 10. Adapter

- A** Battery cover
- B** SCSI port 2
- C** SCSI port 0
- D** SCSI port 1

## Specifications

| Item                     | Description |
|--------------------------|-------------|
| Adapter FRU number       | 42R6578     |
| Cache battery FRU number | 42R3965     |

| Item                                       | Description   |
|--|---|
| Series type                                | IBM System i models   |
| Unit description                           | <ul style="list-style-type: none"> <li>• 64 bit, 133 MHz, 3.3 V</li> <li>• PCI-X 2.0 compliant</li> <li>• Double-wide adapter, requires 2, adjacent, long slots. The SCSI controller side of the adapter pair requires a 64-bit slot. (The controller side is the side with the external SCSI connectors.)</li> <li>• The auxiliary-write cache adapter contains a dual, concurrently maintainable, cache-battery pack, which maintains cache memory on both adapters in the event of an abnormal termination.</li> </ul>   |
| Operating system or partition requirements | <ul style="list-style-type: none"> <li>• i5/OS V5R3, V5R3m5, and V5R4 with PTFs.</li> <li>• AIX 5L Version 5.2 with the 5200-10 Technology Level, or later</li> <li>• AIX 5L Version 5.3 with the 5300-06 Technology Level, or later</li> <li>• Red Hat Enterprise Linux version 4 U4 , or later</li> <li>• SUSE Linux Enterprise Server 10, or later</li> </ul> <p>Check the IBM Prerequisite Web site at <a href="http://www-912.ibm.com/e_dir/eServerPrereq.nsf">http://www-912.ibm.com/e_dir/eServerPrereq.nsf</a>  for further details and updates.</p> |
| Maximum number                             | For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic.  |

## Placement information

For placement information for this adapter, see the PCI adapter placement for IBM System i5<sup>®</sup> and eServer<sup>™</sup> i5 system units and expansion units including the section High-end SCSI controller placement.

## Logical partitioning (LPAR)

When used in an logical partition (LPAR) environment, this double-wide adapter must have both slots of the adapter assigned to the same logical partition. When implementing dynamic logical partitioning (DLPAR), both slots of the adapter must be managed together.

## Replacing the light pipe assembly

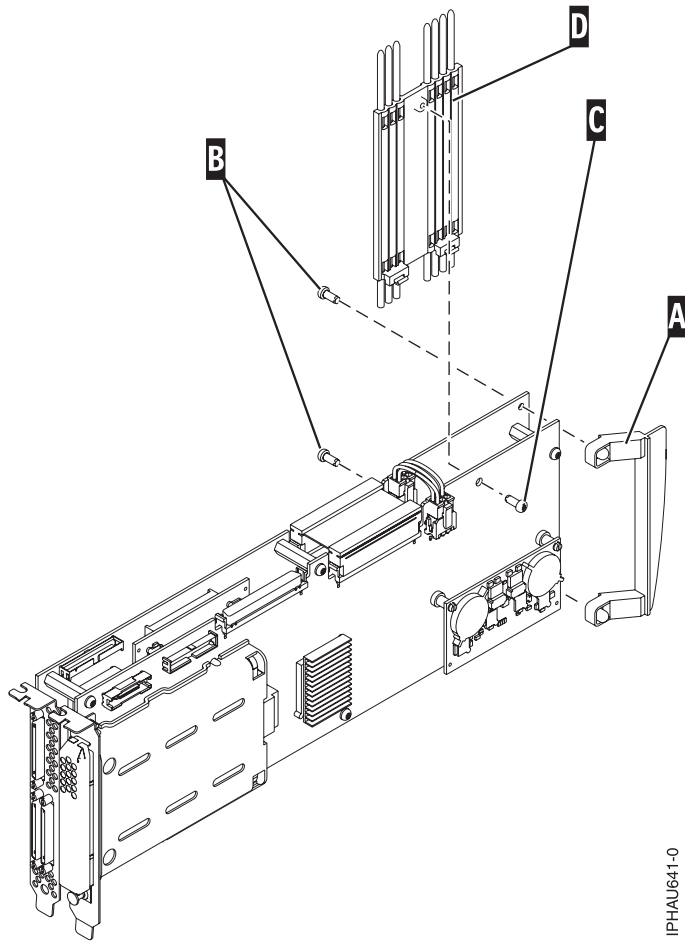
If you are replacing a double-wide adapter which contains a light pipe assembly, you will need to move the light pipe assembly to the replacement FRU. To replace the light pipe, follow these steps:

1. If necessary, remove the adapter handle **A** from the back of the card set.

**Tip:** If you misplace the light-pipe retaining screw **C**, use either of the screws that secure the card handle **B** to the card.

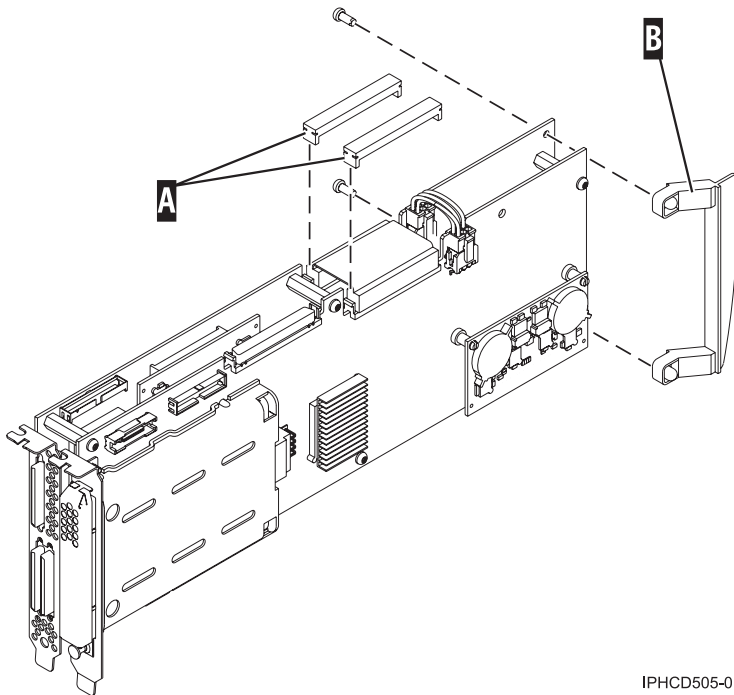
2. Slide the light pipe assembly **D** between the two halves of the adapter. Ensure that the threaded screw hole located on the light pipe assembly is aligned with the screw clearance hole located on the card .





## Installing the adapter in a cassette

To install this adapter in a cassette, first remove the adapter handle (B), and the two plastic covers from the SCSI jumper cable (A), as shown in the following figure. Then follow the general procedures to Place an adapter in the PCI adapter double-wide cassette.



IPHCD505-0

Figure 11. Preparing the adapter for placement in a cassette

## Adapter dividers

If you are installing this double-wide adapter in a system model that uses adapter dividers, the adapter divider must be removed from between the two slots where you are installing the adapter. For instructions, see Model 285, 52x, 550, and 720 PCI adapter dividers

## Power LED

For a double-wide adapter, there is only one power LED visible for both slots.

## Concurrent maintenance procedure

Concurrent maintenance of this adapter is not supported through the Hardware Management Console (HMC). Concurrent maintenance must be done from the Hardware Service Manager (HSM) of the system or owning partition. The HSM will automatically power off both PCI slots when either slot is selected.

### Important:

- Both PCI slots must be powered off when installing or removing this adapter with the system power on.
- If this adapter is the load source IOA, or under the load source IOP, or any other storage IOA/IOP with critical DASD attached for the system, this concurrent maintenance procedure should be done by a qualified service provider. At step 12 on page 39, the HSM will direct you to use control panel functions 68 and 69 to power off the domain.

Follow this procedure:

1. Start an i5/OS session for the system or partition containing the adapter and sign on to the system or partition.
2. Type **strsst** on the command line of the Main Menu and then press Enter.
3. Type your service tools user ID and service tools password on the System Service Tools (SST) Sign On display and press Enter.

4. Select **Start a service tool** from the System Service Tools (SST) display and press Enter.
5. Select **Hardware service manager** from the Start a Service Tools display and press Enter.
6. Select **Logical hardware resources (system, frames, cards)** from the Hardware Service Manager display and press Enter.
7. Select **System bus resources** and press Enter. The display changes to the Logical Hardware Resources on System Bus display.
8. Page down and locate **Combined Function IOP** that controls the IOA to be serviced.
9. Enter 9 in the Opt field for the **Combined Function IOP** to be serviced.
10. Locate the **Storage IOA** resource for the adapter to be serviced and enter 8 in the Opt field for that resource.
11. Enter 3 for **Concurrent maintenance** in the Opt field for the **Storage IOA** resource to be serviced. The display changes to the Hardware Resource Concurrent Maintenance display.
12. Press F9 to power off the domain.
13. Press Enter to confirm start power off. The display changes to the Hardware Resource Concurrent Maintenance Status display, which shows the status of the power off.  
When the power off is complete, the display returns to the Hardware Resource Concurrent Maintenance display. The display will show that the **Power Status** is off for **Storage IOA**. Leave this display up on the HSM while you remove and replace the adapter.
14. Check the slot power LED state for the slot in which the adapter resides to verify that the adapter is powered off.  
For a double-wide adapter, there is only one power LED visible for both slots.
15. Remove and replace the adapter. Removal and replacement procedures are covered in the PCI adapters topic.
16. After the replacement is complete, return to the Hardware Resource Concurrent Maintenance display on the HSM.
17. If you were previously instructed to use operator panel function 69 to power on the adapter, do so now. Then go to step 22, otherwise continue with next step.
18. Enter F10 to power the adapter on.
19. Press Enter to begin power on.
20. If the Work with Controlling Resource display appears, enter 7 in the Opt field for the **Combined function IOP** to assign the IOA to.  
The Hardware Resource Concurrent Maintenance Status display shows the status of the power on.
21. When the power on is complete, the display returns to the Hardware Resource Concurrent Maintenance display. The display will show that the **Power Status** is on for the **Storage IOA**.
22. Check the LED status to verify that the adapter is powered on.  
For a double-wide adapter, there is only one power LED visible for both slots.
23. Return to the procedure that sent you here.

## **PCI-X DDR dual-channel Ultra320 SCSI adapter (FC 0647, 1912, 5736, 5775; CCIN 571A)**

Learn about the specifications for the PCI-X DDR dual-channel Ultra320 SCSI adapter.

The PCI-X DDR dual-channel Ultra320 SCSI adapter is a high-performance SCSI adapter for PCI-X and PCI systems. The adapter provides two SCSI channels (buses), each capable of running 320 MBps (maximum). Each SCSI bus can either be internal (on systems that support internal SCSI devices or backplane attachments) or external, but not both. Internally attached Ultra320 devices run at a data rate of up to 320 MBps on systems that have internal backplanes that are capable of supporting Ultra320 speeds.

The adapter uses and supports low voltage differential (LVD) drivers and receivers only.

## PCI-X DDR dual-channel Ultra320 SCSI adapter specifications

| Item | Description |
|------|-------------|
|------|-------------|

|                   |  |
|-------------------|--|
| <b>FRU number</b> |  |
|-------------------|--|

FC 0647, 5736, or 5775 is 42R4860\* or 39J4996\*\*

FC 1912 is 42R4862\* or 39J4998\*\*

\* Designed to comply with RoHS requirement.

\*\* Not designed to comply with the RoHS requirement.

|                             |  |
|-----------------------------|--|
| <b>I/O bus architecture</b> |  |
|-----------------------------|--|

PCI 2.2 compliant

|                         |  |
|-------------------------|--|
| <b>Slot requirement</b> |  |
|-------------------------|--|

One available 3.3 volt PCI or PCI-X slot

|                       |  |
|-----------------------|--|
| <b>Maximum number</b> |  |
|-----------------------|--|

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

|   |  |
|---|--|
| <b>Operating system or partition requirements</b> |  |
|---|--|

AIX 5L Version 5.2 with the 5200-08 Technology Level, or later

AIX 5L Version 5.3 with the 5300-03 Technology Level, or later

Red Hat Enterprise Linux 4 Update 2, or later

SUSE Linux Enterprise Server 9 Service Pack 2, or later

|                                     |  |
|-------------------------------------|--|
| <b>Required software or drivers</b> |  |
|-------------------------------------|--|

AIX - devices.pci.1410c002 device driver package

Linux - ipr driver Version 2.0.10.3 (or later) for SLES 9 kernels, Version 2.0.11.1 (or later) for RHEL4 kernels, or Version 2.0.13 (or later) for kernel.org kernels (kernel version 2.6.12 or later)

|              |      |
|--------------|------|
| <b>Tools</b> | None |
|--------------|------|

|               |  |
|---------------|--|
| <b>Cables</b> |  |
|---------------|--|

Attachment cables are included with the attaching subsystem or device.

## PCI-X DDR dual-channel Ultra320 SCSI RAID adapter (FC 0648, 1913, 5737, 5776; CCIN 571B)

Learn about the specifications for the PCI-X DDR dual-channel Ultra320 SCSI RAID adapter.

The PCI-X DDR dual-channel Ultra320 SCSI RAID adapter is a high-performance SCSI adapter for PCI-X and PCI systems. The adapter provides RAID 0,10,5,6 capability, 90 MB of write cache, and can address up to 30 16-bit SCSI physical disk drives on two independent SCSI buses. The adapter uses and supports low voltage differential (LVD) drivers and receivers only. Each SCSI bus can either be internal (on systems that support internal SCSI devices or backplane attachments) or external, but not both. Internally attached Ultra320 devices run at a data rate of up to 320 MBps on systems that have internal backplanes that are capable of supporting Ultra320 speeds.

## PCI-X DDR dual-channel Ultra320 SCSI RAID adapter specifications

| Item | Description |
|------|-------------|
|------|-------------|

|                   |  |
|-------------------|--|
| <b>FRU number</b> |  |
|-------------------|--|

FC 0648, 5737, or 5776 is 42R4855\* or 39J5024\*\*

FC 1913 is 42R4857\* or 39J5026\*\*

\* Designed to comply with RoHS requirement.

\*\* Not designed to comply with the RoHS requirement.

|                             |  |
|-----------------------------|--|
| <b>I/O bus architecture</b> |  |
|-----------------------------|--|

PCI 2.2 compliant

**Slot requirement**

One available 3.3 volt PCI or PCI-X slot

**Maximum number**

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

**Operating system or partition requirements**

AIX 5L Version 5.2 with the 5200-07 Technology Level, or later

AIX 5L Version 5.3 with the 5300-03 Technology Level, or later

Red Hat Enterprise Linux version 4, Update 2 or newer

SUSE Linux Enterprise Server 9 Service Pack 2 or newer

i5/OS V5R3 or later

**Required software or drivers**

AIX - devices.pci.1410be02 device driver package

Linux - ipr driver Version 2.0.10.3 (or later) for SLES 9 kernels, Version 2.0.11.1 (or later) for RHEL4 kernels, or Version 2.0.13 (or later) for kernel.org kernels (kernel version 2.6.12 or later)

**Tools** None

**Cables**

Attachment cables are shipped with the attaching subsystem or device.

**Using and maintaining the adapter**

For information about replacing the cache battery, see Replacing the cache battery pack on the 571B, 1913, or 5737.

For information about using and maintaining the adapter, see the *PCI-X SCSI RAID controller reference guide for AIX* or *PCI-X SCSI RAID controller reference guide for Linux*. The guides can be found in the Reference information topic collection.

**Auxiliary-write cache IOA (FC 5580, 5581; CCIN 5708)**

Learn about the specifications and installation notes for the auxiliary-write cache IOA adapter and the PCI-X Ultra4 RAID disk-controller adapters used with it.

Feature 5580 includes a 2780 PCI-X Ultra4 RAID disk-controller adapter, a CCIN 5708 auxiliary-write cache IOA adapter, and the required connection cable. Feature 5581 includes a 2757 PCI-X Ultra RAID disk-controller adapter, a CCIN 5708 auxiliary-write cache IOA adapter, and the required connection cable.

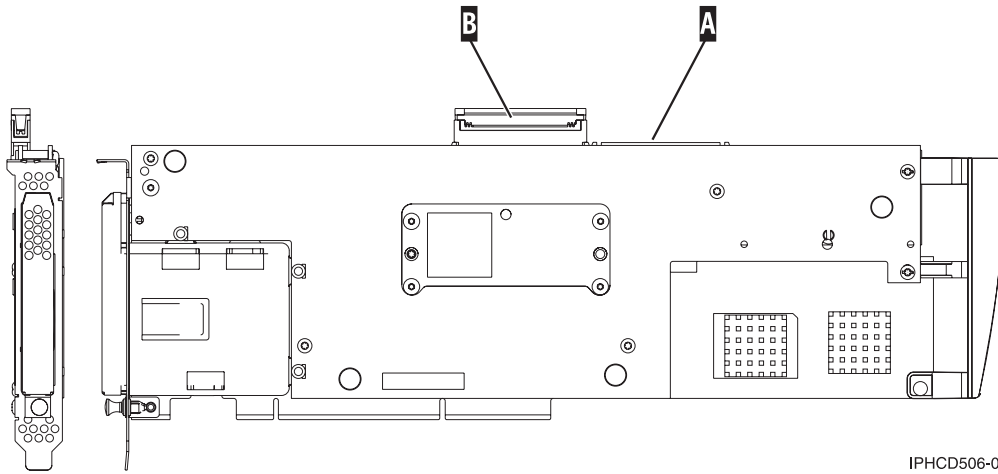


Figure 12. 5708, auxiliary-write cache IOA

- A** SCSI port used to attach the auxiliary-write cache IOA to a supported disk-controller. See “Installing the SCSI cable” on page 43.
- B** Unused SCSI port shown here with a cover over it.

A physical cable connection is required between the 5708 adapter and SCSI port 4 of a 2780 or 2757 adapter. Both the 5708 adapter and the disk-controller adapter it is connected to must be installed in the same physical system unit or expansion unit, and must be installed in the same partition.

The 5708 adapter has 757 MB of auxiliary maximum compressed write cache. The adapter mirrors the write cache of the disk-controller adapter that it is connected to. Protection of data is enhanced by having two copies of the write cache stored on separate adapters. If a failure occurs to the write cache of the disk-controller, the 5708 adapter provides a backup copy during the recovery of the failed IOA.

### Considerations for installing or converting to feature 5580 or 5581

**Attention:** Converting your adapters to feature 5580 or 5581 will require extensive planning. If the planning is not done correctly, the result could be an extended server outage, loss of data, or both. You might need to do a full system restoration.

Read the following questions in relation to your system:

- Are you converting from feature 2780 to feature 5580?
- Are you converting from feature 2757 to feature 5581?
- Are you replacing any other existing storage adapters with features 5580 and 5581?
- Is your server partitioned (LPAR) ?

If the answer to any of these questions is yes, or you are unsure of the answers, contact your authorized service provider for planning and deployment services.

For planning information and examples of deployment for features 5580 and 5581, see Planning for Disk Storage Availability with Cache Solutions

### 5708 adapter specifications

| Item               | Description |
|--------------------|-------------|
| Adapter FRU number | 39J0686     |
| Battery FRU number | 97P4846     |

| Item                                       | Description   |
|--|---|
| Cable FRU number                           | 39J1702   |
| Cables                                     | Specific Storage Adapter to Auxiliary Storage Adapter SCSI cable is necessary and is provided with each feature or conversion.  |
| I/O bus architecture                       | PCI 2.2 power/bus compliant   |
| Unit description                           | <ul style="list-style-type: none"> <li>• Long, 64 bit, 133 MHz, 3.3 V edge connector, single-slot</li> <li>• PCI-X 2.0 compliant</li> <li>• Compatible down to 32 bit, 33 MHz PCI adapter slots</li> </ul>  |
| Operating system or partition requirements | Supported in the i5/OS operating systems or partitions only, versions V5R2, V5R3, and later.  |
| Maximum number                             | For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic.  |
| Partition information                      | <ul style="list-style-type: none"> <li>• If you are placing the feature in the primary partition or any non-partitioned system, the auxiliary cache IOA for the load source adapter must be in the same enclosure as the load source IOA.</li> <li>• If you are placing the feature in the secondary partition on any system, the auxiliary cache IOA for the load source adapter must be under the load source IOP.</li> </ul>   |
| Related information                        | <ul style="list-style-type: none"> <li>• This feature must be placed in attached expansion units. The 5708 adapter cannot be placed in the model 520, 550, or 570 system units.</li> <li>• The disk controller adapter and the auxiliary-write cache adapter each require one PCI slot.</li> <li>• Both adapters must be installed in the same enclosure.</li> <li>• The adapters are connected by a SCSI cable (provided).</li> <li>• The operating system identifies the 5708 adapter as a storage controller with no devices attached.</li> <li>• The 5708 adapter is not supported in an environment without an IOP.</li> <li>• Types 2780 and 2757 will not appear on ordering, shipping, or inventory documentation when received as part of these features.</li> </ul> |

## Installing the adapters

Refer to the PCI adapters topic for instructions on placement and installation of PCI adapters.

Return here for instruction on installing the SCSI cable.

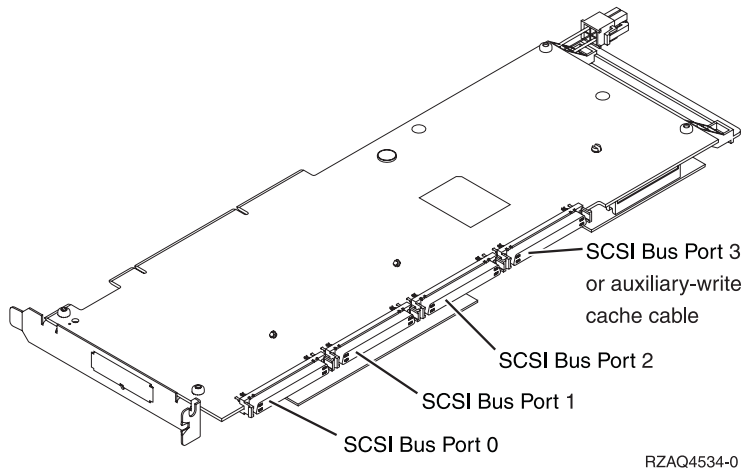
## Installing the SCSI cable

The disk controller adapter and the auxiliary-write cache adapter are connected by a SCSI cable.

**Attention:** Do not install or remove the adapter cable if the adapters have the power on. Use the service procedures to turn off the power to the adapter slots or shut down the system or partition in which the adapters are placed.

To install the SCSI cable, do the following:

1. Attach the SCSI cable to SCSI bus port 3 (fourth physical port) of the disk controller adapter.



2. Attach the cable to SCSI port **A** on the auxiliary-write cache adapter. See Figure 12 on page 42.

**Note:**

1. Attaching the cable to the disk controller reduces the number of SCSI buses that support disk drives from four to three.
2. Reducing the number of SCSI buses might also reduce the number of disk drives supported by the disk controller, depending on the system unit or expansion drawer in which the disk controller is installed.
3. No disk drives are driven by the auxiliary-write cache adapter. This adapter protects against extended outage caused by loss of write cache, but does not protect against a disk controller failure.

**Auxiliary-write cache IOA (FC 0641, 0649, 5582, 5583, 5590; CCIN 574F)**

Learn about the specifications and installation notes for the auxiliary-write cache IOA adapter.

Custom Card Identification Number (CCIN) 574F is an auxiliary-write cache IOA that provides 1.5 GB of (compressed) auxiliary-write cache when paired with a RAID disk controllers.

- The 574F auxiliary-write cache IOA can be used with the 5738, 5777, 2780, 2757, disk controllers.
- The 574F can be used as a replacement IOA for the 5708 auxiliary-write cache IOA.
- The 0641 includes a direct attach 2780 PCI-X Ultra4 RAID Disk Controller and a CCIN 574F auxiliary-write cache IOA.
- The 0649 includes a direct attach 5738 PCI-X quad-channel Ultra320 SCSI RAID adapter and a CCIN 574F auxiliary-write cache IOA
- The 5582 includes an IOP-based 5738 PCI-X quad-channel Ultra320 SCSI RAID adapter and a CCIN 574F auxiliary-write cache IOA.
- The 5583 includes an IOPless, 5777 PCI-X quad-channel Ultra320 SCSI RAID adapter and a CCIN 574F auxiliary-write cache IOA
- The 5590 includes a 2780 PCI-X Ultra4 RAID Disk Controller and a CCIN 574F auxiliary-write cache IOA.

The auxiliary-write cache IOA mirrors the write cache of the disk-controller IOA to which it is connected. If a failure occurs to the write cache of the disk-controller, the auxiliary-write cache IOA provides a backup copy during the recovery of the failed IOA.

The disk controller IOA and the secondary, auxiliary-write cache IOA each require one PCI-X slot and must be installed together in the same enclosure. The disk controller IOA and the auxiliary-write cache IOA are connected by a SCSI cable (provided). The connecting SCSI cable is attached to SCSI bus port 3 of the disk controller IOA, reducing the number of SCSI buses that support disk drives from four to



three. The reduction of SCSI buses can also reduce the number of disk drives supported by the disk controller, depending on the enclosure in which the disk controller is installed. No disk drives are driven by the auxiliary-write cache IOA.

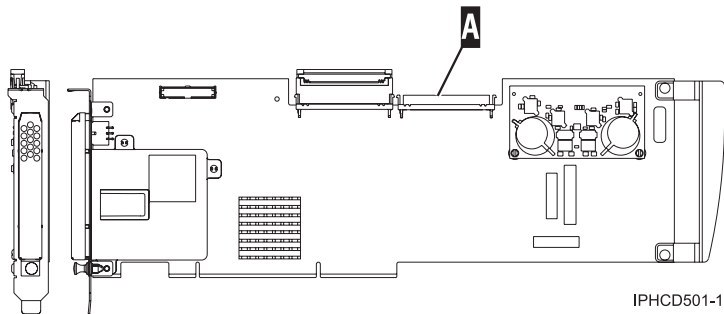


Figure 13. Auxiliary-write cache IOA

**A** SCSI connector

## Considerations for installing or converting to feature 5582 or 5583

**Attention:** Converting your adapters to feature 5582 or 5583 requires extensive planning. If the planning is not done correctly, the result could be an extended server outage, loss of data, or both. You might need to do a system restoration.

Read the following questions as they pertain to your system:


- Are you converting from feature 5738 to feature 5582 or 5583?
- Are you replacing any other existing storage adapters with features 5582 and 5583?
- Is your server partitioned, meaning is it an LPAR?

If the answer to any of these questions is yes, or you are unsure of the answers, it is a good idea to contact your authorized service provider for planning and deployment services.

For planning information and examples of deployment, see [Planning for Disk Storage Availability with Auxiliary Write Cache Solutions](#)

## 574F adapter specifications

| Item                     | Description  |
|--------------------------|--|
| Adapter FRU number       | 42R5133  |
| Cache battery FRU number | 39J5554  |
| Cable FRU number         | 39J1702  |
| Cables                   | A specific storage adapter to auxiliary storage adapter SCSI cable is necessary and is provided with each feature or conversion.   |
| Unit description         | <ul style="list-style-type: none"> <li>• Long, 64 bit, 133 MHz, 3.3 V edge connector, single-slot</li> <li>• PCI-X 2.2 compliant</li> <li>• Compatible down to 32 bit, 33 MHz PCI adapter slots</li> </ul> |

| Item                                       | Description  |
|--|--|
| Operating system or partition requirements | <p><b>i5/OS</b></p> <ul style="list-style-type: none"> <li>When 574F is used with the 2780 or 2757 controller, the feature is supported in V5R2 or later.</li> <li>When 574F is used with the 5738 or 5777 controller, the feature is supported in V5R3 or later.</li> </ul> <p><b>Important:</b> There will be a PTF/Cum level prerequisite for each release. Check the IBM Prerequisite Web site at <a href="http://www-912.ibm.com/e_dir/eServerPrereq.nsf">http://www-912.ibm.com/e_dir/eServerPrereq.nsf</a>  .</p> <p><b>AIX</b></p> <ul style="list-style-type: none"> <li>AIX 5L Version 5.2 with the 5200-10 Technology Level</li> <li>AIX 5L Version 5.3 with the 5300-06 Technology Level</li> </ul>   |
| Maximum number                             | For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic  |
| Partition information                      | <ul style="list-style-type: none"> <li>If you are placing the feature in the primary partition or any non-partitioned system, the auxiliary cache IOA for the load source (LS) adapter must be in the same enclosure as the LS IOA.</li> <li>If you are placing the feature in the secondary partition on any system, the auxiliary cache IOA for the LS adapter must be under the LS IOP.</li> </ul>  |
| Related information                        | <ul style="list-style-type: none"> <li>The auxiliary-write cache IOA cannot be placed in the model 520, 550, or 570 system units. The auxiliary-write cache IOA must be placed in attached expansion units.</li> <li>The disk controller adapter and the auxiliary-write cache adapter each require one PCI slot.</li> <li>Both adapters must be installed in the same enclosure.</li> <li>The adapters are connected by a SCSI cable that is provided.</li> <li>The operating system identifies the auxiliary-write cache IOA as a storage controller with no devices attached. The operating system does not identify which controller the auxiliary-write cache IOA is connected to.</li> <li>The adapter pairs must both be IOPless, or IOP controlled. <ul style="list-style-type: none"> <li>The 5582 includes an IOP-based 5738 PCI-X quad-channel Ultra320 SCSI RAID adapter and a CCIN 574F auxiliary-write cache IOA.</li> <li>The 5583 includes an IOPless, 5777 PCI-X quad-channel Ultra320 SCSI RAID adapter and a CCIN 574F auxiliary-write cache IOA</li> </ul> </li> </ul> |

## Installing the adapters

To install the adapters, refer to the PCI adapters topic, and then return here for instruction on installing the SCSI cable.

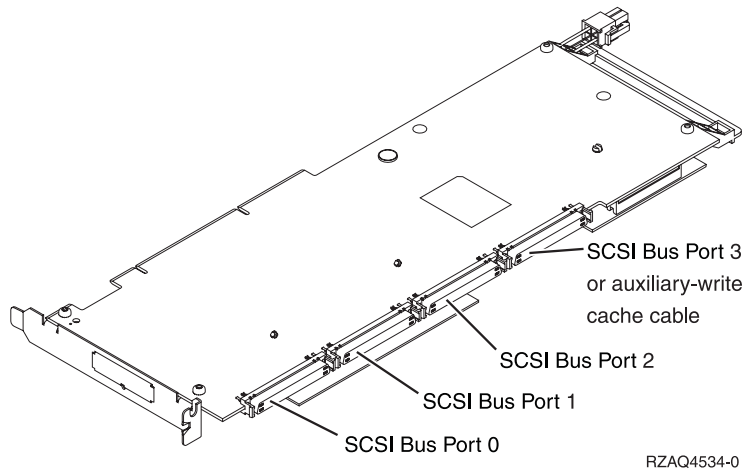
## Installing the SCSI cable

The disk controller adapter and the auxiliary-write cache adapter are connected by a SCSI cable.

**Attention:** Do not install or remove the adapter cable if the adapters have the power on. Use the service procedures to turn off the power to the adapter slots or shut down the system or partition in which the adapters are placed.

To install the SCSI cable, do the following:

1. Attach the SCSI cable to SCSI bus port 3 (fourth physical port) of the disk controller adapter.



2. Attach the cable to the SCSI port on the auxiliary-write cache adapter.

**Note:**

- Attaching the cable to the disk controller reduces the number of SCSI buses that support disk drives from four to three.
- Reducing the number of SCSI buses might also reduce the number of disk drives supported by the disk controller, depending on the system unit or expansion drawer in which the disk controller is installed.
- No disk drives are driven by the auxiliary-write cache adapter. This adapter protects against extended outage caused by loss of write cache, but does not protect against a disk controller failure.

**iSCSI Host Bus Adapter (FC 5783, 5784; CCIN 573B, 573C)**

Learn about the iSCSI Host Bus Adapter (HBA) for IBM System i integrated xSeries® systems with links to installation documentation.

IBM supports attachment of IBM eServer, xSeries and BladeCenter® blade servers to a System i model using an iSCSI network. This implementation uses iSCSI host bus adapters (iSCSI HBAs) and provides systems management and disk consolidation features. Attachment of servers by way of iSCSI HBAs requires i5/OS V5R4.

**Overview**

For a technical overview of the iSCSI HBA that includes benefits, hardware summary, and supported operating systems, see iSCSI host bus adapter at <http://www-03.ibm.com/systems/i/bladecenter/iscsi/>.

**Installation**

For instructions on installing a PCI adapter, see the PCI adapters topic.

Connecting IBM eServer, xSeries and BladeCenter blade servers to a System i model requires additional installation steps beyond the physical installation of the iSCSI HBA PCI adapter. For additional instructions, see the iSCSI install read me first Web page at <http://www.ibm.com/servers/eserver/iseries/integratedxseries/iscsi/readme/>.

**PCI-X DDR External Dual – x4 Port SAS Adapter (FC 5912; CCIN 572A)**

Learn about the specifications and operating system requirements for the 5912 adapter.

## Overview

The Peripheral Component Interconnect-X (PCI-X) DDR External Dual – x4 Port SAS Adapter is a low-profile adapter for high-performance and high-density, serial-attached SCSI (SAS) applications. The adapter provides two mini SAS 4x connectors, which allow the eight physical links to be used in various narrow and wide-port configurations. The adapter is a 64-bit, 3.3 V, bootable SAS adapter that provides RAID 0, 5, 6, and 10 capability. Some RAID level support is operating system dependent. The adapter provides RAID 0, RAID 5, RAID 6 and RAID 10 for AIX and Linux. Under the IBM i operating system, mirroring and data spreading is provided by the operating system and RAID 5 and RAID 6 is provided by the adapter.

The adapter does not have write cache. (The write performance of RAID level 5 and RAID level 6 may be poor on adapters which do not provide write cache. Consider using an adapter which provides write cache when using RAID level 5 or RAID level 6.)

The adapter can address up to 48 SAS disk drives, although the actual number of drives in a system is subject to the physical placement limitations of the system. Externally attached devices are designed to run at a data rate of 1.5 Gb/s for Serial Advanced Technology Attachment (SATA) devices, and 3 Gb/s for SAS devices. This card supports RAID and non-RAID DASD, tape, and optical devices. Feature 5912 supports the multi-initiator and high availability configurations.

**Important:** See the SAS RAID controller for AIX or SAS RAID controller for Linux topics for more information and important considerations for multi-initiator and high availability configurations. See also Important partitioning considerations with dual-slot and multi-adapter configurations.

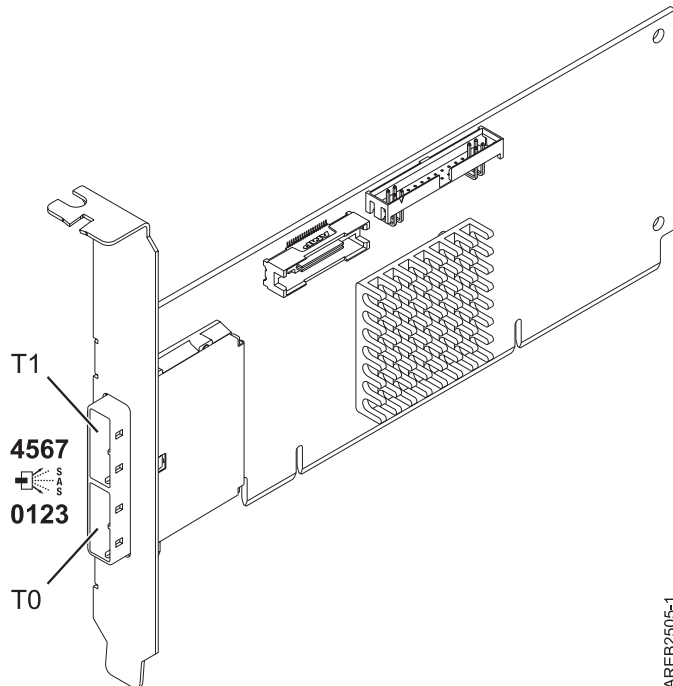


Figure 14. PCI-X DDR External Dual – x4 Port SAS Adapter

## Specifications

| Item | Description |
|------|-------------|
|------|-------------|

**Adapter FRU number**

5912: 44V4413\*

\* Designed to comply with RoHS requirement.

**I/O bus architecture**

PCI-X DDR

**Slot requirement**

One available PCI-X slot

**Cables**

SAS device attachment requires specific cables that are provided with the subsystem or device features being attached. See Serial-attached SCSI cable planning.

**Voltage**

3.3V

**Form factor**

Short, low-profile

**Maximum number**

See PCI adapter placement in the system unit or expansion unit.

**Attributes provided**

- Two external mini SAS 4x connectors provide attachment of SAS and SATA device enclosures
- SAS Serial SCSI Protocol (SSP), Serial ATA Tunneling Protocol (STP), and Serial Management Protocol (SMP)
- RAID 0, 5, 6, 10

The write performance of RAID level 5 and RAID level 6 may be poor on adapters which do not provide write cache. Consider using an adapter which provides write cache when using RAID level 5 or RAID level 6.

- Concurrent firmware update
- Removable media device supported (Removable media is not supported in multi-initiator and high availability configurations)
- 440 - 500 Mhz PowerPC (PPC)
- Support for multi-initiator and high availability configurations (5912)

## Operating system or partition requirements

This adapter is supported for the following operating systems:

- AIX 5L Version 5.3 with the Technology Level 6 and Service Pack 4 (5300-06-04), or later
- AIX 5L Version 5.3 with the 5300-07 Technology Level, or later
- AIX 6.1
- Red Hat Enterprise Linux version 5, with update 1, or later
- SUSE Linux Enterprise Server 10, with service pack 1, or later
- IBM i V5R4m5, or later
- IBM i 6.1, or later

The following versions are required for multi-initiator and high availability support:

- AIX Version 6.1 with the 6100-01 Technology Level, or later
- AIX 5L Version 5.3 with the 5300-08 Technology Level, or later
- Red Hat Enterprise Linux version 4, with update 7, or later
- Red Hat Enterprise Linux version 5, with update 2, or later
- SUSE Linux Enterprise Server 10, with service pack 2, or later

This adapter requires the following drivers:

- AIX: devices.pci.1410bd02 device driver package
- Linux:

- Version 2.0.11.5, or later, for RHEL 4 kernels
- Version 2.2.0.1, or later, for RHEL 5 kernels
- Version 2.2.0.1, or later, for SLES 10 kernels
- Version 2.3.0, or later, for kernel.org kernels (kernel version 2.6.20, or later)

**Note:** If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite

Web site at [http://www-912.ibm.com/e\\_dir/eServerPrereq.nsf](http://www-912.ibm.com/e_dir/eServerPrereq.nsf)  .

## **PCI-X DDR Dual –x4 Port SAS RAID Adapter (FC 5902; CCIN 572B)**

Learn about the specifications and operating system requirements for the 5902 adapter.

### **Overview**

The PCI-X DDR Dual –x4 Port SAS RAID Adapter is a long-form factor adapter for high-performance, serial-attached SCSI (SAS) applications. FC 5902 is always to be used in a high availability, multi-initiator RAID configuration using two adapters in dual-controller mode. Two 5902 adapters provide for mirrored-write cache data and mirrored-RAID parity footprints between the two adapters. If the 5902 pairing is broken, then write cache is disabled. With correct cabling, multiple wide ports are used to provide redundant paths to each dual port SAS disk. The adapter manages SAS path redundancy and path switching should a SAS failure occur. The adapter is a 64-bit, 3.3 V, bootable SAS adapter that supports RAID levels 0, 5, 6, and 10. The adapter pairs are used primarily with EXP 12S SAS disk expansion drawers, FC 5886, but can also be connected to the internal disk drives in the system unit using the appropriate split disk backplane feature and cabling.

**Important:** See the SAS RAID controller for AIX or SAS RAID controller for Linux topics for more information and important considerations for multi-initiator and high availability configurations. See also Important partitioning considerations with dual-slot and multi-adapter configurations.

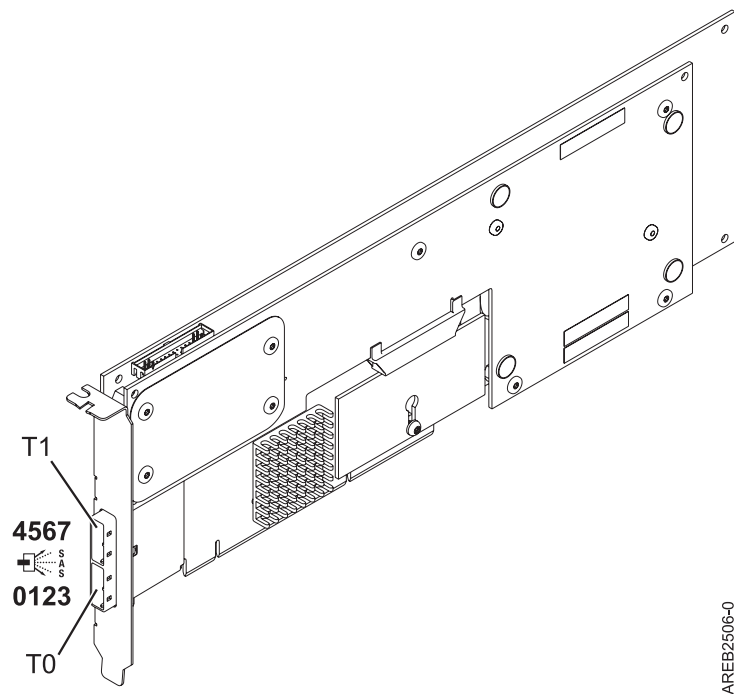


Figure 15. PCI-X DDR Dual -x4 Port SAS RAID Adapter

## Specifications

### Item Description

#### Adapter FRU number

44V5194 (Designed to comply with RoHS requirement.)

#### Battery FRU number

39J5555 (Designed to comply with RoHS requirement.)

#### I/O bus architecture

PCI-X DDR

#### Slot requirement

One long, 64-bit, 3.3 V, Peripheral Component Interconnect-X (PCI-X) slot for each adapter.

Adapters are installed in pairs.

Adapter pairs do not need to be in the same enclosure. For higher availability, place adapters in separate enclosures. For supported placement, see the PCI adapter placement in the system unit or expansion unit.

#### Cables

SAS device attachment requires specific cables that are provided with the subsystem or device features being attached. See Serial-attached SCSI cable planning.

#### Voltage

3.3V

#### Form factor

Long

#### Maximum number

See the PCI adapter placement in the system unit or expansion unit.

#### Attributes provided

- Eight physical links by way of two external x4 SAS ports provides attachment of SAS disk enclosures only
- Supports up to 48 SAS disks when configured with four FC 5886 EXP 12S disk expansion drawers

- Removable media devices are not supported
- SAS Serial SCSI Protocol (SSP), and Serial Management Protocol (SMP)
- 175 MB of nonvolatile fast write cache
- RAID 0, 5, 6, 10
- Concurrent firmware update
- 440 - 500 Mhz PowerPC (PPC)

## Operating system or partition requirements

This adapter is supported for the following operating systems:

- AIX 5L Version 5.3 with the 5300-08 Technology Level, or later
- AIX Version 6.1 with the 6100-01 Technology Level, or later
- Red Hat Enterprise Linux version 4, with update 7, or later
- Red Hat Enterprise Linux version 5, with update 2, or later
- SUSE Linux Enterprise Server 10, with service pack 2, or later

This adapter requires the following drivers:

- AIX: devices.pci.1410bd02 device driver package
- Linux:
  - iprutils version 2.2.8 and ipr driver version 2.0.11.6 (or newer) for RHEL4 kernels
  - iprutils version 2.2.8 and ipr driver version 2.2.0.2 (or newer) for RHEL5 kernels
  - iprutils version 2.2.8 and ipr driver version 2.2.0.2 (or newer) for SLES10 kernels

**Note:** If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite

Web site at [http://www-912.ibm.com/e\\_dir/eServerPrereq.nsf](http://www-912.ibm.com/e_dir/eServerPrereq.nsf) .

## PCI-X DDR 1.5 GB cache SAS RAID Adapter (FC 5904, 5906, 5908; CCIN 572F and 575C)

Learn about the specifications and operating system requirements for the 5904, 5906, and 5908 adapter.

### Overview

The PCI-X DDR 1.5 GB cache SAS RAID Adapter is a SAS disk controller with a maximum of 1.5 GB compressed write cache and a maximum 1.6 GB compressed read cache. Auxiliary write cache and concurrent battery maintenance are provided. The controller is implemented using two physical adapters that are securely connected to form a double-wide adapter. The double-wide adapter requires two adjacent Peripheral Component Interconnect-X (PCI-X) slots. The auxiliary write cache side of the double-wide adapter contains a dual, concurrently maintainable cache battery pack which maintains cache memory on both adapters in the event of an abnormal termination.

When used in a logical partition (LPAR) environment, this double-wide adapter must have both slots of the adapter assigned to the same logical partition. When implementing dynamic LPAR (DLPAR), both slots of the adapter must be managed together.

Feature 5904, 5906, and 5908 are all feature codes representing the same PCI-X DDR 1.5 GB cache SAS RAID Adapter. Different feature codes indicate if a blind swap cassette is used and its type:

- Feature 5904 indicates no blind swap cassette. The feature is used in enclosures that do not use blind swap cassettes.
- Feature 5906 indicates a gen-2.5 blind swap cassette. The feature is used in the 5797 and 5798 enclosures.



- Feature 5908 indicates a gen-3 blind swap cassette. This feature is used in the 5790, 5796, and 9117-MMA enclosures.

572F is the CCIN number on the RAID adapter side of the double-wide adapter pair. 575C is the CCIN number on the write-cache adapter.

The adapter provides RAID 0, RAID 5, RAID 6, and RAID 10 for the AIX and Linux operating systems. Under the IBM i operating system, mirroring and data spreading are provided by the operating system, and RAID 5 and RAID 6 are provided by the adapter.<sup>1</sup>

The adapter provides three mini-SAS 4x connectors for the attachment of SAS drives located in 5886 EXP 12S Expansion Drawers. The adapter supports a maximum of five 5886 EXP 12S Expansion Drawers.<sup>1</sup> With proper cabling and configuration, multiple wide ports are used to provide redundant paths to each dual port SAS drive. The adapter manages SAS path redundancy and path switching should a SAS failure occur.

With the optional pairing of adapter sets, an even higher level of protection is provided by using a dual controller I/O configuration<sup>1</sup> to protect against the failure of an entire adapter set. In such a high availability I/O configuration, SAS X cables are used to attach 5886 EXP 12S Expansion Drawers, and the fourth mini-SAS connector on each card set is used to directly connect the card sets by using a SAS AA cable.

**Important:** See the SAS RAID controller for AIX or SAS RAID controller for Linux topics for more information and important considerations for multi-initiator and high availability configurations. See also Important partitioning considerations with dual-slot and multi-adapter configurations.

<sup>1</sup> See “POWER5 restrictions” on page 55.

The following figure shows the adapter.

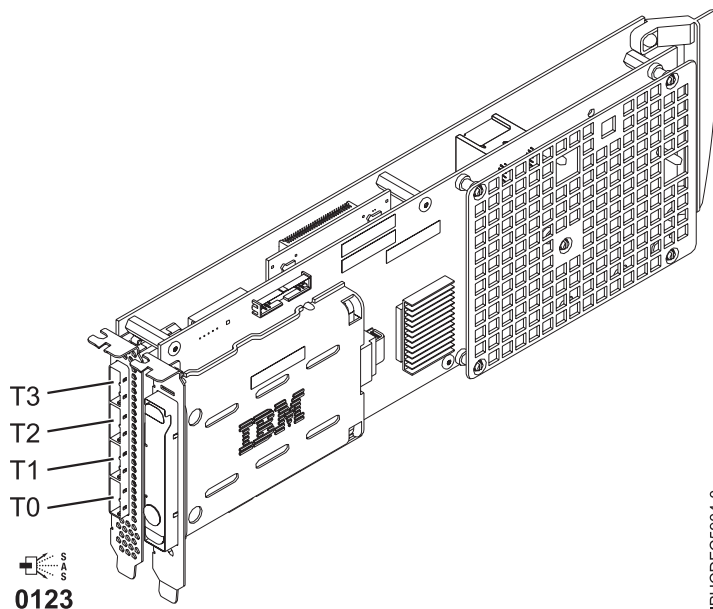


Figure 16. PCI-X DDR 1.5GB cache SAS RAID Adapter

**Note:** Port T3 does not support any device attachment. It is only used in dual controller I/O configurations for adapter to adapter communication.

## Specifications

### Item Description

#### Adapter FRU number

44V5193 (Designed to comply with RoHS requirement.)

#### Battery FRU number

39J5555 (Designed to comply with RoHS requirement.)

#### I/O bus architecture

PCI-X

#### Slot requirement

Two, long, adjacent PCI-X slots.

#### Cables

SAS device attachment requires specific cables that are provided with the subsystem or device features being attached. See Serial-attached SCSI cable planning.

#### Voltage

3.3V

#### Form factor

Long

#### Maximum number

See PCI adapter placement in the system unit or expansion unit.

#### Attributes

- SAS speed: 3 Gbps
- SAS, SAS Serial SCSI Protocol (SSP) and Serial Management Protocol (SMP) supported
- Single controller supported with SAS y cables (3692, 3693, 3694)
- Dual controller supported with SAS x cables (3661, 3662, 3663) and SAS 2:6 cable (3681, 3682)
- Single controller supports mirrored write cache data with auxiliary cache
- Dual controller supports mirrored-write cache data and mirrored-RAID parity footprints between card sets
- Removable media devices are not supported

## Operating system or partition requirements

This adapter is supported for the following operating systems:

- AIX:
  - AIX 5L Version 5.3 with the 5300-07 Technology Level and Service Pack 8, or later
  - AIX 5L Version 5.3 with the 5300-08 Technology Level and Service Pack 6, or later
  - AIX 5L Version 5.3 with the 5300-09 Technology Level and Service Pack 2, or later
  - AIX 5L Version 5.3 with the 5300-10 Technology Level, or later
  - AIX 6.1 and Service Pack 8, or later
  - AIX Version 6.1 with the 6100-01 Technology Level and Service Pack 4, or later
  - AIX Version 6.1 with the 6100-02 Technology Level and Service Pack 3, or later
  - AIX Version 6.1 with the 6100-03 Technology Level, or later
- Linux:
  - Red Hat Enterprise Linux version 4, with update 7, or later
  - Red Hat Enterprise Linux version 5, with update 2, or later
  - SUSE Linux Enterprise Server 10, with service pack 2, or later
- IBM i
  - IBM i V5R4m5 and Resave F, or later
  - IBM i 6.1 and Resave F, or later

This adapter requires the following drivers:

- AIX: devices.pci.1410bd02 device driver package

- Linux:
  - iprutils version 2.4.1 and ipr driver version 2.0.11.6 (or newer) for RHEL4 kernels
  - iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or newer) for RHEL5 kernels
  - iprutils version 2.4.1 and ipr driver version 2.2.0.2 (or newer) for SLES10 kernels

**Note:** If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing prerequisites. To do this, use the IBM Prerequisite

Web site at [http://www-912.ibm.com/e\\_dir/eServerPrereq.nsf](http://www-912.ibm.com/e_dir/eServerPrereq.nsf)  .

## Concurrent maintenance procedure

Concurrent maintenance of this adapter is not supported through the Hardware Management Console (HMC). Concurrent maintenance must be done from within the partition operating system. In IBM i, the Hardware Service Manager (HSM) of the system or owning partition will automatically power off both PCI slots when either slot is selected.

## POWER5™ restrictions

When the feature is used in a POWER5 based system configuration, the following restrictions apply:

- A maximum of three 5886 EXP 12S Expansion drawers can be attached per controller. Cascading is not supported.
- IBM i load source capability is not provided.
- The optional dual controller I/O configuration is not supported.

## 1 Gigabit iSCSI TOE PCI-X adapter (FC 5714, 1987, 5713, 1986)(CCIN 573B, 573C)

Learn about the 1 Gigabit iSCSI TOE PCI-X adapter.

### Description and technical overview

The IBM 1 Gigabit iSCSI TOE PCI-X Adapter encapsulates SCSI commands and data into TCP packets and transports them over a 1-gigabit-Ethernet network through IP. The adapter is dual function, operating as an iSCSI TOE (TCP/IP offload engine) adapter or as a general purpose Ethernet adapter where the TCP/IP protocol is offloaded onto the adapter. However, the network function is not supported by AIX.

The adapter is available in the following versions:

1 Gigabit-SX iSCSI TOE PCI-X Adapter (optical connector), FC 5714 and FC 1987

1 Gigabit-TX iSCSI TOE PCI-X Adapter (copper connector), FC 5713 and FC 1986

### 1 Gigabit-SX iSCSI TOE PCI-X Adapter (optical connector), FC 5714 and FC 1987 (CCIN 573C)

- FRU part number 03N6058\* or 30R5519\*\*  
 (\* Designed to comply with RoHS requirement.  
 \*\* Not designed to comply with the RoHS requirement.)
- Blind swap cassette, spacer bracket FRU number 10N8625, For use with generation 2.5 cassettes (16R0091), or earlier
- 133 MHz PCI-X version 1.0a support and version 2.0 mode 1
- PCI 2.3 compliant
- Low profile
- 3.3 V
- Hardware implementation of entire TCP/IP stack
- 200 MB/s, full duplex gigabit Ethernet

- iSCSI initiator support
- IEEE 802.3z compliant
- iSCSI RFC 3720 Compliant
- Multimode fiber cabling support
- Fiber LC connector for multimode fiber cabling
- Dual-address cycle support for access to 64-bit addresses
- 64-bit addressing support for systems with physical memory greater than 4 gigabytes
- PCI-X split transactions support
- LED indicator for link activity

**Note:** The fiber adapters are designed with specifications that the cable be a dual-cable connector, with transmit and receive cable ends clamped together. If you use separate transmit and receive fiber cables, clamp the cables together to enhance the retention strength on the fiber transceiver connector. Clamping the cables together also improves the alignment of the fibers with the connector and is designed to improve overall performance.

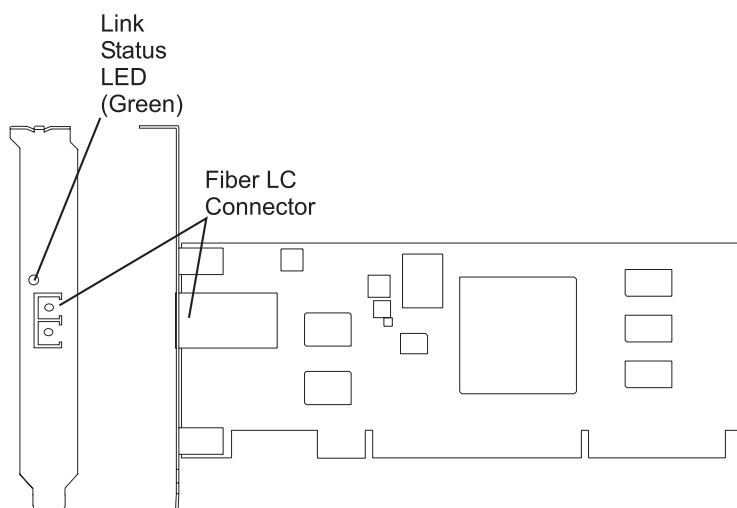


Figure 17. 1 Gigabit-SX iSCSI TOE PCI-X Adapter

### 1 Gigabit-TX iSCSI TOE PCI-X Adapter (copper connector), FC 5713 and FC 1986 (CCIN 573B)

- FRU part number 03N6056\* or 30R5219\*\*  
 (\* Designed to comply with RoHS requirement.  
 \*\* Not designed to comply with the RoHS requirement.)
- 133 MHz PCI-X version 1.0a support and version 2.0 mode 1
- PCI 2.3 compliant
- Low profile
- 3.3 v
- Hardware implementation of entire TCP/IP protocol stack
- Full Duplex Gigabit Ethernet
- iSCSI initiator support
- IEEE 802.3ab 1000 Base-T compliant
- iSCSI RFC 3720 Compliant
- PCI-X split transactions support
- LED indicator for link activity
- RJ-45 unshielded twisted pair (UTP) connector

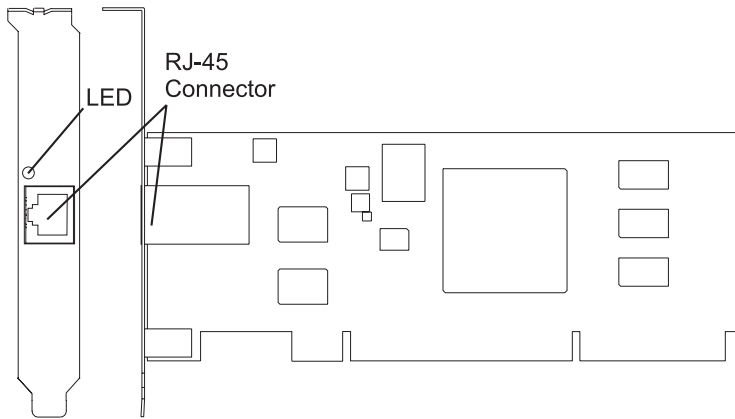


Figure 18. 1 Gigabit-TX iSCSI TOE PCI-X Adapter

### Preparing to install the adapter

Preparing to install the adapter involves the following tasks.

- Verifying your hardware requirements
- Verifying your software requirements
- Checking prerequisites
- Gathering tools and documentation

**Note:** If you are installing your operating system at this time, install the adapter before you install the operating system. If you are installing only the device driver for this adapter, install the device driver before you install the adapter.

#### Verifying your hardware requirements:

Before you install your adapter, verify that you have the required hardware.

#### 1 Gigabit-TX iSCSI TOE PCI-X Adapter (copper connector)

The IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter requires the following hardware:

- Cat 5, Cat 5e, or Cat 6 unshielded twisted pair (UTP) cables for network attachment.  
Customers supply the cables.

**Restriction:** The cable can be no longer than 100 meters (including patch cables) from the adapter to the local switch.

- RJ-45 wrap plug. (Part number 00P1689, included in FC 5713 and FC 1986)

#### 1 Gigabit-SX iSCSI TOE PCI-X Adapter (optical connector)

The IBM 1 Gigabit-SX iSCSI TOE PCI-X Adapter requires the following hardware:

- A wrap plug for the multimode fiber connector (Part number 113847, included in FC 5714 and FC 1987)
- Shortwave (850 nm) 50/62.5 micron multimode fiber network attachment

The following table shows the minimum and maximum allowable fiber cable lengths from the SX adapter to the gigabit Ethernet switch, including patch cables:

Table 8. Fiber cable lengths for the 1 Gigabit-SX iSCSI TOE PCI-X Adapter (optical connector).


| Fiber type        | Modal bandwidth (MHz-km) | Minimum range (meters) | Maximum range (meters) |
|-------------------|--------------------------|------------------------|------------------------|
| 62.5 $\mu$ .m MMF | 160                      | 2                      | 220                    |
| 62.5 $\mu$ .m MMF | 200                      | 2                      | 275                    |
| 50 $\mu$ .m MMF   | 400                      | 2                      | 500                    |
| 50 $\mu$ .m MMF   | 500                      | 2                      | 500                    |

### Verifying your software requirements:

Before you install your adapter, verify that you have the required operating system software.

The 1 Gigabit iSCSI TOE PCI-X Adapter is supported on AIX 5L version 5.2 and 5.3, and on SUSE Linux Enterprise Server 9 SP3.

For additional information, see the IBM Prerequisite Web site at

[http://www-912.ibm.com/e\\_dir/eServerPrereq.nsf](http://www-912.ibm.com/e_dir/eServerPrereq.nsf) 

### Checking prerequisites:

To install the adapter, you will need the following items.

- The adapter
- AIX Base Operating System CD, which includes the device driver, or the AIX device driver CD

If an item is missing or damaged, contact your vendor.

**Note:** Be sure to retain your proof of purchase as it might be required to receive warranty service.

### Gathering tools and documentation:

To install the adapter, you need the following tools and documentation.

- A flat-blade screwdriver
- Instructions on how to install a PCI adapter in your specific, system unit.  
Refer to the PCI adapters topic for instructions on placement and installation of PCI adapters.
- Your operating system documentation. The documentation can be found in the eServer pSeries® and AIX Information Center.

## Installing the device driver software for the adapter

Use the information in this section to install the device driver software. The device driver is provided for the AIX operating system.

### Installing the device driver software for the IBM 1 Gigabit-SX iSCSI TOE PCI-X adapter:

Learn how to install the device driver software. The device driver is provided for the AIX operating system.

**Note:** If you are installing your operating system at this time, install the adapter before you install the operating system. If you are installing only the device driver for this adapter, install the device driver before you install the adapter.

1. If you should install your device driver software first, go to step 1 and continue with this section.

2. If you should install your adapter hardware first, go to “Installing the IBM 1 Gigabit iSCSI TOE PCI-X adapter” on page 61. When you install AIX, your adapter device driver is automatically installed.

**Note:** You only need to install the device driver for the first instance of the IBM 1 Gigabit-SX iSCSI TOE PCI-X Adapter. Any subsequent installation of the IBM 1 Gigabit-SX iSCSI TOE PCI-X Adapter will not require that you install the device driver again. Go to “Installing the IBM 1 Gigabit iSCSI TOE PCI-X adapter” on page 61 for instructions.

To install the device driver software, do the following:

1. Turn on the system unit power.
2. Log in as root user.
3. Insert the media containing the device driver software (for example, a CD-ROM ) into the appropriate media device. If your system does not have a CD-ROM drive, refer to your system documentation for performing a NIM (Network Installation Management) installation.
4. At the command line, type the following System Management Interface Tool (SMIT) fastpath:  
smit devinst
5. Press Enter. The Install Additional Device Software screen highlights the INPUT device/directory for software option.
6. Select or type your input device:  
Press F4 to display the input device list. Select the name of the device (for example: CD-ROM) that you are using, and press Enter.  
OR  
In the entry field, type the name of the input device you are using and press Enter.  
The Install Additional Device Software window highlights the SOFTWARE to install option
7. Press F4 to display the SOFTWARE to install window.
8. Type a forward slash (/) to display the Find window.
9. For the IBM 1 Gigabit-SX iSCSI TOE PCI-X Adapter, type the following device package name:  
devices.pci.1410cf02
10. Press Enter. The system finds and highlights this device driver software.
11. Press Enter.  
The INSTALL ADDITIONAL DEVICE SOFTWARE screen displays. The entry fields are automatically updated.
12. Press Enter to accept the information.  
The ARE YOU SURE window displays.
13. Press Enter to accept the information.  
The COMMAND STATUS screen displays. The term RUNNING is highlighted, to indicate that the installation and configuration command is in progress.
14. When RUNNING changes to OK, scroll to the bottom of the page and locate the Installation Summary.  
After a successful installation, SUCCESS displays in the Result column of the Installation Summary.
15. Remove the installation media from the drive.
16. Press F10 to exit SMIT.
17. Go to “Installing the IBM 1 Gigabit iSCSI TOE PCI-X adapter” on page 61, to see the adapter installation procedure.

#### **Verify AIX software installation:**

Use this procedure to verify that the device driver for the adapter is installed.

1. If necessary, log in as root user.

2. At the command line, type: `lslpp -l devices.pci.1410cf02.rte`
3. Press Enter. Possible results are as follows:
  - If the 1 Gigabit-SX iSCSI TOE PCI-X Adapter device driver is installed, the following is an example of the data that displays on your screen:

| Fileset   | Level   | State     | Description  |
|---|---------|-----------|--|
| Path: /usr/lib/objrepos<br>devices.pci.1410cf02.rte | 5.3.0.0 | COMMITTED | 1000 Base-SX PCI-X iSCSI TOE Adapter Device Software |

Verify that the **devices.pci.1410cf02.rte** filesets are installed at the AIX 5.2.0 or later level. If this information displays but you continue to have problems, go to “Installing the IBM 1 Gigabit iSCSI TOE PCI-X adapter” on page 61.

- If no data displays on your screen, the 1 Gigabit-SX iSCSI TOE PCI-X Adapter device driver did not install correctly. Return to “Installing the device driver software for the IBM 1 Gigabit-SX iSCSI TOE PCI-X adapter” on page 58. If you continue to experience problems, it may be necessary to call your system support organization. Refer to your operating system documentation for instructions.

### Installing the device driver software for the IBM 1 Gigabit-TX iSCSI TOE PCI-X adapter:

Learn how to install the device driver software. The device driver is provided for the AIX operating system.

**Note:** If you are installing your operating system at this time, install the adapter before you install the operating system. If you are installing only the device driver for this adapter, install the device driver before you install the adapter.

- If you should install your device driver software first, go to step 1 and continue with this section.
- If you should install your adapter hardware first, go to “Installing the IBM 1 Gigabit iSCSI TOE PCI-X adapter” on page 61. When you install AIX, your adapter device driver automatically installs.

**Note:** You only need to install device driver for the first instance of the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter. Any subsequent installation of the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter will not require device driver installation again. Go to “Installing the IBM 1 Gigabit iSCSI TOE PCI-X adapter” on page 61 for instructions.

To install device driver software:

1. Turn on the system unit power.
2. Log in as root user.
3. Insert the media containing the device driver software (for example: CD-ROM) into the appropriate media device. If your system does not have a CD-ROM drive, refer to your AIX operating system documentation for performing a NIM (Network Installation Management) installation.
4. Type the following System Management Interface Tool (SMIT) fastpath:  

```
smit devinst
```
5. Press Enter. The Install Additional Device Software screen highlights the INPUT device/directory for software option.
6. Select or type your input device:  
 Press F4 to display the input device list. Select the name of the device (for example: CD-ROM) that you are using and press Enter.  
 OR  
 In the entry field, type the name of the input device you are using and press Enter.  
 The Install Additional Device Software window highlights the SOFTWARE to install option.
7. Press F4 to display the SOFTWARE to install window.
8. Type the following to display the Find window:



/

9. For the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter, type the following device package name:  
devices.pci.1410d002
10. Press Enter. The system finds and highlights this device driver software.
11. Press F7 to select the highlighted device driver software.
12. Press Enter.  
The INSTALL ADDITIONAL DEVICE SOFTWARE screen displays. The entry fields are automatically updated.
13. Press Enter to accept the information.  
The ARE YOU SURE window displays.
14. Press Enter to accept the information.  
The COMMAND STATUS screen displays. The term RUNNING is highlighted to indicate that the installation and configuration command is in progress.
15. When RUNNING changes to OK, scroll to the bottom of the page and locate the Installation Summary.  
After a successful installation, SUCCESS displays in the Result column of the Installation Summary at the bottom of the page.
16. Remove the installation media from the drive.
17. Press F10 to exit SMIT.
18. Go to the adapter installation procedure, "Installing the IBM 1 Gigabit iSCSI TOE PCI-X adapter."

### Verifying AIX software installation:

Use this procedure to verify that the device driver for the adapter is installed.

1. If necessary, log in as root user.
2. At the command line, type: `lslpp -l devices.pci.1410d002.rte`
3. Press Enter. Possible results are as follows:
  - If the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter device driver is installed, the following is an example of the data that displays on your screen:

| Fileset   | Level   | State     | Description   |
|---|---------|-----------|---|
| Path: /usr/lib/objrepos<br>devices.pci.1410d002.rte | 5.3.0.0 | COMMITTED | 1000 Base-TX PCI-X iSCSI TOE Adapter<br>Device Software |

Verify that the devices.pci.1410d002.rte filesets are installed at the AIX 5.2.0 or later level. If this information displays but you continue to have problems, go to "Installing the IBM 1 Gigabit iSCSI TOE PCI-X adapter."

- If no data displays on your screen, the IBM 1 Gigabit-TX iSCSI TOE PCI-X Adapter device driver did not install correctly. Return to "Installing the device driver software for the IBM 1 Gigabit-TX iSCSI TOE PCI-X adapter" on page 60. If you continue to experience problems, it may be necessary to call your system support organization. Refer to your operating system documentation for instructions.

### Installing the IBM 1 Gigabit iSCSI TOE PCI-X adapter

Use the procedures in this section to install the adapter, verify the adapter installation, and run adapter diagnostics.

#### Installing the adapter:

Learn how to install the adapter.

**Note:** If you are installing your operating system at this time, install the adapter before you install the operating system. If you are installing only the device driver for this adapter, install the device driver before you install the adapter.

Refer to the PCI adapters topic for instructions on placement and installation of PCI adapters.

After you have installed the adapter, continue on to “Verifying the adapter installation.”

To install your device driver software first, go to “Installing the device driver software for the adapter” on page 58 first, and then return to this section.

### **Verifying the adapter installation:**

Learn how to verify the adapter installation.

For general instructions on verifying an installed part, refer to the Verify the installed part topic

At the system prompt:

1. Type `cfgmgr` and then press Enter.
2. Type `lsdev -Cs pci` and then press Enter.

A list of PCI devices displays. If the 1 Gigabit-XX iSCSI TOE PCI-X Adapter installed correctly, an Available status indicates that the adapter is installed and ready to use.

If the message on your screen indicates that your adapter is Defined instead of Available, shut down your server. Verify that the adapter was installed correctly.

### **Running adapter diagnostics:**

Diagnostics are provided with the device driver software. To run diagnostics, refer to your system unit documentation for instructions.

## **Configuring the 1 Gigabit iSCSI TOE PCI-X adapter**

Use the following information to configure the 1 Gigabit iSCSI TOE PCI-X adapter in AIX.

**Note:** You must complete this configuration in order for the adapter to function correctly.

### **Overview of configuration process:**

These are the steps in the configuration process.

1. Install any device-specific storage device support files. See “Installing the device-specific storage support files.”
2. Use the **smit** command to configure the adapter in AIX. See “Configuring the adapter in AIX” on page 63.
3. Update the iSCSI targets flat file. See “Updating the iSCSI targets flat file” on page 63.
4. Configure the storage device. See “Configuring the storage device” on page 64.

### **Note:**

1. The adapter does not support autonegotiation. Connected devices should be set to 1 gigabit-per-second only.
2. Some Ethernet switch configurations exhibit degraded reliability when configured in a high fan-in topology. Observe conservative LAN resource allocation practices when planning Ethernet storage networks.

### **Installing the device-specific storage support files:**

For the system to function correctly with AIX, storage devices often require support-files. These files might include special utilities or device specific object data manager (ODM) entries.

Refer to the support documentation provided by the manufacturer of the storage device being used.

### Configuring the adapter in AIX:

Learn how to configure the adapter using AIX commands.

Using the **smit** command, do the following:

1. From the command prompt, type **smit icsi**, then press Enter.
2. In the **smit** menu, move the cursor over the **iSCSI Adapter** entry, then press Enter.
3. In the menu that displays, from the **Change/Show** option, select the number of the adapter you are configuring (Examples: **ics0**, **ics1**). The following is an example of the settings displayed when you select an adapter number:

|  |                        |    |
|--|------------------------|----|
|  | [Entry Fields]         |    |
| iSCSI Adapter                                  | ics0                   |    |
| Description                                    | iSCSI Adapter          |    |
| Status   | Available              |    |
| Location                                       | 1f-09                  |    |
| iSCSI Initiator Name                           | [ ]                    |    |
| Maximum number of Commands to Queue to Adapter | [200]                  | +# |
| Maximum Transfer Size                          | [0x100000]             | +  |
| Discovery Filename                             | [/etc/icsi/targetshw0] | *  |
| Discovery Policy                               | file                   | +  |
| Automatic Discovery Secrets Filename           | [/etc/icsi/autosecret> |    |
| Adapter IP Address                             | [10.100.100.14]        |    |
| Adapter Subnet Mask                            | [255.255.255.0]        |    |
| Adapter Gateway Address                        | [ ]                    |    |
| Apply change to DATABASE only                  | no                     | +  |

|            |               |              |             |
|------------|---------------|--------------|-------------|
| sc+1=Help  | Esc+2=Refresh | Esc+3=Cancel | Esc+4=List  |
| sc+5=Reset | Esc+6=Command | Esc+7=Edit   | Esc+8=Image |
| sc+9=Shell | Esc+0=Exit    | Enter=Do     |             |

#### Note:

- Set the value for the Maximum number of Commands to Queue to Adapter to be greater than the queue depth times the number of LUNs. For example, for 20 LUNs with a queue depth of 20, the value should be greater than 400.
- To use flat file discovery, the Discovery Policy must be set to "file."
- Change the default file name **/etc/icsi/targetshw** from **targetshw** to **targetshwx** where **x** is the adapter instance number (Examples: **ics0**, **ics1**).
- The user may specify the iSCSI node name. If it is not specified, the adapter will use the default iSCSI node name provided by the adapter. To display the iSCSI node name used by a particular adapter, use the **lscfg** command to display the adapter VPD. For example, to display the iSCSI node name for **ics0**, use **lscfg -v1 ics0**. The iSCSI node name is in the **Z1** field of the displayed VPD. The initiator's iSCSI node name may be required to configure some iSCSI targets.
- If the **rmdev** command with the **-d** option is issued, then you must reenter the data in the specified fields.

### Updating the iSCSI targets flat file:

When autodiscovery is not used, the 1 Gigabit iSCSI TOE PCI-X adapter obtains the iSCSI target descriptions from a flat file. The default file name is **/etc/icsi/targetshw**. The information in this file must accurately describe the target devices for this adapter.

For an explanation of this file format, see [http://publib16.boulder.ibm.com/doc\\_link/en\\_US/a\\_doc\\_lib/files/aixfiles/targets.htm](http://publib16.boulder.ibm.com/doc_link/en_US/a_doc_lib/files/aixfiles/targets.htm).

### **Configuring the storage device:**

To be visible to the adapter, storage devices must be correctly configured. Often the storage device must be informed of the adapter iSCSI name, and the adapter must be informed of the storage device iSCSI name. Additionally, either or both may need specific permissions to access the other side of the iSCSI connection.

For instruction on configuring the storage device, refer to the support documentation provided by the manufacturer of the storage device.

### **Connecting the adapter to an Ethernet network**

Use this information to learn about connecting the IBM 1 Gigabit iSCSI TOE PCI-X Adapter to your Ethernet network.

#### **Connecting the IBM 1 Gigabit-SX iSCSI TOE PCI-X adapter (optical connector) to an Ethernet network:**

The fiber adapters are designed with specifications that the cable be a dual-cable connector, with transmit and receive cable ends clamped together. If you use separate transmit and receive fiber cables, clamp the cables together to enhance the retention strength on the fiber transceiver connector. Clamping the cables together also improves the alignment of the fibers with the connector and is designed to improve overall performance.

**Note:** Only one type of network can be attached to the adapter at a time.

#### **Understanding the adapter LED:**

The LED on the 1 Gigabit-SX iSCSI TOE PCI-X Adapter provides information about the card's link status. The LED is visible through the card's mounting bracket and indicates the following conditions.

| <b>Light</b> | <b>State</b> | <b>Description</b>  |
|--------------|--------------|---|
| Green        | On           | Good Link   |
| Green        | Off          | No link: could be the result of a bad cable, bad connector, or configuration mismatch |

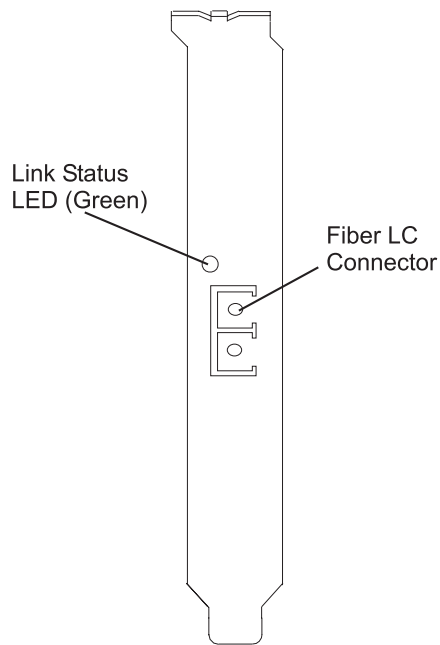


Figure 19. LED on the 1 Gigabit-SX iSCSI TOE PCI-X Adapter

#### Connecting the network cables and adapter:

Use these instructions to connect the adapter to your network.

Before you begin connecting the adapter, make sure you have the hardware listed in “Verifying your hardware requirements” on page 57.

To connect the adapter to the multimode fiber network:

- Insert the male LC Fiber Optic Connector into the adapter LC connector.
- Insert the male LC Fiber Optic connector of the other end of the cable into the network switch.

#### Connecting the IBM 1 Gigabit-TX iSCSI TOE PCI-X adapter (copper connector) to an Ethernet network:

Only one type of network can be attached to the adapter at a time.

#### Connecting the network cables and adapter:

Use these instructions to connect the adapter to your network.

Before you begin connecting the adapter, make sure you have the hardware listed in “Verifying your hardware requirements” on page 57.

To connect the adapter to an unshielded twisted pair (UTP) network, do the following:

1. Insert the RJ-45 jack of the UTP cable into the RJ-45 connector on the adapter.
2. Insert the RJ-45 jack of the other end of the UTP cable into the network switch.

#### Understanding the adapter LED:

The LED on the 1 Gigabit-TX iSCSI TOE PCI-X Adapter provides information about the card’s link status. The LED is visible through the card’s mounting bracket and indicates the following conditions.

| Light | State | Description   |
|-------|-------|---|
| Green | On    | Good Link   |
| Green | Off   | No link: could be the result of a bad cable, bad connector, or configuration mismatch |

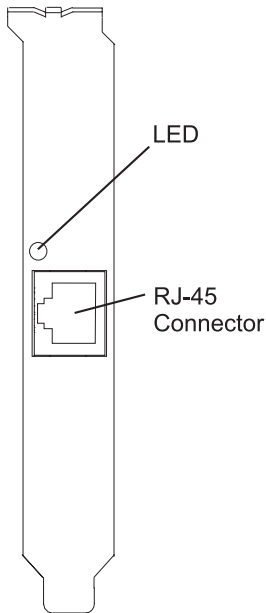


Figure 20. LED on the 1 Gigabit-TX iSCSI TOE PCI-X Adapter

## Technical Appendixes

Learn about config logging information, iSCSI TOE adapter error log information (ICS\_ERR template), and iSCSI TOE protocol driver error log detail (ISCSI\_ERR template).

This information might be useful for resolving configuration errors.

### Config logging information:

It might be helpful to use the config log facility when trying to debug the iSCSI environment.

The most common error scenario is when `cfgmgr -vl ics0` completes successfully, but does not create any hdisks, or creates fewer hdisks than expected. Several common configuration errors can lead to this scenario. The `cfglog` can be used to determine which of several common errors may have occurred.

You can run the following command to display any captured config log data:

```
alog -o -t cfg
```

To display information about the log file configuration, such as the location of the log file, run:

```
alog -L -t cfg
```

If config logging is not enabled, it can be enabled as follows:

```
export CFGLOG=""
echo "Create cfglog" | alog -t cfg
```

A useful debug method is to perform the following:

```

rmdev -Rl ics<x>
rm /usr/adm/ras/cfglog
echo "Create cfglog" | alog -t cfg
cfgmgr -l ics<x>
alog -o -t cfg

```

Some common errors will cause the open of the iSCSI protocol device driver to fail. In this case, the `cfglog` will contain a message such as the following, where `XX` is an error number from `errno.h`

open of /dev/iscsi0 returned XX" where `XX` is an error number from `errno.h`.

The value returned by the open can indicate the problem. Two common values that can be caused by a configuration error are 69 (ENETDOWN) and 70 (ENETUNREACH).

The return code 69 indicates that the link attached to the iSCSI adapter is physically down. Check to see if the cable is correctly plugged in.

The return code 70 indicates that the link is up, but that the adapter was unable to obtain a client address from DHCP. If the adapter's `host_addr` attribute is not set to a valid IP address, the adapter will attempt to acquire an IP address from a DHCP server. If no DHCP server provides an IP address, the open will fail with a return code 70.

After a successful open, the configuration method will attempt to start the device. If the `SCIOSTART` ioctl fails, it will prevent the discovery of the hdisks. A failure of `SCIOSTART` will be recorded in the config log as follows:

```
SCIOSTART failed, errno = E, status_class = C, status_detail = D
```

If the values of `C` or `D` for the Status Class and Status Detail are nonzero, it indicates that the iSCSI login failed. The Status Class and Status Detail are values returned in the iSCSI login response. The meaning of the Status Class and Status Detail values are documented in the iSCSI RFC 3270.

The `SCIOSTART` ioctl may also fail before it attempts the iSCSI login. If the Status Class and Status Detail are both zero but `Errno` is nonzero, then the ioctl failed before the login occurred.

Two common `errno` values returned by the `SCIOSTART` ioctl are 73 (ECONNRESET) and 81 (EHOSTUNREACH).

The `errno` 73 indicates that the target IP address refused the TCP connection that the iSCSI adapter attempted. One possible cause is that the wrong TCP port number is specified in the `/etc/iscsi/targetshw` configuration file.

The `errno` 81 indicates that the iSCSI adapter did not get any response from the target's IP address. In other words, the iSCSI adapter cannot ping the target's IP address.

If the iSCSI adapter does not discover any new hdisks, and the `cfglog` does not reveal any of those errors, the following are other possibilities.

- If the syntax of the `/etc/iscsi/targetshw` file is incorrect, the configuration method will not attempt to open or start the device, so the preceding errors will not appear.
- If the target device is accessible but no LUNs are assigned to the device, no error will appear, but there will be a message indicating 0 luns found.

#### **iSCSI TOE adapter error log information (ICS\_ERR template):**

Learn about the error log entries made by the iSCSI TOE adapter.

- Table 9 on page 68 shows the detail sense data layout.
- Table 10 on page 68 shows the detail sense data descriptions.

- Special detail sense data and Table 11 on page 70 show a special format that is used for logging bulk data such as a crash record or an IOCB request or completion queue.
- Table 12 on page 70 shows the error number values.

The detail sense data log in the ICS\_ERR template for PCI iSCSI TOE adapters uses the structure error\_log\_def defined in src/rspc/kernext/pci/qlisc/qliscdd.h.

Table 9. Detail Sense Data

AAAA AAAA is the general error field.

```

XXXX VVVV AAAA AAAA BBBB BBBB CCHH RRRR YYYY YYYY RRRR RRRR RRRR RRRR RRRR RRRR
IIII IIII IIII IIII IIII IIII IIII IIII PPPP PPPP PPPP PPPP SSSS SSSS UUUU UUUU
LLLL LLLL LLLL LLLL EEEE EEEE EEEE EEEE DDDD DDDD DDDD DDDD MMMM MMMM MMMM MMMM
FFFF FFFF FFFF FFFF GGGG GGGG GGGG GGGG JJJJ JJJJ JJJJ JJJJ KKKK KKKK KKKK KKKK
0000 0000 0000 0000 QQQQ QQQQ QQQQ QQQQ RRRR RRRR RRRR RRRR RRRR RRRR RRRR RRRR
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
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TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT
WWW RRRR ZZZZ ZZZZ 2222 2222 2222 2222 3333 3333 3333 3333 4444 4444 4444 4444
5555 5555 5555 5555 6666 6666 6666 6666 7777 7777 7777 7777 8888 8888 8888 8888
9999 9999 9999 9999 #### #### #### #### $$$$ $$$$ $$$$ $$$$ %%% %%% %%% %%%
&&&& &&&& &&&& &&&& ***** @@@@ @@@@ @@@@ @@@@ ??? ???? ???? ????

```

Table 10. Detail sense data descriptions

| Data | Description   |
|------|---|
| X    | Device type ID. X value of 0 indicates Qlogic iSCSI adapter driver.   |
| V    | Valid length of detail.   |
| A    | Determined by the adapter driver based on the error.  |
| B    | Return code from an operation.  |
| C    | Discovery policy. Possible values: <ul style="list-style-type: none"> <li>• 0 - Unknown how the adapter is connected</li> <li>• 1 - This adapter is using flat file discovery</li> <li>• 2 - This adapter is using SLP</li> </ul>   |
| H    | Type of data in the error log. Possible values: <ul style="list-style-type: none"> <li>• 0 - None</li> <li>• 1 - Mailbox</li> <li>• 2 - IOCB</li> <li>• 3 - Register data</li> <li>• 4 - Driver data</li> <li>• 5 - qlisc_cmd data</li> <li>• 6 - Raw data</li> <li>• 7 - Return code data</li> </ul> |



Table 10. Detail sense data descriptions (continued)

| Data | Description  |
|------|--|
| Y    | Link Speed   |
| R    | These values are reserved for future use.                    |
| I    | IP address of adapter  |
| P    | Port Number of target.                                       |
| S    | Adapter State  |
| U    | Number of iSCSI nodes known                                  |
| L    | Poll Lbolt value   |
| E    | Lbolt of last adapter reset                                  |
| D    | No DMA resource count  |
| M    | No adapter IOCBs available                                   |
| F    | Number of Input requests                                     |
| G    | Number of Outbound requests                                  |
| J    | Number of control requests                                   |
| K    | Total number of Input bytes                                  |
| F    | Total number of Output bytes                                 |
| Q    | Current lbolt value  |
| N    | iSCSI name of target   |
| T    | If command was for IOCB, then this contains IOCB that failed |
| W    | I/O Handle of next IOCB                                      |
| Z    | How often Link stat timer is running (in seconds)            |
| 2    | Number of IOCBs issued                                       |
| 3    | Number of mailboxes issued                                   |
| 4    | Number of link down events                                   |
| 5    | MAC bytes received   |
| 6    | MAC CRC error count  |
| 7    | MAC encoding error count                                     |
| 8    | Number of IP packets transmitted                             |
| 9    | Number of IP bytes transmitted                               |
| #    | Number of IP packets received                                |
| \$   | Number of IP bytes received                                  |
| %    | IP fragment received overlap count                           |
| &    | Transmitted iSCSI PDU count                                  |
| *    | Transmitted iSCSI data bytes                                 |
| @    | Received iSCSI PDU count                                     |
| ?    | Received iSCSI data bytes                                    |

**Special detail sense data**(AAAA AAAA is the general error field.)

This format is used for logging bulk data such as a crash record or an IOCB request or completion queue. The first line of the detail data has a special format and all remaining lines of the detail data contain the

bulk data being logged. Note that the bulk data may take up more than one of these records. The first line of the entry contains information to piece the data together. The first line is:

XXXX XXXX AAAA AAAA BBBB BBBB CCCC CCCC DDDD DDDD EEEE EEEE FFFF FFFF 0000 0000

The following table shows how to interpret the special detail sense data:

Table 11. Special detail sense data descriptions

| Data | Description   |
|------|---|
| X    | Not used  |
| A    | Number determined by the adapter driver based on the error. At present it will always be "0xFF" for the special format. |
| B    | Return code from an operation   |
| C    | Segment number of the data in this record   |
| D    | Offset of the beginning of this record in the total data  |
| E    | Length of valid data in this record   |
| F    | Total length of data to be logged   |

For example, when logging a crash record the total length is usually 0x1000 bytes. Each of these records can contain 0x300 bytes and there will be six of these error report entries. The first five segments will be numbered 1, 2, 3, 4, 5 with length of 0x300 and offsets of x0, x300, x600, x900, xC00. The sixth entry will be segment 6 with length of x100 and offset 0xf00.

Table 12. Error Number Values

| Error Number | Error Template | Description of Error  |
|--------------|----------------|---|
| 0x23         | ICS_ERR6       | DHCP lease expired. Link is no longer usable.   |
| 0x25         | ICS_ERR6       | Adapter Reset Timer expired   |
| 0x26         | ICS_ERR6       | Mailbox time-out, mailbox provided  |
| 0x27         | ICS_ERR2       | IOCB time-out   |
| 0x28         | ICS_ERR2       | Time-out on invalid type timer  |
| 0x29         | ICS_ERR6       | D_MAP_LIST failed return code provided. May need to increase the max_xfer_size attribute for the adapter icsX |
| 0x2A         | ICS_ERR6       | Time-out on invalid type timer  |
| 0x2B         | ICS_ERR6       | Received completion for adapter originated IOCB, but could not find the original IOCB.                        |
| 0x2C         | ICS_ERR6       | Size of mailbox IOCB is not equal to mb info size   |
| 0x2E         | ICS_ERR2       | Abort time out  |
| 0x2F         | ICS_ERR6       | Received unsolicited IOCB and protocol driver does not handle unsolicited IOCBs                               |
| 0x30         | ICS_ERR2       | Adapter reported fatal error  |
| 0x31         | ICS_ERR6       | Invalid command entry type, command provided.   |
| 0x32         | ICS_ERR6       | Invalid command opcode, command provided.   |
| 0x33         | ICS_ERR6       | Invalid command entry type, command provided.   |
| 0x34         | ICS_ERR6       | Invalid command opcode, command provided.   |
| 0x36         | ICS_ERR6       | Stub routine called.  |
| 0x4B         | ICS_ERR6       | D_MAP_INIT in config INIT failed, size of DMA resources provided in return code field                         |

Table 12. Error Number Values (continued)

| Error Number | Error Template | Description of Error   |
|--------------|----------------|--|
| 0x4C         | ICS_ERR6       | D_MAP_INIT at open time failed, size of DMA resources provided in return code field  |
| 0x4D         | ICS_ERR6       | Could not allocate delay timer at open time.   |
| 0x4E         | ICS_ERR6       | Could not allocate poll timer at open time   |
| 0x50         | ICS_ERR10      | Debug Only Trace. Target is reporting busy. IOCB, and cmd included.  |
| 0x51         | ICS_ERR6       | Invalid type or parameter error, IOCB, and cmd included.   |
| 0x52         | ICS_ERR6       | DMA error occurred, IOCB and cmd included.   |
| 0x53         | ICS_ERR6       | Entry State Flag error, IOCB and cmd included.   |
| 0x55         | ICS_ERR6       | Unknown Async IOCB received. IOCB included.  |
| 0x65         | ICS_ERR6       | Should never occur   |
| 0x71         | ICS_ERR6       | Exceeded delay waiting for I/O to complete before download operation.  |
| 0x7A         | ICS_ERR2       | Failed to get NVRAM semaphore for extracting VPD.  |
| 0x83         | ICS_ERR6       | EEH callback function with unsupported parameter...EEH_DD_DEBUG.   |
| 0x90         | ICS_ERR6       | Cannot issue Login because of invalid mode. Mode, origin, and ddb_dev_index provided   |
| 0x91         | ICS_ERR6       | Cannot issue Logout because of invalid mode. Mode, origin, and ddb_dev_index provided  |
| 0x92         | ICS_ERR6       | Cannot get DDB because of invalid mode. Mode, origin, and ddb_dev_index provided   |
| 0x93         | ICS_ERR6       | Cannot set DDB because of invalid mode. Mode, origin, and ddb_dev_index provided   |
| 0x94         | ICS_ERR6       | Cannot do a Get Management data mailbox. Mode, origin, and ddb_dev_index provided  |
| 0x95         | ICS_ERR6       | Cannot do a Read Flash ROM mailbox because of of invalid mode. Mode and origin provided  |
| 0x96         | ICS_ERR6       | Cannot do a Write Flash ROM mailbox because of invalid mode. Mode, origin provided   |
| 0x97         | ICS_ERR6       | Cannot do a ping because of invalid mode. Mode, address provided   |
| 0x98         | ICS_ERR6       | Cannot get crash record data because of invalid mode, Mode, data size and origin provided.                                     |
| 0x99         | ICS_ERR6       | Cannot free DDB because of invalid mode. Mode, origin, and ddb_dev_index provided  |
| 0x9A         | ICS_ERR6       | Cannot get About Firmware data because of invalid mode. Mode, origin provided.   |
| 0x9B         | ICS_ERR6       | Cannot get init firmware control block data because of invalid mode. Mode, origin provided.                                    |
| 0x9A         | ICS_ERR6       | Cannot get firmware state because of invalid mode. Mode, origin provided.  |
| 0xA0         | ICS_ERR6       | Received Mailbox completion, but do not have any mailboxes active. Mailbox completion and last know mailbox IOCB sent included |
| 0xA2         | ICS_ERR6       | Get Initialize Firmware mailbox failed, completion mailbox and original mailbox provided.                                      |
| 0xA3         | ICS_ERR6       | Initialize Firmware mailbox failed, completion mailbox and original mailbox provided.  |
| 0xA4         | ICS_ERR6       | Failed to build Get Firmware State after Initialize Firmware, Return code included.  |

Table 12. Error Number Values (continued)

| Error Number | Error Template | Description of Error  |
|--------------|----------------|---|
| 0xA5         | ICS_ERR6       | Failed to build Get Crash Record mailbox.   |
| 0xA6         | ICS_ERR6       | Failed to build Get DDB mailbox.  |
| 0xA7         | ICS_ERR6       | Get DDB mailbox failed, mailbox, rc, and original mailbox included                    |
| 0xA8         | ICS_ERR6       | Number of iSCSI nodes known by adapter has decreased.                                 |
| 0xA9         | ICS_ERR6       | Failed to build Get Firmware State after Initialize Firmware, Return code included.   |
| 0xAA         | ICS_ERR6       | Issued Get DDB mailboxes, but have no previously known nodes.                         |
| 0xAB         | ICS_ERR6       | Get Crash Record mailbox failed.  |
| 0xAC         | ICS_ERR6       | Get Crash Record succeeded. Crash record data follows in "0xFF" error report entries. |
| 0xAD         | ICS_ERR6       | Unknown mailbox completed. mailbox included.  |
| 0xAE         | ICS_ERR6       | Unrecoverable error reported by Get Firmware State                                    |
| 0xB0         | ICS_ERR2       | Mailbox completed with busy status, completion mailbox and original included.         |
| 0xB1         | ICS_ERR2       | Mailbox failed with invalid parameter or invalid command. Mailbox included            |
| 0xB2         | ICS_ERR2       | Mailbox failed. Mailbox included.   |
| 0xB3         | ICS_ERR2       | Mailbox failed with unknown status. Mailbox included.                                 |
| 0xC0         | ICS_ERR2       | Adapter reported system error.  |
| 0xC1         | ICS_ERR10      | Debug only log, Link up   |
| 0xC2         | ICS_ERR10      | Debug only log. Link Down   |
| 0xC3         | ICS_ERR10      | Debug only log. Adapter reported DDB change   |
| 0xC4         | ICS_ERR10      | Debug only log. Adapter's IP addresss or MAC address changed                          |
| 0xC5         | ICS_ERR10      | Debug only log. iSNS message received.  |
| 0xC6         | ICS_ERR1       | Adapter reporting self test failure.  |
| 0xC7         | ICS_ERR2       | NVRAM invalid async mailbox received  |
| 0xC8         | ICS_ERR2       | Async message reporting login, heartbeat, DNS, failures.                              |
| 0xC9         | ICS_ERR2       | Unknown Async mailbox received.   |
| 0xCA         | ICS_ERR10      | SCSI Command PDU rejected   |
| 0xCB         | ICS_ERR6       | Build get DDB entry mailbox failed  |
| 0xCC         | ICS_ERR10      | Link dead flag set (link down longer than link timeout period                         |
| 0xD0         | ICS_ERR2       | Reset Adapter failed. Reset step provided.  |
| 0xD1         | ICS_ERR2       | Reset Adapter failed. Adapter reported Fatal Error                                    |
| 0xD2         | ICS_ERR2       | Reset Adapter failed. Adapter self test did not complete                              |
| 0xDEAD       | ICS_ERR1       | All retries of adapter reset failed.  |
| 0xE0         | ICS_ERR6       | Failed to allocate iSCSI entry list.  |
| 0xE1         | ICS_ERR6       | Failed to create new node entry for CHAP entry  |
| 0xE2         | ICS_ERR7       | Failed to initialize EEH  |
| 0xF0         | ICS_ERR6       | D_MAP_INIT for microcode download failed  |
| 0xF1         | ICS_ERR6       | D_MAP_PAGE for microcode download failed.   |
| 0xF2         | ICS_ERR6       | Failed to build write FLASH mailbox   |
| 0xF3         | ICS_ERR6       | Get DDB entry mailbox failed.   |

Table 12. Error Number Values (continued)

| Error Number | Error Template | Description of Error   |
|--------------|----------------|--|
| 0xF4         | ICS_ERR6       | Set DDB entry mailbox failed.  |
| 0xF5         | ICS_ERR6       | Could not find empty slot for CHAP secret  |
| 0xF6         | ICS_ERR6       | Could not get CHAP secret entry from FLASH   |
| 0xF7         | ICS_ERR6       | Secrets memory area pointer unexpectedly NULL  |
| 0xF8         | ICS_ERR6       | Build get DDB entry mailbox failed   |
| 0xF9         | ICS_ERR6       | Could not write to FLASH to erase CHAP secret  |
| 0xFA         | ICS_ERR2       | SCSI IOCB Command queue data follows. RC is current queue head. (debug driver only)    |
| 0xFB         | ICS_ERR2       | SCSI IOCB completion queue data follows. RC is current queue head. (debug driver only) |
| 0xFF         | ICS_ERR6       | Crash record or queue data. Special format for detailed sense data.                    |

**iSCSI TOE protocol driver error log detail (ISCSI\_ERR template):**

Learn about the error log entries made by the iSCSI protocol driver.

- Table 13 shows the detail sense data layout.
- Table 14 shows the detail sense data descriptions.
- Table 15 on page 75 shows the error number values.

Table 13. Detail Sense Data

AAAA AAAA is the general error field.

```

XXXX VVVV AAAA AAAA BBBB BBBB CCHH RRRR YYYY YYYY TTTT TTTT LLLL LLLL LLLL LLLL
IIII IIII IIII IIII IIII IIII IIII IIII EEEE EEEE EEEE EEEE EEEE EEEE EEEE EEEE
QQQQ QQQQ QQQQ QQQQ QQQQ QQQQ QQQQ QQQQ ZZZZ ZZZZ ZZZZ ZZZZ ZZZZ ZZZZ ZZZZ ZZZZ
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
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NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN
JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ JJJJ
TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT
TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT TTTT
DDDD DDDD DDDD DDDD DDDD DDDD DDDD DDDD DDDD DDDD DDDD DDDD GGGG GGGG GGGG GGGG
GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG
GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG GGGG
MMMM MMMM MMMM MMMM PPPP PPPP PPPP PPPP KKKK KKKK KKKK KKKK UUUU WWSS 1111 1111
2222 2222 2222 2222 3333 3333 3333 3333
    
```

Table 14. Detail sense data descriptions

| Data | Description  |
|------|--|
| X    | Device type ID. X value of 0 indicates Qlogic iSCSI protocol driver.           |
| V    | Valid length of detail.  |
| A    | Determined by the adapter driver based on the error.                           |
| B    | Return code from either the adapter driver output routine or control function. |

Table 14. Detail sense data descriptions (continued)

| Data | Description   |
|------|---|
| C    | Discovery policy. Possible values: <ul style="list-style-type: none"> <li>• 0 - Unknown how the adapter is connected</li> <li>• 1 - This adapter is using flat file discovery</li> <li>• 2 - This adapter is using SLP</li> </ul> |
| H    | Type of data in the error log. Possible values: <ul style="list-style-type: none"> <li>• 0 - IOCB</li> <li>• 1 - CMD Element</li> <li>• 2 - Raw/General</li> </ul>  |
| Y    | Status value of the control element returned by the adapter driver.   |
| T    | Time-out value of command.  |
| L    | Lun id to which this request was issued   |
| I    | This value is the 128-bit IP address of this adapter.   |
| E    | This value is the 128-bit IP address of the device to which this command was sent.  |
| Q    | The iSCSI CDB that failed.  |
| Z    | Additional CDB  |
| R    | These values are reserved for future use.   |
| N    | Target name   |
| J    | If the type of data is IOCB, then is the failed command IOCB  |
| T    | If the type of data is IOCB, this is the reply IOCB   |
| D    | DSD array for this command  |
| G    | This is used for the first 72 bytes of autosense  |
| M    | Bus real address of SCSI CDB  |
| P    | Bus real address of Auto sense buffer   |
| K    | Bus real address of DSD list  |
| U    | scsi_buf version  |
| W    | q_tag_msg   |
| S    | cmd_type  |
| 1    | Variable CDB len  |
| 2    | Port Number   |
| 3    | num_start_LUNs for this target  |
| F    | This is used for the address of the failing scsi_info structure.  |
| P    | Port Number   |
| G    | Time out value  |
| U    | Number of remaining active commands for this device if it is LUN specific   |
| S    | Qstate if command is to a specific LUN  |
| N    | First 242 bytes of the the iSCSI name of the target.  |
| M    | Target State if applicable  |
| P    | Open count since device configured  |
| 2    | Preempt count for fairness  |
| 3    | Flags from target   |

Table 14. Detail sense data descriptions (continued)

| Data | Description  |
|------|--|
| 4    | Adapter specific stats from ndd_specstats: CRC                     |
| 5    | transmit data in megabytes since opened                            |
| 6    | received data in megabytes since opened                            |
| 7    | Number of writes since opened                                      |
| 8    | Number of reads since opened                                       |
| 9    | Number of nondata requests since opened                            |
| #    | Number of times a request was not sent because no command elements |
| %    | lbolt when last opened   |
| *    | lbolt of current request   |

Table 15. Error number values

| Error Number | Error Template | Description of Error  |
|--------------|----------------|---|
| 0x1          | ISCSI_ERR4     | Command Time-out in SCIOINQU. dev_info information is included.   |
| 0x2          | ISCSI_ERR4     | Command Time-out in SCIOSTUNIT. dev_info information is included.   |
| 0x3          | ISCSI_ERR4     | Command Time-out in Test Unit Ready IOCTL. dev_info information is included.  |
| 0x4          | ISCSI_ERR4     | Command Time-out in Read Block Ioctl. dev_info information is included.   |
| 0x5          | ISCSI_ERR6     | SCIOLNMSRV control request to the adapter driver failed   |
| 0x6          | ISCSI_ERR6     | SCIOSTART failed since target IP address or iSCSI name is the same as this adapter.   |
| 0x7          | ISCSI_ERR6     | Trace table failed to allocate  |
| 0x8          | ISCSI_ERR6     | size of SCIOLNMSRV is not multiple of word.   |
| 0x10         | ISCSI_ERR13    | Only logged when debug is turned on . An LUN reset (SCIORESET) ioctl call failed with EINVAL, most likely because LUN reset is not supported for this device, so a target reset was issued instead. |
| 0x11         | ISCSI_ERR6     | Invalid kernext handle passed to strategy.  |
| 0x12         | ISCSI_ERR6     | Version 0 scsi_buf or no kernext handle passed to strategy  |
| 0x13         | ISCSI_ERR6     | SC_DEV_RESTART received but has a scsi command in it.   |
| 0x14         | ISCSI_ERR6     | Only logged when debug is turned on. An unexpected SC_Q_CLR was received  |
| 0x15         | ISCSI_ERR6     | Only logged when debug is turned on. A SC_DEV_RESTART command was received.   |
| 0x16         | ISCSI_ERR6     | Only logged when debug is turned on . A SC_TARGET_RESET command was received  |
| 0x17         | ISCSI_ERR6     | Only logged when debug is turned on . A SC_LUN_RESET command was received   |
| 0x18         | ISCSI_ERR6     | An invalid scsi_buf was received in the strategy routine.   |
| 0x19         | ISCSI_ERR6     | A SCSI Command with no command length is about to be issued.  |
| 0x1A         | ISCSI_ERR6     | Invalid control element received from adapter driver.   |
| 0x1B         | ISCSI_ERR6     | Invalid IOCB entry type for control element completion.   |
| 0x1C         | ISCSI_ERR6     | Unknown unsolicited IOCB received.  |
| 0x1D         | ISCSI_ERR6     | Control element received from adapter driver, but is not active. cmd included.  |

Table 15. Error number values (continued)

| Error Number | Error Template | Description of Error  |
|--------------|----------------|---|
| 0x1E         | ISCSI_ERR6     | Unknown mailbox command completion received.  |
| 0x1F         | ISCSI_ERR6     | Processing completion of marker command but invalid IOCB or target.   |
| 0x20         | ISCSI_ERR6     | Timeout for an unknown device.  |
| 0x21         | ISCSI_ERR6     | Timeout for an unknown device. ID/Lun is not valid. target_info information is included.  |
| 0x22         | ISCSI_ERR6     | A command completed before it was to be timed out (i.e. the command completed within milliseconds of timing-out).   |
| 0x23         | ISCSI_ERR6     | Timeout for command that is not active. dev_info information is included.   |
| 0x26         | ISCSI_ERR4     | A device cancel timed-out. There are still commands active at the adapter, which were not flushed back. dev_info information is included.                                 |
| 0x27         | ISCSI_ERR6     | A device cancel timed-out and the retry of the cancel failed. dev_info information is included.   |
| 0x28         | ISCSI_ERR4     | A target cancel timed-out. target_info information is included.   |
| 0x29         | ISCSI_ERR4     | A login issued to the adapter driver's cmd entry point timed out. target_info information is included.  |
| 0x2A         | ISCSI_ERR4     | A Pass thru IOCB timed out.   |
| 0x2B         | ISCSI_ERR4     | Proc level task management function (SCIORESET) timed-out. command is included  |
| 0x2C         | ISCSI_ERR4     | Interrupt level task management function (Target Reset) timed-out. command is included  |
| 0x2D         | ISCSI_ERR6     | Wait for DDB time-out occurred.   |
| 0x2E         | ISCSI_ERR4     | Data underrun detected by adapter, the command is included.   |
| 0x2F         | ISCSI_ERR4     | An unknown time-out occurred.   |
| 0x30         | ISCSI_ERR2     | Async status received from adapter indicates a complete adapter failure   |
| 0x31         | ISCSI_ERR2     | Only logged when debug is turned on . Async status received from adapter driver indicating link is dead   |
| 0x32         | ISCSI_ERR4     | Only logged when debug is turned on. Async status received from adapter driver indicating link is down.   |
| 0x33         | ISCSI_ERR4     | Only logged when debug is turned on. Async status received from adapter driver indicating link is up.   |
| 0x34         | ISCSI_ERR4     | Only logged when debug is turned on. Async status received from adapter driver indicating a LOGO was received for a device. target_info information is included           |
| 0x35         | ISCSI_ERR4     | Only logged when debug is turned on . Async status received from adapter driver indicating a State Change Notification was received. target_info information is included. |
| 0x36         | ISCSI_ERR2     | Only logged when debug is turned on . The adapter has been halted.  |
| 0x37         | ISCSI_ERR2     | Only logged when debug is turned on . The adapter has been resumed after being halted.  |
| 0x38         | ISCSI_ERR13    | Only logged when debug is turned on. Async status received from adapter driver indicating PDU was rejected.   |
| 0x39         | ISCSI_ERR6     | Only logged when debug is turned on. Async status received from adapter driver indicating DDB change  |
| 0x3A         | ISCSI_ERR2     | Only logged when debug is turned on. Unknown async NDD status received from adapter driver  |



Table 15. Error number values (continued)

| Error Number | Error Template           | Description of Error   |
|--------------|--------------------------|--|
| 0x3B         | ISCSI_ERR6               | Unknown async status received from adapter driver  |
| 0x3C         | ISCSI_ERR13              | Async status for DDB change received indicating device is different.   |
| 0x3D         | ISCSI_ERR4               | Only logged when debug is turned on. Async status received from adapter indicating DHCP lease expired.   |
| 0x40         | ISCSI_ERR2               | Adapter dd detected error that indicates HOST IO BUS ERROR. cmd element included   |
| 0x41         | ISCSI_ERR2               | Adapter dd detected error that indicates adapter hardware failure. cmd element included.   |
| 0x42         | ISCSI_ERR4               | Adapter dd detected error that indicates adapter software failure. cmd element included.   |
| 0x43         | ISCSI_ERR4               | Adapter dd detected an unknown error status from the adapter driver.cmd element included.  |
| 0x44         | ISCSI_ERR13              | Device returning busy status.  |
| 0x45         | ISCSI_ERR4               | Adapter reporting an invalid IOCB. cmd element included  |
| 0x46         | ISCSI_ERR2               | Adapter reporting DMA error on IOCB. cmd element included  |
| 0x47         | ISCSI_ERR4               | Adapter reporting an entry state flag error. cmd element included  |
| 0x48         | ISCSI_ERR6               | IOCB failed with invalid parameter. Cmd included   |
| 0x49         | ISCSI_ERR2               | IOCB failed with DMA error. Cmd included.  |
| 0x4A         | ISCSI_ERR10              | IOCB failed with transport error. Cmd included.  |
| 0x4B         | ISCSI_ERR10              | IOCB failed because data direction specified from device is different from IOCB. Cmd included.   |
| 0x4C         | ISCSI_ERR6               | IOCB failed because Queue full. Cmd included.  |
| 0x4D         | ISCSI_ERR13              | IOCB failed because device at DDB dev index changed. Cmd included.   |
| 0x4E         | ISCSI_ERR10              | IOCB failed because device indicated the device has a duplicate tag. Cmd included.   |
| 0x4F         | ISCSI_ERR6               | IOCB failed with unknown error status, cmd included.   |
| 0x51         | ISCSI_ERR6               | Could not issue Cancel for above failing a command which has not received an interrupt. dev_info information is included.                          |
| 0x60         | ISCSI_ERR4 or ISCSI_ERR6 | Call to adapter driver's output entry point failed to accept a control element for SCSI command. The return code is included. cmd element included |
| 0x61         | ISCSI_ERR4 or ISCSI_ERR6 | Call to adapter driver's output entry point failed to accept a cancel control element. The return code is included. cmd element included           |
| 0x62         | ISCSI_ERR4 or ISCSI_ERR6 | Output routine failed to accept target reset or a device. The return code is included. target_info information included.                           |
| 0x63         | ISCSI_ERR4 or ISCSI_ERR6 | Output routine failed to accept LUN reset for a device. The return code is included. dev_info information included.                                |
| 0x64         | ISCSI_ERR4 or ISCSI_ERR6 | Output routine failed to accept Abort Task Set for a device. The return code is included. dev_info information included.                           |
| 0x65         | ISCSI_ERR4 or ISCSI_ERR6 | Output routine failed to accept Clear ACA for a device. The return code is included. dev_info information included.                                |
| 0x66         | ISCSI_ERR4 or ISCSI_ERR6 | Output routine failed to accept Marker for a device. The return code is included dev_info information included.                                    |
| 0x67         | ISCSI_ERR4 or ISCSI_ERR6 | Output routine failed to accept normal Passthru IOCB for a device. The return code is included. command is included                                |

Table 15. Error number values (continued)

| Error Number | Error Template            | Description of Error   |
|--------------|---------------------------|--|
| 0x70         | ISCSI_ERR2                | Timed out waiting for either link to come up or DHCP server to reestablish our lease. The rc fields indicates which of these two is the case.                  |
| 0x71         | ISCSI_ERR2                | Timed out waiting for the adapter to resume.   |
| 0x80         | ISCSI_ERR6                | Ioctl issue task management command failed from adapter driver returned error. cmd included.   |
| 0x81         | ISCSI_ERR6                | Ioctl issue task management command failed. cmd included.  |
| 0x82         | ISCSI_ERR6                | non-Ioctl issued task management command failed from adapter driver returned error. cmd included.  |
| 0x83         | ISCSI_ERR6                | non-Ioctl issued task management command failed. cmd included.   |
| 0x84         | ISCSI_ERR6                | Unknown task management command failed. cmd included.  |
| 0x85         | ISCSI_ERR6                | Unknown task management command completed. cmd included.   |
| 0x86         | ISCSI_ERR6                | Unable to cancel task management command.  |
| 0x87         | ISCSI_ERR6                | Unknown task management command timed-out.   |
| 0x90         | ISCSI_ERR6                | Unknown Passthru IOCB completion status returned.  |
| 0x91         | ISCSI_ERR6                | Only displayed with debug driver . Passthru IOCB issued from ioctl failed.   |
| 0x92         | ISCSI_ERR6                | Passthru IOCB not-issued from ioctl failed.  |
| 0x93         | ISCSI_ERR2                | Cancel (Internal Lun Reset) failed.  |
| 0x94         | ISCSI_ERR6                | Cancel completed but has no device associated  |
| 0x95         | ISCSI_ERR10               | Adapter detected underrun/overrun  |
| 0x96         | ISCSI_ERR13               | Async PDU with autosense data received.  |
| 0x97         | ISCSI_ERR13               | Target is requesting logout. Target included.  |
| 0x98         | ISCSI_ERR13               | Target will drop this connection or all connections. Target included   |
| 0x99         | ISCSI_ERR13               | Target requesting renegotiation of iSCSI parameters. Target included   |
| 0x9A         | ISCSI_ERR13               | Unknown Async IOCB received. Control element included.   |
| 0x9B         | ISCSI_ERR10               | Only displayed with debug driver. Check condition with autosense data length returned from a SCSI command, but the key fields of the autosense data are all 0. |
| 0xA0         | ISCSI_ERR13 or ISCSI_ERR6 | A command entry point command was returned from the adapter with an error. This command was for a Login. target_info is included                               |
| 0xA1         | ISCSI_ERR13               | A command entry point relogin command returned succesfully, but the device at this N_Port ID is different (i.e a different iSCSI name) target_info is included |
| 0xA2         | ISCSI_ERR13 or ISCSI_ERR6 | A command entry point command was returned from the adapter with an error. This command was for a Logout. target_info is included                              |
| 0xA4         | ISCSI_ERR6                | Unknown cmd was sent from the adapter driver to protocol driver  |
| 0xB1         | ISCSI_ERR4 or ISCSI_ERR6  | Adapter driver's cmd entry point rejected a login/logout operation. target_info is included  |
| 0xC0         | ISCSI_ERR6                | Multiple matches for target_info found with same iSCSI name.   |
| 0xC1         | ISCSI_ERR6                | Failed to issue cancel prior to Clear ACA.   |
| 0xE0         | ISCSI_ERR6                | IP address not IPV4 nor IPV6 for ioctl iSCSI login   |
| 0xE1         | ISCSI_ERR6                | IP address not IPV4 nor IPV6 for non-ioctl iSCSI login   |

## POWER GXT135P graphics PCI adapter (FC 2848)

Learn about specifications for the POWER® GXT135P graphics PCI adapter.

The POWER GXT135P graphics PCI adapter is a high-performance PCI graphics adapter that accelerates and enhances your system unit video. This adapter has no hardware switches to set. Mode selection is made through the software. Connection to the video monitor is made through a high density 15-pin D-shell connector or, on some versions of the adapter, a 28-pin DVI connector.

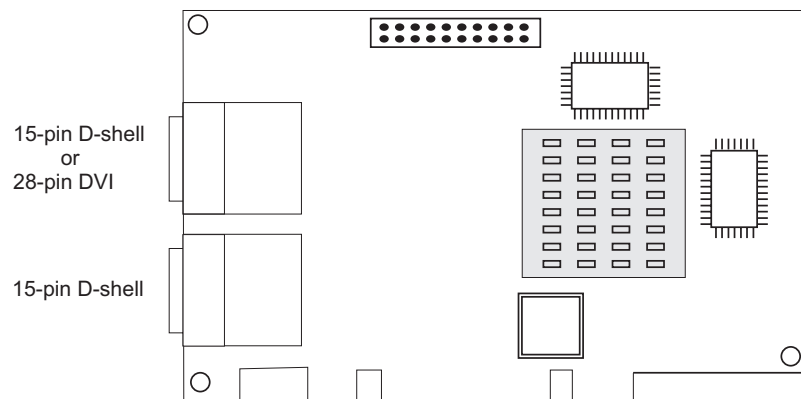


Figure 21. Feature 2848

### Adapter specifications

#### Item Description

##### FRU number

03N5853\* or 00P5758\*\*

\* Designed to comply with RoHS requirement.

\*\* Not designed to comply with the RoHS requirement.

##### Bus architecture

PCI

##### Bus width

32-bit

##### Memory

16 MB SDRAM

##### Number of colors supported

8-bit or 24-bit

##### Screen resolutions

640x480 at 60 Hz vertical refresh

1024x768 at 60 - 85 Hz vertical refresh

1280x1024 at 60 - 85 Hz vertical refresh

1600x1200 at 75 - 85 Hz vertical refresh

2048x1536 at 60 - 75 Hz vertical refresh

##### Display power management

Supports VESA and DPMS

##### Connector

Two 15-pin D-shell connectors

or

One 15-pin D-shell connector and one 28-pin DVI connector

Optional 28-pin DVI to 15-pin D-shell convertor

## POWER GXT135P graphics PCI adapter (FC 2849; CCIN 2849)

Learn about specifications for the POWER GXT135P graphics PCI adapter.

The POWER GXT135P graphics PCI adapter is a high-performance PCI graphics adapter that accelerates and enhances your system unit video. This adapter has no hardware switches to set. Mode selection is made through the software. Connection to the video monitor is made through a high-density 15-pin D-shell connector or a 28-pin DVI connector.

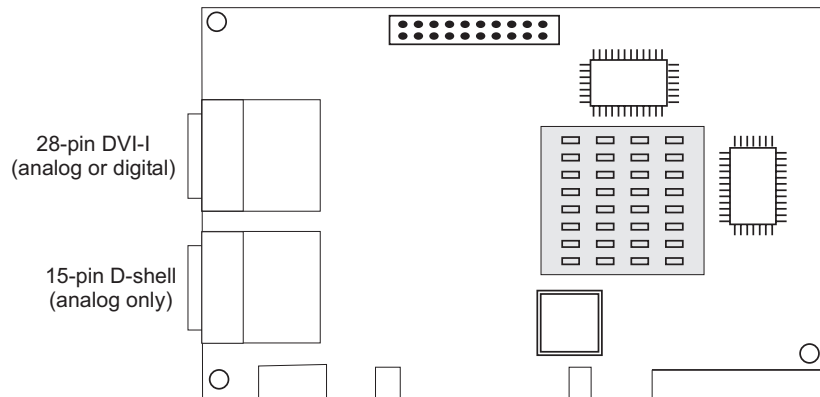


Figure 22. Feature 2849

### Adapter specifications

#### Item Description

#### FRU number

03N5853\* or 00P5758\*\*

\* Designed to comply with RoHS requirement.

\*\* Not designed to comply with the RoHS requirement.

#### Bus architecture

PCI

#### Bus width

32-bit

#### Memory

16 MB SDRAM

#### Number of colors supported

8-bit or 24-bit

#### Analog screen resolutions

640x480 at 60 Hz vertical refresh

1024x768 at 60 - 85 Hz vertical refresh

1280x1024 at 60 - 85 Hz vertical refresh

1600x1200 at 75 - 85 Hz vertical refresh

2048x1536 at 60 - 75 Hz vertical refresh

#### Digital screen resolutions

640x480 at 60 Hz vertical refresh

1024x768 at 60 Hz vertical refresh

1280x1024 at 60 Hz vertical refresh

1600x1200 at 30 Hz vertical refresh

**Display power management**

Supports VESA and DPMS

**Connectors**

15-pin D-shell connector

28-pin DVI-I connector

**PCI audio adapter (FC 8244)**

Learn about specifications for the PCI audio adapter.

The PCI audio adapter provides audio playback and recording capability for your system. External jacks allow you to connect speakers, microphone, or other audio devices to your system. An internal connector and cable are provided for connection to your system's CD-ROM or DVD-ROM drive.

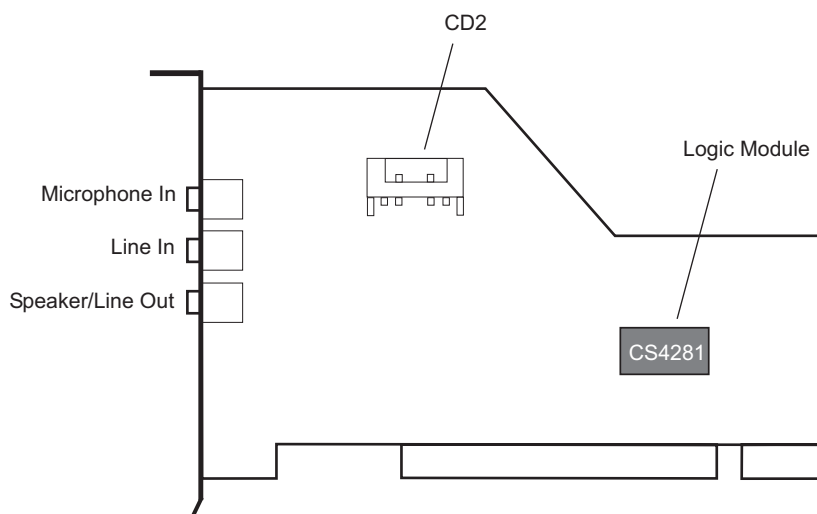


Figure 23. Feature 8244

**PCI audio adapter specifications**

**Item** Description

**FRU number**

10N7732\* or 80P2598\*\*

\* Designed to comply with RoHS requirement.

\*\* Not designed to comply with the RoHS requirement.

**Bus architecture**

PCI

**Bus width**

32-bit

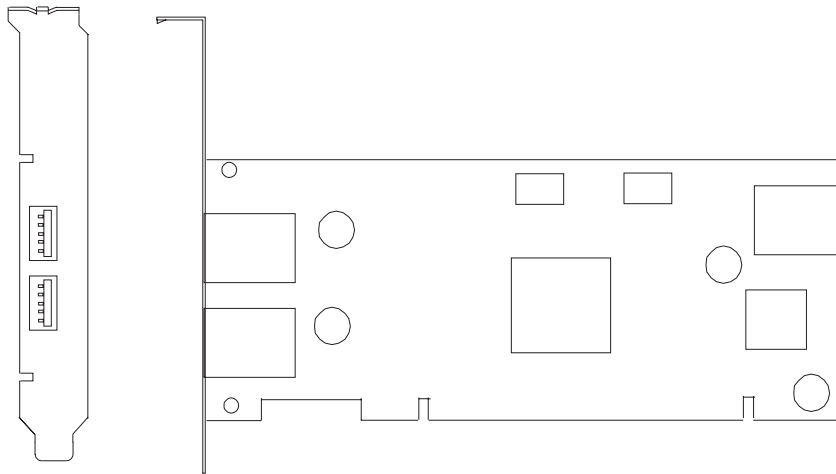
**2-port USB PCI adapter (FC 2738; CCIN 28EF)**

Learn about the specifications for the 2-port USB PCI adapter.

The 2-port USB PCI adapter is a 32-bit, 33 MHz high-performance expansion adapter that provides the following features:

- 32-bit, 33MHz PCI Local Bus Specification Revision 2.2
- Single-slot, half-size PCI card
- +5V or +3.3V signaling

- FCC Class B
- Two downstream USB ports
- Full 12 MHz bandwidth on each port
- Full compliance with Universal Serial Bus Specifications, Revision 1.1 and 2.0
- Compatible with OpenHCI Open Host Controller Interface Specifications for USB, Release 1.10a
- EHCI compatible
- Integrated Dual-Speed USB Transceivers
- Supports up to 127 devices for each port
- Supports peripheral hot-swap and wake-up



## 2 Port USB PCI adapter specifications

### Item Description

#### FRU number

80P2994 \*\*

80P6227 \*\* (OpenPower®)

\*\*Not designed to comply with RoHS requirement.

#### Bus architecture

PCI 2.2 compliant

#### Busmaster

Yes

#### Card type

Half size

#### Maximum number and adapter slots

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic.

#### Connector

Standard USB single pin-type series "A" receptacle

#### Wrap plug

None

#### Cables

None

## 2-Port Asynchronous EIA-232 PCI adapter (FC 5723)

Learn about the specifications for the 2-Port Asynchronous EIA-232 PCI adapter.

This adapter provides connection for two (2) asynchronous EIA-232 devices. Ports are programmable to support asynchronous protocols over an EIA-232 interface at line speeds up to 128 Kbps.

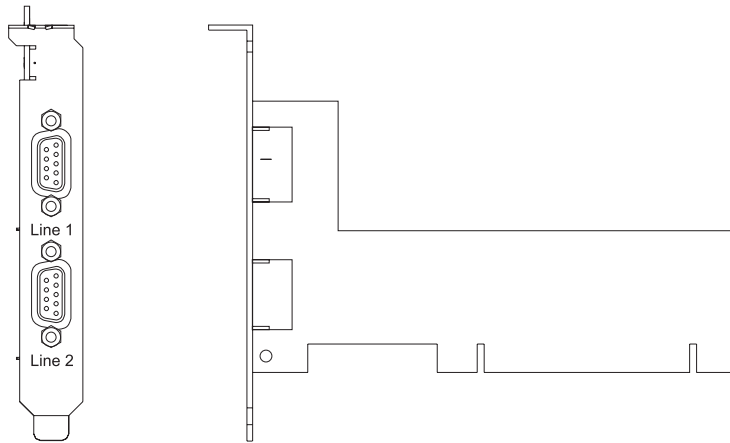


Figure 24. 2-Port Asynchronous EIA-232 PCI adapter

## Features and specifications

- FRU number 80P4353 (Not designed to comply with RoHS requirement.)
- 2 external DB09 connectors
- Exar Dual Async Controller, XR17D152
- EIA-232 compatible
- Supports Xon/Xoff offload
- Supports RTS/CTS or DTR/DSR off-load
- PCI Local Bus Specification Revision 2.2 compliant
- Bus width: 32 bit data and address
- Bus speed: 33 MHz
- Single slot, less than half-size PCI card
- Universal signaling (5V or 3.3V)
- FCC Class-B
- Power consumption: 1.3 watts (nominal), 2.465 watts (maximum)
- Hardware or software flow control
- Custom baud rates
- 16C850 UART equivalent

## Operating system or partition requirements


AIX 5L Version 5.2 with the 5200-04 Technology Level, and later

AIX 5L Version 5.3, and later

Red Hat Enterprise Linux version 4

SUSE Linux Enterprise Server 9 SP1

**Note:** If you are installing a new feature, ensure that you have the software required to support the new feature and that you determine if there are any existing PTF prerequisites. To do this, use the IBM

Prerequisite Web site at [http://www-912.ibm.com/e\\_dir/eServerPrereq.nsf](http://www-912.ibm.com/e_dir/eServerPrereq.nsf) 

## 8-Port asynchronous EIA-232E/RS-422A PCI adapter (FC 2943)

Learn about the specifications for the 8-Port asynchronous EIA-232E/RS-422A PCI adapter.

The 8-Port asynchronous EIA-232E/RS-422A PCI adapter is a multi-channel intelligent serial communications feature that supports speeds of up to 230 Kbps for each asynchronous port and is run by a 32-bit, 20 MHz, IDT 3041 processor.

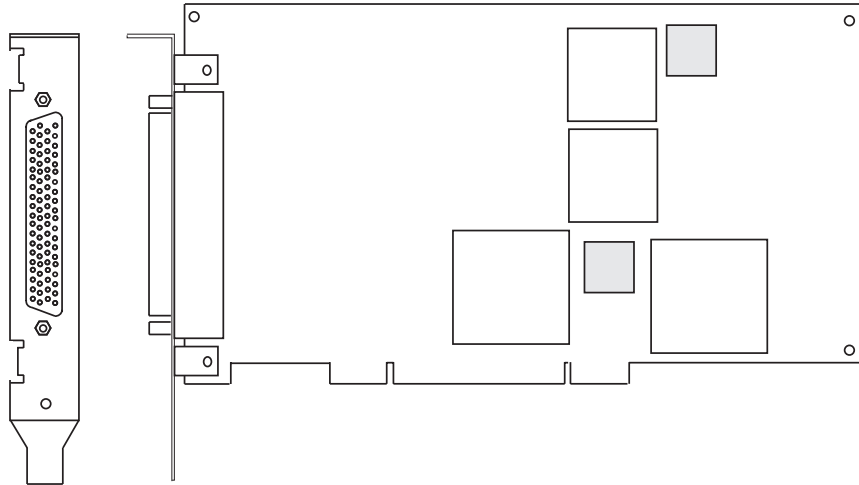


Figure 25. Feature 2943

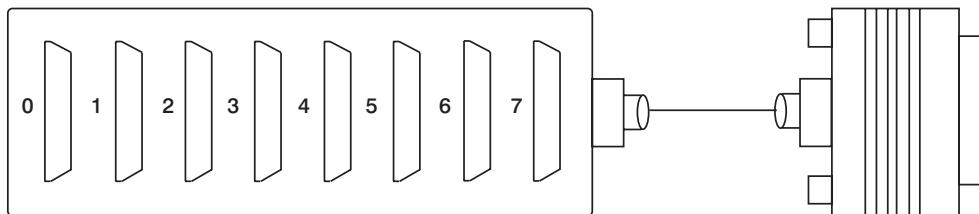


Figure 26. Feature 2943 connector

### 8-Port asynchronous EIA-232E/RS-422A PCI adapter specifications

| Item | Description |
|------|-------------|
|------|-------------|

|                   |  |
|-------------------|--|
| <b>FRU number</b> |  |
|-------------------|--|

|  |   |
|--|---|
|  | 93H6541 (Not designed to comply with RoHS requirement.) |
|--|---|

|                |  |
|----------------|--|
| <b>I/O bus</b> |  |
|----------------|--|

|  |     |
|--|-----|
|  | PCI |
|--|-----|

|                 |  |
|-----------------|--|
| <b>Bit rate</b> |  |
|-----------------|--|

|  |                                   |
|--|-----------------------------------|
|  | 50 - 230,000 (set by the program) |
|--|-----------------------------------|

|                                |  |
|--------------------------------|--|
| <b>Bits for each character</b> |  |
|--------------------------------|--|

|  |                                 |
|--|---------------------------------|
|  | 5, 6, 7, 8 (set by the program) |
|--|---------------------------------|

|                  |  |
|------------------|--|
| <b>Busmaster</b> |  |
|------------------|--|

|  |    |
|--|----|
|  | No |
|--|----|

|                       |  |
|-----------------------|--|
| <b>Maximum number</b> |  |
|-----------------------|--|

|  |   |
|--|---|
|  | 8 |
|--|---|

|                  |  |
|------------------|--|
| <b>Connector</b> |  |
|------------------|--|

|  |                       |
|--|-----------------------|
|  | 78-pin D-shell female |
|--|-----------------------|



**Wrap plug**

EIA-232 25-pin, part number 6298964. This wrap plug tests all of the adapter functions for both EIA-232 and RS-422.

**Cable** 8-Port DB-25 connector box, part number 11H5967 included with adapter

**Modem cable**

EIA-232 modem cable, part number 6323741, feature code 2936, length 3 meters or 10 feet

RS-422 modem cable, customer supplied (must meet RS-422 requirements)

**Terminal/printer cable**

EIA-232 terminal/printer cable, part number 12H1204, feature code 2934, length 3 meters or 10 feet

RS-422 terminal/printer cable, part number 30F8966, feature code 2945, length 20 meters or 66 feet

**8-Port EIA-232E/RS-422A adapter 78-position and 25-position connectors**

The 8-Port asynchronous EIA-232E/RS-422A PCI adapter is shipped with a connector box that provides eight 25 pin D-shell standard connectors.

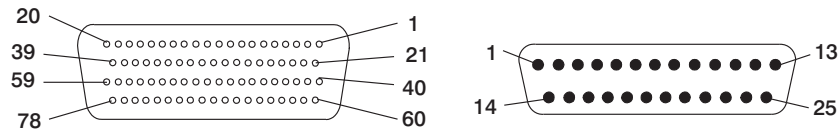


Figure 27. 25 pin D-shell standard connectors

| Mnemonic<br>EIA-232E/<br>RS-422A | I/O | Port 0 | Port 1 | Port 2 | Port 3 | Port 4 | Port 5 | Port 6 | Port 7 | 25-Position<br>Connector |
|----------------------------------|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------------------------|
| TxD/TxD <sub>b</sub>             | O   | 30     | 50     | 11     | 10     | 40     | 02     | 63     | 64     | 02                       |
| RxD/RxD <sub>b</sub>             | I   | 55     | 17     | 37     | 56     | 28     | 08     | 46     | 27     | 03                       |
| RTS/TxD <sub>a</sub>             | O   | 51     | 31     | 12     | 14     | 21     | 41     | 62     | 60     | 04                       |
| CTS/RxD <sub>a</sub>             | I   | 16     | 53     | 59     | 57     | 25     | 04     | 09     | 45     | 05                       |
| DCD/DCD                          | I   | 35     | 33     | 39     | 18     | 43     | 23     | 48     | 06     | 08                       |
| DTR/DTR                          | O   | 49     | 32     | 13     | 52     | 22     | 03     | 61     | 01     | 20                       |
| DSR/DSR                          | I   | 54     | 34     | 58     | 38     | 05     | 42     | 29     | 26     | 06                       |
| RI/NA*                           | I   | 36     | 15     | 20     | 19     | 44     | 24     | 47     | 07     | 22                       |
| SGND**                           | --  | --     | --     | --     | --     | --     | --     | --     | --     | 07                       |
| FGND                             |     |        |        |        |        |        |        |        |        | 01, Cable<br>Shield      |

**Notes:**

- \* = RTS is wrapped internally to CTS and RI for each port in RS-422
- \*\* = Pins 65 through 78 are ground

**IBM ARTIC960Hx 4-Port Selectable PCI Adapter (FC 2947)**

Learn about the specifications for the IBM ARTIC960Hx 4-Port Selectable PCI Adapter.

## Overview

The IBM ARTIC960Hx 4-Port Selectable PCI Adapter consists of an IBM ARTIC960Hx Base PCI Adapter, an IBM ARTIC960 4-Port Selectable PCI Mezzanine Card (PMC), and an 8MB DRAM Memory card.

The Base PCI Adapter provides high-function control of I/O operations and serves to off-load input/output tasks from the system microprocessor. It has a memory connector that supports 8 MB of extended-data output (EDO) dynamic random-access memory (DRAM).

The 4-Port Selectable PMC connects to the Base PCI adapter by two 64-pin connectors. The PMC card provides a high-function, application-specific interface that expands the capability of the base adapter.

The Base PCI Adapter and the attached 4-Port Selectable PMC occupy a single 32-bit expansion slot.

In addition to this topic, you can learn more about the adapter in the *IBM ARTIC960Hx 4-Port Selectable PCI Adapter, IBM ARTIC960Hx 4-Port T1/E1 PCI Adapter, IBM ARTIC960Hx DSP Resource PCI Adapter Installation and User's Guide SA23-2577*

Figure 28 shows a side view of the IBM ARTIC960Hx Base PCI Adapter.

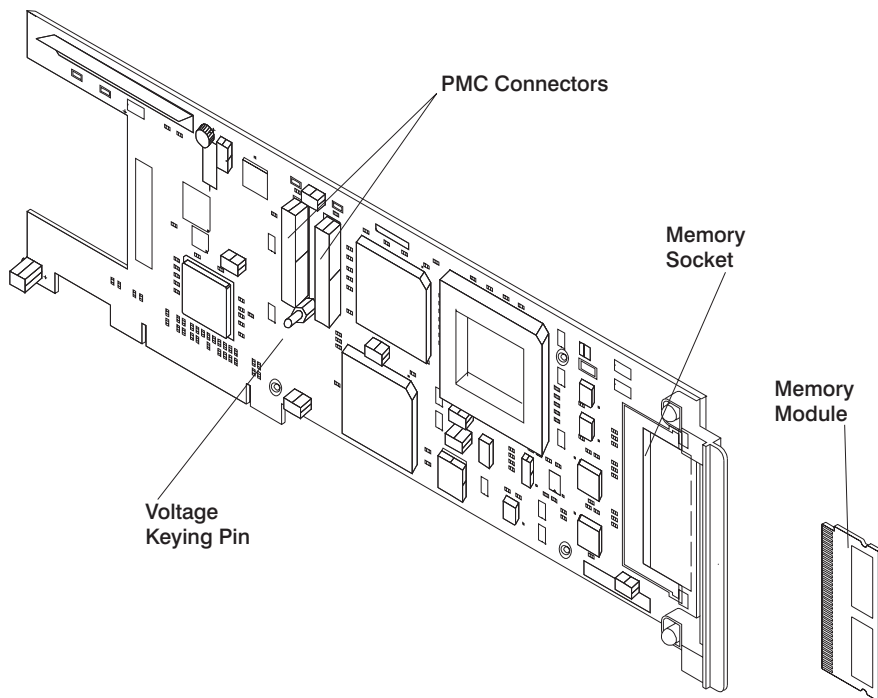


Figure 28. IBM ARTIC960Hx Base PCI Adapter

Figure 29 on page 87 shows a side view of the 4-Port Selectable PMC.

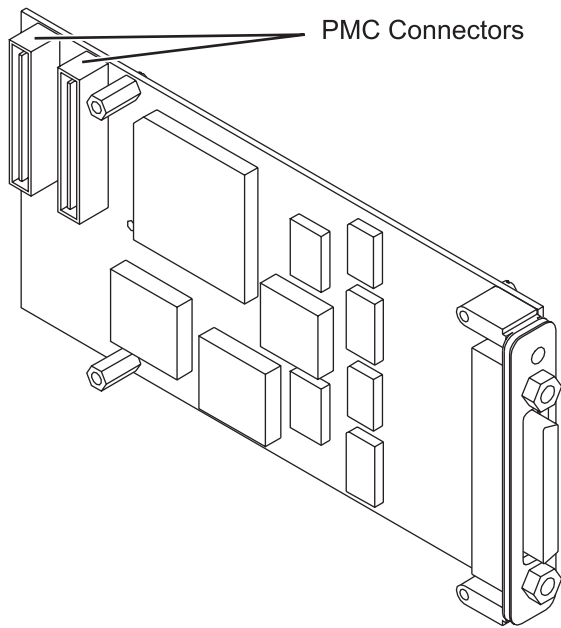


Figure 29. 4-Port Selectable PMC

## Adapter specifications

### Item Description

#### FRU numbers

Base adapter, 87H3427

8 MB memory module, 87H3621

4-Port selectable mezzanine card, 87H3413

#### I/O bus architecture

PCI, 32-bit, 33-MHz

The 2947 can be installed in supported 32-bit or 64-bit, 33-MHz, 66-MHz, 133-MHz, and 266-MHz PCI and PCI-X bus slots.

#### Busmaster

Yes

#### Bus size

32-bit

#### Wrap plugs

See "Wrap plugs" on page 88

#### Cables

EIA-232 (ISO 2110) cable

EIA-530 (ISO 2110) cable

V.35 DTE (ISO 2593) cable

RS 449 (ISO 4902) cable

X.21 (ISO 4903) cable

## Wrap plugs

| FRU number | Description of wrap plug                                    |
|------------|---|
| 87H3311    | 120-pin connector   |
| 87H3439    | 25-pin wrap plug (EIA-232 (ISO 2110) or EIA-530 (ISO 2110)) |
| 87H3442    | 34-pin wrap plug (V.35 DTE (ISO 2593) 34-pin male block)    |
| 87H3440    | 37-pin wrap plug (RS-449 (ISO 4902))                        |
| 53G0638    | 15-pin wrap plug (X.21 (ISO 4903))                          |

## Port speeds

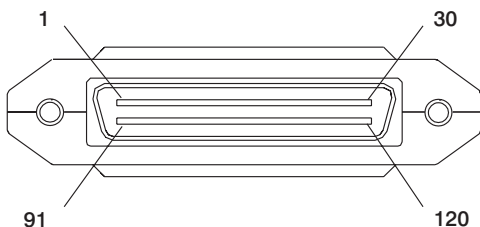
When clocks are supplied by an external device (all interfaces except EIA-232), the 4-Port Selectable PMC supports four ports running simultaneously at a maximum data rate of 2.048 Mbps, duplex, and synchronous. The following table shows the maximum speed supported for each electrical interface.

| Electrical interface | Maximum speed per port                      |
|----------------------|---|
| EIA-232 (ISO 2110)   | 38.4 Kbps (U.S. only) 19.2 Kbps (EMEA only) |
| EIA-530 (ISO 2110)   | 2.048 Mbps                                  |
| V.35 DTE (ISO 2593)  | 2.048 Kbps (US only) 64 Kbps (EMEA only)    |
| RS 449 (ISO 4902)    | 2.048 Mbps                                  |
| X.21 (ISO 4903)      | 2.048 Mbps                                  |

Clocks supplied by a Dual Universal Serial Communications Controller (DUSCC) on the 4-Port Selectable PMC provide synchronous data rates up to 230.4 Kbps, duplex. In addition, an on-card clock generator can provide data rates of either 1.544 Mbps or 2.048 Mbps for each port. Selection of the clock frequency is programmable.

## 4-Port Selectable PMC 120-pin connector

The individual signals for all ports connect to the 4-Port Selectable PMC through the 120-pin connector at the rear of the card. Each cable has a single 120-pin, male, D-shell connector that branches into four individual cables, each of which provides access to one of four independent ports. The 120-pin D-shell connector is shown in the following illustration.



## 64-bit/66MHz PCI ATM 155 UTP adapter (FC 4953)

Learn about the specifications for the 64-bit/66MHz PCI ATM 155 UTP adapter.

The 64-bit/66MHz PCI ATM 155 UTP adapter provides the interface between the ATM 155 Mb/sec unshielded twisted pair network and the 64-bit/66 MHz PCI bus in your system.

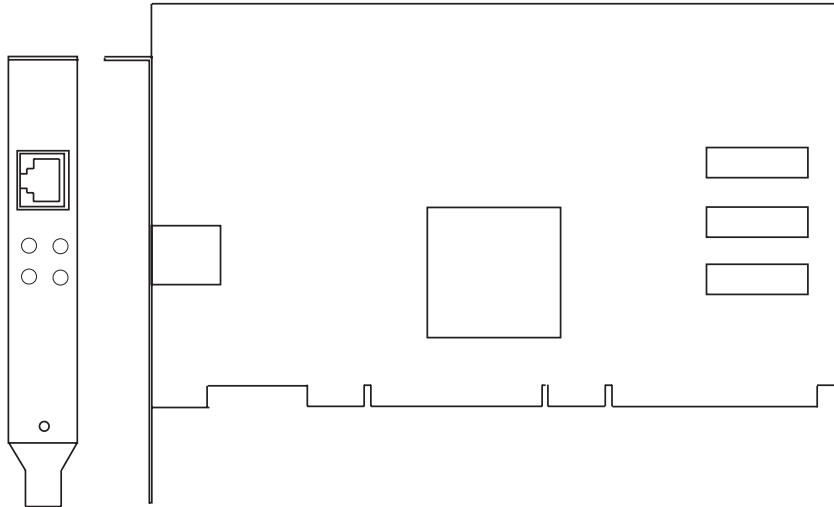


Figure 30. Feature 4953

## 64-bit/66MHz PCI ATM 155 UTP adapter specifications

### Item Description

#### FRU number

21P4112 (Not designed to comply with RoHS requirement.)

#### Bus architecture

PCI 2.2

#### Card type

Half

#### Adapter slots

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic.

#### Wrap plug

21P8009 (Supplied with adapter) or 42H0540

#### Connector information

RJ-45

#### Cables

The cat5 cable can be unshielded twisted pair (UTP) or shielded twisted pair (STP), up to 100 meters in length.

## PCI-X Cryptographic Coprocessor (FC 4764; CCIN 4764)

Learn about the specifications, requirements, and installation notes for the 4764 PCI-X Cryptographic Coprocessor.

The adapter for the PCI-X Cryptographic Coprocessor provides applications with cryptographic processing capability and a means to securely store cryptographic keys. Cryptographic functions available include encryption for keeping data confidential, message digests and message authentication codes for ensuring that data has not been changed, and digital signature generation and verification for authentication. In addition, the coprocessor provides basic services for financial PIN, EMV, and SET applications. The coprocessor also can serve as an accelerator to accelerate the establishment of new SSL sessions.

The adapter is designed to meet FIPS PUB 140-2 Security Level 4 requirements.

### Specifications and requirements

#### Item Description

**FRU number**

41U0442\* or 12R6540\*\*

\* Designed to comply with RoHS requirement.

\*\* Not designed to comply with the RoHS requirement.

**Battery kit**

41V1061, kit contains two batteries and a battery tray.

**Adapter type**

Short, 64-bit, 3.3 v, PCI version 2.2, PCI-X version 1.0

**Placement information**

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

**Environmental requirements**

**Attention:** The PCI-X Cryptographic Coprocessor must be shipped, stored, and used within the following environmental specifications. If these specifications are not met, the 4764 tamper sensors can be activated and render the 4764 permanently inoperable.

**Shipping**

Ship the adapter in the original packaging (moisture barrier bag with desiccant and thermally insulated box with gel packs).

Temperature when shipping: +5 degrees F (-15 degrees C) to +140 degrees F (+60 degrees C)

Pressure when shipping: minimum 550 mbar, maximum 1039 mbar

Humidity when shipping: 5% to 100% RH

**Storage**

Store the adapter in sealed moisture barrier bag with desiccant.

Temperature in storage: +38.8 degrees F (+1 degrees C) to +140 degrees F (+60 degrees C)

Pressure in storage: minimum 700 mbar, maximum 1039 mbar

Humidity in storage: 5% to 80% RH

**Operation (ambient in system)**

Temperature while operating: +50 degrees F (+10 degrees C) to +104 degrees F (+40 degrees C)

Humidity while operating: 8% to 80% RH

Altitude while operating: maximum 7000 feet, equivalent to 768 mbar

**Handling requirements**

Each PCI-X Cryptographic Coprocessor is shipped from the factory with a certified device key. This electronic key, which is stored in the adapter's battery-powered and protected memory, digitally signs status messages to confirm that the PCI Cryptographic Coprocessor is genuine and that no tampering has occurred.

If any of the secure module's tamper sensors are triggered by tampering or by accident, the PCI-X Cryptographic Coprocessor erases all data in the protected memory, including the certified device key. Incorrect removal of the batteries triggers the tamper sensors and destroys the certified device keys. The PCI Cryptographic Coprocessor cannot operate without the certified device keys. To protect the keys, follow the guidelines given in the documentation provided with the coprocessor.

**Attention:** The batteries keep the coprocessor powered on even when it is not installed in a system. When handling, installing, or removing the adapter, do not let the adapter circuits come in contact with any conductive surface or tools. Doing so can render the adapter permanently inoperable.

Do not remove the adapter's batteries. Data in the protected memory is lost when battery power is removed. For information about replacing the batteries, see "Replacing the batteries" on page 93.

**Attention:** While installing the coprocessor, observe the following precautions:

- The coprocessor is always powered by the batteries, even when it is not installed in the system.
- The battery power is necessary to keep the coprocessor operational.
- The loss of battery power or a voltage drop triggers a Tamper Event and permanently renders the coprocessor inoperable.
- Any short on the battery power distribution circuits causes a voltage drop and a Tamper Event.
- Do not lay the coprocessor on or cause the coprocessor to come in contact with any conductive surface.
- Do not touch the coprocessor circuits with metal or conductive tools.
- Use static-protective measures at all times when handling the coprocessor.

### **Operating system or partition requirements**

AIX 5L Version 5.2 with the 5200-09 Technology Level, or later

AIX 5L Version 5.3 with the 5300-05 Technology Level, or later

### **Required software or drivers**

#### **AIX**

devices.pci.1410e501 device driver package

#### **Linux**

No Linux support

### **Required firmware**

CD form number LCD8-0477-00 contains functional firmware and must be purchased with the adapter.

### **PKCS11 support program installation**

The *4764 PCI-X Cryptographic Coprocessor PKCS#11 Support Program Installation Manual* is included on the CD that is shipped with the adapter. The manual is contained in the csufx.xcrypto.man file set.

### **CCA support program installation**

The *4764 PCI-X Cryptographic Coprocessor CCA Support Program Installation Manual* is included on the CD that is shipped with the adapter. The manual is contained in the csufx.xcrypto.man file set. You can also view or download the manual from the IBM Systems Hardware Information Center Web site at <http://publib.boulder.ibm.com/infocenter/eserver/v1r3s/index.jsp>.

## **Preparing for installation**

If you are installing your operating system at this time, install your adapter before you install the operating system. See "Installing the adapter" on page 93 for instructions.

If you are installing only the device driver for this adapter, install your device driver software before you install the adapter. See "Installing the device driver software" for instructions.

## **Installing the device driver software**

This section explains how to install device driver software. The device driver is provided for the following AIX 5L technology levels:

AIX 5L Version 5.2 with the 5200-09 Technology Level

AIX 5L Version 5.3 with the 5300-05 Technology Level

To install device driver software, do the following:

1. Log in to the system unit as root user.
  2. Insert the media containing the device driver software (for example; CD) into the appropriate media device.
  3. Type the following System Management Interface Tool (SMIT) fast path: `smitty devinst`
  4. Press Enter. The Install Additional Device Software menu highlights the INPUT device or directory for software option.
  5. Select or type your input device:
    - a. Press F4 to display the input device list.
    - b. Select the name of the device (for example; CD-ROM) that you are using and press Enter.
- OR
- a. In the entry field, type the name of the input device that you are using and press Enter.
  - b. The Install Additional Device Software window highlights the SOFTWARE to install option.
6. Press F4 to display the SOFTWARE to install window.
  7. Enter / to display the Find window.
  8. For the adapter, type the following device package name: `devices.pci.1410e501`
  9. Press Enter. The system finds and highlights this device driver software.
  10. Press F7 to select the highlighted device driver software.
  11. Press Enter. The INSTALL ADDITIONAL DEVICE SOFTWARE menu displays. The entry fields are automatically updated.
  12. Press Enter to accept the information. The ARE YOU SURE menu displays.
  13. Press Enter to accept the information. The COMMAND STATUS menu displays.
    - The term RUNNING is highlighted to indicate that the installation and configuration command is in progress.
    - When RUNNING changes to OK, scroll to the bottom of the page and locate the Installation Summary.
    - After a successful installation, SUCCESS displays in the Result column of the Installation Summary at the bottom of the display.
  14. Remove the installation media from the drive.
  15. Press F10 to exit SMIT.
  16. Verify the device driver. See “Verifying the device driver”
  17. Install the adapter. See “Installing the adapter” on page 93.

## Verifying the device driver

To verify that the device driver for the adapter is installed, do the following:

1. If necessary, log in as root user.
2. At the command line, enter: `lslpp -l devices.pci.1410e501.rte`
3. Press Enter.

If the adapter device driver is installed, the following is an example of the data that displays on your display:

| Fileset   | Level    | State     | Description               |
|---|----------|-----------|---------------------------|
| Path: /usr/lib/objrepos<br>devices.pci.1410e501.rte | 5.2.0.95 | COMMITTED | Cryptographic Coprocessor |

Verify that the filesets `devices.pci.1410e501.rte` are at level 5.2.0.95 or higher.



If no data displays on your display, the adapter device driver did not install correctly. Reinstall the driver.

## Installing the adapter

**Attention:** While installing the coprocessor, observe the following precautions:

- The coprocessor is always powered by the batteries, even when it is not installed in the system.
- The battery power is necessary to keep the coprocessor operational.
- The loss of battery power or a voltage drop triggers a Tamper Event and permanently renders the coprocessor inoperable.
- Any short on the battery power distribution circuits causes a voltage drop and a Tamper Event.
- Do not lay the coprocessor on or cause the coprocessor to come in contact with any conductive surface.
- Do not touch the coprocessor circuits with metal or conductive tools.
- Use static-protective measures at all times when handling the coprocessor.

Refer to the PCI adapters topic for instructions on placement and installation of PCI adapters.

After you have installed the adapter, verify the adapter installation.

## Verifying the adapter installation

To verify that your system unit recognizes the PCI adapter, do the following:

1. If necessary, log in as root user.
2. At the command line, type: `lsdev -Cs pci`
3. Press Enter.

A list of PCI devices displays. If the adapter is installed correctly, an Available status for each port indicates that the adapter is installed and ready to use. If the message on your display indicates that any of the ports are DEFINED instead of AVAILABLE, shut down the system and verify that the adapter was installed correctly. The adapters appear as Crypt0, Crypt1, and so on.

## Running coprocessor diagnostics

Diagnostics are provided with the device driver software. If you need to run diagnostics, see the Working with AIX diagnostics topic.

If you remove a cryptographic adapter and do not replace it, and you run diagnostics on the remaining cryptographic adapters, the results might not be correct. As a result, always run the `cfmgmgr -v` command after removing a cryptographic adapter.

## Replacing the batteries

Two lithium batteries that are mounted on the adapter supply power to the adapter's components, including protected memory. Support software or application software can query the coprocessor to determine whether the batteries need to be replaced. When the batteries need replacing, have the procedure done by trained service providers using the 41V1061 Battery kit for the 4764. Instructions are in the Replacing the battery on a type 4764 card topic.

## Connectors

Table 16. Connectors and jumpers on the PCI-X Cryptographic Coprocessor

| Connectors | Name of jumper     | Default position |
|------------|--------------------|------------------|
| J7         | PCI-X EEPROM write | Jumper installed |

Table 16. Connectors and jumpers on the PCI-X Cryptographic Coprocessor (continued)

| Connectors | Name of jumper                   | Default position             |
|------------|----------------------------------|------------------------------|
| J8         | External intrusion latch disable | Jumper not installed         |
| J9         | Battery disconnect wire          | Jumper (wire loop) installed |
| J10        | Temporary-battery connector      | Jumper not installed         |
| J11        | External intrusion latch         | Jumper not installed         |

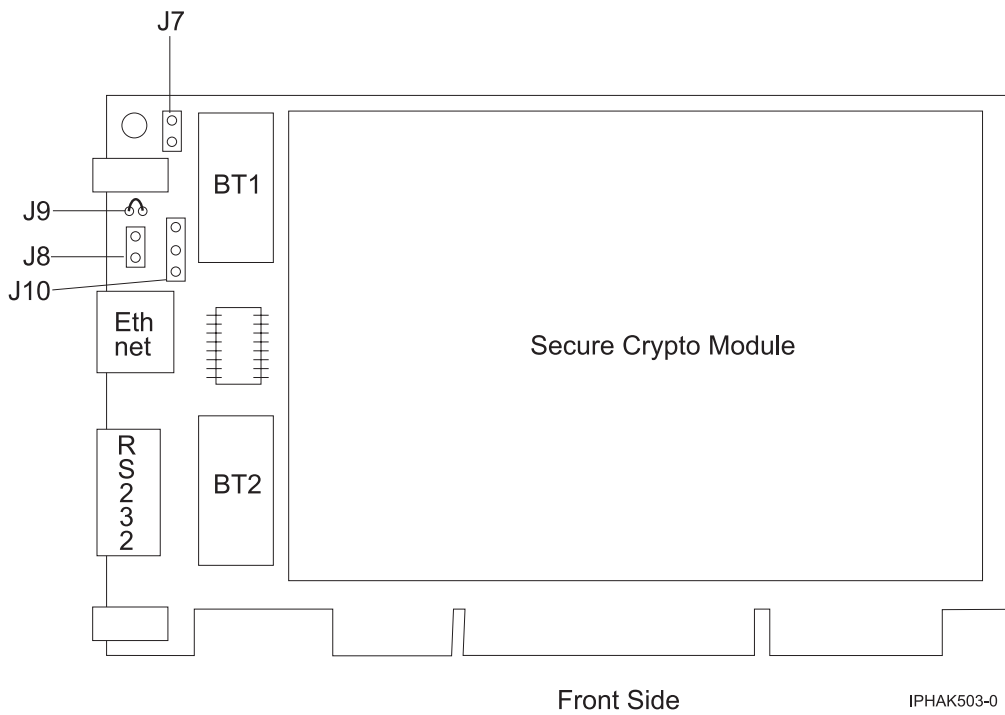


Figure 31. Front side of the adapter

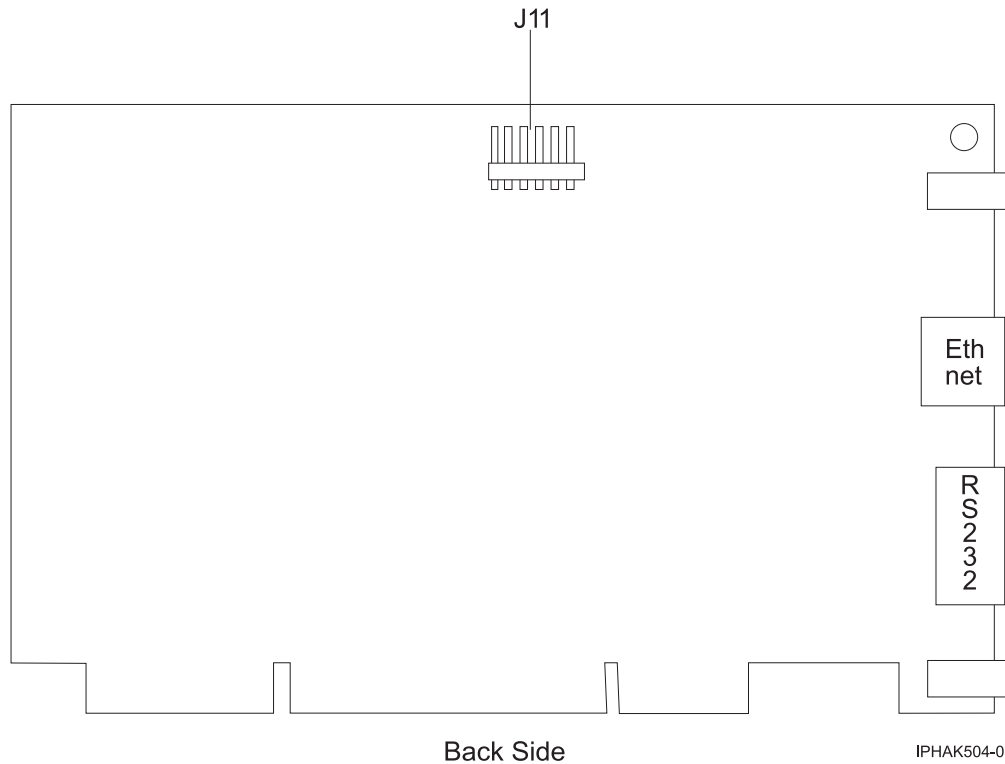


Figure 32. Back side of the adapter

## Cryptographic accelerator (FC 4960; CCIN 2058)

Learn about the specifications for the cryptographic accelerator.

The cryptographic accelerator provides high cryptographic performance through hardware acceleration by offloading computationally intensive public-key processing from a host processor. The overall operation control, including command decoding, is implemented in hardware.

As a result, e-business applications requiring Public Key Cryptography might experience an increase in performance. At the same time, the cryptographic accelerator releases the host processor to respond to other Internet transactions, database transactions, customer requests, and so on.

The adapter supports the following encryption and decryption functions:

- DES
- T-DES
- DES MAC
- T-DES MAC
- SHA-1
- Parallel processing of the same input data using DES and SHA
- DES to SHA
- Modular Exponentiation (with and without CRT)
- Modular Multiplication.

You install the cryptographic accelerator in a PCI card slot.

**Note:** This adapter does not incorporate a microprocessor subsystem (CPU, DRAM, Flash), a secure programming environment, nor tamper detection and response functions.

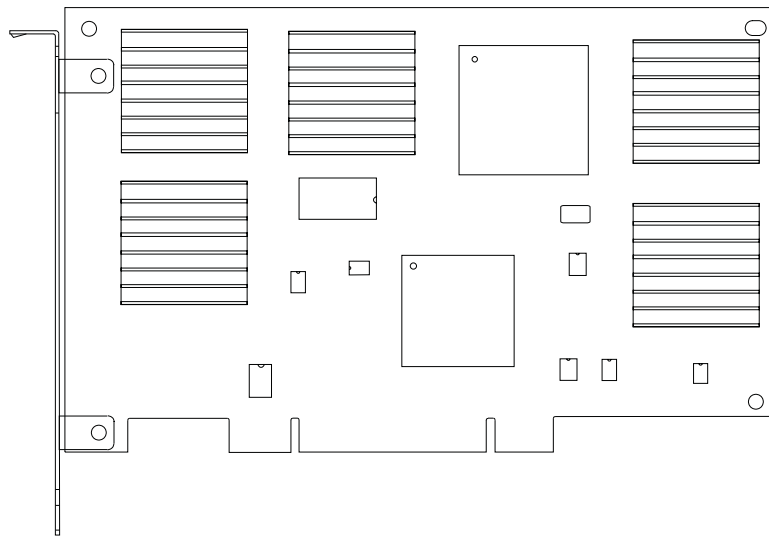


Figure 33. Feature 4960

## Cryptographic accelerator specifications

The following items are requirements and specifications for this adapter.

### FRU part number

11P3106 (Not designed to comply with RoHS requirement.)

### Power consumption

Typical, 20 watts

### Voltage

+5.0 Vdc  $\pm$ 10 percent

### Temperature

Operating, +10 to +40 degrees C (50 to 104 degrees F)

Storage, +1 to +40 degrees C (5 to 104 degrees F)

### Relative humidity

8 to 80 percent

### Physical dimensions

174.63 mm by 106.68 mm

### Maximum number

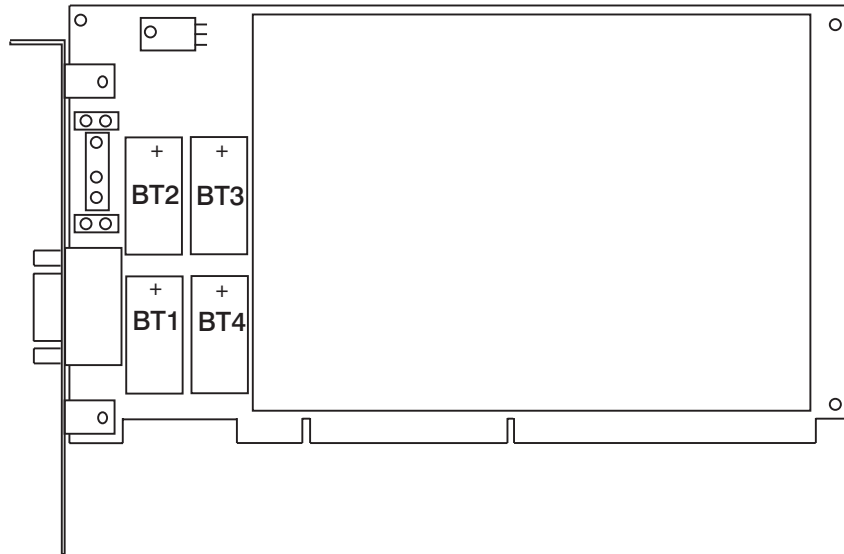
For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

## PCI cryptographic coprocessor (FC 4963)

Learn about the specifications for the PCI cryptographic coprocessor.

The PCI cryptographic coprocessor is designed to provide data security functions for PCI bus systems. The PCI cryptographic coprocessor provides high-performance secure hardware engines, including methods of transmitting data, verifying electronic signatures, bulk data encryption, and decryption.

The adapter is designed to FIPS PUB 140-1 Security Level 4 Standards.



Each PCI Cryptographic Coprocessor is shipped from the factory with a certified device key. This electronic key, which is stored in the adapter's battery-powered and protected memory, digitally signs status messages to confirm that the PCI Cryptographic Coprocessor is genuine and that no tampering has occurred.

**Attention:**

- If any of the secure module's tamper sensors are triggered by tampering or by accident, the PCI Cryptographic Coprocessor erases all data in the protected memory, including the certified device key. Incorrect removal of the batteries triggers the tamper sensors and destroys the certified device keys. The PCI Cryptographic Coprocessor cannot operate without the certified device keys. To protect the keys, follow the guidelines given in the documentation provided with the coprocessor.
- The batteries keep the coprocessor powered on even when it is not installed in a system. When handling, installing, or removing the coprocessor, do not let the coprocessor circuits come in contact with any conductive surface or tools. Doing so can render the adapter permanently inoperable.

**PCI cryptographic coprocessor specifications**

**Item**    **Description**

**FRU number**

10J0357 (Not designed to comply with RoHS requirement.)

**Battery kit**

09J8199, Kit contains two batteries and a battery tray. Two kits are required for battery replacement.

**Bus architecture**

PCI version 2.1

**Adapter slots**

For system-specific adapter placement information, see the PCI placement section in the PCI adapter topic

**Temperature range, stored**

+33.8 degrees F (+1 degree C) to +140 degrees F (+60 degrees C)

**Temperature range, operating**

+50 degrees F (+10 degrees C) to +104 degrees F (+40 degrees C)

## Connector

For manufacturing test use only. Not for use by customer.

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## Managing host channel adapters

Learn how to install and manage host channel adapters.

For information about installing and managing a host channel adapter in an InfiniBand™ cluster network, see *Clustering systems using InfiniBand hardware* in the IBM Systems Hardware Information Center.

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## Managing media devices

Learn about the features and requirements for media devices.

## Tape drives

Learn about specific tape drives and how to use them.

### Overview

Learn about how to use tape drives.

Select the appropriate information from this list:

- Tape drive overview
- Tape drive environment and use
- Tape handling and storage
- Environmental issues
- Tape drive cleaning
- SCSI hardware issues
- Microcode updates

### Tape drive overview

Your tape drive must be installed in the cleanest possible environment. Additionally, tape drives require high quality, data grade tapes and cleaning on a regular basis. Media must also be stored and handled properly. Improper use, storage or handling of tape drives or media may void your warranty or service agreement. If a tape drive stops functioning due to a component failure during the tape drive warranty or maintenance time, the tape drive supplier will replace the tape drive unit. The tape drive supplier will replace any defective tape drive under the terms and conditions of the warranty or service agreement.

The tape drive is a streaming device used primarily for:

- Saving and restoring system data files
- Archiving important records
- Distributing operating system software upgrades

**Note:** The following information describes hardware features and functions. While the hardware supports them, the availability of these features and functions depends upon support from the operating system. For information about support for features and functions, see the documentation for your operating system.

## Tape drive environment and use

Tape drives require specific maintenance and environmental conditions to operate well over time. Using high-quality, data-grade media, handling and storing this media correctly, operating the tape drive in a clean environment, and keeping the tape drive correctly cleaned can help you to avoid problems with your tape drive.

If a tape drive stops functioning due to a component failure during the tape drive warranty or maintenance time, the service provider will replace the tape drive unit. The service provider will replace any defective tape drive under the terms and conditions of its warranty or service agreement. It is the service provider's objective to work with you to identify the cause of any tape-drive problem and provide a solution.

## Tape handling and storage

Most tape is supplied in a sealed cartridge so that the tape will remain clean. Opening the cartridge allows dirt and airborne particles to enter and then become a source of contamination. The cartridge should only be opened by the tape drive and not an operator. The tape also is held under proper tension inside the cartridge. If the cartridge is dropped, this tension will be relaxed.

**Attention:** Inserting a dropped cartridge into a tape drive can cause incorrect loading and result in a jam. This action will ruin the tape and can cause physical damage if the cartridge is not removed correctly.

When the tapes are stored, they must be replaced in their protective containers and stored on their end. The storage area must be clean, dry, at normal room temperature, and away from any magnetic fields. Improper use, storage, or handling of tape drives or media might void your warranty or service agreement.

## Environmental issues

Tape drives are designed to operate in a clean environment. Problems can be caused by dirt, dust, fibers, and airborne particles. Airborne particles are the most difficult to address. When a tape is installed into the tape drive, the clearance between the heads and the tape is measured in microns. Particles can damage the tape or the head if they come in contact with either. Customers are responsible to provide a clean operating environment for the tape drive and system.

## Tape drive cleaning

No matter how clean the environment, debris can build up on the heads of any tape drive. Every time tape motion occurs, some of the media surface comes off on the heads. Over time, this surface builds up and causes errors in reading and writing. Customers are responsible to clean the tape drive in accordance with the cleaning information that was provided with the tape drive.

Cleaning cartridges can be used a limited number of times. After a cleaning cartridge has been used to its maximum number of times, the cartridge is considered expired. When cartridges expire, they must be replaced. Never reuse an expired cleaning cartridge. Doing so allows previously removed dirt to be reintroduced to the tape drive. Place a mark on the cleaning cartridge after each use, to best determine when your cleaning cartridge has expired.

## SCSI hardware issues

**Note:** If you are installing the auto-docking version of this device on your system, this section does not apply to your system. For information about the auto-docking feature, see your system documentation.

SCSI bus cables and terminators can affect tape drive performance. Use cables and terminators that are designed specifically to keep the SCSI bus as free of noise as possible. Generic cables or terminators can adversely affect the SCSI bus performance. If your service provider's analysis indicates a problem with inferior cables, it might be necessary for the customer to replace them.

## Microcode updates

To make certain that the tape drives work their best, your system supplier might release changed microcode for the tape drives. When a microcode change is developed, your system supplier makes the change available to you through its service organization or by electronic delivery. You might be responsible for installing new microcode as it becomes available. However, microcode can be installed by your service provider or your system administrator. For more information, contact your authorized service provider.

## Using tape drive media

Learn about using the different types of tape drive media.

For specific information related to the media that can be used with the tape drive you have, see "Type of tape device" on page 105.

**Attention:** Your system supplier might support only the media that it sells. If the supplier's analysis indicates that the problem is caused by using inferior media, it is the customer's responsibility to replace the inferior media.

Select the appropriate information from this list:

- Types of cartridges
- Recommendations for data cartridge usage
- Prolonging head life
- Storage and shipping environments
- Tape cartridge storage
- Operating in harsh environments
- Ordering tape cartridges

## Types of cartridges

Most tape devices include the following media cartridges.

### Data cartridge

Use the data cartridge to save or restore programs or data.

### Test cartridge

Use the specially labeled test cartridge to run the AIX system diagnostics (for information about running diagnostics, refer to your AIX documentation). Do not use the test cartridge to save or restore customer programs or data.

### Cleaning cartridge

Use the specially labeled cleaning cartridge to clean the device.

**Attention:** Use of other than the IBM specified cleaning cartridge can damage your device and might void your warranty.

To order additional cartridges, refer to Ordering tape cartridges.

## Recommendations for data cartridge usage



The following list describes recommended guidelines that will help to protect your data and prolong the life of your tape cartridges and the device:

- Use only the tape cartridge specified for your “Type of tape device” on page 105
- Remove the tape cartridge from the drive when the drive is not in use.
- Back up and then discard any tape cartridge that repeatedly produces error messages (the error information is in the System Error Log).
- On the data cartridge, do not open the door that covers the tape. The door protects the tape from dirt, dust, and damage.
- Do not touch the tape. Any substance transferred to the tape by touching could cause loss of data.
- To avoid problems with loading and unloading, use only one label on a cartridge. Multiple or poorly placed labels can clog the drive load mechanism.
- Do not use poor-quality tape cartridges. They can cause excessive read or write errors, and they might damage the tape drive.
- Discard any tape cartridges that are dropped, because the impact might damage the tape’s internal mechanism.
- Make sure the environment is kept clean and constant. Do not operate in a dusty environment and always maintain a constant environment. A consistent storage and operating environment reduces media exposure to climatic stress.
- Use only the recommended cleaning cartridge to clean the tape drive. Use of other than recommended cleaning cartridges can damage your drive and might void the warranty.
- Printers and copiers can produce paper dust and toner dust. Locate the tape unit away from these items. High traffic areas near hallways and doors can also produce excess dust and dirt.
- Record all important information on the tape label. Information, such as the model and number of the system or tape drive, the date, the density, any error statistics, and include a log number. Also note the operating environment and compression mode.

## Prolonging head life

This new technology found in the tape device is read and write compatible with newer tape cartridges. Due to media characteristics, extended use of older tape cartridges might increase head wear on the drive. An indication of this head wear is an increase in soft (recoverable) errors. Using newer tape cartridges may have enhanced characteristics that can reduce drive head wear and maximize the overall advantages of the tape device.

## Storage and shipping environments

Before using a tape cartridge, let it acclimatize to the operating environment by placing the cartridge in the operating environment for as long as it has been away from the environment or for 24 hours, whichever is less. Acclimatization is necessary for any data cartridge exposed to an environmental change in humidity or to temperature changes of 11°C (20°F) or more. To determine the appropriate operating environment, see Tape drive environment and use.

Retrieval of archived data can be performed on a tape unit that is clean and fully operational. Try to make the recovery environment the same as the operating environment. Allow tapes at least 24 hours to acclimatize to the environment of the tape unit.

The recommended environment for storage and shipment of cartridges is shown in Table 17.

*Table 17. Recommended environment for data cartridges*

| Environmental Factor | Storage                      | Shipping                      |
|----------------------|------------------------------|-------------------------------|
| Temperature          | 5°C to 32°C<br>(41° to 90°F) | -40 to 52°C<br>(-40 to 125°F) |

Table 17. Recommended environment for data cartridges (continued)

| Environmental Factor                 | Storage        | Shipping       |
|--------------------------------------|----------------|----------------|
| Relative Humidity<br>(noncondensing) | 20 to 60%      | 5 to 80%       |
| Maximum Wet Bulb                     | 26°C<br>(79°F) | 26°C<br>(79°F) |

## Tape cartridge storage

Tape drives record data using densities similar to hard disk drives. Because most computer systems are not located in a dust-free, climate-controlled environment, you must exercise special care when dealing with tape cartridges and tape drives. They must be treated as a valuable asset used to protect your business data.

Use the following guidelines for storing your tape cartridges:

- Keep temperature and humidity constant at the levels listed in Table 17 on page 101.
- Always store tape cartridges in their protective cases. The storage case helps prevent damage from dust and physical misuse. When the tape cartridges are not in use or being stored, keep them in their storage cases and stand on edge in a designated storage location. Do not stack cartridges on the flat side or stack other items on top of the tape cartridges. Handle your tape cartridges with care to reduce archival problems.
- Keep protective cases for tape cartridges closed except when inserting or removing a cartridge. Contamination can build up and be transferred to the tape cartridge if the protective case is left open.
- Exercise stored tapes at least once every 12 months. Run the tape from Beginning of Data (BOD) to End of Data (EOD) and back to BOD at normal operating speeds. Exercise tapes stored in a warmer environment more frequently.
- Sunlight can damage the tape and the cartridge shell. Store tape cartridges out of the direct sunlight.

**Attention:** Operation outside of the recommended environment can result in possible loss of data or failure of the drive.

## Operating in harsh environments


The device is suited to streaming operations, as opposed to multiple stop-and-start, random-search tape operations. When the tape is used for frequent stop-and-start operations, it is beneficial to still have as much streaming movement as possible. This can be accomplished by ensuring that any save or restore operation is the only active operation being performed.

Do not use any tape for archival purposes if it has been used outside of the ranges specified in Table 17 on page 101 for an extended period of time. The magnetic and physical strength of the tape will have deteriorated as a result of its exposure to the environment. Do not store important data on such a tape; transfer the data to a newer tape for reliable archiving.

## Ordering tape cartridges

All tape cartridges are not alike. The tape composition and length, and the construction of the cartridge itself can all affect the quality and capacity of the recording and the performance of your tape drive. A poor quality tape cartridge might appear to work adequately in your system, yet it can leave contamination in the tape path or impede the speed of the recording.

The length and composition of the tape, and the size, shape, and construction of the cartridge shell must all be considered when selecting the tape cartridge to be used with your system. IBM supports using only data and cleaning cartridges supplied by IBM. Use only data-grade tape media for backup and data processing.

To order cartridges in the United States and Canada, call 1-888-IBM-MEDIA or, on the internet, see  [www.storage.ibm.com/media/](http://www.storage.ibm.com/media/)

To order cartridges in other locations, contact your local provider of IBM storage products.

The following tables list all available data cartridges for a specific type of cartridge:

*Table 18. Recommended 4-mm data cartridges*

| IBM Part Number | Type of Cartridge       | Native (uncompressed) Capacity |
|-----------------|-------------------------|--------------------------------|
| 59H3465         | Data Cartridge DDS3     | 12GB                           |
| 59H4458         | Data Cartridge DDS4     | 20GB                           |
| 18P7912         | DAT 72 Data Cartridge   | 36 GB                          |
| 59H4457         | 4-mm Test Cartridge     |                                |
| 21F8763         | 4-mm Cleaning Cartridge |                                |

*Table 19. Recommended 8-mm data cartridges*

| Part Number | Type of Cartridge                        | Length         |
|-------------|--|----------------|
| 35L1044     | 20 GB AME with SmartClean Data Cartridge | 75 m (246 ft)  |
| 09L5323     | 40 GB AME with SmartClean Data Cartridge | 150 m (492 ft) |
| 18P6484     | 60 GB AME with SmartClean Data Cartridge | 225 m (738 ft) |
| 35L1409     | Cleaning Cartridge                       |                |

*Table 20. Recommended VXA X-type data cartridges*

| Part Number | Type of Cartridge                | Length         |
|-------------|----------------------------------|----------------|
| 24R2137     | 80/160 GB X23 VXA Data Cartridge | 230 m (754 ft) |
| 24R2136     | 40/80 GB X10* VXA Data Cartridge | 124m (406 ft)  |
| 24R2134     | 20/40 GB X6* VXA Data Cartridge  | 62 m (203 ft)  |
| 24R2135     | VXA X6* Test Cartridge           | 62 m (203 ft)  |
| 24R2138     | VXA 20 X Cleaning Cartridge      |                |

**Note:** \*X type media requires a minimum microcode level of 2105.

*Table 21. Recommended VXA V Type data cartridges*

| Part Number | Type of Cartridge                | Length         |
|-------------|----------------------------------|----------------|
| 19P4876     | 80/160 GB V23 VXA Data Cartridge | 230 m (754 ft) |
| 24R2136     | 40/80 GB V10 VXA Data Cartridge  | 124m (406 ft)  |
| 19P4878     | 20/40 GB V6 VXA Data Cartridge   | 62 m (203 ft)  |
| 19P4879     | VXA V6 Test Cartridge            | 62 m (203 ft)  |
| 19P4880     | VXA 20 V Cleaning Cartridge      |                |

**Note:** V cartridges are the original VXA cartridge

Table 22. LTO Ultrium data cartridges

| Part Number | Type of Cartridge                       | Length           |
|-------------|---|------------------|
| 08L9120     | 100/200GB LTO Ultrium 1 data cartridges | 610 m (2000 ft ) |
| 08L9870     | 200/400GB LTO Ultrium 2 data cartridges | 610 m (2000 ft ) |
| 24R0395     | LTO Gen-2 Test Tape                     | 610 m (2000 ft ) |
| 35L2086     | Universal Cleaning Tape                 |                  |

## Preparing the tape drive for installation

Find what you need to know before you install a SCSI tape drive.

Select the appropriate information from this list:

- Handling recommendations
- Planning your SCSI device layout
- Determining your SCSI address
- Setting the SCSI address
- Configuring the tape drive
- Updating microcode levels

### Handling recommendations

**Attention:** Be sure to read these instructions before you remove the device from its anti-static bag or any time you handle it.

For optimum performance, always follow these recommendations:

- Handle the drive carefully and by its external metal chassis. Keep your hands away from the printed circuit boards, components, and printed circuit (flex) cables.
- If possible, work on a cushioned surface, and do not drop the device onto the work surface.
- If you move the device to an environment that is colder or warmer than its previous environment, keep the drive in its package and allow the package to reach the current room temperature. This action prevents potential data loss or damage to the device. Allow one hour of acclimatization for each 10 degrees C (18 degrees F) difference between the ship or storage temperature and the room temperature.

**Note:** If you are installing the auto-docking version of this device on your system, the remainder of this information does not apply to your system. For information about the auto-docking feature, see your system documentation.

### Planning your SCSI device layout

SCSI devices are attached in a daisy-chain configuration to a SCSI adapter inside your system unit. SCSI devices can be installed inside your system unit or connected externally. When you connect more than one SCSI device, it is important that you plan the layout of your SCSI chain. Each device in the chain has a unique SCSI address (also called a *SCSI ID*). A terminator is required at each end of the SCSI chain.

### Determining your SCSI address

Before you install the drive, you must set the SCSI address on the drive. First, determine which SCSI addresses are available to use. Then choose an address and install jumpers on the drive to set the selected address. The drive supports addresses 6 through 0 and 8 through 15. You can use any available SCSI

address as long as no two SCSI devices on the same chain use the same address. Usually, no device can use address 7, which is reserved for the SCSI adapter.

**Note:** Drives are usually shipped with an SCSI address of 0.

SCSI addresses are in sequential order from highest to lowest priority. All SCSI devices can use SCSI addresses 6 through 0. If your system unit and adapter support the wide (16-data bit, 68-conductor cable) SCSI interface, you might see addresses in the range of 0 through 15.

## Setting the SCSI address

The drive is provided with jumpers packaged in a small plastic bag. After you choose an available SCSI address, you can install the jumpers on the drive to match the selected address.

**Attention:** Each tape drive has different jumper settings and pin locations.

To set the SCSI address complete the following steps:

1. Remove the drive from its anti-static bag.
2. Find the pin positions located on the jumper block on the back of the drive. These positions are always used to set the SCSI address on the drive.
3. Refer to the drawing labeled **SCSI ID Setting** on the tape drive to determine in which pin positions you insert the jumpers to correctly set the SCSI address.
  - a. To set a position to **On**, insert a jumper onto both the top and bottom pins.
  - b. To set a position to **Off**, either insert a jumper onto the top pin only or remove the jumper from the jumper block.

## Configuring the tape drive

To configure the drive after installation, boot your system unit. Device drivers are provided in the operating systems that support the drive. Your operating system recognizes the drive and automatically updates your system unit configuration.

## Updating microcode levels

Media devices contain microcode that you can update. Contact your authorized service provider for instructions on how to obtain and install the latest microcode levels for your device.

## Type of tape device

Learn about the different models of tape devices.

### 200/400 GB Half High Ultrium 2 tape drive (FC 5755):

Learn about the features of this media device.

The LTO half-high tape drive is a SCSI device that can be used for backing up, restoring and archiving data. These files can include multimedia, imaging, transaction processing, large databases, and other storage-intensive applications. Each tape cartridge can store up to 200 GB of data (uncompressed), or up to 400 GB of data (compressed), assuming a 2 to 1 compression ratio.

**Note:** The actual capacity varies depending on the application, the type of data, and the tape cartridge. 200 GB is typical and 400 GB is possible when the Data Compression setting is activated. The default setting of Data Compression is controlled by the host system. The user and the application software can control the activation or deactivation of the data compression setting. The drive can optimally achieve a 2:1 compression ratio.

The LTO half-high tape drive FRU part number is 96P1775.

The LTO half-high tape drive features:

- A sustained native data transfer rate of up to 24 MB per second, 48 MB per second at 2:1 compression
- Downward read and write compatibility with earlier LTO-type data cartridges.
- Uses the self-configuring SCSI device driver native to the host operating system.
- Can be used as an bootable device, depending on the host system configuration.

*Cleaning the tape drive:*

You might need to clean your tape drive. Use the procedure in this section to perform this task.

Clean the device whenever the Fault status light comes on or a system I/O error related to the device occurs.

**Attention:** Use only the recommended cleaning cartridge to clean the tape drive. Use of other than recommended cleaning cartridges can damage your drive and might void the warranty.

To clean the tape drive, complete the following steps:

1. Make sure that the power is on to the tape drive.
2. If a tape cartridge is in the tape drive, eject and remove the cartridge.

**Note:** Some cleaning cartridges have white dots on the window side that are designed to be used to log the use of the cartridge. Each time the cartridge is used, mark one of the dots on the cartridge with a pen or marker. When all of the dots have been marked, discard the cleaning cartridge.

3. Grasp the cleaning cartridge by the outer edges, with the window-side up and the write-protect switch facing you.
4. Slide the cartridge into the opening on the front of the drive until the loading mechanism pulls the cartridge into the drive and the drive door closes.

After the cleaning cartridge has been inserted, the remainder of the cleaning process is automatic. The tape drive does the following:

- Loads the cleaning cartridge into the tape drive.
- Cleans the drive by moving the cleaning tape forward for approximately 30 seconds.
- Unloads the cleaning cartridge when the cleaning operation is complete.
- Indicates a successful cleaning operation by turning off the Cleaning status light (if the Cleaning light was on prior to the cleaning process. Otherwise, the Cleaning light remains solid to indicate that the cleaning cartridge is no longer usable. Obtain a new cleaning cartridge and repeat the process.)

**Note:** If the cleaning operation completes but the Cleaning light remains on, repeat the cleaning procedure with a new cleaning cartridge. If the light still remain on, contact your authorized service representative.

To determine how many times a cleaning cartridge may be used, check the information printed on the cartridge. If you attempt to use a depleted cleaning cartridge, the drive automatically detects the error and ejects the cartridge. If the Cleaning status light was on prior to the cleaning process, it stays on; if the Cleaning light was off, the depleted cartridge causes the light to come on.

If a system error occurs, clean the drive and retry the operation. If the operation fails, replace the data cartridge, clean the drive again, then retry the operation.

*Resetting the tape drive (FC 5755):*

You might need to reset your tape drive. Use the procedure in this section to perform this task.

Use this information to reset your half-high LTO-2 tape drive, without impacting server operation. Please allow up to 2 minutes for the entire tape drive process to complete.

**Attention:** Resetting a tape drive before the current backup operation has completed may cause loss of customer data.

To reset the tape drive, follow these steps:

1. Press and hold the eject button for 7 seconds, until the green Ready LED starts flashing rapidly, then release the button. The Ready LED will continue flashing, indicating that the drive is waiting for a cartridge to be inserted.
2. Press and release the eject button. The green Activity LED will begin flashing rapidly.
3. Double-click the eject button. The Activity LED will continue flashing slowly while the reset function is in progress. When the reset function is complete, the tape cartridge will remain in the drive and the Ready LED will be lit. Allow up to 2 minutes for the reset function to complete.

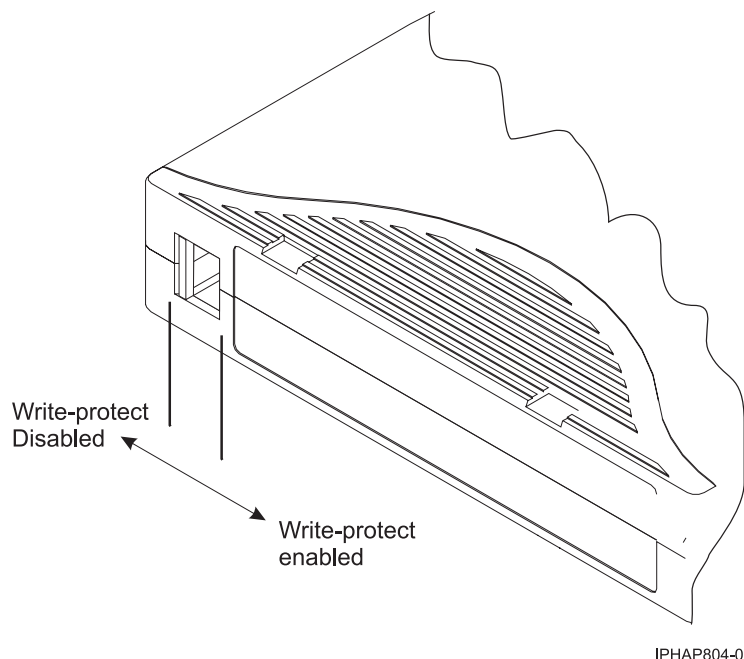
**Note:** A solid amber Cleaning LED light indicates that the reset is complete, but the tape unit requires cleaning. Clean the tape unit by inserting an IBM Universal LTO Cleaning Cartridge (part number 35L2086).

After the reset function completes, the tape unit is restored to normal operating mode. To remove the cartridge, press the eject button.

*Setting the write-protect switch (FC 5755):*

You might need to set the write-protect switch on your tape drive. Use the procedure in this section to perform this task.

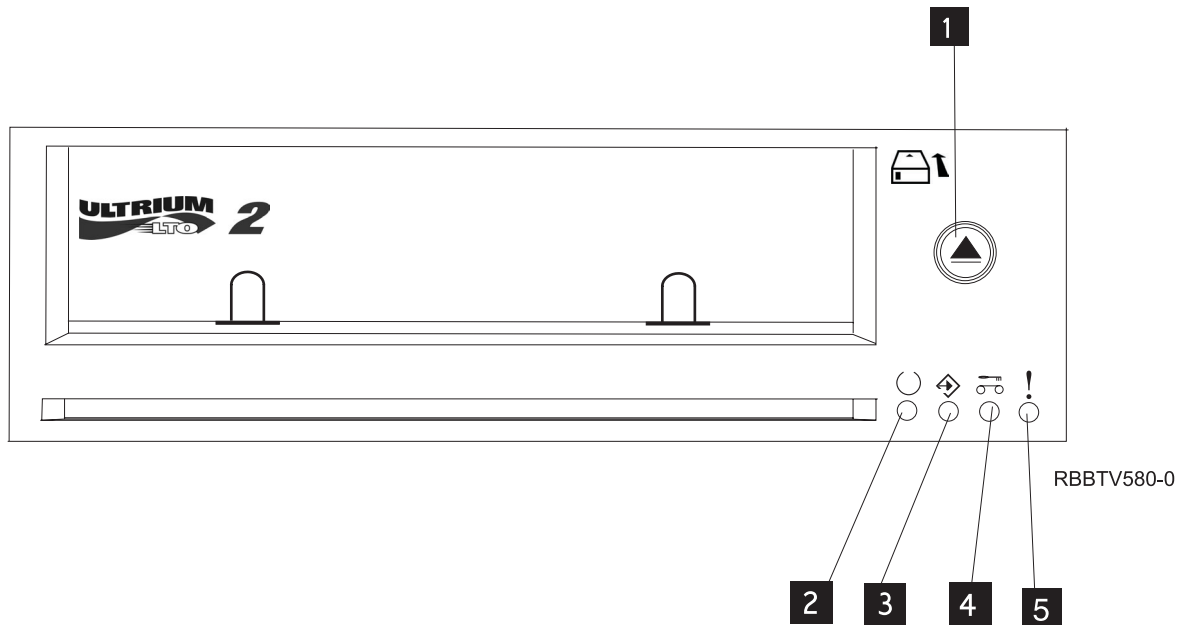
The position of the write-protect switch on the tape cartridge determines when you can write to the tape. Before loading cartridges into magazines, set the write-protect switch of each cartridge to enable or disable data recording. When the switch is set to the left, data can be written to the tape. When the switch is set to the right, data cannot be written to the tape.



*Status lights (FC 5755):*

You might need to read the status lights on your tape drive to determine the drive's operating status. Use the information in this section to perform this task.

The following illustration shows a front view of the tape drive:



*Figure 34. Front view of tape drive*

- |   |                  |
|---|------------------|
| 1 | Eject button     |
| 2 | Ready (green)    |
| 3 | Active (green)   |
| 4 | Cleaning (amber) |
| 5 | Fault (amber)    |

The status lights and their ISO symbols are on the device as follows:

**Ready** ○ (green)

**Activity** ◈ (green)





**Cleaning** ○—○ (amber)

**Fault** ! (amber)

The combinations of the lights and their definitions are shown in the following table.



Table 23. Definition of Status Light Combinations

| Operation   | Ready<br> | Activity<br> | Cleaning<br> | Fault<br> |
|---|--|---|---|--|
| Power-On LED Test <sup>1</sup>                        | On for 2.0 seconds   | On for 2.0 seconds  | On for 2.0 seconds  | On for 2.0 seconds   |
| Power-On Self-Test (POST) is in progress <sup>2</sup> | Flashing   | Off   | Off   | Off  |
| A cartridge is not loaded                             | Off  | Off   | On <sup>3</sup> /Off  | Off  |
| Cartridge loaded, no activity                         | On   | Off   | On <sup>3</sup> /Off  | Off  |
| Data cartridge loaded, activity                       | On   | Flashing  | On <sup>3</sup> /Off  | Off  |
| Cleaning cartridge loaded, activity                   | On   | Flashing  | On  | Off  |
| Cleaning cartridge loaded, cleaning failed            | Off  | Off   | On <sup>3 4</sup>   | Off  |
| Cartridge is loading or unloading                     | Off  | Flashing  | On <sup>3</sup> /Off  | Off  |
| Unrecoverable drive failure                           | On/Off   | Off   | On <sup>3</sup> /Off  | Flashing <sup>5</sup>  |
| Firmware download is in progress                      | Flashing   | Off   | On <sup>3</sup> /Off  | Off  |
| Firmware update is in progress                        | Flashing   | Flashing  | On <sup>3</sup> /Off  | Off  |
| Firmware download failure <sup>6</sup>                | Off  | Off   | On <sup>3</sup> /Off  | Flashing <sup>5</sup>  |
| Maximum operating temperature exceeded <sup>7</sup>   | Off  | Off   | On <sup>3</sup> /Off  | On   |
| Diagnostics test is in-progress                       | Flashing   | Off or Flashing   | On <sup>3</sup> / Off   | Off  |
| Media failure <sup>8</sup>                            | Off  | Off   | Flashing  | Off  |
| Incorrect media inserted in drive <sup>8</sup>        | Off  | Both LEDs Flashing Together   |   | Off  |

**Notes:**

1. All 4 LEDs will be on solid for 2 seconds. A timing tolerance of 10 percent is acceptable.
2. If the drive completes Power-On Self-Test (POST) within 2 seconds, no POST in progress indication is required.
3. A solid amber Clean LED indicates that the drive needs cleaning. In most cases the drive will continue to function, but it must be cleaned as soon as possible.
4. If the cleaning function completes and the solid amber Clean LED remains lit, the cleaning function was not successful. The cleaning cartridge may be depleted. Obtain a new LTO cleaning cartridge and use it to perform the cleaning function again.
5. The Fault LED will flash to indicate an unrecoverable error. An unrecoverable error is an error condition that results in the drive not being able to function unless initiator, operator, or service

intervention is applied. An unrecoverable drive failure is usually the result of a hardware error condition. One of the following actions will be needed to clear the flashing Fault LED:

- Hard SCSI reset
- Cartridge eject
- Power cycle
- Retry microcode download

An unrecoverable cartridge (media) failure is usually the result of a defective cartridge, media, or cartridge state and will require the drive to eject the cartridge (if possible) to clear the flashing LED.

6. The firmware download failed and the drive is not functional. The drive boot code is in control and the firmware download must be retried.
7. When the Fault LED is solid, it indicates an over temperature condition. The drive has exceeded its preset temperature limit, and if a tape is present in the drive it will be ejected. The Fault LED will remain solid until the drive temperature drops below a secondary temperature limit, and a data or cleaning cartridge is inserted.
8. While running drive diagnostics (using either SEND DIAG or the Self-Test Procedure), a media-related problem (hard media error or excessive soft error rate) will be reported as a media failure (with flashing Clean LED), and a write-protected, damaged, or incompatible cartridge will be reported as incorrect media (with Activity and Clean LEDs flashing simultaneously).

*Tape cartridges (FC 5755):*

Learn about the types of tape cartridges that are available for this drive.

### Available tape cartridges

*Table 24. LTO Ultrium data cartridges*

| Part Number | Type of Cartridge                       | Length           |
|-------------|---|------------------|
| 08L9120     | 100/200GB LTO Ultrium 1 Data Cartridges | 610 m (2000 ft ) |
| 08L9870     | 200/400GB LTO Ultrium 2 Data Cartridges | 610 m (2000 ft ) |
| 24R0395     | LTO Gen-2 Test Tape                     | 610 m (2000 ft ) |
| 35L2086     | Universal Cleaning Tape                 | --               |

**Attention:** Do not attempt to bulk erase an LTO data cartridge for reuse. Bulk eraser devices cannot properly erase an LTO data cartridge and will permanently damage the cartridge.

### 160/320 GB internal tape drive VXA-320 (FC 6279):

Learn about the features of this media device.

|                            |   |
|----------------------------|---|
| <b>Description</b>         | <p>The IBM 160/320 GB Internal Tape Drive with VXA Technology is a 5.25-inch, half-high, Ultra2 LVD 16-bit tape drive, which provides a high capacity for save/restore and achieve functions. This tape drive uses VXA tape data cartridges and is capable of compression, providing a capacity of up to 320 GB.</p> <p>Characteristics:</p> <ul style="list-style-type: none"> <li>• FRU part number: 95P1976</li> <li>• Capacity: 160 GB native mode, 320 GB (typical) compression mode</li> <li>• Form Factor: 5.25-inch half high</li> <li>• Media: uses VXA tape data cartridges</li> <li>• Technology: Helical scan, rotating head</li> <li>• Operation: Streaming</li> <li>• Data Transfer Rate: 12 MBps native mode, 24 MBps (typical) compression</li> <li>• Interface: SCSI-2 (LVD/SE) asynchronous/synchronous</li> <li>• Compatability: 160 GB mode (Read/Write), 320 GB compression (Read/Write)</li> <li>• Attributes provided: One 160/320 GB internal tape drive</li> <li>• Attributes required: One 1.6-inch (41 mm) half-high media bay and one SCSI-2 internal 16-bit address</li> </ul> |
| <b>Tools</b>               | <p>The following tools and documentation are needed to complete the installation:</p> <ul style="list-style-type: none"> <li>• A flat-blade screwdriver (if this device is not an auto-docking feature on your system)</li> <li>• Your system unit documentation, including any service documentation</li> <li>• Your operating system documentation</li> </ul> <p>If an item is missing or damaged, contact the place of purchase.</p>   |
| <b>Related information</b> | <p>Check that your package contains the following items:</p> <ul style="list-style-type: none"> <li>• The device</li> <li>• Media kit containing: <ul style="list-style-type: none"> <li>– 1 cleaning cartridge</li> <li>– 1 test tape</li> <li>– Jumpers (located in a plastic bag)</li> </ul> </li> <li>• Specific hardware for attaching the device to your specific system, as detailed on the parts listing provided with your device</li> </ul>   |

*Cleaning the tape drive:*

You might need to clean your tape drive. Use the procedure in this section to perform this task.

Clean the device whenever the Fault status light comes on or a system I/O error related to the device occurs.

**Attention:** Use only the recommended cleaning cartridge to clean the tape drive. Use of other than recommended cleaning cartridges can damage your drive and might void the warranty.

To clean the tape drive, complete the following steps:

1. Make sure that the power is on to the tape drive.
2. If a tape cartridge is in the tape drive, eject and remove the cartridge.

**Note:** Some cleaning cartridges have white dots on the window side that are designed to be used to log the use of the cartridge. Each time the cartridge is used, mark one of the dots on the cartridge with a pen or marker. When all of the dots have been marked, discard the cleaning cartridge.

3. Grasp the cleaning cartridge by the outer edges, with the window-side up and the write-protect switch facing you.
4. Slide the cartridge into the opening on the front of the drive until the loading mechanism pulls the cartridge into the drive and the drive door closes.

After the cleaning cartridge has been inserted, the remainder of the cleaning process is automatic. The tape drive does the following:

- Loads the cleaning cartridge into the tape drive.
- Cleans the drive by moving the cleaning tape forward for approximately 30 seconds.
- Unloads the cleaning cartridge when the cleaning operation is complete.
- Indicates a successful cleaning operation by turning off the Cleaning status light (if the Cleaning light was on prior to the cleaning process. Otherwise, the Cleaning light remains solid to indicate that the cleaning cartridge is no longer usable. Obtain a new cleaning cartridge and repeat the process.)

**Note:** If the cleaning operation completes but the Cleaning light remains on, repeat the cleaning procedure with a new cleaning cartridge. If the light still remain on, contact your authorized service representative.

To determine how many times a cleaning cartridge may be used, check the information printed on the cartridge. If you attempt to use a depleted cleaning cartridge, the drive automatically detects the error and ejects the cartridge. If the Cleaning status light was on prior to the cleaning process, it stays on; if the Cleaning light was off, the depleted cartridge causes the light to come on.

If a system error occurs, clean the drive and retry the operation. If the operation fails, replace the data cartridge, clean the drive again, then retry the operation.

#### *Loading and unloading cartridges:*

Learn about loading and unloading tape cartridges from this drive.

To avoid problems with loading and unloading, use only one label on a cartridge. Having too many or poorly placed labels can clog the drive-load mechanism.

#### *Loading a cartridge:*

To load a cartridge, complete the following steps:

1. Make sure that the tape device power is on.
2. Grasp the cartridge by the outer edges, with the window-side up and the write-protect switch facing you.

**Note:** Make sure that the write-protect switch is correctly set.

3. Slide the cartridge into the opening on the front of the device until the loading mechanism pulls the cartridge into the drive and the drive door closes.

To indicate that the load operation was successful, the Ready status light comes on.

#### *Unloading a cartridge:*

To unload a cartridge, complete the following steps:

1. Make sure that the tape device power is on.
2. Press the Unload button. The device rewinds, unloads, and ejects the tape cartridge.

The process might take from 15 seconds to several minutes, depending on the position of the tape and the amount of data written. During this task, the status lights do the following:

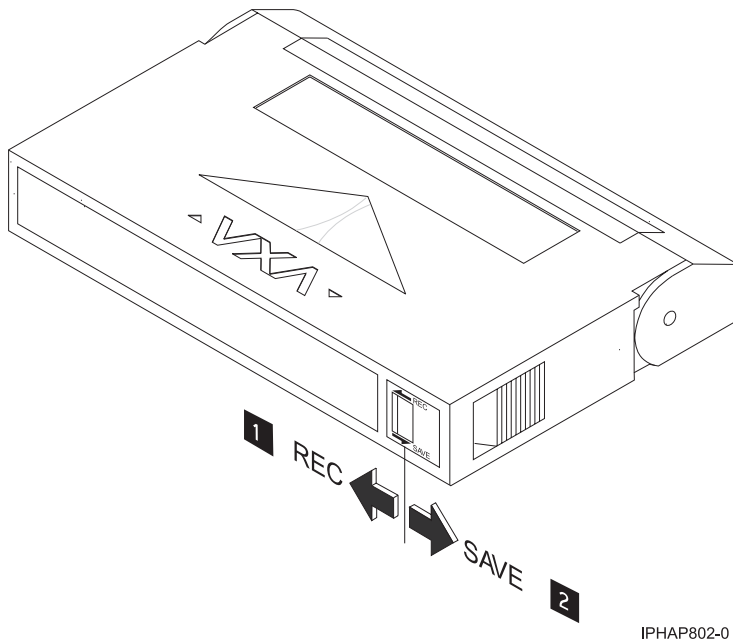
- The Ready status light turns off.
- The Activity status light flashes during the unload operation.
- The Activity status light turns off when the cartridge is ejected from the tape drive.

**Attention:** There is an emergency eject and reset feature that releases the tape cartridge and resets the drive. Use the emergency eject feature if the cartridge does not move correctly or if the unload process fails. The emergency eject and reset feature procedure might result in loss of data. To perform an emergency eject of the tape cartridge or a reset of the drive, press and hold the Unload button for at least 10 seconds. If a cartridge is in the drive, the cartridge automatically ejects without rewinding the tape.

*Setting the write-protect switch (FC 6279):*

You might need to set the write-protect switch on your tape drive. Use the procedure in this section to perform this task.

The position of the write-protect switch on the tape cartridge determines when you can write to the tape.

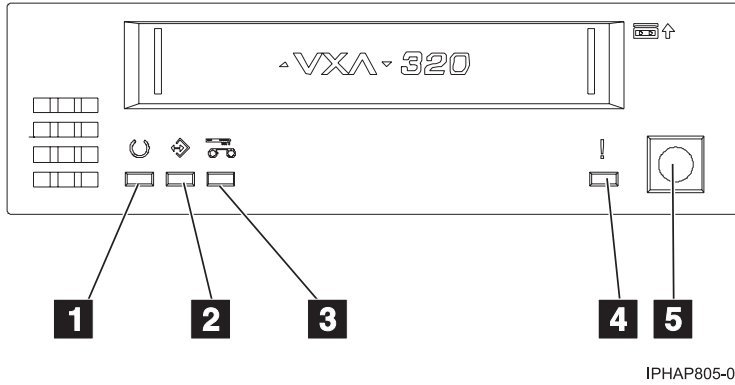


- 1 When the switch is set to the left, data can be written to and read from the tape.
- 2 When the switch is set to the right, data can only be read.

*Status lights (FC 6279):*

You might need to read the status lights on your tape drive to determine the drive's operating status. Use the information in this section to perform this task.

The following is a front view of the tape drive:



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Figure 35. Front view of tape drive


- 1 Ready (green)
- 2 Active (green)
- 3 Cleaning (amber)
- 4 Fault (amber)
- 5 Eject button

The status lights and their ISO symbols are on the device as follows:

Ready  (green)

Activity  (green)

Cleaning  (amber)

Fault  (amber)

The combinations of the lights and their definitions are shown in the following table.

Table 25. Definition of Status Light Combinations









| Operation   | Ready<br> | Activity<br> | Cleaning<br> | Fault<br> |
|---|--|---|---|--|
| Power-on self-test <sup>1</sup>                         | Flashing   | Off   | Off   | Off  |
| Power On LED Test                                       | On for 2.0 seconds   | On for 2.0 seconds  | On for 2.0 seconds  | On for 2.0 seconds   |
| No tape loaded  | Off  | Off   | On <sup>2</sup> /Off  | Off  |
| Cartridge loaded, no activity                           | On   | Off   | On <sup>2</sup> /Off  | Off  |
| Data or Cleaning Cartridge loaded, activity             | On   | Flashing  | On <sup>2</sup> /Off  | Off  |
| Cleaning Cartridge loaded, cleaning failed <sup>2</sup> | Off  | Off   | On <sup>2</sup>   | Off  |

Table 25. Definition of Status Light Combinations (continued)

| Operation                                   | Ready<br> | Activity<br> | Cleaning<br> | Fault<br> |
|---|--|---|---|--|
| Cartridge loading or unloading <sup>2</sup> | Off  | Flashing  | On <sup>2</sup> /Off  | Off  |
| Unrecoverable drive failure <sup>3</sup>    | On/Off   | Off   | On <sup>2</sup> /Off  | Flashing <sup>3</sup>  |
| Firmware Download                           | Flashing   | Off   | On <sup>2</sup> /Off  | Off  |
| Firmware Update                             | Flashing   | Flashing  | On <sup>2</sup> /Off  | Off  |
| Microcode Download failure <sup>4</sup>     | Off  | Off   | On <sup>2</sup> /Off  | Flashing <sup>3</sup>  |
| Over Temperature <sup>5</sup>               | Off  | Off   | On <sup>2</sup> /Off  | On   |

**Notes:**

1. If the drive completes the Power On Self Test (POST) within the 2.0 second Power On LED Test time, the POST indicator sequence is eliminated.
2. A solid amber LED indicates the drive needs cleaning. The drive will continue to function, but, needs cleaning as soon as possible. A power cycle does not turn off this indicator.
3. The Fault LED will flash to indicate an unrecoverable error. An unrecoverable error is an error condition that results in the drive not being able to function unless initiator, operator, or service intervention is applied. An unrecoverable drive failure is usually the result of a hardware error condition. One of the following actions will be needed to clear the flashing Fault LED:
  - Hard SCSI Reset
  - Cartridge Eject
  - Power Cycle
  - Retry microcode download

An unrecoverable cartridge (media) failure is usually the result of a defective cartridge, media, or cartridge state and will require the drive to eject the cartridge (if possible) to clear the flashing LED.
4. The firmware download failed and the drive is not functional. The drive boot code is in control and the microcode download should be retried. The drive can be identified using the Inquiry command and is bootable while in this state.
5. The Fault LED will be on solid to indicate an over temperature condition.

*Tape cartridges (FC 6279):*

Learn about the types of tape cartridges that are available for this drive.

**Compatible tape cartridges**

Types of tape cartridges are supported by this tape drive:

- X cartridges are the newer version of the VXA cartridge
- V cartridges are the original VXA cartridge

The V and X cartridges have similar shells and come in a variety of tape lengths. Both cartridges use Advanced Metal Evaporated (AME) media and offer the similar read/write speeds and capacities.

## Available tape cartridges

Table 26. X tape cartridges

| Part Number | Description          | Type               | Other information |
|-------------|----------------------|--------------------|-------------------|
| 24R2137     | 230m 80/160GB        | X23 Data Cartridge | Teal Accent       |
| 24R2136     | 124m 40/80GB         | X10 Data Cartridge | Teal Accent       |
| 24R2134     | 20/40GB              | X6 Data Cartridge  | Teal Accent       |
| 24R2135     | 62m 20/40GB          | X6 Test Cartridge  | Teal Accent       |
| 24R2138     | X Cleaning Cartridge | VXA 20 usage       | Teal Accent       |

Table 27. V tape cartridges

| Part Number | Description   | Type               | Other information |
|-------------|---------------|--------------------|-------------------|
| 19P4876     | 230m 80/160GB | V23 Data Cartridge | Purple accent     |

Most bulk eraser devices do not have the capability to erase the data cartridge. To properly erase a VXA data cartridge with a bulk eraser device, the erasure field strength must be a minimum of 4000 gauss.

### 80/160 GB internal tape drive VXA-2 (FC 6120):

Learn about the features of this media device.

|                    |  |
|--------------------|--|
| <b>Description</b> | <p>The IBM 80/160 GB Internal Tape Drive with VXA Technology is a 5.25-inch, half-high, Ultra2 LVD 16-bit tape drive, which provides a high capacity for save/restore and achieve functions. This tape drive uses VXA tape data cartridges and is capable of compression, providing a capacity of up to 160 GB.</p> <p>Characteristics:</p> <ul style="list-style-type: none"> <li>• FRU part number: 19P4898</li> <li>• Capacity: 80 GB native mode, 160 GB (typical) compression mode</li> <li>• Form Factor: 5.25-inch half high</li> <li>• Media: uses VXA tape data cartridges</li> <li>• Technology: Helical scan, rotating head</li> <li>• Operation: Streaming</li> <li>• Data Transfer Rate: 6 MBps native mode, 12 MBps (typical) compression</li> <li>• Interface: SCSI-2 (LVD/SE) asynchronous/synchronous</li> <li>• Compatibility: 80 GB mode (Read/Write), 160 GB compression (Read/Write)</li> <li>• Attributes provided: One 80/160 GB internal tape drive</li> <li>• Attributes required: One 1.6-inch (41 mm) half-high media bay and one SCSI-2 internal 16-bit address</li> </ul> |
| <b>Tools</b>       | <p>The following tools and documentation are needed to complete the installation:</p> <ul style="list-style-type: none"> <li>• A flat-blade screwdriver (if this device is not an auto-docking feature on your system)</li> <li>• Your system unit documentation, including any service documentation</li> <li>• Your operating system documentation</li> </ul> <p>If an item is missing or damaged, contact the place of purchase.</p>  |



|                            |   |
|----------------------------|---|
| <b>Related information</b> | <p>Check that your package contains the following items:</p> <ul style="list-style-type: none"> <li>• The device</li> <li>• Media kit containing: <ul style="list-style-type: none"> <li>– 1 data cartridge</li> <li>– 1 cleaning cartridge</li> <li>– 1 test tape</li> <li>– Jumpers (located in a plastic bag)</li> </ul> </li> <li>• Specific hardware for attaching the device to your specific system, as detailed on the parts listing provided with your device</li> </ul> |
|----------------------------|---|

### *Cleaning the tape drive:*

You might need to clean your tape drive. Use the procedure in this section to perform this task.

Clean the device whenever the Fault status light comes on or a system I/O error related to the device occurs.

**Attention:** Use only the recommended cleaning cartridge to clean the tape drive. Use of other than recommended cleaning cartridges can damage your drive and might void the warranty.

To clean the tape drive, complete the following steps:

1. Make sure that the power is on to the tape drive.
2. If a tape cartridge is in the tape drive, eject and remove the cartridge.

**Note:** Some cleaning cartridges have white dots on the window side that are designed to be used to log the use of the cartridge. Each time the cartridge is used, mark one of the dots on the cartridge with a pen or marker. When all of the dots have been marked, discard the cleaning cartridge.

3. Grasp the cleaning cartridge by the outer edges, with the window-side up and the write-protect switch facing you.
4. Slide the cartridge into the opening on the front of the drive until the loading mechanism pulls the cartridge into the drive and the drive door closes.

After the cleaning cartridge has been inserted, the remainder of the cleaning process is automatic. The tape drive does the following:

- Loads the cleaning cartridge into the tape drive.
- Cleans the drive by moving the cleaning tape forward for approximately 30 seconds.
- Unloads the cleaning cartridge when the cleaning operation is complete.
- Indicates a successful cleaning operation by turning off the Cleaning status light (if the Cleaning light was on prior to the cleaning process. Otherwise, the Cleaning light remains solid to indicate that the cleaning cartridge is no longer usable. Obtain a new cleaning cartridge and repeat the process.)

**Note:** If the cleaning operation completes but the Cleaning light remains on, repeat the cleaning procedure with a new cleaning cartridge. If the light still remain on, contact your authorized service representative.

To determine how many times a cleaning cartridge may be used, check the information printed on the cartridge. If you attempt to use a depleted cleaning cartridge, the drive automatically detects the error and ejects the cartridge. If the Cleaning status light was on prior to the cleaning process, it stays on; if the Cleaning light was off, the depleted cartridge causes the light to come on.

If a system error occurs, clean the drive and retry the operation. If the operation fails, replace the data cartridge, clean the drive again, then retry the operation.

### *Loading and unloading cartridges:*

Learn about loading and unloading tape cartridges from this drive.

To avoid problems with loading and unloading, use only one label on a cartridge. Having too many or poorly placed labels can clog the drive-load mechanism.

#### *Loading a cartridge:*

To load a cartridge, complete the following steps:

1. Make sure that the tape device power is on.
2. Grasp the cartridge by the outer edges, with the window-side up and the write-protect switch facing you.

**Note:** Make sure that the write-protect switch is correctly set.

3. Slide the cartridge into the opening on the front of the device until the loading mechanism pulls the cartridge into the drive and the drive door closes.

To indicate that the load operation was successful, the Ready status light comes on.

#### *Unloading a cartridge:*

To unload a cartridge, complete the following steps:

1. Make sure that the tape device power is on.
2. Press the Unload button. The device rewinds, unloads, and ejects the tape cartridge.

The process might take from 15 seconds to several minutes, depending on the position of the tape and the amount of data written. During this task, the status lights do the following:

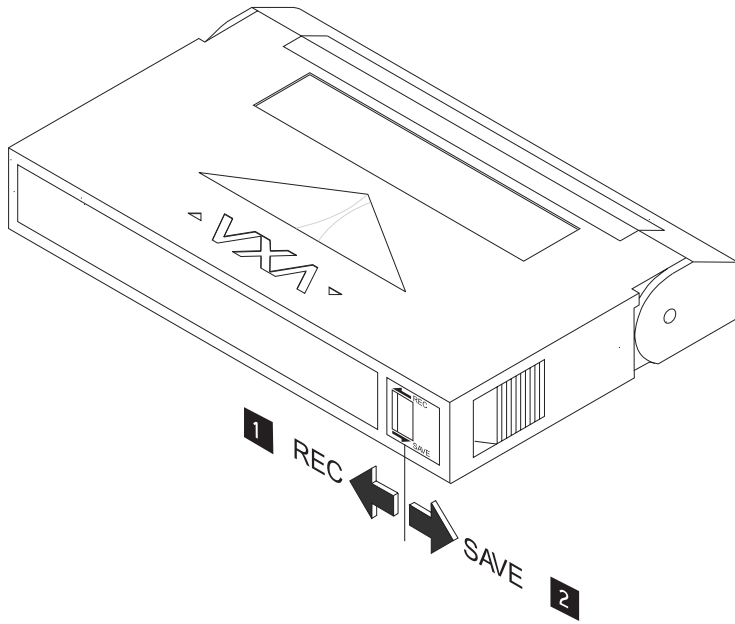
- The Ready status light turns off.
- The Activity status light flashes during the unload operation.
- The Activity status light turns off when the cartridge is ejected from the tape drive.

**Attention:** There is an emergency eject and reset feature that releases the tape cartridge and resets the drive. Use the emergency eject feature if the cartridge does not move correctly or if the unload process fails. The emergency eject and reset feature procedure might result in loss of data. To perform an emergency eject of the tape cartridge or a reset of the drive, press and hold the Unload button for at least 10 seconds. If a cartridge is in the drive, the cartridge automatically ejects without rewinding the tape.

#### *Setting the write-protect switch (FC 6120):*

You might need to set the write-protect switch on your tape drive. Use the procedure in this section to perform this task.

The position of the write-protect switch on the tape cartridge determines when you can write to the tape.



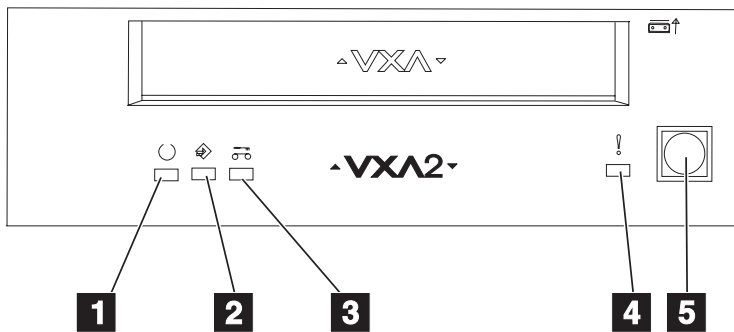
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- 1 When the switch is set to the left, data can be written to and read from the tape.
- 2 When the switch is set to the right, data can only be read.

*Status lights (FC 6120):*

You might need to read the status lights on your tape drive to determine the drive's operating status. Use the information in this section to perform this task.

The following illustration is a front view of the tape drive:



RBBTV564-0

Figure 36. Front view of tape drive


- 1 Ready (green)
- 2 Active (green)
- 3 Cleaning (amber)


- 4 Fault (amber)
- 5 Eject button

The status lights and their ISO symbols are on the device as follows:

**Ready**  (green)





**Activity**  (green)

**Cleaning**  (amber)

**Fault**  (amber)

The combinations of the lights and their definitions are shown in the following table.

Table 28. Definition of status light combinations

| Operation   | Ready<br> | Activity<br> | Cleaning<br> | Fault<br> |
|---|--|---|---|--|
| Power-on self-test <sup>1</sup>                         | Flashing   | Off   | Off   | Off  |
| Power On LED Test                                       | On for 2.0 seconds   | On for 2.0 seconds  | On for 2.0 seconds  | On for 2.0 seconds   |
| No tape loaded  | Off  | Off   | On <sup>2</sup> /Off  | Off  |
| Cartridge loaded, no activity                           | On   | Off   | On <sup>2</sup> /Off  | Off  |
| Data or Cleaning Cartridge loaded, activity             | On   | Flashing  | On <sup>2</sup> /Off  | Off  |
| Cleaning Cartridge loaded, cleaning failed <sup>2</sup> | Off  | Off   | On <sup>2</sup>   | Off  |
| Cartridge loading or unloading <sup>2</sup>             | Off  | Flashing  | On <sup>2</sup> /Off  | Off  |
| Unrecoverable drive failure <sup>3</sup>                | On/Off   | Off   | On <sup>2</sup> /Off  | Flashing <sup>3</sup>  |
| Firmware Download                                       | Flashing   | Off   | On <sup>2</sup> /Off  | Off  |
| Firmware Update   | Flashing   | Flashing  | On <sup>2</sup> /Off  | Off  |
| Microcode Download failure <sup>4</sup>                 | Off  | Off   | On <sup>2</sup> /Off  | Flashing <sup>3</sup>  |
| Over Temperature <sup>5</sup>                           | Off  | Off   | On <sup>2</sup> /Off  | On   |

**Notes:**

1. If the drive completes the Power On Self Test (POST) within the 2.0 second Power On LED Test time, the POST indicator sequence is eliminated
2. A solid amber LED indicates the drive needs cleaning. The drive will continue to function, but needs cleaning as soon as possible. A power cycle does not turn off this indicator.
3. The Fault LED will flash to indicate an unrecoverable error. An unrecoverable error is an error condition that results in the drive not being able to function unless initiator, operator, or service

intervention is applied. An unrecoverable drive failure is usually the result of a hardware error condition. One of the following actions will be needed to clear the flashing Fault LED:

- Hard SCSI reset
- Cartridge eject
- Power cycle
- Retry microcode download

An unrecoverable cartridge (media) failure is usually the result of a defective cartridge, media, or cartridge state and will require the drive to eject the cartridge (if possible) to clear the flashing LED.

4. The firmware download failed and the drive is not functional. The drive boot code is in control and the microcode download should be retried. The drive can be identified using the Inquiry command and is bootable while in this state.
5. The Fault LED will be on solid to indicate an over-temperature condition.

*Tape cartridges (FC 6120):*

Learn about the types of tape cartridges that are available for this drive.

### Compatible tape cartridges

Two types of tape cartridges are supported by this tape drive:

- **X** cartridges are the newest version of the VXA cartridge
- **V** cartridges are the original VXA cartridge

The **V** and **X** cartridges have similar shells and come in a variety of tape lengths. Both cartridges utilize AME media and offer the similar read/write speeds and capacities.

#### Note:

1. To use **X** cartridges, the tape drive must have a minimum microcode level of 2105. To display the microcode level of the tape drive in AIX, do the following:
  - a. Open an AIX command prompt.
  - b. Type the `lscfg -vl rmtx` command, where *x* is the tape drive number, then press Enter.

The output will contain the following line:

```
Device Specific.(Z1).....2105
```

In the previous example, 2105 represents the microcode level. If the command output contains a value of 2105 or higher, the tape drive supports the use of **X** cartridges. If the command output contains a value of 2104 or lower, update your microcode to 2105 or higher to use **X** cartridges in this tape drive.

2. **X** cartridges are only supported in VXA-2 tape drives. A user can write an **X** cartridge in VXA-1 format on a VXA-2 tape drive, but it will only be readable on a VXA-2 drive.
3. The VXA-2 drive supports use of V10 media, but this cartridge is not offered.

### Available tape cartridges

*Table 29. X tape cartridges*

| Part Number | Description          | Type               | Other information |
|-------------|----------------------|--------------------|-------------------|
| 24R2137     | 230m 80/160GB        | X23 Data Cartridge | Green accent      |
| 24R2136     | 124m 40/80GB         | X17 Data Cartridge | Green accent      |
| 24R2134     | 20/40GB              | X6 Data Cartridge  | Green accent      |
| 24R2135     | 62m 20/40GB          | X6 Test Cartridge  | Green accent      |
| 24R2138     | X Cleaning Cartridge | VXA 20 usage       | Green accent      |

Table 30. V tape cartridges

| Part Number | Description          | Type               | Other information |
|-------------|----------------------|--------------------|-------------------|
| 19P4876     | 230m 80/160GB        | V23 Data Cartridge | Purple accent     |
| 19P4877     | 124m 40/80GB         | V17 Data Cartridge | Red accent        |
| 19P4878     | 20/40GB              | V6 Data Cartridge  | Blue accent       |
| 19P4879     | 62m 20/40GB          | V6 Test Cartridge  | Blue accent       |
| 19P4880     | X Cleaning Cartridge | VXA 20 usage       | Gray accent       |

### 60/150 GB 16-bit 8-mm internal tape drive (FC 6134):

Learn about the features of this media device.

|                           |   |
|---------------------------|---|
| <p><b>Description</b></p> | <p>The 60/150GB 16-bit 8-mm Internal Tape Drive consists of a 5.25-inch half-high, 16-bit tape drive. This drive provides a high capacity tape drive for save/restore and archiving functions. This tape drive uses IBM 8-mm data cartridges and is capable of compression, providing a capacity of up to 150 GB. The 60/150 GB 16-bit 8-mm Internal Tape Drive, is limited to a maximum system ambient operating temperature of 31C (87.8F) at a maximum operating altitude of 2134m (7000 ft). Lower altitudes have higher maximum ambient operating temperatures.</p> <p>Characteristics:</p> <ul style="list-style-type: none"> <li>• FRU part number: 19P0708</li> <li>• Capacity: 60 GB Native Mode, 150 GB (typical) Compression Mode</li> <li>• Form Factor: 5.25-inch Half-high</li> <li>• Media: IBM 8-mm Data Cartridge with SmartClean Technology</li> <li>• Operation: Streaming</li> <li>• Data Transfer Rate: 12 MB/Sec. Native Mode, 30 MB/Sec. (typical) Compression M</li> <li>• Interface: SCSI-2 16-bit Low Voltage Differential (LVD) / Single-ended (SE) Asynchronous/Synchronous</li> <li>• Compatibility: Contact your authorized service provider</li> <li>• Attributes provided: 60/150GB 16-bit 8-mm Internal Tape Drive</li> <li>• Attributes required: One 1.6-inch (41mm) half-high media bay and one SCSI-2 internal 16-bit address</li> </ul> |
| <p><b>Tools</b></p>       | <p>The following tools and documentation are needed to complete the installation:</p> <ul style="list-style-type: none"> <li>• A flat-blade screwdriver (if this device is not an auto-docking feature on your system)</li> <li>• Your system unit documentation, including any service documentation</li> <li>• Your operating system documentation</li> </ul> <p>If an item is missing or damaged, contact the place of purchase.</p> <p><b>Note:</b> If you are installing the auto-docking version of this device on your system, the remainder of this information does not apply to your system. See your system documentation for information about the auto-docking feature.</p>  |

|                            |   |
|----------------------------|---|
| <b>Related information</b> | <p>Check that your package contains the following items:</p> <ul style="list-style-type: none"> <li>• The device</li> <li>• Media kit containing: <ul style="list-style-type: none"> <li>– 1 data cartridge</li> <li>– 1 cleaning cartridge</li> <li>– 1 test tape</li> <li>– Jumpers (located in a plastic bag)</li> </ul> </li> <li>• Specific hardware for attaching the device to your specific system, as detailed on the parts listing provided with your device</li> </ul> |
|----------------------------|---|

*Cleaning the tape drive:*

You might need to clean your tape drive. Use the procedure in this section to perform this task.

Clean the device whenever the Fault status light comes on or a system I/O error related to the device occurs.

**Attention:** Use only the recommended cleaning cartridge to clean the tape drive. Use of other than recommended cleaning cartridges can damage your drive and might void the warranty.

To clean the tape drive, complete the following steps:

1. Make sure that the power is on to the tape drive.
2. If a tape cartridge is in the tape drive, eject and remove the cartridge.

**Note:** Some cleaning cartridges have white dots on the window side that are designed to be used to log the use of the cartridge. Each time the cartridge is used, mark one of the dots on the cartridge with a pen or marker. When all of the dots have been marked, discard the cleaning cartridge.

3. Grasp the cleaning cartridge by the outer edges, with the window-side up and the write-protect switch facing you.
4. Slide the cartridge into the opening on the front of the drive until the loading mechanism pulls the cartridge into the drive and the drive door closes.

After the cleaning cartridge has been inserted, the remainder of the cleaning process is automatic. The tape drive does the following:

- Loads the cleaning cartridge into the tape drive.
- Cleans the drive by moving the cleaning tape forward for approximately 30 seconds.
- Unloads the cleaning cartridge when the cleaning operation is complete.
- Indicates a successful cleaning operation by turning off the Fault status light (if the Fault light was on prior to the cleaning process).

**Note:** If the cleaning operation completes but the Fault light remains on, repeat the cleaning procedure with a new cleaning cartridge. If the light still remains on, contact your authorized service provider.

To determine how many times a cleaning cartridge can be used, check the information printed on the cartridge. If you attempt to use a depleted cleaning cartridge, the tape drive automatically detects the error and ejects the cartridge. If the Fault status light was on prior to the cleaning process, it stays on; if the Fault light was off, the depleted cartridge causes the light to come on.

If a system error occurs, clean the drive and retry the operation. If the operation fails, replace the data cartridge, clean the drive again, then retry the operation.

*Loading and unloading cartridges:*

Learn about loading and unloading tape cartridges from this drive.

To avoid problems with loading and unloading, use only one label on a cartridge. Having too many or poorly placed labels can clog the drive-load mechanism.

#### *Loading a cartridge:*

To load a cartridge, complete the following steps:

1. Make sure that the tape device power is on.
2. Grasp the cartridge by the outer edges, with the window-side up and the write-protect switch facing you.

**Note:** Make sure that the write-protect switch is correctly set.

3. Slide the cartridge into the opening on the front of the device until the loading mechanism pulls the cartridge into the drive and the drive door closes.

To indicate that the load operation was successful, the Ready status light comes on.

#### *Unloading a cartridge:*

To unload a cartridge, complete the following steps:

1. Make sure that the tape device power is on.
2. Press the Unload button. The device rewinds, unloads, and ejects the tape cartridge.

The process might take from 15 seconds to several minutes, depending on the position of the tape and the amount of data written. During this task, the status lights do the following:

- The Ready status light turns off.
- The Activity status light flashes during the unload operation.
- The Activity status light turns off when the cartridge is ejected from the tape drive.

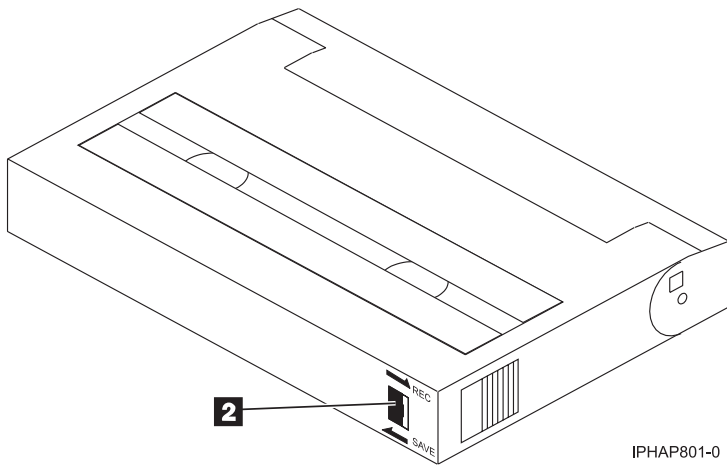
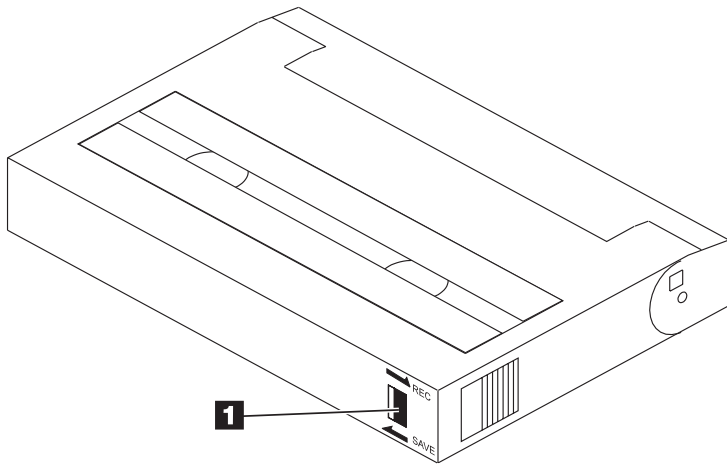
**Attention:** There is an emergency eject and reset feature that releases the tape cartridge and resets the drive. Use the emergency eject feature if the cartridge does not move correctly or if the unload process fails. The emergency eject and reset feature procedure might result in loss of data. To perform an emergency eject of the tape cartridge or a reset of the drive, press and hold the Unload button for at least 10 seconds. If a cartridge is in the drive, the cartridge automatically ejects without rewinding the tape.

#### *Setting the write-protect switch (FC 6134):*

You might need to set the write-protect switch on your tape drive. Use the procedure in this section to perform this task.

The position of the write-protect switch on the tape cartridge determines when you can write to the tape.





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When the switch is set to the left in the SAVE position **1**, data cannot be written to or read from the tape (data is saved).  
When the switch is set to the right in the REC (Record) position **2**, data can be written to and read from the tape.

*Status lights (FC 6134):*

You might need to read the status lights on your tape drive to determine the drive's operating status. Use the information in this section to perform this task.

The following illustration is a front view of the tape drive:

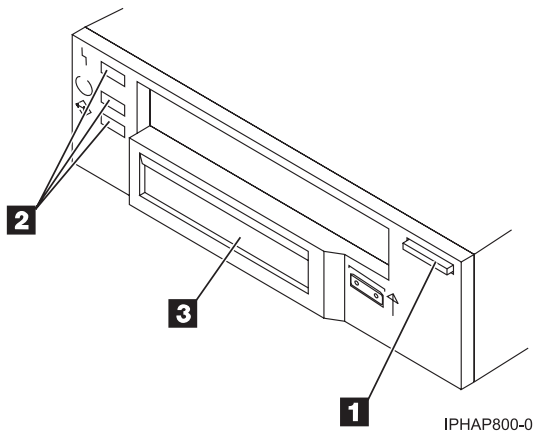



Figure 37. Front view of tape drive

- 1 Unload button
- 2 Status lights
- 3 Liquid crystal display (LCD)

The status lights and their ISO symbols are on the device as follows:




Ready  (green)

Activity  (green)

Fault  (amber)

The combinations of the lights and their definitions are shown in the following table.

Table 31. Definition of status light combinations

| Operation                   | Ready<br> | Activity<br> | Fault<br> |
|-----------------------------|--|---|--|
| POST or Reset               | On   | On  | On   |
| Error or Failed POST        | Off  | Off   | Flash  |
| Ready (No Cartridge Loaded) | Off  | Off   |  |
| Ready (Cartridge Loaded)    | On   | Off   |  |
| Normal Cartridge Motion     | On   | Flashing  |  |
| High Speed Motion           | On   | Fast Flashing   |  |
| Time to Clean Cartridge     | N/A  | N/A   | On   |
| Cleaning in Progress        | On   | Flashing  | On   |

Tape cartridges (FC 6134):

Learn about the types of tape cartridges that are available for this drive.

## Available tape cartridges


Table 32. 8-mm data cartridges

| Part Number | Type of Cartridge                        | Length         |
|-------------|--|----------------|
| 35L1044     | 20 GB AME with SmartClean Data Cartridge | 75 m (246 ft)  |
| 09L5323     | 40 GB AME with SmartClean Data Cartridge | 150 m (492 ft) |
| 18P6484     | 60 GB AME with SmartClean Data Cartridge | 225 m (738 ft) |
| 35L1409     | Cleaning Cartridge                       |                |

### 36/72GB Data72 4mm internal tape drive (FC 6258):

Learn about the features of this media device.

|                    |  |
|--------------------|--|
| <b>Description</b> | <p>The 36/72 GB Data72 4-mm Internal Tape Drive is a 5.25-inch, half-high, LVD or SAS drive, which provides a high capacity for save/restore and achieve functions. This tape drive uses IBM 4-mm data cartridges and is capable of compression, providing a capacity of up to 72 GB.</p> <p>Characteristics:</p> <ul style="list-style-type: none"> <li>• FRU part number for FC 6258: 18P8779</li> <li>• Capacity: 36 GB native mode, 72 GB (typical) compression mode</li> <li>• Form Factor: 5.25-inch half high</li> <li>• Media: DAT72, DDS4, and DDS3 media</li> <li>• Technology: Helical scan, rotating head</li> <li>• Operation: Streaming</li> <li>• Data Transfer Rate: 3 MBps native mode, 6 MBps (typical) compression</li> <li>• Interface for FC 6258: Low voltage differential</li> <li>• Compatibility: 12 GB mode (read/write), 20 GB (read/write), and 36 GB mode (read/write)</li> <li>• Attributes provided: 4 mm tape capability</li> <li>• Attributes required: One 1.6-inch (41 mm) half-high media bay and one SCSI internal LVD or SAS 16-bit address</li> </ul> |
| <b>Tools</b>       | <p>The following tools and documentation are needed to complete the installation:</p> <ul style="list-style-type: none"> <li>• A flat-blade screwdriver (if this device is not an auto-docking feature on your system)</li> <li>• Your system unit documentation, including any service documentation</li> <li>• Your operating system documentation</li> </ul> <p>Contact the place of purchase if an item is missing or damaged.</p> <p><b>Note:</b> If you are installing the auto-docking version of this device on your system, the remainder of this chapter does not apply to your system. See your system documentation for information about the auto-docking feature.</p>  |

|                                   |  |
|-----------------------------------|--|
| <p><b>Media</b></p>               | <p>This tape drive uses 4mm data cartridges for saving and restoring system data. It is designed to use only DDS (Digital Data Storage) data cartridges. The cartridges are identified by one of the following DDS symbols:</p>  <p>The tape drive reads and writes data to tape cartridges that are DDS-3, DDS-4, or DAT 72 format.</p> <p><b>Note:</b> This tape drive only supports DDS-3, DDS-4, and DAT 72 tape cartridges. If any other cartridge is inserted in the drive, it will be ejected.</p> <p>This tape drive has been designed to operate with DDS media that meet the following standards of the European Computer Manufacturers Association (ECMA):</p> <ul style="list-style-type: none"> <li>• ECMA-236 DDS-3 format</li> <li>• ECMA-288 DDS-4 format</li> </ul> |
| <p><b>Related information</b></p> | <p>Your package contains the following items:</p> <ul style="list-style-type: none"> <li>• The tape drive</li> <li>• Media kit containing: <ul style="list-style-type: none"> <li>– 1 cleaning cartridge</li> <li>– 1 test tape</li> <li>– Jumpers (located in a plastic bag)</li> </ul> </li> <li>• Specific hardware for attaching the drive to your specific system, as detailed on the parts listing provided with your drive.</li> </ul>  |

*Cleaning the tape drive:*

You might need to clean your tape drive. Use the procedure in this section to perform this task.

Clean the device whenever the Fault status light comes on or a system I/O error related to the device occurs.

**Attention:** Use only the recommended cleaning cartridge to clean the tape drive. Use of other than recommended cleaning cartridges can damage your drive and might void the warranty.

To clean the tape drive, complete the following steps:

1. Make sure that the power is on to the tape drive.
2. If a tape cartridge is in the tape drive, eject and remove the cartridge.

**Note:** Some cleaning cartridges have white dots on the window side that are designed to be used to log the use of the cartridge. Each time the cartridge is used, mark one of the dots on the cartridge with a pen or marker. When all of the dots have been marked, discard the cleaning cartridge.

3. Grasp the cleaning cartridge by the outer edges, with the window-side up and the write-protect switch facing you.
4. Slide the cartridge into the opening on the front of the drive until the loading mechanism pulls the cartridge into the drive and the drive door closes.

After the cleaning cartridge has been inserted, the remainder of the cleaning process is automatic. The tape drive does the following:

- Loads the cleaning cartridge into the tape drive.
- Cleans the drive by moving the cleaning tape forward for approximately 30 seconds.
- Unloads the cleaning cartridge when the cleaning operation is complete.

- Indicates a successful cleaning operation by turning off the Fault status light (if the Fault light was on prior to the cleaning process).

**Note:** If the cleaning operation completes but the Fault light remains on, repeat the cleaning procedure with a new cleaning cartridge. If the light still remains on, contact your authorized service provider.

To determine how many times a cleaning cartridge can be used, check the information printed on the cartridge. If you attempt to use a depleted cleaning cartridge, the tape drive automatically detects the error and ejects the cartridge. If the Fault status light was on prior to the cleaning process, it stays on; if the Fault light was off, the depleted cartridge causes the light to come on.

If a system error occurs, clean the drive and retry the operation. If the operation fails, replace the data cartridge, clean the drive again, then retry the operation.

#### *Loading and unloading cartridges:*

Learn about loading and unloading tape cartridges from this drive.

To avoid problems with loading and unloading, use only one label on a cartridge. Having too many or poorly placed labels can clog the drive-load mechanism.

#### *Loading a cartridge:*

To load a cartridge, complete the following steps:

1. Make sure that the tape device power is on.
2. Grasp the cartridge by the outer edges, with the window-side up and the write-protect switch facing you.

**Note:** Make sure that the write-protect switch is correctly set.

3. Slide the cartridge into the opening on the front of the device until the loading mechanism pulls the cartridge into the drive and the drive door closes.

To indicate that the load operation was successful, the Ready status light comes on.

#### *Unloading a cartridge:*

To unload a cartridge, complete the following steps:

1. Make sure that the tape device power is on.
2. Press the Unload button. The device rewinds, unloads, and ejects the tape cartridge.

The process might take from 15 seconds to several minutes, depending on the position of the tape and the amount of data written. During this task, the status lights do the following:

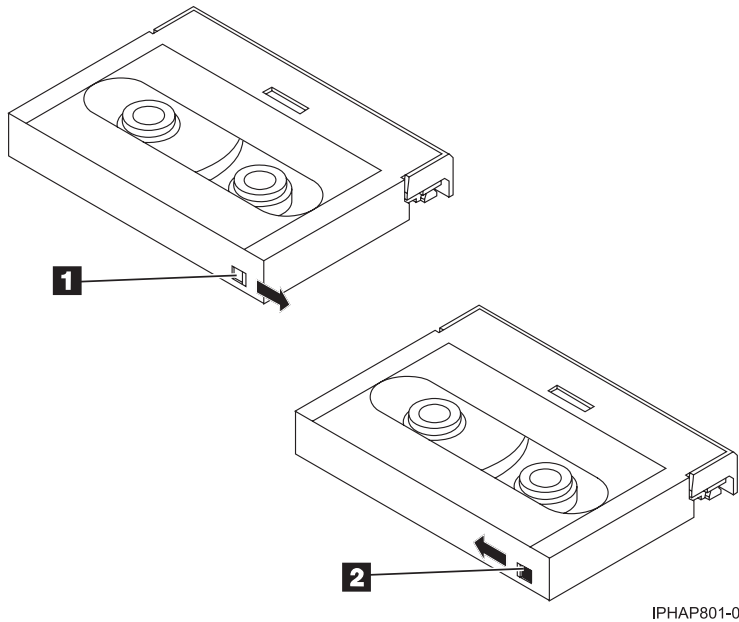
- The Ready status light turns off.
- The Activity status light flashes during the unload operation.
- The Activity status light turns off when the cartridge is ejected from the tape drive.

**Attention:** There is an emergency eject and reset feature that releases the tape cartridge and resets the drive. Use the emergency eject feature if the cartridge does not move correctly or if the unload process fails. The emergency eject and reset feature procedure might result in loss of data. To perform an emergency eject of the tape cartridge or a reset of the drive, press and hold the Unload button for at least 10 seconds. If a cartridge is in the drive, the cartridge automatically ejects without rewinding the tape.

#### *Setting the write-protect switch (FC 6258):*

You might need to set the write-protect switch on your tape drive. Use the procedure in this section to perform this task.

The position of the write-protect switch on the tape cartridge determines when you can write to the tape.



- 1 When the switch is set to the right, data can be written to and read from the tape
- 2 When the switch is set to the left, data can only be read.

*Status lights (FC 6258):*

You might need to read the status lights on your tape drive to determine the drive’s operating status. Use the information in this section to perform this task.

The following illustration is a front view of the tape drive:

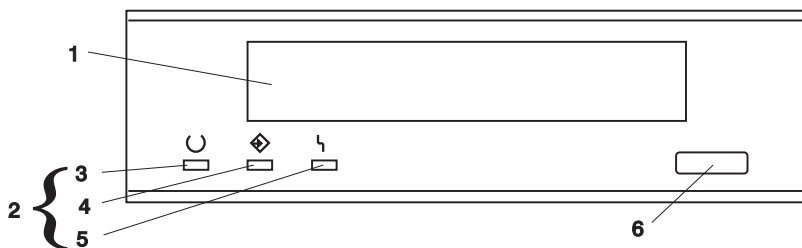


Figure 38. Front view of tape drive

- 1 Tape drive door
- 2 Status lights
- 3 Ready (green)
- 4 Active (green)
- 5 Fault (amber)
- 6 Unload/Reset button

The status lights and their ISO symbols are on the device as follows:

## Ready

○ **Ready** (green)

## Activity

◊ **Activity** (green)

## Fault

⌋ **Fault** (amber)

The combinations of the lights and their definitions are shown in the following table.

Table 33. Definition of status light combinations

| ○ <b>Ready</b> (green) | ◊ <b>Activity</b> (green) | ⌋ <b>Fault</b> (amber) | Definition   |
|------------------------|---------------------------|------------------------|--|
| Flashing               | Off                       | Off                    | The Power-On Self Test (POST) is running or the test cartridge is running.   |
| Off or On              | Off or Flashing           | On                     | The tape drive requires cleaning. See <a href="#">Cleaning the tape drive</a> . <ul style="list-style-type: none"><li>• If the Ready light is on, a tape cartridge is in the drive. If the light is off, a cartridge is not in the drive.</li><li>• If the Activity light flashes, a tape cartridge is in the drive and tape movement is occurring. If the light is off, no tape movement is occurring.</li></ul>  |
| Off                    | Off                       | Off or On              | One of the following conditions exists: <ul style="list-style-type: none"><li>• The power is off (Fault light is off).</li><li>• The POST completed successfully, but no tape cartridge has been inserted.</li><li>• If the Fault light is on, cleaning is required. See <a href="#">Cleaning the tape drive</a>.</li></ul>  |
| On                     | Off or Flashing           | Off or On              | A data cartridge has been inserted. <ul style="list-style-type: none"><li>• The device is ready to receive commands from the system (whether the Fault light is on or off).</li><li>• If the Fault light is on, cleaning is required. See <a href="#">Cleaning the tape drive</a>.</li><li>• If the Activity light flashes, a tape cartridge is in the drive and tape movement is occurring. If the light is off, no tape movement is occurring.</li></ul> |
| On                     | Flashing                  | Off or On              | The tape is in motion, and the device is running an operation or is cleaning.  |

Table 33. Definition of status light combinations (continued)

| Ready<br>ⓘ Ready (green) | Activity<br>⚡ Activity (green) | Fault<br>! Fault (amber) | Definition   |
|--------------------------|--------------------------------|--------------------------|--|
| Off                      | Off                            | Flashing                 | <p>The device detected an internal fault that requires corrective action.</p> <ol style="list-style-type: none"> <li>1. Reset the error by turning the power off to the device, then turning it back on, or by holding down the Unload/Reset button for 8 seconds.</li> <li>2. If the Fault light still flashes after the reset, contact your service provider.</li> </ol> |

**Notes:**

- The device needs cleaning when the tape drive turns on the Fault status light (solid amber). The light turns on when the device exceeds a preset operating limit.
- The recommended preventive-maintenance cleaning frequency is approximately 50 tape motion hours. Tape motion hours are defined as the time that the tape drive is moving tape.
- When the Fault light turns on (solid amber), the device causes AIX to log an information error (TAPE\_ERR6) in the AIX log, indicating that the tape drive needs to be cleaned.
- Use only quality media and cleaning cartridges.
- The device is designed to operate in typical office environments. Dirty environments or other poor environments might damage the tape drive. It is the customer’s responsibility to provide the proper operating environment.
- When the tape drive indicates that the drive needs to be cleaned, it is the customer’s responsibility to clean the tape drive with the recommended cleaning cartridge.
- If a tape cartridge that is not DDS-3, DDS-4, or DAT72 format is used, that cartridge will be immediately ejected as an incorrect cartridge type.

*Tape cartridges (FC 6258):*

Learn about the types of tape cartridges that are available for this drive.

**Available tape cartridges**

Table 34. 4-mm Data Cartridges

| IBM Part Number | Type of Cartridge       | Native (uncompressed) Capacity |
|-----------------|-------------------------|--------------------------------|
| 18P7912         | DAT 72 Data Cartridge   | 36 GB                          |
| 59H4457         | 4-mm Test Cartridge     | --                             |
| 21F8763         | 4-mm Cleaning Cartridge | --                             |
| 59H3465         | Data Cartridge DDS3     | 12GB                           |
| 59H4458         | Data Cartridge DDS4     | 20GB                           |

Most bulk eraser devices do not have the capability to erase the 4mm data cartridge. To correctly erase a 4mm data cartridge with a bulk eraser device, the erasure coercivity rating must be a minimum of 3900 Oersted.

**DVD drives**

Learn about the features of specific DVD drives.



## 16X/48X IDE DVD-ROM Drive (FC 2634)

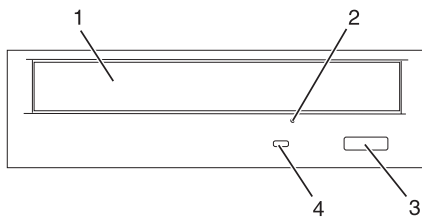
Learn about the features of this media device.

### Features

This section describes the features of the 16X/48X IDE DVD-ROM Drive. The 16X/48X IDE DVD-ROM Drive is a half-high, 5.25-inch, single-ended, tray-loading drive. Its features include the following:

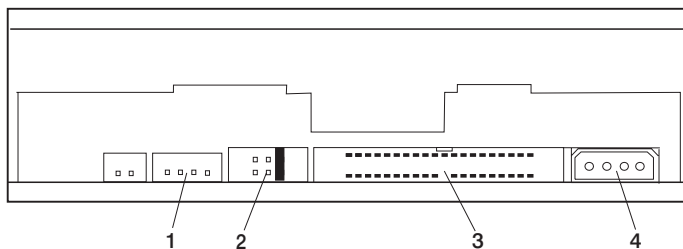
- CD media high-speed data transfer rate of 3300 KB per second (22X) at the inner diameter, and 7200 KB per second (48X) at the outer diameter.
- DVD media high-speed transfer rate is 8.91 MB per second (6.6x) at the inner diameter and 21.6 MB (16X) at the outer diameter.
- High-speed burst rate of 16.6 MB per second in PIO mode 4 and 33.3 MB per second in UDMA mode 2.
- Average random access time of 90 ms for CD media and 105 ms for DVD media.
- Can be installed in either a vertical or horizontal orientation.
- Loading tray accommodates both 8 cm discs (in the horizontal orientation only) and 12 cm discs.
- Reads multisession discs.
- Reads CD-recordable discs.
- Reads CD-RW discs.
- Supports all major CD-ROM formats: Mode 1, Mode 2, XA, CDDA, and audio.
- Reads DVD-RAM discs as defined by the *DVD Specification for Rewritable Discs, Version 2.1*.

### Front view



- 1 Compact Disc Tray
- 2 Emergency Eject Hole
- 3 Load/Unload Button
- 4 Status Light

### Rear view



**Note:** Audio is currently not enabled on server systems.

- 1 Audio Line-Out Connector

- 2 Jumper Block and Pins
- 3 40-pin IDE Interface Connector
- 4 Power Connector

## Opening the Tray Manually

The tray automatically opens when you press the Load/Unload button. If it does not automatically open, follow these steps to manually open the tray:

1. Follow your operating system instructions for shutting down your system, then turn off the power to your system unit. Unplug the power cord from the wall outlet.
2. Insert the straightened end of a paper clip into the emergency eject hole until you feel some resistance.
3. Continue to push in the paper clip while you pull out the tray with your fingernail.
4. Pull the tray completely open and remove the disc. It is normal for the tray to make a clicking sound while you are pulling it open.

## DVD-RAM Type II Disc

The DVD-RAM Type II disc can be removed from its cartridge and played in a DVD-ROM drive that is compatible with DVD-RAM.

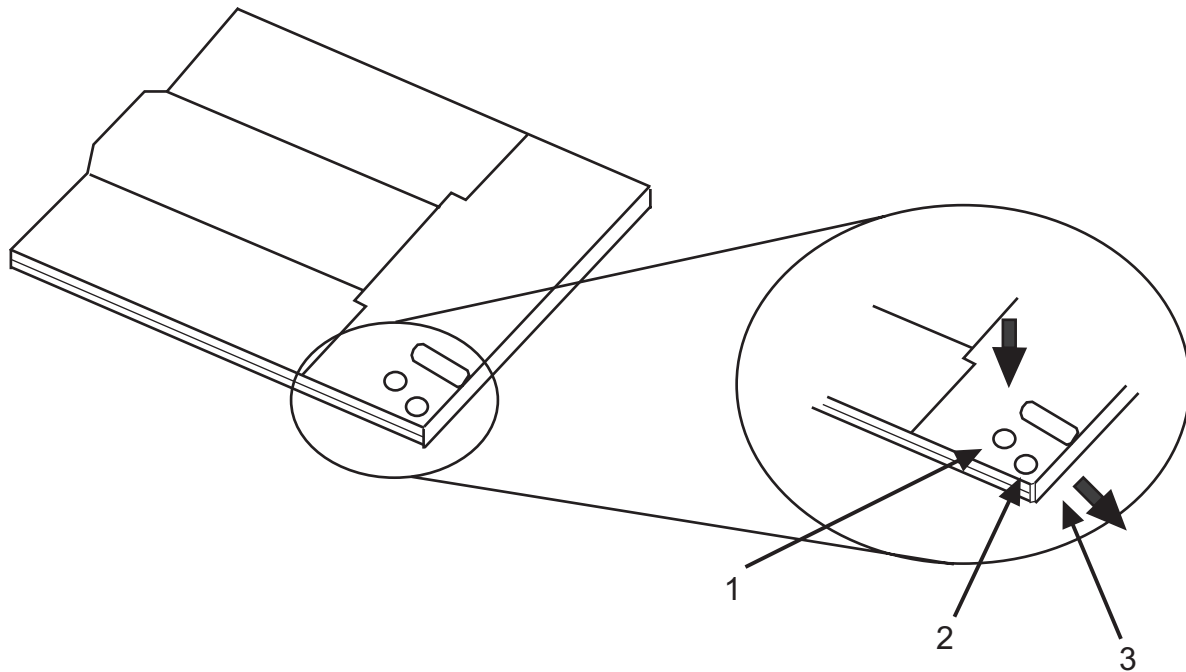
**Attention:** Be careful when handling removed discs. Debris, dust particles, fingerprints, smears, or scratches can affect recording and playback of discs. To clean dust or other debris, use the IBM DVD-RAM/CD-ROM cleaning kit. Do not use solvents to clean disc surfaces. When labeling a disc, write only on the printed label side, using a soft felt-tip marker. Do not use a hard-tip pen to write on disc surface. Keep out of direct sunlight, high temperatures, and humidity. Do not attach labels to either side of the disc.

## Removing a Disc from the Cartridge

To remove a disc from the cartridge, do the following:

1. Use the tip of a ballpoint pen to push the locking pin up and out of the disc cartridge.
2. Use the tip of a ballpoint pen to push down on the lock button while pulling the cartridge lid open.
3. With the cartridge lid open, slide the disc out of the cartridge.

**Note:** Handle the disc only by its edges.



- 1 Locking Pin
- 2 Lock Button
- 3 Cartridge Lid

### Returning a Disc to the Cartridge

To return a disc to the cartridge, do the following:

**Note:** Both the disc label and the cartridge label should be facing up.

1. Slide the disc into the cartridge.
2. Close the cartridge lid. Make sure the lock button snaps into position.
3. Install the locking pin.

**Attention:** Handle the disc only by its edges.

### 16X/48X SCSI DVD-ROM Drive (FC 2635)

Learn about the features of this media device.

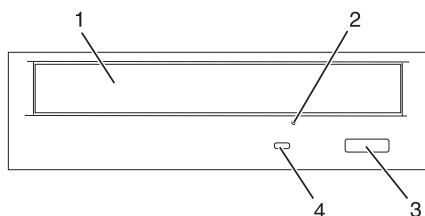
#### Features

This section describes the features of the 16X/48X SCSI DVD-ROM Drive. The 16X/48X IDE DVD-ROM Drive is a half-high, 5.25-inch, tray-loading drive with a Low-Voltage-Differential (LVD) SCSI interface. Its features include the following:

- CD media high-speed data transfer rate of 3300 KB per second (22X) at the inner diameter, and 7200 KB per second (48X) at the outer diameter.
- DVD media high-speed transfer rate is 8.91 MB per second (6.6x) at the inner diameter and 21.6 MB (16X) at the outer diameter.
- Average random access time of 90 ms for CD media and 105 ms for DVD media.
- Can be installed in either a vertical or horizontal orientation.
- Loading tray accommodates both 8 cm discs (in the horizontal orientation only) and 12 cm discs.
- Reads multisession discs.

- Reads CD-recordable discs.
- Reads CD-RW discs.
- Supports all major CD-ROM formats: Mode 1, Mode 2, XA, CDDA, and audio.
- Reads DVD-RAM discs as defined by the *DVD Specification for Rewritable Discs, Version 2.1*.

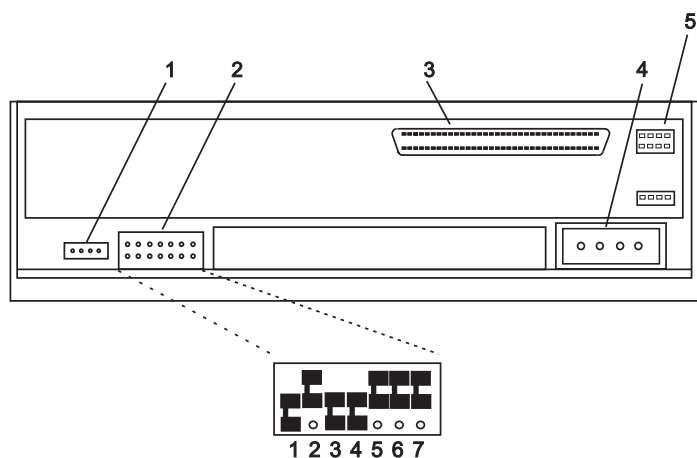
### Front View



- 1 Compact Disc Tray
- 2 Emergency Eject Hole
- 3 Load/Unload Button
- 4 Status Light

### Rear View and Jumper Pin Positions

The following figure shows the jumper pins as they are set at the factory.



- 1 Audio line-out connector
- 2 Jumper block and jumper pins
- 3 68-pin SCSI interface connector
- 4 Power connector
- 5 SCSI mode/term power (Not Used)

| SCSI ID | Jumper 1 | Jumper 2 | Jumper 3 | Jumper 4 |
|---------|----------|----------|----------|----------|
| 0       | 0        | 0        | 0        | 0        |
| 1       | 1        | 0        | 0        | 0        |
| 2       | 0        | 1        | 0        | 0        |
| 3       | 1        | 1        | 0        | 0        |
| 4       | 0        | 0        | 1        | 0        |

| SCSI ID | Jumper 1 | Jumper 2 | Jumper 3 | Jumper 4 |
|---------|----------|----------|----------|----------|
| 5       | 1        | 0        | 1        | 0        |
| 6       | 0        | 1        | 1        | 0        |
| 7       | 1        | 1        | 1        | 0        |
| 8       | 0        | 0        | 0        | 1        |
| 9       | 1        | 0        | 0        | 1        |
| 10      | 0        | 1        | 0        | 1        |
| 11      | 1        | 1        | 0        | 1        |
| 12      | 0        | 0        | 1        | 1        |
| 13      | 1        | 0        | 1        | 1        |
| 14      | 0        | 1        | 1        | 1        |
| 15      | 1        | 1        | 1        | 1        |

### DVD-RAM Type II Disc

The DVD-RAM Type II disc can be removed from its cartridge and played in a DVD-ROM drive that is compatible with DVD-RAM.

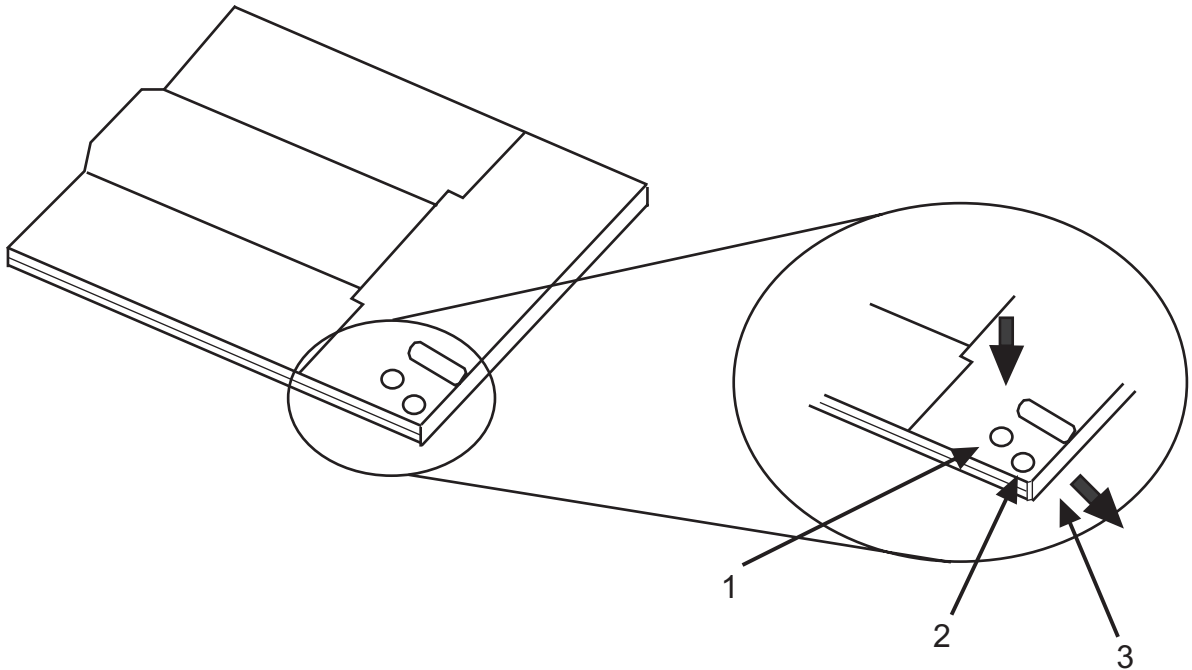
**Attention:** Be careful when handling removed discs. Debris, dust particles, fingerprints, smears, or scratches can affect recording and playback of discs. To clean dust or other debris, use the IBM DVD-RAM/CD-ROM cleaning kit. Do not use solvents to clean disc surfaces. When labeling a disc, write only on the printed label side, using a soft felt-tip marker. Do not use a hard-tip pen to write on disc surface. Keep out of direct sunlight, high temperatures, and humidity. Do not attach labels to either side of the disc.

### Removing a Disc from the Cartridge

To remove a disc from the cartridge, do the following:

1. Use the tip of a ballpoint pen to push the locking pin up and out of the disc cartridge.
2. Use the tip of a ballpoint pen to push down on the lock button while pulling the cartridge lid open.
3. With the cartridge lid open, slide the disc out of the cartridge.

**Attention:** Handle the disc only by its edges.



- 1 Locking Pin
- 2 Lock Button
- 3 Cartridge Lid

**Returning a Disc to the Cartridge**

To return a disc to the cartridge, do the following:

**Note:** Both the disc label and the cartridge label should be facing up.

1. Slide the disc into the cartridge.
2. Close the cartridge lid. Make sure the lock button snaps into position.
3. Install the locking pin.

**Note:** Handle the disc only by its edges.

**Opening the Tray Manually**

The tray automatically opens when you press the Load/Unload button. If it does not automatically open, follow these steps to manually open the tray:

1. Follow your operating system instructions for shutting down your system, then turn off the power to your system unit. Unplug the power cord from the wall outlet.
2. Insert the straightened end of a paper clip into the emergency eject hole until you feel some resistance.
3. Continue to push in the paper clip while you pull out the tray with your fingernail.
4. Pull the tray completely open and remove the disc. It is normal for the tray to make a clicking sound while you are pulling it open.

**Diskette drives**

Learn about the features of specific diskette drives.

## External USB 1.44 MB diskette drive (FC 2591)

Learn about the features of this media device.

The following provides information about the external USB 1.44 MB diskette drive.

|                                 |  |
|---------------------------------|--|
| <b>Installation and removal</b> | <p>To install this external USB 1.44 MB diskette drive, complete the following steps:</p> <ol style="list-style-type: none"><li>1. Unpack the device and ensure you have all the cables and parts.</li><li>2. Connect the USB cables to an available USB port on the system unit.</li><li>3. Wait for the system to recognize the new device (approximately 1-3 minutes).</li></ol> <p>To remove this external USB 1.44 MB diskette drive, complete the following steps:</p> <ol style="list-style-type: none"><li>1. Ensure you complete any processes running from or to the diskette drive.</li><li>2. Eject any diskette you have in the device.</li><li>3. Disconnect the device from the system unit.</li></ol> <p>If you are installing this device on system unit or partition running the AIX operating system you can refer to the manual at the following URL:USB 1.44 MB External Diskette Drive Installation and Using Guide <a href="http://publib16.boulder.ibm.com/pseries/en_US/infocenter/base/hardware_docs/pdf/231332.pdf">http://publib16.boulder.ibm.com/pseries/en_US/infocenter/base/hardware_docs/pdf/231332.pdf</a></p> <p>If you are installing this device on a system or partition running any other operating system, see the documentation for that operating system.</p> |
| <b>Description</b>              | <p>The externally attached USB diskette drive provides storage capacity up to 1.44 MB on a high-density (2HD) diskette and 720 KB on a double-density diskette. Includes 350mm (13.7 in) captured cable with standard USB connector.</p> <p>Limitations:</p> <ul style="list-style-type: none"><li>• Maximum 1 USB diskette per adapter</li><li>• Up to 1 Keyboard and Mouse also supported on the adapter with the diskette drive at the same time</li><li>• No system boot capability</li><li>• Not to be operated upside down or with eject button down</li></ul> <p>Characteristics:</p> <ul style="list-style-type: none"><li>• FRU part number: 53P2735</li><li>• Capacity - 1.44 MB (2HD disk) or 720 KB (double-density disk)</li><li>• Physical Dimensions: Width=103mm (4.05 in), Height=17.6mm (.69 in), Depth=141.8-mm (5.58 in)</li><li>• Color: Black</li><li>• Data Rate: 12 Mbits/sec</li><li>• Maximum Power Consumption: 2.36 Watt (seek)</li><li>• Operates in all positions except those noted in the preceding limitations</li><li>• Attributes provided: External diskette drive</li><li>• Attributes required: 1 available USB port</li></ul>   |

---

## Managing communications devices

Learn about communications devices.

### LAN-attached Remote Asynchronous Node 16 (MTM 7036-P16)

Learn about installing, removing, replacing and managing the LAN Attached Remote Asynchronous Node (RAN) 16 (MTM 7036-P16).

**Note:** Additional information can be found on the software CD provided with this device.

To view the quick start guide for this device, see the 7036-P16 quick start guide.

For information about installing, removing, replacing and managing the 7036-P16 device, see the following:

## **7036-P16 description and overview**

Learn about the product description, characteristics, and throughput considerations for this device.

### **Product description**

The 7036-P16 is a 16-Port EIA-232 LAN Attached Remote Asynchronous Node (RAN) for IBM System p servers. The 7036-P16 provides connectivity to asynchronous EIA-232 devices, such as modems, TTY terminals, printers, and so on.

The 7036-P16 can be used in a rack-mounted or table-top configuration. Hardware to mount the 7036-P16 in a rack or to use on a table top is included in the package. When installed in a rack, take care with routing the cables to ensure the cables do not interfere with other devices mounted in the rack.

The 7036-P16, when used with Digi RealPort software, will convert the serial data stream to and from attached asynchronous EIA-232 devices into TCP/IP traffic. After the data is on the TCP/IP network, a host system attached to the same network can treat the attached devices as if the devices were connected directly to the host system.

### **Product characteristics**

#### **Electromagnetic Compatibility (EMC) Certifications:**

- FCC Rules Part 15, Subpart B, Class A limit
- EN61000-3-2:2000 and EN61000-3-3:1995 + Amendment A1:2001
- EN55022: 1998 + Amendment 1:2000 Class A
- AS/NZS CISPR 22:2002
- Japan VCCI V3.2001.04
- ICES-003, Class A
- EMC Directive 89/336/EEC (CE Mark) consisting of EN55024 1988
- Australian EMC Framework (C-Tick Mark) consisting of AS/NZS CISPR 22:2002

#### **Safety:**

- UL CD certified to EN60950 3rd Edition
- CSA C22.2 No 60950
- UL recognized to UL60950 3rd Edition

#### **Physical characteristics:**

- Physical Dimensions: (16.8in./42.7cm)x(6.6in./16.76cm)x(1.6in./4.06cm)
- Weight: 7.05 lb./3.2 kg

#### **Environmental Limits:**

- **Operating**
  - Temperature: 0 to 40 C (ambient air temperature)
  - Humidity: 5% to 95% (non-condensing)
  - Wet Bulb: 29 C
  - Altitude: 0 - 7000 ft
- **Storage**



- Temperature: 1 to 60 C
- Humidity: 5% to 80% (non-condensing)
- Wet Bulb: 29 C
- **Shipping**
  - Temperature: -40 to 60 C
  - Humidity: 5% to 100% (non-condensing)
  - Wet Bulb: 29 C

## Power Consumption

Table 35. 7036-P16 power consumption

| Voltage (input)    | Current (amp) | Watt         |
|--------------------|---------------|--------------|
| 100/250VAC nominal | 0.8 A Maximum | 12 W typical |
| 90/264VAC maximum  | 40A in rush   |              |
| 47/63 Hz           | 2A fuse       |              |

## Throughput considerations

The limits on throughput are a function of the network and the server or server partition to which the 7036-P16 ports are configured.

### System port throughput:

The 7036-P16 supports full-duplex operation up to 230K bps on all ports. Operation with all sixteen ports running full-duplex at 230K bps is supported.

### Network throughput:

The 7036-P16 is an Ethernet attached device and as such, any number may be attached to a given network. However, attaching more devices to any network reduces the overall network throughput and care must be taken to not overload any given network.

Testing has shown that as many as eight 7036-P16 devices may be attached to a network without adversely affecting network throughput. Eight 7036-P16 devices will support up to 128 asynchronous EIA-232 connections. More devices may be attached, but network performance may be adversely affected.

### Server or partition throughput:

Each 7036-P16 provides 16-Ports of asynchronous EIA-232 connectivity over a 10/100 Ethernet port at speeds up to 230K bps. Given that any number of 7036-P16s may be attached to a server or partition, a single server or partition could in effect have a very large number of asynchronous EIA-232 connections that could adversely affect any single server or partition.

## Installing 7036-P16 hardware

You might need to install this hardware. Use the procedure in this section to perform this task.

### Purpose

The following information describes the materials and procedures for installing this device. A Phillips screwdriver is required to complete the installation of this unit.

## 7036-P16 hardware package contents

Before you install the 7036-P16 unit, verify that the hardware package contains the following items:

- 7036-P16 unit
- 7036-P16 software and documentation CD
- 7036-P16 Quick Setup Guide
- Brackets to mount 7036-P16 on rack
- Rubber feet for tabletop usage
- Power cord (North American 120 V ac use only)
- RJ-45 to DB25 serial cable DB25 wired per EIA-232 specification
- RJ-45 to DB09 serial cable DB09 matches pin configuration on existing DB09 system ports on IBM System p systems
- RJ-45 wrap plug for diagnostics.

## Deskside 7036-P16 unit installation procedure

To install the deskside 7036-P16 unit, do the following:

1. Unpack the hardware.
2. Remove the rubber feet from the plastic bag.
3. Attach the rubber feet to the bottom of the 7036-P16 in the locations indicated.
4. Attach the power cord. A power cord for use in North America is provided.
5. Use an Ethernet cable to connect the 7036-P16 to the network.
6. Connect serial devices as needed.

## Rack-mounted unit installation procedure

To install the rack-mounted 7036-P16 unit, do the following:

1. Unpack the hardware.
2. Remove the right-angle brackets and screws from the plastic bag.
3. Use a Phillips screw to attach the brackets in the predrilled holes on the sides of the 7036-P16.
4. Mount the 7036-P16 in the same location from which the 7036-P16 was removed.
5. Attach the power cord. A power cord for use with 120 V ac is provided.

Optional rack power cord feature codes (FC) are available to connect the 7036-P16 to the rack Power Distribution Unit (PDU). These cords come in various lengths. They are identified by the following feature codes:

- FC 6458: Power Cord (14-foot), Drawer to IBM PDU, 250V/10A
- FC 6672: Power Cord (9-foot), Drawer to IBM PDU, 250V/10A
- FC 6671: Power Cord (5-foot), Drawer to IBM PDU, 250V/10A

The previous features are only available for use in racks less than 25U in size.

6. Use an Ethernet cable to connect the 7036-P16 to the network.
7. Connect serial devices as needed.

## Installing Digi RealPort software for the 7036-P16 device

You might need to install the Digi RealPort software on an AIX or Linux host server. Use the procedure in this section to perform this task.

## Digi RealPort software-support packages

The following is a list of the software packages available on the software CD provided with the 7036-P16 unit:

- The Digi RealPort software package for AIX supports the following AIX levels:
  - AIX 5L 5.2.0.75 (and later)
  - AIX 5L 5.3.0.30 (and later)
- The Digi RealPort software package for Linux supports the following Linux levels:
  - Linux for POWER Red Hat Version RHEL4, Update 3
  - Linux for POWER SUSE Version SLES 9 SP2

## Installing the Digi RealPort software

To install the Digi RealPort software, do the following:

1. Install all updates and packages required to bring the operating system to the supported levels.
2. Install all Linux packages required to compile and create binaries from the Digi RealPort Software source code.

The following is a list of Linux packages that are required to install the Digi RealPort software:

- gcc
  - gcc-64bit
  - gcc-c++
  - gcc-g77-64bit
  - gcc-info
  - gcc-locale
  - gcc-objc
  - gcc-objc-64bit
  - kernel sources
  - glibc-devel-64bit
  - ncurses-64bit
  - ncurses-devel
3. Install the Digi RealPort software. To install the software, see the following procedures.

## Installing the AIX Digi RealPort software

To install the software package for the AIX environment, do the following:

1. Log in to the host server as the root user.
2. Insert the CD-ROM into the CD-ROM drive.
3. Type the following command: `smitty install_all`
4. Press F4.
5. Select `digiasync`, then press Enter.
6. Use the cursor to scroll to ACCEPT new license agreement
7. Press F4.
8. Select Yes, then press Enter.

When installation commences, do not interfere until the installation completes. A successful installation will return an OK message. An unsuccessful installation will return a FAILED message.

If you receive an OK message, continue to the next step. If you receive a failed message, review the `smit.log` file to determine why the installation failed.

9. Press F10.

10. Type: `lslpp -l | grep digi`  
If the Digi RealPort package installed correctly, you will receive a message. The following are examples of return messages:
  - `digiasync.realport.obj 3.8.7.0 COMMITTED Digi RealPort Driver`
  - `digiasync.realport.obj 3.8.7.0 COMMITTED Digi RealPort Driver`
11. After the Digi RealPort Software is installed, the user may configure the 7036-P16 onto the network, if it is not already configured. For instructions on how to perform the network configuration, see “Configuring the 7036-P16 into the network” on page 147.

## Installing the Linux SUSE Digi RealPort software

To install the software package for the Linux SUSE environment, do the following:

1. Log in to the server as the root user.
2. If the CD-ROM is already inserted and mounted, then proceed to Step 5.
3. Insert the CD-ROM into the CD-ROM drive.
4. Type: `mount -t auto /dev/cdrom /mnt`
5. Type: `cp /mnt/linux/40002086_M.src.rpm /usr/src/packages/SOURCES`
6. Type: `umount /mnt`
7. Type: `cd /usr/src/linux*`
8. Type: `make mrproper`
9. Type: `make oldconfig`
10. Type: `cd /usr/src/packages/SOURCES`
11. Type: `rpmbuild --rebuild 40002086_M.src.rpm`
12. Type: `rpm -i /usr/src/packages/RPMS/ppc64/dgrp-1.9-6.ppc64.rpm`
13. Type: `rpm -qa | grep dgr`  
If the Digi RealPort Package installed correctly, the following is an example of the return message:  
`dgr-1.9.6`
14. After the Digi RealPort software is installed, the user may configure the 7036-P16 onto the network, if it is not already configured. For instructions on how to perform the network configuration, see “Configuring the 7036-P16 into the network” on page 147.

## Installing the Linux Red Hat Digi RealPort software

To install the software package for the Linux Red Hat environment, do the following:

1. Log in to the server as the root user.
2. If the CD-ROM is already inserted and mounted, then proceed to Step 5.
3. Insert the CD-ROM into the CD-ROM drive.
4. Type: `mount -t auto /dev/cdrom /mnt`
5. Type: `cp /mnt/linux/40002086_M.src.rpm /usr/src/packages/SOURCES`
6. Type: `umount /mnt`
7. Type: `cd /usr/src/packages/SOURCES`
8. Type: `rpmbuild --rebuild 40002086_M.src.rpm`
9. Type: `rpm -i /usr/src/packages/RPMS/ppc64/dgrp-1.9-6.ppc64.rpm`
10. Type: `rpm -qa | grep dgr`  
If the Digi RealPort Package installed correctly, the following is an example of the return message:  
`dgr-1.9.6`

11. After the Digi RealPort software is installed, the user may configure the 7036-P16 onto the network, if it is not already configured. For instructions on how to perform the network configuration, see “Configuring the 7036-P16 into the network” on page 147.

## Configuring the 7036-P16 device and TTY

You might need to configure the 7036-P16 as a serial device on a host server. Use the procedure in this section to perform this task.

The task consists of the following steps:

1. Configure the 7036-P16 as a serial device on a host server installed with one of the following operating systems:
  - AIX 5L 5.2.0.75, or later
  - AIX 5L 5.3.0.30, or later
  - Red Hat Enterprise Linux version 4, Update 3, or later
  - SUSE Linux Enterprise Server 9, SP2, or laterThis in effect binds the 7036-P16 to the host server.
2. Configure 7036-P16 system ports for use with Digi RealPort software.

## Configuring a 7036-P16 device on an AIX host server

### Assumptions:

- The target 7036-P16 and the host server are configured on an Ethernet network.
- The target 7036-P16 and the host server are attached to an Ethernet network.
- The Digi RealPort software is installed on the server.

### Gather the following information:

- IP Address of the target 7036-P16: [7036-P16 IP Address]
- IP Address of the host server: [Host Server IP Address]
- Root password of target 7036-P16

### Configure the 7036-P16 as a serial device on an AIX server:

1. Ensure that the 7036-P16 and the server are on the network. Ping the 7036-P16 by typing the following command: `ping -c 1 [IP Address of target 7036-P16]`  
If the 7036-P16 responds to the ping, then it is on the network and the user can proceed to the next step. If the 7036-P16 does not respond to the ping, then the 7036-P16 is not on the network and the user must perform the network configuration procedure, see “Configuring the 7036-P16 into the network” on page 147.
2. Ensure that the Digi RealPort Software is installed on the server. Type the following command: `ls | pp -l | grep digi`  
The response indicates that the `digiasync.realport.obj` file is installed.

**Note:** If the response indicates the Digi RealPort Software is installed then proceed to step 3. If there is no response, then the Digi RealPort Software is not installed and the user must install the Digi RealPort Software, see “Configuring the 7036-P16 into the network” on page 147.

3. Type: `smitty devices`
4. Use the cursor to select: `Digi Device and Terminal Servers`, then press `Enter`.
5. Use the cursor to select: `Add a Digi Device and Terminal Servers`, then press `Enter`
6. Use the cursor to select: `cts_16_r`, then press `Enter`.
7. Move the cursor to the IP Address box and type: `[IP Address]`, then press `Enter`. This is the [IP Address of the target 7036-P16] used in Step 1.

Upon successful completion of this command the user will see the following on the screen: Command: OK stdout: yes stderr: no Before command completion, additional instructions may appear.  
sa[device number] Available

8. Press F3.
9. To configure additional devices, repeat Steps 7. through 10.
10. Press F10 to exit from **smitty** and return to the server's command line.

After the serial device is configured, the TTY ports may be configured.

## Configuring a 7036-P16 system port TTY on an AIX host server

### Assumptions:

- The target 7036-P16 and the host server are configured on an Ethernet network.
- The target 7036-P16 and the host server are attached to an Ethernet network.
- The Digi RealPort software is installed on the server.

### Gather the following information:

- IP Address of the target 7036-P16: [7036-P16 IP Address]
- IP Address of the host server: [Host Server IP Address]
- Root password of target 7036-P16

### Procedure:

1. Ensure that the 7036-P16 and the server are on the network. Ping the 7036-P16 by typing the following command: ping -c 1 [IP Address of target 7036-P16]

**Note:** If the 7036-P16 responds to the ping, then it is on the network and the user may proceed to the next step. If the 7036-P16 does not respond to the ping, then the 7036-P16 is not on the network and the user must perform the network configuration procedure, see "Configuring the 7036-P16 into the network" on page 147.

2. Ensure that the Digi RealPort Software is installed on the server. Type the following command: `lslpp -l | grep digi`

**Note:** The response indicates that the **digiasync.realport.obj** file is installed. If the response indicates the Digi RealPort Software is installed then proceed to the next step. If there is no response, then the Digi RealPort Software is not installed and the user must install the Digi RealPort software, see "Configuring the 7036-P16 into the network" on page 147.

3. Type: `smitty tty`, then press Enter.
4. Use the cursor to select: Add a TTY, then press Enter.
5. Use the cursor to select: `tty rs232 Asynchronous Terminal`, then press Enter.
6. Use the cursor to select: `sa[device number] Available IBM LAN Attached RAN 16`, then press Enter.
7. Enter a port number not already assigned to a TTY, for example 1, and press Enter

Upon successful completion of this command the user sees the following on the screen: Command: OK stdout: yes stderr: no Before command completion, additional instructions may appear.  
tty[number] Available

**Note:** The [number] is the number assigned by **smitty** as the next available tty device.

8. Press F3.
9. To configure additional TTY devices, repeat Steps 7. through 9.
10. Press F10 to exit from **smitty** and return to the server's command line.

This concludes the system port TTY configuration on an AIX Server.

## Configuring the 7036-P16 as a TTY Device on a Linux host server

### Assumptions:

- The target 7036-P16 and the host server are configured on an Ethernet network.
- The target 7036-P16 and the host server are attached to an Ethernet network.
- The Digi RealPort software is installed on the server.

### Gather the following information:

- IP Address of the target 7036-P16: [7036-P16 IP Address]
- IP Address of the host server: [Host Server IP Address]
- Root password of target 7036-P16

### Procedure:

1. Ensure that the 7036-P16 and the server are on the network. Ping the 7036-P16 by typing the following command: `ping -c 1 [IP Address of target 7036-P16]`

**Note:** If the 7036-P16 responds to the ping, then it is on the network and the user may proceed to the next step. If the 7036-P16 does not respond to the ping, then the 7036-P16 is not on the network and the user must perform the network configuration procedure, see “Configuring the 7036-P16 into the network.”

2. Ensure that the Digi RealPort software is installed on the server. Type the following command: `rpm -qa | grep dgr`

The response from the command is: `dgr-1.9.6`

**Note:** If there is no response, then the Digi RealPort software is not installed and the user must install the Digi RealPort Software, see the Linux Red Hat or the Linux SuSE installation procedure, see “Configuring the 7036-P16 into the network.”

3. Type the following command:

```
dgrp_cfg_node -v init [Device ID] [IP Address] [7036-P16 Port(s)]
```

Where: [Device ID] is any two characters that the user uses to identify the target 7036-P16. [IP Address] is the IP Address of the target 7036-P16. [7036-P16 Port(s)] correspond to the port number(s) being configured.

This concludes the system port TTY configuration on a Linux Host server.

## Configuring the 7036-P16 into the network

You might need to configure the 7036-P16 device to work within the system network. Use the procedure in this section to perform this task.

### Purpose

The following section describes network configuration methods and considerations; configuring the 7036-P16 onto an Ethernet network, the Ping-ARP method, and the direct-terminal attach method.

### Network configuration methods and considerations

The 7036-P16 is an Ethernet device and as such it must be configured onto the network like any other Ethernet device. Various network configuration methods are available to the user.

### Configuring the 7036-P16 onto an Ethernet network

If the 7036-P16 is to be used in a network that supports Dynamic Host Configuration Protocol (DHCP), then the configuration will be performed by simply connecting to the network and powering up the 7036-P16. The 7036-P16 is shipped from the factory with the DHCP option enabled.

If DHCP is not supported on the network, then the user must choose between the ARP-Ping Configuration or the Direct Terminal Attach methods.

The ARP-Ping Configuration method is recommended for the following reasons:

- This method does not require the user to be in the same room as the 7036-P16.
- This method does not require any extra hardware, such as a tty terminal or cabling to attach the 7036-P16 to the tty terminal.
- This method works equally well for AIX and Linux installations.
- This method does not require the 7036-P16 be connected into a network that supports DHCP.

## ARP-ping network configuration method

To configure the 7036-P16 device into the network using this method, do the following:

1. Gather the following information from the system or network administrator:
  - MAC Address: [MAC Address] (MAC Address label is on the back of the 7036-P16)
  - IP Address: [IP Address]
  - Default Gateway: [IP Gateway Address]
  - Name Server: [Name Server Address]
  - Subnet Mask: [Subnet mask]
  - Host Name: [Host Name]
  - Domain Name: [Domain Name]
2. Connect the power cord from the 7036-P16 to a power source and turn the power on.
3. Connect the Ethernet cable from the 7036-P16 to an Ethernet network.
4. Log in to a server as root user, and make sure the server is on the same subnet as the 7036-P16.
5. Manually update the server's ARP table.
6. Use the IP address and the 7036-P16's MAC address gathered in Step 1.  
The AIX and the Linux command line entries to update the ARP table are different, use the following examples on how to update the server's ARP table:  
AIX Command: `arp -s ether [IP Address] [MAC Address]`  
Linux Command: `arp -v -H ether -s [IP Address] [MAC Address]`
7. Ping the 7036-P16 using the IP address by typing: `ping -c 1 [IP Address]` The ping may time out before there is a response from the 7036-P16. Repeat the ping until the 7036-P16 responds. The ping response indicates that the IP address has been configured.
8. Use telnet to access the 7036-P16, using the IP address from the ping command: `telnet [IP Address]`
9. Log in to the 7036-P16 as root. Use the default password: `dbps`
10. After logging in, you can change the root password. To change the password, type: `newpass` Follow the prompts provided after entering the command.
11. To view the current configuration, type: `set config`
12. Type the following commands on the 7036-P16 command line using the information gathered in Step 1 to complete the IP Address configuration:

```
set config ip=[IP Address]
set config submask=[Subnet Mask]
set config gateway=[IP Gateway Address]
set config dns=[Name Server Address]
set config dhcp=off
set config hostname=[Host Name]
set config domain=[Domain Name]
```
13. As a precaution, you can deactivate the Ping-ARP and RARP options. To deactivate the Ping-ARP and RARP options type the following commands:



```
set config Ping-ARP=off
set config RARP=off
```

14. If the user plans to use the Digi RealPort software on the host server to control all the 7036-P16 ports, then the system ports must be configured for use with the Digi RealPort software. Type the following command: `set port range=* dev=rp`
15. Issue the reboot command to the 7036-P16 in order to permanently set the changes. Type the following command: `boot action=reset`

When the 7036-P16 reboots, then the network configuration is complete.

The 7036-P16 can now be accessed through the Ethernet connection. The user can program other features as required. See additional documentation on the 7036-P16 Software and Documentation CD.

## Direct-attach configuration method

A regular tty terminal or a PC running a terminal emulation program, may be attached directly to any one of the 16 ports and commands entered on the 7036-P16 command line to configure the 7036-P16 onto the network.

This method requires the user to be in the same room as the 7036-P16. This method requires the user to have a tty terminal or a PC available. This method requires a serial cable to connect the tty terminal or PC to the server. This method is independent of the operating system installed on the server.

To configure the 7036-P16 device into the network using this method, do the following:

1. Gather the following information from the system or network administrator:
  - MAC Address: [MAC Address] (MAC Address label is on the back of the 7036-P16)
  - IP Address: [IP Address]
  - Default Gateway: [IP Gateway Address]
  - Name Server: [Name Server Address]
  - Subnet Mask: [Subnet mask]
  - Host Name: [Host Name]
  - Domain Name: [Domain Name]
2. Connect the power cord from the 7036-P16 to a power source and power up.
3. Connect the serial cable from tty terminal to the 7036-P16.
4. Log in to the 7036-P16 as the root user, use the default password dbps.
5. After login, you can change the root password. Type: `newpass`
6. To view the current configuration, type: `set config`
7. Type the following commands on the 7036-P16 command line using the information gathered in Step 1 to complete the IP Address configuration:

```
set config ip=[IP Address]
set config submask=[Subnet Mask]
set config gateway=[IP Gateway Address]
set config dns=[Name Server Address]
set config dhcp=off
set config hostname=[Host Name]
set config domain=[Domain Name]
```

8. As a precaution, you can deactivate the Ping-ARP and RARP options. To deactivate the Ping-ARP and RARP options type the following commands:

```
set config Ping-ARP=off
set config RARP=off
```

9. If you plan to use the Digi RealPort software on the host server to control all the 7036-P16 ports, then the system ports must be configured for use with the Digi RealPort software. Type the following command: `set port range=* dev=rp`

10. Issue the reboot command to the 7036-P16 in order to permanently set the changes. Type the following command: `boot action=reset`

When the 7036-P16 reboots, then the network configuration is complete.

The 7036-P16 may now be accessed via the Ethernet connection. The user can program other features as required. See additional documentation on the 7036-P16 Software and Documentation CD.

### **Using diagnostic aids for the 7036-P16**

You might need to use diagnostic programs to identify hardware problems. Use the procedure in this section to perform this task.

The 7036-P16 is not supported under AIX Diagnostics. A means to diagnose hardware problems with the 7036-P16 is provided by an executable program.

The purpose of this program is to diagnose hardware problems with the 7036-P16, such as bad connectors, faulty electronic components, and so on. The diagnostic is not intended to resolve protocol problems, network problems or a faulty host server to which the 7036-P16 may be attached.

### **Requirements for using the 7036-P16 diagnostic program**

- The 7036-P16 and the AIX host server must be on the same network.
- The Digi RealPort Software for AIX Package must be installed.
- The user must ensure the problems are not caused by a faulty host server, the network or a device attached to any one of the 16 system ports.
- The Diagnostic Program is run from the AIX host server.
- Wrap Plug IBM part number 43G0928.

### **7036-P16 diagnostic program capabilities**

- Wrap data on each of the 16 system ports
- Monitor data on each of the 16 system ports
- Provide VPD (vital production data)

### **Using the 7036-P16 diagnostic program**

1. Log in to the AIX host server as root.
2. From the root home directory type:  
`./usr/lbin/tty/dpa-ncxa`
3. Press Enter.
4. The next screen will present a list of all the 7036-P16s configured on the host server. The list includes the device name and the IP Address for each 7036-P16. The user should look at the bottom of the screen for options.
5. Select a 7036-P16 on the list by using the cursor keys. The 7036-P16 selected is highlighted.
6. Type "D" to see the 7036-P16 product information.
7. Press enter to test an individual tty port on the selected 7036-P16. The next screen will present Port-1 of the 7036-P16 that was selected.
- 8.
9. To select a a different tty port, use the cursor keys to either increment or decrement the port number.
10. Once a tty port is selected, the select one of the following:
  - a. Wrap data by typing a "T". If this option is chosen, use wrap plug part number 43G0928. Insert the wrap plug into the tty port.
  - b. Monitor the data on the selected port by typing a "D".
11. To exit the diagnostic program, press ESC.

## General purpose diagnostic procedures, visual inspections

### Ethernet cables

- Ensure an Ethernet cable is attached to the 7036-P16 and the host server.
- Ensure the Ethernet cable is wired correctly.
- Ensure the Ethernet cable is good.

### Serial cables

- Ensure a serial cable is attached to every 7036-P16 port that is in use.
- Ensure the serial cables are wired correctly.
- Ensure the serial cables are good.

## Investigating Ethernet network problems associated with the 7036-P16

1. Gather the following information:

For the 7036-P16:

- MAC Address: [MAC Address] (MAC Address label is on the back of the 7036-P16)
- IP Address: [7036-P16 IP Address]
- Default Gateway: [IP Gateway Address]
- Name Server: [Name Server Address]
- Host Name: [Host Name] (if a host name is assigned)

For the host server:

- Machine Type and Model
- AIX Level
- IP Address: [Host server IP Address]
- Default Gateway: [IP Gateway Address]
- Name Server: [Name Server Address]
- Host Name: [Host Name] (if a host name is assigned)

2. Ping the 7036-P16 from the host server by typing: `ping -c 1 [7036-P16 IP Address]`

If the 7036-P16 responds to the ping, then both devices are on the network; the problem is not a network attachment problem. If the ping times out, then either the 7036-P16 or the host server is not on the network.

3. Use traceroute to see where the link between the 7036-P16 and the host server is broken. Type:  
`traceroute [7036-P16 IP Address]`

## Replacement and configuration recovery instructions for the 7036-P16

You might need to create a 7036-P16 configuration file, reconfigure a 7036-P16 from a stored configuration file, or replace a 7036-P16. Use the procedures in this section to perform this task.

This section provides instructions on how to perform the following tasks:

- Creating a 7036-P16 configuration file
- Reconfiguring a 7036-P16 from a stored configuration file
- Replacing a 7036-P16

### Creating a 7036-P16 configuration file

Create a copy of the 7036-P16 configuration and to store it on the host server.

### Hardware requirements:

- AIX or Linux host server with Web access

- 7036-P16 attached to an Ethernet network

#### Gather the following information:

- IP Address of the target 7036-P16: [7036-P16 IP Address]
- IP Address of the host server: [Host Server IP Address]
- Root password of target 7036-P16

#### 7036-P16 configuration file creation methods

The following are methods for creating a 7036-P16 configuration file:

- Web user interface method
- Command line method

Access the 7036-P16 command line and enter commands directly onto the 7036-P16. This method requires TFTP to be enabled on the host server.

#### Web user interface method

To create a configuration file using the web user interface method, do the following:

1. Use the host server to access the web interface of the target 7036-P16 by entering the 7036-P16 IP address in a browser's URL window, then log in as the root user.
2. Select Backup/Restore
3. Select Backup
4. Select Save
5. The program will create a file named **backup.cfg**. Consider changing that name to something more meaningful. Example: **backup\_[IP Address].txt**
6. When the task is completed a Download Complete message will be posted to the screen.

#### Command line method

To create a configuration file using the command line method, do the following:

1. Ensure the TFTP daemon is enabled on the host server. On an AIX server type the following on the command line: `ps -ef | grep tftp`  
If the TFTP daemon is enabled, the response will include two active TFTP processes and the user should proceed to Step 8. If the response indicates that only the grep process is active, then the TFTP daemon must be enabled.
2. To enable the TFTP daemon, type the following command: `smitty subsystem`
3. Select Start a Subsystem, then press Enter.
4. Press F4
5. Search the resulting list for `tftpd`, then press Enter.
6. Telnet to the target 7036-P16. Type: `telnet [IP Address of target 7036-P16]`, then press Enter.
7. Login as the root user, use the root password.
8. Type the following on the 7036-P16 command line:  
`cpconf tohost=[Host Server IP Address]:/tmp/backup_[IP Address].txt`  
The complete IP and tty port configuration information is now captured in the **backup\_[IP Address].txt** file. If the user changes the configuration, the user is strongly advised to recreate the **backup\_[IP Address].txt** file. The user should make a note of the file name created.

## Reconfiguring a 7036-P16 from a stored configuration file

Use a stored configuration file when replacing a 7036-P16.

### Hardware requirements:

- AIX or Linux host server with Web access
- 7036-P16 attached to an Ethernet network

### Gather the following information:

- IP Address of the target 7036-P16: [7036-P16 IP Address]
- IP Address of the host server: [Host Server IP Address]
- Root password of target 7036-P16

### 7036-P16 reconfiguration methods

The following are methods for creating a 7036-P16 configuration file:

- Web user interface method
- Command line method

Access the 7036-P16 command line and enter commands directly onto the 7036-P16. This method requires TFTP to be enabled on the host server.

#### Web user interface method

To modify the configuration file using the web user interface method, do the following:

1. Use the host server to access the web interface of the target 7036-P16 by entering the 7036-P16 IP address in a browser's URL window, then log in as the root user.
2. Select Backup/Restore
3. Select Browse and navigate to the directory where the stored file is kept on the host server.
4. Select the stored configuration file and click on Open. For example: backup\_[IP Address].txt The complete path to the stored file will appear in the Browse window.
5. Click on Restore.
6. Wait for the configuration to complete, then click on Done.
7. Click on Reboot.
8. The task is complete when the 7036-P16 reboots.

#### Command line method

To modify the configuration file using the command line method, do the following:

1. Telnet to the target 7036-P16. Type: telnet [IP Address of target 7036-P16], then press Enter.
2. Login as root, use the root password.
3. To reconfigure the 7036-P16, type the following:  
`cpconf fromhost=[Host Server IP Address]:/tmp/backup_[IP Address].txt`
4. Reboot the 7036-P16. Type: boot action=reset
5. When the 7036-P16 reboots, then the task is complete.

## Replacing a 7036-P16

**Attention:** Before replacing a 7036-P16, create a 7036-P16 configuration file.

You need a Phillips screwdriver to replace this unit.

To replace a 7036-P16 unit, do the following steps:

1. Gather the following IP information for the 7036-P16 unit to be replaced:
  - MAC Address: [MAC Address] (MAC Address label is on the back of the 7036-P16)
  - IP Address: [IP Address]
  - Default Gateway: [IP Gateway Address]
  - Name Server: [Name Server Address]
  - Subnet Mask: [Subnet mask]
  - Host Name: [Host Name]
  - Domain Name: [Domain Name]
2. Power off the 7036-P16.
3. Remove the power cord.
4. Remove the Ethernet cable.
5. Remove each serial cable, and make sure each cable is marked indicating from which tty port it was removed.
6. If the 7036-P16 is installed as a desktop unit, then remove the rubber feet from the plastic bag and attach them to the replacement 7036-P16.
7. If the 7036-P16 is used as a rack mounted device, then undo the screws from the rack and remove the 7036-P16 from the rack.
8. Remove the replacement 7036-P16 unit from the shipping package.
9. Remove the right angle brackets and screws from the plastic bag.
10. Use a Phillips screw to attach the brackets in the predrilled holes on the sides of the 7036-P16.
11. Mount the new 7036-P16 in the same location from which the previous 7036-P16 was removed.
12. Attach the power cord.
13. Attach the Ethernet cable.
14. Attach the serial cables, using the markings from Step 5 in order to restore each cable to its previous port.
15. After the 7036 is configured on the network, telnet to the target 7036-P16. Type: telnet [IP Address of target 7036-P16]
16. Log in as the root user.
17. To reconfigure the 7036-P16, type the following:

```
cpconf fromhost=[Host Server IP Address]:/tmp/backup_[IP Address].txt
```

## Field replacement units for the 7036-P16

Identify replacement parts for the 7036-P16.

The following table lists the field replacement units for the 7036-P16.

*Table 36. Replacement parts for the 7036-P16*

| Part Number | Description   |
|-------------|---|
| 80P6911     | 7036-P16 FRU  |
| 10N77L4     | 7036-P16 Software and Documentation CD. Form Number: LCD8-0170-01 |
| 03N6839     | 7036-P16 Rubber Feet and Brackets Accessory FRU                   |
| 39J5823     | RJ-45 to DB09 (Male) cable  |
| 12H1204     | DB25 to DB25 (Male) cable   |

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## Appendix. Accessibility features

Accessibility features help users who have a physical disability, such as restricted mobility or limited vision, to use information technology products successfully.

The following list includes the major accessibility features:

- Keyboard-only operation
- Interfaces that are commonly used by screen readers
- Keys that are tactilely discernible and do not activate just by touching them
- Industry-standard devices for ports and connectors
- The attachment of alternative input and output devices

### IBM and accessibility

See the IBM Accessibility Center at <http://www.ibm.com/able/> for more information about the commitment that IBM has to accessibility.





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European Community contact:  
IBM Technical Regulations  
Pascalstr. 100, Stuttgart, Germany 70569  
Tele: 0049 (0)711 785 1176  
Fax: 0049 (0)711 785 1283  
E-mail: tjahn@de.ibm.com

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**IBM Taiwan Contact Information:**

台灣IBM 產品服務聯絡方式：  
台灣國際商業機器股份有限公司  
台北市松仁路7號3樓  
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Verantwortlich für die Konformitätserklärung nach des EMVG ist die IBM Deutschland GmbH, 70548 Stuttgart.

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- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables or connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interferences, and (2) this device must accept any interferences received, including interference that may cause undesired operation.

### **Industry Canada Compliance Statement**

This Class B digital apparatus complies with Canadian ICES-003.

## Avis de conformité à la réglementation d'Industrie Canada

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

## European Community Compliance Statement

This product is in conformity with the protection requirements of EC Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22 / European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

Properly shielded and grounded cables and connectors must be used in order to reduce the potential for causing interference to radio and TV communications and to other electrical or electronic equipment. Such cables and connectors are available from IBM authorized dealers. IBM cannot accept responsibility for an interference caused by using other than recommended cables and connectors.

European Community contact:  
IBM Technical Regulations  
Pascalstr. 100, Stuttgart, Germany 70569  
Tele: 0049 (0)711 785 1176  
Fax: 0049 (0)711 785 1283  
E-mail: tjahn@de.ibm.com

## VCCI Statement - Japan

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。  
取扱説明書に従って正しい取り扱いをして下さい。

The following is a summary of the VCCI Japanese statement in the box above.

This is a Class B product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

## IBM Taiwan Product Service Contact Information

台灣IBM 產品服務聯絡方式：  
台灣國際商業機器股份有限公司  
台北市松仁路7號3樓  
電話：0800-016-888

## Electromagnetic Interference (EMI) Statement - Korea

이 기기는 가정용으로 전자파적합등록을 한 기기로서 주거 지역에서는 물론 모든 지역에서 사용할 수 있습니다.

## Radio Protection for Germany

### Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse B EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse B ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

### Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

### Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse B.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Konformitätserklärung nach des EMVG ist die IBM Deutschland GmbH, 70548 Stuttgart.

Generelle Informationen:

**Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse B.**



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