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4520/5520

PCI SCSI-2 Adapter

User's Guide

Document No. UG05520-000, REVC

Release Date: May 1, 1996

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Do Not Operate in an Explosive Atmosphere

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

Keep away from Live Circuits

Do not install or replace component with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

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Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed. You should also employ all other safety precautions which you deem necessary for the operation of the equipment in your operating environment.



Warning

This equipment generates, uses, and can radiate electromagnetic energy. It may cause or be susceptible to electromagnetic interference (EMI) if not installed and used in a cabinet with adequate EMI protection.

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Product Name: PMC SCSI

Model Number: 4520

conforms to the following Standards:

Safety:	EN 60950:1988 + A1, A2
EMC:	EN 55022:1988 class A EN 50082-1 Part 1 1992

Supplementary Information:

This product complies with the requirements of the **Low Voltage Directive 73/23/EEC** and the **EMC directive 89/336/EEC**.

Dallas, March 15, 1996



Mike Jobe, Quality Manager

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Model Number: 5520

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EMC: EN 55022:1988 class B
EN 50082-1 Part 1 1992

Supplementary Information:

This product complies with the requirements of the **Low Voltage Directive 73/23/EEC** and the **EMC directive 89/336/EEC**.

Dallas, July 31, 1995



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Preface

Inside This User's Guide

This user's guide describes the 5520 PCI SCSI-2 Adapter, the 4520 PMC SCSI-2 Adapter, the installation of the adapters in a motherboard, and the installation of the PCI software drivers. The terminology and structure of this user's guide is directed to system administrators, or those with equivalent technical experience.

This user's guide is organized as follows:

Chapter 1, *Introduction*, provides general information about the PCI SCSI-2 adapters, product features, and system requirements. Brief overviews for the PCI bus and the SCSI-2 architectures are at the end of the chapter.

Chapter 2, *Hardware Installation*, provides step-by-step instructions for installing the 5520 adapter in PCI bus-based user stations and servers. Installation of the 4520 adapter in motherboards that support a PMC mezzanine architecture is discussed.

Chapter 3, *Software Driver Installation*, provides a guide for configuring the AIX operating system, and step-by-step instructions for installing the PCI SCSI-2 driver under Windows NT operating systems.

Chapter 4, *Troubleshooting*, provides tips and suggestions for when you are having problems with the installation or operation of the adapters.

Appendix A, *Specifications*, provides operating criteria and environmental limits for the adapters.

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The **Glossary** provides a collection of common acronyms and terms used in describing SCSI activity and functions.

Acronyms and Terminology

The following acronyms and terminology are often used in this manual instead of the complete title or name:

AEN ..... Asynchronous Event Notification
CCB ..... Command Control Block
CCS ..... Command Control Set
CDB ..... Command Descriptor Block
CPU ..... Central Processing Unit
DMA ..... Direct Memory Access
ISA ..... Industry Standard Architecture
LU ..... Logical Unit
LUN ..... Logical Unit Number
MIC ..... Media Interface Connector
PCI ..... Peripheral Component Interface
SCB ..... SCSI Control Block
SCSI ..... Small Computer System Interconnect

For extended definitions of the above and other common computer and SCSI terms, please refer to the glossary at the end of this user's guide.

Important Information

Icons draw your attention to especially important information:

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Note

The Note icon indicates important points of interest related to the current subject being discussed in the guide.



Caution

The Caution icon brings to your attention those items or steps that, if not properly followed, could cause problems in your machine's configuration or operating system.



Warning

The Warning icon alerts you to steps or procedures that could be hazardous to your health, cause permanent damage to the equipment, or impose unpredictable results on the surrounding environment.

Conventions

The following conventions are used in this manual. Computer-generated text is shown in a monospace, typewriter-like font. Examples of computer-generated text are: program output (such as the screen display during the software installation procedure), commands, directory names, file names, variables, prompts, and sections of program code.

```
Computer-generated text example
```

Commands to be entered by the user are printed in **`bold Courier`** type. For example:

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```
cd /usr/tmp
```

Pressing the return key (↵ **Return**) at the end of the command line entry is assumed, when not explicitly shown. For example:

```
/bin/su
```

is the same as:

```
/bin/su  ↵ Return
```

Input required by the user, when mixed with program output, is printed in **bold Courier** type. References to UNIX programs and manual page entries follow the standard UNIX conventions.

When a user command, system prompt, or a system response is too long to fit on a single line in this user's guide, it will be shown as

```
Do you want the new kernel moved into
\ vmunix? [y]
```

with a backslash at the beginning of the continued line or with a backslash at the end of the previous line.

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Introduction 1

Adapter Overview

The 5520 adapter is a single-slot, fast and wide SCSI-2 (Small Computer System Interface-2) that provides high throughput connectivity for open systems applications. The 4520 adapter provides the same level of performance for workstations with embedded PMC (PCI Mezzanine Card) slots. Combined with a 32-bit/33-MHz PCI (Peripheral Component Interconnect) interface into local CPU memory, the adapters provide a total wide and fast pathway for data, which is especially important for servers, image processing, high-speed networks, and other high performance peripherals. They are designed to operate within the framework of today's open systems architectures by providing physical and data-link services as defined by the ANSI X3.131 specifications for SCSI-2.

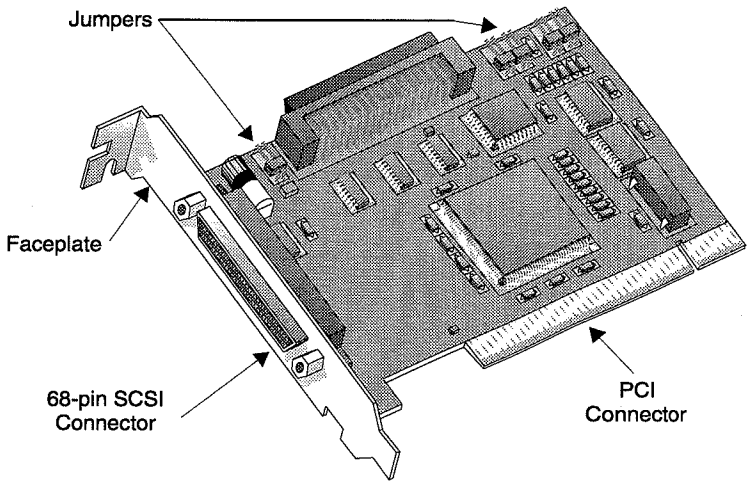


Figure 1-1. 5520 PCI SCSI-2 Adapter

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Product Features

The 4520/5520 adapters are available with the following capabilities:

- Compliant with PCI Local Bus, version 2.1
- 32-bit, zero wait state PCI DMA master
- Up to 132 Mbps burst DMA rate
- 20 Mbps Fast and Wide SCSI-2
- Differential or Single-Ended SCSI-2 interfaces
- Support for up to 30 devices from a single slot
- 64K EPROM for Network Boot or BIOS Firmware

The 4520/5520 adapters are plug-and-play devices with systems that are compliant with the PCI Local Bus Revision 2.1 specification. Systems that are not compliant may require manual configuration via a PCI Device Configuration menu in the BIOS. Refer to your host system's documentation for PCI Device Configuration.

Supported Software Drivers

A Windows NT 3.5x driver is the only driver included with this release. An AIX driver for SCSI-2 devices is included in the AIX operating system.



Note

The 4520 adapter and the 5520 adapter use the same software drivers. Whether the adapter is installed in a PCI slot (5520 adapter) or a PMC mezzanine slot (4520 adapter), the selection of a driver is based on the operating system in use by the host computer, not on the configuration of the system hardware.

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Installation Kit Contents

The 5520 adapter installation kit contains the following:

- 5520 PCI SCSI-2 Adapter card
- *5520 PCI SCSI-2 Adapter User's Guide*
- Read Me First documentation containing important, up-to-date information about the software.
- Appropriate software drivers.



Caution

The 4520/5520 adapters are sensitive to static electricity. Do not touch any components or metal parts without using a grounding strap. To prevent damage from electrostatic discharge, handle the adapter only while wearing a grounding strap.

System Requirements

Minimum system requirements to operate the 4520/5520 adapters are as follows:

- Hardware:
  - Intel x86 and Pentium systems, or Power PC systems running Windows NT 3.5x or better
  - RS6000 systems, or Power PC systems running AIX 4.1
- Bus Architecture: the I/O interface must comply with PCI Local Bus specification Revision 2.0 or better
- 16 MB total system memory.
- A 3.5-inch floppy disk drive.

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PCI Overview

Peripheral Component Interconnect (PCI) was developed by Intel's Architecture Lab, along with leading computer vendors, to overcome the bottlenecks associated with traditional 16-bit expansion slots, operating at 8 MHz, or essentially 5 megabytes per second. The result was a local bus system capable of transferring 32 bits of data at 33 MHz for a maximum data transfer rate of 132 megabytes per second. The PCI Local Bus takes peripherals off the I/O bus and connects them together with the CPU and the memory subsystem. This provides a wider, faster pathway for data, which is especially important for servers, graphic-intensive software, high-speed networks, and other high-performance peripherals.

Features of the PCI Local Bus architecture include:

- Processor-independent bridge between the CPU and high-speed peripherals that serves as a traffic controller between buses.
- 32-bit memory addressing for CPU, Direct Memory Access (DMA) devices, and bus masters.
- 32-bit data transfers at 33 MHz for CPU, DMA, and bus master devices.
- 132 Mbps maximum data transfer rate.
- Data is written and read from the peripherals in linear bursts at every clock cycle.
- Buffers located between the peripherals and the CPU that allow multiple, high-speed peripherals to be attached to the same PCI local bus.
- Automatic translation of bus cycles between PCI and the traditional I/O slots for EISA, ISA, and MicroChannel buses.
- Automatic configuration of system and expansion boards.

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Introduction to SCSI-2

SCSI (Small Computer System Interface) is an I/O bus protocol that provides high performance, peer-to-peer data communications for up to 16 devices, including one or more host computers. The main advantage of using SCSI-2 is that all the initialization information is stored in the SCSI-2 device. The host's operating system can obtain all the pertinent information about the device without referencing external setup files or software drivers.

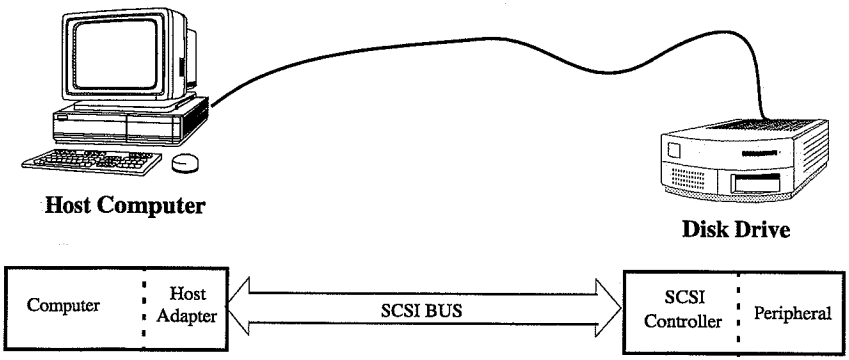


Figure 1-2. Single Initiator, Single Target Systems

In a SCSI-2 system, a computer with a host-adapter serves as the primary initiator for all actions on the SCSI bus. All other devices connected to the bus are SCSI targets. Figure 1-2 illustrates a simple configuration where a host computer is connected to a single target, a disk drive with an embedded SCSI controller. The controller can be a standalone device with multiple peripherals as shown in Figure 1-3:

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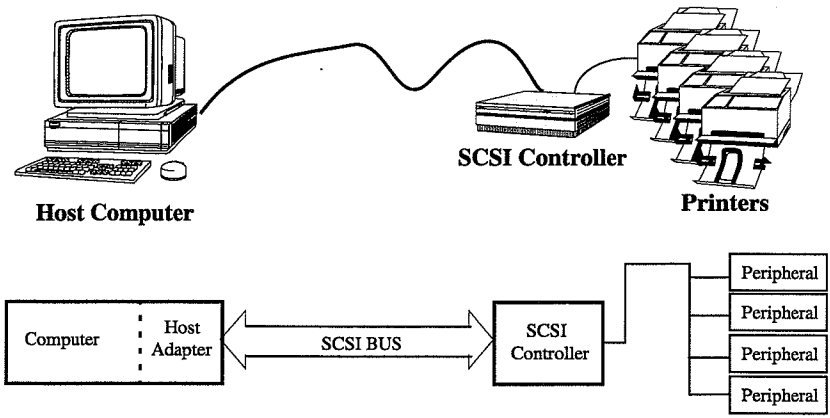


Figure 1-3. Target with Multiple Peripherals

The SCSI-2 architecture allows for multiple devices on the bus where more than one host computer can communicate with more than one target at a time. They can be daisy-chained together in a *narrow* configuration using a 50-conductor, 8-bit cable to connect up to 8 SCSI devices on the bus. A *wide* configuration expands the bus to a 68-conductor, 16-bit bus that can handle up to 16 SCSI devices. They can be intermixed on the same bus.

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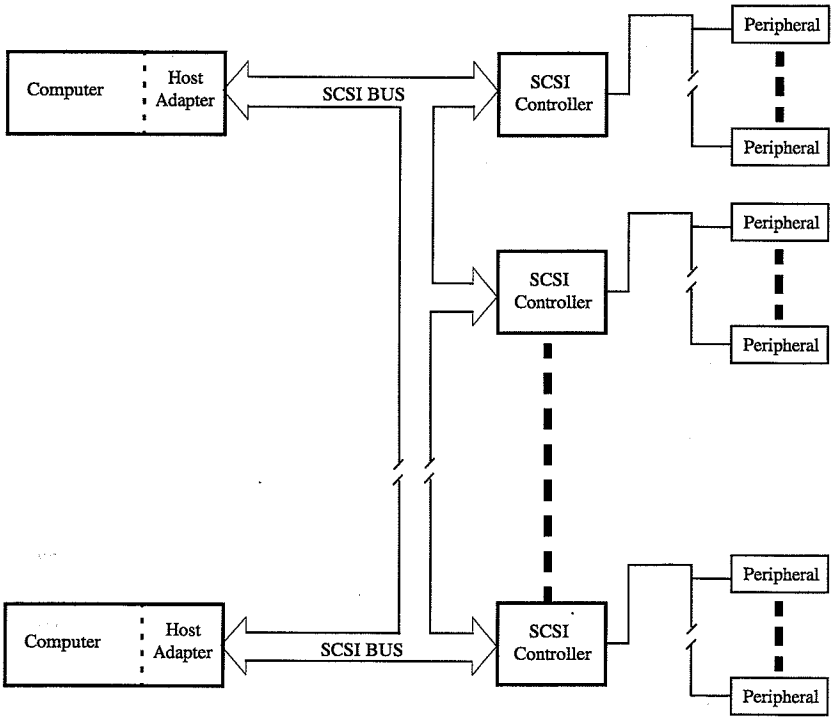


Figure 1-4. Multiple Device Configuration

All SCSI devices are required to operate using asynchronous data transfers. Synchronous transfers are optional, and negotiated between the host and target during power-up.

There are two electrical alternatives, single-ended and differential. They are electronically incompatible and cannot be mixed on the same physical bus. Cable lengths up to 25 meters can be used for differential systems. Single-ended configurations can be up to 6 meters. The overall performance of the two are about the same.

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Shielded and non-shielded cabling can be mixed on the same bus; however, the non-shielded connections should be restricted to internal cabinet applications only. All SCSI devices are configured with a socket connector. The bus cable consists of the mating pin-type connectors.

Both ends of the bus cable must be properly terminated. Interface errors can be reduced if the termination voltage is maintained at the extreme ends of the cable. All SCSI hardware includes a setting (usually with hardware jumpers) that allows the device to serve as a terminator. Where possible, the SCSI devices serving as initiators should supply terminator voltage, usually a hardware jumper on the device's SCSI adapter or controller card.

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Hardware Installation 2

Overview

The 4520/5520 adapters can be installed in any PCI bus-equipped system. The 5520 PCI SCSI-2 Adapter is designed to be installed in PCI expansion slots on the motherboard. The 4520 PMC SCSI-2 Adapter resides in a PMC mezzanine in systems so equipped. This chapter describes the procedure for physically installing the adapters and includes the following:

- Unpacking the adapter board
- Installing the board in a host expansion slot
- Connecting the adapter board to the SCSI-2 bus

Please observe all notes, cautions, and warnings.

For technical specifications on the 4520/5520 adapters, see Appendix A.

Tools Required

The only tools required are a grounding strap and a #1 Phillips head screwdriver.



Note

The 5520 PCI SCSI-2 Adapter is a plug-and-play device with systems that are compliant with the PCI Local Bus Revision 2.1 specification. Systems that are not compliant may require manual

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configuration via a PCI Device Configuration menu in the BIOS. Refer to your host system's documentation for PCI Device Configuration.



Warning

There are two electrical versions of the 4520/5520 adapters, a single-ended version and a differential version. Make sure you have the correct type of adapter to match the bus and peripherals being connected. A mixed installation can cause electrical damage to both the peripherals and the adapter.

Unpacking the Adapter



Caution

The board is packed in an antistatic bag to protect it during shipment. Keep the adapter in the protective antistatic bag until you are ready to install it on the motherboard of the host computer. To prevent damage to the adapter due to electromagnetic discharge, wear a grounding strap and handle the adapter only by the edges. Do not touch the components or any metal parts on the adapter, except for the metal faceplate.

1. Open the shipping container and carefully remove its contents. **Do not open the antistatic bag containing the adapter at this time.**
2. Verify that you have received all items on the packing list, and inspect each item for damage.

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If you find any omissions or damage, contact your supplier and the carrier that delivered the package.

3. Return all packing materials to the shipping container and save.

   If the board must be returned, ship it in its original box (or one providing equivalent protection). Failure to do so could nullify your warranty.

The 4520/5520 adapters reside in different locations in the host system's hardware. The installation instructions for each type of adapter (motherboard and mezzanine) are discussed in separate sections in this chapter. If you are installing a 5520 PCI SCSI-2 Adapter, continue with the following section. The installation instructions for the 4520 PMC SCSI-2 Adapter begin on page 18.

Installing the 5520 PCI SCSI-2 Adapter



Warning

Your computer operates with voltages that can be lethal. Before you remove the computer cover, carefully review the steps in this procedure and observe all cautions and warnings to protect yourself and prevent damage to the system.

To install the 5520 adapter in a host expansion slot, do the following:

1. Turn off the computer's power switch and unplug the unit from its power source. Disconnect all cables that are connected to the main system unit.
2. Use only insulated or nonconductive tools.

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3. Remove the computer's cover according to the manufacturer's instructions and locate a suitable PCI expansion slot.

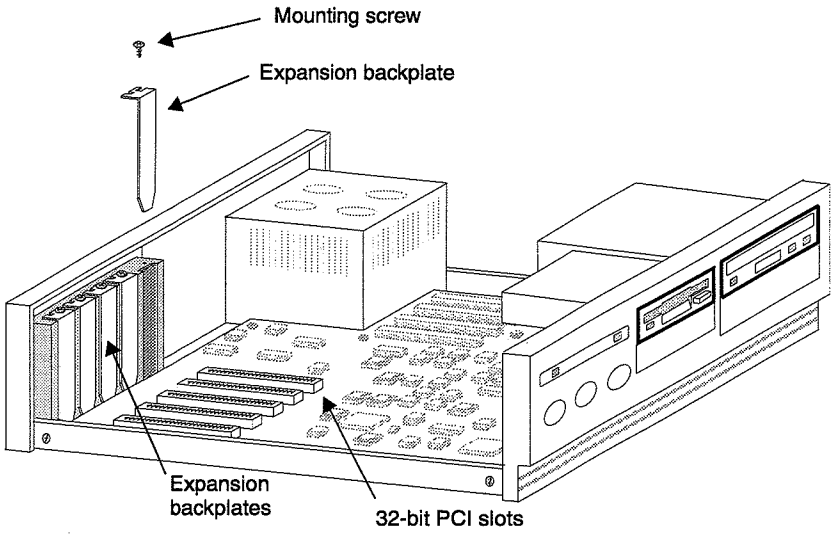


Figure 2-1. Expansion Backplate Removal

4. Remove the selected expansion slot's backplate by removing the mounting screw and lifting out the backplate.

5. Attach a grounding strap to your wrist or ankle, and carefully remove the adapter from its antistatic bag.

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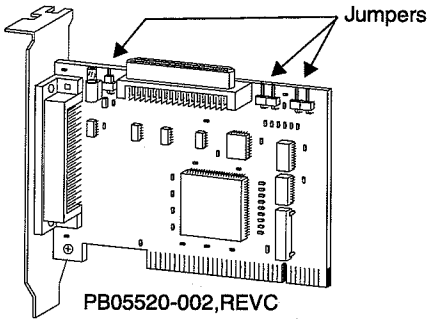


Figure 2-2. 5520 Single-Ended Adapter

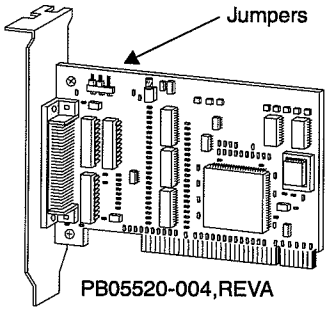


Figure 2-3. 5520 Differential Adapter

6. Set the jumpers on the 5520 adapter as described in Table 2-1 and Table 2-2 for single-ended adapters, and in Table 2-3 for differential adapters.

   Terminators: The SCSI bus (cable) must be properly terminated at each end of the bus. The first and last devices on the bus should be the only devices that are set to provide this function.

   Terminator Power: The SCSI terminators require adequate voltage to properly terminate the cable. All SCSI host adapters on the bus should be set to supply

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terminator power and, where possible, be located at the end of the bus and serve as cable terminators.

Table 2-1. 5520 Jumper Settings (PB05520-002,REVC, Single-Ended)

Jumper Setting	Description
JA1	When jumper is installed, the adapter supplies terminator power to the SCSI bus.
JA2	When jumper is installed, enables active termination for SCSI control and the lower data 7 through 0.
JA3	When jumper is installed, enables active termination for upper SCSI data 15 through 8.
JA4	When jumper is installed, enables an external LED to light up when the SCSI drive is busy.

Table 2-2. 5520 Jumper Settings (PB05520-002,REVA, Single-Ended)

Jumper Setting	Description
JA1	When jumper is installed, the adapter supplies terminator power to the SCSI bus.
JA2	When jumper is installed, enables active termination for upper SCSI data 15 through 8.
JA3	When jumper is installed, enables active termination for SCSI control and the lower data 7 through 0.

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Table 2-3. 5520 Jumper Settings (PB05520-004,REVA, Differential)

Jumper Setting	Description
JA1	When jumper is installed, the adapter supplies terminator power to the SCSI bus.
JA2	When jumper is *not* installed, enables active termination for SCSI control and the lower data 7 through 0.
JA3	When jumper is *not* installed, enables active termination for upper SCSI data 15 through 8.

7. Remove any dust from the 5520 adapter's connector with dry, compressed air.

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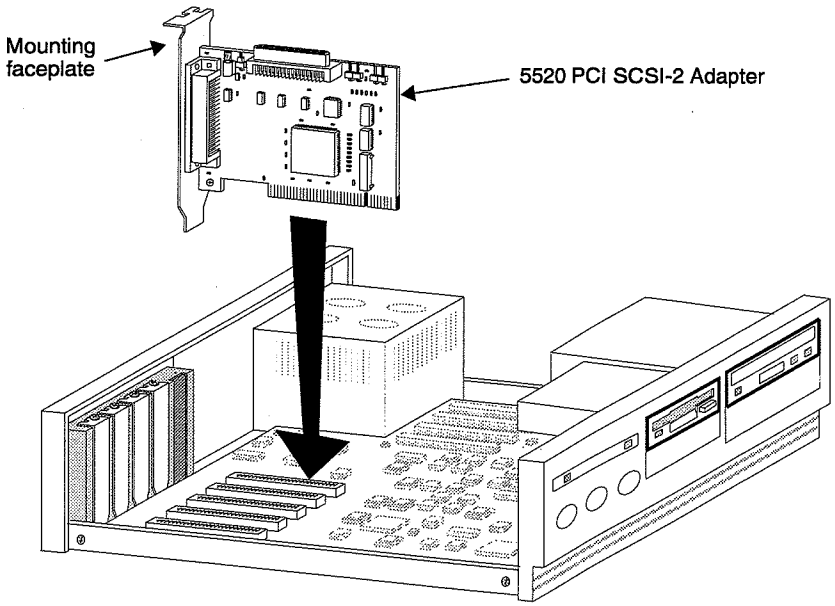


Figure 2-4. Inserting the 5520 Adapter Card

8. Insert the 5520 adapter in the selected slot. Firmly press the board into the slot and secure it in place with the screw from the backplate removed in Step 5.

9. Take note of the slot position. You may need this information when installing the software.

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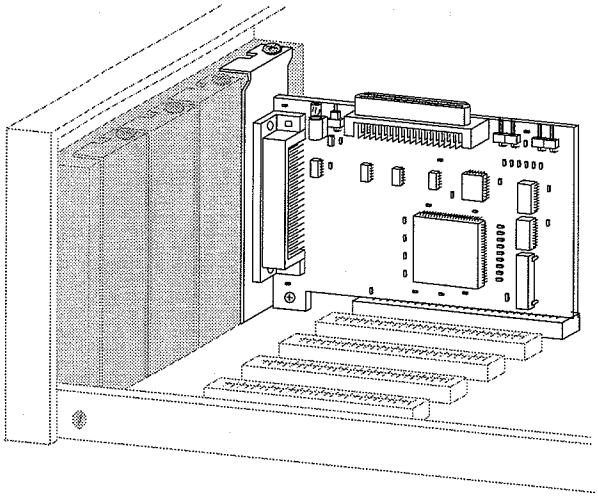


Figure 2-5. Adapter Card Installed in Chassis

10. Replace the system cover and connect the 5520 adapter to the SCSI bus as discussed in *Connecting to the SCSI Bus* on page 25.

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Installing the 4520 PMC SCSI-2 Adapter

The 4520 adapter provides high performance fast and wide SCSI-2 connectivity for systems with embedded PMC slots. The PMC I/O module capitalizes on the speed and interoperability of the PCI bus standard.

Figure 2-8 and Figure 2-9 show the differential and single-ended board layouts for PB04520-001, REVA:

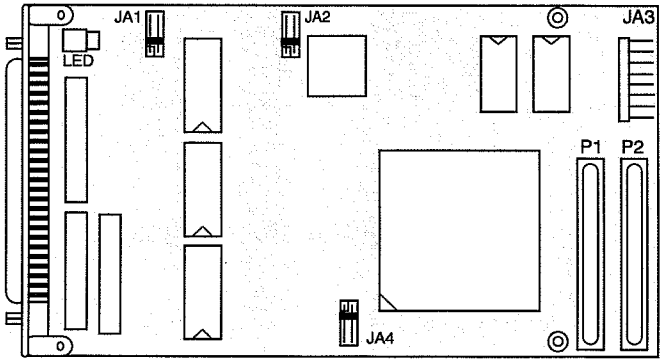


Figure 2-6. 4520 SCSI-2 Differential Adapter

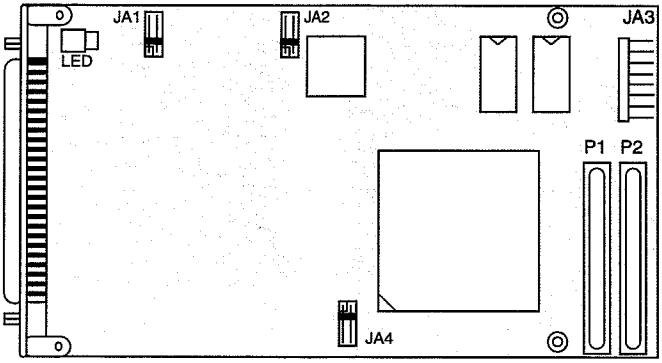


Figure 2-7. 4520 SCSI-2 Single-Ended Adapter

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Figure 2-8 shows the differential and single-ended board layout for PB04520-002,REVA:

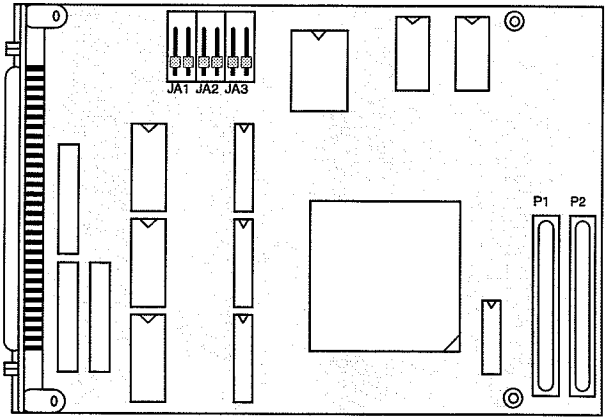


Figure 2-8. 4520 SCSI-2 Single-Ended Adapter

Figure 2-9 shows the differential board layout for PB04520-004,REVA:

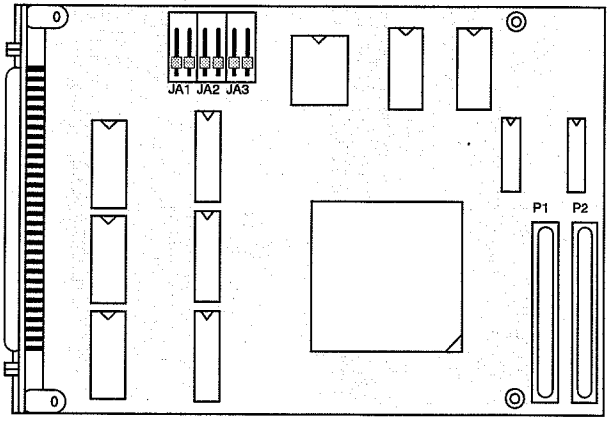


Figure 2-9. 4520 SCSI-2 Differential Adapter

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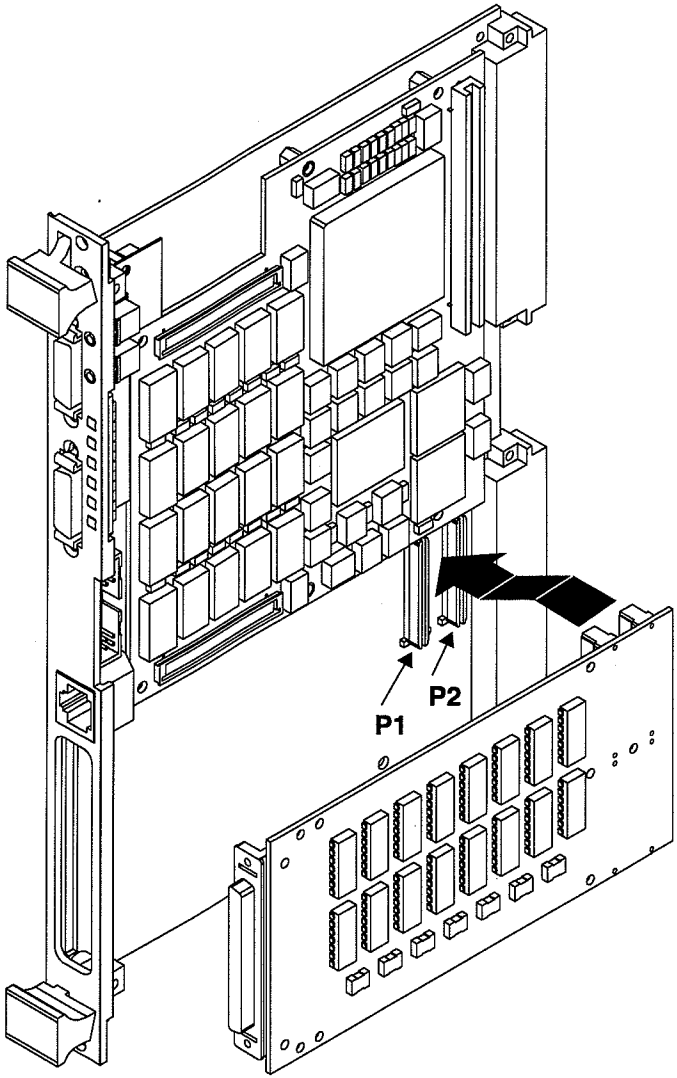


Figure 2-10. Installing a 4520 Adapter

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Warning

Make sure the electrical configuration (single-ended or differential) of the 4520 adapter matches the common termination type of the device(s) that will be connected to the SCSI bus. A mixed installation can cause electrical damage to both the peripherals and the 4520 adapter.

Your computer operates at voltages that can be lethal. Before you remove the computer cover, carefully review the steps in this procedure and observe all cautions and warnings to protect yourself and to prevent damage to the system.

1. With power disconnected and the motherboard's faceplate screws unfastened, remove the motherboard from the system chassis.
2. Remove the spring metal clip covering the mezzanine aperture on the faceplate of the motherboard.
3. With a grounding strap attached to your wrist or ankle, carefully remove the adapter from its antistatic bag.
4. Set the jumpers on the 4520 adapter as described in Table 2-4, Table 2-5, Table 2-6, or Table 2-7.

   Terminators: The SCSI bus (cable) must be properly terminated at each end of the bus. The first and last devices on the bus should be the only devices that are set to provide this function.

   Terminator Power: The SCSI terminators require adequate voltage to properly terminate the cable. All SCSI host adapters on the bus should be set to supply terminator power and, where possible, be located at the end of the bus and serve as cable terminators.

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Table 2-4. 4520 Jumper Settings (PB04520-001,REVA Single-Ended)

Jumper Setting	Description
JA1	When jumper is installed, the adapter supplies terminator power to the SCSI bus.
JA2	When jumper is installed, the bus terminator is enabled.
JA3	No user capabilities.
JA4	When jumper is installed, the Big Endian mode is enabled. The default setting (no jumper) is Little Endian mode.

Table 2-5. 4520 Jumper Settings (PB04520-001,REVA Differential)

Jumper Setting	Description
JA1	When jumper is installed, the adapter supplies terminator power to the SCSI bus.
JA2	When jumper is *not* installed, the bus terminator is enabled.
JA3	No user capabilities.
JA4	When jumper is installed, the Big Endian mode is enabled. The default setting (no jumper) is Little Endian mode.

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Table 2-6. 4520 Jumper Settings (PB04520-002,REVA, Single-Ended)

Jumper Setting	Description
JA1	When jumper is installed, the adapter supplies terminator power to the SCSI bus.
JA2	**For H04520-004:** (Microlinear termination is used in positions u4, u6, and u8 on the PCB) When the jumper is *not* installed, enables active termination of SCSI control and the lower data 7 through 0. **For H04520-006:** (No parts located in PCB positions u4, u6, and u8) When the jumper is installed, enables active termination of SCSI control and the lower data 7 through 0
JA3	**For H04520-004:** (Microlinear termination is used in positions u4, u6, and u8 on the PCB) When jumper is *not* installed, enables active termination for upper SCSI data 15 through 8. **For H04520-006**: (No parts located in PCB positions u4, u6, and u8) When jumper is installed, enables active termination for upper SCSI data 15 through 8.

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Table 2-7. 4520 Jumper Settings (PB04520-004,REVA, Differential)

Jumper Setting	Description
JA1	When jumper is installed, the adapter supplies terminator power to the SCSI bus.
JA2	When jumper is *not* installed, enables active termination for SCSI control and the lower data 7 through 0.
JA3	When jumper is *not* installed, enables active termination for upper SCSI data 15 through 8.

5. Hold the 4520 adapter at an angle and slide the adapter faceplate into the opening in the motherboard. Align connectors P1 and P2 with the motherboard bus connectors and carefully press the adapter into place.

   Figure 2-10 illustrates the installation of a PMC adapter to a typical motherboard.

6. Insert the 4520 adapter through the rear of the faceplate of the motherboard while aligning the dual mating connectors on the motherboard and the 4520 adapter card. Fasten the cards together with screws. A metal standoff post on the motherboard and an alignment hole on the adapter card facilitate alignment.

7. Replace the assembly in the motherboard system chassis slot, and connect the 4520 adapter to the SCSI bus as discussed in the following section.

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Connecting to the SCSI Bus

You are now ready to connect the adapter to the SCSI bus.

Table 2-8. Connector and Cable Requirements

Connectors	68-pin Euro style SCSI	**Shielded:** external or internal cabinet applications
		Non-shielded: internal cabinet applications only
Bus Cable	68-conductor, flat ribbon or discrete	**Single-ended:** • Type: twisted pair only • Shielding: match with connector • Maximum bus length: 6 meters
		Differential: • Type: twisted pair only • Shielding: match with connector • Maximum bus length: 25 meters



Warning

Single-ended and differential SCSI devices are electronically incompatible and cannot be mixed on the same physical bus. Failure to do so can cause permanent damage to both the peripherals and the 5520 adapter.



Caution

Cables of different impedance must not be mixed on the same physical bus.

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1. Attach the appropriate SCSI connector to the adapter as shown in Figure 2-11.
2. Secure the bus connector to the adapter card with lug screws. Do not over tighten.

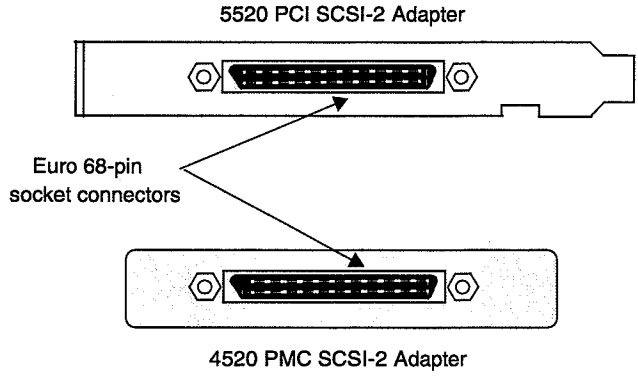


Figure 2-11. SCSI Connector Port

3. Turn on the power to the computer.

The installation of the hardware for the 4520/5520 adapter is complete.

The next step is to install the software driver. See Chapter 3 for these instructions.

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Software Driver Installation 3

The 4520 adapter and the 5520 adapter use the same software drivers. Whether the adapter is installed in a PCI slot (5520 adapter) or a PMC mezzanine slot (4520 adapter), the selection of a driver is based on the operating system in use by the host computer, not on the configuration of the system hardware.

AIX Operating Systems

There is no software to install because the necessary driver software is installed as the driver for the NCR825 family of SCSI adapters during AIX installation. However, the AIX system administrator must now determine the names of the peripheral devices that AIX will assign upon booting up, and configure the devices with the System Management Integration Tool (SMIT).

The administrator could determine the new SCSI disk device names by using the command line:

```
lsdev -Cc disk | grep -i scsi
```

This would indicate all SCSI disks found, not just the new ones. The new devices indicate that they were "defined;" however, they are not "available" until the logical volumes and volume groups are configured and file systems created via SMIT and mounted by a knowledgeable administrator.

Refer to your AIX system administrator's documentation for more information on configuring the driver and peripheral devices.

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Windows NT Operating Systems

The remainder of this chapter describes the procedure for installing the Windows NT software drivers for the 4520/5520 adapters. They can be installed as part of the Custom setup procedure or from within the Windows NT environment. For additional instructions on installing and configuring SCSI adapters with this operating system refer to the *Microsoft Windows NT System Guide*.

Before installing the Windows NT driver, verify that your system meets the following minimum requirements:

- An Intel x86 or Pentium system running Microsoft Windows NT version 3.5 or later, or a Power PC system running Microsoft Windows NT 3.51 or later.
- 16 MB total system memory.
- A 3.5-inch diskette drive.

Installing the Windows NT Driver

To install the Windows NT driver:

1. From the **Main** group, double-click the **Windows NT Setup** icon to display the dialog shown in Figure 3-1:

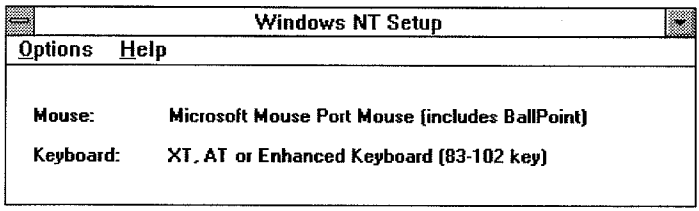


Figure 3-1. Windows NT Setup

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2. From the **Options** pull-down, select **Add/Remove SCSI Adapters**.

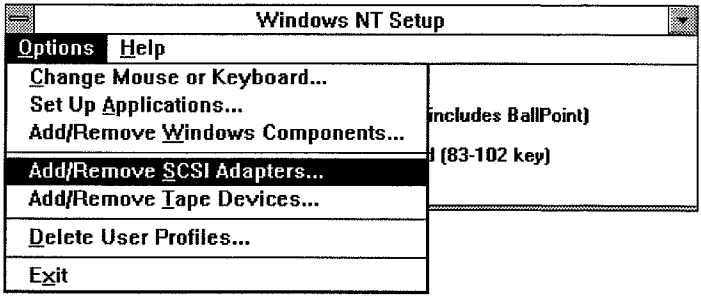


Figure 3-2. Windows NT Setup Options Menu

The SCSI Adapter Setup dialog appears:

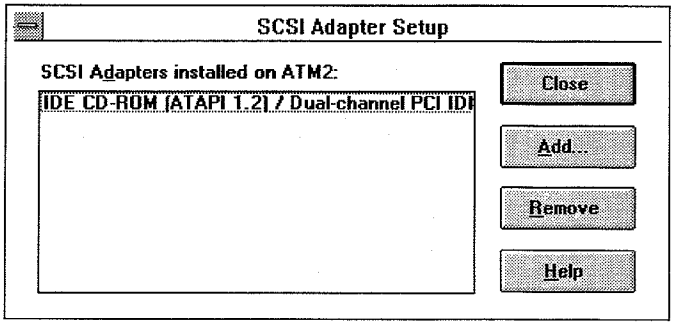


Figure 3-3. SCSI Adapter Setup

3. Click **Add**. The message in Figure 3-4 appears, advising you that there could be a startup problem after installing a SCSI adapter driver:

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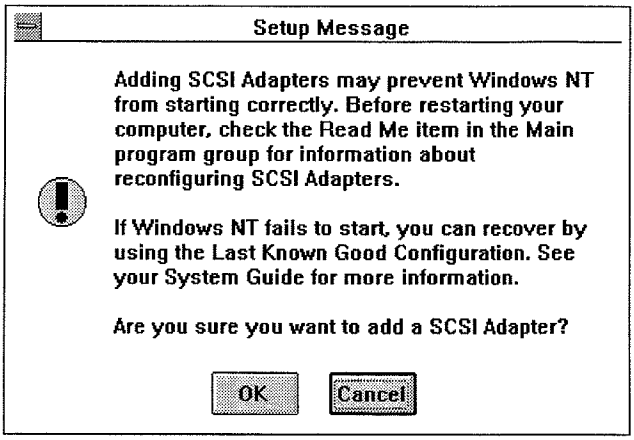


Figure 3-4. Setup Message

4. Click **OK** when you are ready to continue.

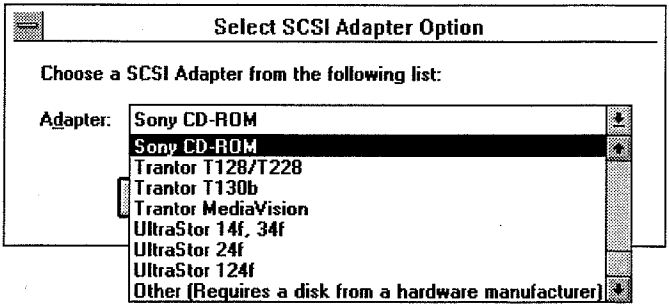


Figure 3-5. Select SCSI Adapter Option

5. Select **Other (Requires a disk from a hardware manufacturer)**.

   The dialog in Figure 3-4 appears:

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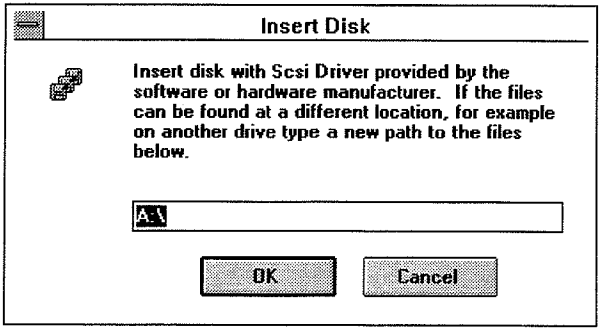


Figure 3-6. Insert SCSI Software Driver Disk

6. If need be, change the directory location of the floppy drive as directed in the dialog.

7. Insert the Interphase diskette labeled

Interphase 4520/5520
SCSI PCI x86 driver
Installation Diskette for Windows
NT Workstation, V3.5

and click **OK**.

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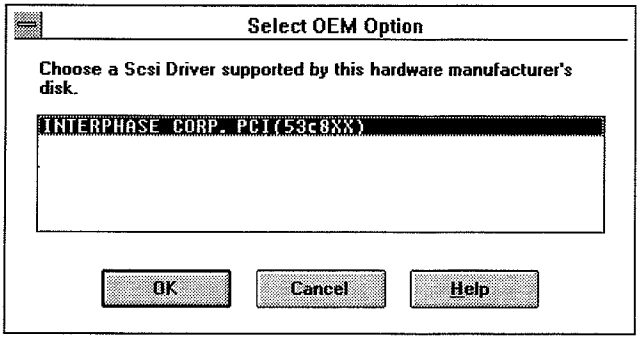


Figure 3-7. Select OEM Option

8. Select **INTERPHASE CORP. PCI (53c8xx)** and click **OK**.

   The Windows NT operating system loads the driver to the local hard disk.

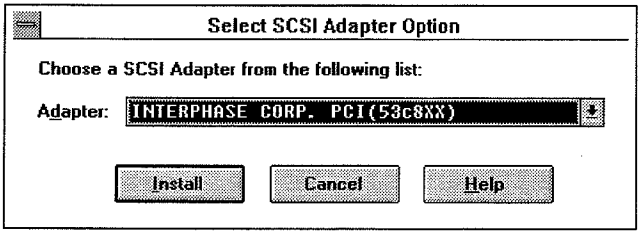


Figure 3-8. Select SCSI Adapter Option

9. Click **Install**.

   When the installation is complete, the following dialog appears, showing that the software driver for the 4520/5520 adapters has been installed:

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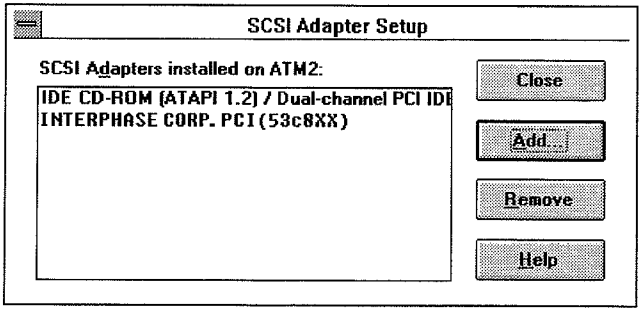


Figure 3-9. Installed Adapter Listing

10. Click **Close** to exit the installation.

The driver does not take effect until the computer is restarted. The following dialog comes to view to remind you of this.

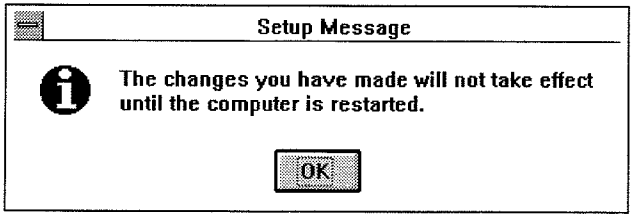


Figure 3-10. Restart Message

11. When you are ready to proceed, click **OK** and restart your computer.

The installation of the software driver is now compete.

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Note

See your NT Disk Administrator for proper formatting and partitioning of your SCSI disks.

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Troubleshooting 4

Overview

This chapter provides possible solutions for common problems encountered while installing and operating the 4520/5520 adapters. It describes various symptoms and corrective actions for your computer and for the card. If the information in this chapter does not resolve a problem, contact Interphase Customer Service.

Startup

Table 4-1. Startup Problems

Problem	Possible Solution
Computer will not start or come ON	1. Verify that the power-on LED on the computer is illuminated. 2. Verify that the computer's power cord is intact and is plugged in to a working AC power outlet. 3. Check the power source by plugging a known good appliance or unit into the outlet. If the system does not operate when plugged into the outlet, plug the original unit's power cord into a different power source. If the computer still does not operate when plugged into a known working power source, troubleshoot the computer or install the adapter card in a different unit.

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Bootup

Table 4-2. Bootup Problems

Problem	Possible Solution
Computer does not boot up	1. Check to see if the system is plugged in. 2. Check to see if your monitor is plugged into your video adapter. 3. Check to see if the adapter is properly seated in the PCI bus expansion slot. 4. Try a different PCI slot. 5. Remove the adapter and see if the system boots up and returns to a normal state of operation. 6. Try a known good adapter card in your system. If the new board also fails, check the Read Me item in the Main program group for information about reconfiguring SCSI adapters.
Windows NT does not boot	1. Check your setup. Delete the **`INPH8XX.sys`** file in the NT `system32/driver` directory. If you are running the FAT file system, boot the system from a bootable DOS floppy, then delete the above file. Reinstall the software driver for the 4520/5520 adapters as explained in Chapter 3, *Software Driver Installation*. 3. If NT still will not boot, check the Read Me item in the Main program group for information about reconfiguring SCSI adapters. You can recover by using the Last Known Good Configuration. See the *Windows NT System Guide* for more information.

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Applications

Table 4-3. Applications Problems

Problem	Possible Solution
A Windows NT application no longer works	If the application program worked prior to the installation of the adapter, there is probably a hardware conflict. It is possible that some programs which access the hardware can cause a conflict at some point. This typically happens with hardware such as printers and modems. If you suspect a hardware conflict, check the PCI configuration that came with your system to resolve the conflict.

4520/5520 Adapters

Table 4-4. 4520/5520 Adapters Problems

Problem	Possible Solution
Host adapter not found	The PCI system in your computer is supposed to automatically configure the bus address locations. An address conflict is probably not the problem. If the driver is correctly installed, a driver message should appear on the screen during bootup of your computer. 1. Make sure the adapter card is seated correctly in the bus expansion slot. 2. Check for correct configurations of the SCSI bus cable. A broken wire or inverted wiring can cause SCSI reset problems.

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User Notes

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Specifications

A

Hardware

Table A-1. 4520/5520 Adapters Specifications

Item	Specification
Host Bus Interface	PCI Local Bus Revision 2.0 or later
SCSI Interface	Fast and Wide SCSI-2
SCSI Standard	ANSI X3.131-1994 SCSI-2
IEEE Compliance	IEEE P1386 adapter card specification
SCSI ID	Software settable (factory default set @ 7)
SCSI-2 Data Handling	Synchronous: Fast and Wide SCSI (20 megabytes/sec) Fast SCSI (10 megabytes/sec) Asynchronous: Fast SCSI (10 megabytes/sec)
Host Data Transfer	32-bit bus master DMA transfers to 132 Mbps
Transfer Counter	24-bit
RAM	128 Kilobytes of static RAM 1 Kilobyte of NOVRAM
FIFO	64-byte DMA FIFO
Arbitration	16-bit arbitration
Electrical Drivers	Single-ended or differential
Bus Connector	68-socket, Euro style SCSI
Operating Power	5 volts @ 1 ampere (maximum)

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Software

Table A-2. Software Specifications

Item	Specification
5520 adapter driver	**Intel x86 and Pentium processors:** Microsoft Windows NT, version 3.5 or later **Power PC:** Microsoft Windows NT, version 3.51 or later

Environment

Table A-3. Environmental Specifications

Item	Mode	Minimum	Maximum
Temperature	Operate	0° C (32° F)	55° C (131° F)
	Storage	-20° C (-4° F)	70° C (158° F)
Relative Humidity (non-condensing)	Operate	10%	90%
	Storage	5%	95%
Altitude	Operate	Sea level	15,000 feet
	Storage	Sea level	50,000 feet

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Connectors and Cables

Table A-4. Connector and Cable Requirements

Item	Requirement
Connectors	68-pin Euro style SCSI: Shielded: external or internal cabinet applications Non-shielded: internal cabinet applications only
Bus Cable	68-conductor, flat ribbon or discrete wires: Single-ended applications: Type: twisted pair only Shielding: match with connector Maximum bus length: 6 meters Differential applications: Type: twisted pair only Shielding: match with connector Maximum bus length: 25 meters

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SCSI "P" Cable Contact Assignments

Table A-5. Single-Ended Contact Assignments

Signal name	Connector contact number	Cable conductor number		Connector contact number	Signal name
Ground	1	1	2	35	-DB(12)
Ground	2	3	4	36	-DB(13)
Ground	3	5	6	37	-DB(14)
Ground	4	7	8	38	-DB(15)
Ground	5	9	10	39	-DB(P1)
Ground	6	11	12	40	-DB(0)
Ground	7	13	14	41	-DB(1)
Ground	8	15	16	42	-DB(2)
Ground	9	17	18	43	-DB(3)
Ground	10	19	20	44	-DB(4)
Ground	11	21	22	45	-DB(5)
Ground	12	23	24	46	-DB(6)
Ground	13	25	26	47	-DB(7)
Ground	14	27	28	48	-DB(P)
Ground	15	29	30	49	Ground
Ground	16	31	32	50	Ground
TERMPWR	17	33	34	51	TERMPWR
TERMPWR	18	35	36	52	TERMPWR
Reserved	19	37	38	53	Reserved
Ground	20	39	40	54	Ground
Ground	21	41	42	55	-ATN
Ground	22	43	44	56	Ground
Ground	23	45	46	57	-BSY
Ground	24	47	48	58	-ACK
Ground	25	49	50	59	-RST
Ground	26	51	52	60	-MSG
Ground	27	53	54	61	-SEL
Ground	28	55	56	62	-C/D
Ground	29	57	58	63	-REQ
Ground	30	59	60	64	-I/O
Ground	31	61	62	65	-DB(8)
Ground	32	63	64	66	-DB(9)
Ground	33	65	66	67	-DB(10)
Ground	34	67	68	68	-DB(11)

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Table A-6. Differential Contact Assignments

Signal name	Connector contact number	Cable conductor number		Connector contact number	Signal name
+DB(12)	1	1	2	35	-DB(12)
+DB(13)	2	3	4	36	-DB(13)
+DB(14)	3	5	6	37	-DB(14)
+DB(15)	4	7	8	38	-DB(15)
+DB(P1)	5	9	10	39	-DB(P1)
Ground	6	11	12	40	Ground
+DB(0)	7	13	14	41	-DB(0)
+DB(1)	8	15	16	42	-DB(1)
+DB(2)	9	17	18	43	-DB(2)
+DB(3)	10	19	20	44	-DB(3)
+DB(4)	11	21	22	45	-DB(4)
+DB(5)	12	23	24	46	-DB(5)
+DB(6)	13	25	26	47	-DB(6)
+DB(7)	14	27	28	48	-DB(7)
+DB(P)	15	29	30	49	-DB(P)
DIFFSENS	16	31	32	50	Ground
TERMPWR	17	33	34	51	TERMPWR
TERMPWR	18	35	36	52	TERMPWR
Reserved	19	37	38	53	Reserved
+ATN	20	39	40	54	-ATN
Ground	21	41	42	55	Ground
+BSY	22	43	44	56	-BSY
+ACK	23	45	46	57	-ACK
+RST	24	47	48	58	-RST
+MSG	25	49	50	59	-MSG
+SEL	26	51	52	60	-SEL
+C/D	27	53	54	61	-C/D
+REQ	28	55	56	62	-REQ
+I/O	29	57	58	63	-I/O
Ground	30	59	60	64	Ground
+DB(8)	31	61	62	65	-DB(8)
+DB(9)	32	63	64	66	-DB(9)
+DB(10)	33	65	66	67	-DB(10)
+DB(11)	34	67	68	68	-DB(11)

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Glossary

adapter

A device, usually in the form of a user interface card, that physically connects a computer to the SCSI bus. Also referred to as a *host adapter.*

ANSI (American National Standards Institute)

Organization which coordinates, develops, and publishes standards used in the United States.

asynchronous transmission

A data transmission technique where the initiator and the target lock into a transfer of data. Each block of data must be acknowledged before the next block is transmitted.

Attenuation

Signal power lost in a transmission medium as the signal travels from sender to receiver.

Bus Device Reset

A SCSI message to a target that instructs the target to clear all activity.

Byte

An eight-bit unit of data. It is usually the smallest addressable unit in memory.

CBR (Constant Bit Rate)

The transmission of bits at a fixed rate over a network or over a communications bus.

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CCB (Command Control Block)

A block of information prepared by the host computer, for the SCSI adapter, to provide the adapter with parameters needed to execute a SCSI command.

CCITT

International Telephone and Telegraph Consultative Committee. The international standards body for telecommunications.

CCS (Command Control Set)

A standard set of SCSI commands used to communicate with SCSI devices.

CDB (Command Descriptor Block)

A block of communication passed from the SCSI host to the SCSI target that provides all control information the target needs to carry out a command.

CPU (Central Processing Unit)

A personal computer's main microprocessor chip.

decode

The act of recovering the original information from an encoded signal.

differential

Refers to the electrical configuration of the signals used on the SCSI bus. A set of two conductors are used to maintain a positive (+) and a negative (-) polarity. This technique allows SCSI devices to communicate over longer distances with minimum interference.

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disconnect

The function used by a SCSI target to remove itself from the SCSI bus and release the control of the bus to other users.

DMA (Direct Memory Access)

A fast method of moving data between two processor subsystems without processor intervention.

driver

A software program, usually supplied by the device manufacturer, that maps the interface of the device to the operating system of the host computer.

EIA (Electronic Industries Association)

A standards organization specializing in the electrical and functional characteristics of interface equipment.

EISA (Expanded Industry Standard Architecture)

A superset of the 8-bit/16-bit ISA bus architecture. By extending the capabilities of the ISA standard, EISA provides full compatibility with the ISA standard.

encode

The act of changing data into a series of electrical or optical pulses that can travel efficiently over a medium.

ES (End System)

A machine intended for running user application programs and connected to a communications medium. In a SCSI bus system, it is the SCSI device located at each end of the bus, preferably a host computer.

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fast SCSI

A special set of timing commands for SCSI-2 that allow a faster transfer of data than typical SCSI timers do.

host

Generally, a computer or PC that contains a SCSI adapter used to communicate with other devices on the SCSI bus.

host adapter

A device, usually in the form of a user interface card, that physically connects a computer to the SCSI bus. It is generally referred to as an *adapter*.

host name

A unique number (0-15) that identifies each device on the SCSI bus. Also referred to as the SCSI ID.

IEEE (Institute of Electrical and Electronic Engineers)

An information exchange organization. As part of its various functions, it coordinates, develops, and publishes network standards for use in the United States, following ANSI rules.

initiator

A device connected to a SCSI bus that requests an operation to be performed by another SCSI device. Normally, it is the host computer that initiates all actions on the bus. Targets can become initiators when they need to contact another device (other than the host) to execute a set of commands. For example, the host could instruct a disk drive to send a

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file to another disk drive. The first disk drive temporarily becomes an initiator while communicating and transferring the file to the second disk drive.

interoperability

The ability of all system elements to exchange information between single vendor and multivendor equipment. Also called *open communications*.

ISA (Industry Standard Architecture)

A well-known architecture for the buses in personal computers such as those used in IBM PCs and compatibles.

ISO (International Standards Organization)

An international body that creates networking standards, including the Open Systems Interconnections (OSI) model.

KB

Kilobytes. 1024 bytes.

local

Local refers to files and devices, such as disk drives, that are attached to or on your machine.

local bus

A bus on the motherboard of a personal or desktop computer that is connected directly to the CPU, and brings the peripheral functions closer to the microprocessor.

log in

The process of gaining access to a computer's operating system, often by entering a user name and password.

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LU (Logical Unit)

A physical device or virtual device that is addressed through a target. For example, a bank of printers connected to a SCSI controller (the target) are Logical Units.

LUN (Logical Unit Number)

A 3-bit identifier for a Logical Unit (LU).

Mbps

Megabits (1,048,576 bits) per second.

narrow SCSI

A 50-conductor SCSI bus with 8-bit communications that can have up to 8 SCSI devices attached.

open communications

The ability of all systems to exchange information between single vendor and multivendor equipment. Also called *interoperability.*

PCI (Peripheral Component Interconnect)

An Intel standard governing the connections and timings for a *local bus* that is 32 bits wide operating at 33 MHz. It brings high-speed peripheral functions closer to the microprocessor while maintaining compatibility with traditional 16-bit expansion systems operating at 8 MHz.

point-to-point

Transmission of data between two (and only two) devices where one device is the sender and the other device is the receiver.

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propagation delay

The time it takes for a signal to travel across the SCSI bus.

protocol

A set of rules and conventions that govern the exchange of information between communicating devices.

RAM (Random Access Memory)

The type of computer memory where a byte of data can be read or stored at any location.

reconnect

The arbitration used by a SCSI target to regain control of the bus to continue communications with a SCSI host. The previous transmission was most likely suspended with a time-out parameter to allow other devices to use the bus.

SCSI (Small Computer System Interface)

An I/O bus protocol that provides high performance, peer-to-peer data communications for up to 16 devices, including one or more host computers.

SCSI device

Any peripheral that can be attached to a SCSI bus.

SCSI ID

A unique number (0-15) that identifies each device on the SCSI bus. Also referred to as the *host name*.

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single-ended

Refers to the electrical configuration of the signals used on the SCSI bus. A single conductor with a common ground is used to transfer a signal. This configuration should only be used over short distances of up to 6 meters. Longer distances require the use of a *differential* configuration.

single-threaded

Only one program can run on the computer at any given time.

synchronous transmission

A data transmission scheme in which fixed time intervals are used to transmit data across the SCSI bus. Unlike asynchronous transmissions, the acknowledgments are used for error checking only.

target

A SCSI device that performs operations in response to a request from an *initiator*, usually the host computer.

wide SCSI

A 68-conductor SCSI-2 bus with 16-bit communications that can have up to 16 SCSI devices attached. Narrow (50 conductor) and wide devices can be intermixed on the same bus.

word

A two-byte (16-bit) unit of data.

workstation

A networked computer, typically reserved for end-user applications.

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