



# PCI Fast/Wide Ultra SCSI Adapter

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*User's Guide*

OPTIONS  
*by IBM*

**Note:** Read the information under Appendix H, “Product Warranty” on page 3-69, Appendix I, “System Programs License Agreement” on page 3-71, and Appendix J, “Notices” on page 3-73 before using this information and the product it supports.

#### **First Edition (November 1996)**

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## ***About This Book***

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

**Part 1:** Abbreviated installation instructions in the following languages:

English	German
French	Spanish
Italian	Brazilian Portuguese
Japanese	

**Part 2:** Product information and detailed installation instructions

**Part 3:** Safety information, specifications, utility programs information, troubleshooting and technical service information, warranty, license, and notices

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

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## Part 1: Quick Installation Guide

The PCI Fast/Wide Ultra SCSI Adapter is designed to attach SCSI devices to a computer that has 5-volt, peripheral component interconnect (PCI) interface slot. In addition to the User's Guide and Warranty Registration Card, the option package contains:

One 50-pin, internal SCSI cable for connecting two internal 8-bit devices

One 68-pin, internal SCSI cable for connecting four 16-bit internal Wide devices

Three EZ-SCSI diskettes containing device drivers and utility programs

Two 7800 Family Manager Set diskettes containing device drivers for several operating systems

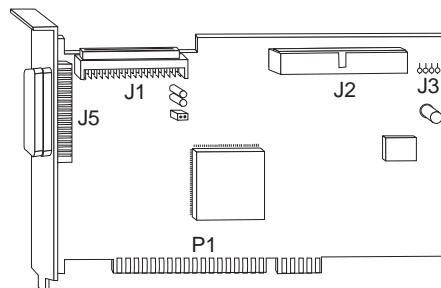


**Caution:** Read the Safety Information in Appendix A, page 3-1, before installing this product.

This section contains host adapter installation instructions in abbreviated form. If you are familiar with SCSI products and experienced installing options, use these instructions. For a description of the host adapter and more detailed information about how to install the adapter 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 this SCSI bus. The adapter supports SCSI IDs from 0 to 15. The SCSI ID of the host adapter is 7.
2. Turn off all attached devices. Turn off the computer. Remove the cover from the computer.
3. Before opening the static-protective bag containing the host adapter, touch the bag to an unpainted metal surface on the 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 illustration identifies the adapter components.



4. Locate an unused 5-volt, PCI expansion slot. These slots are shorter than ISA or EISA slots and colored white. Remove the bracket screw and expansion slot cover. 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.

5. Terminate the last SCSI device at the end of each SCSI cable connected to the adapter. You can connect up to two SCSI cables to the host adapter. Remove or disable termination from all other devices on each SCSI cable.

Termination of the host adapter is controlled by software commands using the *SCSISelect* utility program. The initial termination setting for the host adapter is *Automatic*. When set to *Automatic*, the adapter senses the bus cables attached and sets proper termination settings.

6. Mount and connect each internal SCSI device in the computer. Connect the 68-pin cable into the **J1** connector for 16-bit, Wide devices; connect the 50-pin cable into the **J2** connector for 8-bit devices.
7. Connect the internal devices into available connectors at the end of the SCSI cable farthest from the adapter to ensure better 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, connect a light-emitting diode (LED) to indicated SCSI hard disk drive activity. Unplug the LED cable from the connector on your computer system board. Connect the LED cable connector to the external LED connector, **J3**, on the host adapter.

9. Connect the power cable for each device to the internal power connector, as needed. Replace the computer cover and secure it in place.
10. Connect the external SCSI cable to the host adapter connector, **J5**, and connect external devices.
11. Reconnect the ac power cord and other cables. Turn on all attached devices; then turn on the computer.
12. The initial *SCSISelect* host adapter settings are appropriate for most PCI computers. If you need more information about changing the initial settings, see Appendix B, "SCSISelect" on page 3-11.
13. Install device drivers using the appropriate software:
  - EZ-SCSI — This provides device drivers for DOS, Windows 3.x, Windows 95, Windows NT, and several additional utility programs.
  - 7800 Family Manager Set — This provides device drivers for Novell NetWare, OS/2, Windows 95, Windows NT, SCO UNIX, and UnixWare.

### *Product Description*

The PCI Fast/Wide Ultra SCSI Adapter is designed to attach SCSI devices to a computer that has 5-volt, peripheral component interconnect (PCI) interface slot. The UltraSCSI host 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). The host adapter can be used in place of, or together with, a standard hard disk IDE adapter.

If you need to configure the host adapter, use the *SCSISelect* utility program that is on the adapter. *SCSISelect* allows you to change the host adapter settings without opening the computer or handling the adapter.

In addition to the User's Guide and Warranty Registration Card, this option package contains:

- One 50-pin, internal SCSI cable for connecting two internal 8-bit devices
- One 68-pin, internal SCSI cable for connecting four 16-bit internal Wide devices
- Three EZ-SCSI diskettes containing device drivers and utility programs

Two 7800 Family Manager Set diskettes containing device drivers for several operating systems

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### Host Adapter Features

The PCI bus interface supports:

- Bus master for data transfer
- Single and dual address cycle support
- Bus address and data parity generation

The adapter supports data transfer rates up to:

- 12 MB per second for asynchronous SCSI data transfers
- 20 MB per second for synchronous Fast (8-bit) UltraSCSI data transfers
- 40 MB per second for synchronous Wide (16-bit) UltraSCSI data transfers

The adapter reduces your computer processing load by using:

- RISC sequencer that automates SCSI command processing and reduces interrupts and command overhead through task scheduling and message-based communication
- Bus mastering data transfers in which the adapter processor handles the transfer of data directly into memory without involving the computer processor



32-, 24-, 16- and 8-bit host PCI bus data transfers

The adapter supports disk array devices by:

- Starting up from any array Logical Unit on the SCSI bus
- Providing extensive support for leading disk array vendors
- Supporting multithreaded I/O operations
- Allowing simultaneous operations on multiple SCSI targets or Logical Units (The maximum number of Logical Units per SCSI target is eight.)

The adapter supports Fast/Wide UltraSCSI implementation by:

- Providing concurrent support for SCSI synchronous (data transfers clocked at regular intervals) and asynchronous (data transfer at irregular intervals) devices
- Providing concurrent support for 8-bit and 16-bit SCSI devices
- Providing a scatter/gather feature to allow high performance in computers that have fragmented memory buffers by accessing many segments of memory in a single transfer
- Providing a disconnect/reconnect feature to maximize SCSI bus use with multiple targets on the bus
- Providing tagged queuing of return data commands to improve performance
- Supporting parity handling in data, message, status, selection/reselection, and command phases
- Negotiating with devices on the SCSI bus to ensure that data transfer rates are acceptable to both the adapter and the devices

Other features provided by the adapter include:

Multiple adapter option: You can install multiple host adapters in your computer if PCI bus slots are available. Each host adapter has its own separate SCSI bus and attached SCSI devices. You can connect up to fifteen SCSI devices (a combination of 16-bit and 8-bit devices) to each host adapter.

Supports capabilities of DOS 3.3 for up to two disk drives and DOS 5.0 and above for up to eight disk drive.

Supports disk drives with capacities up to 8 GB under DOS.

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## Device Driver Support

The adapter option includes two device driver software packages:

EZ-SCSI provides a menu-driven program that installs device drivers automatically for: Windows 95, Windows NT, DOS, and Windows 3.1x. The program includes:

- DOS and Windows 3.1x device drivers that enable your computer to communicate with SCSI devices
- ASPI (Advanced SCSI Programming Interface) managers that enable the SCSI device drivers, your host adapter, and your SCSI devices to communicate with each other
- DOS and Windows utility programs such as a SCSI device interrogator, CD player, hard disk drive formatter and partitioner, and a removable media manager
- *SCSITutor* providing useful information about SCSI topics

7800 Family Manager Set software provides device driver support for the following operating systems:

- Novell NetWare

- OS/2
- Windows 95
- Windows NT
- SCO UNIX
- UnixWare

## *Before You Begin*

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

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## **Installation Requirements**

In addition to this option package, you need:

Personal computer that supports PCI Revision 2.0.

5-volt, PCI expansion slot that is capable of bus mastering. Some PCI-bus computers have both bus-mastering and non-bus-mastering slots. Portable computers might have a 3.3-volt, PCI expansion slot. Read your computer documentation to determine its type of PCI slot.

Single-ended SCSI devices (differential SCSI devices might be damaged if connected to the host adapter).

You might also need one or more of the following:

A 50-pin SCSI cable for connecting more than two 8-bit, internal devices to this bus (the option includes a cable that connects two devices).

A 68-pin SCSI cable for connecting more than two 16-bit, internal Wide devices to this bus (the option includes a cable that connects four devices).

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

A inline SCSI terminator, if a terminator is not built into the internal device (if needed to terminate internal SCSI bus).

A terminator plug for an external device (if needed to terminate external SCSI chain). Use only an active terminator to provide reliable SCSI bus operation.

---

## **Choosing SCSI Cables**

If you need to obtain a cable with additional device connectors, use only a high-quality SCSI cable especially if you use Fast SCSI data transfer rates. Poor-quality cables can cause data corruption, parity errors, and other problems.

Round external SCSI cables vary widely in quality and electrical characteristics. Be sure that external SCSI cables meet SCSI-2 standards. Therefore, use cables with a single-ended impedance range of 80 to 110 ohms. 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:

Do not exceed 3 meters (9.8 feet) total length when one or more Fast SCSI devices are connected to the host adapter.

If no Fast SCSI devices are connected, the total length of all cables must not exceed 6 meters (19.7 feet).

## *Installing the Adapter*

Follow these steps to install the host adapter.

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### **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 **F1** during the start up after the memory check completes.
- Use SCSI adapter utility programs.
- Inspect the installed SCSI devices to see how the IDs are set.

ID 7 is the highest priority ID on the SCSI bus. Leave ID 7 for the host adapter ID. Do not use the *SCSISelect* to change the

adapter ID. 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 that the devices are cabled to the host adapter.)

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

Change the IDs according to your ID assignments. Refer to the device documentation on how to change each SCSI ID. Optionally, 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 put pressure on the cover because the pressure might damage the drive.

Optionally, write the SCSI ID you assign to each device in the following table to assist your planning. The SCSI IDs are listed in priority order.

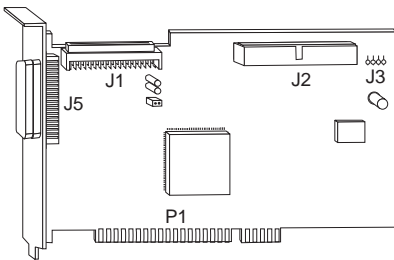
SCSI ID	Device
7	PCI Fast/Wide Ultra SCSI Adapter
6	
5	
4	
3	
2	
1	
0	
15	
14	
13	
12	
11	
10	
9	
8	

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

---

## Step 2. Unpacking the Adapter

1. Turn off all attached devices. Turn off the computer. Unplug the power cords for the computer and all attached devices; then open the computer. For specific information on opening your computer refer to the documentation that comes with your computer.
2. Before opening the static-protective bag containing the host adapter, touch the bag to an unpainted metal surface on the 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.
3. Inspect the adapter before you install it in your computer for any physical damage. The following illustration identifies the adapter components.

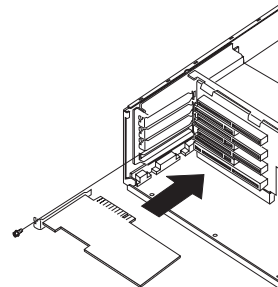


- J1** 68-pin, 16-bit, Wide internal SCSI connector
- J2** 50-pin, 8-bit, internal SCSI connector
- J3** External LED connector
- J5** 68-pin, 16-bit, Wide external SCSI connector
- P1** PCI bus card-edge connector

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## Step 3. Inserting the Adapter into the PCI Slot

1. Locate an open 5-volt, PCI expansion slot. These slots are shorter than ISA or EISA slots as shown in the following illustration. The PCI slots are colored white.



2. Remove the bracket screw and 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.

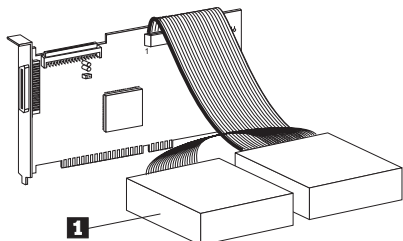
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## Step 4. Terminating the SCSI Bus

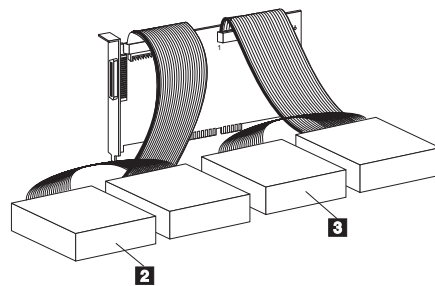
SCSI devices connect serially to one another on a SCSI bus in a daisy chain fashion. For the devices to work properly, SCSI termination is required at both ends; there are no exceptions. All devices that are between the ends of a SCSI bus must have their terminators removed or disabled.

The following are possible SCSI termination configurations.

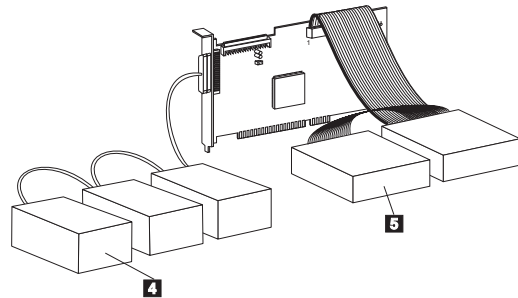
If the SCSI configuration consists of one cable, terminate the last device **1** on the cable. Remove termination from other devices on the cable.



If the SCSI bus consists of two internal SCSI cables, terminate the last devices, **2** and **3**, on both cables. Remove termination from the other devices on each cable. Do not connect an external cable in this configuration because the host adapter supports only two concurrent SCSI cable connections.



If the SCSI bus consists of one internal SCSI cable and one external SCSI cable, terminate the last device, **4** and **5**, on the internal and external SCSI cables. Remove termination from the other devices on each cable. Do not connect an external cable in this configuration because the host adapter supports only two concurrent SCSI cable connections.



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## Step 5. Terminating the Host Adapter

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

With the automatic termination setting, the host adapter detects if SCSI cables are connected to any of the three SCSI connectors. The adapter sets termination for the low and high bytes of the 16-bit, Wide SCSI bus, as needed. Under normal circumstances, do not change the initial termination setting (*Automatic*). If you need to manually set the host adapter termination, refer to “Basic Host Adapter Settings” on page 3-11 for more information.

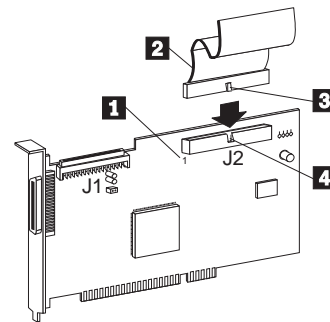
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## Step 6. Connecting Internal Devices

Follow these steps to connect internal SCSI devices.

1. Mount each SCSI device in the computer.
2. Connect the 68-pin cable into the **J1** connector for 16-bit, Wide devices; connect the 50-pin cable into the **J2** connector for 8-bit devices.

For the 50-pin connector, align the tab **3** on the cable connector with the slot **4** on the adapter connector. Use the colored stripe **2** on one side of the ribbon cable to match up with the number **1** printed on the host adapter.



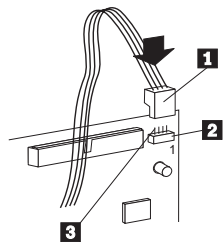
3. Connect the internal devices into available connectors at the end of the SCSI cable farthest from the adapter to ensure better signal quality. Connect pin-1 on each cable connector to pin-1 on each device throughout the bus, or your SCSI devices will not work properly.
4. Connect the power cable for each device to the internal power connector, as needed.

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## Step 7. 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.
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 pin-1 on the cable is aligned with the pin-1 connection **3** on the adapter. On computers with a two pin LED cable, connect the LED cable to pins **1 3** and **2** on the LED connector.



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 8. Closing the Computer

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

1. The SCSI bus is properly terminated.
2. Each SCSI device on the SCSI bus is set to a unique SCSI ID.
3. The host adapter is firmly seated and secured in a 5-volt, PCI bus 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.



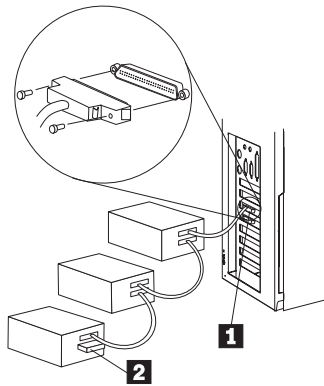
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## Step 9. Connecting External SCSI Devices

Daisy chain devices to the host adapter using an additional external cable for each device connected. Up to 15 Wide SCSI external devices can be daisy-chained to the host adapter connector.

To start the daisy chain follow these steps:

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



2. Extend the daisy chain with a cable from the host adapter to the connector on the first external device. Use the second connector on the back of the device and connect it to the next device.
3. Connect additional devices in a similar manner.
4. To terminate the last device on the daisy chain, insert an active terminating plug into the last device in the chain 2 .

---

## Step 10. Configuring the Computer

To configure the computer follow these steps.

1. Reconnect the ac power cord and other cables.
2. Turn on all attached devices; then turn on the computer.
3. For most computers, the computer performs a power-on self-test (POST) and the setup 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 host computer does not recognize the host adapter after it starts up, enter the setup configuration program and review the PCI configuration options. If you change these options, be sure to apply them to the PCI bus slot in which the host adapter is installed. Some configuration options apply to a specific PCI bus slot. 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 the computer setup 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 “Step 1: Troubleshooting” on page 3-66.

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## Step 11. Configuring the Host Adapter

The *SCSISelect* adapter 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 *SCSISelect*. Refer to Appendix B, “*SCSISelect*” on page 3-11 to review or modify the initial adapter settings.

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## Step 12. Installing Device Drivers

Install the device drivers for your operating system.

**EZ-SCSI** — This provides device drivers for DOS and Windows 3.x and several additional utility programs. Refer to Appendix C, “EZ-SCSI” on page 3-17.

**7800 Family Manager Set** — This provides device drivers for Novell NetWare, OS/2, Windows 95, Windows NT, SCO UNIX, and UnixWare. Refer to Appendix D, “7800 Family Manager Set” on page 3-23.



## Appendix B. SCSISelect

The host adapter includes a menu-driven SCSISelect utility program includes a configuration and a disk utility program. The first menu that appears displays lets you choose to either configure and view the host adapter settings or use the SCSI disk utilities.

You start the SCSISelect by pressing **Ctrl+A** when the following prompt appears briefly at start up time:

```
Press <Ctrl><A> for SCSISelect Utility!
```

SCSISelect 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 **Enter**.

In some cases, selecting an option displays another menu. You can return to the previous menu at any time by pressing **Esc**.

To restore the original SCSISelect initial values, press **F6**.

To toggle the display between color and monochrome modes, press **F5**. (This feature might not work on some monitors.)

To exit SCSISelect, press **Esc** 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 the computer. Any changes you made in SCSISelect take effect after the computer starts up.

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### Configuration Utility Program

If you select the configure or view the host adapter settings, you can select to 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 is 7 that 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 <sup>1</sup>	N/A <sup>1</sup>	50-pin and 68-pin internal connectors, and 68-pin external connector

<sup>1</sup> This is an invalid combination because the adapter only supports two connectors concurrently.

## 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 3-14.)

## 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 3-16.

**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).

- 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<sup>2</sup>/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).

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<sup>2</sup> MB equals approximately 1 000 000 bytes.

- 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 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<sup>3</sup>. 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<sup>4</sup>. 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 *SCSISelect* 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

<sup>3</sup> GB equals approximately 1 000 000 000 bytes.

<sup>4</sup> MB equals approximately 1 000 000 bytes.



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 than 1024 cylinders. The initial setting is *Disabled*. This option is valid only if the **host adapter BIOS** is *Enabled*.

**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*.

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## 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 **Esc** at any time to cancel the program.

## Appendix C. EZ-SCSI

The EZ-SCSI software provides device driver support for: Windows 95, Windows NT, DOS, and Windows 3.1x. This appendix discusses installing the device drivers and the DOS hard disk drive utilities programs. For additional information and information about other utility programs included with this software, refer to the *EZ-SCSI Help*. After you install EZ-SCSI, you can run the *SCSITutor* program to learn more about the features of SCSI.

To install support for other kinds of SCSI devices such as optical disks, refer to the hardware documentation for those devices. If the device requires ASPI (Advanced SCSI Programming Interface) support, run EZ-SCSI to install an ASPI manager, and then install any other software provided with the device. If the device is designed to interface directly with the host adapter, no ASPI manager is required.

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### System Requirements

The minimum requirements to install the software are:

- 386-based PC with at least 4 MB of memory
- 10 MB of free disk space
- 3.5-inch diskette drive
- Microsoft Windows 95, Windows NT 3.51 or later, Windows 3.1x, Windows for Workgroups 3.1x, or DOS 6.x or later

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### Installing the Software

First, install your host adapter and other SCSI devices (see hardware documentation for details). Then follow the instructions for your operating system software in one of the following sections.

#### Windows 95 or Windows NT

To install Windows 95 or Windows NT on a new computer system, you might be able to access your SCSI CD-ROM drive at first. (Usually, you install Windows 95 and Windows NT from a CD-ROM disc.) To gain access to your CD-ROM drive, follow the installation instructions for DOS on this page. Then restart your system and follow these instructions.

1. Install Windows 95 or Windows NT 3.51 or later, and start up your computer.
2. Insert the EZ-SCSI diskette #1 in your diskette drive.
3. Click on the **Start** button and select **Run**.
4. Type **a:\setup**; then click on **OK**.
5. Follow the instructions that appear on the screen.

#### Windows and Windows for Workgroups 3.1x

1. Install Windows 3.1x or Windows for Workgroups 3.1x and start up your computer.
2. Insert the EZ-SCSI diskette #1 into your diskette drive.
3. Select **File/Run** from the Program Manager menu.
4. When the Run dialog box appears, type **a:\setup**; then click on **OK**.

## DOS

1. Install DOS 6.x (or later) and start up your computer.
2. Insert the EZ-SCSI diskette #1 in your diskette drive.
3. At the DOS prompt, type **a:\dosinst**; then press **Enter**.
4. Follow the instructions that appear on the screen.

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## Information for Windows 95 and Windows NT Users

### 1. What is a miniport driver, and how do I make sure that the miniport driver for my host adapter is installed correctly?

Miniport drivers are a new kind of 32-bit protect-mode device driver used by Windows 95 and Windows NT to control host adapters and other kinds of devices. Windows 95 and Windows NT include a set of miniport drivers for various types of SCSI host adapters.

The host driver is automatically installed and configured during Windows 95 and Windows NT installation if your host adapter is already installed. To make sure the driver is installed correctly in systems running Windows 95, open the Control Panel, double-click on **System**, and click on **Device Manager** tab. Then double-click on **SCSI Controllers** icon; you then will see the model name and the name of the SCSI host adapters installed in your system.

### 2. What if there is no SCSI controllers icon under Device Manager, or the model name of the host adapter does not appear under Device Manager?

If the SCSI controllers icon or your host adapter model name do not appear, open the Control Panel and double-click on the **Add New Hardware** icon. Let Windows search for the host adapter by selecting **Yes** on the second screen of the Add New Hardware wizard.

If Windows does not detect the host adapter, run the Add New Hardware wizard again. This time, select **No** on the second screen of the wizard, then select **SCSI controllers** on the next screen. Select the name of your host adapter when it appears.

If the name of your SCSI host adapter does not appear, you might be able to find its miniport driver on the Windows 95 CD-ROM. Follow these steps:

- a. Place the Windows 95 CD-ROM in your CD-ROM drive and run the Add New Hardware wizard.
- b. Select **No** on the second screen; then select **SCSI controllers** on the next screen.
- c. Click on **Have Disk**; then click on **Browse**.
- d. Look in the `\DRIVERS\STORAGE` subdirectory of the CD-ROM and select the name of your SCSI host adapter if it appears.

### 3. What if a yellow exclamation point or a red X appears in Device Manager in front of my host adapter?

This means there is some kind of resource problem. First, see if the names of any host adapters appear that are not actually

installed in your computer. If so, select the name and click on **Remove**.

If a red X appears in front of your host adapter name, remove all the host adapter references under SCSI Controllers and run Add New Hardware, as described in the previous question and answer.

If a yellow exclamation point appears in front of your host adapter name, the resources that the driver use probably do not match the resources used by the hardware. Double-click on the host adapter name, then click on **Resource** tab.

Deselect **Use automatic settings** box and edit the resources (such as Interrupt Request, Direct Memory Access) so they match those used by the host adapter.

If the problem still remains, there is probably a hardware resource conflict between the host adapter and other hardware in your computer. You can fix this by changing the hardware resource settings. See your hardware documentation for more information.

4. **What do I need to do if I change or upgrade my host adapter?**

- a. Open the Control Panel, double-click on **System**, and click on **Device Manager** tab.
- b. Double-click on the **SCSI Controllers** icon, select the name of the old host adapter, and click on **Remove**.
- c. Turn off the computer and physically remove the currently installed host adapter.
- d. Install the new host adapter according.

- e. Turn the computer on. If the new host adapter supports plug and play, Windows will install and configure it automatically. Otherwise, run Add New Hardware to make sure the new driver is loaded.

5. **If I am running under Windows 95, do I need lines for the real mode ASPI drivers and MSCDEX in my CONFIG.SYS and AUTOEXEC.BAT files?**

Usually, you do not need to use these real mode ASPI drivers, because the new Windows miniport drivers support most SCSI host adapters and SCSI devices. However, load the drivers (including MSCDEX, if you have a CD-ROM drive) if any of the following is true:

Running in DOS mode

Using a scanner or another SCSI device with CONFIG.SYS or AUTOEXEC.BAT based drivers, such as HPs SJIIX.SYS. Have another model SCSI-1 CD-ROM drive that Windows 95 does not support

Using a CD-Recorder drive (however, some newer models of CD-Recorder drives can use the miniport drivers included with Windows.

To install the EZ-SCSI DOS drivers, click on **Start** and select **Restart the computer in DOS mode**. When the DOS prompt appears, follow the installation instructions for "DOS" on page 3-18.

#### 6. My CD-ROM driver doesn't work properly with Windows 95

Some older models of SCSI CD-ROM drives are not compatible with the CD-ROM driver included with Windows 95. You can add support for the CD-ROM driver by doing the following.

- a. Click on **Start** and select **Restart the computers in DOS mode**.
- b. When the DOS prompt appears, follow the installation instructions for "DOS" on page 3-18.
- c. After running EZ-SCSI for DOS, find the file named CDTSD.VXD file in the WINDOWS\SYSTEM\IOSUBSYS subdirectory and rename it CDTSD.SAV.

#### 7. My CD-ROM drive shows up as more than one icon under My Computer.

The mapping between MSCDEX, which runs in real mode, and the Windows 95 CD-ROM driver does not match. Correct this in one of two ways:

Comment out the line that loads MSCDEX.EXE in the AUTOEXEC.BAT file.

Change the /L switch on the line that loads MSCDEX.EXE in the AUTOEXEC.BAT file so it assigns the CD-ROM drive the next highest logical drive letter after the hard disk drives.

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### Information for DOS and Windows 3.1x Users

The following information might be useful if you install EZ-SCSI on a computer running DOS, Windows 3.1x, or Windows for Workgroups 3.1x.

#### DOS and Windows 3.1x Device Drivers

Device drivers are programs that enable your computer to communicate with SCSI devices such as hard disk drives, CD-ROM drives, and scanners. Each kind of device requires a different device driver. EZ-SCSI includes several DOS and Windows 3.1x device drivers that are copied to your hard disk during installation. EZ-SCSI adds command lines to your CONFIG.SYS and AUTOEXEC.BAT files to load these device drivers if it finds these kinds of devices on your computer.

To learn more about the EZ-SCSI device drivers, including their command line option information, see the online *EZ-SCSI Online Reference*, a Windows Help application.

## DOS and Windows 3.1x ASPI Managers

ASPI managers are software programs that enable the SCSI device drivers, your host adapter, and your SCSI devices to communicate with each other. ASPI managers are written for a specific operating system, such as DOS, and a specific host adapter.

EZ-SCSI includes several ASPI managers for DOS and Windows 3.1x. When you install EZ-SCSI on these operating systems, it detects what kind of host adapter is installed in your computer and automatically configures your system with the correct ASPI manager. To learn more about these ASPI managers, including their command line option information, see the *EZ-SCSI Online Reference*, a Windows Help application.

### DOS Low-Level Formatter (SCSIFMT)

Use the DOS-based SCSIFMT utility program for low-level formatting of SCSI hard disk drives, removable media, and magneto-optical drives. You can also use it to scan a disk device for surface defects before you store data on it.

Run SCSIFMT from the DOS prompt, not from the Windows DOS prompt. Before you run it, be sure the disk devices you want to format are connected to the host adapter and that they are turned on. Then follow these steps:

1. Change the directory where SCSIFMT.EXE is located (usually C:\SCSI), type **scsifmt** at the DOS prompt and press **Enter**.

If you are formatting a SCSI disk device that supports more than one LUN, type **scsifmt /L** at the command line.

2. When the first screen appears, read it and press **Enter** to continue. Information about your SCSI disk drives appears on the screen. (Press **F1** at any time to view Help.)
3. Use the arrow keys to move the highlighted bar to a hard disk drive you want to format or verify; then press **Enter**.
4. When the next screen appears, select either **Format** or **Verify** (to verify that the disk drive is free of surface defects), then press **Enter**.

**Attention:** Back up important data before you format the hard disk drive. A low-level format erases all data from the disk.

5. If you select:
  - Format**, confirm that you want to format the disk; then wait while the disk device is formatted. This might take a long time if the disk is large.
  - Verify**, you can press **Esc** at any time to stop the verification process. This action does not damage the disk. If the program finds bad blocks on the disk, it displays information about them. Reassign the bad blocks to prevent data from being stored there.
6. Repeat steps 3, 4, and 5, as needed, to format or verify other disk devices. When you are finished, press **Esc** to exit.

## Formatter and Partitioner (AFDISK)

Use the DOS-based AFDISK utility program to partition and format SCSI hard disk and magneto-optical drives. You can also use AFDISK to remove DOS and non-DOS partitions from a disk drive and to format removable media in standard hard disk format, OS/2 diskette format, or DOS V (Japanese) format. Use AFDISK only if the disk device is not controlled by the host adapter BIOS — that is, if the BIOS is not enabled. If the disk device is controlled by the host adapter BIOS, use the DOS FDISK utility program to partition and format the disk device. See the DOS documentation for more information.

Only Run AFDISK from the DOS prompt, not from the Windows DOS prompt. Before you run it, be sure the disk devices you want to format and partition are connected to the host adapter and that they are turned on. Follow these steps:

1. Change to the directory where AFDISK.EXE is located (usually C:/SCSI), type **afdisk** at the DOS prompt, and press **Enter**. Information about your SCSI disk devices appears on the screen. The number that appears after *Target* is the device SCSI ID.
2. Use the arrow keys to move the highlight bar to the disk device you want to partition, then press **Enter**.

If the selected disk device is controlled by the host adapter BIOS, you can view information about it but you cannot partition it with AFDISK. Use the DOS FDISK and FORMAT utility programs.

If the selected disk device is unpartitioned, you must partition it before you can format it. To do this, follow the

instructions on the screen. You can press F1 to see an explanation of the partitioning options.

Information about the selected disk device appears in the lower left of the screen. Disks smaller than 1 GB have 64 heads, 32 sectors per track, and cylinders equal to the number of MB of available capacity. Disks larger than 1 GB have 255 heads, 63 sectors per track, and one cylinder per 8 MB of available capacity.

3. To create a new partition on the disk drive, press **Ins**. The **Disk Setup** program screen appears. You can create a partition on the disk drive equal to its entire capacity. If this is what you want to do, skip the next step.
4. To change the size of the partition, use the arrow keys to select **Start Cylinder** and **End Cylinder** and type in the numbers you want. Partitions up to 2 GB are supported.

5. When the number of cylinders is what you want, press **Esc**. When the confirmation prompt appears, select **Yes** and press **Enter** to create the partition.

To create more partitions on the same disk device, repeat steps 3, 4, and 5. As you create partitions on the disk, they are added to the window at the upper right of the screen.

6. Press **Esc** to return to the Select SCSI Device to Partition window. If you want to partition another drive, select the drive from the list and repeat the steps.
7. To quit AFDISK, press **Esc** and select **Yes** to confirm that you want to quit.

## Removable Media Manager (RMVTOOL)

The DOS-based RMVTOOL utility program allows you to lock, unlock, and eject removable media, for example a cartridge in a removable media drive. You run RMVTOOL by entering commands at the DOS prompt. Here are the commands for a removable drive installed at SCSI ID 5:

To lock the disk media: `RMVTOOL /LOCK /ID=5`

To unlock the disk media: `RMVTOOL /UNLOCK /ID=5`

To eject the disk media: `RMVTOOL /EJECT /ID=5` (Note that some devices do not support the EJECT command.)

If the device is set to another SCSI ID, type that number instead of 5. If you are not sure which device is set to which SCSI ID, type **rmvtool /?** at the DOS prompt and press **Enter**. A list of SCSI devices appears. Devices that support removable media are marked.

If your computer has two or more host adapters, add another number to the command. For example, if you have two host adapters, one of them is host adapter 0 and the other is host adapter 1. (This information appears when you enter the **rmvtool /?** command.) So if the removable disk drive is set to SCSI ID 3 on host adapter 1, enter this command to lock the disk media: **rmvtool /lock /ID=1:3**.

You can issue RMVTOOL commands for two or more devices, and you can add the commands to the AUTOEXEC.BAT file. If you add this command line to your AUTOEXEC.BAT file, RMVTOOL locks the media in the two devices when the computer starts up. This prevents the disk media from being removed until another command is issued to unlock it: `RMVTOOL /LOCK /ID=4 /ID=5`.

## Appendix D. 7800 Family Manager Set

The 7800 Family Manager Set (7800 Family) contains device drivers that allow your host adapter to communicate with your computer. The 7800 Family device drivers supports a group of Adaptec PCI-to-SCSI host adapters which are referred collectively as the 7800 Family host adapters. Different operating systems usually require separate device drivers. The 7800 Family contains device drivers for the following operating systems:

- Novell NetWare
- OS/2
- Microsoft Windows 95
- Microsoft Windows NT
- SCO UNIX
- UnixWare

Some operating systems include the 7800 Family device driver as part of the installation software. These device drivers work fine with your host adapter; however, install the most recent version of the device driver for your host adapter to perform at an even higher level.



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## Novell NetWare Installation

This section provides the information needed to install and use the 7800 Family software for NetWare 3.1x and 4.x. The 7800 Family device drivers for Novell NetWare are fully Novell NetWare Tested and Approved. There are two NetWare subdirectories (\NETWARE\V3\_1X and \NETWARE\V4\_XX) on the diskette for NetWare; however, the files in \NETWARE\V3\_1X can only be used with NetWare 3.1x, and the files in \NETWARE\V4\_XX with NetWare 4.x. The files in these subdirectories are:

AIC7870.DSK — Device driver for NetWare  
ASPITRAN.DSK — ASPI transport layer device driver for NetWare  
ASPIC.DSK ASPI device driver for CD-ROM drives  
AIC7870.DDI — (only for NetWare 4.x) Device driver definition information file to provide setup information to NetWare during installation; NetWare can then prompt you with parameters to be configured for the device driver during the installation process  
README.TXI — An ASCII text file describing the device drivers for NetWare

To begin device driver installation, first calculate the slot number as described in “Calculating the Slot Number.”

## Calculating the Slot Number

The slot number is used to uniquely identify each host adapter installed in your computer. To properly load the device driver for each host adapter, you will need to calculate the slot number in order to include it as part of the load command line. If the slot number is not included, NetWare prompts you for one.

During NetWare installation, the slot number (a decimal number) calculated here is interpreted by NetWare as a hex number. This hex number is then added to the load command line in the STARTUP.NCF file. To correctly identify the host adapter in the STARTUP.NCF file, change the hex number back to the original decimal slot number calculated here.

To calculate the slot number, obtain the **Bus:Device** *xx:xxh* values identified when running *SCSISelect* for your host adapter. The calculation is done manually, as described in the following steps.

1. Make sure your PCI computer is properly set up and configured.
2. Run *SCSISelect* for your host adapter. Refer to Appendix B, “SCSISelect” on page 3-11 for instructions. Note that the host adapter light is lit during activity. If you have multiple adapters, use this light to determine for which adapter *SCSISelect* is displaying information.
3. On the first screen of *SCSISelect*, the **Bus:Device** *xx:xxh* numbers are displayed in the upper right corner. Write down these numbers exactly as they appear.

**Bus** refers to the PCI bus on the computer. The default for **Bus** is 0. Usually only one PCI bus is supplied with a computer; however, computers might contain more than one PCI bus.

**Device** refers to the physical slot number on the PCI bus. The **Device** number is in hex; convert it to a decimal number. The **Device** slot number identified through *SCSISelect* is not the same as the slot number needed to load the device driver through the load command line.

4. Use the following formula to calculate the slot number.

$$\text{Slot Number} = (\text{Bus} \times 10) + \text{Device} + 16$$

For example, if the **Bus:Device** number is 0:06h (that is 0:6), then the slot number is 22 ( $22 = (0 * 10) + 6 + 16$ ).

## Installing NetWare and the Device Driver

This section describes how to install the AIC7870.DSK device driver at the same time you install NetWare 3.1x or 4.x. If NetWare 3.1x or 4.x is already installed and you want to install or update the AIC7870.DSK device driver, see "Updating NetWare and the Device Driver" on page 3-27.

### NetWare 4.x

Follow these instruction only if you are installing NetWare 4.x for the first time.

1. Make backup copies of all Novell and 7800 Family diskettes using DISKCOPY, and use those backup copies as your working diskettes.

2. Start up DOS on your computer.
3. Change to the subdirectory where the installation files are found. For a CD-ROM, the subdirectory is similar to  
d:\netware.4 \english
4. Type **install** and press **Enter**.
5. Select **Install New NetWare v4.x** if you are installing NetWare 4.x for the first time, or **Upgrade NetWare v3.1x** or **v4.x** if you are upgrading to NetWare 4.x.
6. Follow the instructions in the *NetWare User's Manual* for partitioning, creating a server name, and checking the IPX Network number.
7. When a screen appears that asks you to select a disk driver, press **Insert**.
8. Insert the Family Manager diskette for NetWare into your A drive.
9. Press **F3** and specify the path to the AIC7870.DSK device driver for NetWare (for example, **a:\netware\v4 xx**).
10. Select **AIC7870.DSK** and press **Enter**. Note that specific help text for each device driver appears in the middle of the screen as you scroll down the list. The Loaded Drivers window below the list of available device drivers displays the names of drivers that are loaded and operational. For a new installation, this list is initially empty. For a selective installation, the list shows the disk drivers already running.

11. Specify the server directory (usually **c:\server.40** for NetWare 4.02 or **c:\nwserver** for NetWare 4.10) and press **Enter**. The installation program copies the necessary files to this directory.
12. When the screen displays:  
     Loading driver aic787 .dsk, Please wait,  
     switch to the System Console screen by pressing **Alt+Esc** to  
     switch screens.
13. When the device driver has prompted you for the slot number,  
     enter the slot number calculated for your host adapter and press  
     **Enter** (See “Calculating the Slot Number” on page 3-24). You  
     are automatically switched back to continue with installation.
14. If you are using multiple host adapters in your server, load the  
     device driver again for each host adapter and follow the  
     instructions in Appendix E, “Configuring Multiple Host  
     Adapters” on page 3-64 for properly configuring the hardware for  
     use with multiple adapters. Refer to the *NetWare User's Manual*  
     for information on installing other NetWare Loadable Modules  
     (NLMs). If an error message appears when you attempt to load  
     the device driver, see “Troubleshooting” on page 3-33.
15. Select **Continue the Installation** to create disk partitions and  
     system volumes, and to specify volume names; follow the  
     procedures listed in the *NetWare User's Manual*. Note that to  
     load the device driver automatically at server start up, make sure  
     the STARTUP.NCF file includes the load command line and  
     correct slot number for your host adapter. See “Updating  
     NetWare and the Device Driver” on page 3-27 and “Using  
     STARTUP.NCF and AUTOEXEC.NCF” on page 3-30.

### NetWare 3.1

Follow these instructions if you are installing NetWare 3.1x for the first time.

1. Make backup copies of all Novell and 7800 Family diskettes using DISKCOPY, and use those backup copies as your working diskettes.
2. Start up DOS on your computer.
3. Change to the subdirectory where the installation files are found. For a CD-ROM, the subdirectory is similar to:  
     d:\netware.312\english
4. Type **install** and press **Enter**. Follow the procedures in your NetWare documentation for installing a new server.
5. When you see the NetWare colon prompt (:), use the LOAD command to install the device driver from the 7800 Family diskette for NetWare. You will also need the slot number described in “Calculating the Slot Number” on page 3-24. The correct syntax to load the 7800 Family device driver is:  
     :load pathname\aic787 .dsk options slot=x

Command line options are not case sensitive. Placing commas between command line options is optional. See “Using the Load Command Line Options” on page 3-28 for possible values. Note that the ASPITRAN.DSK must reside in the same path as AIC7870.DSK, because NetWare attempts to load this file automatically.

6. Load the device driver once for each installed host adapter. To load the device driver automatically at server start up, copy the driver to the server startup directory and modify the STARTUP.NCF file. See “Updating NetWare and the Device Driver” on page 3-27 and “Using STARTUP.NCF and AUTOEXEC.NCF” on page 3-30.
7. Load the NetWare installation program from the NetWare colon prompt by typing **load install**. Follow the instructions in the NetWare documentation to complete installation (for example, creating disk partitions and system volumes) of your server.
3. If necessary, modify the load command line in the STARTUP.NCF file so that the proper path to the device driver and the correct slot number are specified. See “Using STARTUP.NCF and AUTOEXEC.NCF” on page 3-30 for more information. The correct syntax to load the 7800 Family device driver is:
 

```
load pathname\aic787 .dsk options slot=x
```

Command line options are not case sensitive. Placing commas between command line options is optional. See “Using the Load Command Line Options” on page 3-28 for possible values. To calculate the slot number for each host adapter, see “Calculating the Slot Number” on page 3-24.

## Updating NetWare and the Device Driver

This section describes how to update and install the AIC7870.DSK device driver if NetWare 3.1x or 4.x is already installed. The instructions for updating and installing the device driver are similar for both NetWare 3.1x and 4.x. Procedures that are specific to a NetWare version are noted below.

1. Make a backup copy of the old device driver (if it exists) before installing the new driver.
2. Copy the AIC7870.DSK device driver and ASPITRAN.DSK module from the 7800 Family diskette for NetWare into the servers startup directory (for example, C:\NWSERVER, C:\SERVER.40, C:\SERVER.312) on your hard disk. This overwrites any existing version of the device drivers in the directory. The diskette files are located in:

\NETWARE\V3.1X subdirectory for NetWare 3.1x  
 \NETWARE\V4.XX subdirectory for NetWare 4.x

## Using the Load Command Line Options

You can specify several command line options when the device driver is loaded. The available options are described in the following table.

Option	Values (Default)	Description
slot=	16-41, 116-141, (None)	Defines host adapter device location. If none is given, you are prompted for one. See "Calculating the Slot Number" on page 3-24.
verbose=	y (n)	Causes the device driver to display host adapter configuration information at load time.
removable=5	on, off (on)	Enables support for removable media other than CD-ROMs, which are controlled by ASPICD.DSK. By default, removable media is supported. You might want to disable removable disk support in order to load an ASPI removable disk module.
fixed_disk=	on, off (on)	Enables support for hard disks. By default, hard disks are supported. You might want to disable fixed disk support in order to load an ASPI fixed disk module.
dev_enable=	00-FF (FF)	Allows you to enable the driver registration of SCSI devices on a per-target basis. A bit value of 0 causes the target not to register under the operating system. These devices are still accessible through ASPI. This enable bit mask is entered in hex (see page 3-29).

Option	Values (Default)	Description
start_unit	0-FF (0)	A bit mask to enable sending Start_Unit. The command is sent only if the device responds with a Not Ready Status. This feature is not needed by most devices. This bit mask is entered in hex (see page 3-29).
tag_disable	0-FF (00)	Disables tagged queuing for specific targets. Tagged queuing is enabled by default. If the bit mask is set, then tagged queuing for that particular device is disabled. This disable bit mask is entered in hex (see page 3-29).
lun_enable=5	00-FF (01)	A bit mask to enable scanning for specific LUNs on all targets. For example, a value of 7 would cause the device driver to scan for LUNs 0, 1, and 2 on all targets. The default value of 01 causes the driver to scan only LUN 0. For multiple LUN CDs, use the lun_enable switch on ASPICD.DSK, not AIC7870.DSK. This enable bit mask is entered in hex (see page 3-29).
io_combine	1-32 (32)	Specifies maximum number of segments in a scatter/gather list.
max_sectors	1-256 (256)	Specifies maximum number of total sectors in a single scatter/gather list.
max_tags	1-32 (16)	Specifies maximum number of tagged commands per device.

<sup>5</sup> Many multiple-LUN and removable media devices are changers or magazines. Some of these are only supported by the AIC7870.DSK device driver through an ASPI driver provided by the hardware vendor.

Option	Values (Default)	Description
max_nontags	1-2 (2)	Specifies maximum number of nontagged commands pending per device. Only one command is actually sent on the SCSI bus. A value of 2 allocates a control block where the next command waits for the previous command to complete.
read_after_write	0-1 (1)	Specifies default verify mode; 0 = No verify on writes, 1 = Hardware verify.
instrumentation	0-1 (0)	If 1, enables instrumentation (variable updates at load time). The device driver maintains internal instrumentation data for use by the I/O management applications. Instrumentation can also be enabled by the I/O management application, so inclusion of this option is not always necessary.

### Bit Mask Options

Use this example to aid in calculating bit mask option hex values. Each SCSI device (ID 0 to 7 or 0 to 15) is enabled by a 1 in its corresponding bit position. In this example, **lun\_enable=05** enables scanning for LUNs 0 and 2 on all targets.

ID	Bit Position
SCSI ID: 0, 2	0000 0000 0000 0101
Converted binary-to-hex: = 05h	0 0 0. 5

### Sample Load Command

Here is a simple load command with no option switches (if loaded from drive A).

```
load a:\netware\v3_1x\aic787
```

The following information displays on the resulting screen.

```
:load a:\netware\v3_1x\aic787 <ENTER>
Loading module aic787 .dsk
Supported Slot values are 27, 29, 31
Slot: 27 <ENTER>
```

Slot values that already have another registered device do not appear. Only the slots available for use by the host adapter appear on the screen. If an error message appears when attempting to load the device driver, refer to “Troubleshooting” on page 3-33. The following is an example of the AIC7870.DSK device driver being loaded with command line options (if loaded from drive A).

```
load a:\netware\v3_1x\aic787 verbose=y slot=22
```

The following information displays on the resulting screen.

```
:load a:\netware\v3_1x\aic787 verbose=y slot=22 <ENTER>
Loading module aic787 .dsk
PCI Bus Number:
PCI Device Number: 6
Host Adapter SCSI ID: 7
Interrupt Level: 11
Shared Interrupts: Enabled
Firmware Type: 7871
Firmware Revision: .
```

## Using STARTUP.NCF and AUTOEXEC.NCF

The STARTUP.NCF and AUTOEXEC.NCF files contain a set of commands that are executed at server start up. The STARTUP.NCF file contains the commands to load the disk drivers. Once STARTUP.NCF loads disk drivers, control is passed to the AUTOEXEC.NCF file to complete the start up process. For additional information on the STARTUP.NCF and AUTOEXEC.NCF files, refer to your NetWare documentation.

To automatically load the AIC7870.DSK device driver at server start up, the STARTUP.NCF must contain a load command line that specifies the location of the driver on the hard disk, any load command options (see “Using the Load Command Line Options” on page 3-28, and the slot number (“Calculating the Slot Number” on page 3-24).

To load the device driver from your hard disk, copy the AIC7870.DSK driver and ASPITRAN.DSK file from the 7800 Family diskette for NetWare to a directory on your hard disk, usually the server start up directory (for example, C:\NWSERVER). The syntax to load the AIC7870.DSK device driver is:

```
load pathname\aic787 options slot=x
```

For example, the command line to load the device driver from the C:\NWSERVER directory, with the **verbose=** option on, and a **slot=** number of 16 is:

```
load c:\nwserver\aic787 verbose=y slot=16
```

Note that for each host adapter installed, include a separate load command line in the STARTUP.NCF file. The slot number (**slot=**) identifies the specific adapter.

### 3-30 PCI Fast/Wide Ultra SCSI Adapter

To modify the STARTUP.NCF file, use your DOS text editor or follow these steps.

1. Type **load install** at the NetWare prompt and press **Enter**.
2. Select the appropriate menu choice that allows you to edit the STARTUP.NCF file.
3. Make the necessary changes. When you are done, press **Esc**.

## Using SCSI Devices

This section provides procedures and tips on the following.

### Starting Up from a SCSI Device

1. For the 7800 Family host adapter, use *SCSISelect* to configure your preferred startup device. When the **Host Adapter BIOS** is *Enabled*, the host adapter can be set to scan the SCSI bus; the computer starts up from the first drive encountered.
2. Modify your DOS AUTOEXEC.BAT file to run **server** from your server startup directory.
3. Restart your server. NetWare starts up at this point.
4. Enter your file server name and internal IPX number.

### Formatting Media (only with NetWare 3.1x)

The NetWare 3.1x install program (INSTALL.NLM) lets you optionally format a disk drive for use with NetWare. When using SCSI, you can low-level format several SCSI drives simultaneously. The NetWare format procedure is not the same as using FDISK or FORMAT under DOS. Do not format a drive that contains partitions for other operating systems because that information will be destroyed.

When you select a drive to format, INSTALL prompts you for an *interleave* from one to nine. What INSTALL does not say is that you can also enter an interleave value of zero. When formatting SCSI disks or removable drives on the 7800 Family host adapter, you use an interleave value of zero. The zero interleave value instructs the drive to use its optimal interleave value.

Using Removable Media

The AIC7870.DSK device driver fully supports removable-media disk drives, including magneto-optical drives. Removable media is treated as a standard SCSI hard disk, with some exceptions.

The AIC7870.DSK device driver recognizes and registers only media with 512 bytes per sector.

NetWare allows you to mount and dismount the media, and to lock and unlock the media.

NetWare MONITOR program (MONITOR.NLM) supports several removable media options. Follow these steps to view and configure these options.

1. Load the MONITOR.NLM to display the various options.
2. Select **Disk Information**. All computer disk drives appear.
3. Select the removable-media device. The following drive status options appear.
  - a. Volume Segments On Drive — Select for list to make selection. This option is valid for both removable and nonremovable types of SCSI disk drives.

- b. Read After Write Verify — The default value is *Hardware Level*. This option is valid for both removable and nonremovable types of SCSI disk drives. This option cannot be specified in the STARTUP.NCF or AUTOEXEC.NCF files. However, the default can be set on the command line, see “Using the Load Command Line Options” on page 3-28. The available options are defined in the following table.

Option Setting	Function
Disabled	All writes to SCSI disk drives are with the SCSI Write command (2Ah)
Hardware Level	All writes to SCSI disk drives are with the SCSI Write and Verify command (2Eh). If not supported by the drive, behavior is the same as if Read After Write Verify is disabled.
Software Level	Not supported

- c. Drive Light Status — The default value is *Not Supported*. This option is valid for both removable and nonremovable types of SCSI disk drives.
- d. Driver Operating Status — The default value is *Active*. This option is valid for both removable and nonremovable types of SCSI disk drives.
- e. Removable Drive Mount Status — This default value is *Mounted*. This option is only valid for removable media. Mounting causes a drive to come online as a NetWare



storage device. Dismounted drives are inactive and cannot be accessed. Before you eject your current media, dismount it with this option. When the media status is dismounted, you can eject the media. However, NetWare does not allow you to dismount it if the media is locked. To insert your new media, wait for the drive to spinup, and then select the **Drive Mount** option.

- f. Removable Drive Lock Status — The default value is *Not Locked*. This option is only valid for removable media. If your removable-media device supports the *Lock* and *Unlock* feature, you can lock the media with this option. The media must be in the *Not Locked* state before you can eject it. If the media is *Locked*, it cannot be ejected when you press the **Eject** button.

#### Using the NetWare Tape Backup

SBACKUP (SBACKUP.NLM) is a server-based tape backup utility program included with Novell NetWare. This program allows you to backup server disk drives to a server tape drive. Novell NetWare documentation contains instructions for loading the server backup software. Refer to the *NetWare Server Backup Manual* to load the TAPEDAI, TSA, and SBACKUP programs.

1. Once you have loaded AIC7870.DSK, type the following commands where TSA<sub>xxx</sub> is: TSA312, TSA400, or TSA410.

```
load tapedai
load tsaxxx
load sbackup
```

The appropriate device driver that interfaces SBACKUP to ASPI is loaded automatically. If you are duplexing the host adapter with another host adapter for NetWare drive mirroring, also load the appropriate ASPI manager (.DSK) for the second host adapter.

2. When SBACKUP is loaded, it asks for a login name. Enter the appropriate name.
3. If SBACKUP asks you to select the device driver, select the **HP DIBI-2 Tape Driver**, regardless of the type of SCSI tape drive being attached. Novell also includes a device driver called ADAPTEC.NLM. Do not load it; the driver is not needed. The AIC7870.DSK device driver program takes advantage of ASPI interface features bypassed by ADAPTEC.NLM.

#### Using a CD-ROM with NetWare

To use a CD-ROM with NetWare 3.1x or 4.x:

1. Load AIC7870.DSK by entering the following line.  
load pathname aic787 .dsk slot=x
2. Load ASPICD by entering the following line.  
load pathname\aspicd.dsk

For multiple LUN CDs, enable multiple LUN scanning with the **lun\_enable** switch (for example, LOAD ASPICD **lun\_enable=FF**). The **lun\_enable** switch is not needed for AIC7870.DSK.

3. Load CDROM.NLM by entering the following line.  
load pathname\cdrom.nlm Load NWPA.NLM before you load CDROM.NLM only if using NetWare 4.01 or 4.02.

4. Enter the following line at the prompt and then note the number and name of the CD.

```
cd device list
```

5. Enter the number or volume name of the CD at the command line.

```
cd mount x name
```

### Optimizing Performance

The 7800 Family SCSI Bus Master microcode increases the SCSI performance of the host adapter under multitasking operating systems. The microcode uses a paging mechanism to handle up to 255 simultaneous SCSI commands. The sequencer can simultaneously manage up to 32 tagged, or 2 nontagged, SCSI commands for each SCSI device, up to a limit of 255 SCSI commands. The microcode can queue as many commands as the operating system is able to send to the host adapter. To set this feature, enter the following.

```
max tags=n
```

In general, a low number of **max tags** gives better sequential performance, and a high number a better random performance. Note that a large number of **max tags** can also cause problems with some drives.

### **Troubleshooting**

Any error that occurs while the device driver is initializing prevents it from loading. If an error does occur, the driver first beeps the computer and then displays a numbered error message in the following format.

```
ERR xxx:message
```

The *xxx* indicates the error code, and message is a descriptive line describing the error. The error codes are divided into the following categories.

```
000-099 NonHost adapter specific
100-299 Host adapter specific
300-999 Reserved
```

Specific error codes appear only if you have installed the host adapters and device drivers that generate them.

#### NonHost Adapter Specific

##### **000 Failed ParseDriverParameters call**

A call to NetWare ParseDriverParameters routine has failed for an unknown reason. The command line contains errors, or you pressed **Esc** at the port or slot prompt.

##### **001 Unable to reserve hardware, possible conflict**

The device driver failed in its attempt to reserve the host adapter hardware settings (DMA and IRQ settings). Another adapter in your computer might be causing a conflict with the host adapter.

##### **002 NetWare rejected card - Failed AddDiskSystem call**

The device driver failed in its attempt to register the host adapter with NetWare. The file server might not have enough memory.

##### **003 Invalid command line option entered -> option**

An invalid option was entered on the command line. The Option field displays the invalid option that was entered.

**004 Invalid command line, please enter correctly**

The device driver was unable to understand the command line options you entered. Be sure you have entered these options correctly.

**005 Unable to allocate resource tags from NetWare**

NetWare was unable to allocate resource tags for memory allocation or other computer functions.

**006 Unable to register events with NetWare**

NetWare is unable to register event routines needed to return to DOS.

Host Adapter Specific

**200 No host adapter found for this driver to register**

No host adapter was found in your computer for the device driver to register. Be sure the host adapter is properly configured and properly seated in the slot.

**203 Invalid 'slot' setting**

The **slot=** number is invalid. Remove the **slot=** option and allow the device driver to prompt you for slot choices.

**204 Invalid 'verbose' setting, use 'y'**

You can enter only *y* for this option (for example, **verbose = y**).

**205 Invalid 'removable' setting, use 'off'**

You can enter only *off* for this option (for example, **removable = off**).

**206 Invalid 'fixed disk' setting, use 'off'**

You can enter only *off* for this option (for example, **fixed disk = off**).

**208 SCSI present but not enabled/configured for PCI**

A host adapter is present, but its bus and device entry has not been enabled.

**209 Invalid 'read after write' setting, use 0 (disable) or 1 (HW verify)**

You can enter only 0 or 1 for this option (for example, **read after write = 1**).

**211 Unable to initialize host adapter**

The host adapter failed the initialization routine.

---

## OS/2 Installation

The following files are available on the 7800 Family diskette for OS/2 (OS/2 2.1x OS/2 Warp). Normally these files are in the OS2\_3X directory.

README — ASCII text file describing the 7800 Family device driver for OS/2.

AIC7870.ADD — 7800 Family device driver for OS/2

AIC7870.DDP Installation instructions for DDINSTALL.EXE

7870PRES.EXE — Program that searches for the host adapter

Note that a special note for OS/2 if you are installing a CD-ROM, do not set the CD-ROM SCSI ID to 0 or 7.

### Installing OS/2 and the Device Driver

This section describes how to install the AIC7870.ADD device driver at the same time you install OS/2 2.1x or OS/2 Warp. If OS/2 2.1x or OS/2 Warp is already installed and you want to update and install the AIC7870.ADD device driver, see “Updating OS/2 and the Device Driver” on page 3-36.

### OS/2 2.1x

Follow these instructions only if you are installing OS/2 2.1x for the first time.

1. Use DISKCOPY to make backup copies of all OS/2 and 7800 Family diskettes. Use the backup copies as your working diskettes.
2. Copy the OS2LDR file from the 7800 Family diskette for OS/2 (\OS2\_3X directory) onto the OS/2 installation diskette.
3. Copy the IBMINT13.I13 and the AIC7870.ADD files from the 7800 Family diskette for OS/2 (\OS2\_3X directory) onto the OS/2 diskette #1. This overwrites any existing version of the files included on diskette #1.
4. Add the following line to the CONFIG.SYS file on diskette #1.  
`basedev=aic787 .add /pcihw`
5. Run the OS/2 2.1x installation program; follow the instructions in your OS/2 documentation.
6. At the end of the installation process, follow the instructions on the screen to remove the last OS/2 distribution diskette and restart the computer.
7. After the computer has restarted, OS/2 displays a welcome screen. You have the option to view online information while the OS/2 Desktop is building. Allow OS/2 to finish building.

Refer to the README.TXT file for any additional information on installing OS/2 2.1x and the device driver.

### OS/2 Warp

Follow these instructions only if you are installing OS/2 Warp for the first time.

1. Use DISKCOPY to make backup copies of all OS/2 and 7800 Family diskettes. Use the backup copies as your working diskettes.
2. Copy the AIC7870.ADD device driver from the 7800 Family diskette for OS/2 (\OS2\_3X directory) onto the OS/2 Warp installation diskette #1. This overwrites any existing version of the driver included on diskette #1.
3. Run the OS/2 Warp installation program; follow the instructions in your OS/2 documentation.
4. At the end of the installation process, follow the instructions on the screen to remove the last OS/2 distribution diskette and restart the computer.
5. Once the computer has restarted:
  - a. Overwrite any older versions of the AIC7870.ADD device driver existing on the hard drive with the newer version of the driver now available on the OS/2 Warp installation diskette #1.
  - b. Check the root and OS/2 directories, and any of the OS/2 subdirectories for older versions of the device driver by comparing the dates of the files. If an older version is found, overwrite it with the newer version by copying the AIC7870.ADD driver from diskette #1 to the hard disk.

6. Restart the computer.

### **Updating OS/2 and the Device Driver**

Follow these instructions only if OS/2 2.1x or OS/2 Warp is already installed. The instructions for updating or installing the device driver are the same for both OS/2 2.1x or OS/2 Warp.

1. Use DISKCOPY to make backup copies of all OS/2 and 7800 Family diskettes. Use the backup copies as your working diskettes.
2. If you are updating the driver, copy the AIC7870.ADD device driver from the 7800 Family diskette for OS/2 (\OS2\_3X directory) into the OS/2 directory on your hard disk. (Make a backup copy of the older device driver before doing this.) The copy overwrites any existing version of the driver in the directory. Updating of the driver is now complete.

If OS/2 has been installed and does not recognize the host adapter, or if you are adding your host adapter to your OS/2 computer, install the device driver.

- a. Run the DDINSTALL program by selecting the **Device Driver Install** icon from the System Setup folder or by typing **ddinstal** at the OS/2 prompt. (If you are running OS/2 2.1x, change to the directory containing AIC7870.ADD and associated files and run the DDINSTALL program from the OS/2 prompt.)

**Note:** If you are running OS/2 2.1x GA, do not run **Device Driver Install** from the System Setup folder. Instead, open a full screen OS/2 session and change to the drive with the 7800 Family diskette for OS/2. Then type **ddinstal** and press **Enter**.

- b. Insert the 7800 Family diskette for OS/2 in the appropriate disk drive and follow the prompts from the DDINSTALL program.
- c. The computer scans for the host adapter. If a host adapter is found, the following message appears.

Installing Device Drivers Another message appears when the device driver is successfully installed. If no host adapters are found, an error message appears.

### Using Command Line Options

The AIC7870.ADD device driver is normally installed automatically and does not require any modifications to its configuration. In certain situations, however, you might want to modify the driver to meet your specific needs. The command line options described in this section apply to both OS/2 v2.1x and OS/2 Warp. The following sections describe the command format. For more information using the command line options, refer to your OS/2 documentation.

**Attention:** Your computer might not start up if you enter the command line options incorrectly.

### ADD Command Syntax

The standard command line syntax for the ADD command line switches is:

```
basedev=aic787 .add [Universal Parameters] [Adapter  
Unit Parameters:SCSI Target ID
```

Place the command and switches in the CONFIG.SYS file. Switch settings take effect after the computer is restarted. OS/2 command line switches are not case sensitive.

### ADD Command Switches

The options listed in the following subsections apply to all host adapters controlled by the AIC7870.ADD device driver. Replace the italicized letters (x,y,z, and so on) in the switch descriptions below with the SCSI target IDs of the devices that you want affected. Separate the IDs by commas (x, y).

#### Universal Parameters

***./et***

Embedded targets allowed. Makes the device driver assume that all targets have more than one Logical Unit Number (LUN) defined.

***!/et***

No embedded targets allowed. Makes the device driver assume that all targets have only one LUN defined. (This is the default setting.)

***/v***

Verbose mode. Information such as the device driver name, version number, and Adaptec copyright appears if the driver loads successfully and also displays information about all targets found in the computer.

#### **/pcihw**

PCI configuration hardware registers. Enables device driver to access PCI configuration hardware registers. This switch is available for some PCI computers that run into problems when trying to access PCI configuration space through PCI BIOS function calls.

#### Adapter ID

##### **/a:n**

Adapter numbers are assigned based on BIOS address (starting from the lowest first) and then Device number (PCI device number in hex as seen at the upper right corner of the first *SCSISelect* screen) if the BIOS is disabled. Built-in single-channel host adapters are generally assigned ID 0 (zero), as the first found adapter.

#### Unit Parameters

##### **/dm:x,y,z**

Enables Direct Access Storage Device (DASD) manager support. Allows OS2DASD.DMD to control the specified targets when they are identified as DASD devices. (This is the default setting.)

##### **!/dm:x,y,z**

Disables DASD manager support. Prevents OS2DASD.DMD from controlling the specified targets.

##### **/sm:x,y,z**

Enables SCSI manager support for the target devices x,y,z. Allows OS2SCSI.DMD to control the specified targets if they are identified as non-DASD SCSI devices. All SCSI hard drives are controlled by OS2DASD.DMD. (This is the default setting.)

##### **!/sm:x,y,z**

Disables SCSI manager support. Prevents OS2SCSI.DMD from controlling the specified targets.

##### **/tag:x**

Specifies the maximum number of tagged commands for all target devices on the host adapter (1—16). A value of 1 disables tagged queuing. The maximum number allowed is 16. (The default is 8.)

##### **/i**

Ignores the host adapter. The device driver ignores the host adapter so another driver might control it.

##### **/ur**

Enables reporting of under runs.

##### **!/ur**

Disables reporting of under runs. (This is the default setting.)

The following examples show how the command line options can be used in specific installations.

**Attention:** Do not remove DASD manager support from the startup drive, or the computer will not be able to start up.

### Example 1

Suppose that you have a removable-media drive as target 3. Normally OS2DASD.DMD allocates this device, treats it as a large diskette, and prevents you from sending any SCSI commands through another device manager.

The command line below prevents OS2DASD.DMD from accessing the target and allows OS2SCSI.DMD and OS2ASPI.DMD to share access to it.

```
basedev=aic787 .add /a: /!dm:3
```

### Example 2

Suppose that you have a multidisk CD-ROM as target 4 on host adapter 0 and two DASD devices as targets 1 and 5 on host adapter 1. The command line below prevents OS2SCSI.DMD from accessing the CD-ROM and OS2DASD.DMD from controlling the DASD devices. The device driver searches for multiple LUNs on all devices.

```
basedev=aic787 .add /et /a: /!sm:4 /a:1 /!dm:1,5
```

that there are no switches for directly controlling OS2ASPI.DMD, the ASPI device manager.

### Important Tips

The following are important tips for using the command line options.

OS2SCSI.DMD allocates devices only when a device driver requests it, but this prevents OS2ASPI.DMD from accessing it. There is nothing in the ASPI specification regarding device allocation, so OS2ASPI.DMD depends on other managers to fairly share targets. This might be a problem only if you have

two drivers that use different managers and you want them both to access the same target at the same time (for example, if you have two tape applications, one is using OS2SCSI.DMD, the other is using OS2ASPI.DMD, and they are both trying to access the tape at the same time).

Do not disable DASD manager access to the startup drive if you are starting up from your SCSI host adapter. If you do, your computer will not be able to start up. The SCSI target ID is the target to which the Unit Parameters are applied. This parameter might be a single ID (d) or a list of IDs (d,d,d).

### **Using Disk Drives greater than 1 GB**

If you are using a SCSI hard disk drive larger than 1 GB on your OS/2 computer, leave the **Extended BIOS Translation** feature at the default setting of *Enabled*. If you format a partition using the FAT file system, create the partition within the first 1024 cylinders of the drive to ensure compatibility with DOS. However, if you are running NetWare and UNIX on the same SCSI disk drive (that is greater than 1 GB), *Disable* the **Extended BIOS Translation** feature. For drivers greater than 1 GB, any time you change this feature from *Enabled* to *Disabled*, or vice versa, be sure to repartition and high-level format the drive.



---

## Microsoft Windows 95 Installation

The 7800 Family diskette for Windows 95 contains the files needed for device driver installation. The Windows 95 directory (\WIN95) on the diskette contains the following files:

AIC78XX.MPD — 7800 Family device driver for Windows 95  
AIC78XX.INT — File used by Windows 95 Setup for device driver installation  
README.TXT — ASCII text file describing the host adapter device driver for Windows 95

If you are performing a first time Windows 95 installation, see “Installing Windows 95 and the Device Driver” If Windows 95 is already installed in your computer, see “Updating Windows 95 and the Device Driver.”

### Installing Windows 95 and the Device Driver

A version of the AIC78XX.MPD device driver is included on in the Windows 95 installation CD. During a normal Windows 95 installation, the host adapter is detected in your computer and this AIC78XX.MPD device driver is automatically installed. Once the Windows 95 installation is complete, you can update the AIC78XX.MPD device driver with the most recent version of the driver by following the instructions in “Updating Windows 95 and the Device Driver.”

If Windows 95 installation cannot detect the host adapter installed in your computer, install the AIC78XX.MPD device driver manually once Windows 95 installation is complete. To determine if the

AIC78XX.MPD device driver was installed, and to install the driver manually, refer to “Updating Windows 95 and the Device Driver.”

### Updating Windows 95 and the Device Driver

This section describes how to update and install the AIC78XX.MPD device driver if Windows 95 is already installed. Note that additional PCI Fast/Wide Ultra SCSI Adapters use the same AIC78XX.MPD device driver. Once the driver is updated, it is not necessary to update it again for each host adapter installed in your computer. To update the device driver:

1. Start Windows 95.
2. Click on **Start** on the Windows 95 task bar, and then point to **Settings**.
3. Click on **Control Panel**
4. Double-click on **System** icon.
5. On the Device Manager tab, click on the plus sign (+) next to the SCSI controller icon. If Windows 95 cannot determine the type of host adapter installed in your computer, a yellow question mark labelled **Other Devices** appears instead of the SCSI controller icon. To continue, click on the plus sign (+) next to the question mark; a yellow question mark appears labelled  
PCI SCSI Bus Controller
6. Double-click on the host adapter you want to update, or if a yellow question mark displays labelled  
PCI SCSI Bus Controller  
Double-click on the question mark (?).

7. On the Driver tab, click on **Change Driver**. You might be asked to select the hardware type; if asked, select **SCSI Controller**.
8. Click on **Have Disk** and type **a:\win95** as the location to copy the manufacturer's file.
9. Click on **OK**
10. Select the host adapter, and click on **OK**.
11. Click on **OK**. The device driver is copied and scanned.
12. Restart your computer for the changes to take effect.

Click on **Yes** to restart your computer.

Click on **No** to return to the system properties window.

---

## Microsoft Windows NT Installation

The 7800 Family diskette for Windows NT contains the files needed for device driver installation for Windows NT (Windows NT 3.1 and 3.5x). The two Windows NT subdirectories on the diskette, \WINNT\3.1 for Windows NT 3.1, and \WINNT\3\_5 for Windows NT 3.5. Each subdirectory contains:

AIC78XX.SYS — 7800 Family device driver for Windows NT  
OEMSETUP.INF — File used by Windows NT Setup for device driver installation

README.TXT — ASCII text file describing the 7800 Family device driver for Windows NT

### Installing Windows NT and the Device Driver

This section describes how to install the AIC78XX.SYS device driver at the same time you install either Windows NT 3.1 or 3.5x. If Windows NT is already installed in your computer, see "Updating Windows NT and the Device Driver" on page 3-43.

#### Windows NT 3.1

Follow these instructions only if you are installing Windows NT 3.1 for the first time. You might install Windows NT from a diskette or from a CD-ROM; whichever you choose, make sure the hardware installation is completed prior to following these steps.

1. If you choose to install Windows NT from a diskette, locate the *Windows NT Disk 1 for Floppy Installation*. If you are installing from a CD-ROM, locate the *Windows NT Setup Disk for CD-ROM Installation*.

- Put the diskette into drive A (not drive B) and turn on your computer.
- When prompted, select **Custom** setup.

**Attention:** If you choose **Express** setup, the installation process is unable to detect your host adapter and the installation fails.

- Windows NT Setup displays all recognized host adapters. If no host adapters are installed, Windows NT Setup displays none. Press **S** to configure additional SCSI adapters.
- From the list of additional SCSI adapters, select **Other** and press **Enter**. (Requires diskette provided by a hardware manufacturer).
- Insert the 7800 Family diskette for Windows NT into drive A and press **Enter**.
- The screen displays the adapter device drivers supported on the diskette. Use the down arrow to select **Adaptec AHA-2940/AIC-78xx (PCI) NT v3.1** and press **Enter**.
- If you want to add other host adapters, repeat Step 5 for each additional adapter and insert the appropriate diskette provided by the hardware manufacturer.
- Press **Enter** to continue with the Windows NT operating system setup. Follow the instructions on the screen and in the Windows NT installation documentation.

#### Windows NT 3.5x

An older version of the AIC78XX.SYS device driver is included in the Windows NT 3.5x installation diskettes (or CD). First install this driver by following the instructions in your Windows NT 3.5x documentation for a normal Windows NT installation.

Once the Windows NT installation is complete, update the AIC78XX.SYS device driver by following the instructions in "Updating Windows NT and the Device Driver" on page 3-43. (This step is needed because if Windows NT detects the host adapter it automatically installs the version of AIC78XX.SYS that is included with Windows NT.)

If you are starting up the computer from a host adapter and you are unable to install the included AIC78XX.SYS device driver by performing a Windows NT installation, then follow the instructions here. Complete a fresh Windows NT installation and install the AIC78XX.SYS device driver from the 7800 Family diskette for Windows NT.

You might install Windows NT from a diskette or from a CD-ROM; whichever you choose, make sure the hardware installation is completed prior to following these steps.

- If you choose to install Windows NT from a diskette, locate the *Windows NT Disk 1 for Floppy Installation*. If you are installing from a CD-ROM, locate the *Windows NT Setup Disk 1 for CD-ROM Installation*.
- Put the diskette into drive A and turn on your computer. When prompted, insert the *Windows NT Disk 2*.

3. From the Welcome to Setup Screen, press **Enter** to setup Windows NT.
4. When prompted, select **Custom** setup. If you select **Express** setup, the version of the AIC78XX.SYS device driver included with Windows NT will be loaded and not the most recent version of driver available from the 7800 Family diskette for Windows NT.
5. Press **S** to skip mass storage device detection. This allows you to manually select the device driver for your host adapter.
6. Because mass storage device detection was skipped in the previous step, Windows NT Setup displays none in the list of recognized devices. Press **S** to configure additional SCSI adapters.
7. From the list of additional SCSI adapters, expand the list, select **Other**, and press **Enter**.
8. Insert the 7800 Family diskette for Windows NT into drive A and press **Enter**.
9. The screen displays the device drivers supported on the diskette and highlights the following entry.  
     Adaptec AHA-294 /AIC-78xx (PCI) NT 3.5x  
     Press **Enter**.
10. If you want to add other host adapters, do so at this time. Repeat Step 7 for each additional adapter and insert the appropriate diskette provided by the hardware manufacturer. If you install another PCI Fast/Wide Ultra SCSI Adapter, it is not necessary to install the AIC78XX.SYS driver again.

11. Press **Enter** to continue with the Windows NT operating system setup. Follow the instructions given on the screen and in the Windows NT installation documentation.

## Updating Windows NT and the Device Driver

This section describes how to update and install the AIC78XX.SYS device driver if Windows NT 3.1 or 3.5x is already installed.

### Windows NT 3.1

Follow these instruction only if Windows NT 3.1 is already installed.

1. Select and start the Windows NT Setup program. (Its icon is usually found in the Main program group.) There is a brief pause while Windows NT Setup scans your hardware configuration.
2. Select the **Options** pull-down menu and then select **Add/Remove SCSI Adapters**. The SCSI adapter setup program displays a list of all host adapters currently installed.
3. Click on **Add** to add another host adapter type to the list. A list of additional SCSI adapters appears.
4. Expand the list of additional SCSI adapters; select **Other** and press **Enter**.
5. Insert the 7800 Family diskette for Windows NT into drive A and press **Enter**.
6. Enter the path to the installation files by typing:  
     a:\winnt\3\_1

7. The screen displays the adapter device drivers supported on the diskette. Use the down arrow (↓) to select **Adaptec AHA-2940/AIC-78xx(PCI) NT v3.1**. Click on **OK**. The device driver is added to the list of SCSI adapters.
8. Select **Adaptec AHA-2940/AIC-78xx (PCI) NT 3.1** from the list of SCSI adapters and click on **Install**. At this point, Windows NT Setup checks to see if the specified device driver (in this example, AIC78XX.SYS) has already been copied to your hard disk.
9. If the following message appears, click on **New** to replace the existing device driver and skip to Step 11.
 

The SCSI Adapter selected is already installed

If the following message appears, continue with Step 10.

Please enter the full path to the Windows NT S Adapter files
10. Change the path to the directory (that is, A:\WINNT\3\_1) with the desired device driver, then click on **Continue**. The device driver is copied to your hard disk and the Windows NT configuration is updated so that the new device driver loads when Windows NT restarts.
11. When the installation is complete, Windows NT Setup again displays a list of currently installed host adapter types. Verify that the new host adapter appears on the list; the string looks similar to:
 

Adaptec AHA-294 /AIC 78xx (PCI) NT v3.1
12. Add other types of host adapters if necessary (see Step 4), or click **Close** to exit the SCSI adapters portion of Windows NT Setup, and then close the program.
13. When you see the following message, click on **OK** to exit.
 

The changes you have made will not take effect until the computer is restarted

If this message does not appear, no changes have been made to the Windows NT system configuration.
14. Restart your computer and Windows NT. It is possible that some drive letter assignments might change from the previous configuration.

**Attention:** If you are updating the device driver that controls the computer startup host adapter from which Windows NT loads, complete the additional steps listed in following section.

If the device driver you are updating controls the startup host adapter from which Windows NT 3.1 loads, update the device driver in two locations (because Windows NT starts up in a two-stage process): the Windows NT device driver path (\WINNT\SYSTEM32\DRIVERS\AIC78XX.SYS) and C:\NTBOOTDD.SYS.

In the first stage of start up, no software configuration is available and Windows NT loads the device driver to control the computer startup disk from the file C:\NTBOOTDD.SYS. Therefore, when you perform the steps described previously to update a driver, explicitly copy the AIC78XX.SYS device driver to C:\NTBOOTDD.SYS (meaning that AIC78XX.SYS is copied over and renamed as C:\NTBOOTDD.SYS).

- Click on the **Command Prompt** icon in the Main program group.
- Switch to the root directory of the C drive by typing:
 

```
cd \
```
- Because the C:\NTBOOTDD.SYS file is *system, hidden, and read only*; use an attribute change program to disable the *hidden* and *read-only* attributes so that the file can be modified. To disable the attributes, type:
 

```
attrib ntbootdd.sys -r -h -s
```
- To copy the AIC78XX.SYS device driver to NTBOOTDD.SYS, type:
 

```
copy %systemroot%\system32\drivers\aic78xx.sys ntbootdd.sys
```
- To change the attributes of the NTBOOTDD.SYS file back to the original, type:
 

```
attrib ntbootdd.sys +r +h +s
```
- Click on **Add** to add another host adapter type to the list. A list of additional SCSI adapters appears.
- Expand the list of additional SCSI adapters; select **Other** and press **Enter**.
- Insert the 7800 Family diskette for Windows NT into drive A; enter the following path to the installation files and then click on **OK**.
 

```
a:\winnt\3_5
```
- The screen displays the adapter device drivers supported on the diskette and highlights:
 

```
Adaptec AHA-294 1AIC-78xx (PCI) NT 3.5x
```

 Click on **OK**. The device driver is added to the list of SCSI adapters.
- Select **Adaptec AHA-2940IAIC-78xx (PCI) NT 3.5x** from the list of SCSI adapters and click on **Install**. Windows NT Setup checks to see if the specified device driver (in this example, AIC78XX.SYS) has already been copied to the hard disk.
- If the following message appears, click on **New** to replace the existing device driver and skip to Step 10.
 

```
The driver(s) for this SCSI Adapter are already on the system. Do you want to use the currently installed driver(s) or install new one(s).
```

 If the following message appears, continue with Step 9.
 

```
Please enter the full path to the Windows NT SCSI Adapter files
```

### Windows NT 3.5x

Follow these instructions only if Windows NT 3.5x is already installed.

- Select and start the Windows NT Setup program. (Its icon is usually found in the Main program group.) There is a brief pause while Windows NT Setup scans your hardware configuration.
- Select the **Options** pull-down menu and then select **Add/Remove SCSI Adapters**. The SCSI Adapter setup program displays a list of all host adapters currently installed.
- Change the path to the directory (A:\WINNT\3\_5) with the desired device driver, then click on **Continue**. The device driver is copied to your hard disk and the Windows NT

configuration is updated so that the new device driver loads when Windows NT restarts.

10. When the installation is complete, Windows NT Setup again displays a list of currently installed host adapter types. Verify that the new host adapter appears on the list; the string looks similar to:  
`Adaptec AHA-294 /AIC-78xx (PCI) NT v3.5x`
11. Add other types of host adapters if necessary (see Step 4), or click **Close** to exit the SCSI adapters portion of Windows NT Setup, and then close the program.
12. When you see the following message, click on **OK** to exit.  
The changes you have made will not take effect until the computer is restarted  
If this message does not appear, no changes have been made to the Windows NT system configuration.
13. Restart your computer and Windows NT. It is possible that some drive letter assignments might change from the previous configuration.

## Removing a Host Adapter

**Attention:** If you have removed a host adapter but still have other host adapters of the same type installed in your computer, do not use Windows NT Setup to remove the device driver.

Removing a host adapter can be as simple as physically removing it from the slot when your computer is shut down. Windows NT starts up and functions properly in this configuration, but a warning message

is generated every time you start up Windows NT. To eliminate the warning message, update the Windows NT software configuration.

1. Select and start the Windows NT Setup program. There is a brief pause while Windows NT Setup scans your hardware configuration.
2. Select the **Options** pull-down menu and then select **Add/Remove SCSI Adapters**. The SCSI Adapter setup program displays a list of all host adapters currently installed.
3. Select the host adapter you want to remove and click the **Remove**. When the Windows NT Setup program asks you for confirmation, click on **OK**. Because SCSI device drivers are loaded during computer start up and because they might be needed to load Windows NT itself, a screen might appear warning you that Windows NT might not start up if you remove the SCSI adapter.
4. If you are sure you are removing the correct host adapter type, click **OK**.
5. Return to Step 3 if you want to remove device driver support for other types of host adapters, or click on **Close** to exit the SCSI adapters portion of Windows NT Setup.
6. Close the Windows NT Setup program. When the following message appears, click on **OK** to exit.

The changes you have made will not take effect until the computer is restarted

If this message does not appear, no changes have been made to the Windows NT system configuration.

7. Restart the computer. Note that Windows NT Setup does not delete the device driver from your hard disk drive; it only updates Windows NT software configuration information so that the device driver is no longer loaded during computer start up.

## Swapping a Host Adapter

Swapping one type of host adapter for another is similar to the procedure for adding a host adapter. The important distinction is that you make all software configuration changes while Windows NT is running and before you make the hardware changes.

1. Install the device driver for the new host adapter by following the steps in “Updating Windows NT and the Device Driver” on page 3-43.

It is not essential to remove the device driver for the host adapter you are replacing. Windows NT dynamically detects the absence or presence of host adapter hardware. Leave the existing driver installed. You might remove the driver later, after you have successfully restarted Windows NT. However, if you leave the device driver in, the operating system alerts you with an error message of the extra device driver every time you start up. See “Removing a Host Adapter” on page 3-46.

2. Once the new device driver is installed, shut down Windows NT and replace the existing host adapter.
3. Restart your computer and Windows NT. It is possible that some drive letter assignments might change from the previous configuration.

Only for Windows NT 3.1, if the host adapter you are swapping controls the computer startup device, follow the additional steps in “Updating Windows NT and the Device Driver” on page 3-43.

## Troubleshooting

The startup manager for Windows NT contains recovery logic to allow you to return to the last known good configuration. If you have changed your host adapter configuration and Windows NT no longer starts up, follow these steps to recover.

1. Undo any hardware changes you have made to the computer since it was last operational.
2. Restart the computer. Watch the display carefully during start up. If the following message appears, press the **Spacebar** and follow the instructions on the screen to continue starting with the last known good configuration.  

```
Press spacebar NOW to invoke the Last Known Good menu
```
3. Once your computer is operational again, check all of the hardware and software configuration changes you want to make. Look specifically for conflicts with parts of the existing system configuration that are not being changed.

If you cannot determine the source of the error, refer to Appendix G, “Technical Support” on page 3-66.



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## SCO UNIX Installation

The following device drivers are available on the 7800 Family diskette for SCO UNIX.

ALAD — 7800 Family driver for:

- SCO UNIX 3.2 v4.2
- SCO OpenDesktop 3.0 (ODT 3.0)
- SCO OpenServer 3.0

ALAD325 — 7800 Family driver for SCO OpenServer 5

If you are installing a tape drive, set the tape drive to SCSI ID 2; if you are installing with a CD-ROM, set the CD-ROM drive to SCSI ID 5 as recommended by SCO.

### BTLD Process

The BTLD (Boot Time Loadable Device) process is used during SCO UNIX installation to install the device driver package for SCO UNIX. The process allows SCO UNIX to use the host adapter that might not have included (embedded) in SCO operating system. Without the BTLD process, new hardware could not be used until their device drivers are included in the next SCO product release. The steps to perform the BTLD process are described in the following section. Note that SCO OpenServer 5 includes the device driver package for SCO UNIX and does not require the BTLD process.

## Installing SCO UNIX and the Device Driver

This section describes how to install the ALAD device driver at the same time you install either SCO UNIX 3.2 v4.2, SCO ODT 3.0, or SCO OpenServer 3.0. If you are installing SCO OpenServer 5, follow the instructions provided with the SCO product to perform the initial installation (regular non-BTLD installation) with the device driver included in SCO. If you then want to update this included device driver, follow the instructions in “Updating SCO UNIX and the Device Driver” on page 3-50.

If you are changing the startup device from a non-SCSI hard disk to a SCSI hard disk attached to the SCSI host adapter, reinstall SCO UNIX. If you are already starting up from a SCSI hard disk and want to start up from SCSI hard disk attached to the SCSI host adapter, you can either reinstall SCO UNIX with the new device driver (as described in this section), or update SCO UNIX with the new driver (see “Updating SCO UNIX and the Device Driver” on page 3-50). If you have difficulty performing the driver installation or update, see page 3-55.

For best results, only install SCSI the host adapter in your computer when you perform the installation. At various points in the procedures you are instructed to follow the installation procedures in the SCO manuals. After completing those procedures, return to the instructions here and continue.

1. Insert the *SCO UNIX NI (Startup)* diskette into the primary diskette drive and turn on the computer.
2. When you see this message, type **link** and press **Enter**.

SCO UNIX System V/386

Boot

The screen then displays the following message.

What packages do you need linked in the system,  
or 'q' to quit?:

(Note that the UNIX commands are case sensitive. Enter the  
commands exactly as shown in the instructions.)

3. Type **alad** and press **Enter**. ALAD is the package name (prefix)  
for the ALAD device driver used with the host adapter.

4. Next, this startup line and a series of prompts similar to the  
following appear.

```
fd(64)unix rootfd(96) swapram( ) swaplo32 ronly
mem/p
link"alad" btldfd(x)
:
Loading kernel fd(x)unix .text... ..
:
```

The *x* in the prompts above represents the minor number for your  
diskette startup drive. *x* is found by the operating system; you do  
not have to enter this minor number.

5. When you see the following message, insert the requested volume  
(7800 Family diskette for SCO UNIX) and press **Enter**.

Please insert the fd(x)alad volume and press  
<Return>, or 'q' to quit:

Messages similar to the following appear until the device driver is  
completely loaded.

```
alad.alad:Loading module
fd(52)/alad/driver/alad/Driver.o
.text .....
```

:

:

alad: Driver "alad" successfully loaded.

6. When the following message appears, remove the 7800 Family  
diskette for SCO UNIX, insert the *SCO UNIX N2 filesystem*  
diskette and press **Enter**.  
Insert N2 filesystem floppy and press <Return>
7. Turn to the appropriate SCO manual for instructions on  
completing an installation or upgrade of your operating system.  
Only for SCO UNIX 3.2 v4.2, when the run-time installation is  
complete, make sure you select the **Install Additional Software**  
option. This ensures that the Link Kit is installed and available  
for later device driver integration. Follow the SCO manual  
installation instructions until you have completed the Password  
procedure.
8. After completing the Password procedure, a message similar to  
the following appears.  
The BTLN packages will now be added to the Link  
Kit. The following packages are on this disk.  
Name Description  
alad Adaptec AIC-787 Driver v1.7 for SCO .  
alad325 Adaptec AIC-787 Driver v1.7 for SCO .  
Please enter the names of the packages you want  
to install or q to quit:  
[default: alad]
9. Type **alad** and press **Enter**. The ALAD device driver for your  
host adapter has been relinked to the SCO UNIX kernel.  
Installation is complete.

## Updating SCO UNIX and the Device Driver

This section describes how to update and install the 7800 Family device driver for SCO UNIX if SCO UNIX 3.2 v4.2, SCO ODT 3.0, SCO OpenServer 3.0, or SCO OpenServer 5 is already installed. The instructions for installing and updating the device driver are similar for all SCO products. Procedures that are specific to SCO versions are noted below.

**Attention:** Improper or incorrect device driver updates might destroy your existing UNIX filesystem. Back up all important files before proceeding.

If you are adding an additional PCI Fast/Wide Ultra SCSI Adapter to a computer with a 7800 Family adapter already installed, skip to “Adding Devices with MKDEV” on page 3-53. You might update the device driver first by following steps 1 through 6 in “Installing SCO UNIX and the Device Driver” on page 3-48.

Complete the following six procedures in the order that the sections appear to install or update the device driver. (To update and install the driver, first enter the Single User Mode, System Maintenance Mode.)

### 1. Performing a System Backup

This procedure backs up the old UNIX kernel and any other important files. Follow these steps to back up all important files on the computer. (Refer to your SCO manuals for more information.)

- a. Login as root.
- b. For SCO 3.2v4.2 based UNIX, to back up the current kernel configuration, type the following and press **Enter**.

```
cp /unix /unix.orig
```

For SCO OpenServer 5, to back up the current kernel configuration, type the following and press **Enter** after each line.

```
umount /stand
mount /etc/boot /stand
cp /stand/unix /stand/unix.orig
```

If you ever need to start up from the pre-update kernel, load the UNIX.ORIG backup kernel at the UNIX Boot prompt.

To do this, type **unix.orig** and press **Enter**.

- c. This step is optional. For extra security, back up the MDEVICE file and the SDEVICE.D directory. Check the current directory sizes to help you decide if you want to devote the driver space to the backed-up files. To perform this extra backup, type the following and press **Enter**.

```
copy -rom /etc/conf /etc/conf.bak
```

If you ever want to restore the previous kernel configuration, the extra backup step above ensures that the entire system configuration can be restored. To restore the previous configuration, start up from the original kernel (see page 3-55), type the following and press **Enter** after each line.

```
mv /etc/conf /etc/conf.alad
mv /etc/conf.bak /etc/conf
```

## 2. Installing the Package

This procedure uses INSTALLPKG to load the device driver.

- a. At the UNIX system prompt, type **installpkg** and press **Enter**. The screen then displays the following messages.

```
Confirm
Please insert the floppy disk
:
:
Strike ENTER when ready or ESC to stop.
```
- b. Insert the 7800 Family diskette for SCO UNIX and press **Enter**. The screen then displays the following messages.

```
Installation is in progress - do not remove the
floppy disk.
The following packages are on this disk:
Name      Description
alad      Adaptec AIC-787  Driver v1.7 for SCO
alad325   Adaptec AIC-787  Driver v1.7 for SCO
Please enter the names of the packages you want
to install, or q to quit:
```
- c. At this point, type **alad** (type **alad325** for SCO OpenServer 5) and press **Enter**. The screen then displays the following message and various installation status prompts.

```
Installing alad
```

When the device driver is done loading, the following appears.

```
Installed alad
#
The ALAD device driver has now been loaded into the Link
Kit for kernel addition.
```

## 3. Examining the MSCSI File

This procedure modifies the SCSI configuration master table (MSCSI file). If you want to change your primary host adapter to a PCI Fast/Wide Ultra SCSI Adapter, replace the string **spad**, **ad**, **arad**, **ciad**, or other string with **alad** for host adapter number 0 in the MSCSI file. This replacement causes the driver to become a permanent part of the new startup kernel on rebuild.

- a. Enter the following command.

```
cd /etc/conf/cf.d
```
- b. Enter the following command to copy the file.

```
cp mscsi mscsi.org
```
- c. Use a text editor to edit this file. Enter the following command if using the VI editor.

```
vi mscsi
```
- d. Search for all entries with the host adapter number 0. The host adapter number is the third column in each entry.

---

<sup>6</sup> This field applies to only SCO OpenServer 5.

Host Adapter Prefix	SCSI Device Type	Host Adapter No.	Target ID	Logical Unit No.	Bus <sup>6</sup>
xx	Stp	0	2	0	0
xx	Sdsk	0	0	0	0
xx	Srom	0	5	0	0

- e. Modify your MSCSI file depending on your hardware configuration.

If you are starting up from a 7800 Family adapter, make sure the host adapter prefix for the host adapter number 0 is ALAD.

If you are not starting up from the a 7800 Family adapter, make sure the prefix for the host adapter number 0 is the appropriate prefix for each device on your primary host adapter.

Host Adapter Prefix	Type of Device Driver	Primary Host Adapter
auto	embedded	AHA-1540/1640 family
auto	embedded	AHA-1740 family
auto	embedded	AIC-6260 family
arad	BTLD	AIC-7770 family
smad	BTLD	AIC-6260/630 family

- f. Save the file and exit the text editor.

#### 4. Rebuilding the UNIX Kernel

This procedure rebuilds the kernel to reflect the new changes.

- Type the following at the # prompt and press **Enter** after each line.
 

```
cd /etc/conf/cf.d
./link_unix
```
- When the kernel has been built, shut down the operating system by typing **haltsys** and pressing **Enter**.
- Turn off the computer power when you are prompted.
- Continue with the next section updating the hardware configuration. (The UNIX kernel has been prepared for 7800 Family host adapter operation.)

#### 5. Updating the Hardware Configuration

This procedure configures the hardware by setting switches using *SCSISelect* as explained in Appendix B, “SCSISelect” on page 3-11.

#### 6. Starting Up with the New Kernel

This procedure restarts the computer with the new kernel.

- Follow the screen instructions to restart your computer, usually by pressing **Enter**.
- Check the host adapter BIOS messages to verify that all your installed SCSI devices are listed. If some or all of your

installed SCSI devices do not appear, your SCSI cables might be loose, or the SCSI device setup might not be complete. Correct any problem before proceeding.

- c. Wait for UNIX to complete start up with the new kernel. Refer to “Troubleshooting” on page 3-54 if the operating system malfunctions or if UNIX error messages are displayed during start up.

The ALAD device driver for your host adapter is now be ready for use.

## Adding Devices with MKDEV

Follow the instructions in the SCO manuals for adding devices or a host adapter (to a computer with a PCI Fast/Wide Ultra SCSI Adapter already present) using the MKDEV command. Keep the following in mind.

MKDEV asks for the device prefix. The 7800 Family device driver package name, ALAD, is the prefix for the host adapter.

When the operating system asks for the host adapter prefix, type **alad** and press **Enter**.

Refer to the *SCO UNIX Operating System Administration Guide* for additional information on MKDEV and adding devices.

## Using Wide SCSI Host Adapters and Devices

SCO UNIX 3.2 v4.2, SCO ODT 3.0, and SCO OpenServer 3.0 support SCSI IDs 0 to 7; SCSI IDs greater than 7 are not recognized. Only 7 SCSI devices (SCSI ID 0 to 6, with the host adapter set at SCSI ID 7) can be attached and supported.

SCO OpenServer 5 supports SCSI IDs 0 to 15; therefore up to 15 SCSI devices can be attached and supported.

## Using ALAD Device Driver Tunable Parameters

For SCO UNIX, some parameters are defined in the following file.

```
/etc/conf/patch.d/alad/space.c
```

These parameters can be tuned for the ALAD device driver (prefix for the 7800 Family driver). After modifying the SPACE.C file, rebuild the kernel for the new parameters to take effect. If the SPACE.C file has not been modified, all the parameters are set according to *SCSISelect* for your host adapter. However, you can override the parameters by modifying the SPACE.C file.

If you want to change the configured values, the first number indicates whether to change the default. If it is set to 0, the parameter is set to the default. If it is set to 1, the second number is used to override the default. For example:

```
char variable = {1,22};
```

The first number is 1 which overrides the default variable with the value 22.

The following are examples of setting parameters.

Example — `alad_parity[SCSI_NALAD]` — specifies whether the host adapter checks parity on incoming SCSI data. If the second number is set to 0, parity checking is enabled. If it is set to 1, parity checking is disabled.

In this example you want the host adapter not to check parity on incoming SCSI data; define parameters as:

```
alad_parity[SCSI NALAD] = {1,1};
```

Other Information — The ALAD device driver supports scatter/gather and tagged queuing; however, the *Sdsk* driver controls whether these features are enabled or disabled. Look for the *Sdsk* driver controls in the `SPACE.C` file located at:

```
/etc/conf/pack.d/Sdsk/space.c
```

### Using Disk Drives greater than 1 GB

SCO UNIX supports drives greater than 1 GB. SCO UNIX has no limitation with drives greater than 1 GB, and recognizes the drive whether the **Extended BIOS Translation** feature is *Enabled* or *Disabled* in *SCSISelect* (see “Advanced Host Adapter Settings” on page 3-14 for additional information on using drives greater than 1 GB).

### Troubleshooting

This section contains three troubleshooting areas: checking host adapter BIOS messages, starting up from the old kernel, and starting up from a SCSI drive to assist in problem determination.

#### Checking Host Adapter BIOS Messages

Make sure that BIOS messages appear for your primary host adapter. If not, the host adapter might not be properly configured, check the following.

The host adapter supports level-triggered interrupts and can share the same interrupt with another host adapter or PCI hardware that also supports level-triggered interrupts. Refer to “Step 10. Configuring the Computer” on page 2-10 for details in configuring IRQs and other parameters in the setup.

Install the startup host adapter into the lowest PCI Device number. The slot number on the PCI bus determines the **Device** number. To find out the **Device** number of your host adapter, run the *SCSISelect* (refer to Appendix B, “SCSISelect” on page 3-11 for more information on running this program). Look on the first screen of the program in the upper right corner for **Bus:Device** *xx:xxh* (given in hex).

If the **Device** number is high, power off the computer, move the host adapter to a PCI slot at the other end of the system board, and rerun *SCSISelect* to see if the number is lower. The host adapter LED lights during activity. This light helps to determine which adapter *SCSISelect* displays information. Refer to your

operating system documentation for further details on determining the PCI slot number and slot number order in the computer.

If starting up from the SCSI host adapter and using ISA/EISA-based host adapters as secondary devices, disable the BIOS on all ISA/EISA-based host adapters.

If starting up from ISA/EISA-based host adapters and using the SCSI host adapter as a secondary device, see your ISA/EISA-based host adapter documentation to ensure the host adapter is at the lowest BIOS base address. ISA/EISA-based host adapters start up before the SCSI host adapters.

Check the BIOS messages to verify that all installed SCSI devices are listed. If some or all devices do not appear, possible reasons are as follows.

SCSI cables might be loose.

Installed devices on the adapter might have SCSI ID conflicts. SCSI termination might be set incorrectly.

Some older SCSI device, especially CD-ROM drives, do not properly respond to synchronous negotiation. As a result, these devices might lock or reset the SCSI bus. To solve this problem, turn off synchronous negotiation for this device ID through *SCSISelect*, see “SCSI Device Settings” on page 3-12 for information.

#### Starting Up with the Old Kernel

Follow these steps to start with the old kernel.

1. Restart the computer.

2. At the Booting UNIX System... prompt, type **unix.orig** and press **Enter**. You can now start up the computer from the backup kernel you created prior to the device driver update.

#### Starting Up the Computer from a SCSI Drive

Make sure your host adapter is installed and configured correctly. The following are some of the things to verify.

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

Drives setting (in your computer setup configuration program) that corresponds to the SCSI startup drive is set to **None** or **No Drives Installed**, as is required for SCSI disk drives. (See your computer documentation for more information.)

**Host Adapter BIOS** setting in *SCSISelect* is *Enabled*.

**Extended BIOS Translation** feature in *SCSISelect* is *Disabled*.

This feature is used only with DOS 5.0 or later. You do not need to enable this option for SCO UNIX.

Examine the SCO UNIX MSCSI file to make sure the correct host adapter and device are specified as the startup entry. The startup entry is the first all zero entry in the MSCSI file (see page 3-51 for additional information).

For SCO UNIX 3.2v4.2, the startup entry looks like:

```
alad sdisk
```

For SCO OpenServer 5, the startup entry looks like:

```
alad sdisk
```



Each field is separated by a tab (do not use the Spacebar to separate fields). The meaning of each field is as follows.

Host Adapter Prefix (ALAD) — Identifies the name of the host adapter device driver. If you are starting up from the SCSI host adapter, make the Host Adapter Prefix be ALAD.

SCSI Device Type (Sdsk) — Identifies the type of SCSI device. For example, *Sdsk* indicates that the device is a SCSI hard disk, *Srom* indicates a CD-ROM drive, and *Stp* indicates a tape drive.

Host Adapter Number (0) — Identifies the SCSI host adapter to which the SCSI device is attached. For example, the first SCSI host adapter is 0, the second SCSI host adapter is 1.

Target ID (0) — Identifies the SCSI ID of the SCSI device.

Logical Unit Number (0) — Identifies the Logical Unit Number of the SCSI device. This field is usually 0.

Bus (0) (This field applies only to SCO OpenServer 5.) — Identifies the SCSI bus to which the SCSI device is attached. For most single channel devices the **Bus** number is 0.

To edit the MSCSI file, use the VI editor. Build a new kernel in order for any changes to take effect (see page 3-52).

---

## UnixWare Installation

The following device driver packages are available on the 7800 Family diskette for UnixWare 1.x and 2.x.

ADSL — 7800 Family device driver for UnixWare 2.x.

ADSLO — 7800 Family device driver for UnixWare 1.x

If you are performing a first time UnixWare installation, see “Installing UnixWare and the Device Driver” on page 3-57 to begin device driver installation. If UnixWare is already installed in your computer, see “Updating UnixWare and the Device Driver” on page 3-59.

## Device Driver Installation Process

The 7800 Family device driver for UnixWare is installed in one of two ways: linked-and-integrated with the UnixWare kernel, or loadable to start, running after the kernel has loaded into memory.

For installations on computers that start up from a SCSI device connected to the host adapter, link the device driver directly to the kernel. If the computer does not start up from a device connected to the host adapter, the device driver might be installed as loadable. Linked and loadable device driver installations are done as follows.

When performing a new UnixWare installation, the operating system determines whether your computer starts up from the SCSI host adapter. The device driver is automatically installed as loadable, or link-edited with the kernel to suit your computer. When performing a device driver update installation, UnixWare assumes that your computer does not start up from a device

connected to the SCSI host adapter. If your computer starts up from the SCSI host adapter, perform an edit described on page 3-60.

## Using Disk Drives greater than 1 GB

UnixWare 1.x does not support **Extended BIOS Translation**. If you have a hard drive greater than 1 GB, disable this feature on your host adapter before installing or updating the device driver. See “Advanced Host Adapter Settings” on page 3-14 for details on using drives greater than 1 GB.

After changing the setting of the **Extended BIOS Translation** feature, partition and high-level format the drive.

## Installing UnixWare and the Device Driver

This section describes how to install the 7800 Family driver for UnixWare at the same time you install UnixWare 1.x or 2.x.

### UnixWare 1.x

Follow these instruction only if you are installing UnixWare 1.x for the first time. Be sure to read the installation documentation included with your UnixWare distribution package and complete the following procedures in the order they appear. (The UnixWare 1.x operating system supports only eight SCSI buses in the computer. This means you can install no more than eight host adapters.)

1. Modifying the Advanced CMOS Setup — Follow these instructions for modifying the Advanced CMOS Setup.

- a. Restart the computer and press **F1**, **F2**, or **Del** (depending on the BIOS) to enter the CMOS setup program.
- b. Set all PCI channels to IRQ 10.

When installing UnixWare 1.x, all installed PCI Fast/Wide Ultra SCSI Adapters use IRQ 10 and will not work with other IRQs. (When installing UnixWare 2.x, any IRQ can be used.)

When initial installation of UnixWare 1.x is complete, the IRQ can be changed to another supported IRQ as long as there are no conflicts with the IRQ of another host adapter. Make the IRQ in the CMOS setup correspond to the IRQ in the configuration table.

- c. To change the host adapter configuration, see Appendix B, “SCSISelect” on page 3-11 for more information.

2. Installing UnixWare — Follow these instructions to load the UnixWare operating system and ADSLO device driver into memory from the UnixWare distribution media and the IHV HBA diskette (or the 7800 Family diskette for UnixWare). Refer to the *Unix Ware Installation Guide* for more information.

- a. Insert Diskette 1 of the *UnixWare 1.x Boot Package* into the diskette startup drive. Turn your computer on.
- b. Follow the screen instructions to start up (usually by pressing **F1**). The UnixWare operating system starts to load.
- c. When prompted to insert the host bus adapter device drivers diskette, insert the IHV HBA diskette (or 7800 Family diskette for UnixWare) into the primary diskette drive and

press **Enter**. (You cannot load the ADSLO device driver from a secondary diskette drive.) As the driver loads, a message identifying the located host adapter briefly appears on screen.

- d. Follow the screen instructions to load the UnixWare operating system. Refer to the operating system documentation and screen help files for help in choosing options.

The installation program instructs you to load the second and third *UnixWare Startup and Foundation Set* diskettes.

Then the installation program instructs you to choose a media format for the Foundation Set software. If the media type for the device you connected for the Foundation Set software media does not appear as a choice, the device might not have been recognized when the device driver was loaded into memory.

The UnixWare 1.x optional online explanation of the installation process can be accessed at this time. If this is your first installation, the information might be valuable to you.

- e. At the end of this part of the installation process you are prompted to insert the HBA diskettes that you used before. Continue with the next section.
3. Loading the Device Drivers onto the Hard Disk — Follow these instructions to copy the device drivers to the hard disk, and relink the kernel.

- a. Insert the IHV HBA device driver diskette (or 7800 Family diskette for UnixWare), into the primary diskette drive and press **Enter**.
- b. Follow the screen instructions to finish the installation. Refer to the operating system documentation for help in choosing options.
- c. Remove the IHV HBA device driver diskette (or 7800 Family diskette for UnixWare) when prompted to do so.
- d. After the installation, restart the computer, login, set user-level information. The UnixWare operating system E-mail utility program notifies you that there are messages in your mailbox.
- e. Check your UnixWare mailbox for an E-mail message on the status of the installed ADSLO device driver package.

Your UnixWare installation is now be complete. If your installation fails, do not attempt to use the update installation PKGADD procedure to fix the installation. Follow the instructions in the UnixWare 1.x documentation and this document to retry the installation.

### UnixWare 2.x

Follow these instructions only if you are installing UnixWare 2.x for the first time.

1. Insert the *Install Diskette* of the UnixWare 2.x package into the diskette startup drive. Restart your computer. Wait for the first UnixWare 2.x installation screen and prompt and then follow the screen instructions.

2. One of the prompts appears.
 

```
Install Host Bus Adapter Drivers
Continue Installation
```

 Remove the install diskette, then select **Install Host Bus Adapter Driver** and press **Enter**.
3. Insert the HBA device driver diskette (or 7800 Family diskette for UnixWare) into the primary diskette drive and press **Enter**. (You cannot load drivers from a secondary diskette drive.) As the driver loads, a message identifying the located host adapter briefly appears on screen. The installation process determines which device drivers on the diskettes are needed.
4. If you have additional HBA diskettes, insert the next HBA diskette, select **Install Another HBA Diskette**, and press **Enter**. If all of your HBA diskettes have been installed, remove the last HBA diskette, select **Continue Installation**, and press **Enter**.
5. If necessary, enter the DCU (Device Configuration Utility) to view and change the UnixWare device driver configuration data.
6. Follow the screen instructions to continue with installation. Refer to the operating system documentation and screen help files for help in choosing options.
7. When prompted, you are asked to reinsert the specific HBA Diskettes that you used before.
8. Follow the screen instructions to complete the UnixWare installation. If your installation fails, do not attempt to use the update installation PKGADD procedure to fix the installation. Follow the instructions in the UnixWare documentation and in this document to retry the installation.

## Updating UnixWare and the Device Driver

This section describes how to update and install the 7800 Family device driver if UnixWare 1.x or 2.x is already installed. These instructions are similar for both UnixWare 1.x and 2.x. Procedures that are specific to a UnixWare version, are noted.

**Attention:** Improper or corrupt device driver updates might destroy your existing UnixWare file system. Back up all important files before proceeding. Consult your UnixWare manuals for proper backup procedures.

The following is an overview of the procedures needed to update and install the device driver. Complete the procedures in the order the sections appear. (Note that the UnixWare commands are case sensitive. Enter the commands exactly as shown here.)

1. Backing Up the Computer — Backs up the old UnixWare kernel and any other important files. If you have not already done so, back up all important files on the computer. Consult your UnixWare documentation for proper UnixWare file system backup procedures.
  - a. Login as root at the UnixWare # system prompt.
  - b. To back up the old UnixWare kernel, type the following and press **Enter**.
 

```
cp /stand/unix /stand/unix.work
```
2. Loading the Package — Uses PKGADD to load the 7800 Family device driver package.

- a. For Unix Ware 1.x, delete the old device driver by typing the following and pressing **Enter**.  

```
/etc/conf/bin/idinstall -d adslo
```

For Unix Ware 2.x, delete the old device driver by typing the following and pressing **Enter**.  

```
/etc/conf/bin/idinstall -d ads1
```
- b. At the system prompt, type the following and press **Enter**.  

```
pkgadd -d diskette1
```

Follow the screen instructions to insert the IHV HBA diskette (or 7800 Family diskette for UnixWare) into the diskette startup drive.
- c. Select the install package.  

```
ihvhba
```

 (UnixWare 1.x) from the screen menu  

```
ads1
```

 (UnixWare 2.x) from the screen menu  
Press **Enter**. The package is loaded into your UnixWare operating system.
- d. When the package has loaded, you might be prompted to install the diskette again. Do not reinsert the IHV HBA diskette (or 7800 Family diskette for UnixWare 1.x and 2.x). Instead, type **q** (quit) and press **Enter**
- e. Type **mail** and press **Enter**. The mail messages tell you if the installation was successful. If a mail message informs you that the installation has failed, turn to “Troubleshooting” on page 3-63.
- f. Type **pkginfo** and press **Enter**

- g. Verify that the device driver is now listed. The host adapter driver appears among the other installed packages. If the host adapter device driver does not appear in the *Pkginfo* listing, turn to “Troubleshooting” on page 3-63.

For UnixWare 1.x, the listing is:

```
system ihvhba  Adaptec AIC-787  PCI SCSI
                IHV HBA
```

For UnixWare 2.x, the listing is:

```
system ads1  Adaptec AIC-787  PCI SCSI
                IHV HBA
```

3. Modifying the New System File — Modifies the new device driver that was loaded in the previous procedure for computers starting up from a device connected to the host adapter. Loading the driver causes the driver to become a permanent part of the new startup kernel on rebuild.

If you are not starting up your computer from the host adapter SCSI and you want to leave the device driver as a loadable module, skip to page 3-61 and page 3-61 for UnixWare 2.x.

If you are starting up your computer from a device connected to the host adapter, follow these steps to modify the new device driver system file that was loaded in the previous section.

- a. Back up the ADSL UnixWare configuration file. To do this, type the following and press **Enter** after each line.  

```
cd /etc/conf/sdevice.d
cp ads/save/ads1.org
```
- b. Edit the configuration file.

For UnixWare 1.x — Use the VI text editor to remove the following line from the ADSL configuration file.

```
$loadable adslo
```

For UnixWare 2.x — Use the VI text editor to add the following line immediately below the *version 2* line in the ADSL configuration file:

```
$static
```

- c. Display the contents of the edited ADSL or ADSLO file by typing the following and pressing **Enter**.

```
cat adsl (for UnixWare 2.x)
```

```
cat adslo (for UnixWare 1.x)
```

For UnixWare 1.x, — Verify there is no line \$LOADABLE ADSLO present.

For UnixWare 2.x — Verify there is a line \$STATIC present immediately below the line \$VERSION 2.

4. Building the Loadable Modules (UnixWare 1.x Only) — Builds the loadable modules for the device drivers.

If you are starting up your computer from a device on the SCSI host adapter, skip to the next section.

If you are not starting up your computer from a device on the SCSI host adapter and you left the \$LAODABLE ADSL line in the ADSL file, type these commands to build the loadable modules for the device drivers.

```
cd /etc/conf/bin
./idbuild -M adsl
```

5. Rebuilding the UnixWare Kernel — Rebuilds the kernel with the new device driver.

- a. Type the following at the # prompt and press **Enter** after each line.

```
cd /etc/conf/bin
```

```
./idbuild -B
```

Status messages appear.

- b. When the kernel has been built, type the following and press **Enter** after each line (note that the 0 in -g0 is zero, not the letter O).

```
cd /etc/conf/cf.d
```

```
cp unix /stand/unix
```

```
cd /
```

```
shutdown -g
```

- c. Type **y** and press **Enter** when the computer asks if you really want to shut down. The following message appears on the screen.

```
System Is Down
```

The UnixWare kernel is now ready for host adapter operation.

6. Starting Up the New Kernel — Restarts with the new kernel.

- a. Follow the screen instructions (usually by pressing **Enter**) to restart your computer.

- b. Check the startup messages to verify that all your installed SCSI devices are listed. If some or all of your installed SCSI devices do not appear, your SCSI cables might be loose, or the SCSI device setup might not be complete. Refer to your computer troubleshooting and SCSI configuration documentation.

- c. Wait for UnixWare to complete start up with the new kernel. Refer to “Troubleshooting” on page 3-63 if the computer malfunctions or if UnixWare error messages appear during start up.

The updated device driver for UnixWare is now be ready to use.

### Using Tunable Parameters

For UnixWare, some parameters are defined in the following files.

```
/etc/conf/pack.d/adslo/space.c (for UnixWare 1.x)
/etc/conf/pack.d/ladsl/space.c (for UnixWare 2.x)
```

These parameters can be tuned for the ADSL and ADSLO device drivers. Refer to the comments in the appropriate SPACE.C file for a description of these parameters. After modifying the SPACE.C file, rebuild the kernel for the new parameters to take effect. Note that the ADSL and ADSLO device drivers support tagged queuing and reinitialization.

### Using Multiple Host Adapters

When using multiple host adapters, consider the following.

When installing UnixWare 1.x and multiple host adapters, make sure all PCI channels are set to IRQ 10. The host adapter must use IRQ 10 and will not work with other IRQs. When installing UnixWare 2.x, any IRQ can be used.

When initial installation of UnixWare is complete, the IRQs can be changed to another supported IRQ as long as there are no conflicts with the IRQs of another host adapter. Make the IRQ in the CMOS setup correspond to the IRQ in the configuration table.

Configure the host adapter and computer for multiple host adapters as explained in Appendix E, “Configuring Multiple Host Adapters” on page 3-64.

To start up from the host adapter, set the adapter to the lowest PCI Device number. See “Step 10. Configuring the Computer” on page 2-10.

For UnixWare 1.x, if you skip a host adapter in a PCI slot, *Disable* the **Host Adapter BIOS** (see “Advanced Host Adapter Settings” on page 3-14). Enable the channel in the SDEVICE.D file by selecting **Y** at the line /ETC/CONF/SDEVICE.D/ADSL.

UnixWare 2.x supports automatic configuration. When adding multiple host adapters to an existing UnixWare 2.x system, simply install the board and restart; the operating system automatically reconfigures and rebuilds the kernel. If you want to choose a host adapter to start up from, simply disable the BIOS on all other host adapters.

### Removing the Device Driver

If you no longer need the ADSL or ADSLO device driver, you can use the following procedure to remove it completely.

1. Back up all important computer files.
2. For Unix Ware 2.x, at the UnixWare root prompt, type the following.

```
/etc/conf/bin/dinstall -d adsl
```

The following files will be deleted.

```
/etc/conf/mdevice.d/adsl  
/etc/conf/pack.d/adsl/Driver.o  
/etc/conf/pack.d/adsl/space.c  
/etc/conf/pack.d/adsl/disk.cfg  
/etc/conf/sdevice.d/adsl
```

For UnixWare 1.x, at the UnixWare root prompt, type the following.

```
/etc/conf/bin/idinstall -d adsl
```

The following files will be deleted.

```
/etc/conf/mdevice.d/adsl  
/etc/conf/pack.d/adsl/Driver.o  
/etc/conf/pack.d/adsl/space.c  
/etc/conf/pack.d/adsl/disk.cfg  
/etc/conf/sdevice.d/adsl
```

3. Then, rebuild the kernel (0 in -g0 is zero, not the letter O).

```
/etc/conf/bin/idbuild -B -K  
cp /etc/conf/cf.d/unix /unix  
cd /  
shutdown -g
```

4. Reconfigure your computer for your alternative or replacement drive controller, and restart the computer.

## Troubleshooting

If your computer malfunctions or displays error messages during the start up procedure, try one of the following.

Check the Advanced CMOS Setup (only for UnixWare 1.x)

1. Restart the computer and press **F1** or **Del** (depending on the BIOS) to enter the CMOS setup program.
2. Set all PCI channels to IRQ 10. For UnixWare 1.x, the host adapter uses IRQ 10 and will not work with other IRQs. For UnixWare 2.x, any IRQ can be used.

Starting Up with the Old Kernel

1. Restart the computer
2. At the Booting UNIX System.... prompt or loading UnixWare graphics, press the **Spacebar**.
3. For Unix Ware 1.x, the computer asks which kernel you want to start. Type the name of the old kernel (for example, **unix.work**) and press **Enter**. You can now start up the computer from the backup kernel created earlier in "Updating UnixWare and the Device Driver" on page 3-59.

For Unix Ware 2.x, from the [boot]# prompt, first type **KERNEL=old kernel** (for example, **KERNEL=unix.work**) and press **Enter**. Then, type **go** and press **Enter**. You can now start up the computer from the backup kernel created earlier in "Updating UnixWare and the Device Driver" on page 3-59.



#### Repeat the Update Installation

1. Follow the instructions in “Removing the Device Driver” on page 3-62 to delete the device driver from your computer.
2. Perform the device driver update procedure again. See “Updating UnixWare and the Device Driver” on page 3-59 for more information.

## ***Appendix E.*** ***Configuring Multiple Host Adapters***

Multiple PCI Fast/Wide Ultra 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 Fast/Wide Ultra 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 *SCSISelect*, if the program finds multiple PCI Fast/Wide Ultra 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 *SCSISelect* 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 F.*** ***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 G.*** ***Technical Support***

Before calling, please prepare for your call by following these steps.

---

### **Step 1: Troubleshooting**

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 6. Connecting Internal Devices” on page 2-8.)

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 2-4.)

Are all the devices on the SCSI bus terminated properly? (See “Step 4. Terminating the SCSI Bus” on page 2-7.)

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 10. Configuring the Computer” on page 2-10.)

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 *SCSISelect*.

**04h - Hardware error:**

The disk drive might be defective. Consult the hardware documentation and contact the manufacturer.

**05h - Illegal request:**

The *SCSISelect* 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 3-12 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 *SCSISelect* 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.

---

## Step 2: Preparing for the Call

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

1. Computer manufacturer and computer model
2. Option name: PCI Fast/Wide Ultra SCSI Adapter
3. Proof of purchase
4. Exact wording of the error message (if any)
5. Description of the problem
6. 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.

---

## Step 3: Placing the Call to IBM

Technical support is available during the warranty period to answer any questions about your new IBM option. Support response time will vary depending on the number and nature of calls received.

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 in the table or insert, contact your IBM reseller or IBM marketing representative.

<i>Support 24 hours a day, 7 days a week</i>	
Canada	1-800-565-3344
Puerto Rico	1-800-772-2227
United States	1-800-772-2227

## Appendix H. 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

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**Warranty Period\*:** Three Years

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

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### Warranty Service

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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:

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