IBM PCI Wide Ultra2 SCSI Adapter

User's Guide

OPTIONS
by IBM

Note: Read the information under Appendix F, “Product warranty” on page 3-12 and Appendix G, “Notices” on page 3-15 before using this information and the product it supports.

First Edition (July 1999)

Contents

Safety: Read first

Before installing this product, read the Safety Information.

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information (安全信息)。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

安裝本產品之前，請先閱讀「安全資訊」。

Registering your option

Thank you for purchasing OPTIONS by IBM . Please take a few moments to register your product and provide us with information that will help IBM to better serve you in the future. Your feedback is valuable to us in developing products and services that are important to you, as well as in developing better ways to communicate with you. Register your option on the IBM Web site at:

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

IBM will send you information and updates on your registered product unless you indicate on the Web site questionnaire that you do not want to receive further information.

About this book

This manual contains information on how to install, configure, and troubleshoot the PCI Wide Ultra2 SCSI Adapter. The manual is divided into the following parts:

Part 1: Abbreviated installation instructions in the following languages:

English
German
French
Italian
Spanish
Brazilian Portuguese
Japanese

Part 2: Product information and detailed installation instructions

Part 3: Utility programs information, specifications, problem solving, help and service information, warranty, and notices

Note: The illustrations in this manual might be slightly different from your hardware.

Part 1: Quick installation guide

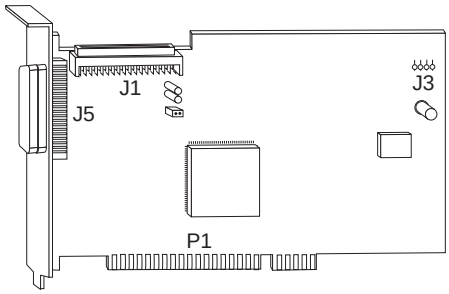
The IBM PCI Wide Ultra2 SCSI Adapter is designed to attach SCSI devices to a computer that has an available peripheral component interconnect (PCI) expansion slot. In addition to this User's Guide, the option package contains:

The PCI Wide Ultra2 SCSI Adapter
One 68-pin, internal SCSI cable for connecting four 16-bit internal Wide devices
One 4-pin internal LED cable
The option CD-ROM which contains the EZ-SCSI and 7800 Family Manager Set device driver and utility packages
The IBM *Safety Information Book*

This section contains installation instructions in abbreviated form. If you are familiar with SCSI products and are experienced in installing options, use these instructions. For a description of the host adapter and more detailed information about how to install it see “Part 2: User's guide” on page 2-1. To install the host adapter:

1. Set a unique SCSI ID for each device you are connecting to the SCSI chain. The adapter supports SCSI IDs from 0 to 15. The SCSI ID of the host adapter is 7.
2. Turn off all attached devices; then turn off your computer. Unplug the power cords of all attached devices and your computer. Remove the cover from your computer. For instructions on how to remove your computer’s cover, refer to the documentation that comes with your computer.
3. Before opening the static-protective bag containing the host adapter, touch the bag to an unpainted metal surface on your computer for at least two seconds. Remove the adapter from the static-protective bag. If you must put the adapter down, place it on the static-protective bag.

   The following is an illustration of the host adapter.



4. Locate an available PCI expansion slot. These slots are shorter than ISA or EISA slots. Remove the bracket screw and the metal expansion slot cover. Insert the card-edge connector, P1 in the above illustration, into the white PCI bus connector. Press the host adapter into place and secure it with the bracket screw.
5. The internal SCSI cable included in this option package has an adaptive terminator at its far end. This terminator serves as the termination device for all

Ultra2 or pre-Ultra2 SCSI devices that are attached to the cable. Remove or disable termination from all other devices on the SCSI cable.

6. If needed, set the host adapter termination. Termination of the host adapter is controlled by software commands using the SCSI*Select* utility program. The initial termination setting for the host adapter is *Automatic*. With this setting, the adapter senses the bus cables attached and sets proper termination settings. If you want to manually set the termination for the host adapter, see Appendix B, "SCSISelect" on page 3-2.

7. Mount and connect each internal SCSI device in your computer. Connect the 68-pin cable into the connector for 16-bit Wide SCSI devices (J1 in the illustration of the adapter).

   Connect the internal devices into available connectors at the end of the SCSI cable farthest from the adapter and closest to the terminator, to ensure best signal quality. Connect pin-1 on each cable connector to pin-1 on each device throughout the bus, or your SCSI devices will not work properly.

8. Optionally, you can connect a light-emitting diode (LED) to indicate SCSI hard disk drive activity. Unplug the LED cable from the connector on the computer system board. Connect the LED cable connector to the external LED connector on the host adapter (J3 in the illustration of the adapter).

9. Connect the power cable for each device to the internal power source, as needed. Replace and secure the cover on your computer.

10. If you have external SCSI devices, connect your external SCSI cable (not provided with this option) to the external connector on the host adapter (J5 in the illustration of the adapter) and then connect your external devices.

11. Reconnect the power cord and other cables. Turn on all attached devices; then turn on your computer. If your computer does not recognize the host adapter, start your configuration program and review and set the configuration options.

12. The initial SCSI*Select*host adapter settings are appropriate for most computers with PCI expansion slots. If you need more information about changing the initial settings, see Appendix B, "SCSISelect" on page 3-2.

13. Install the device driver and utility software.

    The Microsoft Windows 95, Windows 98, Windows NT , Novell NetWare, IBM OS/2 , SCO Unix , and UnixWare operating systems may already contain device drivers for your SCSI adapter. If this is the case, your operating system will recognize the device after installation and will use the appropriate device drivers. If your operating system does not recognize the host adapter after installation, you will need to use the option CD-ROM to install the appropriate device drivers.

    Device drivers for the host adapter are included in the EZ-SCSI and 7800 Family Manager Set (Family Manager) software packages. The EZ-SCSI software package contains device drivers for the following operating systems:

    DOS 6.x
    Windows 3.1x

Windows 95 or Windows 98
Windows NT

The Family Manager software package contains device drivers for the following operating systems:

Windows 95 or Windows 98
Windows NT
Novell NetWare
IBM OS/2
SCO Unix
UnixWare

Note: Device drivers for Windows 95, Windows 98, and Windows NT are included in both the EZ-SCSI and Family Manager packages. You may use either package to install the appropriate drivers.

To find detailed installation instructions for each operating system listed above:

a. Insert the option CD-ROM into your CD- or DVD-ROM drive.
b. Access the available files on the CD, and locate the directory labeled with the name of the operating system you have installed on your computer.
c. Read the README.TXT file in your operating system's directory for detailed installation instructions and additional configuration and usage information.

Quick installation (translated)

The IBM PCI Wide Ultra2 SCSI Adapter is designed to attach SCSI devices to a computer that has an available peripheral component interconnect (PCI) expansion slot. In addition to this User's Guide, the option package contains:

The PCI Wide Ultra2 SCSI Adapter
One 68-pin, internal SCSI cable for connecting four 16-bit internal Wide devices
The option CD-ROM which contains the EZ-SCSI and 7800 Family Manager Set device driver and utility packages
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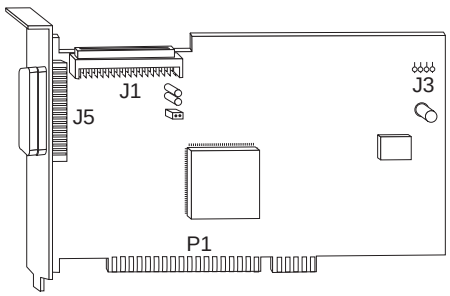
This section contains installation instructions in abbreviated form. If you are familiar with SCSI products and are experienced in installing options, use these instructions. For a description of the host adapter and more detailed information about how to install it see “Part 2: User's guide” on page 2-1. To install the host adapter:

1. Set a unique SCSI ID for each device you are connecting to the SCSI chain. The adapter supports SCSI IDs from 0 to 15. The SCSI ID of the host adapter is 7.
2. Turn off all attached devices; then turn off your computer. Unplug the power cords of all attached devices and your computer. Remove the cover from your computer. For instructions on how to remove your computer’s cover, refer to the documentation that comes with your computer.
3. Before opening the static-protective bag containing the host adapter, touch the bag to an unpainted metal surface on your computer for at least two seconds. Remove the adapter from the static-protective bag. If you must put the adapter down, place it on the static-protective bag.

   The following is an illustration of the host adapter.



4. Locate an available PCI expansion slot. These slots are shorter than ISA or EISA slots. Remove the bracket screw and the metal expansion slot cover. Insert the card-edge connector, P1 in the above illustration, into the white PCI bus connector. Press the host adapter into place and secure it with the bracket screw.
5. The internal SCSI cable included in this option package has an adaptive terminator at its far end. This terminator serves as the termination device for all Ultra2 or pre-Ultra2 SCSI devices that are attached to the cable. Remove or disable termination from all other devices on the SCSI cable.

6. If needed, set the host adapter termination. Termination of the host adapter is controlled by software commands using the SCSI*Select* utility program. The initial termination setting for the host adapter is *Automatic*. With this setting, the adapter senses the bus cables attached and sets proper termination settings. If you want to manually set the termination for the host adapter, see Appendix B, "SCSISelect" on page 3-2.

7. Mount and connect each internal SCSI device in your computer. Connect the 68-pin cable into the connector for 16-bit Wide SCSI devices (J1 in the illustration of the adapter).

   Connect the internal devices into available connectors at the end of the SCSI cable farthest from the adapter and closest to the terminator, to ensure best signal quality. Connect pin-1 on each cable connector to pin-1 on each device throughout the bus, or your SCSI devices will not work properly.

8. Optionally, you can connect a light-emitting diode (LED) to indicate SCSI hard disk drive activity. Unplug the LED cable from the connector on the computer system board. Connect the LED cable connector to the external LED connector on the host adapter (J3 in the illustration of the adapter).

9. Connect the power cable for each device to the internal power source, as needed. Replace and secure the cover on your computer.

10. If you have external SCSI devices, connect your external SCSI cable (not provided with this option) to the external connector on the host adapter (J5 in the illustration of the adapter) and then connect your external devices.

11. Reconnect the power cord and other cables. Turn on all attached devices; then turn on your computer. If your computer does not recognize the host adapter, start your configuration program and review and set the configuration options.

12. The initial SCSI*Select* host adapter settings are appropriate for most computers with PCI expansion slots. If you need more information about changing the initial settings, see Appendix B, "SCSISelect" on page 3-2.

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    Windows 95 or Windows 98
    Windows NT

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c. Read the README.TXT file in your operating system's directory for detailed installation instructions and additional configuration and usage information.

Product Registration

Thank you for purchasing OPTIONS by IBM . Please take a few moments to register your product and provide us with information that will help IBM to better serve you in the future. Your feedback is valuable to us in developing products and services that are important to you, as well as in developing better ways to communicate with you. Register your option on the IBM Web site at:

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

IBM will send you information and updates on your registered product unless you indicate on the Web site questionnaire that you do not want to receive further information.

Product Service and Warranty Information

For technical support, support hours, and warranty terms and conditions, see the enclosed inserts, or contact your IBM reseller or IBM marketing representative.

Part 2: User's guide

Product description

The PCI Wide Ultra2 SCSI Adapter is designed to attach SCSI devices to a computer that has an available peripheral component interconnect (PCI) expansion slot. The Ultra2 SCSI adapter provides a multitasking interface between the PCI bus and SCSI devices. You can connect up to 15 SCSI devices to the adapter (disk drives, CD-ROM drives, scanners, and other devices) in a daisy-chain fashion. The host adapter can be used in place of, or together with, a standard IDE adapter.

If you need to configure the host adapter, use the SCSI*Select* utility program that is built-in to the host adapter. SCSI*Select* allows you to change the host adapter settings without opening the computer or handling the adapter.

In addition to the User's Guide, this option package contains:

- The PCI Wide Ultra2 SCSI Adapter
- One 68-pin, internal SCSI cable for connecting four 16-bit Wide SCSI devices
- One 4-pin internal LED cable
- The option CD-ROM which contains the EZ-SCSI and 7800 Family Manager Set device driver and utility packages
- The IBM *Safety Information Book*

Before you begin

Attention: The host adapter is sensitive to static electricity; even a mild shock can destroy one or more of its components. Keep the adapter in its static-protective wrapping until you are ready to install it in your computer. Before you handle the adapter, always ground yourself by touching an unpainted surface on your computer.

System requirements

In addition to this option package, you need:

- Personal computer that supports PCI Revision 2.0.
- An available PCI expansion slot that is capable of bus mastering. Some PCI-bus computers have both bus-mastering and non-bus mastering slots. Read your computer documentation to determine the type of PCI slots your computer has.
- Low voltage differential (LVD) or single-ended SCSI devices

You might also need one or more of the following:

- A 68-pin external SCSI cable for connecting each external 16-bit Wide SCSI device.

A termination device for external SCSI devices (if needed to terminate external SCSI chain). To provide reliable SCSI bus operation, use only an active terminator compatible with the type of devices you are using. For instance, if you are using all Ultra2 SCSI devices, use an Ultra2 termination device. If you have any devices on the external SCSI chain that are pre-Ultra2, you can use either an Ultra2 or a pre-Ultra2 termination device.

Choosing SCSI cables

Round external SCSI cables vary widely in quality and electrical characteristics. Be sure that external SCSI cables meet Ultra2 SCSI standards. Do not use cables shorter than 30 cm (11.8 inches) between any two SCSI devices.

To ensure reliable operation, the total length of the SCSI bus, including both the internal and external cabling, is an important factor. Follow these guidelines for total SCSI cable length:

If any Fast SCSI devices are connected to the host adapter, the total length of all cables must not exceed 3 meters (9.8 feet).
If no Fast SCSI devices are connected, the total length of all cables must not exceed 6 meters (19.7 feet).
If only LVD (Ultra2 SCSI) devices are connected to the host adapter, the total length of all cables must not exceed 12 meters (39.4 feet).

Installing the adapter

Follow these steps to install the host adapter.

Step 1. Assigning SCSI IDs

Each device attached to the host adapter, as well as the adapter itself, must have a unique SCSI ID number from 0 to 15. The SCSI ID serves two purposes: it uniquely defines each SCSI device on the SCSI bus, and it determines the device priority for service on the SCSI bus.

The host adapter supports the SCSI configured automatically (SCAM) protocol which assigns SCSI IDs dynamically and resolves SCSI ID conflicts automatically at start up. Most SCSI devices currently in use, however, do not support SCAM. The SCSI IDs on these devices must be set manually. Consider the following when assigning a SCSI ID.

Determine the SCSI ID assignments for devices currently installed. You might be able to use the existing ID assignments. To determine existing SCSI ID assignments, use one of the following.
- For most IBM computers, press the F1 key during start up after the memory check completes.
- Use the SCSI utility programs which came with your SCSI devices.
- Inspect the installed SCSI devices to see how the IDs are set.

ID 7 is the highest priority ID on the SCSI bus. Make sure ID 7 is assigned to the host adapter. Do not use the SCSI*Select* utility program to change the ID

assignment of the host adapter. The priority of the other IDs in descending priority order are 6 to 0 and 15 to 8.

Assign higher priority SCSI ID numbers to the devices that are most often used or are faster than other devices in the SCSI chain. (The SCSI ID assigned to a device is not related to the order in which the devices are attached to the host adapter.)

If you start up your computer from a SCSI device, assign SCSI ID 0 to the startup drive. ID 0 is the SCSI*Select* initial setting. (If both SCSI and IDE disk drives will be installed, you cannot start up your computer from a SCSI device. In this case, the IDE disk drive is always the startup device.)

Change the ID settings according to ID assignments you have chosen. Refer to the documentation that comes with your SCSI devices for information on how to change the SCSI ID. One way to remember the SCSI ID for each device is to write the SCSI ID on a piece of tape and put it on the device. When putting the tape on a hard disk drive, do not press down on the top of the drive because the pressure might damage it.

You can also use the following table in your planning by writing down the SCSI ID you assign to each device. The SCSI IDs are listed in decreasing priority order.

SCSI ID	Device
7	PCI Wide Ultra2 SCSI Adapter
6	
5	
4	
3	
2	
1	
0	
15	
14	
13	
12	
11	
10	
9	
8	

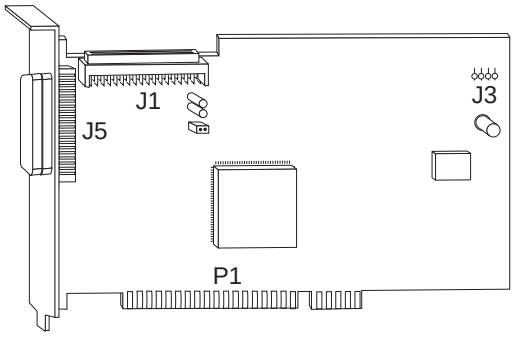
Note that if you install more than one SCSI host adapter in your computer, each adapter has a separate SCSI bus, and you can use each SCSI ID once on each bus.

Step 2. Opening your computer

1. Turn off all attached devices.
2. Turn off your computer.
3. Unplug the power cords for your computer and all attached devices; then open your computer. For specific information on opening your computer refer to the documentation that comes with your computer.

Step 3. Unpacking the host adapter

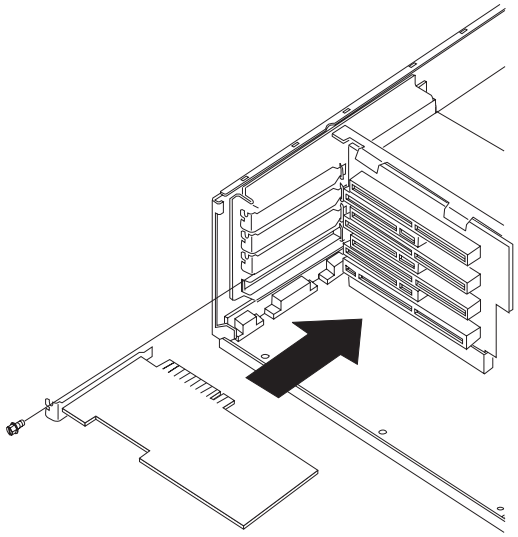
1. Before opening the static-protective bag containing the host adapter, touch the bag to an unpainted metal surface on your computer for at least two seconds.
2. Remove the adapter from the static-protective bag. If you must put the adapter down, place it on top of the static-protective bag.
3. Inspect the adapter before you install it in your computer for any physical damage. The following illustration identifies the adapter components.



J1 68-pin, 16-bit Wide internal SCSI connector
J3 External LED connector
J5 68-pin, 16-bit Wide external SCSI connector
P1 PCI bus card-edge connector

Step 4. Inserting the adapter into the PCI slot

1. Locate an available PCI expansion slot. These slots are shorter than ISA or EISA slots as shown in the following illustration. The PCI bus connectors (inside the computer) are colored white.



2. Remove the bracket screw and metal expansion slot cover.
3. Insert the card-edge connector, **P1**, into the empty PCI bus connector. Press the host adapter into place and secure it with the bracket screw.

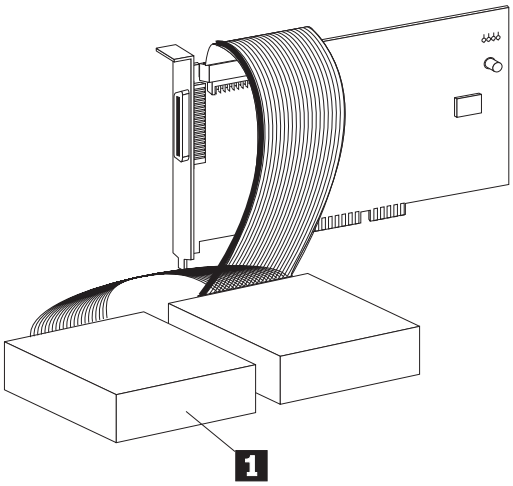
Step 5. Terminating the SCSI bus

SCSI devices connect serially to one another on a SCSI bus in a daisy chain fashion. For the devices to work properly, SCSI termination is required at both ends; there are no exceptions. All devices that are between the ends of a SCSI chain must have their termination devices removed or disabled.

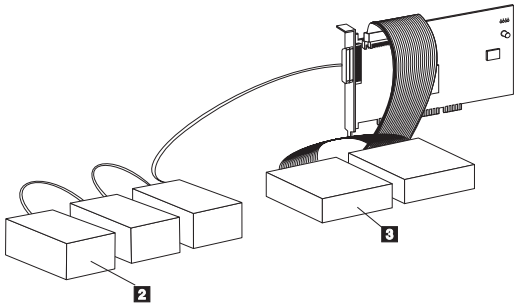
The internal SCSI cable that comes with this option has an Ultra2 SCSI termination device at the end of the cable farthest from the adapter. All SCSI devices which are connected to the internal cable between the host adapter and the termination device at the end of the cable must have termination removed or disabled. Any on-board terminators on internal SCSI devices must be removed also. When no external SCSI devices are attached to the bus, the internal cable is terminated at one end by the host adapter itself, and at the other by the termination device on the internal cable.

The following are possible SCSI termination configurations.

If the SCSI configuration consists of one cable, terminate the last device `1` on the cable. Remove termination from other devices on the cable.



If the SCSI bus consists of one internal SCSI cable and one external SCSI cable, terminate the last device 2 on the external SCSI cable and the last device 3 on the internal SCSI cable. Remove termination from the other devices on each cable.



Step 6. Terminating the host adapter

Termination on the host adapter is controlled by software commands using the SCSI*Select*. The initial termination setting is *Automatic*.

With the *Automatic* termination setting, the host adapter detects if SCSI cables are connected to any of the two SCSI connectors. The adapter then sets termination as needed. If you need to manually set the host adapter termination, see Appendix B, “SCSISelect” on page 3-2 for more information.

Step 7. Connecting internal devices

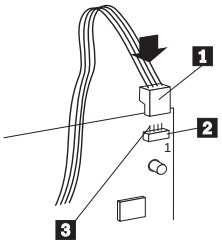
Follow these steps to connect internal SCSI devices.

1. Mount each SCSI device in the computer.
2. Connect the 68-pin cable into the connector for 16-bit Wide SCSI devices (J1 in the adapter illustration).
3. Connect the internal devices into available connectors at the end of the SCSI cable farthest from the adapter to ensure best signal quality. Connect pin-1 on each cable connector to pin-1 on each device throughout the bus, or your SCSI devices will not work properly.
4. Connect the power cable for each device to the internal power connector, as needed.

Step 8. Connecting the LED cable (Optional)

Most computers have a light-emitting diode (LED) on the front panel that lights up when the hard disk drive is accessed. You can attach the LED cable to the host adapter instead, so it lights up to indicate activity on the SCSI bus. Follow these steps to connect the LED cable to the host adapter.

1. Unplug the LED cable from the connector on your computer system board. Refer to your computer documentation to locate the LED cable. If needed, you can use the 4-pin LED cable included with this option.
2. Connect the LED cable connector `1` to the external LED connector `2` on the host adapter as shown in the following illustration.



   Ensure that pins on the LED cable are correctly aligned with the pins on the connector `3` . Pin-1 on the LED cable should align with the pin marked 1 in the illustration.

If you change the LED connection and your computer includes non-SCSI disk drives, the LED will no longer indicate non-SCSI disk activity.

Step 9. Closing the computer

Review your work before closing your computer. Be sure that:

1. The SCSI chain is properly terminated.
2. Each SCSI device on the SCSI chain is set to a unique SCSI ID.
3. The host adapter is firmly seated and secured in a PCI expansion slot.
4. Internal SCSI devices are firmly connected to the host adapter and pin-1 on each SCSI cable connector attaches to pin-1 on each SCSI device connector.
5. Power and interface connectors are securely attached.

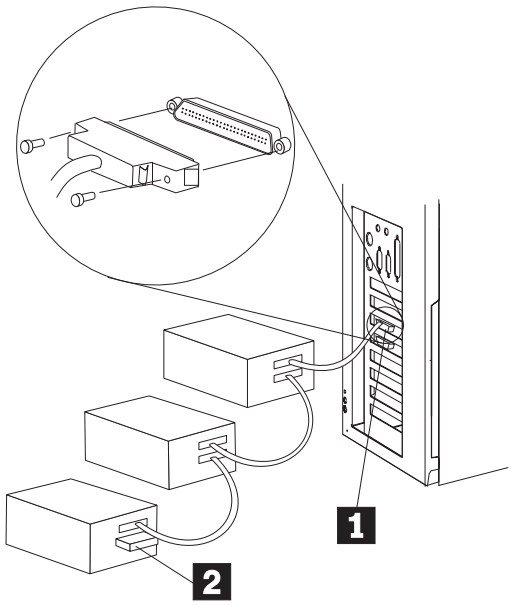
Replace the computer cover and secure it in place.

Step 10. Connecting external SCSI devices

Connect devices to the host adapter using an additional external cable for each device connected. Up to 15 Wide SCSI external devices can be connected to the host adapter in a chain.

To start the SCSI chain follow these steps:

1. Connect the external SCSI cable to the host adapter `1` . External cable connectors are designed to plug in only one way; therefore, pin-1 orientation is automatic.



2. Extend the external SCSI cable from the host adapter to the connector on the first external device. Plug a second external SCSI cable into the second connector on the first device.
3. Plug the other end of the second external SCSI cable into the next device, and continue in this fashion until all external devices are connected.

4. To terminate the last device on the SCSI chain, insert an active terminating plug into the second connector on the last device in the chain 2 .

Step 11. Configuring the computer

To configure your computer follow these steps.

1. Reconnect the power cord and other cables.
2. Turn on all attached devices; then turn on your computer.
3. For most computers, the computer performs a power-on self-test (POST) and the configuration program automatically recognizes the new host adapter. However, you might have to answer questions about your system changes when you restart your computer.

   If your computer does not recognize the host adapter after it starts up, enter the configuration program and review the PCI configuration options. Some configuration options apply to a specific PCI bus slot. If you change these options, be sure to apply them to the PCI bus slot in which the host adapter is installed. Read your computer documentation if you are not sure which slot corresponds to each number.

   Here are some things you might need to do while using your computer's configuration program.

   If there is an Interrupt Type or Interrupt Line option, select **Int-A** or **Interrupt Type = A**. Depending on your computer design, you might also be required to change a system board jumper setting.
   If there is a Triggering Interrupt option, select **Level**.
   If there is an option to enable or disable bus-mastering for the PCI slot, select **Enabled**.
   If there is an option to enable or disable individual PCI slots, select **Enable** for the slot in which you installed the host adapter.
   If your computer has a combination of ISA (or EISA) and PCI adapters, you might need to mark the IRQs used by ISA/EISA adapters as **Used** so that the computer BIOS will not try to assign these IRQs to other PCI adapters.
   In some computers the BIOS reserves a set of available IRQs for PCI adapters. You might have to assign the adapter IRQ manually.

   Refer to your computer documentation for more information. If you still encounter problems during installation, see Appendix D, "Problem solving" on page 3-9.

Step 12. Configuring the host adapter

The SCSI*Select* initial settings are appropriate for most PCI computers. If you do not need to change any of the initial settings, there is no need to run SCSI*Select*. Refer to Appendix B, "SCSISelect" on page 3-2 to review or modify the initial adapter settings.

Step 13. Installing device driver and utility software

The Microsoft Windows 95, Windows NT , Novell NetWare, IBM OS/2 , SCO Unix , and UnixWare operating systems may already contain device drivers for your SCSI adapter. If this is the case, your operating system will recognize the device after installation and will use the appropriate device drivers. If your operating system does not recognize the host adapter after installation, you will need to use the option CD-ROM to install the appropriate device drivers.

Device drivers for the host adapter are included in the EZ-SCSI and 7800 Family Manager Set (Family Manager) software packages. The EZ-SCSI software package contains device drivers for the following operating systems:

DOS 6.x
Windows 3.1x
Windows 95 or Windows 98
Windows NT

The Family Manager software package contains device drivers for the following operating systems:

Windows 95 or Windows 98
Windows NT
Novell NetWare
IBM OS/2
SCO Unix
UnixWare

Note: Device drivers for Windows 95, Windows 98, and Windows NT are included in both the EZ-SCSI and Family Manager packages. You may use either package to install the appropriate drivers.

To find detailed installation instructions for each operating system listed above:

1. Insert the option CD-ROM into your CD- or DVD-ROM drive.
2. Access the available files on the CD, and locate the directory labeled with the name of the operating system you have installed on your computer.
3. Read the README.TXT file in your operating system's directory for detailed installation instructions and additional configuration and usage information.

Part 3: Appendixes

Appendix A. Product specifications

Termination power

Some disk drives allow termination power to be supplied to their resistor modules from the SCSI bus instead of from the drive's power supply. The host adapter supports this function because it always supplies termination power on the SCSI bus.

Physical dimensions

Depth: 178.0 mm (7.0 in.)
Height: 127.0 mm (5.0 in.)
Length: 108.0 mm (4.25 in.)

Power requirements

Voltage: +5.0 V dc ±0.25 V
Current: 1.5 Amps maximum

Temperature requirements

Operation and Storage: 0°C (32°F) to 55°C (131°F)

Appendix B. SCSISelect

The host adapter comes with a built-in menu-driven utility program called SCSI*Select*. SCSI*Select* includes a configuration program and a disk utility program.

When your computer starts up, the following prompt appears briefly:

```
Press <Ctrl><A> for SCSISelect(TM) Utility!
```

You can start the SCSI*Select* program by pressing **Ctrl+A**. The first menu that appears on your screen prompts you to choose either to configure and view the host adapter settings or to use the SCSI disk utilities.

SCSI*Select* uses menus to list options you can select.

To select an option, use the ↑ and ↓ keys to move the cursor to the option; then press the Enter key.
In some cases, selecting an option displays another menu. You can return to the previous menu at any time by pressing the Esc key.
To restore the original SCSI*Select* settings, press the F6 key.
To toggle the display between color and monochrome modes, press the F5 key. (This feature might not work on some monitors.)

To exit SCSI*Select*, press the Esc key until a message prompts you to exit. If you changed any adapter settings, you are prompted to save the changes before you exit. At the prompt, select **Yes** to exit; then press any key to restart your computer. Any changes you made in SCSI*Select* will take effect after your computer restarts.

Configuration utility program

If you choose to configure or view the host adapter settings, you can review settings in the following areas: basic host adapter, boot device, SCSI device, and advanced host adapter. The following sections provide information on each of these setting areas.

Basic host adapter settings

The basic host adapter settings are most likely to require some modification.

Host adapter SCSI ID — This option sets the host adapter SCSI ID. The initial value of 7 gives the host adapter the highest priority on the SCSI bus. Do not change this setting.

SCSI parity checking — This option determines whether the host adapter verifies the accuracy of data transfer on the SCSI bus. The initial setting is *Enabled*.

- Leave it *Enabled*. Most SCSI devices support SCSI parity.
- *Disable* this option if any device connected to the host adapter does not support SCSI parity. If you are not sure whether a device supports SCSI parity, see the documentation that comes with the device.

Host adapter SCSI termination — This option sets termination on the host adapter. The initial setting is *Automatic*. This setting is appropriate for most

situations. If you want to manually set the termination setting, refer to following table for the appropriate settings for the low and high by the settings of the 16-bit, Wide SCSI bus. (The low byte controls 8-bit SCSI; the low and high bytes together control 16-bit, Wide SCSI.)

Low	High	Devices Are Attached to
On	On	68-pin internal connector only
On	On	68-pin external connector only
On	On	50-pin internal connector only
Off	Off	68-pin internal and 68-pin external connectors
Off	On	50-pin and 68-pin internal connectors
Off	On	50-pin internal and 68-pin external connectors
N/A[1]	N/A[1]	50-pin and 68-pin internal connectors, and 68-pin external connector

Boot device settings

These settings allow you to specify the startup device.

Boot target ID — This option specifies the SCSI ID of the device from which to start up. The initial setting is SCSI ID *0*. The SCSI ID selected must correspond to the SCSI ID configured on the startup device.

Boot LUN number — If your startup device has multiple LUNs (Logical Unit Numbers) and **multiple LUN support** is *Enabled*, this option allows you to specify which LUN to start up from on your startup device. The initial setting is LUN *0*. (You can set the **multiple LUN support** in the "Advanced host adapter settings" on page 3-5.)

SCSI device settings

The SCSI device settings allow you to configure certain parameters for each device on the SCSI bus. To configure a specific device, use the SCSI ID assigned to that device. If you are not sure of the SCSI ID, see "SCSI disk utilities" on page 3-7.

Initiate sync negotiation — Synchronous negotiation is a SCSI feature that allows the host adapter and its attached SCSI devices to transfer data in synchronous mode. Synchronous data transfer mode is faster than asynchronous data transfer. This option determines whether the host adapter initiates synchronous negotiation between the device and host adapter. The initial setting is *Yes* (Enabled).

[1] This is an invalid combination because the adapter only supports two connectors concurrently.

– Normally leave this option enabled (*Yes*); most SCSI devices support synchronous negotiation and because it allows for faster data transfer.
– Some older SCSI-1 devices do not support synchronous negotiation. This might cause your computer to operate erratically or hang if this option is set to *Yes*. Set this option to *No* (Disabled) for these devices.

The host adapter always responds to synchronous negotiation if the SCSI device initiates it. If neither the host adapter nor the SCSI device initiate synchronous negotiation, data is transferred asynchronously.

Initiate Wide negotiation — This option determines whether the host adapter initiates 16-bit data transfer (Wide negotiation) instead of 8-bit data transfer. The effective transfer rate is doubled when 16-bit data transfer is used because the data path is twice the size of normal 8-bit SCSI. For example, a transfer rate of 20 MB[2]/sec becomes 40 MB/sec. The initial setting is *Yes* (Enabled).

– When this option is set to *Yes*, the host adapter attempts 16-bit transfer.
– Some 8-bit SCSI devices might have trouble handling Wide negotiation; this might result in erratic behavior or a hang condition. For these devices, set this option to *No*.
– When this options is set to *No*, 8-bit data transfer is used unless the SCSI device itself requests Wide negotiation.

Maximum sync transfer rate — This option sets the maximum synchronous data transfer rate that the host adapter supports. The initial setting is 20 MB/sec. This setting supports an effective rate up to the UltraSCSI maximum of 40 MB/sec with 16-bit, Wide transfers.

– If your device is a Wide UltraSCSI device, you can use a maximum rate of 40 MB/sec.
– If your device is not Wide UltraSCSI device, select a lower transfer rate that is compatible with your device.
– If this option is set to *No*, the maximum synchronous transfer rate is the maximum rate that the host adapter accepts from the device during negotiation. (This is standard SCSI protocol.)

Enable disconnection — This option determines whether the host adapter allows a SCSI device to disconnect from the SCSI bus (sometimes called disconnect/reconnect). Enabling disconnect allows the host adapter to perform other operations on the SCSI bus while the SCSI device is temporarily disconnected. The initial setting is *Yes* (Enabled).

– If two or more SCSI devices are connected to the host adapter, leave this option set to *Yes*. This optimizes SCSI bus performance.
– If only one SCSI device is connected to the host adapter, set this option to *No* to achieve slightly better performance.

Send Start Unit Command — This option determines whether the Start Unit Command is sent to the SCSI device at start up (most devices do not require

[2] MB equals approximately 1 000 000 bytes.

this). The initial setting is *Yes* (Enabled) for all SCSI IDs except 7. This option is only valid if the **host adapter BIOS** is *Enabled*.

- Setting this option to *Yes* reduces the load on your computer power supply by allowing the host adapter to start up SCSI devices one at a time when you start up your computer. With this option set to *Yes* for many devices, the start up time will vary depending how long it takes each drive to start.
- When this option is set to *No*, the devices are allowed to start up at the same time. Most devices require you to set a jumper before they can respond to this command.

Advanced host adapter settings

Do not change the advanced host adapter settings unless absolutely necessary.

Plug and play SCAM support — This option determines whether the host adapter automatically assigns SCSI IDs to attached SCSI devices that support the SCAM protocol. The initial setting is *Disabled*.

- Most non-SCAM devices coexist with the SCAM protocol, so you can *Enable* this option even for non-SCAM devices.
- In rare cases, an old SCSI-1 device might not coexist with SCAM and might cause the computer to hang or operate erratically. If this happens, *Disable* this option.

Host adapter BIOS — This option enables or disables the host adapter BIOS. The initial setting is *Enabled*.

If you are starting up your computer from a SCSI disk drive connected to the host adapter, the BIOS must be *Enabled*. Do not disable the host adapter BIOS if the devices on the SCSI bus (for example, CD-ROM drives) are all controlled by the device drivers and do not need the BIOS.

Support removable disks under BIOS as fixed disks — This option allows you to control which removable-media drives are supported by the host adapter BIOS. The initial setting is *Boot Only*. The *Boot Only* setting is only valid if the **host adapter BIOS** is *Enabled*. The choices are:

- *Boot Only*: Only the removable-media drive designated as the startup device is treated as a hard disk.
- *All Disks*: All removable-media drives supported by the BIOS are treated as hard disks.
- *Disabled*: No removable-media drives are treated as hard disk drives. In this situation, device drivers are needed because the drives are not controlled by the BIOS.

Attention: If the host adapter BIOS controls a removable-media SCSI device, do not remove the media while the drive is on or you might lose data! If you want to be able to remove media while the device is on, install your removable-media device driver and set this option to *Disabled*.

Extended BIOS translation for DOS drives > 1 GB — This option determines whether extended translation scheme is available for SCSI hard disks with

capacities greater than 1 GB[3]. The standard translation scheme for SCSI host adapters provides a maximum accessible capability of 1 GB. The initial setting is *Enabled*.

- This option is valid only if the **host adapter BIOS** is *Enabled*.
- Do not *Enable* this option with NetWare, OS/2, Windows NT, or UNIX. This option is only used with DOS 5.0 or later.

Attention: If you decide to change the translation scheme; back up your disk drives first. All data is erased when you change from one translation scheme to another.

- When set to *Enabled*, the adapter supports disk drives up to 8 GB under DOS with a maximum partition size of 2 GB.
- When you partition a disk larger than 1 GB, use the DOS FDISK utility program as you normally would. Because the cylinder size increases to 8 MB under extended translation, the partition size you choose must be a multiple of 8 MB[4]. If you request a size that is not a multiple of 8 MB, FDISK rounds up to the nearest whole number of 8 MB.

Display <Ctrl−A> message during BIOS initialization — This option determines whether the

```
Press <Ctrl> <A> for SCSISelect (TM) Utility!
```

message appears on your screen during system start up. The initial setting is *Enabled*. This option is valid only if the **host adapter BIOS** is *Enabled*. If this setting is *Disabled*, you can still invoke the SCSI*Select* by pressing **Ctrl+A** after the host adapter BIOS banner appears.

Multiple Logical Unit (LUN) support — This option determines whether starting up from a SCSI device that has multiple LUNs is supported. The initial setting is *Disabled*. Enable this option if your startup device has multiple LUNs. This option is valid only if the **host adapter BIOS** is *Enabled*.

BIOS support for more than 2 drives — This option determines whether the host adapter BIOS provides support for two to eight hard disk drives. This feature is supported by DOS 5.0 and later. The initial setting is *Enabled*. This option is valid only if the **host adapter BIOS** is *Enabled*. For example with this setting *Enabled*, DOS can support two IDE drives on the IDE adapter, and up to six SCSI drives (supported by the BIOS) on the SCSI host adapter.

BIOS support for bootable CD-ROM — This option determines whether the host adapter BIOS provides support for starting up from a CD-ROM drive. The initial setting is *Disabled*. This option is valid only if the **host adapter BIOS** is *Enabled*.

BIOS support for int 13 extensions — This option determines whether the host adapter BIOS supports disks with more then 1024 cylinders. The initial setting is *Disabled*. This option is valid only if the **host adapter BIOS** is *Enabled*.

---

[3] GB equals approximately 1 000 000 000 bytes.

[4] MB equals approximately 1 000 000 bytes.

BIOS support for UltraSCSI speed — This option determines whether the host adapter supports the Fast transfer rates (13.4, 16, 20.0) of UltraSCSI devices. The initial setting is *Enabled*.

SCSI disk utilities

Once you select the SCSI disk utilities program, the program immediately scans the SCSI bus, then displays a list of all SCSI IDs and the devices assigned to each ID. When you select a specific ID and device, a small menu appears, displaying the options to format and verify the disk media.

Format Disk — This program allows you to perform a low-level format on a hard disk drive. Most SCSI disk devices are preformatted at the factory and do not need to be formatted again. This disk utility program is compatible with the vast majority of SCSI disk drives.

Attention: A low-level format destroys all data on the hard disk. Back up your data on this disk before performing this operation. You cannot abort a low-level format once it is started.

Verify Disk Media — This program scans the hard disk for defects. If the program finds bad blocks on the disk, it prompts you to reassign them; if you select *Yes* to reassign them, these blocks are no longer used. You can press the Esc key at any time to cancel the program.

Appendix C. Configuring multiple host adapters

Multiple PCI Wide Ultra2 SCSI Adapter can be installed in your computer; you are limited only by the number of available PCI bus slots (installation and setup is the same as a single host adapter). Each host adapter you install forms a separate SCSI bus with a different set of SCSI devices.

In computers with multiple host adapters, consider the following:

If you are starting up from the SCSI host adapter, you might have to install the startup host adapter in the lowest numbered PCI bus slot. (Most IBM and Intel based PCI computers do not have this requirement.) Refer to your computer documentation to determine the PCI bus slot number.

If you have two host adapters and each has a startup device connected, the computer starts up from the host adapter in the lowest numbered PCI bus slot. If you want to select a specific host adapter to start up from, enable the BIOS only on that host adapter.

If you are starting up from the SCSI host adapter and you also have an ISA/EISA-based host adapter installed, you must disable the BIOS on the ISA/EISA-based host adapter.

If you are starting up from an ISA/EISA-based host adapter and you have a PCI Wide Ultra2 SCSI Adapter installed with a startup device connected, the ISA/EISA-based host adapter will start up before the SCSI host adapter.

When running the SCSI*Select*, if the program finds multiple PCI Wide Ultra2 SCSI Adapters in your computer, it displays the PCI bus number and PCI device number of each host adapter. To determine which of the host adapters SCSI*Select* is configuring, view the red LEDs on the host adapters as you move the highlight bar to different host adapters with the ↑ and ↓ keys. (The computer cover must be removed to view the LEDs.)

Appendix D. Problem solving

You might be able to solve the problem yourself. The host adapter has been tested for compatibility with a wide range of SCSI devices. Most problems that occur during installation result from errors in preparing and connecting devices on the SCSI bus. If you have problems when using the host adapter, check these items first:

Are all SCSI devices turned on?

Are the power cables and SCSI interface cables properly connected?

Is the host adapter firmly seated and secured in a 5-volt, PCI bus slot that is capable of bus-mastering?

Is pin-1 orientation maintained throughout the SCSI bus? (See “Step 7. Connecting internal devices” on page 2-7.)

Is each SCSI device, including the host adapter, set to a unique SCSI ID, 0 to 15? (See “Step 1. Assigning SCSI IDs” on page 2-2.)

Are all the devices on the SCSI bus terminated properly? (See “Step 5. Terminating the SCSI bus” on page 2-5.)

Are the PCI bus and slot parameters set correctly in your computer's setup configuration program? The PCI bus is designed to assign IRQ, port address, and BIOS address settings automatically to the host adapter. You might need to assign some of these values manually in the setup program. (See “Step 11. Configuring the computer” on page 2-9.)

If your problem is still not resolved, continue with the next section.

Other Problems and Solutions

If you are starting up from a SCSI hard disk drive, make sure the *Drives* setting (in your computer configuration setup program) that corresponds to the drive is set to **None** or **No Drives Installed**. (See your computer documentation for more information.)

If both the SCSI and non-SCSI (for example, IDE) disk drives are installed, then the non-SCSI disk drive is always the startup device.

If you changed any values on a host adapter, in a computer setup program, or on a SCSI device, did you turn power off and on to ensure the new values are loaded?

If you tried to use the Format/Verify utility program on a disk device and got an Unexpected SCSI Command Failure pop-up box with a lot of error information, the utility program encountered a problem with the disk device or the media and therefore cannot run.

You can probably determine from the Sense Key information (for example, 06h - Unit Attention) both the cause of the problem and its solution. Here are some of the more common Sense Key values and their meanings:

02h - Not ready:
The media is not ready to format. Be sure that media is inserted in the drive and that the media is spin up.

03h - Medium error:
The disk media might be defective. If it is a removable-media drive, try using a different disk media. If it is a hard disk drive, the disk might be physically damaged. Verify and format the media with the SCSI*Select*.

04h - Hardware error:
The disk drive might be defective. Consult the hardware documentation and contact the manufacturer.

05h - Illegal request:
The SCSI*Select* formatting utility program does not support a low-level format of this device; however, the device might already be low-level formatted by the manufacturer. (This error rarely occurs.)

06h - Unit attention:
The removable media might be write-protected. Disable write protection and run the utility program again.

The Additional Sense Code field provides more information about the error. The meaning of these codes might be listed in your hardware manual.

BIOS Startup Messages

After you have installed your host adapter, the host adapter BIOS displays a message when you start up your computer. Normally, this message lists the SCSI ID, manufacturer, model number, and other information for each SCSI device that the BIOS detects.

If the **Host Adapter BIOS** is *Enabled*, but it fails to initialize, the system displays a specific error message followed by a BIOS Installation Failure message. Here are some of these error messages and their meaning:

Device Connected, but not ready..
The host adapter received no answer when it requested data from an installed SCSI device. Try setting the Send Start Unit Command to **Yes** for the host adapter. (See "SCSI device settings" on page 3-3 for more information.)

If the message still appears, follow the drive manufacturer instructions to make sure the drive is set to spin up when the power is switched on.

Start unit request failed.
The BIOS was unable to send a Start Unit Command to the device. Run the SCSI*Select* and disable **Send Start Unit Command** for the device.

Time-out failure during ...
An unexpected timeout occurred. Check the SCSI bus termination. Try disconnecting the SCSI device cables from the host adapter and then starting up the computer. If the computer successfully restarts, check SCSI bus termination and cable connections. One of the devices on the SCSI bus might be defective.

Appendix E. Help and service

This section contains information on how to obtain online and telephone technical support.

Online technical support

Online technical support is available during the life of your product. Online assistance can be obtained through the Personal Computing Support Web site, the PSG Electronic Bulletin Board System, and the IBM Automated Fax System.

Online technical support	
IBM Personal Computing Support Web Site	http://www.ibm.com/pc/support
IBM PSG BBS	1-919-517-0001
IBM Automated Fax System	1-800-426-3395 1-800-465-3299 (in Canada)

During the warranty period, assistance for replacement or exchange of defective components is available. In addition, if your IBM option is installed in an IBM computer, you might be entitled to service at your location. Your technical support representative can help you determine the best alternative.

Telephone technical support

Marketing, installation, and configuration support through the HelpCenter will be withdrawn or made available for a fee, at IBM's discretion, 90 days after the option has been withdrawn from marketing. Additional support offerings, including step-by-step installation assistance, are available for a nominal fee.

To assist the technical support representative, have available as much of the following information as possible:

1. Option name
2. Option number
3. Proof of purchase
4. Computer manufacturer, model, serial number (if IBM), and manual
5. Exact wording of the error message (if any)
6. Description of the problem
7. Hardware and software configuration information for your system

If possible, be at your computer. Your technical support representative might want to walk you through the problem during the call.

For the support telephone number and support hours by country, refer to the following table or to the enclosed technical support insert. If the number is not provided, contact your IBM reseller or IBM marketing representative. Response time may vary depending on the number and nature of the calls received.

Support 24 hours a day, 7 days a week	
Canada	1-800-565-3344
U.S.A./Puerto Rico	1-800-772-2227

Appendix F. Product warranty

The following warranty information applies to products purchased in the United States, Canada, and Puerto Rico. For warranty terms and conditions for products purchased in other countries, see the enclosed Warranty insert, or contact your IBM reseller or IBM marketing representative.

International Business Machines Corporation Armonk, New York, 10504

Statement of Limited Warranty

The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you originally purchase for your use, and not for resale, from IBM or your reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. If you have any questions, contact IBM or your reseller.

Machine: PCI Wide Ultra2 SCSI Adapter

Warranty Period*: Three Years

**Contact your place of purchase for warranty service information.*

Production Status

Each Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's warranty terms apply.

The IBM Warranty for Machines

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period IBM or your reseller, if authorized by IBM, will provide warranty service under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

For IBM or your reseller to provide warranty service for a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many of these transactions involve the removal of parts and their return to IBM. You represent that all removed parts are genuine and unaltered. A part that replaces a removed part will assume the warranty service status of the replaced part.

If a Machine does not function as warranted during the warranty period, IBM or your reseller will repair it or replace it with one that is at least functionally equivalent, without charge. The replacement may not be new, but will be in good working order. If IBM or your reseller is unable to repair or replace the Machine, you may return it to your place of purchase and your money will be refunded.

If you transfer a Machine to another user, warranty service is available to that user for the remainder of the warranty period. You should give your proof of purchase and this Statement to that user. However, for Machines which have a life-time warranty, this warranty is not transferable.

Warranty Service

To obtain warranty service for the Machine, you should contact your reseller or call IBM. In the United States, call IBM at **1-800-772-2227**. In Canada, call IBM at **1-800-565-3344**. You may be required to present proof of purchase.

IBM or your reseller will provide certain types of repair and exchange service, either at your location or at IBM's or your reseller's service center, to restore a Machine to good working order.

When a type of service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item. Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service. You also agree to ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange.

You agree to:

1. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
2. where applicable, before service is provided —
   a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
   b. secure all programs, data, and funds contained in a Machine, and
   c. inform IBM or your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Extent of Warranty

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PCI Wide Ultra2 SCSI Adapter

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

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 and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party:

International Business Machines Corporation
New Orchard Road
Armonk, NY 10504
Telephone: 1-919-543-2193

Industry Canada Class B Emission 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 est conform à la norme NMB-003 du Canada.

Deutsche EMV-Direktive (electromagnetische Verträglichkeit)

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG-Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM UK, Greenock.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

European Union - Emission Directive

This product is in conformity with the protection requirements of EU Council Directive 89/366/ECC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

IBM can not 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.

Union Européenne - Directive Conformité électromagnétique

Ce produit est conforme aux exigences de protection de la Directive 89/336/EEC du Conseil de l'UE sur le rapprochement des lois des États membres en matière de compatibilité électromagnétique.

IBM ne peut accepter aucune responsabilité pour le manquement aux exigences de protection résultant d'une modification non recommandée du produit, y compris l'installation de cartes autres que les cartes IBM.

Ce produit a été testé et il satisfait les conditions de l'équipement informatique de Classe B en vertu de CISPR22 / Standard européen EN 55022. Les conditions pour l'équipement de Classe B ont été définies en fonction d'un contexte résidentiel ordinaire afin de fournir une protection raisonnable contre l'interférence d'appareils de communication autorisés.

Unione Europea - Directiva EMC (Conformidad électromagnética)

Este producto satisface los requisitos de protección del Consejo de la UE, Directiva 89/336/CEE en lo que a la legislatura de los Estados Miembros sobre compatibilidad electromagnética se refiere.

IBM no puede aceptar responsabilidad alguna si este producto deja de satisfacer dichos requisitos de protección como resultado de una modificación no recomendada del producto, incluyendo el ajuste de tarjetas de opción que no sean IBM.

Este producto ha sido probado y satisface los límites para Equipos Informáticos Clase B de conformidad con el Estándar CISPR22 y el Estándar Europeo EN 55022. Los límites para los equipos de Clase B se han establecido para entornos residenciales típicos a fin de proporcionar una protección razonable contra las interferencias con dispositivos de comunicación licenciados.

Union Europea - Normativa EMC

Questo prodotto è conforme alle normative di protezione ai sensi della Direttiva del Consiglio dell'Unione Europea 89/336/CEE sull'armonizzazione legislativa degli stati membri in materia di compatibilità elettromagnetica.

IBM non accetta responsabilità alcuna per la mancata conformità alle normative di protezione dovuta a modifiche non consigliate al prodotto, compresa l'installazione di schede e componenti di marca diversa da IBM.

Le prove effettuate sul presente prodotto hanno accertato che esso rientra nei limiti stabiliti per le le apparecchiature di informatica Classe B ai sensi del CISPR 22 / Norma Europea EN 55022. I limiti delle apparecchiature della Classe B sono stati stabiliti al fine di fornire ragionevole protezione da interferenze mediante dispositivi di comunicazione in concessione in ambienti residenziali tipici.

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