QLA940–PI
QLA1040–PI
QLA1041–PI

Host Adapter Cards
for the PCI Bus

Installation Guide

PC4051102–00 Rev. A
March 5, 1996

Document Revision History
Rev. A initial release, 3/5/96

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NOTE: The following peripheral component interconnect (PCI) boards are collectively referred to as the *PCI Ultra board* unless otherwise noted: QLA940–PI (eight–bit, single–ended), QLA1040–PI (wide, single–ended), and QLA1041–PI (wide, differential). Narrow is defined as eight bits per data transfer. Wide is defined as 16 bits per data transfer.

Using these Instructions

Reading this installation guide is recommended before you install your PCI Ultra board. Advanced users may wish to bypass the guide and proceed directly to these installation procedures. This section is a condensed version of the instructions in sections 2 and 3.

Termination for the QLA940–PI and QLA1040–PI boards is set automatically. See appendix B for termination instructions for the QLA1041–PI board.

What You Need for Installation

- ○ A screwdriver
- ○ A SCSI–2, high–density, 50–pin cable (required only if connecting **narrow, external devices** to the QLA940–PI board)
- ○ A SCSI–2, high–density, 68–pin cable (required only if connecting **wide, external devices** to the QLA1040–PI and QLA1041–PI boards)

Installing Your PCI Ultra Board

First, backup your data:

- ○ Make a backup copy of the DOS–NT–NetWare–OS/2–Win95 diskette.
- ○ Make a backup copy of all the current disk devices you want to move to the PCI Ultra board.

Second, install the PCI Ultra board:

- ◯ Power down your peripherals, then your computer.
- ◯ Remove the computer cover.
- ◯ Check the motherboard and make any configuration changes necessary to accommodate the PCI Ultra board.
- ◯ Install the PCI Ultra board in an appropriate slot.
- ◯ Connect the appropriate internal and/or external SCSI peripheral cables. Make sure you match pin 1 on the 50–pin internal connector with pin 1 on the ribbon cable.

  CAUTION! You can use any two of the connectors on the QLA1040–PI and QLA1041–PI boards (see figures 2 and 3 in this guide). Using all three connectors at the same time violates the SCSI specification.
- ◯ Replace the computer cover.
- ◯ Power up the peripherals, then the computer.

Third, install the DOS and Windows software:

- ◯ Insert the DOS–NT–NetWare–OS/2–Win95 diskette in an appropriate drive.
- ◯ At the prompt, type `(drive):INSTALL`. For example:

  ```
  A:INSTALL
  ```

- ◯ Press the <ENTER> key. At the prompt, read the introductory information.
- ◯ At the prompt, select Express or Custom Installation. Follow the instructions on the screen.

Congratulations! You have successfully installed your new PCI Ultra board. Refer to the rest of this guide for additional configuration information and troubleshooting hints.

Section 1
Introduction

NOTE: The following peripheral component interconnect (PCI) boards are collectively referred to as the *PCI Ultra board* unless otherwise noted: QLA940–PI (eight–bit, single–ended), QLA1040–PI (wide, single–ended), and QLA1041–PI (wide, differential). Narrow is defined as eight bits per data transfer. Wide is defined as 16 bits per data transfer.

1.1
General Description

Thank you for selecting the PCI Ultra board as your small computer system interface (SCSI). The PCI Ultra board is an intelligent, high–performance, direct memory access (DMA) bus master SCSI host adapter designed for high–end systems. The intelligence and performance are derived from the ISP1020 chip, making the PCI Ultra board a leading–edge host adapter. The ISP1020 combines a powerful RISC processor, a SCSI executive processor (SXP), and a PCI local bus interface in a single–chip solution. The PCI Ultra board supports bootable devices and can be used with hard drives, tape drives, compact disc–read only memory (CD–ROM) drives, and other SCSI devices. Installation of the PCI Ultra board and its software is quick and easy.

1.2
What are SCSI and Ultra SCSI?

SCSI, pronounced *scuzzy*, is a high–performance specification defined by the American National Standards Institute (ANSI). Ultra SCSI (Fast–20), also defined by ANSI, has double the performance of fast SCSI (see appendix C).

NOTE: You need Ultra SCSI devices to achieve ultra transfer speeds.

An Ultra SCSI device can connect computers to other computers or peripheral devices, such as CD–ROM drives, tape drives, or hard drives. Ultra SCSI allows up to 15 (QLA940–PI allows up to 7) SCSI or Ultra SCSI devices to be connected to a single port using a *daisy chain*. (A daisy chain is a series of connections where the first device is connected to the computer, the second device is connected to the first, and so on.) Each SCSI device must have a unique SCSI ID.

SCSI allows the computer to use a standard set of commands to communicate with peripherals. These commands make it easy to add a variety of peripherals to your computer using one host adapter board.

1.3 Features

- Compliance with Intel PCI Local Bus Rev. 2 specification
- Compliance with ANSI X3.131–1994 SCSI–2 standard
- Compliance with ANSI X3T10/1071D SCSI–3 Fast–20 standard (Ultra SCSI)
- Compliance with U.S. and international safety and emissions standards
- Support for asynchronous and synchronous transfer modes
- Synchronous SCSI data transfer rates (QLA940–PI board):
  - Ultra SCSI (20 Mbytes/sec)
  - Fast SCSI (10 Mbytes/sec)
  - Normal SCSI (5 Mbytes/sec)
- Synchronous SCSI data transfer rates (QLA1040–PI and QLA1041–PI boards):
  - Wide and Ultra SCSI (40 Mbytes/sec)
  - Ultra SCSI (20 Mbytes/sec)
  - Wide and fast SCSI (20 Mbytes/sec)
  - Fast SCSI (10 Mbytes/sec)
  - Normal (5 Mbytes/sec)

- ○ Support for single–ended mode (QLA940–PI and QLA1040–PI boards)
- ○ Support for differential mode (QLA1041–PI board)
- ○ Support for up to seven SCSI devices (QLA940–PI board)
- ○ Support for up to 15 SCSI devices (QLA1040–PI and QLA1041–PI boards)
- ○ Support for logical unit numbers (LUNs) 0–7
- ○ Support for bus master DMA
- ○ Single–chip, high–performance SCSI RISC processor
- ○ *Fast*!UTIL software to custom configure parameters on the PCI Ultra board and the attached drives
- ○ Active termination (QLA940–PI and QLA1040–PI boards)
- ○ Active negation (QLA940–PI and QLA1040–PI boards)
- ○ 68–pin, high–density SCSI connectors for internal and external use (QLA1040–PI and QLA1041–PI boards)
- ○ 50–pin, high density SCSI connector for external use (QLA940–PI board)
- ○ 50–pin ribbon connector for internal use

1.3.1
Mixed Peripheral Support

- ○ Support for hard disk, removable disk, optical disk, scanner, tape drive, CD–ROM, and other SCSI devices
- ○ Simultaneous, mixed–peripheral configurations support
- ○ Bootable device support
- ○ Advanced SCSI programming interface (ASPI) manager for disk, tape, and other devices
- ○ CD–ROM driver for support of digital and audio command sets

1.3.2
Driver Options

The drivers provided with your PCI Ultra board are listed below:

- Disk Operating System (DOS) 5.0 and Windows 3.1 and above
  - *Fast*!SCSI Install software
  - Random access memory basic input/output system (RAM BIOS) driver
  - Disk driver
  - ASPI manager driver
  - CD–ROM driver
- Windows new technology (NT) 3.1, 3.5, and 3.51 operating systems
  - Windows NT Miniport driver
- Novell NetWare
  - NetWare 3.1X and 4.X driver
- IBM Operating System/2 (OS/2) Warp
  - OS/2 adapter device driver (ADD)
- Windows 95
  - Windows 95 driver
- Santa Cruz Operations (SCO) UNIX
  - SCO UNIX release 3.2 version 4.2
  - SCO Open Desk Top (ODT) driver release 3.0.0

Drivers for all the supported operating systems, except for SCO UNIX, are contained on the DOS–NT–NetWare–OS/2–Win95 diskette. The SCO UNIX drivers are contained on the SCO UNIX diskette.

1.4
What You Need for Hardware Installation

Before you install the PCI Ultra board in your computer, you need the following:

- ○ A quick review of this installation guide
- ○ A screwdriver
- ○ A SCSI–2, 50–pin cable (required only if connecting narrow**,** external devices to the QLA940–PI board)
- ○ A 68–pin to 50–pin cable (required if connecting narrow**,** external devices to the QLA1040–PI or QLA1041–PI board)
- ○ A SCSI 68–pin cable (required if connecting wide, external devices to the QLA1040–PI or QLA1041–PI board)

NOTE:

- ○ Ultra drives: For the QLA940–PI or QLA1040–PI board, the total length of all the cables cannot exceed 9.8 feet (3 meters) if you have four or less SCSI devices attached to the board. If you have five or more devices, the total cable length cannot exceed 4.9 feet (1.5 meters). For the QLA1041–PI board, the total length of all the cables cannot exceed 82 feet (25 meters).
- ○ Non–Ultra drives: For the QLA940–PI or QLA1040–PI board, the total length of all cables cannot exceed 19.7 feet (6 meters). For the QLA1041–PI board, the total length of all the cables cannot exceed 82 feet (25 meters).

  If you are mixing Ultra and Non–Ultra drives, the total length of all cables cannot exceed the maximum cable length established for Ultra drives.
- ○ Be sure to get a high–quality SCSI–2 cable, especially if you have Ultra SCSI devices. You will get better performance from the PCI Ultra board and its attached devices.

1.5
What You Need for Software Installation

Before you install the software drivers, you need to:

- ○ Read this guide to determine what drivers you want to install.
- ○ Make a backup copy of the diskettes.
- ○ Make a backup copy of all the current disk devices you want to move to the PCI Ultra board.

Section 2

Hardware Installation

2.1

Preinstallation Procedures

Before installing your PCI Ultra board, take a moment to read the following cautions, and section 2.2 to see if you need to change termination on the board.

CAUTION!

- ○ Make a backup copy of all the current disk devices you want to attach to the PCI Ultra board.
- ○ The configuration of your computer system, the computer's motherboard, your PCI Ultra board, and each SCSI device must work together for optimum performance. Refer to the appropriate documentation to configure your computer and your SCSI devices.
- ○ Refer to your operating system and software guides for specific instructions about using SCSI devices.
- ○ Pay particular attention to the SCSI ID. The PCI Ultra board is set to ID 7 at the factory. **The PCI Ultra board and each SCSI device must have unique IDs.**
- ○ If you are going to attach a removable drive to the PCI Ultra board and want to swap cartridges, the SCSI ID on the drive must be 2 or greater. If you want to boot from the removable drive, the SCSI ID must be 0 or 1.
- ○ Keep the PCI Ultra board in the antistatic bag until you are ready to install the board. Place the board on the bag when examining or configuring it. After the board is installed, store the antistatic bag in a safe place for possible future use.

Use figures 1, 2, and 3 to identify the PCI Ultra board components referenced in the following sections.

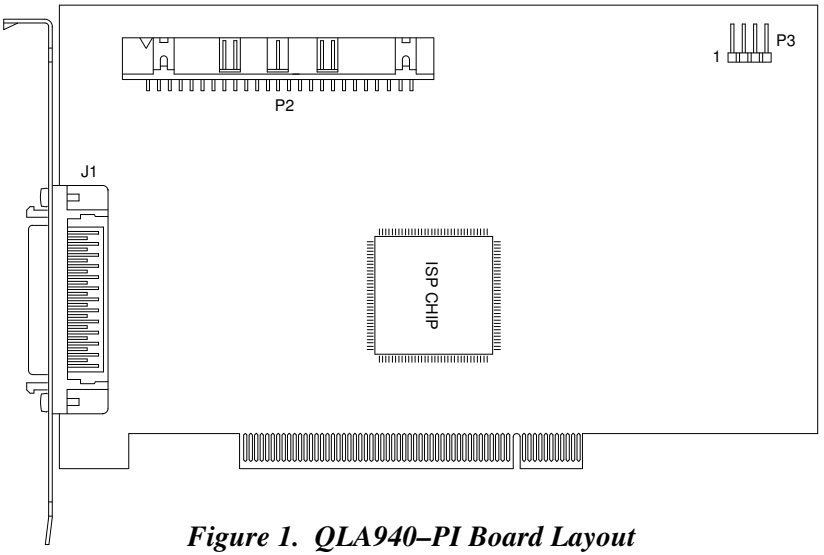

Figure 1. QLA940–PI Board Layout

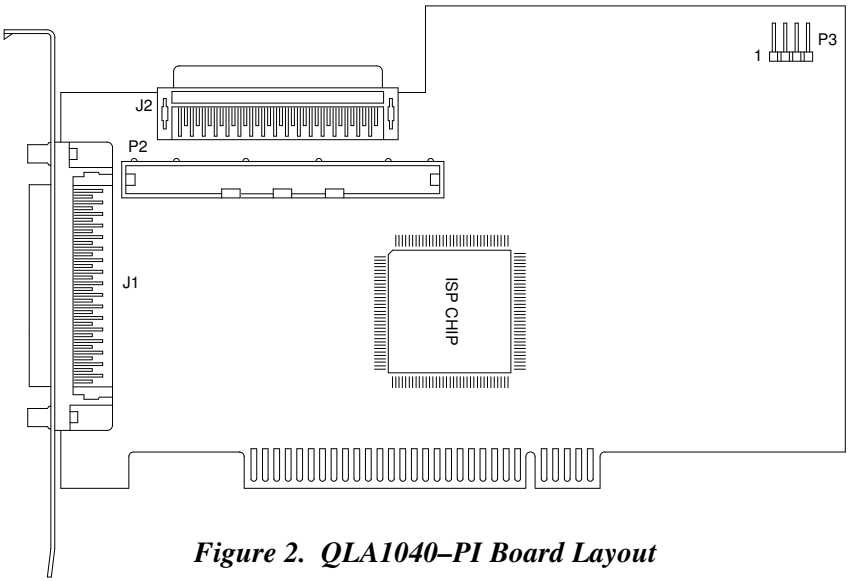

Figure 2. QLA1040–PI Board Layout

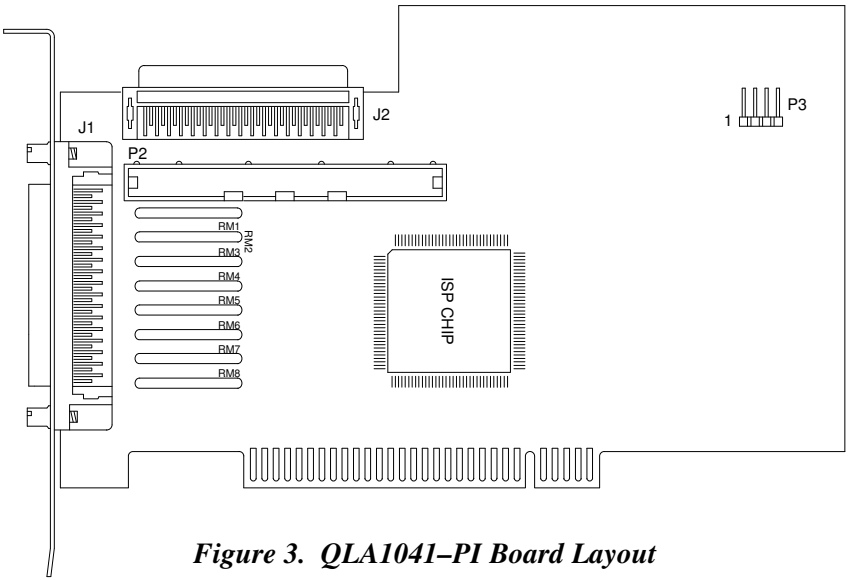

Figure 3. QLA1041–PI Board Layout

2.2

Setting the SCSI Termination

Termination for the QLA940–PI and QLA1040–PI boards is set automatically. If you need to manually change the termination, see appendix A. Termination instructions for the QLA1041–PI board are in appendix B.

2.3

SCSI Termination Power

The PCI Ultra board supplies termination power to itself and to the SCSI bus. It is protected by a self–restoring fuse.

2.4

Installing the Drive Activity Light

If the SCSI drive is internal to your personal computer (PC), the drive activity light on the front panel of the PC can be connected to the P3 jumper block. Pins 1 and 4 on the jumper block have positive polarity.

2.5

Installation in the Computer

If you changed the termination on the QLA1041–PI board, double–check the new settings before installing the board.

Perform the following steps to install the PCI Ultra board in your PC:

1. Power down the peripherals, then the computer.
2. Remove the computer cover and save the screws.
3. Check the motherboard and make any configuration changes necessary to accommodate the PCI Ultra board. The PCI Ultra board is self–configuring, but some motherboards require manual configuration. For example, some systems have a PCI Device Configuration menu in the motherboard setup basic input/output system (BIOS) where you must enable the PCI Ultra board, bus master slot, and interrupt request (IRQ) level. If the motherboard supports triggering, use level triggering for the PCI Ultra board.

   See the documentation for the motherboard to determine if it requires configuration. If you do not have any documentation, contact the dealer who sold you the computer.
4. Choose any PCI bus slot that supports bus mastering. You must assign an IRQ to this slot and use interrupt line A.

   NOTE:

   - Some motherboards have two kinds of PCI bus slots: master and slave. The PCI Ultra board must be in a bus master PCI slot. (Some motherboards have bus master PCI slots that are shared with onboard devices. PCI Ultra boards do not work in shared slots.)
   - Some systems set up the PCI bus through the motherboard BIOS. Make sure the slot in which you have installed the PCI Ultra board is activated in the motherboard BIOS. See your system manual for more information.
5. Unscrew and remove the slot cover. Put the screw and slot cover with the other screws.

6. Place the PCI Ultra board into the slot. Press down on the top of the board until it seats firmly.

   NOTE: PCI boards are designed to have the components on the opposite side compared to the non–PCI boards in your computer.

7. Secure the PCI Ultra board with the slot cover screw.
8. Internal SCSI drive: Connect the appropriate cable from the drives to the J2 connector (QLA1040–PI and QLA1041–PI boards) and/or the P2 connector on the top edge of the board (see figure 4).

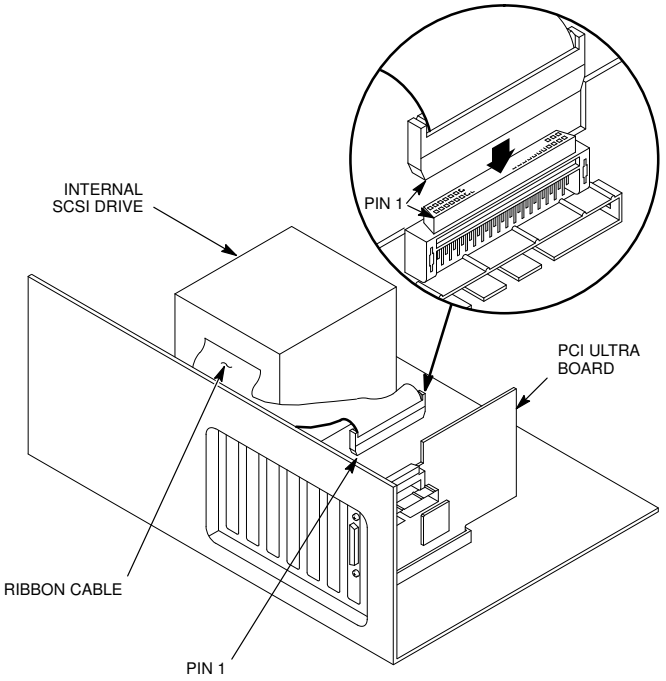

Figure 4. Internal SCSI Drive and Ribbon Cable

9. External SCSI drive: Connect a SCSI cable from the drives to be used to the J1 connector on the PCI Ultra board.

   NOTE: If you are attaching an external drive, you must provide your own cable.

   CAUTION! You can use any two of the connectors on the QLA1040–PI and QLA1041–PI boards. Using all three connectors at the same time violates the SCSI specification.

10. Carefully replace and reinstall the computer cover. Insert and tighten the computer cover screws.

11. Power up all external SCSI devices, then power up the PC and observe the monitor. The BIOS lists all SCSI devices attached to the PCI Ultra board on the system monitor.

    The monitor displays the SCSI devices. For example:

```
QLogic Corporation
PCI SCSI ROM BIOS Version X.XX
Copyright(C) QLogic Corporation 1993-95 All rights reserved.

Press <Alt-Q> for Fast!UTIL

ISP1020 Firmware Version X.XX
Using IRQ number X

Device  Device  Adapter  SCSI   SCSI   Vendor   Product   Product
Number   Type   Number    ID    LUN      ID       ID     Revision

  81     Disk      0       0      0    SEAGATE  ST42100    7394
```

    If no SCSI disk devices are attached to the computer, the monitor displays the BIOS information followed by an error or status message.

    It is a good idea to write down and store the SCSI device information for future use. If this information does not remain on the screen long enough for you to copy it, use *Fast*!UTIL to access this information easily (see appendix A). This information will be helpful if your system becomes inoperative or if you change peripherals and they do not function properly.

If the monitor displays the correct screen information, congratulations! You have installed the PCI Ultra board in your computer successfully.

Sections 3 through 8 provide detailed instructions on how to install the software drivers needed for your applications. Please read the section that applies to the drivers you want to install.

If your monitor does not display the correct screen information and you have checked the PCI Ultra board's configuration, see section 9 for troubleshooting information.

2.6 Installation Extras

If your system has an integrated drive electronics (IDE) device, it is assigned device number 80 and is the boot device. If your system does not have an IDE device, then the first SCSI device configured is assigned device number 80 and is the boot device.

SCSI ID numbers must be unique. If they are not unique, the monitor does not display the BIOS list correctly. If the BIOS list is incorrect, power down the computer and check the configuration. This includes the host adapter, which has a default of 7.

The PCI Ultra board comes from the factory set for optimal performance. If you aren't seeing the performance you expect from the SCSI devices attached to the PCI Ultra board or if the device is not listed in the BIOS banner, see appendix A.

You do not have to specify a drive type in your CMOS when you set up SCSI peripherals. If you do not have an IDE drive, set these parameters to *None* or *Not Installed.* The read–only memory basic input/output system (ROM BIOS) on the SCSI controller automatically configures the SCSI peripherals.

Your system BIOS may have an option to enable an onboard SCSI device. This option does not apply to the PCI Ultra board and should not be changed.

Section 3

DOS and Windows Drivers Installation

NOTE:

- ○ If you are installing a new system that has an uninitialized SCSI hard drive and no other hard drives attached, install the DOS operating system according to your user manual before installing the DOS and Windows drivers.
- ○ If you have an existing system and are attaching a new SCSI hard drive to the PCI Ultra board, run the DOS FDISK and FORMAT utilities to prepare the drive for use.

3.1

Installing Your Drivers with *Fast*!SCSI Install

Fast!SCSI Install is a menu–based utility for installing and configuring your DOS and Windows drivers. It automatically updates your CONFIG.SYS and AUTOEXEC.BAT files and creates a backup copy of the original files. *Fast*!SCSI Install runs under version 5.0 or later of MS–DOS or PC–DOS. It also runs in a DOS window under Windows 3.1 or later.

If you use *Fast*!SCSI Install, you do not need to perform the manual installation procedures in section 3.2.

To use the *Fast*!SCSI Install program, follow these steps:

1. Insert the DOS–NT–NetWare–OS/2–Win95 diskette in an appropriate drive.
2. At the DOS prompt, type `(drive):INSTALL`, for example:

   ```
   A:INSTALL
   ```

3. Press the <ENTER> key.

4. You are prompted to read introductory information about *Fast*!SCSI Install or continue with the installation. Use the up and down arrow keys and the <ENTER> key to confirm your selection.
5. You are prompted to select Express Installation, which installs the software onto your hard disk. Most of the options are fixed. If you require more flexibility, use Custom Installation.

   Use the up and down arrow keys and the <ENTER> key to select menu items.

   Use the <ESC> key to exit *Fast*!SCSI Install.

   De–installation removes the drivers from the CONFIG.SYS and AUTOEXEC.BAT files.
6. Follow the instructions on the screen.
7. You are prompted to reboot your system.

The drivers and utilities are loaded into memory. The following example shows what is added to your CONFIG.SYS file in a standard installation:

```
DEVICEHIGH=C:\QLC\QL10DOS.SYS
DEVICEHIGH=C:\QLC\QL00ASPI.SYS
REM DEVICEHIGH=C:\QLC\QL00DISK.SYS
DEVICEHIGH=C:\QLC\QL00CDRM.SYS /D:QLC0000
```

3.2 Installing Your DOS and Windows Drivers Manually

If you don't want to use *Fast*!SCSI Install, read the following sections for diskette data and more detailed information on installing the DOS and Windows drivers.

The following files on the DOS–NT–NetWare–OS/2–Win95 diskette are provided for installation of the DOS and Windows drivers:

- \DOS\QL10DOS.SYS – RAM BIOS driver
- \DOS\QL00DISK.SYS – disk driver
- \DOS\QL00ASPI.SYS – ASPI manager driver
- \DOS\QL00CDRM.SYS – CD–ROM driver
- \DOS\README.TXT – helpful hints about the DOS and Windows drivers

To install the software driver, copy to your system only the files you need. Be sure to review the README.TXT file for both new and changed information.

NOTE: If you are running HIMEM.SYS and a memory manager such as EMM386.SYS, you can save low memory space by substituting DEVICEHIGH for DEVICE in your CONFIG.SYS file when installing the drivers.

3.2.1
DOS RAM BIOS Driver and Switch Options

The PCI Ultra board has an onboard basic input/output system programmable read–only memory (BIOS PROM) that provides support for booting the system from a SCSI disk. A RAM–based BIOS is also provided. Use the provided RAM BIOS driver because it offers enhanced performance and additional functionality.

NOTE:

- Using the RAM BIOS driver is mandatory when you install the ASPI manager, CD–ROM driver, disk driver, or if you are using Windows 3.1 or 3.11.
- The ASPI manager driver and the CD–ROM driver are also provided on the DOS–NT–NetWare–OS/2–Win95 diskette. Use these drivers if you require ASPI support or if you are using a CD–ROM drive.

The following option switches may be appended to the DEVICE= line in your CONFIG.SYS file when installing your RAM BIOS driver:

/NOSEEK	Some SCSI devices do not implement SCSI seek commands. This switch disables the SCSI seek commands. By default, SCSI seek commands are enabled.
/DISPLAY or /D	When enabled, this switch displays the SCSI configuration when the driver is loaded. By default, the SCSI configuration is not displayed.

3.2.1.1

Installing the RAM BIOS Driver

Perform the following steps to install the RAM BIOS driver.

NOTE: If you are installing NetWare, the RAM BIOS driver is not required and should not be loaded.

1. Place the DOS–NT–NetWare–OS/2–Win95 diskette in an appropriate drive.
2. Create a directory on the boot drive of the computer to store the driver. For example:

   ```
   MKDIR C:\QLC
   ```

3. Copy the RAM BIOS driver file from the diskette to the directory created in step 2. For example:

   ```
   COPY A:\DOS\QL10DOS.SYS C:\QLC\*.*
   ```

4. Add the RAM BIOS driver to your CONFIG.SYS file. For example:

   ```
   DEVICE=C:\QLC\QL10DOS.SYS
   ```

   NOTE: Memory managers such as EMM386.SYS should be loaded after QL10DOS.SYS.

5. If you want to use any of the option switches, append them to the DEVICE= line in your CONFIG.SYS file. For example:

   ```
   DEVICE=C:\QLC\QL10DOS.SYS /DISPLAY
   ```

6. Save your edited CONFIG.SYS file.
7. Reboot the system.

3.2.2
DOS Disk Driver

Use the DOS disk driver if you have disk devices attached to the PCI Ultra board and you have disabled the PCI Ultra board's BIOS (see section A.2.1). When the BIOS is disabled, the DOS disk driver configures the disk devices into DOS and assigns drive letters.

3.2.2.1
Installing the DOS Disk Driver

Before you can install the DOS disk driver, you must first install the RAM BIOS driver (see section 3.2.1.1).

Perform the following steps to install the DOS disk driver.

1. Place the DOS–NT–NetWare–OS/2–Win95 diskette in an appropriate drive.
2. Copy the DOS disk driver file from the diskette to the computer's boot drive. For example:

   ```
   COPY A:\DOS\QL00DISK.SYS C:\QLC\*.*
   ```

3. Add the disk driver to your CONFIG.SYS file. For example:

   ```
   DEVICE=C:\QLC\QL00DISK.SYS
   ```

   Make sure the line that loads the disk driver is after the line that loads the RAM BIOS driver. For example:

   ```
   DEVICE=C:\QLC\QL10DOS.SYS
   DEVICE=C:\QLC\QL00DISK.SYS
   ```

   NOTE: Memory managers such as EMM386.SYS should be loaded after QL00DISK.SYS.
4. Save your edited CONFIG.SYS file.
5. Reboot the system.

3.2.3
DOS ASPI Manager Driver and Switch Option

The DOS ASPI manager provides the standard ASPI interface to the PCI Ultra board that many SCSI application programs require for disk backup and restore operations to SCSI tape devices, scanners, removable devices, etc.

The following option switch may be appended to the DEVICE= line in your CONFIG.SYS file when installing your ASPI manager driver.

/D	When enabled, this switch displays the SCSI configuration when the driver is loaded (see step 11 in section 2.5). By default, the SCSI configuration is not displayed.

NOTE: When installing manufacturer's drivers, the ASPI manager driver must be installed first.

3.2.3.1
Installing the ASPI Manager Driver

Before you can install the ASPI manager driver, you must first install the RAM BIOS driver (see section 3.2.1.1).

Perform the following steps to install the ASPI manager driver.

1. Place the DOS–NT–NetWare–OS/2–Win95 diskette in an appropriate drive.
2. Copy the ASPI driver file from the diskette to the computer's boot drive. For example:

   ```
   COPY A:\DOS\QL00ASPI.SYS C:\QLC\*.*
   ```

3. Add the ASPI manager driver to your CONFIG.SYS file. For example:

   ```
   DEVICE=C:\QLC\QL00ASPI.SYS
   ```

Make sure the line that loads the ASPI manager driver is after the line that loads the RAM BIOS driver. For example:

```
DEVICE=C:\QLC\QL10DOS.SYS
DEVICE=C:\QLC\QL00ASPI.SYS
DEVICE=C:\manufacturer's driver
```

4. If you want to use the /D switch, append it to the DEVICE= line in your CONFIG.SYS file. For example:

   ```
   DEVICE=C:\QLC\QL00ASPI.SYS /D
   ```

5. Save your edited CONFIG.SYS file.
6. Reboot the system.

3.2.4 DOS CD–ROM Driver and Command Line Parameter

The DOS CD–ROM driver provides the interface between the MSCDEX.EXE program and the CD–ROM device attached to the PCI Ultra board. The MSCDEX.EXE program and the CD–ROM driver are required for accessing the CD–ROM device as a data disk.

The DOS CD–ROM driver supports the following **mandatory** parameter:

/D:*your drive name* Informs the PCI Ultra board of the name of your CD–ROM driver.

NOTE: The /D: in the parameter does not refer to the drive letter of the CD–ROM.

An identical parameter is also specified when loading the MSCDEX.EXE program. The signature name is used by the MSCDEX.EXE program to determine with which drive to communicate.

Make sure the driver name you supply to the MSCDEX.EXE program is identical to the one you supply to the DOS CD–ROM driver parameter.

NOTE: The MSCDEX.EXE program is provided by Microsoft with MS–DOS version 6.0 and above. If you are running an older version of DOS, contact Microsoft to obtain the program.

3.2.4.1
Installing the DOS CD–ROM Driver

Before you can install the CD–ROM driver, you must first install the RAM BIOS and ASPI manager drivers (see sections 3.2.1.1 and 3.2.3.1).

NOTE: If you are installing NetWare from a CD–ROM, you must use the QLNWCDRM.SYS CD–ROM driver instead of the QL00CDRM.SYS CD–ROM driver in step 3. For example:

```
DEVICE=C:\QLC\QLNWCDRM.SYS /D:QLC0000
```

Perform the following steps to install the DOS CD–ROM driver.

1. Place the DOS–NT–NetWare–OS/2–Win95 diskette in an appropriate drive.
2. Copy the DOS CD–ROM driver file from the diskette to the computer's boot drive. For example:

   ```
   COPY A:\DOS\QL00CDRM.SYS C:\QLC\*.*
   ```

3. Add the CD–ROM driver to your CONFIG.SYS file. For example:

   ```
   DEVICE=C:\QLC\QL00CDRM.SYS /D:QLC0000
   ```

   Make sure the line that loads the CD–ROM driver is after the line that loads the RAM BIOS driver. For example:

   ```
   DEVICE=C:\QLC\QL10DOS.SYS
   DEVICE=C:\QLC\QL00ASPI.SYS
   DEVICE=C:\QLC\QL00CDRM.SYS /D:QLC0000
   ```

4. Save your edited CONFIG.SYS file.
5. Install the MSCDEX.EXE program in your AUTOEXEC.BAT file. For example:

   ```
   C:\DOS\MSCDEX.EXE /D:QLC0000
   ```

6. Save your edited AUTOEXEC.BAT file.
7. Reboot the system.

Section 4

Windows NT Miniport Driver Installation

4.1

Introduction

This section provides instructions for installing the Miniport driver under the following Windows NT operating system conditions:

- ○ Initial installation of the Windows NT operating system and the Miniport driver
- ○ Installation of the Miniport driver in a previously installed Windows NT operating system

4.2

Windows NT Miniport Driver Files

The following files on the DOS–NT–NetWare–OS/2–Win95 diskette are provided for installation of the Windows NT Miniport driver:

- ○ TXTSETUP.OEM – driver installation script for initial Windows NT text setup
- ○ QLSCSI – identification file for Windows NT setup program
- ○ \NT\OEMSETUP.INF – driver installation script for Windows NT setup program
- ○ \NT\QL10NT31.SYS – Windows NT 3.1 Miniport driver for the PCI Ultra board
- ○ \NT\QL10WNT.SYS – Windows NT 3.5 Miniport driver for the PCI Ultra board
- ○ \NT\README.TXT – helpful hints about the Windows NT Miniport driver

Be sure to review the README.TXT file for both new and changed information.

4.3
Windows NT Installation

If Windows NT is not installed on your system, perform the installation procedure in section 4.3.1; if Windows NT is already installed on your system, perform the installation procedure in section 4.3.2. If you are connecting a SCSI tape device to the PCI Ultra board, you also need to perform the installation procedure in section 4.3.3.

4.3.1
Installing Windows NT and the NT Miniport Driver

Perform the following steps to install Windows NT on the SCSI disk drive attached to the PCI Ultra board. These same steps also install Windows NT from a CD–ROM attached to the PCI Ultra board.

1. Locate your Windows NT setup diskette.
2. Place the diskette in an appropriate drive.
3. Reboot your system.

   If you are installing Windows NT version 3.51, follow the standard NT installation procedure. The NT Miniport driver is included with the operating system.

   If you are installing Windows NT version 3.1 or 3.5, continue with step 4.
4. At the menu prompt, select *Custom Setup*.
5. Enter *S* to configure additional SCSI adapters.
6. Select *Other* from the list of supported adapters.
7. Remove the Windows NT setup diskette from the drive. Insert the DOS–NT–NetWare–OS/2–Win95 diskette. Press <ENTER>.
8. Select QLogic *Fast*!SCSI IQ PCI for Windows NT version 3.1 or 3.5 and press <ENTER>. The Miniport driver installation proceeds automatically.
9. Go to section 4.3.3 if you are connecting a SCSI tape device to the PCI Ultra board.

4.3.2
Installing the NT Miniport Driver

Perform the following steps to add an NT Miniport driver to a previously installed Windows NT system.

1. Select *Windows NT Setup* from the main program group.
2. Select *Options* from the Windows NT Setup window.
3. Select *Add/Remove SCSI Adapter* from the menu.
4. Select *Add* from the SCSI Adapter Setup window.
5. If you are running Windows NT version 3.51, select *QLogic PCI SCSI Adapters* from the list of supported adapters. Follow the standard installation procedure from your Windows NT source media.

   If you are running Windows NT version 3.1 or 3.5, select *Other* from the list of supported adapters. Continue with step 6.
6. Place the DOS–NT–NetWare–OS/2–Win95 diskette in an appropriate drive.
7. Enter *<drive>:\NT* for the path to the NT driver and select *OK*.
8. Choose *QLogic Fast!SCSI IQ PCI* driver for Windows NT version 3.1 or 3.5 and select *OK*.
9. Select *Install* followed by *Continue* to install the driver.
10. Reboot Windows NT.
11. Go to section 4.3.3 if you are connecting a SCSI tape device to the PCI Ultra board.

4.3.3
Windows NT Drivers to Support SCSI Tape Devices

Perform the following steps to install the Windows NT driver to support SCSI tape devices:

1. Select *Windows NT Setup* from the main program group.
2. Select *Options* from the Windows NT Setup window.

3. Select *Add/Remove Tape Devices* from the menu.
4. Select *Add* from the Tape Device Setup window.
5. Select the desired tape drive from the list of supported tape devices.
6. Select *Install*.
7. Enter the Windows NT CD–ROM device letter and path to the Windows NT installation files. For example:

```
D:\I386
```

Section 5

NetWare 3.1X and 4.X Driver Installation

5.1

Introduction

The drivers interface with Novell NetWare and are compatible with NetWare 3.1X and 4.X operating systems. The diskette data for the NetWare drivers and installation information are described in this section.

5.2

NetWare 3.1X and 4.X Driver Files and Setting Options

The following files on the DOS–NT–NetWare–OS/2–Win95 diskette are provided for installation of the NetWare 3.1X and 4.X driver:

- ○ \NETWARE\QL10NWR3.DSK – NetWare 3.1X and 4.X driver with ASPI support
- ○ \NETWARE\QL10NWN3.DSK – NetWare 3.1X and 4.X driver without ASPI support
- ○ \NETWARE\QLNWCDRM.SYS – DOS CD–ROM driver used during NetWare installation from CD–ROM
- ○ \NETWARE\README.TXT – helpful hints about the NetWare 3.1X and 4.X driver and setting options

Be sure to review the README.TXT file for both new and changed information.

You must load the NetWare 3.1X and 4.X driver with the appropriate settings for the interface between the driver and Novell NetWare to work correctly. The available settings are described in table 1.

Table 1. NetWare Setting Options

Parameter	Description
EXCLUDE[a] (1 or 0)	This option excludes drives from being accessed through the normal input/output (I/O) interface, allowing them to be accessed through the ASPI interface (EXCLUDE set to 1). Set EXCLUDE to 0 (default) for normal I/O interface.
EXTEND (1 or 0)	This option corresponds to the size of the drives connected to the PCI Ultra board. Set EXTEND to 0 for drives less than one gigabyte; set EXTEND to 1 for drives greater than one gigabyte. This function is handled by the driver unless you override it by specifying EXTEND=0 when loading the driver.
RAWV (1 or 0)	The read–after–write verification option is turned on when RAWV=1 or off when RAWV=0. For optimum data integrity, set RAWV to 1. For optimum performance, set RAWV to 0.
LUNS (1–7)	The default of this option is one LUN per SCSI ID. If your peripheral supports multiple LUNs per SCSI ID, indicate how many LUNs should be enabled on each SCSI ID.
CARD (1–255)	This option assigns a unique number to your PCI Ultra board. This number helps your system manager track the SCSI boards in your system.

Table Notes

[a]EXCLUDE is not normally required. EXCLUDE is provided for certain tape backup utilities and RAID software requiring only ASPI access to devices.

The EXCLUDE, EXTEND, RAWV, and LUNS parameters can be entered one of three ways. For example:

- EXCLUDE=0 enables I/O access on all SCSI devices.
- EXCLUDE=1 enables ASPI access on all SCSI devices.
- EXCLUDE=[0000000000000000] enables/disables ASPI access on a per SCSI ID basis. The SCSI IDs start with the lowest ID (0) on the left and end with the highest ID (15) on the right. The host adapter uses ID 7 by default. For example, EXCLUDE=[1000010000000000] enables ASPI access for SCSI IDs zero and five.

  For the QLA940–PI board, only eight SCSI IDs are supported (0–7). For example:

  EXCLUDE=[00000000]

5.3 Installing the NetWare 3.1X and 4.X Driver

If you are installing NetWare from a CD–ROM, you must first install the CD–ROM driver (see section 3.2.4.1) before you can install the NetWare driver.

Perform the following steps to install the NetWare 3.1X and 4.X driver in a previously installed NetWare system.

1. Place the DOS–NT–NetWare–OS/2–Win95 diskette in an appropriate drive.
2. Copy the appropriate NetWare 3.1X and 4.X driver file from the diskette to the server root directory. For example:

   ```
   COPY A:\NETWARE\QL10NWR3.DSK
   C:\SERVER.312\*.*
   ```

   Use the \NETWARE\QL10NWN3.DSK file if you have another SCSI board in your system that has the ASPI manager installed.

NOTE: If you have a CD–ROM attached to the PCI Ultra board, you must load the CDROM.NLM, which is provided with NetWare to mount CD–ROM volumes on the server.

3. The following LOAD example works for a default (factory setting) PCI Ultra board. The values should be changed to reflect your customized settings (see section 5.2).

   Load the driver at the NetWare server prompt (:) by typing the appropriate information. For example:

   ```
   LOAD QL10NWR3
   ```

   This line should also be entered in your NetWare STARTUP.NCF file to load the driver automatically when your system boots.

Section 6

OS/2 ADD Installation

6.1

Introduction

This section provides diskette data and instructions for installing the OS/2 ADD under the following OS/2 operating system conditions:

- ○ Initial installation of the OS/2 Warp operating system and the OS/2 ADD
- ○ Installation of the OS/2 ADD in an existing OS/2 Warp operating system

6.2

OS/2 ADD Files and Switch Options

The following files on the DOS–NT–NetWare–OS/2–Win95 diskette are provided for installation of the OS/2 ADD:

- ○ \OS2\QL10.DDP – device driver profile script required for the OS/2 Device Driver Install utility
- ○ \OS2\QL10OS2.ADD – OS/2 ADD
- ○ \OS2\README.TXT – helpful hints about the OS/2 ADD

Be sure to review the README.TXT file for both new and changed information.

The following option switches may be appended to the BASEDEV= line in your CONFIG.SYS file when installing the OS/2 ADD:

/A:*d*	This switch specifies the adapter (*d* = 0–3) to which the following command line parameters apply.
/I	When enabled, this switch ignores the specified adapter. This switch must follow the /A:*d* switch.

/DM /!DM	This switch enables (/DM) or disables (/!DM) direct access storage device (DASD) manager support for the PCI Ultra board and its attached devices. Add :*d*,*d*,*d* to the end of the switch to specify a list of SCSI IDs, or add :(*d*,*d*),(*d*,*d*),(*d*,*d*) to specify ID,LUN pairs. By default, this switch is enabled.
/SM /!SM	This switch enables (/SM) or disables (/!SM) SCSI manager support for the PCI Ultra board and its attached devices. Add :*d*,*d*,*d* to the end of the switch to specify a list of SCSI IDs or add :(*d*,*d*),(*d*,*d*),(*d*,*d*) to specify ID,LUN pairs. By default, this switch is enabled.
/!R	This switch reports removable disk devices to OS/2 as fixed disks. By default, removable disks are reported as removable.
/SR /!SR	This switch enables (/SR) or disables (/!SR) SCSI bus reset at power up on the PCI Ultra board. Do not use the disable option if any device attached to the PCI Ultra board has synchronous negotiation enabled. By default, this switch is enabled.
/ET /!ET	This switch enables (/ET) or disables (/!ET) embedded target support for the SCSI devices attached to the PCI Ultra board. By default, this switch is enabled (all eight LUNs are supported). Specify /!ET for supporting LUN 0 only.
/V	When enabled, this switch displays configuration data during power up. By default, configuration data is not displayed.

6.3 OS/2 Driver Installation

If OS/2 is not installed on your system, perform the installation procedure in section 6.3.1 for OS/2 Warp version 3 from a CD–ROM or in section 6.3.2 for OS/2 Warp version 3 from diskettes. If OS/2 Warp is already installed on your system, perform the installation procedure in section 6.3.3.

6.3.1 Installing OS/2 Warp and the OS/2 ADD from CD–ROM Distribution

Perform the following steps to install OS/2 Warp version 3 and the OS/2 ADD using CD–ROM.

1. Make a disk copy of the IBM OS/2 Warp Diskette 1. Label the backup copy **Modified 1**. For example:

   ```
   DISKCOPY A: A: /V
   ```

2. To make room for the OS/2 ADD, delete the appropriate files from the Modified 1 diskette:

   IBM2*.* — If you have an ISA or EISA (non–Micro Channel) computer

   IBM1*.* — If you have a Micro Channel computer

3. Place the DOS–NT–NetWare–OS/2–Win95 diskette in an appropriate drive.
4. Copy the \OS2\QL10OS2.ADD file from the DOS–NT–NetWare–OS/2–Win95 diskette into the root directory of the Modified 1 diskette.
5. Edit the CONFIG.SYS file located on the Modified 1 diskette.
   a. Insert the letters REM before any lines that refer to the files deleted in step 2.
   b. Add the following statement to the end of the file:

      ```
      BASEDEV=QL10OS2.ADD
      ```

6. If you want to use any of the switch options, append them to the BASEDEV= line in your CONFIG.SYS file. For example:

```
BASEDEV=QL10OS2.ADD /!ET/V
```

7. Place the IBM OS/2 Installation diskette in an appropriate drive.
8. Reboot the system to start the installation procedure. Use the Modified 1 diskette when the system prompts you to insert the IBM OS/2 Warp Diskette 1.

6.3.2
Installing OS/2 Warp from Diskette Distribution

Perform the following steps to install OS/2 Warp version 3 using diskettes.

1. Place the IBM OS/2 Installation diskette in an appropriate drive.
2. Reboot the system. Insert other diskettes as the system prompts for them.
3. When prompted about installation type, select *Advanced Installation*.
4. If you have a SCSI CD–ROM attached to the PCI Ultra board, select the *CD–ROM Device Support* icon followed by the type of CD–ROM device to be supported when the System Configuration window is displayed.
5. After completing the OS/2 installation from diskettes, go to section 6.3.3 to install the OS/2 ADD.

6.3.3
Installing the OS/2 ADD

Perform the following steps to add a OS/2 ADD to a previously installed OS/2 Warp system:

1. Boot OS/2 Warp.
2. Place the DOS–NT–NetWare–OS/2–Win95 diskette in an appropriate drive.

3. Select the *System Setup* icon from the OS/2 System program group.
4. Select the *Device Driver Install* icon from the OS/2 System Setup program group.
5. Change the source directory on the DOS–NT–NetWare–OS/2–Win95 diskette to OS2. For example:

   ```
   A:\OS2
   ```

6. Select *Install*.
7. Select *QLogic Fast!SCSI IQ PCI ADD Driver* followed by *OK*. The driver is copied to your boot disk and your CONFIG.SYS file is updated.
8. Reboot your system.

Section 7

Windows 95 Driver Installation

NOTE: If you are installing a new system that has an uninitialized SCSI hard drive and no other hard drives attached, install Windows 95 according to your user manual before installing the Windows 95 driver.

7.1

Introduction

This section provides instructions for installing the Windows 95 driver under the following operating system conditions:

- ○ Initial installation of Windows 95 operating system and the Windows 95 driver
- ○ Installation of the Windows 95 driver in a previously installed Windows 95 operating system

7.2

Windows 95 Driver Files

The following files on the DOS–NT–NetWare–OS/2–Win95 diskette are provided for installation of the Windows 95 driver:

- ○ \WIN95\QLOGIC.INF – driver installation script for the Windows 95 setup program
- ○ \WIN95\QL1000.MPD – Windows 95 driver
- ○ \WIN95\README.TXT – helpful hints about the Windows 95 driver

Be sure to review the README.TXT file for both new and changed information.

7.3
Windows 95 Driver Installation

If Windows 95 is not installed on your system, perform the installation procedure in section 7.3.1; if Windows 95 is already installed on your system, perform the installation procedure in section 7.3.2.

7.3.1
Installing Windows 95 and the Windows 95 Driver

Perform the following steps to install Windows 95 and the Windows 95 driver.

1. If you have a Windows 95 upgrade package, install DOS and Windows 3.X onto the system hard disk if you haven't already.
2. If you are installing Windows 95 from a CD–ROM attached to the PCI Ultra board, install the DOS CD–ROM driver (see section 3.2.4).
3. Run the SETUP program to install Windows 95.
4. Open the computer icon.
5. Open the *Control Panel* icon.
6. Open the *System* icon.
7. Select the *Device Manager* tab.
8. Click on the plus sign (+) next to *Other devices*. *PCI SCSI Bus Controller* appears; double–click on it.
9. Select the *Driver* tab and click on *Change Driver.*
10. Select *SCSI Controllers* and click on *OK.*
11. Insert the DOS–NT–NetWare–OS/2–Win95 diskette in an appropriate drive.
12. Click on *Have Disk.*

13. Type the path to the driver. For example:

    ```
    A:\WIN95
    ```

    Click on *OK*.

14. Select *QLogic Fast!SCSI IQ PCI Ultra Adapter* and click on *OK*. The driver file name appears.
15. Click on *OK* to install the Windows95 driver.
16. A ROM window for the QLogic *Fast*!SCSI PCI host adapter appears. Click on *Cancel.*
17. The System Setting Change windows appears. Click on *Yes*. The system reboots.

7.3.2
Installing the Windows 95 Driver

Perform the following steps to install the Windows 95 driver in a previously installed Windows 95 system.

1. Shut down the computer and install the PCI Ultra board if you haven't already (see section 2.5).
2. During the reboot process, the New Hardware Found window appears with a message that the system has found a PCI SCSI bus controller.
3. Insert the DOS–NT–NetWare–OS/2–Win95 diskette in an appropriate drive.
4. Select the *Driver from disk provided by hardware manufacturer* option, and click on *OK*.
5. Type the path to the driver. For example:

    ```
    A:\WIN95
    ```

    Click on *OK* to install the Windows 95 driver.

Section 8

SCO Device Driver Installation

NOTE: Throughout this section, the term *SCO* refers to SCO UNIX, SCO ODT, and SCO Open Server unless otherwise noted.

8.1 Introduction

This section provides instructions for installing the SCO device driver under the following SCO operating system conditions:

- ○ Initial installation of the SCO operating system and the SCO device driver
- ○ Installation of the SCO device driver in an existing SCO operating system

The SCO device driver uses the SCO boot–time loadable driver (BTLD) function to install SCO. BTLDs can be link edited into the UNIX system kernel during the boot process. The link editing is done by **boot** (HW) after the driver is loaded into random access memory (RAM), but before the kernel is started.

NOTE: The SCO UNIX diskette cannot be read from a DOS environment.

8.2 SCO Driver Installation

If SCO is not installed on your system, perform the installation procedure in section 8.2.1. If SCO is already installed, perform the installation procedure in section 8.2.2.

The installation of SCSI host adapters and devices is covered in detail in the SCO documentation. See the following topics for more information.

- ○ Using boot–time loadable drivers (Installation Guide)
- ○ Adding hard disks and CD–ROM drives (System Administrator's Guide)

8.2.1
Installing the SCO Operating System and the SCO Device Driver

Perform the following steps to install SCO and the SCO device driver.

1. Follow the instructions for SCO installation in your SCO installation guide.

   NOTE: In the SCO installation guide, follow the instructions for BTLDs.

2. At the prompt (Boot:), type:

   `link`

3. At the prompt for the package type, type:

   `qlIS` (lowercase Q and L, uppercase I and S)

4. During the installation process, you are prompted to insert the package diskette in an appropriate drive. Insert the SCO UNIX diskette.
5. Later in the installation process, you are asked if you want to permanently install the SCO device driver on your device.

CAUTION! If you're using a CD–ROM as part of the installation process, some versions of SCO require the CD–ROM drive to be configured as ID 5 and cartridge tape drives as ID 2.

8.2.2
Installing the SCO Device Driver

Perform the following steps to add the SCO device driver to a previously installed SCO system.

1. Log on to the system as a root.
2. Place the SCO UNIX diskette in an appropriate drive.
3. Type the following:

   ```
   installpkg
   ```

4. Press the <ENTER> key. Follow the instructions on the screen.

NOTE: Do not use the *custom* utility, the System ➧ Software option of *sysadmsh*, or the *Software Manager* utility for adding the SCO device driver.

8.3
Device Configuration

After installing the SCO device driver, you need to configure your SCSI devices attached to the PCI Ultra board so the system recognizes them. Configuration is done manually or by using the *mkdev* utility. See your SCO hardware configuration guide for information on how to configure the devices manually. See your SCO installation guide for information on using the *mkdev* utility. Mkdev edits the system files to support your PCI Ultra board and its attached SCSI devices.

NOTE: Users can access mkdev using the *Sysadmsh* utility with the following menu selections:

System ➧ Hardware ➧ HardDisk

Section 9

Troubleshooting

9.1

Problems After Installation

There are three basic types of problems that can occur after installation that cause your PCI Ultra board to function incorrectly: hardware problems, system problems, and SCSI problems. The following sections provide itemized checklists to help you determine why your PCI Ultra board is not functioning.

9.2

Hardware Problem Checklist

- ○ Are any boards in the PC loose?
- ○ Are any connections to the internal or external SCSI drives loose (see section 2.5)?
- ○ Is the PCI Ultra board seated correctly in the PC? The gold–fingered edge should not be visible.
- ○ Did the BIOS banner appear followed by an invalid data message? If so, change the PCI Ultra board to its default settings (see section A.2.4).
- ○ Are all external peripherals properly connected and the system powered up?

9.3

System Problem Checklist

○ Check the motherboard and make any configuration changes necessary to accommodate the PCI Ultra board. The PCI Ultra board is self–configuring, but some motherboards require manual configuration. For example, some systems have a PCI Device Configuration menu in the motherboard setup BIOS where you must enable the PCI Ultra board, bus master slot, and IRQ level. If the motherboard supports triggering, use level triggering for the PCI Ultra board.

See the documentation for the motherboard to determine if it requires configuration. If you do not have any documentation, contact the dealer from whom you purchased your computer.

○ If your system message is “Missing Operating System” or “No ROM BASIC, System Halted”, the disk drive attached to the PCI Ultra board is not partitioned in a format compatible with the board.

Not all adapter manufacturers use the same geometry when formatting disk drives. The geometry used is the Microsoft standard of 64 heads, 32 sectors per track for drives less than one gigabyte and 255 heads, 63 sectors per track for drives greater than one gigabyte.

If the drive is not formatted with this geometry, you need to repartition and format the drive using the DOS FDISK and FORMAT utilities.

○ If you are using DOS and Windows drivers and are not getting the performance results you expect, make sure the RAM BIOS driver is installed. The RAM BIOS driver offers enhanced performance and additional functionality (see section 3.2.1).

9.4
SCSI Problem Checklist

- ○ Confirm that the SCSI bus termination for the PCI Ultra board is set correctly (see appendices A and B).
- ○ Is termination for all devices on the SCSI bus set correctly?
- ○ Are all the SCSI devices plugged in and turned on before you power up the PC? Power up all external SCSI devices, then power up the PC.
- ○ Does each device have a unique SCSI ID? Each device must have its own unique ID between 0 and 15 (0–7 for the QLA940–PI board). The PCI Ultra board is set for SCSI ID 7 at the factory.
- ○ Are all the cables firmly attached to their correct ports?

  Ultra drives: For the QLA940–PI and QLA1040–PI boards, the total length of all cables cannot exceed 9.8 feet (3 meters) if you have four or less SCSI devices attached to the boards. If you have five or more devices, the total cable length cannot exceed 4.9 feet (1.5 meters). For the QLA1041–PI board, the total length of all cables cannot exceed 82 feet (25 meters).

  Non–Ultra drives: The total length of all cables cannot exceed 19.7 feet (6 meters) for the QLA940–PI and QLA1040–PI boards or 82 feet (25 meters) for the QLA1041–PI board.

  NOTE: If you are mixing Ultra and Non–Ultra drives, the total length of all cables cannot exceed the maximum cable length established for Ultra drives.
- ○ Have you installed a device driver for the PCI Ultra board? See the installation section in this guide that applies to the drivers you want.
- ○ If you are running Windows 3.1 or 3.11, is the RAM BIOS driver installed (see section 3.2.1.1)?

Appendix A
Fast!UTIL

A.1
Introduction

This appendix provides detailed configuration information for advanced users who want to custom configure the PCI Ultra board and the connected drives.

The PCI Ultra board is configured at the factory to provide **maximum** performance. Maximizing performance means the board may not be 100% compatible with some older SCSI–1 devices you might connect to it. If you are using a SCSI–1 device, see section A.5 for help.

The settings can be configured using *Fast*!UTIL. When you power up the system, access *Fast*!UTIL with the <ALT>–<Q> key combination during the PCI Ultra board BIOS initialization (it may take a few seconds for the *Fast*!UTIL menu to appear). If you have more than one PCI Ultra board, *Fast*!UTIL asks you to select which board to configure. After changing the settings, *Fast*!UTIL reboots your system to load the new parameters.

CAUTION! If the configuration settings are incorrect, your PCI Ultra board will not function properly.

The following sections describe the *Fast*!UTIL options.

A.2
Configuration Settings

The first selection on the *Fast*!UTIL Options menu is Configuration Settings. These settings configure the host adapter and the drives connected to it.

A.2.1
Host Adapter Settings

From the Configuration Settings menu in *Fast*!UTIL, select *Host Adapter Settings*. The default settings for the PCI Ultra board (host adapter) are listed in table 2 and described in the following paragraphs.

Table 2. Host Adapter Settings

Setting	Range	Default
Host adapter	Enabled or Disabled	Enabled
Host adapter BIOS	Enabled or Disabled	Enabled
Host adapter SCSI ID	0–7 (QLA940–PI) 0–15 (QLA1040–PI and QLA1041–PI)	7
PCI bus DMA burst	Enabled or Disabled	Enabled
SCSI bus reset	Enabled or Disabled	Enabled
SCSI bus reset delay	0–15 seconds	5 seconds
SCSI termination[a]	Auto, Enabled, Disabled, High only	Auto

Table Notes
[a]SCSI termination does not apply to the QLA1041–PI board.

- **Host adapter.** When this setting is enabled, the system BIOS and drivers recognize the PCI Ultra board. When this setting is disabled, the BIOS and drivers ignore the board. The default is enabled.
- **Host adapter BIOS.** When this setting is disabled, the ROM BIOS on the PCI Ultra board is disabled, which frees up additional space in upper memory for loading other drivers. The RAM BIOS and other drivers still recognize the PCI Ultra board. Do not disable this setting if you are booting from a SCSI disk drive attached to the PCI Ultra board. The default is enabled.
- **Host adapter SCSI ID.** This setting sets the SCSI ID of the PCI Ultra board. The default is SCSI ID 7.

- **PCI bus DMA burst.** When this setting is enabled, burst transfers are performed. When this setting is disabled, data is transferred in nonburst mode, with each cycle initiated by a new address phase. The default is enabled.
- **SCSI bus reset.** This setting enables or disables resetting the SCSI bus when the system is powered up. The default is enabled (the SCSI bus is reset when the system powers up).
- **SCSI bus reset delay.** After resetting the SCSI bus, the firmware refrains from initiating any SCSI activity for the number of seconds specified in the SCSI bus reset delay setting. The default delay is 5 seconds.
- **SCSI termination.** (QLA940–PI and QLA1040–PI boards) When this is set for Auto (the default), termination for the QLA940–PI and QLA1040–PI boards is set automatically. Termination instructions for the QLA1041–PI are in appendix B.
  - If you want to manually disable SCSI termination, select *Disabled.*
  - If you want to manually enable SCSI termination for the QLA940–PI board, select *Enabled.*
  - If you want to manually enable SCSI termination for the PCI Ultra board and are using the J1 or J2 connector and the P3 connector, select *High only.* In all other cases, select *Enabled.*

A.2.2
SCSI Device Settings

After changing the host adapter settings for the PCI Ultra board, you can also modify the device parameters for the SCSI devices you want to connect. From the Configuration Settings menu in *Fast*!UTIL, select *SCSI Device Settings*. The settings are linked to the device's SCSI ID (0–15); be sure to change the settings for the SCSI ID assigned to your device. Select *Scan SCSI Bus* from the *Fast*!UTIL Options menu to see the SCSI IDs assigned on your system (see section A.3).

The defaults for the SCSI device settings for drives attached to the PCI Ultra board are listed in table 3 and described in the following paragraphs.

Table 3. SCSI Device Settings

Setting	Range	Default
Enable Device	Yes or No	Yes
Disconnects OK	Yes or No	Yes
Check Parity	Yes or No	Yes
Negotiate Wide[a]	Yes or No	Yes
Negotiate Synchronous	Yes or No	Yes
Tagged Queuing	Yes or No	No

Table Notes

[a]Negotiate wide does not apply to the QLA940–PI board.

- **Enable Device.** When this setting is Yes, the system BIOS and drivers recognize the drives attached to the PCI Ultra board. When this setting is No, the system BIOS and drivers ignore the drive at this SCSI ID. The default is Yes.
- **Disconnects OK.** When this setting is Yes and the PCI Ultra board issues a command to the drive, the drive is notified that it can optionally sever the communications link. When the drive is ready to continue executing the command, it must reestablish the link through a reconnect cycle. The default is Yes.

  If you have more than one device attached to the PCI Ultra board, set Disconnects OK to Yes for best performance.
- **Check Parity.** When this setting is Yes, odd parity is checked and passed to the SCSI FIFO when data is received from the SCSI bus. When this setting is No, the received SCSI parity is ignored and odd parity is generated for the SCSI FIFO. The default is Yes.
- **Negotiate Wide (QLA1040–PI and QLA1041–PI boards).** When this setting is Yes, the drive supports wide (16–bit) SCSI data transfers. When this setting is No, only eight–bit SCSI data transfers are supported. The default is Yes.

  The QLA1040–PI board supports 8–bit (narrow) and 16–bit (wide) SCSI devices. If you don't know whether your device is 8 bits or 16 bits wide, check with the peripheral manufacturer.

- **Negotiate Synchronous.** When this setting is Yes, the PCI Ultra board negotiates synchronous data transfers with the selected device. When this setting is No, the PCI Ultra board uses asynchronous transfers, unless the selected device negotiates synchronous transfers. The default is Yes.
- **Tagged Queuing.** When this setting is Yes, the drive queues multiple commands. The default is No.

A.2.3
Automatically Configure SCSI Devices

Selecting the Autoconfigure SCSI Devices option from the Configuration Settings menu causes the PCI Ultra board to scan the devices on the SCSI bus and set the following options, based on the devices' capabilities:

- Enable Device
- Disconnects
- Negotiate Wide
- Negotiate Synchronous
- Tagged Queuing

The settings are displayed in the SCSI Device Settings screen. At this time, you can use the arrow keys to change the settings. See section A.2.2 for more information about the SCSI device settings and section A.2.1 for host adapter settings.

Be sure to run *Fast*!UTIL and select Autoconfigure SCSI Devices after adding or reconfiguring devices attached to the PCI Ultra board.

A.2.4
Restore Default Settings

Selecting the restore defaults option from the Configuration Settings menu restores the PCI Ultra board default settings. The default settings are displayed on the SCSI Device Settings screen. At this time, you can use the arrow keys to change the settings.

See section A.2.2 for more information about the SCSI device settings and section A.2.1 for host adapter settings.

A.3 Scan SCSI Bus

Selecting this option causes *Fast*!UTIL to scan the SCSI bus and list all the connected devices by SCSI ID. Information about each device is listed, such as vendor name, product name and revision. This information is useful when configuring your PCI Ultra board and attached devices.

A.4 SCSI Disk Utility

Selecting this option causes *Fast*!UTIL to scan the SCSI bus and list all the connected devices by SCSI ID. You can select a disk device and perform a low–level format or verify the disk media.

A.5 Using SCSI–1 Devices

The configuration settings on the PCI Ultra board are configured at the factory with default parameters that provide **maximum** performance. Maximizing performance means the board may not be 100% compatible with some older SCSI–1 devices you might connect to it.

If your SCSI device attached to the PCI Ultra board is having problems, you can turn off some of the high–performance parameters to get maximum compatibility. Follow these steps:

1. When you power up the system, access *Fast*!UTIL with the <ALT>–<Q> key combination.
2. Select Configuration Settings from the *Fast*!UTIL Options menu.

3. Select *SCSI Device Settings*. A screen appears with the settings for each SCSI device.
   a. Change the Negotiate Wide setting to No.
   b. Save the parameters.
   c. Exit from *Fast*!UTIL.
   d. Reboot your system.
4. If your SCSI device is still having problems, repeat steps 1 through 3. In step 3, change the following parameters to No, one at a time, rebooting after each change to check your system's performance.
   a. Negotiate Synchronous
   b. Check Parity
   c. Disconnects OK

   You're done when the system operates correctly; do not continue changing the parameters!

If you've changed all the SCSI device settings in steps 3 and 4 and things still aren't working right, follow these steps.

1. When you power up the system, access *Fast*!UTIL with the <ALT>–<Q> key combination.
2. Select Configuration Settings from the *Fast*!UTIL Options menu.
3. Select Host Adapter Settings.
4. Change the PCI bus DMA burst setting to Disable.
5. Exit from *Fast*!UTIL.
6. Reboot your system.

Appendix B
QLA1041–PI Termination

B.1
Setting the SCSI Termination

The first and last physical SCSI devices on each end of the SCSI bus must be terminated. Termination for the QLA1041–PI board is controlled by a set of resistors (terminators) labeled RM1–RM8 (see figure 3).

The QLA1041–PI board comes from the factory with termination enabled, so the board must be at one end of the SCSI bus and you may use only **one** of the board's connectors. If the board is not at one end of the SCSI bus, you must use **two** of the board's connectors and you need to change the termination setting.

NOTE: Some cables have multiple connectors, so you can connect multiple devices to one of the PCI Ultra board's connectors (see figure 5). If the PCI Ultra board uses a connector that is **not** on either end of the cable, then the board is not at one end of the SCSI bus and you need to change the termination setting (see section B.1.2).

The QLA1041–PI board supports 8–bit (narrow) and 16–bit (wide) SCSI devices. If you don't know whether your device is 8 bits or 16 bits wide, check with the peripheral manufacturer before proceeding.

The following sections describe how to set termination for the QLA1041–PI board. The text and illustrations describe multiple SCSI devices on a single connector (daisy chaining). When daisy chaining narrow and wide SCSI devices, always have a wide SCSI device at the end of the chain.

B.1.1
Termination with One Connector

If you are using one connector, no changes are necessary.

B.1.2
Termination with Two Connectors or with One Connector using a Multiple–Connector Cable

If you are using two connectors or one connector in the middle of a multiple–connector cable, change the termination as follows.

- ○ If you have wide devices on the J1 and J2 connectors, remove all the terminators.
- ○ For all other combinations, remove the RM4–RM8 terminators.

CAUTION! You can use any two of the connectors. Using all three connectors at the same time violates the SCSI specification.

Figures 5 through 7 show some of the possible configurations.

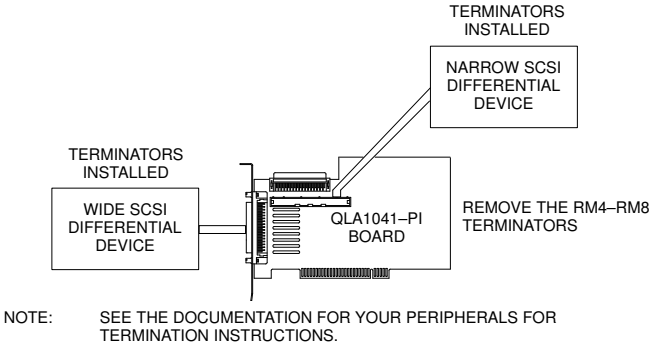

Figure 5. Termination with the J1 and P2 Connectors

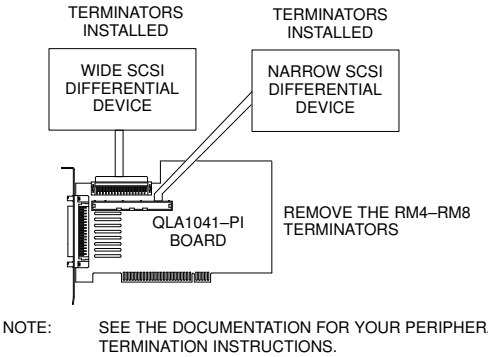

Figure 6. Termination with J2 and P2 Connectors

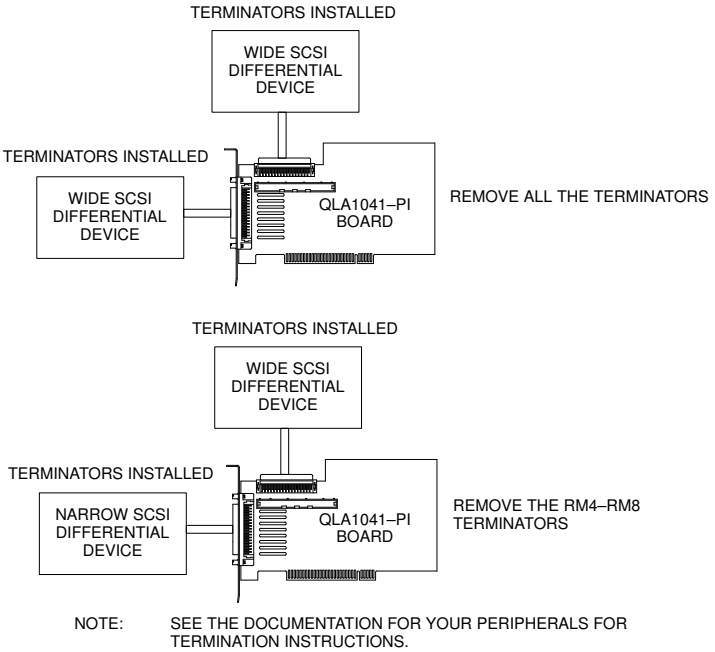

Figure 7. Termination with J1 and J2 Connectors

Appendix C
Specifications

Table 4. PCI Ultra Board Operating Environment

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

Table 5. PCI Ultra Board Specifications

Type	Specification
Host bus	Conforms to PCI Local Bus Rev. 2 specification
SCSI standard	ANSI X3.131–1994 SCSI–2 ANSI X3T10/1071D SCSI–3 Fast–20 (Ultra SCSI)
SCSI data handling	Synchronous (QLA940–PI board): Ultra SCSI (20Mbytes/sec) Fast synchronous SCSI (10 Mbytes/sec) Normal synchronous SCSI (5 Mbytes/sec)
	Synchronous (QLA1040–PI and QLA1041–PI boards): Wide and Ultra SCSI (40 Mbytes/sec) Ultra SCSI (20 Mbytes/sec) Wide and fast SCSI (20 Mbytes/sec) Fast SCSI (10 Mbytes/sec) SCSI–1 (5 Mbytes/sec)
	Asynchronous (all boards)
Central processing unit (CPU)	On–chip RISC processor
Host data transfer	32–bit, bus master DMA data transfers to 132 Mbytes/sec
Transfer counter	24 bit
RAM	64K bytes of static RAM

Type	Specification
FIFO	64–byte DMA FIFO per channel with threshold control
Electrical drivers	Single–ended (QLA940–PI and QLA1040–PI) Differential (QLA1041–PI board)
Connectors	QLA940–PI board: 50–pin external connector 50–pin internal ribbon connector QLA1040–PI and QLA1041–PI boards: 68–pin, high–density, external SCSI–2 connector 68–pin, high–density, internal SCSI–2 connector 50–pin internal ribbon connector
Form factor	17.78 cm X 10.67 cm (7.0” X 4.2”)
Operating power	5 volts @ 1 ampere

Appendix D
FCC Compliance

FCC ID: KZM910PIU (QLA940–PI)
KZM1020PI (QLA1040–PI)
KZM1001PIU (QLA1041–PI)

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

CLASS B EQUIPMENT

Information to User

This equipment has been tested and found to comply with the limits for a CLASS B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions contained in this manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ○ Re–orient or relocate the receiving antenna.
- ○ Increase the separation between the equipment and the receiver.
- ○ Connect the equipment into an outlet on a circuit different from that of the receiver.
- ○ Consult the dealer or an experienced audio television technician.

NOTE: Connecting this device to peripheral devices that do not comply with CLASS B requirements or using an unshielded peripheral data cable could also result in harmful interference to radio or television reception.

The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

To ensure the use of this product does not contribute to interference, it is necessary to use shielded I/O cables.

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Appendix E
Vfg Compliance

Anhang zur Anlage 1 zur AmtsblVfg 243/1991

Bescheinigung des
Herstellers/Importeurs

Hiermit wird bescheinigt, daß der/die/das

SCSI HOST ADAPTER, QLA940–PI, QLA1040–PI, QLA1041–PI

(Gerät, Typ, Bezeichnung)

(DIN–VDE–Norm bzw.EN–Norm Bzw.BMPT–AmtsblVfg 243–1991 funk–entstört ist.)

Dem Bundesamt für Zulassungen in der Telekommunikation wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf die Einhaltung der Bestimmungen eingeräumt.

QLogic Corporation

3545 Harbor Blvd. Costa Mesa, CA 92626

(Name und Anschrift des Herstellers/Importeurs)

Appendix F
Declaration of Conformity

Application of Council Directive(s)..... 89/336/EEC

Standard(s) to which Conformity is Declared.... EN55022, EN50082-1

Manufacturer's Name ..... QLogic Corporation

Manufacturer's Address.. 3545 Harbor Blvd Costa Mesa, CA 92626 USA

Importer's Name .....

Type of Equipment ..... SCSI Host Adapter

Model No. QLA940-PI,QLA1040-PI,QLA1041-PI

Serial No. ....Various Year of Manufacture...1995

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s)

Place Costa Mesa,CA USA

Date December 6, 1995

(Signature)

Gil Larson

(Full Name)

Director MIS/ES

(Position)

CE

Acronyms

ADD	adapter device driver
ANSI	American National Standards Institute
ASPI	advanced SCSI programming interface
BIOS	basic input/output system
BIOS PROM	basic input/output system programmable read–only memory
BTLD	boot–time loadable driver
CD–ROM	compact disc–read only memory
CMOS	complementary metal–oxide semiconductor
CPU	Central Processing Unit
DASD	direct access storage device
DMA	direct memory access
DOS	Disk Operating System
Fast SCSI	SCSI definition for 10 Mbytes/sec data transfers
IDE	integrated drive electronics
I/O	input/output
IRQ	interrupt request level
LUN	logical unit number
NT	new technology
ODT	Open Desk Top
OS/2	IBM Operating System/2
PC	personal computer

PCI	peripheral component interconnect
RAM	random access memory
RAM BIOS	random access memory basic input/output system
ROM BIOS	read–only memory basic input/output system
SCO	Santa Cruz Operations
SCSI	small computer system interface
Ultra SCSI	SCSI definition for 20 Mbytes/sec data transfers
SXP	SCSI executive processor