qlogic™ Corp.

Hardware Installation Guide for the QLA22*xx* Board Family

Fibre Channel Host Adapter Boards for the PCI Bus

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Rev. A, initial release, 4/16/99
Rev. B, update, 10/4/99, extended firmware settings added to *Fast!*UTIL
Rev. C, update, 2/15/00, QLA2200G and QLA2200L boards added
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Rev. D.1, update, 2/6/01, QLA2212F board added

Boards Affected
QLA2200 family QLA2200F family QLA2202F family QLA2204F family QLA2200G family QLA2200L family QLA2212F family

Table of Contents

FIGURES

TABLES

Section 1
Introduction

NOTE: The following QLogic host adapter boards are collectively referred to as the **QLA22xx board** unless otherwise noted:

- **QLA2200** family (64-bit PCI to Fibre Channel copper media):
  FC0210406-03 (ISP2200 chip)
  FC0210406-04 (ISP2200A/33 chip)
  FC0210406-05 (ISP2200A/66 chip)

- **QLA2200F** family (64-bit PCI to Fibre Channel optical media):
  FC0310406-03 (ISP2200 chip)
  FC0310406-04 (ISP2200A/33 chip)
  FC0310406-05 (ISP2200A/66 chip)

- **QLA2202F** family (64-bit PCI to dual channel optical media):
  FC0610403-04 (ISP2200A/33 chip)
  FC0610403-05 (ISP2200A/66 chip)

- **QLA2204F** family (64-bit PCI to quad channel optical media):
  FC2610402-*xx* (ISP2200A/66 chip)

- **QLA2200G** family (64-bit PCI to Fibre Channel gigabit interface converter [GBIC]) with ISP2200A/66 chip:
  FC3010402-01 (QLA2200G/66; without GBIC)
  FC3010402-01(QLA2200GC/66, with GBIC copper)
  FC3010402-01 (QLA2200GF/66; with GBIC optical)

- **QLA2200L** family (64-bit, low-profile PCI to Fibre Channel copper media):
  FC0210408-*xx* (ISP2200A/66 chip)

- **QLA2212F family** (64-bit PCI to dual channel optical media):
  FC0610404-*xx* (ISP2200A/66 chip)

In the chip and board names, /33 indicates 33 MHz; /66 indicates 66 MHz.

1.1
General Description

Thank you for selecting the QLA22*xx* Fibre Channel (FC) board. The QLA22*xx* board is an intelligent, high-performance, DMA bus master host adapter designed for high-end systems. The intelligence and performance are derived from the ISP22*xx* chips, making the QLA22*xx* board a leading-edge host adapter. The ISP22*xx* combines a powerful RISC processor, a fibre protocol module (FPM) with gigabit transceivers, and a peripheral component interconnect (PCI) local bus interface in a single-chip solution. The QLA22*xx* board supports all FC peripherals

that support private loop direct attach (PLDA) and fabric loop attach (FLA). Installation of the QLA22*xx* board is quick and easy.

1.2
What is Fibre Channel?

Fibre channel technology is outlined in the *SCSI-3 Fibre Channel Protocol* (SCSI-FCP) standard. Fibre Channel is a high-speed data transport technology used for mass storage and networking. It connects mainframes, super computers, workstations, storage devices, and servers.

Fibre Channel supports data transfer rates of 100 Mbytes/sec on copper and optical interfaces. The QLA2200/2200L board uses a copper interface for short connections (less than 30 meters); the QLA2200F/2202F/2204F/2212F board uses a multimode optical interface for intermediate distances (less than 500 meters); the QLA2200G board uses a GBIC, which can be either a single mode or multimode optical interface for long distances (greater than 500 meters).

With increased connectivity and performance, Fibre Channel is the technology preferred and used by system designers.

1.3
Features

- Compliance with PCI version 2.2 specification

- Compliance with *Third Generation Fibre Channel Physical and Signaling Interface* (FC-PH-3) standard

- Compliance with *Fibre Channel-Arbitrated Loop* (FC-AL-2) standard

- Compliance with U.S. and international safety and emissions standards

- Support for bus master DMA

- *Fast!*UTIL BIOS utility to customize the configuration parameters on the QLA22*xx* board and attached drives

- Two independent channels on a single board (QLA2202F board)

- Two independent channels, one of which supports internal and external connection (QLA2212F)

- Four independent channels on a single board (QLA2204F board)

- Supports Fibre Channel SCSI (FCP-SCSI) and internet protocol (IP) protocols

- Supports point-to-point fabric connection (F-PORT FABRIC LOGIN)

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Section 2
Hardware Installation

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2.1
Preinstallation Procedures

Before installing your QLA22*xx* board, take a moment to read this guide.

CAUTION! The QLA22*xx* board contains parts that can be damaged by electrostatic discharge (ESD). Before handling the QLA22*xx* board, use standard methods to discharge static electricity. Keep the QLA22*xx* board in the antistatic bag until you are ready to install it. Place the board on the bag when you examine or configure it. Retain the bag for future use.

2.2
What You Need for Installation

Before you install the QLA22*xx* board in your computer, you need the following:

- A screwdriver (usually a Phillips #1)
- A high-speed, serial data connector (HSSDC) cable for the QLA2200/2200L board
- An optical, multimode cable with an SC-style duplex connector for the QLA2200F/2202F/2212F board
- An optical mutimode cable with an LC-style duplex connector for the QLA2204F board
- One of the following cables for each of the three-position point-to-point adapters on the QLA2212F board (J3 and J4; see figure 2-7):
  - ❏ PTP to HDDSC-AMP 636351-X
  - ❏ PTP to DB-9 plug-AMP 636373-X
  - ❏ PTP to DB-9 receptacle-AMP 636372-X
- A GBIC and appropriate cable for the QLA2200G board

NOTE: QLogic does not supply cables. Contact your distributor for the appropriate cable type and length.

Figures 2-1 through 2-6 identify the QLA22*xx* board components referenced throughout this section.

Each QLA22xx board has a unique serial number; its location on the board is noted in figures 2-1 through 2-6. Take a minute to write down the serial number of the

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QLA22xx board in the unlikely event that the NVRAM is corrupted. If the NVRAM is corrupted, you will be prompted for the QLA22xx serial number.

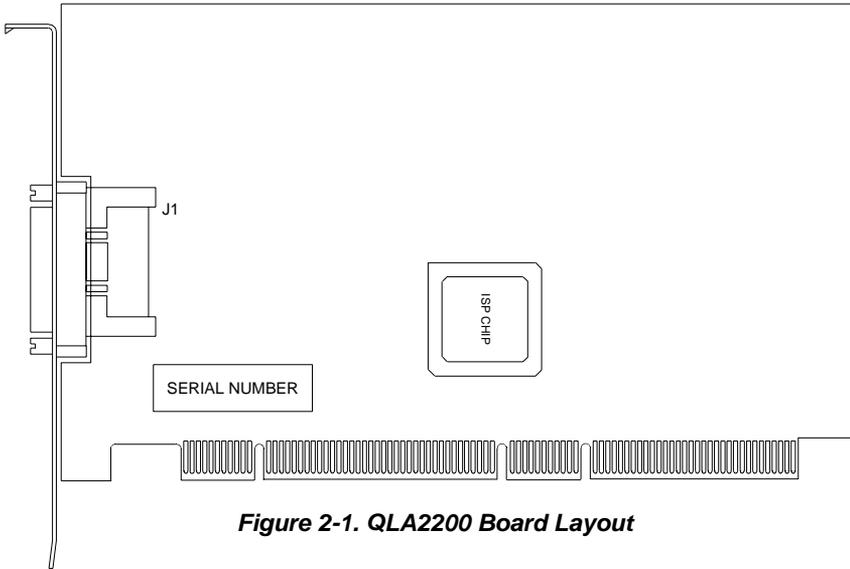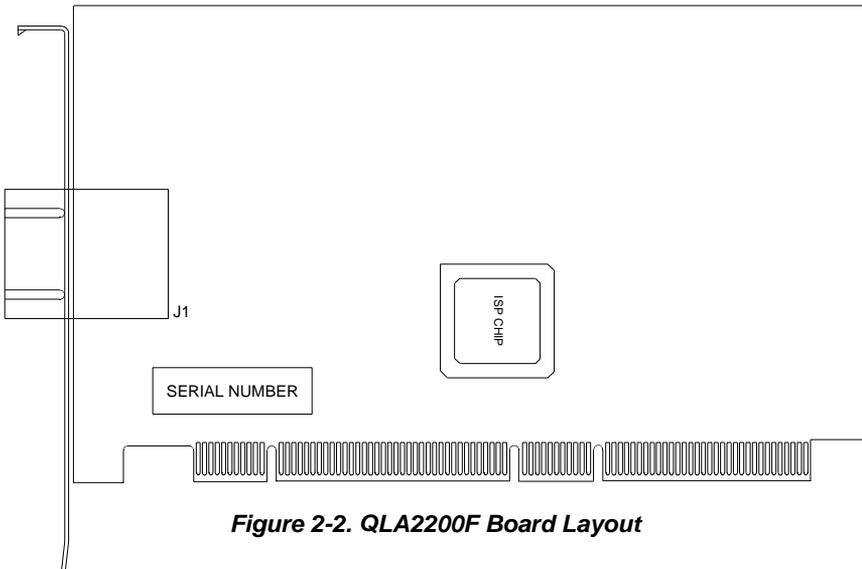**Figure 2-1. QLA2200 Board Layout**

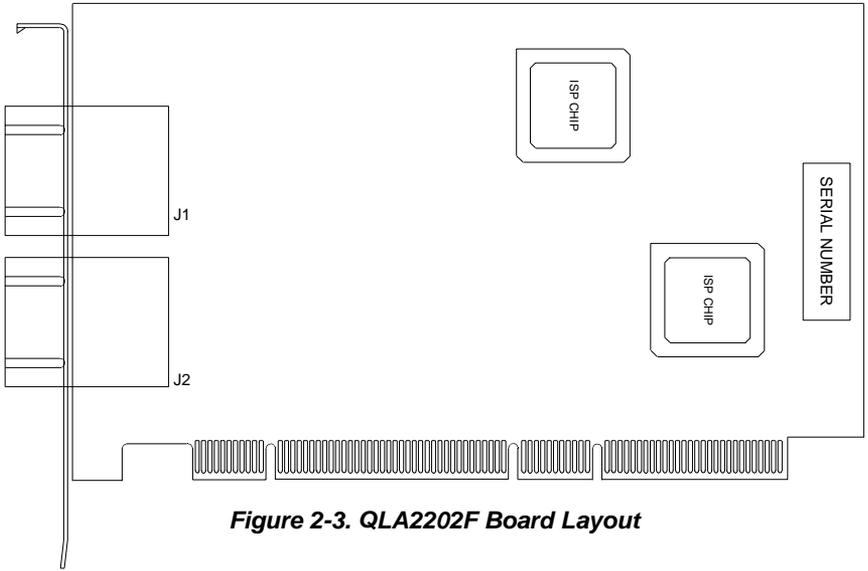**Figure 2-2. QLA2200F Board Layout**

Figure 2-3. QLA2202F Board Layout
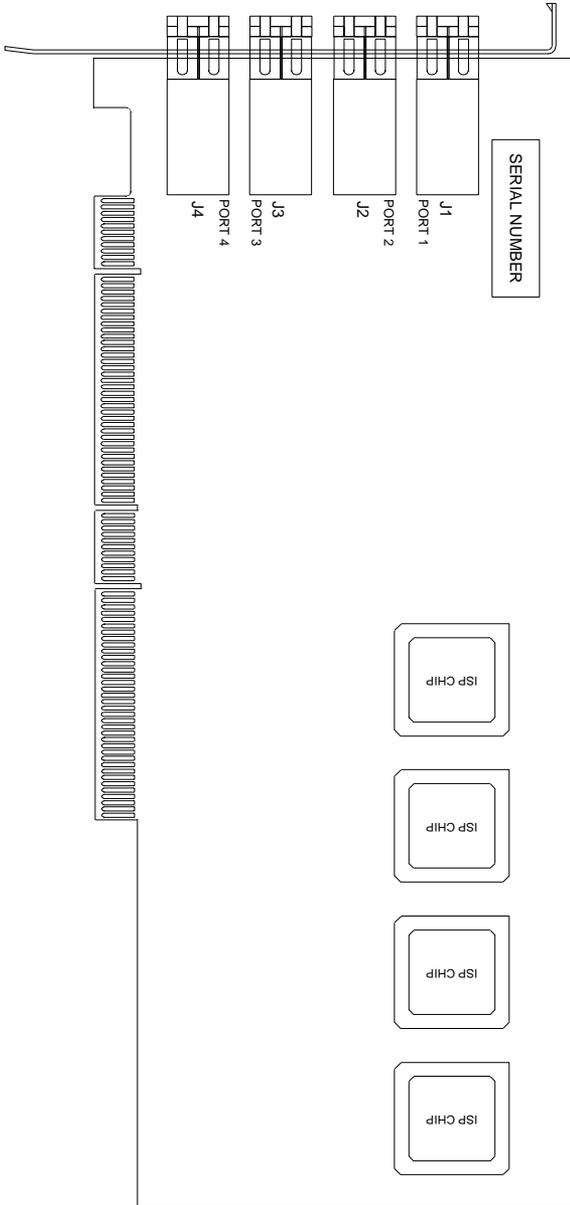
Figure 2-4. QLA2204F Board Layout
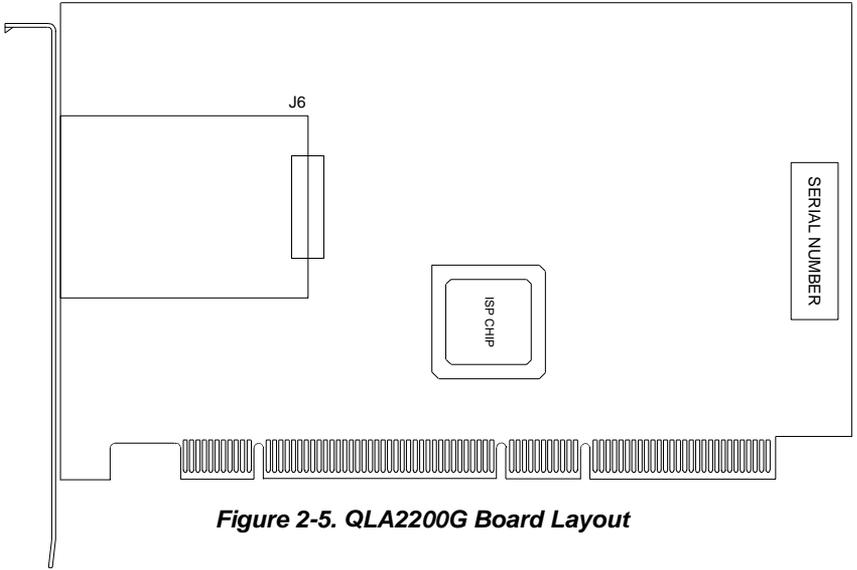
Figure 2-5. QLA2200G Board Layout
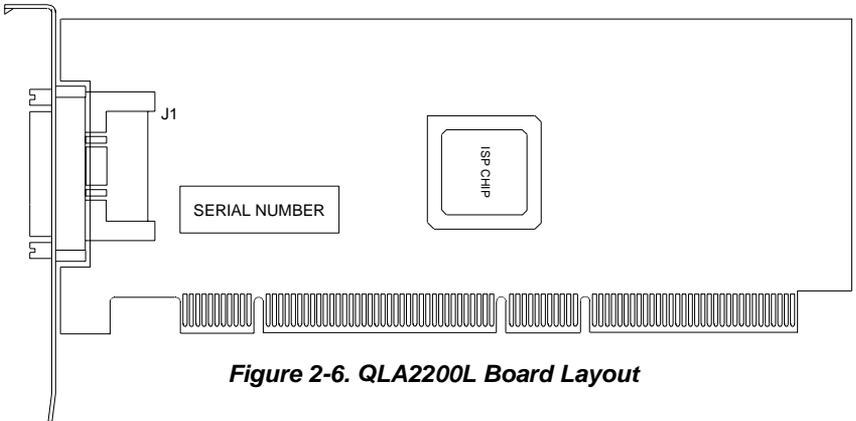
Figure 2-6. QLA2200L Board Layout
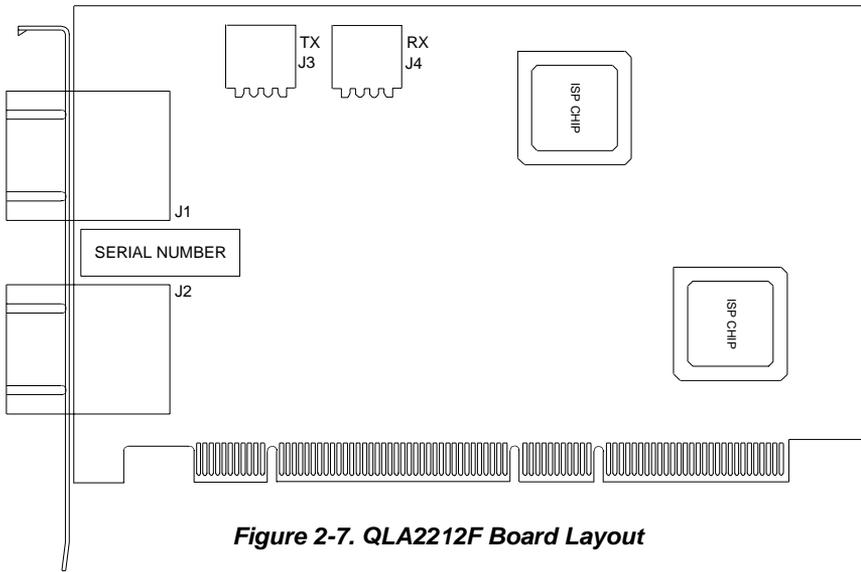
Figure 2-7. QLA2212F Board Layout

2.3
Power Distribution

The QLA2200/2200L board supplies +5 volts to pin 7 of the **HSSDC** copper interface to support an external media interface adapter (MIA), if required. (An MIA converts copper bus signals to optical bus signals.)

2.4
Installation in the Computer

Perform the following steps to install the QLA22*xx* board in your PC:

1. Check the motherboard and make any configuration changes necessary to accommodate the QLA22*xx* board.

    The QLA22*xx* board is self-configuring; however, some motherboards require manual configuration. For example, some systems have a *PCI Device Configuration* menu in the motherboard setup BIOS where you must enable host adapter boards, bus master slots, and interrupt request (IRQ) levels. If the motherboard supports triggering, use *level triggering* for the QLA22*xx* board. See the documentation supplied with your computer, or contact your computer dealer to determine if your motherboard requires configuration.

2. Power down the peripherals, then the computer.

3. Remove the computer cover and save the screws.

4. Choose any PCI bus slot that supports bus mastering. Most motherboards automatically assign an IRQ level and interrupt line; if your motherboard does not, you must assign the IRQ level and use **interrupt line A** for this slot.

   NOTE:

   ❑ Some motherboards have two kinds of PCI bus slots: master and slave. The QLA22*xx* board must be in a PCI bus master slot. (Some motherboards have PCI bus master slots that are shared with onboard devices. QLA22*xx* boards do not work in shared slots.)

   ❑ PCI connectors vary among system board manufacturers. The QLA22*xx* board is a 64-bit PCI device that can function in a 32-bit PCI slot that conforms to the PCI specification (the rear edge of the PCI slot is notched). If you try to install the QLA22*xx* board into a PCI slot that does not conform to the PCI specification, you may damage the QLA22*xx* board.

   ❑ The 66-MHz QLA22*xx* boards (indicated by /66 in their name) are backward compatible; consequently, they can be used in a 33-MHz slot.

5. Unscrew and remove the slot cover. Retain the screw; you will use it when you install the QLA22*xx* board.

6. Place the QLA22*xx* board into the slot. Carefully press the board into the slot until it seats firmly.

7. Secure the QLA22*xx* board to the chassis with the slot cover screw.

8. Connect the appropriate cable from the devices to the corresponding connector:

   ❑ J1 (QLA2200/2200F/2202F/2200L)

   ❑ J1 and J2 (QLA2202F/2212F)

   ❑ J3 and J4 (QLA2212F). These are three-position point-to-point adapters connected to J1. J3 is the transmit connector; J4 is the receive connector.

   ❑ J1 through J4 (QLA2204F)

   ❑ J6 (QLA2200G)

9. Carefully reinstall the computer cover. Insert and tighten the computer cover screws.

10. Power up all external FC devices, then power up the PC and observe the monitor. The BIOS is disabled by default. Consequently, the devices attached to the QLA22*xx* board are not identified. For example:

```
QLogic Corporation
QLA22xx PCI Fibre Channel ROM BIOS Version X.XX
Copyright (C) QLogic Corporation 2000 All rights reserved.
www.qlogic.com
Press <Alt-Q> for Fast!UTIL

BIOS for Adapter 0 is disabled
ROM BIOS not installed
```

> ### *NOTE:*
> ❑ Sun SPARC systems do not display the BIOS banner.
>
> ❑ Enable the BIOS only if the boot device is attached to the QLA22*xx* board.
>
> ❑ For further information about enabling the QLA22*xx* BIOS, see appendix A.

If the information displayed on your monitor is correct, congratulations! You have successfully installed the QLA22*xx* board in your computer.

See the appropriate QLogic software installation guide for detailed instructions on how to install the software drivers.

If the information displayed is not correct and you have checked the QLA22*xx* board's configuration, see section 3 for troubleshooting information.

2.5
Installation Help

If your system has an integrated drive electronics (IDE) fixed disk device, it may be assigned device number 80, which is the boot device. If your system does not have an IDE disk device, the first bootable FC disk device configured (the one with the lowest ID) is assigned device number 80 and becomes the boot device. The QLA22*xx* BIOS must be enabled if the boot device is connected to the QLA22*xx*.

If you have a selectable boot BIOS, set the motherboard BIOS parameters to None or Not Installed. The ROM BIOS on the FC controller automatically configures the FC peripherals.

Section 3
Troubleshooting

3.1
Problems After Installation

There are three basic types of installation problems that can cause your QLA22*xx* board to function incorrectly: hardware problems, system configuration problems, and Fibre Channel problems. The following section provides itemized checklists to help you determine why your QLA22*xx* board is not functioning.

3.2
Hardware Problem Checklist

- Are all of the circuit cards installed securely in the system?

- Are all of the cables securely connected to the correct connectors? Be sure that the FC cables that attach from the QLA22*xx* connectors to the device are connected correctly. For example, the optical transmit connector on the board should be connected to the optical receive connector on the device. Some connectors require a firm push to ensure proper seating. An easy way to check is to switch the connectors on either the QLA22*xx* or the device, then reboot your system. If the BIOS is enabled, devices attached to the QLA22*xx* board are displayed on the screen.

- Is the QLA22*xx* board installed correctly in the PCI slot? Is it seated firmly in the slot? Check for interference due to nonstandard PCI connectors.

- Is the GBIC on the QLA2200G fully seated?

- Are all external peripherals properly powered up? See appendix A.3 for information about displaying attached devices.

3.3
System Configuration Problem Checklist

All PCI-compliant systems automatically detect 32- or 64-bit boards and set the appropriate bus speed (33 or 66 MHz). Check the motherboard for proper configuration (see section 2.4).

See the documentation supplied with your computer, or contact your computer dealer to determine if your motherboard requires special configuration.

3.4
Fibre Channel Problem Checklist

- ■ Were all of the FC devices powered up before you powered up the PC?
- ■ Check that all cables are properly connected.

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Appendix A
*Fast!*UTIL

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NOTE: The *Fast!*Util BIOS utility does not run on Sun SPARC systems. Refer to the *Software Installation Guide for the QLA2200 Board Family* for information regarding adapter configuration settings.

A.1
Introduction

This appendix provides detailed configuration information for advanced users who want to customize the configuration of the QLA22*xx* board and the connected devices.

The board can be configured using *Fast!*UTIL. Access *Fast!*UTIL by pressing <ALT>-<Q> during the QLA22*xx* board BIOS initialization (it may take a few seconds for the *Fast!*UTIL menu to appear). If you have more than one QLA22*xx* board, *Fast!*UTIL asks you to select the board you want to configure. After changing the settings, *Fast!*UTIL reboots your system to load the new parameters.

CAUTION! If the configuration settings are incorrect, your QLA22*xx* board may 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 FC devices and the QLA22*xx* board to which they are attached.

A.2.1
Host Adapter Settings

From the *Configuration Settings* menu in *Fast!*UTIL, select Host Adapter Settings. The default settings for the QLA22*xx* host adapter board are listed in table A-1 and described in the following paragraphs.

Table A-1. Host Adapter Settings

Setting	Options	Default
Host Adapter BIOS	*Enabled or Disabled*	*Disabled*
Frame Size	*512, 1024, 2048*	*1024*
Loop Reset Delay	*0-15 seconds*	*5 seconds*
Adapter Hard Loop ID	*Enabled or Disabled*	*Disabled*
Hard Loop ID	*0-125*	*0*

- ■ **Host Adapter BIOS.** When this setting is disabled, the ROM BIOS on the QLA22*xx* board is disabled, freeing space in upper memory. This setting must be enabled if you are booting from an FC disk drive attached to the QLA22*xx* board. The default is *Disabled*.

- ■ **Frame Size.** This setting specifies the maximum frame length supported by the QLA22*xx* board. The default size is *1024*. If using F-Port (point-to-point) connections, change this setting to 2048 for maximum performance.

- ■ **Loop Reset Delay.** After resetting the loop, the firmware refrains from initiating any loop activity for the number of seconds specified in this setting. The default is *5 seconds*.

- ■ **Adapter Hard Loop ID.** This setting forces the adapter to attempt to use the ID specified in the Hard Loop ID setting. The default is *Disabled*.

- ■ **Hard Loop ID.** If the Adapter Hard Loop ID setting is enabled, the adapter attempts to use the ID specified in this setting. The default ID is *0*.

A.2.2
Selectable Boot Settings

The *Selectable Boot Settings* option is accessed from the *Configuration Settings* menu. If you enable this option, you can select the node name from which you want to boot. Once enabled, this option forces the system to boot on the selected FC drive, ignoring any IDE drives attached to your system. If you disable this option, the system looks for a boot device (as selected in the system BIOS). In disabled mode, the Boot ID and Boot LUN parameters have no effect.

NOTE: This option applies only to disk devices; it does not apply to tape drives and other nondisk devices.

A.2.3
Restore Default Settings

The *Restore Defaults* option from the *Configuration Settings* menu restores the QLA22*xx* board default settings.

A.2.4
Raw NVRAM Data

This option displays the adapter's NVRAM contents in hexadecimal format. This is a QLogic troubleshooting tool; you cannot modify the data.

A.2.5
Advanced Adapter Settings

From the *Configuration Settings* menu in *Fast!*UTIL, select Advanced Adapter Settings. The default settings for the QLA22*xx* host adapter board are listed in table A-2 and described in the following paragraphs.

Table A-2. Advanced Adapter Settings

Setting	Options	Default
Execution Throttle	*1-256*	*16*
Fast Command Posting	*Enabled or Disabled*	*Enabled*
>4GByte Addressing	*Enabled or Disabled*	*Disabled*
Luns per Target	*0, 8, 16, 32, 64, 128, 256*	*8*
Enable LIP Reset	*Yes or No*	*No*
Enable LIP Full Login	*Yes or No*	*Yes*
Enable Target Reset	*Yes or No*	*No*
Login Retry Count	*0-255*	*8*
Port Down Retry Count	*0-255*	*8*
Drivers Load RISC Code	*Enabled or Disabled*	*Enabled*
Enable Database Updates	*Yes or No*	*No*
Disable Database Load	*Yes or No*	*No*
IOCB Allocation	*1-512 buffers*	*256 buffers*
Extended Error Logging	*Enabled or Disabled*	*Disabled*

■ **Execution Throttle.** This setting specifies the maximum number of commands executing on any one port. When a port's execution throttle is reached, no new commands are executed until the current command finishes executing. The valid options for this setting are *1-256*. The default (optimum) is *16*.

■ **Fast Command Posting.** This setting decreases command execution time by minimizing the number of interrupts. The default is *Enabled*.

■ **>4GByte Addressing.** This option should be enabled if the system has more than 4 Gbytes of memory available. The default is *Disabled*.

■ **LUNs per Target.** This setting specifies the number of LUNs per target. Multiple LUN support is typically for redundant array of independent disks (RAID) boxes that use LUNs to map drives. The default is *8*. If you do not need multiple LUN support, set the number of LUNs to *0*.

■ **Enable LIP Reset.** This setting determines the type of loop initialization process (LIP) reset that is used when the operating system initiates a bus reset routine. When this setting is yes, the driver initiates a global LIP reset to clear the target device reservations. When this setting is no, the driver initiates a global LIP reset with full login. The default is *No*.

■ **Enable LIP Full Login.** This setting instructs the ISP chip to re-login to all ports after any LIP. The default is *Yes*.

■ **Enable Target Reset.** This setting enables the drivers to issue a Target Reset command to all devices on the loop when a SCSI Bus Reset command is issued. The default is *No*.

■ **Login Retry Count.** This setting specifies the number of times the software tries to log in to a device. The default is *8* retries.

■ **Port Down Retry Count.** This setting specifies the number of times the software retries a command to a port returning port down status. The default is *8* retries.

■ **Drivers Load RISC Code.** When this setting is enabled, the host adapter uses the RISC firmware that is embedded in the software driver. When this setting is disabled, the software driver loads the RISC firmware that is stored in the QLA22*xx* BIOS. The default is *Enabled*.

> *NOTE:* The driver being loaded must support this setting. If the driver does not support this setting, the result is the same as disabled regardless of the setting. Leaving this option enabled guaranties a certified combination of software driver and RISC firmware.

■ **Enable Database Updates.** When enabled, this setting allows the software to save the loop configuration information in flash memory when the system powers down. The default is *No*.

■ **Disable Database Load.** When enabled, the device database is read from the Registry during driver initialization. When disabled, the device database is created dynamically during driver initialization. The default is *No*.

　NOTE: This option usually applies to Windows NT operating environment.

■ **IOCB Allocation.** This setting specifies the maximum number of buffers from the firmware's buffer pool that are allocated to any one port. The default is *256 buffers*.

■ **Extended Error Logging.** This setting provides additional error and debug information to the operating system. When enabled, events are logged into the Windows NT Event Viewer. The default is *Disabled*.

A.2.6
Extended Firmware Settings

From the *Configuration Settings* menu in *Fast!*UTIL, select Extended Firmware Settings. The default settings for the QLA22*xx* host adapter board are listed in table A-3 and described in the following paragraphs.

Table A-3. Extended Firmware Settings

Setting	Options	Default
Extended Control Block	*Enabled or Disabled*	*Enabled*
RIO Operation Mode	*0, 1, 2, 3, 4*	*0*
Connection Options	*0, 1, 2, 3*	*3*
Class 2 Service	*Enabled or Disabled*	*Disabled*
ACK0	*Enabled or Disabled*	*Disabled*
Fibre Channel Tape Support	*Enabled or Disabled*	*Disabled*
Fibre Channel Confirm	*Enabled or Disabled*	*Disabled*
Command Reference Number	*Enabled or Disabled*	*Disabled*
Read Transfer Ready	*Enabled or Disabled*	*Disabled*
Response Timer	*0-255*	*0*
Interrupt Delay Timer	*0-255*	*0*

- **Extended Control Block.** This setting enables all other extended firmware settings. The default is *Enabled*.

- **RIO Operation Mode.** This setting specifies the reduced interrupt operation (RIO) modes, if supported by the software driver. RIO modes allow posting multiple command completions in a single interrupt (see table A-4). The default is *0*.

Table A-4. RIO Operation Modes

Option	Operation Mode
0	No multiple responses
1	Multiple responses, 16 bit handles, interrupt host
2	Multiple responses, 32 bit handles, interrupt host
3	Multiple responses, 16 bit handles, delay host interrupt
4	Multiple responses, 32 bit handles, delay host interrupt

- **Connection Options.** This setting defines the type of connection (loop or point to point) or connection preference (see table A-5). The default is *3*.

Table A-5. Connection Options

Option	Type of Connection
0	Loop only
1	Point to point only
2	Loop preferred, otherwise point to point
3	Point to point, otherwise loop

- **Class 2 Service.** This setting enables Class 2 service parameters to be provided during all automatic logins (loop ports). The default is *Disabled*.

- **ACK0.** This setting determines the type of acknowledge (ACK) used. When this setting is enabled, sequence ACK is used. When this setting is disabled, frame ACK is used. The default is *Disabled*.

  NOTE: The Class 2 Service setting must be enabled to use the ACK0 setting.

- **Fibre Channel Tape Support.** This setting is reserved for Fibre Channel tape support, which will be implemented in a future version of the QLA22*xx*. The default is *Disabled*.

- **Fibre Channel Confirm.** This setting is reserved for Fibre Channel tape support, which will be implemented in a future version of the QLA22*xx*. The default is *Disabled*.

- ■ **Command Reference Number.** This setting is reserved for Fibre Channel tape support, which will be implemented in a future version of the QLA22*xx*. The default is *Disabled*.

- ■ **Read Transfer Ready.** This setting is reserved. The default is *Disabled*.

- ■ **Response Timer.** This setting contains the value (in 100-microsecond increments) used by a timer to limit the time waiting accumulating multiple responses. For example, if this field is 8, the time limit is 800 microseconds. The default is *0*.

- ■ **Interrupt Delay Timer.** This setting contains the value (in 100-microsecond increments) used by a timer to set the wait time between accessing (DMA) a set of handles and generating an interrupt. The default is *0*.

A.3
Scan Fibre Channel Devices

This option scans the FC loop and lists all the connected devices by loop ID. Information about each device is listed, for example, vendor name, product name, and revision. This information is useful when configuring your QLA22*xx* board and attached devices.

A.4
Fibre Disk Utility

This option scans the FC loop bus and lists all the connected devices by loop ID. You can select a disk device and perform a low-level format or verify the disk media.

CAUTION!   Performing a low-level format destroys all data on the disk.

A.5
Select Host Adapter

Use this setting to select a specific QLA22*xx* board if you have multiple QLA22*xx* boards in your system.

Appendix B
Specifications

Table B-1. QLA22xx 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 B-2. QLA22xx Board Specifications

Type	Specification
Host bus	Conforms to *PCI Local Bus Specification*, revision 2.2
PCI signaling environment	3.3 V and 5.0 V busses supported
PCI transfer rate	132 Mbytes/sec maximum burst rate for 32-bit PCI operation at 33 MHz 264 Mbytes/sec maximum burst rate for 32-bit PCI operation at 66 MHz 264 Mbytes/sec maximum burst rate for 64-bit PCI operation at 33 MHz 528 Mbytes/sec maximum burst rate for 64-bit PCI operation at 66 MHz
Fibre Channel specifications	Bus type: copper media, twisted pair (QLA2200/2200L) fibre optic media (QLA2200F/2202F/2204F/2212F) GBIC (QLA2200G) Bus transfer rate: 100 Mbytes/sec maximum at half duplex 200 Mbytes/sec maximum at full duplex Interface chip: ISP2200 or ISP2200A
Central processing unit (CPU)	Single-chip design that includes a RISC processor, Fibre Channel protocol manager, PCI DMA controller, and 1-gigabit transceivers
Host data transfer	64-bit, 33-MHz bus master DMA data transfers to 264 Mbytes/sec 64-bit, 66-MHz bus master DMA data transfers to 528 Mbytes/sec
RAM	128K bytes of SRAM
BIOS ROM	128K bytes of flash ROM in two 64K-byte, software selectable banks. The flash is field programmable.
NVRAM	256 bytes, field programmable
Onboard DMA	Three independent DMA channels: two data and one command. Integrated 4K-byte frame buffer FIFO for each data channel.

Table B-2. QLA22xx Board Specifications (Continued)

Type	Specification
Connectors	QLA2200/2200L: HSSDC connector that supports copper cabling. Fibre optic support available using an external MIA.
	QLA2200F/2202F: SC-style connector that supports non-OFC, multimode fibre optic cabling using 1 x 9 fibre optic transceiver module.
	QLA2204F: LC-style connector that supports non-OFC, multimode fibre optic cabling using a small form factor optical transceiver module.
	QLA2200G: GBIC receptacle.
	QLA2212F: SC-style connector that supports non-OFC, multimode fibre optic cabling using 1 x 9 fibre optic transceiver module. One channel provides an internal copper connection to support PTP cabling.
Form factor	17.78 cm x 10.67 cm (7.0" x 4.2") (QLA2200/2200F/2202F/2200G/2212F)
	16.93 cm x 5.15 cm (6.7" x 2.5") (QLA2200L)
	31.2 cm x 10.6 cm (12.2" x 4.2") (QLA2204F)
Operating power	Less than 15 watts