Installation
and
Operating Guide

Scalar 218FC Library

Copyright Notice

Copyright Notice (Europe)

EMI/RFI Compliance

United States – FCC

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

> Re-orient or relocate the receiving antenna.
>
> Increase the separation between the equipment and receiver.
>
> Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
>
> Consult the dealer or an experienced radio/TV technician for help.

You may find the following booklet prepared by the Federal Communications Commission helpful: *How to Identify and Resolve Radio-TV Interference Problems.* This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock No. 004-000-00354-04.

Any changes or modifications not expressly approved by ADIC could void the user's authority to operate this equipment.

Canada – Department of Communications

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus", ICES-003 of the Department of Communications.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Class A prescriptes dans la norme sur le matériel brouilleur: "Appareils Numériques", NMB-003 édictée par le ministre des Communications.

DECLARATION OF CONFORMITY

according to EN 45014

Manufacturer's Name: Advanced Digital Information Corporation

Manufacturer's Address:

11431 Willows Road
Redmond, Washington 98052
USA

ZAC des Basses Auges
1, rue Alfred de Vigny
78112 - Fourqueux
FRANCE

declares, that the product:

**Product
(Produit, Erzeugnis):**

SCALAR 218FC

**Model Number
(Marque Commercial,
Warenbezeichnung):**

SCALAR 218FC

conforms to the following international specifications, as required by 89/336/EEC & 92/31/EEC:

EMI: EN 50081-1, EN-55022 Class B

EMC: EN 50082-1, IEC 801-2, IEC 801-3, IEC 801-4

Safety: EN 60950

Supplementary Information:

Redmond, Washington USA   12/10/96   Product Engineering Mgr**.**

Location   **Date**   **Signature/Title**

63-1095-01 rev A

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Table of Contents

Safety

Warnings

This symbol should alert the user to the presence of "dangerous voltage" inside the product that might cause harm or electric shock.

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

Caution

All safety and operating instructions should be read before this product is operated, and should be retained for future reference. This unit has been engineered and manufactured to assure your personal safety. Improper use can result in potential electrical shock or fire hazards. In order not to defeat the safeguards, observe the following basic rules for its installation, use and servicing.

Warning

The Scalar 218 weighs over 60 lbs. when equipped with two drives. *Do Not* attempt to lift the Scalar out of the packing box, or off of a work surface, by yourself. To avoid personal injury and possible damage to the equipment, two people are required when unpacking, lifting and moving the unit.

Heed Warnings - All warnings on the product and in the operating instructions should be adhered to.

Follow Instructions - All operating and use instructions should be followed.

Ventilation - The product should be situated so that its location or position does not interfere with proper ventilation.

Heat - The product should be situated away from heat sources such as radiators, heat registers, furnaces, or other heat producing appliances.

Power Sources - The product should be connected to a power source only of the type directed in the operating instructions or as marked on the product.

Power Cord Protection - The AC line cord should be routed so that it is not likely to be walked on or pinched by items placed upon or against it, paying particular attention to the cord at the wall receptacle, and the point where the cord exits from the product.

Object and Liquid Entry - Care should be taken to insure that objects do not fall and liquids are not spilled into the product's enclosure through openings.

Servicing - The user should not attempt to service the product beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

Precautions

Do not use oil, solvents, gasoline, paint thinners or insecticides on the unit.

Do not expose the unit to moisture, to temperatures higher than 140ºF (60ºC) or to extreme low temperatures.

Keep the unit away from direct sunlight, strong magnetic fields, excessive dust, humidity and electronic/electrical equipment, which generates electrical noise.

Hold the AC power plug by the head when removing it from the AC source outlet; pulling the cord can damage the internal wires.

Use the unit on a firm level surface free from vibration, and do not place anything on top of unit.

Handle optical cables with care. Do not bend at 90º, as cable is made of optical (glass) fibers and they may break. Take care not to touch or otherwise contaminate ends of optical cables as it may degrade signal integrity. The optical contacts can be cleaned using a piece of silk cloth.

Chapter

1

Introduction

This Chapter …

❐   provides a brief overview of the Scalar 218FC Library features. For detailed
specifications, see Appendix F.
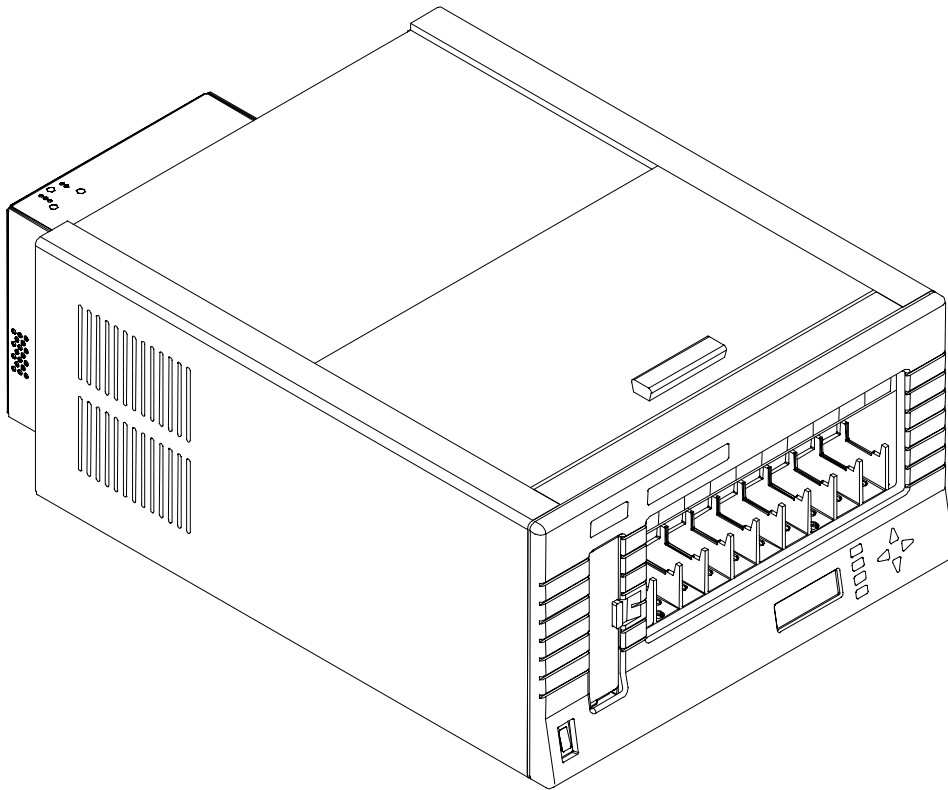
With ever changing technology, enterprise storage managers must deal with applications that are increasingly information intensive. At the same time, they are faced with increasing storage demands and shrinking backup windows. To meet these demands, the paradigm of storage routing is being introduced into the Data Center. The need for faster access, distributed resources, greater bandwidth and high availability is creating a convergence of networking and storage media. Fibre Channel technology is one of the most important technological paradigms currently being brought to these problems.

Your ADIC Scalar 218FC Library is a fully automated, high-performance, high-capacity, mass storage system. The Scalar 218FC provides you with unattended, near-line and off-line data storage, archiving, backup, hierarchical storage management (HSM), and retrieval for mid-range and high-end servers and networks.

Your Scalar 218FC Library allows direct inter-connect to the Fibre Channel network. The maximum two DLT™ drives and library can be controlled through a single server, and can also be connected to a FC-AL (Fibre-Channel Arbitrated Loop) interface to allow for independent control of the drives from various workstations. Your Scalar library supports the non-OFC (multi-mode) standard for transmission lengths of up to 500 meters. Your 218FC continues to operate using SCSI-2 compliant protocol over the Fibre Channel interface to achieve high capacity, high throughput, and data compression by incorporating streaming tape drives. Your library can contain up to 18 data cartridges providing a maximum formatted capacity of 1.44 TB and a sustained data transfer rate as high as 1440 MB per minute at an average compression of 2:1 (when equipped with two drives). The tape media, rated at up to 1,000,000 passes and a shelf life of 30 years provides superior media durability and data reliability.

Features

Direct connection to Fibre Channel networks. Your Scalar 218FC is designed to provide high-speed data storage and retrieval using SCSI-2 compliant protocol over Fibre Channel networks.

Desktop and Rack-Mounted units. Your Scalar 218FC is the first desktop unit to offer over 1 TB of data storage. Its attractive case looks great in any office environment. The more utilitarian rack-mounted unit includes all of the features of the desktop unit, but comes equipped with built-in hardware to allow simple installation into standard 19-inch racks.

Multi-function Operator Panel. The Operator Panel, located at the bottom-right corner of the front panel, employs a 4-line by 20-character liquid crystal display (LCD) and an eight-key keypad to permit you to monitor and control the operations of your library.

Media Picker. The uniquely designed Media Picker is the media cartridge handling mechanism and normally responds to commands from the application software to move the cartridges between the storage slots and the drives. The Media Picker employs a bi-directional, pass-through gripper that will pick a cartridge from both the front of the picker, or the rear.

Mailbox. The firmware-configurable single-slot mailbox, mounted on the front panel, allows you to insert and remove cartridges from your library without opening the sliding access panel. When configured with a mailbox slot, there are 17 storage slots available for data cartridges in the Scalar 218FC. This reduces the maximum data capacity to 1.36 TB.

DLT drives. Your Scalar 218FC library is equipped with one or two fourth-generation DLT7000 or DLT8000 drives. The DLT8000 provides a maximum data cartridge capacity of 80 GB (avg. 2:1 compression) with the DLTtape IV cartridge. The DLT7000 can read and write 2.6 GB, 6.0 GB, and 10.0 GB tape formats, while the DLT8000 can read and write 10.0 GB, 15.0 GB, 20.0 GB, and 35.0 GB tape formats, providing 100% interchange compatibility with earlier DLT drives. You may select tape density through the application software or by pressing a button on the drive.

Barcode Scanner. The Barcode Scanner reads cartridge information contained in a barcode label attached to each of the data cartridges. This information becomes part of the application software's library cartridge inventory.

Exabyte® Emulation. To maximize application software compatibility, your ADIC library provides functional emulation of the Exabyte EXB-480™ library and can appear as either a Scalar or an Exabyte EXB-480.

System Integrity. A physically lockable sliding access panel on the top of the Scalar 218FC protects the cartridge slots, drives, and robotics. The application software can enable or disable system security. Additionally, the application software can set a logical system lock.

Maintainability. The transparent window on the front panel allows you to view the full operation of your library. If a problem occurs, it is both visible and readily correctable. Your library will report any condition that causes a cartridge load or unload to fail, by displaying an appropriate message on the Operator Panel LCD.

Cleaning Cartridge. Although the cleaning cartridge can occupy a cartridge storage slot in the Scalar 218FC (facilitating automated cleaning cycles), you may manually insert a cleaning cartridge through the Mailbox or the sliding access panel.

Manual Cartridge Use. You may easily transport individual cartridges to the drives using the Mailbox slot, or through the sliding access panel.

Cartridge Pre-Check. Whenever you power up, your Scalar 218FC maps all cartridge locations. With barcode scan enabled, the barcode scanner will scan the barcode label on each cartridge and build a log of valid cartridge locations.

Downloadable Firmware. Your Scalar 218FC and the DLT drives employ Flash EEPROM technology. The library firmware is easily updated using any computer and an associated serial communications application. The drive firmware is updated on-site by loading a firmware update tape ("FUP" tape).

Built-in Diagnostics. Diagnostic firmware tells you when it is time to clean the drive. It also reports diagnostic results, and drive operating status. Embedded data logging of operational and drive errors can aid you in failure analysis.

Chapter

2

Getting Started

This Chapter …

❒ covers what you need (and what you need to know) to install your Scalar 218FC. Read this chapter before you begin installation.

Installation of the Scalar 218FC desktop unit requires checking all necessary Fibre Channel interface connections, loading application software on the host computer, and applying power. Installation of the rack-mount unit begins by mounting slide rails, a cable channel, and channel stop to your rack before continuing the installation.

Requirements

The footprint of your Scalar 218FC Library is 19.0 inches wide, 27.6 inches deep, and 11.0 inches high. You must allow clearance at the rear and sides of the desktop unit for airflow and enough room at the top to permit you to bulk load and unload data cartridges through the sliding access panel. To bulk load and unload cartridges from the rack-mount unit, you must slide the library out from the rack to the stop limits of the rails. There must be adequate clearance above it, to perform the bulk load/unload procedure.

You must integrate your Scalar 218FC into your host computer system. Backup software and a Fibre-Channel Host Bus Adapter interface card must be purchased separately.

Necessary tools: to install the rack-mount unit, you will need the following tools.

> #1 philips screwdriver.
>
> 11/32-inch hex nut-driver.

Unpacking and Inspecting

Warning

The Scalar 218FC weighs more than 60 pounds. ***Do Not*** attempt to lift the Library out of the packing box by yourself. See the *Scalar 218FC Unpacking Instructions*, taped to the outside of the poly bag surrounding the Scalar, for complete unpacking instructions.

---

1. Following the procedures in the document mentioned in the above warning, unpack all items from the carton. Save the packing materials in case you need to move or ship the system in the future.

Caution

You must use the original or equivalent packing materials when shipping the Scalar 218FC. Failure to use the original or equivalent materials may invalidate your warranty.

Checking the Accessories

Check to make certain that the following items are included with your Scalar 218FC:

Power cord

One DLTtape IV data cartridge

One cleaning cartridge, or a coupon for a free DLT cleaning cartridge

One 3-meter, 50-micron, Non-OFC cable

This Installation and Operating Guide

A Warranty Registration card

Two keys for the sliding access panel lock (desktop unit only), or the slam-lock (rack-mount unit only)

One cable channel (rack-mount unit only)

One channel stop (rack-mount unit only)

Two outer rails (rack-mount unit only)

Mounting hardware (rack-mount unit only)

✔   None of the items should show signs of damage.

Preparing the Library for Installation

Caution

If the operating environment differs from the storage environment by 15° C (30° F) or more, let the unit acclimate to the surrounding environment for at least 12 hours.

Rack-mount Scalar 218FC

Complete instructions for installing the rack-mount Scalar 218FC are in Appendix D of this manual. After mounting the unit in your rack, return to this section to complete the installation process.

Removing the Shipping Bracket

A shipping bracket holds the Media Picker in place. Remove this bracket before powering-on the unit. Follow the instructions below to remove the shipping bracket.

Desktop Scalar 218FC

1.   Remove the keys taped to the rear panel of your library, and unlock the sliding access panel. The lock is located in the top-right corner of the front panel.

2.   Using the handle, open the access cover fully by pushing it towards the rear of the Scalar.

Rack-mount Scalar 218FC

1. Remove the keys taped to the rear panel of your library, and unlock the front panel. Slide it towards you until the slide stops engage.

All Scalar 218FC Units

1. Inside the Scalar 218FC cartridge storage bay, locate the red shipping bracket mounted on the floor.

2. Remove the wing nuts that secure the shipping bracket to the floor.

Remove this bracket
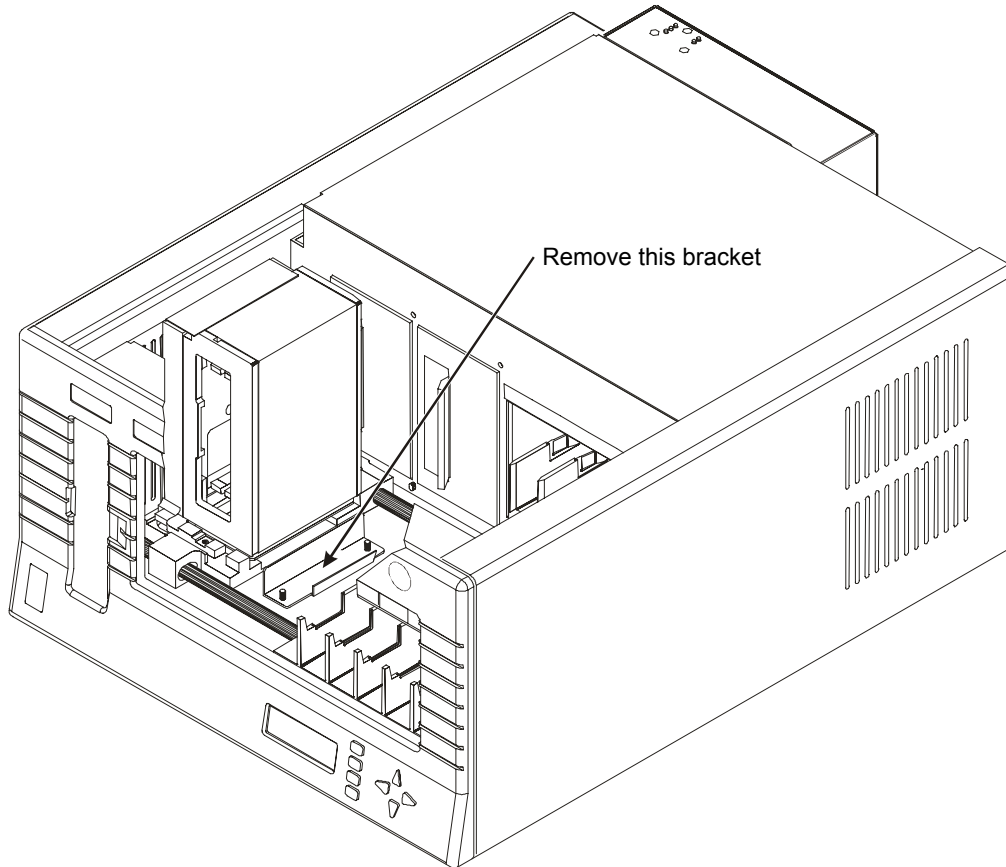
Removing the Shipping Bracket (Desktop Scalar 218FC shown)

3. Pull the shipping bracket off the studs and remove it from the Scalar 218FC.

4. Remove the packing foam located between the left chassis wall and the Media Picker.

Prepare and Install the Data Cartridges

Barcode Labels

To install the barcode labels, position the label with the numbers upright, as shown in the illustration below, sliding the label under the ridges on the sides of the cartridge recess.
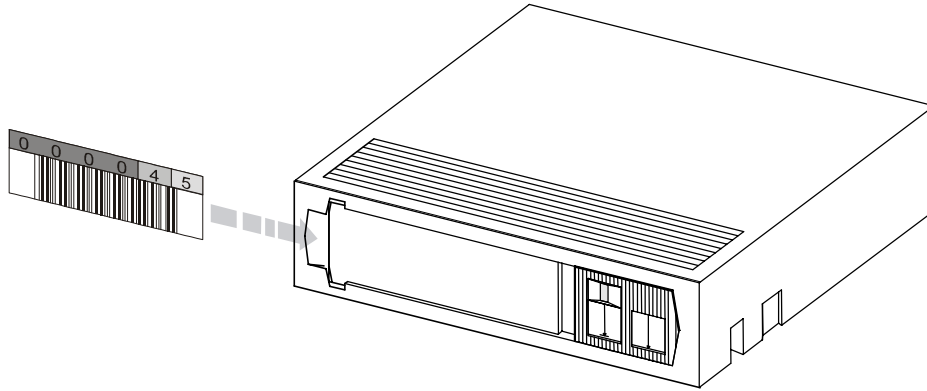
Barcode Labels

Write-Protect Switch

1. Set the write-protect switch (see illustration below) on each cartridge to the appropriate position. Use your finger to push the switch in one of the directions shown in the following illustration.
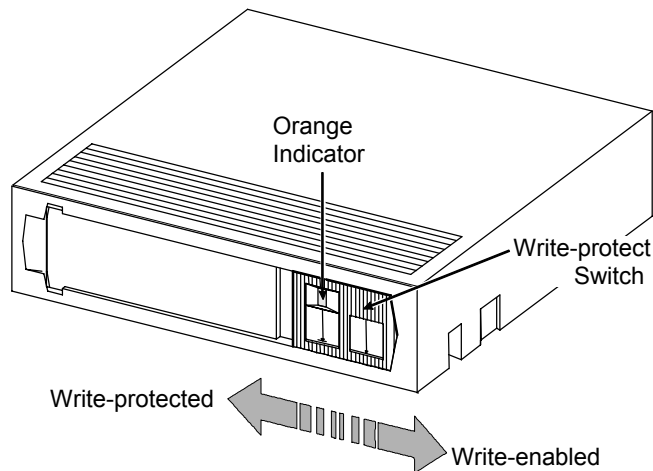
DLT Cartridge Write-Protect Switch

Install Data Cartridges

Desktop Scalar 218FC

1. If necessary, unlock the sliding access panel by placing the key in the lock, and turning it one-half turn ccw (left) to unlock.

2. Open the sliding access panel by sliding it to the rear of the Scalar 218FC.

Rack-mount Scalar 218FC

1. If necessary, unlock the front panel and slide it towards you until the slide stops engage.

All Scalar 218FC Units

1. Place each of the cartridges into the library storage slots. Install all cartridges with the barcode label facing forward and the write-protect switch at the top.
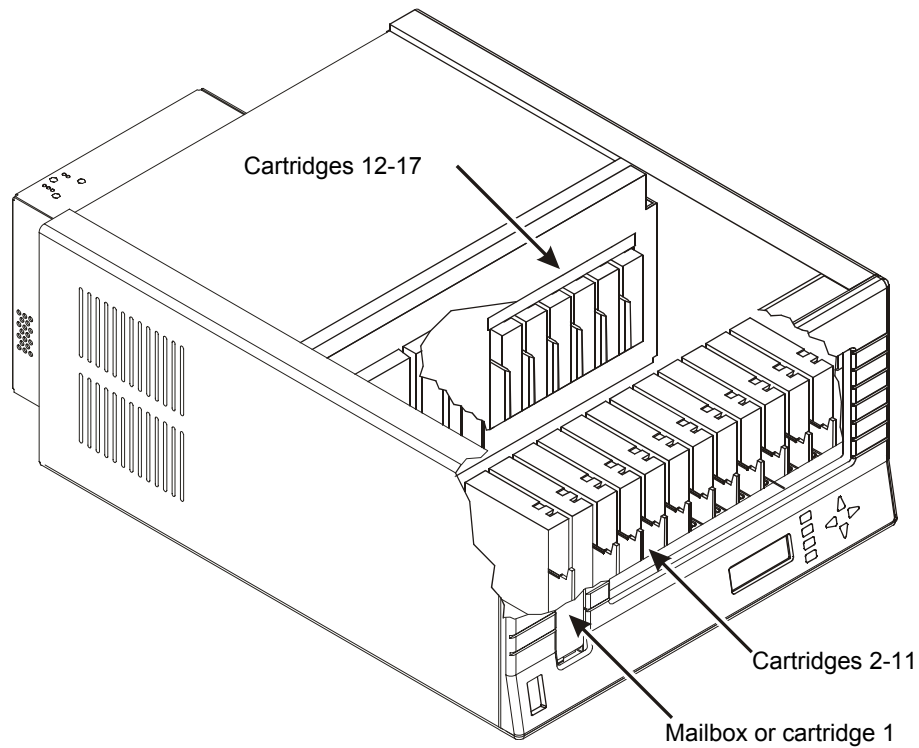
Cartridge Locations

> **Note**
>
> The design of the six rear slots and the Mailbox slot prevents you from incorrectly installing the cartridges. When powered-on, the Scalar 218FC senses the orientation of each cartridge installed in the 11 front slots. The library will sound the error alarm and display a message on the LCD warning of any incorrectly installed cartridges in these slots.

Install Cleaning Cartridge (Optional)

If your backup software is capable of scheduling and performing a drive cleaning cycle automatically, you may want to dedicate a cartridge storage slot to a cleaning cartridge. After using all cleaning cycles, remove the cleaning cartridge and install a new one. Refer to *Chapter 5: Operations and Maintenance*, section *Cleaning the Drive Head*, for information on determining when a new cleaning cartridge is needed.

Close and Lock the Sliding Access Panel or Scalar

1. On the desktop Scalar 218FC, close the sliding access panel by sliding it forward.

2. Insert the key into the front panel lock and turn ½-turn clockwise to lock the sliding access panel in place.

3. Remove the key from the lock.

4. On the rack-mount Scalar 218FC, slide the Scalar back into the rack until the slam-lock engages.

5. Insert the key into the slam-lock and turn ½-turn clockwise to lock the Scalar into the rack.

6. Remove the key from the lock.

Preparing the Host Computer System

Power Off the Computer

1. Turn off the power switch.

Confirm and/or Install the Fibre Channel Host Interface

Your Scalar 218FC must be connected directly to a fibre channel host bus adapter card installed in the computer or through a fibre channel hub. Install the fibre channel interface (card or hub) before connecting your Scalar library. Refer to the instructions supplied with your selected fibre channel interface.

Backup Software

A variety of backup and data storage software is available for use with your Scalar 218FC. Special backup software should not be required to operate with the fibre channel interface since the same SCSI commands are simply sent over the fibre channel interface to the target device. Please check with ADIC Sales or Customer Assistance if you have a question on the compatibility of a particular software package.

Now you are ready to connect your Scalar 218FC to your host computer. Follow the instructions provided in the next chapter.

Chapter

3

Connecting the Scalar 218FC Library

This Chapter …

❐   provides instructions for physically connecting your Scalar 218FC to your host system.

❐   steps you through the final phase of the installation process.

Installing the Interface Cables

Follow the steps on the following pages to connect your Scalar 218FC to your host computer and the Fibre Channel bus. This involves installing cables onto the connectors at the rear of the Scalar 218FC. See the section titled: *Rear Panel Indicators, Switches and Connectors* in *Chapter 4 Equipment Description* for an illustration showing the positions of the connectors on the rear panel of the Scalar 218FC.

Fibre Channel Connection

Your Scalar 218FC provides support for Multi-Mode Fibre at 1.0625 Gbaud using dual SC connectors:

1. Connect the 3-meter, 50-micron, non-OFC cable (supplied with your Scalar 218FC) between the SC connectors on the Host Bus Adapter (HBA) installed in your host computer or to a fibre channel hub, and the SC connectors on the rear of the Scalar 218FC. The connectors are keyed to prevent improper installation of the cable.

Fibre Channel Interface Serial Port

The modular jack on the rear panel of your Scalar 218FC provides an RS-232 connection that can be used to configure the fibre channel subsystem, monitor diagnostic status, or update the firmware. To connect the serial cable:

1. Make sure that power is off to the Scalar 218FC.

2. Connect the serial cable plug into the serial connector of the host computer and the modular plug to the serial port connector of the Scalar 218FC.

10Base-T Ethernet Connection

Your Scalar 218FC supports Ethernet connectivity to provide enhanced configuration capabilities. All functions available through the Fibre Channel Interface Serial Port are available through Ethernet. For example, if you are going to download upgraded firmware using the serial port, you will need to have a copy of the firmware on the host computer hard drive or on a diskette before beginning the procedure. Using Ethernet, however, you can log into a BBS or a world-wide web site and download firmware directly to the Scalar 218FC. If you plan to use the Ethernet capability:

1. Connect an Ethernet cable between your network and the Ethernet connector on the rear panel of the Scalar 218FC.

Setting the SCSI IDs

Your Scalar 218FC consists of three SCSI devices; the two DLT drives and the library robotics. Each SCSI device in your Scalar 218FC must be set to a unique ID. The ID for the robotics is set by selecting it through the Operator Panel, Off-Line Mode, Configuration Menu, Set SCSI ID option (see sub-subsection titled: *Set SCSI ID*, subsection *Configuration Menu*, section *Off-Line Mode Menus* in *Chapter 4 Equipment Description*). Set each drive ID by selecting the appropriate ID number on the switch located on the back of

the drive assembly. Access the switches by opening the Scalar 218FC fibre channel subsystem cover on the rear panel as shown in the following illustration:

1. Loosen the two thumbscrews that secure the right side of the cover to the rear panel by turning each of them counter-clock-wise until the internal spring pushes the screw away from the mounting hole.
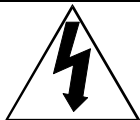
Drive SCSI ID Switches
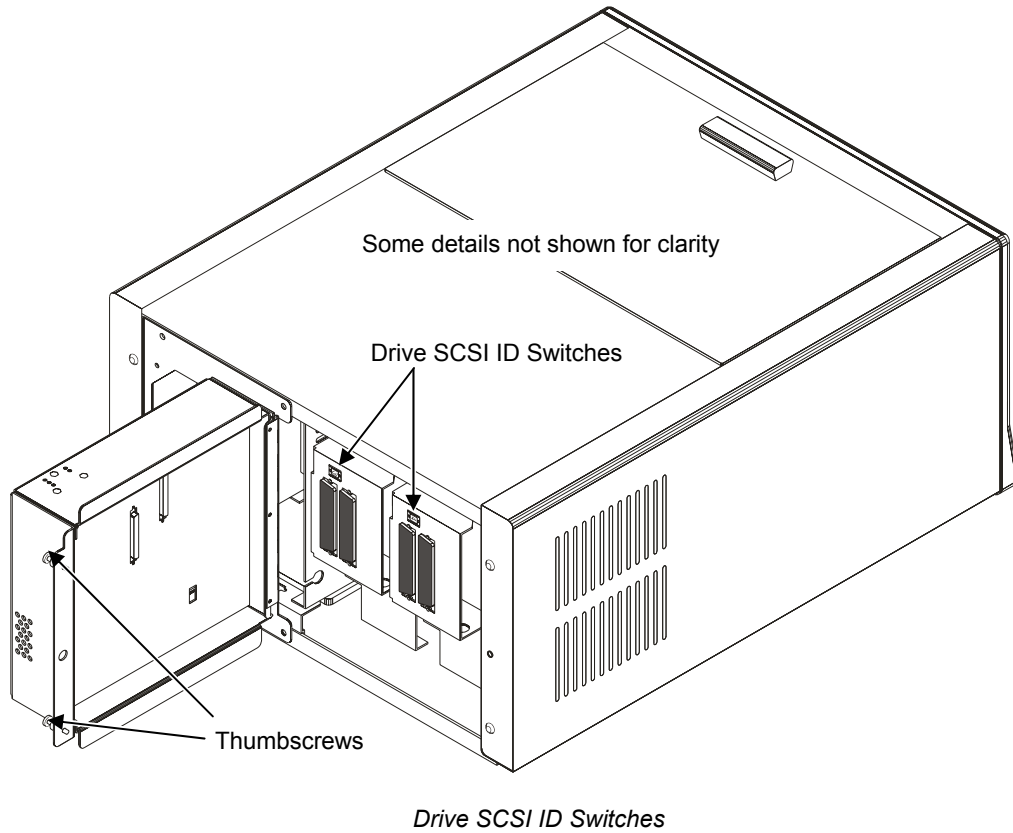
Powering on the System

❒   Plug the power cord into the back of your Scalar 218FC.

❒   Plug the power cord from the Scalar 218FC into a grounded electrical outlet.

Use caution when plugging the power cord into an electrical outlet. Hazardous voltages are present in the sockets of the outlet.

❒   Plug the power cord from your host computer into a grounded electrical outlet.

❒   Turn on power to your Scalar 218FC.

❒   Turn on power to the host computer.

The following illustration shows the Operator Panel LCD message displayed when your Scalar 218FC has completed the boot and initialization process.

```
Scalar 218              21"
```

Notes

With the factory default conditions unchanged, your Scalar 218FC will sign-on as a Scalar 218.

Your Scalar 218FC displays its current internal temperature (in degrees centigrade). Whenever the internal temperature meets or exceeds 40º C, an alarm will sound and the "**HIGH TEMP ALARM**" message will appear on the LCD. The alarm will quit and the message will be removed from the LCD when the temperature falls below 40º C.

Chapter

4

Configuring the Fibre Channel Subsystem

This Chapter …

❐ provides instructions for configuring the fibre channel subsystem of your Scalar 218FC.

❐ steps you through the final phase of the installation process.

Configuring Your Communications Terminal

The fibre channel subsystem of your Scalar 218FC includes an embedded high-performance 32-bit microprocessor with its own firmware located in Flash EEPROM. The Configuration Program, part of this firmware, allows you to configure the subsystem, monitor subsystem diagnostic results, and download new subsystem firmware. For information on configuring the robotics subsystem of your Scalar 218FC, refer to section titled: *Off-Line Mode Menus* in *Chapter 4 Equipment Description*.
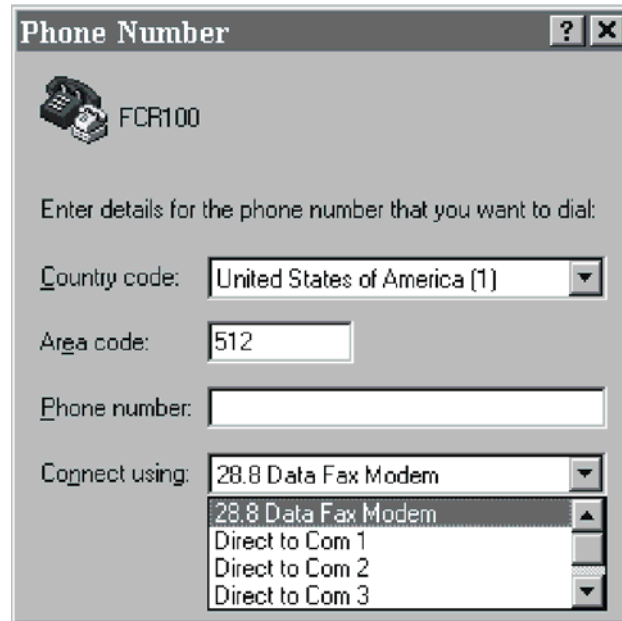
This manual and the Configuration Program make references to the "FCR 100" in discussions on fibre channel configuration, monitoring of diagnostic results, and firmware downloading procedures. In these instances, "Scalar 218FC fibre channel subsystem" and "FCR 100" are interchangeable.

To configure the fibre channel subsystem of your Scalar 218FC, to monitor diagnostic results or to download new subsystem firmware, you need to use a host computer application that supports the X-modem data transfer protocol. The following example uses the HyperTerminal application included in Windows NT 4.0. Other applications may use different procedures and com ports, but notice that the baud rate, number of data bits, number of stop bits, whether parity is enabled and what type of flow control to use must be set for your serial communications port as given in this example.

1. Select **Programs** from the Start Menu by clicking on the Start Button.

2. Select **Accessories** from the **Programs** menu.

3. Select **HyperTerminal** from the **Accessories** menu.

4. Click on the **Hypertrm** icon in the HyperTerminal program group.

5. A new HyperTerminal window appears with a dialog box for you to enter a name for your hyperterminal and to select an icon to represent the Hyperterminal in future sessions.
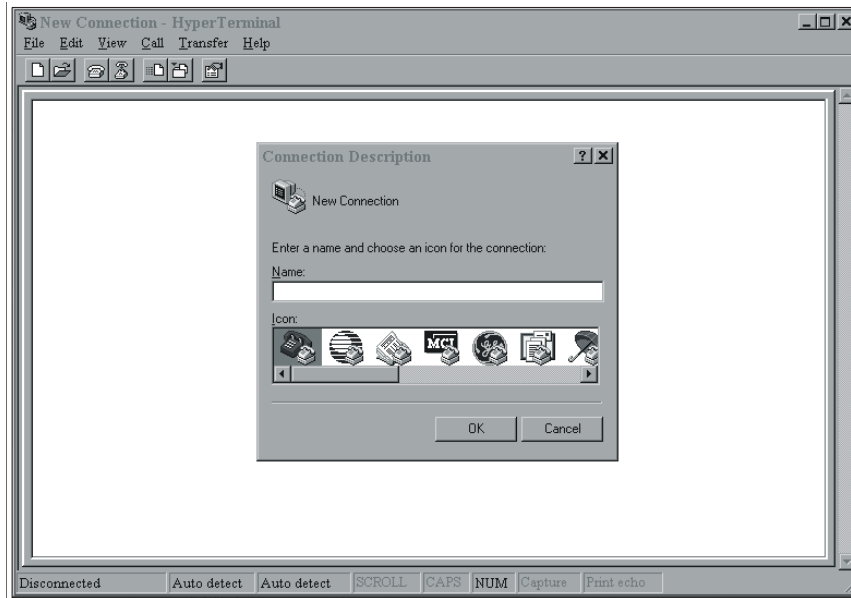
6. For this example we will name our Hyperterminal **FCR 100** and select the Dial-in icon:

7. Click on **OK**. Now the Phone Number dialog box appears.

You do not have to enter a phone number, since you will be connecting directly through your serial port.

8. From the **Connect using:** pull-down menu, select the communications port assigned to your serial port.

> **Note**
>
> This example uses COM2 for the serial port. You may use any serial port that supports baud rates of at least 9600 bits per second.

9. Click on **OK**. The **Com PORT Properties** dialog box appears:
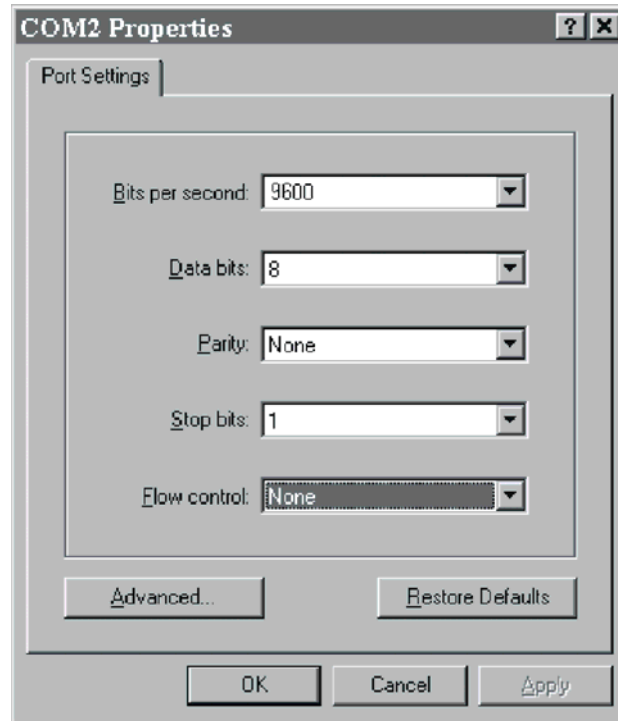
Set your port settings to those shown in this dialog box:

Bits per second (baud rate)   **9600 (default), 19200, 38400, 57600, or 115200**

Data bits   **8**

Parity   **None**

Stop bits   **1**

Flow control   **None**

10. Click on **OK**.

11. Repeatedly press **ENTER** on the host computer until the Configuration Program main menu appears in the command prompt area of HyperTerminal; The Build Level is the firmware level of the fibre channel subsystem:

```
ADIC FCR100/CP4100 Fibre Channel/SCSI Router Configuration
Build Level: a9802

1) Perform Configuration
2) Do a Trace Dump
3) Reboot
4) Download a New Revision of the Firmware
Command >
```

Configuring the Fibre Channel Interface

Introduction

The Scalar 218FC Configuration Program allows you to control many configuration settings through the
fibre channel serial interface or through the Ethernet connectivity capability. Among these are:

- Baud rate of the serial port
- Fibre Channel configuration
- SCSI configuration
- Ethernet configuration
- Fibre Channel-to-SCSI mapping
- Trace level settings

The default configuration settings of the Scalar 218FC are adequate for most applications. Configuration
settings may be changed and saved. They become the new default settings the next time you start your Scalar
218FC.

Repeatedly press **ENTER** on the host computer until the Configuration Program main menu appears on the
monitor:

```
ADIC FCR100/CP4100 Fibre Channel/SCSI Router Configuration
Build Level: a9802

1) Perform Configuration
2) Do a Trace Dump
3) Reboot
4) Download a New Revision of the Firmware
Command >
```

Configuration

To configure the Scalar 218FC fibre channel interface, press **1** under the Configuration Program menu. This displays the Configuration Menu:

```
Configuration Menu

Build Level: a9802

     1) Baud Rate Configuration

     2) Fibre Channel Configuration

     3) SCSI Configuration

     4) Ethernet Configuration

     5) Fibre Channel to SCSI Mapping Configuration

     6) SCSI to Fibre Channel Mapping Configuration

     7) Trace Settings Configuration

     8) SNMP Configuration*

        A) Save Configuration

        B) Restore Last Saved Configuration

        C) Reset Configuration to Factory Defaults

        X) Return to main menu
```

> **Notes**
>
> Most of the factory default settings within this section should not have to be modified. The following descriptions of each menu choice are provided so that you will have a better understanding of how the fibre channel subsystem functions.
>
> Menu choice **6) SCSI to Fibre Channel Mapping Configuration** is not supported by your Scalar 218FC.
>
> Call the ADIC Technical Assistance Center at (800) 827-2822 if any default settings do not meet the desired requirements.

Baud Rate Configuration

The baud rate is the rate of speed used by the Scalar 218FC Fibre Channel serial port to communicate with another serial device. To configure the baud rate, press **1**. This displays the following menu of choices:

```
Baud Rate Configuration Menu

Build Level: a9802

     1) * 9600   2)   19200

     3)   38400  4)   57600

     5)   115200
```

```
        X) Return to previous menu:
```

The Baud Rate Configuration Menu displays a list of possible baud rates accepted by the Scalar 218FC fibre channel interface. The default baud rate is 9600.

To select a different baud rate than the default:

1. Press the number corresponding to the desired baud rate in the listing.

To abort baud rate configuration, press **X** to return to the Scalar 218FC Fibre Channel Configuration Menu.

Note

Alphabetical menu and list choices in the Configuration Program are *not* case sensitive. Uppercase and lowercase characters may be used interchangeably.

---

2. Press **X** on the Baud Rate Configuration menu to return to the Configuration Menu.

3. Press **A** on the Configuration Menu to save the new baud rate setting.

Fibre Channel Configuration

Each Fibre Channel node is assigned a unique world wide name based on a unique vendor identifier that is registered with IEEE. The World Wide Name is a 64 bit value. This value is broken into a 32-bit high-order word and a 32-bit low-order word for configuration. An ADIC World Wide Name has the following format:

| **High-order** | **10** | **00** | **00** | **E0** |
| **Low-order** | **02** | *xx* | *xx* | *xx* |

To perform fibre channel configuration, press **2** in the Configuration Menu. This displays the following menu of choices:

```
Fibre Channel Configuration Menu

Build Level: a9802

Current Fibre Channel Configuration:

    World Wide Name High: 0x10000011

    World Wide Name Low: 0x10000001

    Use Hard ALPA: No

        1) Change World Wide Name High

        2) Change World Wide Name Low

        3) Toggle Hard ALPA Usage

        X) Return to previous menu
```

This menu displays:

The current value of the high-order word of the Fibre Channel World Wide Name

The current value of the low-order word of the Fibre Channel World Wide Name

The current value of the Hard Source ID (**Use Hard ALPA**) flag

You can change any of these three values.

World Wide Name High

This is the high-order word of the World Wide Name associated with a Fibre Channel entity.

To change the high-order word of the World Wide Name:

1. Press **1** in the Fibre Channel Configuration Menu. The Scalar 218FC Fibre Channel Serial Interface displays the following prompt:

   ```
   Enter new World Wide Name High value >
   ```

2. Enter the high-order word of your new World Wide Name.

   If the value you specify is not a valid World Wide Name, the system will display the following warning:

   ```
   ERROR:

        Invalid World Wide Name Value!
   ```

   ```
   Press Any Key to Continue...
   ```

World Wide Name Low

This is the low-order word of the World Wide Name associated with the Fibre Channel entity.

To change the low-order word of the World Wide Name:

3. Press **2** in the Fibre Channel Configuration Menu. The Scalar 218FC Fibre Channel Serial Interface will display the following prompt:

   ```
   Enter new World Wide Name Low value >
   ```

4. Enter the low-order word of your new World Wide Name.

   If the value you specify is not a valid World Wide Name, the system will display the following warning:

   ```
   ERROR:

        Invalid World Wide Name Value!
   ```

   ```
   Press Any Key to Continue...
   ```

Hard ALPA Usage. This setting allows you to specify whether you can change the Fibre Channel Source ID. If **Use Hard ALPA** is set to **Yes** (**TRUE**), then the Source ID may be changed. If **Use Hard ALPA** is set to **No** (**FALSE**), then the Source ID may not be changed.

To change the **Use Hard ALPA:**

5. Press **3** in the Fibre Channel Configuration Menu.

   This toggles the setting of **Use Hard** ALPA between **Yes** and **No**. If you toggle to yes, the menu adds a selector to allow a hard address value and an address value of 0x1 is set.

6. Press **X** to return to the Configuration Menu.

7. Press **A** on the Configuration Menu to save the new Fibre Channel configuration.

SCSI Configuration

The SCSI configuration selection allows you to change the Initiator SCSI ID as well as to add or remove a target SCSI ID.

```
SCSI Configuration Menu

Build Level: a9802

Current SCSI Configuration:

Initiator SCSI ID: 7

Target SCSI ID(s):

Reset SCSI Bus on Boot: Yes

SCSI Initial Discovery Delay: 15000 ms


        1) Change Initiator SCSI ID

        2) Add Target SCSI ID

        3) Remove Target SCSI ID

        4) Toggle SCSI Reset Operation

        5) Change Discovery Delay Time

        X) Return to previous menu
```

This menu displays:

> the current SCSI Initiator ID
>
> a list of the current SCSI Target IDs
>
> the current value of the SCSI bus reset flag
>
> a menu of valid SCSI configuration operations.

The operations to change these values are described below.

Change Initiator SCSI ID. The Initiator SCSI ID is the ID of the SCSI device that requests an operation to be performed. To change the initiator SCSI ID:

> ***Note***
>
> *In any case*, do not enter Target SCSI IDs. It should not be necessary to change the Initiator SCSI ID setting.

1. Press **1** while in the SCSI Configuration Menu. The Configuration Menu displays the following prompt:

    ```
    Enter new Initiator SCSI ID >
    ```

2. Enter the new SCSI Initiator ID. The Configuration Menu accepts values between 0 and 15. The Scalar 218FC allows a target to have more than one ID.

3. After specifying your new SCSI Initiator, press **Enter**.

If you specify an invalid value, the Configuration Menu displays the following message:

```
ERROR:
```

```
    Invalid SCSI ID. Valid values are 0 - 15.
Press Any Key to Continue...
```
If the new initiator is in the list of Target SCSI ID(s), you must remove it. See **Remove Target SCSI ID**, below. This prevents a SCSI device from being both initiator and target.

4. Press **X** to return to the Configuration Menu.

5. Press **A** to save the new SCSI configuration.

Add Target SCSI ID. The target SCSI ID is the ID of the SCSI device receiving a request. You may have more than one ID as a SCSI target on the Scalar 218FC. To add a Target SCSI ID:

1. Press **2** while in the SCSI Configuration Menu. The Configuration Menu displays the following prompt:
```
Add new Target SCSI ID >
```

2. Enter a new SCSI Target ID. The Scalar 218FC accepts values between 0 and 15.

The new Target ID is added to the list of Target SCSI IDs under the SCSI Configuration Menu.

If you specify an ID that is already on the list of Target SCSI IDs, no change to the current list is made.

If you specify a number that is out of range, the Configuration Menu displays the following error:
```
ERROR:
    Invalid SCSI ID. Valid values are 0 - 15.
Press Any Key to Continue...
```

3. Press **X** to return to the Configuration Menu.

4. Press **A** to save the new SCSI configuration.

Toggle SCSI Reset Operation. You can set the Scalar 218FC fibre channel subsystem to reset the SCSI bus on boot. By default, this setting is Yes. To toggle the SCSI reset setting:

1. Press **4** under the SCSI Configuration Menu. The resulting display will reflect the setting change.

Change Discovery Delay Time. You can set the Scalar 218FC fibre channel subsystem to reset the SCSI bus on boot. By default, this setting is Yes. To toggle the SCSI reset setting:

Ethernet Configuration

To select Ethernet Configuration, press **4** while in the Configuration Menu.
```
Ethernet Configuration Menu

Build Level: a9802

Current Ethernet Configuration:

    Ethernet Physical Address     : Unique value (set at factory)

    IP Address                    : 001.001.001.001 (default value)

    Subnet Mask                   : 255.255.255.0 (default value)

        1) Change Ethernet Physical Address

        2) Change IP Address

        3) Change IP Subnet Mask

        X) Return to previous menu
```
The Ethernet Configuration Menu displays:

the current Ethernet Physical Address

the current Scalar 218FC Fibre Channel IP Address

the current Scalar 218FC Fibre Channel IP Subnet Mask.

The operations to change these values are described below.

Ethernet Physical Address. The Ethernet Physical Address is sometimes referred to as the MAC address. It is a unique 48-bit value that is based on a vendor ID assigned by the IEEE. To change the Scalar 218FC's physical Ethernet address:

1. Press **1** while in the Ethernet Configuration Menu. The Configuration Menu displays the following prompt:

```
Enter new Ethernet Physical Address >
```

2. Enter your new Ethernet physical address and press **Return**.

If you enter an invalid Ethernet address, the Serial Interface displays the following error:

```
ERROR:

    Invalid Ethernet Address!

Press Any Key to Continue...
```

3. Press **X** to return to the Configuration Menu.

4. Press **A** to save the new Ethernet Address.

IP Address. The IP address is used by the TCP/IP protocol to route information in a TCP/IP network. A systems administrator usually assigns the IP address. To change the Scalar 218FC Internet (IP) address:

1. Press **2** while in the Ethernet Configuration Menu. The interface displays the following prompt:

```
Enter new IP Address >
```

2. Enter the new IP address and press **Return**.

If the IP address you specify is invalid, the following error message is displayed:

```
ERROR:

    Invalid input!

Press Any Key to Continue...
```

3. Press **X** to return to the Configuration Menu.

4. Press **A** to save the new IP Address.

IP Subnet Mask

The IP subnet mask is used by TCP/IP protocol to establish a path to a default TCP/IP gateway. A systems administrator usually assigns this value. To change the IP subnet mask:

1. Press **3** while in the Ethernet Configuration Menu. The following prompt is displayed:

```
Enter new Subnet Mask >
```

2. Enter the new IP subnet mask and press **Return**.

If you enter an invalid IP subnet mask, the following message is displayed:

```
ERROR:

    Invalid input!

Press Any Key to Continue...
```

3. Press **X** to return to the Configuration Menu.

4. Press **A** to save the new IP subnet mask.

Fibre Channel-to-SCSI Mapping Configuration

For a discussion of Fibre Channel-to-SCSI mapping, see Appendix A. To configure Fibre Channel-to-SCSI mapping, select item **5** from the Configuration Menu. This presents the following display:

```
Fibre Channel to SCSI Configuration Menu

Build Level: a9802

Current Fibre Channel to SCSI Mapping Mode is Auto-assigned

    1) Display Attached SCSI Devices, LUN Priority

    2) Display Attached SCSI Devices, Target ID Priority

    3) Display Attached SCSI Devices, Bus Number Priority

    4) Change the Fibre Channel to SCSI Mapping Mode

    X) Return to Previous Menu
```

LUN Priority Display. To view LUN priorities of attached SCSI devices:

1. Press **1** while in the Fibre Channel-to-SCSI Configuration Menu.

The Configuration Menu displays a screen similar to the following:

```
Querying SCSI devices, please be patient ...

    Currently Attached Devices

    Build Level: userLevel

        BUS TGT LUN DEVICE DESCRIPTION

        0   1   0   Scalar 448

        0   2   0   Quantum DLT 7000

        0   3   0   Quantum DLT 7000

    X to return, <enter> for more >
```

Target ID Priority Display. To display the target ID priorities of SCSI devices, select **2**. This results in a display similar to the one shown above.

Bus Priority. Item 3 has no significance on the Scalar 218FC, since it only has one SCSI bus. Selecting this choice results in the following error:

```
ERROR:

    There is only one bus on this device

Press Any Key to Continue...
```

Fibre Channel-to-SCSI Mapping Mode. This allows you to select the way in which Fibre Channel addresses are mapped to SCSI addresses.

Pressing **4** on the Fibre Channel-to-SCSI Mapping Mode Configuration Menu displays the following menu of selections:

```
Fibre Channel to SCSI Mapping Mode Configuration Menu

Build Level: a9802

    Current Fibre Channel to SCSI Mapping Mode is Auto-assigned

    1) Set to SCC

    2) Set to Indexed

    3) Set to Auto-assigned, LUN priority
```

```
4) Set to Auto-assigned, target ID priority

5) Set to Auto-assigned, bus number priority

X) Return to Previous Menu
```

> **Notes**
>
> If your selected HBA supports SCC Mode set the SCSI Mapping Mode to SCC.
>
> The factory default setting is: 5) Set to Auto-assigned, bus number priority.

At the head of the display is the current value of the Fibre Channel-to-SCSI Mapping Mode. The default value is SCSI Controller Command (**SCC**). There are five possible mapping modes:

SCC— Use the SCSI-3 Controller Command Set (SCC) Logical Unit Addressing method. This mode requires that the host device driver is capable of addressing a controller device. In this mode, the controller will respond directly to commands issued using the Peripheral Device Addressing Method. Commands addressed using the Logical Unit Addressing Method will be routed to the appropriate SCSI device as specified by the host.

Indexed—provides a user-configurable table that maps FCP LUN values to SCSI devices directly. In this mode, the controller is not addressable by the host. Configuration allows for sequential FCP LUN values (0, 1, 2,...) to be mapped to arbitrary SCSI BUS:TARGET:LUN addresses. This table can then be saved in FLASH memory and will persist across power cycles. Various editing assists are provided for creating and modifying this table.

Auto-assigned, LUN priority—Auto assigned mode is similar to indexed mode: a table is used to map FCP LUN values to SCSI addresses. However, this table is created at power up and does not persist across reboots or power cycles. Discovery is performed on the SCSI bus, and each device is added to the table in the order in which it is discovered.

In LUN priority, as discovery is performed, the LUN value is incremented after the Target value. Therefore, as discovery is performed, all SCSI targets are identified before subsequent LUNs are identified.

Auto-assigned, target ID priority—As discovery is performed, the Target value is incremented after the LUN. Therefore, all LUNs appear adjacent to the target device in the table.

Auto-assigned bus number priority—This option is not relevant to the configuration of the FCR100, which has only one bus.

To change the Fibre Channel-to-SCSI mapping mode:

1. Press the number corresponding to the desired mapping mode.
2. Press **X** to return to the Configuration Menu.
3. Press **A** on the Configuration Menu to save the new mapping configuration.

SCSI-to-Fibre Channel Mapping

The SCSI-to-Fibre Channel Mapping option is not supported by your Scalar 218FC.

Trace Settings Configuration

Trace Settings Configuration allows you to set the trace level for diagnostics. For performance reasons, trace settings should all be turned off, except in cases where a problem might be detected by a trace. The default configuration has all levels set to **ON**. Pressing 7 on the Configuration Menu results in the following display:

```
Trace Settings

Build Level: a9802

    Level 0 : ON        Level 1 : OFF

    Level 2 : OFF       Level 3 : OFF

    Level 4 : OFF       Level 5 : OFF

    Level 6 : OFF       Level 7 : OFF

U) Update Current Operating Trace Levels

X) Return to previous menu

Enter trace level to change >
```

> ### *Note*
>
> The Trace capability is provided for diagnostic purposes only. You should only change the Trace Level settings when instructed to do so by ADIC Technical Support. Call ADIC Technical Support at (425) 883-HELP (4357) for additional information.

To change the trace level:

1. Enter a trace level number corresponding to the trace level you wish to change. This toggles the current value between **ON** and **OFF**.
2. After all settings have been toggled to the value you desire, you can make them permanent by selecting **U** to update the current operating trace level. (Note that Step 4, below, is still necessary, however.
3. Press **X** to return to the Configuration Menu.
4. Press **A** to save the your configuration settings.

Save Configuration

Pressing **A** on the Configuration Menu saves all currently changed values. See the previous examples for the use of this option.

Restore Last Saved Configuration

Pressing **B** on the Configuration Menu restores all values from the previously saved configuration.

Reset Configuration to Factory Defaults

Pressing **C** on the Configuration Menu restores the factory default configuration. The following table summarizes the default settings:

Setting	Value
Baud Rate	9600
World Wide Name High	Unique value (set at factory)

World Wide Name Low	Unique value (set at factory)
Hard Address Usage	No
Initiator SCSI ID	7
Target SCSI ID(s):	
Reset SCSI Bus on Boot	Yes
Ethernet Physical Address	Unique value (set at factory)
IP Address	001.001.001.001
Subnet Mask	255.255.255.0
Fibre Channel-to-SCSI Mapping Mode	Auto-assigned Bus Number Priority

Return to main menu

Pressing X on the Configuration Menu returns to the main configuration program. If you have made changes to the configuration, the program will display the following message:

```
The configuration has changed and you have not saved the new configuration to
flash. The configuration must be saved to flash for it to take effect on the
next reboot!
Save the configuration now (Y/N)? n
```

SNMP Configuration

The following section describes the ADIC SNMP Management Information Base (MIB). Many of these definitions are specific to ADIC products and are not currently publicly defined by the IETF (Internet Engineering Task Force) or other public body. General parameters are described for SNMP **gets** and **sets** for various functional areas of the Scalar 218FC, and appropriate standards are described.

Several Fibre Channel draft MIB definitions are available for review from:

ftp://ftp.isi.edu/internet-drafts/

ftp.dpt.com/t11/pub/fc/misc./

Your Scalar 218FC currently supports the ADIC private MIB, whose details follow.

Description

The fibre channel subsystem of your Scalar 218FC provides several interfaces, each of which sends and receives data. Management functions are accessible out-of-band via the Ethernet port (10BaseT) that serves as the initial access point for MIB data. The MIB is used to track statistics regarding the flow of data (from Fibre Channel-to-SCSI and vice versa), as well as to allow for configuration changes to be made to the fibre channel subsystem. Possible configuration changes are mostly concerned with the need to change addressing modes depending upon customer needs.

The ADIC private MIB includes all information accessible from the serial user interface. This MIB is included in the fibre channel subsystem firmware installed on your Scalar 218FC.

Interfaces

There are a total of four types of interfaces to the FCR100:

Fibre Channel

SCSI

Ethernet

RS-232 (serial port)

The fibre channel subsystem of your Scalar 218FC is configured as follows:

1 SCSI F/W interface

1 Gigabit Fibre Channel interface (optical)

1 10BaseT Ethernet Port

1 RS-232 Serial Port

The serial and Ethernet ports are used primarily for fibre channel subsystem configuration and management. (TCP/IP requests may also be serviced over the Fibre Channel ports (in-band) in future releases.) A discussion of each of these ports and its associated MIB data follows. Configuration information for each interface is contained in the following section as well.

Fibre Channel

Fibre Channel data reported includes frame and packet information, upper layer protocol (ULP) type (FCP or IP), and other Fibre Channel-specific information. Draft MIBs for Fibre Channel N_Ports and F_Ports are in the public realm.

ADIC proposes to support portions of two standard Fibre Channel MIBs as well as an ADIC private MIB. The ADIC private MIB includes:

> Groups for Fibre Channel Configuration
>
> FC N_Port Physical Table
>
> FC N_Port Statistics
>
> SCSI-to-FC Mapping
>
> FC-to-SCSI Mapping

SCSI

SCSI is not generally an SNMP managed protocol. The ADIC MIB, however, gathers SCSI information for management purposes. This ADIC specific MIB provides information about the following:

> number of I/O operations per bus
>
> number of disconnects
>
> abort count
>
> total data counts in bytes
>
> bus resets
>
> vital product data from Inquiry command for each SCSI device

This information can be found in the **SCSIStatisticsTable** and the **SCSIProductData** Groups of the ADIC private MIB.

Ethernet and Serial Interfaces

The Ethernet interface is used for configuration and management, so total traffic flow is relatively low. The basic Ethernet configuration items are found in the Management Interfaces Table.

The serial port is provided for user configuration. The serial port baud rate will be kept in the Management Interfaces Table.

ADIC Private MIB

The following chart lists all attributes that can be specified using the ADIC private SNMP MIB. Included with each attribute are the attribute's read/write property and a brief description of the meaning of values read or written.

Parameter	Read/Write	Description
fcConfigNodeName	Read/Write	Worldwide name of a collection of N_Ports that comprise a Node.
fcConfigNodeNumNPorts	Read Only	Number of N_Ports that comprise the named Node.
fcConfigEnableReset	Read/Write	Toggle for software reset. True indicates that resetting the product via SNMP is allowed. NOTE: each time the product is initialized this object is set to FALSE (i.e. it is not sticky).
fcConfigUseHardAddress	Read/Write	Toggle for address configuration. True indicates that configuration of the source ID is allowed. False indicates that the source ID may not be changed.
fcConfigSourceID	Read/Write	3 byte Source address. For arbitrated loop, this will be the Hard Assigned AL_PA (preceded by 20 bytes).
fcConfigSCSIMode	Read/Write	Fibre Channel-to-SCSI mapping mode.
fcConfigTraceMask	Read/Write	Trace Level.
fcConfigReset	Read/Write	Reset the product. Setting this object to TRUE will re-start all the software (similar to powering the product off, then on). The reset will only take place if fcConfigResetEnable is also TRUE. NOTE: resetting the product will disconnect all current Fibre Channel connections.
fcConfigCommit	Read/Write	Commit the configuration values to the flash memory.
miSerialBaudRate	Read/Write	The baud rate for the serial interface.
miMACAddress	Read/Write	Physical address (MAC address).
miethernetIPAddr	Read/Write	The IP address for this device.
miethernetIPNetmask	Read/Write	Ethernet Net Mask.
miCommunitySet	Read/Write	SNMP Community name for Sets. Not supported.
miCommunityGet	Read/Write	SNMP Community name for Gets. Not supported.
scsiConfigTable	Read/Write	A Table containing SCSI Configuration parameters.
scsiConfigEntry	Read/Write	An entry in the SCSI Configuration Table.
scsiConfigIndex	Read Only	Index into the SCSI Configuration Table.
scsiConfigInitID	Read/Write	Initiator SCSI ID.
scsiConfigTargetIDAdd	Read/Write	Set this SCSI target ID.
Parameter	**Read/Write**	**Description**
scsiConfigTargetIDRemove	Read/Write	Remove this SCSI target ID. The SCSI ID you specify will no longer be a target.

Configuring the Fibre Channel Subsystem

scsiConfigResetFlag	Read/Write	Toggle SCSI Reset Operation. TRUE indicates that the SCSI bus will be reset on boot.
fctoSCSIMapTable		A Table containing the Fibre Channel-to-SCSI Map.
fctoSCSIMapEntry		An entry in the Fibre Channel-to-SCSI Map Table.
fctoSCSIMapIndex	Read Only	Index into the Fibre Channel-to-SCSI Map (SCSI LUN).
fctoSCSIbus	Read/Write	SCSI bus number.
fctoSCSItarget	Read/Write	SCSI ID.
fctoSCSILUN	Read/Write	SCSI LUN.
scsitoFCMappingTable		A Table containing information describing how SCSI channels are mapped to the Fibre Channel.
scsitoFCMapEntry		An entry in the SCSI-to-FC Mapping Table.
scsitoFCMapIndexBus	Read Only	Index into the SCSI-to-FC Map. SCSI bus number
scsitoFCMapIndexSCSIID	Read Only	Index into the SCSI-to-FC Map. SCSI ID.
scsitoFCMapIndexLUN	Read Only	Index into the SCSI-to-FC Map. SCSI LUN.
scsitoFCMapDestID	Read/Write	The Fibre Channel Node number.
scsitoFCMapLUNlo	Read/Write	SCSI LUN low bytes.
scsitoFCMapLUNhi	Read/Write	SCSI LUN high bytes.
fcNPortPhysTable		A Table containing N_Port Physical Characteristics.
fcNPortPhysEntry		An entry in the N_Port Physical Characteristics Table.
fcNPortPhysNPortIndex	Read Only	A unique number that identifies an N_Port/NL_Port. This number ranges from 1 to the value of fcNodeNumNPorts and its value remains constant for the identified N_Port/NL_Port until the management agent of the Node is re-initialized.
FcNPortSpeed	Read Only	The transmission rate, an FC-0 physical characteristic.
fcNPortMedia	Read Only	Type of media, an FC-0 physical characteristic.
fcNPortTransmitterType	Read Only	Type of transmitter, an FC-0 physical characteristic.
fcNPortDistance	Read Only	The maximum distance, an FC-0 physical characteristic.
fcNPortLinkState	Read Only	The state of the FC link. Pending indicates that the initialization is still pending. Failed indicates that link initialization has failed. Successful indicates that the FC Link has initialized successfully.
fcNPortRTTOV	Read Only	Receiver_Transmitter timeout value, used by the receiver logic to detect Loss of Synchronization.
Parameter	**Read/Write**	**Description**
fcNPortTopologyModel	Read Only	The topology model on the Link. The N_Port/NL_Port may be attached to a Fabric, or attached to another N_Port or to FC-AL (Arbitrated Loop). This value is only meaningful if the FC Link has initialized successfully. (i.e. fcNportLinkState = Successful)

scsiStatisticsTable		A Table containing SCSI Statistics.
scsiStatsEntry		An entry in the SCSI Statistics Table.
scsiStatsIndex	Read Only	Index into the SCSI Statistics Table.
scsiStatsIOs	Read Only	The number of IO operations on the SCSI bus.
scsiStatsDisconnects	Read Only	The number of Disconnects on the SCSI bus.
scsiStatsAbortCount	Read Only	The of SCSI bus termination messages (i.e. ABORT, ABORT TAG, CLEAR QUEUE, BUS DEVICE RESET) which have terminated I/O processes.
scsiStatsBusResets	Read Only	The count of SCSI bus resets
scsiProductDataTable	Read Only	A Table containing SCSI Product Data.
scsiPDEntry	Read Only	An entry in the SCSI Product Data Table. (**scsiPDIndex**.)
scsiPDIndex	Read Only	The Index into the SCSI Product Data Table. (The SCSI LUN.)
scsiPDDeviceCode	Read Only	Device type code.
scsiPDQualifier	Read Only	Device type qualifier.
scsiPDRemoveable	Read Only	Removable media.
scsiPDANSIVersion	Read Only	Device type version.
scsiPDECMAVersion	Read Only	Device type version.
scsiPDISOVersion	Read Only	Device type version.
ScsiPDRespFormat	Read Only	Response Format.
ScsiPDLength	Read Only	Additional data length.
ScsiPDSoftReset	Read Only	Support for Soft reset.
ScsiPDCommandQing	Read Only	Support for Command Queuing.
ScsiPDLinkedCommands	Read Only	Support for Linked Commands.
ScsiPDSyncTransfer	Read Only	Support for sync transfer.
scsiPD16Bit	Read Only	16-bit wide SCSI support.
scsiPD32Bit	Read Only	32-bit wide SCSI support.
ScsiPDRelativeAddr	Read Only	Support for Relative address.
ScsiPDVendorID	Read Only	Vendor ID.
ScsiPDProductID	Read Only	Product ID.
ScsiPDRevLevel	Read Only	Revision Level.
FcNPortStatisticsTable	Read Only	A table of NPort statistics.
Parameter	**Read/Write**	**Description**
FcNPSEntry	Read Only	An entry in the NPort statistics table.

FcNPSIndex	Read Only	A unique number that identifies an N_Port. This number ranges from 1 to the value of fcNodeNumNPorts and its value remains constant for the identified N_Port until the management agent of the Node is re-initialized.
FcNPSInDeviceDataFrames	Read Only	The number of Device Data frames received by this N_Port/NL_Port.
FcNPSOutDeviceDataFrames	Read Only	The number of Device Data frames transmitted by this N_Port/NL_Port.
FcNPSInLinkDataFrames	Read Only	The number of Link Data frames received by this N_Port/NL_Port.
FcNPSOutLinkDataFrames	Read Only	The number of Link Data frames transmitted by this N_Port/NL_Port.
FcNPSInLCRFrames	Read Only	Counter not implemented.
FcNPSOutLCRFrames	Read Only	Counter not implemented.
FcNPSInPBSYFrames	Read Only	The number of P_BSY frames received by this N_Port/NL_Port.
FcNPSOutPBSYFrames	Read Only	The number of P_BSY frames transmitted by this N_Port/NL_Port.
FcNPSInPRJTFrames	Read Only	The number of P_RJT frames received by this N_Port/NL_Port.
FcNPSOutPRJTFrames	Read Only	The number of P_RJT frames transmitted by this N_Port.
FcNPSAborts	Read Only	Number of Aborts.
FcNPSLaserFaults	Read Only	Number of laser faults.
FcNPSLOS	Read Only	Number of seconds of Loss of Signal.
FcNPSBadRXChar	Read Only	Number of bad characters received.
FcNPSClearRegisters	Read/Write	Clear (zero) all N-Port Statistics Registers.

Trace Dumps

The Trace Dump selection on the Configuration Program menu allows you to perform traces of Scalar 218FC activity for diagnostic purposes. The trace levels defined in Trace Settings Configuration (see above) determine the level of detail displayed. You can perform a trace dump of either the current or previous Scalar 218FC boot cycle (the period of operation between power on or reboot until either the trace dump is performed or the system is powered off). If you encounter problems with your Scalar 218FC, you may be asked by an ADIC Support Engineer to perform the following operation. To perform a Trace Dump:

1. Press **2** on the Configuration Program main menu. This displays the Trace Dump menu.

```
Trace Dump Menu

Build Level: a9802

    1) Dump trace for the current boot cycle

    2) Dump trace from the previous boot cycle

    X) Return to previous menu
```

2. Press **1** to perform a trace dump for the current Scalar 218FC boot cycle, or press **2** to trace the previous boot cycle. The resulting display will be similar to the following, depending upon the trace levels set during configuration.

```
399 ms 936 us Init Timer went off!  Restart initialization...!

0 ms  24 us Trying to go on-line!

399 ms 937 us Init Timer went off!  Restart initialization...!

0 ms  24 us Trying to go on-line!

399 ms 936 us Init Timer went off!  Restart initialization...!

0 ms  24 us Trying to go on-line!

399 ms 937 us Init Timer went off!  Restart initialization...!

0 ms  24 us Trying to go on-line!

399 ms 936 us Init Timer went off!  Restart initialization...!

0 ms  24 us Trying to go on-line!

399 ms 937 us Init Timer went off!  Restart initialization...!

0 ms  24 us Trying to go on-line!

399 ms 936 us Init Timer went off!  Restart initialization...!

0 ms  24 us Trying to go on-line!

399 ms 937 us Init Timer went off!  Restart initialization...!

0 ms  24 us Trying to go on-line!

399 ms 935 us Init Timer went off!  Restart initialization...!

0 ms  23 us Trying to go on-line!

399 ms 939 us Init Timer went off!  Restart initialization...!

0 ms  24 us Trying to go on-line!

399 ms 936 us Init Timer went off!  Restart initialization...!

0 ms  24 us Trying to go on-line!

399 ms 935 us Init Timer went off!  Restart initialization...!
0 ms  23 us Trying to go on-line!
399 ms 938 us Init Timer went off!  Restart initialization...!
```

New Firmware Revisions

The Scalar 218FC uses a serial connection and the XMODEM protocol to update the firmware.

1. Press **4** (Download a New Revision of the Firmware) in the Configuration Program main menu. The following prompt will be displayed:

```
Download Firmware Menu
Build Level: a9802
This will replace the current revision of the firmware.
A reboot will also be performed as part of this process.
Are you sure (Y/N)?
```

2. Press **Y** to download the firmware revision and reboot the Scalar 218FC.

```
Downloading...
```

3. Pull down the Transfer menu on the HyperTerminal menu bar and click on **Send File…**, or click on the **Send** button on the tool bar. This activates the Send File dialog box.
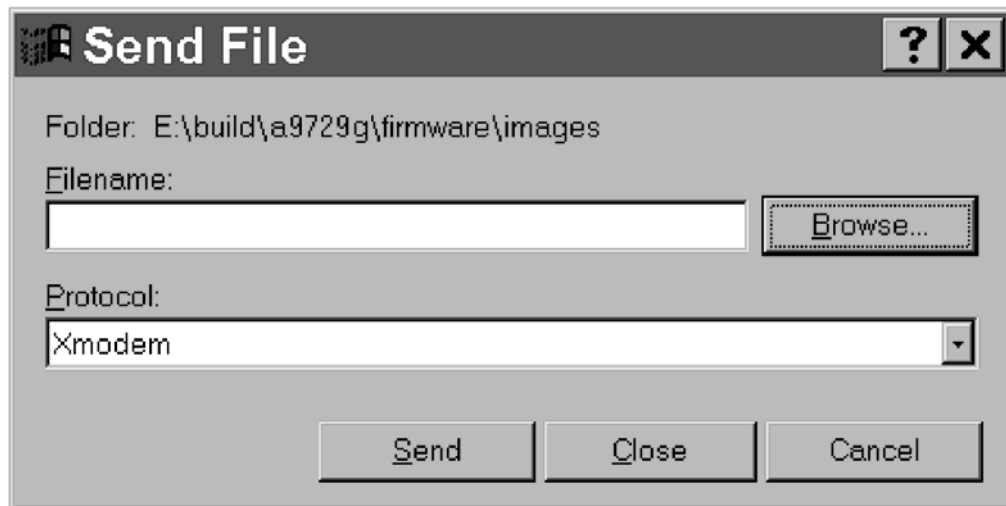
4. Enter the filename of the firmware version that you wish to download, or use the **Browse** button to search for the file. This opens the Select File to Send dialog box.
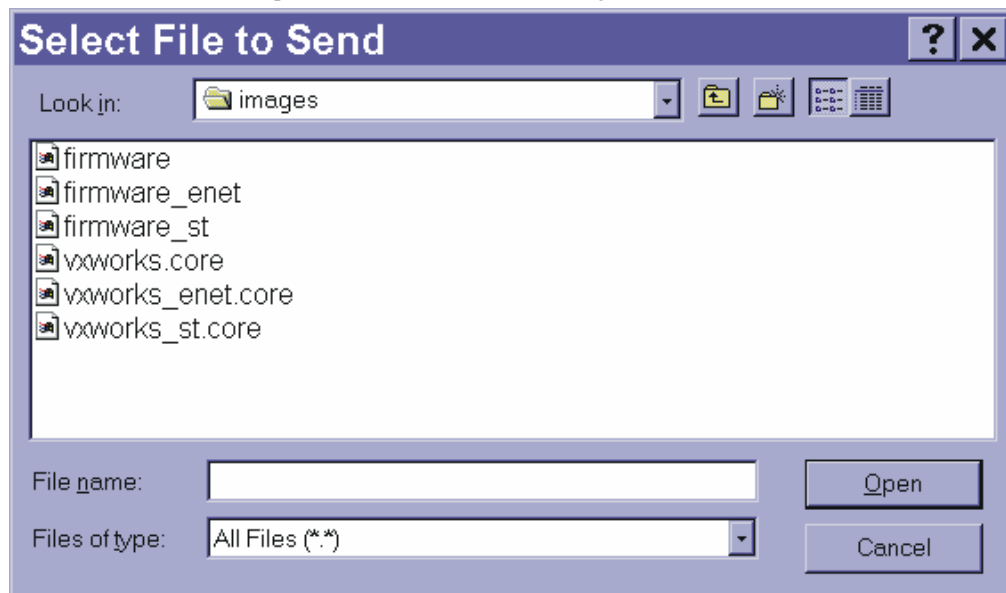
5. Click on **firmware** to enter it into the **File name** text box, then click on **Open**.
6. Set the protocol in the Send File dialog box to XMODEM.

7. Click on **Send**. The downloading process will proceed and the Scalar 218FC will reboot. The following output is an example that may be different on your system.

```
.text: 0xa00d0000 → 0xfee10000, size: 0x00000688.

.data: 0xa00d0688 → 0xfee10688, size: 0x0004eadc.

.bss:  0xa011f170 → 0xfee5f170, size: 0x0001b130.
```

Should the download fail, you will see the following message:

```
Download failed

ERROR:

     Downloading of firmware image failed!

Press Any Key to Continue...
```

Rebooting the Scalar 218FC

For configuration changes to take effect, you must reboot the Scalar 218FC.

To reboot the Scalar 218FC:

1. Press **3** under the Configuration Program. This displays the following confirmation prompt:

```
Reboot! Are you sure (Y/N)?
```

2. To reboot the Scalar 218FC, press **Y**; to abort, press **N.**

You are now ready to install the backup software – if it has not already been installed.

Installing the Backup Software

At this point you need to refer to your software installation guide for instructions on installing the backup and controlling software for the Scalar 218FC onto the host computer.

After you have completed installation of the Scalar 218FC and of the software, you should run any diagnostic test(s) supplied with the backup software to make sure that your unit is operating correctly.

After your library and host computer are connected, and the application software installed, the library is ready for use. Just turn on the power switch.

Chapter

5

Equipment Description

This Chapter …

❒ describes the switches, indicators and connectors on the front and rear of your Scalar 218FC.

❒ describes the various functions available via the front panel buttons.

❒ describes the power-up procedure and messages on the front panel LCD display.

Front Panel Switches and Indicators

The following illustration shows the front panel switches and indicators.

Mailbox

On/Off switch

4-line x 20-character LCD

8-key keypad
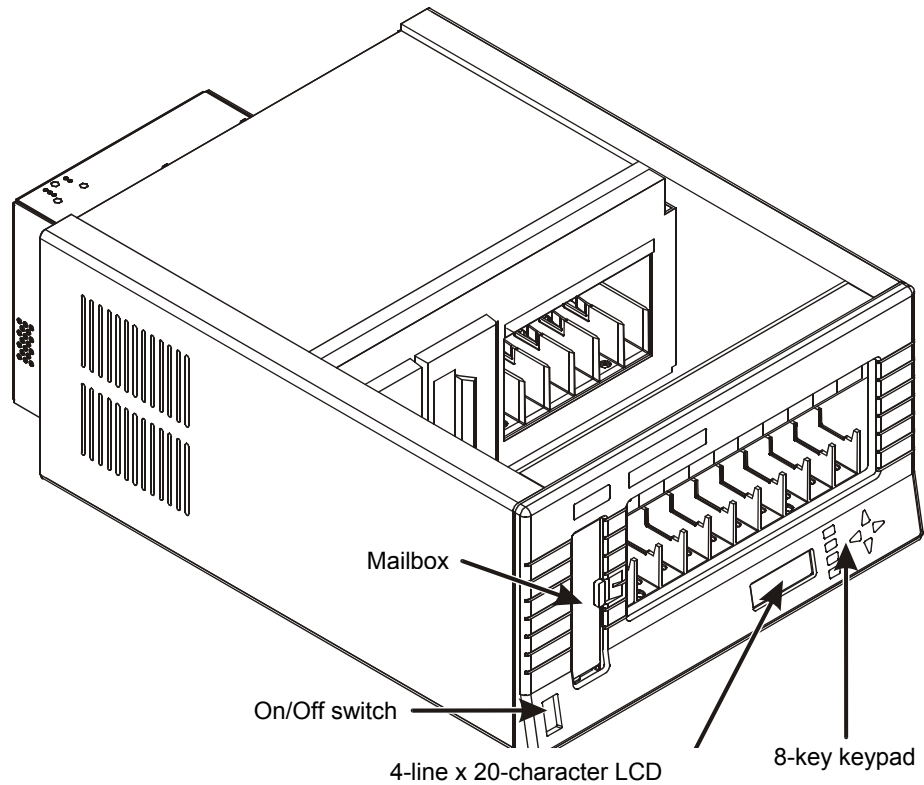
Front of Scalar 218FC Library

Switches and Indicators	
Display	The four-line 20-character LCD shows current drive status of the Scalar 218FC Library, allows access to change features or displays error messages.
Power Switch	The power switch turns the Scalar 218FC ON and OFF.
MENU	Press this button to enter or exit the Off-Line mode of operation.
ESC	Exits current menu and returns to previous menu.

ALT	Selects alternate function for another button.
ENTER	Selects currently displayed item.
△	Selects previous item or value in menu, and moves cursor to previous line.
▽	Selects next item or value in menu, and moves cursor to next line.
▷	Selects previous field on same line, and scrolls message to the left. When in the On-Line mode of operation, if pressed immediately after the **ALT** key has been pressed, this key will cause the Picker to move to the extreme right.
◁	Selects next field on same line, and scrolls message to the right. When in the On-Line mode of operation, if pressed immediately after the **ALT** key has been pressed, this key will cause the Picker to move to the extreme left.

Rear Panel Indicators, Switches and Connectors

The following illustration shows the indicators, switches and connectors on the rear of the Scalar 218FC Library.
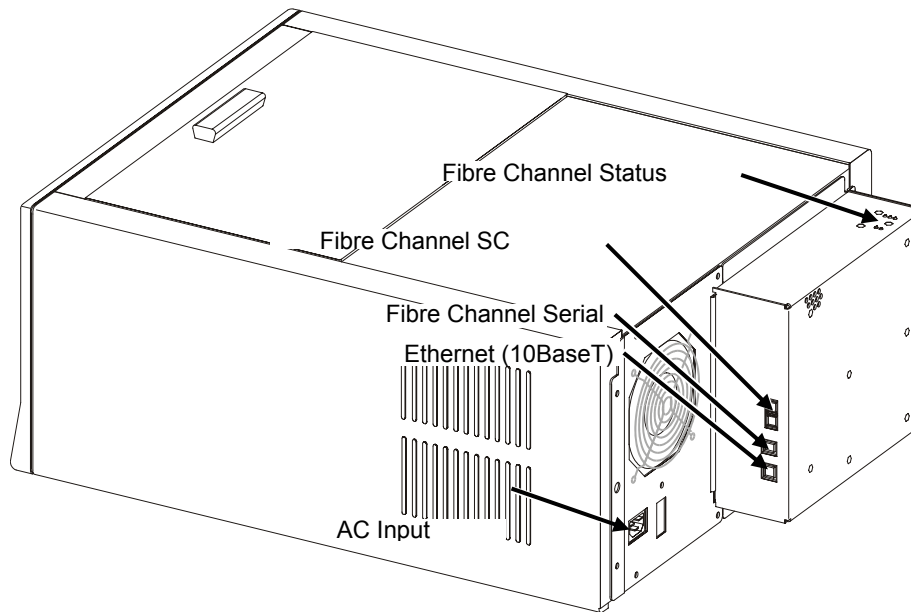
Rear of Scalar 218FC

Rear Panel Fibre Channel Status Indicators (LEDs)	
FC	Indicates Fibre Channel activity when illuminated.
10Base-T	Indicates 10Base-T activity when illuminated.
SCSI	Indicates SCSI activity when illuminated.
FAULT	Indicates a failure in the Fibre Channel interface circuitry.
POWER	Indicates power is applied to the Fibre Channel interface circuitry.

Rear Panel Connectors	
AC Input Connector	Plug the AC power cord into this connector.
Fibre Channel SC Connector	Connection for the Fibre Channel interface cables. Used to connect the Scalar 218FC to the host computer Host Bus Adapter (HBA) using a non-OFC optical cable.
Ethernet Connector	Ethernet 10Base-T connectivity
Fibre Channel Serial Connector	Multi-function port. Used to monitor the Fibre Channel interface self-test, perform firmware upgrade of the FC interface, reboot the FC interface, monitor the FC interface diagnostics. Also, used to configure the Fibre Channel interface. Connect to a serial port on your host computer.

How the Scalar 218FC Processes SCSI Commands

The fibre channel subsystem of your Scalar 218FC acts as a pass-through device that receives and transmits SCSI Fibre Channel Protocol (FCP) packets. This allows the host equipped with a FC host bus adapter (HBA), to access SCSI peripheral devices transparently over the fibre channel connection.
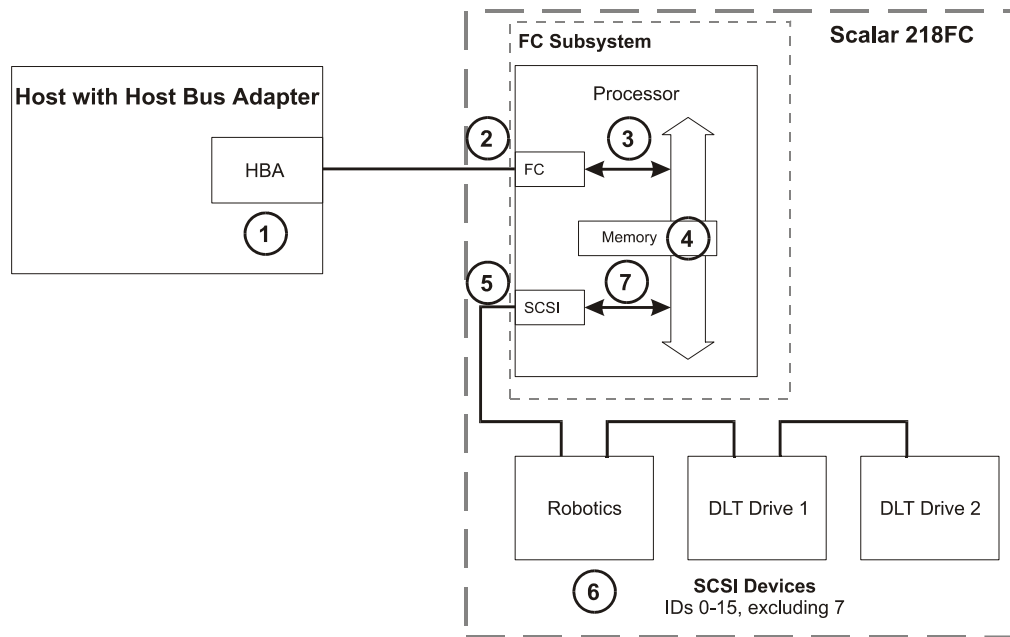
1. The host issues a SCSI command.

2. The fibre channel subsystem in the host encapsulates the command in the FC protocol and sends the packet to the Scalar 218FC.

3. The fibre channel subsystem in the Scalar 218FC receives the packet, interprets the FC information, and places the packet in memory.

4. The fibre channel subsystem processor interprets the SCSI information and programs the appropriate SCSI or fibre channel subsystem to process the transaction.

5. The SCSI subsystem sends the command to the appropriate SCSI target (Scalar 218FC robotics, DLT drive 1, or DLT drive 2).

6. The target executes the command and return information is sent to subsystem memory.

7. The subsystem processor encapsulates the return information in the FC protocol and sends the packet back to the host.

Off-Line Mode Menus

The following diagram is a quick reference to the Scalar 218FC LCD menus described on the next few pages.

Configuration Menu			Diagnostics Menu		Write Flash Memory	Serial Dnld Flash
Buzzer Configuration			Open Drive Door			
ErrAlarm	Yes/No		Close Drive Door			
Kybd	Yes/No		Firmware Revision			
Set SCSI ID			Map Slots & Drives			
Library's SCSI ID: X	(0-7)		Scan Bar Codes	Yes/No		
Product Sign-On			Pos Picker at Slot			
EXB-480: N	Yes/No		Slot ss	(ss = 01-18)		
Off-Line Time			Pos Picker at Mbox			
Max time: X min	1-99 minutes		Pos Picker at Drv			
Init Mapping			Drv dd	(dd = 01, 02)		
Map Slots and Drives	Yes/No		Pick From Slot			
Init Scan Barcodes			Slot ss	(ss = 01-18)		
Scan Barcodes	Yes/No		Pick From Mailbox			
Barcode Scanner			Pick From Drive			
Enable: Y	Yes/No		Drv dd	(dd = 01, 02)		
Verify SCSI Bus			Place In Slot			
Same Bus: Y	Yes/No		Slot ss	(ss = 01-18)		
Enable Mailbox			Place In Mailbox			
Enable Mailbox	Yes/No		Place In Drive			
Adjust Slot Count			Drv dd	(dd = 01, 02)		
Number of Slots	?		Event Counters			
			Operation Log			
			Calibrate Position			
			Display Sensors			
			Run Demo			

```
Scalar 218          21"



```

When powered-on, and after completing the initialization process, the LCD will appear as shown above.

❐ To access the Off-Line Mode menu, press the **MENU** key. The display will appear as follows:

```
OFF-LINE MENU
Configuration Menu ▼


```

❐ Use the **UP** or **DOWN** keys to scroll through the menu choices. Press **ENTER** to select the item displayed on the top line. Use the **RIGHT** or **LEFT** keys to scroll through fields on the same line.

❐ To exit the Off-Line Mode menu and return to the On-Line Mode from anywhere in the menu, press the **MENU** key.

❐ Press **ENTER** to select the Configuration Menu.

Configuration Menu

The Configuration Menu allows you to select the following operating parameters:

Buzzer Configuration	Set SCSI ID (Library Robotics)
Product Sign-On	Off-Line Time
Init Mapping	Init Scan Barcodes
Barcode Scanner	Verify SCSI Bus
Enable Mailbox	Adjust Slot Count

Buzzer Configuration

```
BUZZER CONFIGURATION
Error Alarm:N Kybd:Y
```

Enables/disables the sounding of an alarm when an error message or warning alarm is displayed.
Enables/disables the beep sound when you press a keypad key.

❐ To enable the error alarm use the **LEFT** key to select the ErrAlarm field. Use **UP** or **DOWN** to
select "Y" to enable alarm or "N" to disable alarm. When the error alarm is enabled, a continuous
alarm tone will sound in the event of an error message. The alarm will sound until the condition
that caused the error has been removed or any key is pressed. To clear an error message from the
display, press **ALT** and **ENTER.**

❐ If you wish to change the status of the keyboard beep, use the **RIGHT** key to select the Kybd field.
Use **UP** or **DOWN** to select "Y" to enable a beep when you press a key or "N" to disable the beep.

Note

BUZZER CONFIGURATION default: Err Alarm: N, Kybd: Y

❐ Press **ENTER** to make the changes effective or press **ESC** to return to previous menu item.

Set SCSI ID

```
SET SCSI ID
Library's SCSI ID:5
```

Lets you select the SCSI ID for the robotics on the library.

❐ Use **UP** and **DOWN** to select the desired ID. Press **ENTER** to execute the change. Confirm the
change by pressing **ENTER** again.

Note

SET SCSI ID default is Library's SCSI ID:1.

Product Sign-On

```
PRODUCT SIGN-ON
Sign on "EXABYTE
EXB-480": N
```

Let's you select how the Scalar Library appears to application software. The library can be set to sign-on as an Exabyte® EXB-480™ library. This permits maximum application software compatibility.

❒ Use **UP** or **DOWN** to select "Y" or "N". Press **ENTER** to execute the change.

Note

PRODUCT SIGN-ON default is EXB-480: N.

Off-Line Time

```
OFF-LINE TIME
Max. time: 02 min.
```

Lets you set the number of minutes the Scalar Library will remain in the Off-Line Mode. If someone leaves the library in the Off-Line mode, after the pre-set number of minutes the library will automatically return to the On-Line Mode. This assures that your automatic backup will be done even if the library has accidentally been left off-line.

❒ Use **UP** or **DOWN** to select the number of minutes you wish the Scalar Library to remain in Off-Line Mode. Press **ENTER** to execute the change.

Note

OFF-LINE TIME default setting is "2" minutes.

Init Mapping

```
INIT MAPPING
Map slots and drives
at initialization: Y
```

Enables/disables the mapping of the storage slots whenever the Scalar Library is powered-up, after the sliding access panel has been opened and then closed, or if a SCSI bus Reset occurs.

❒ To disable the mapping of slots use the **UP** or **DOWN** keys to select "N". Press **ENTER** to execute the change.

Note

INIT MAPPING default setting is Y.

Note

Disabling INIT MAPPING by selecting "N" will force INIT SCAN BARCODES to "N" (see below).

Init Scan Barcodes

```
INIT SCAN BARCODES
Scan barcodes at
initialization: Y
```

Enables/disables the scanning of the cartridge barcodes whenever the Scalar Library is powered-up, or after the sliding access panel has been opened and then closed. The application software overrides the setting of this parameter. If Barcode Scanner configuration is set to No, Initialize Scan Barcodes is ignored, and the barcode reader is not available to the application software.

❒ To disable the scanning of barcodes use the **UP** or **DOWN** keys to select "N". Press **ENTER** to execute the change.

Note

INIT SCAN BARCODES default setting is Y.

Note

Enabling INIT SCAN BARCODES by selecting "Y" will force INIT MAPPING to "Y" (see above).

Barcode Scanner

```
BARCODE SCANNER
Enable bar code
scanner: Y
```

Enables/disables the barcode scanner. If disabled, the Initialize Scan Barcodes, Configuration Menu parameter (see above), and the Scan Barcodes sub-function of the Map Slots Diagnostics Menu function (see *Appendix B*), is ignored. If disabled, the barcode scanner *is not* available to the application software.

❒ To disable the barcode scanner use the **UP** or **DOWN** keys to select "N". Press **ENTER** to execute the change.

> **Note**
>
> ENABLE BARCODE SCANNER default setting is Y.

Verify SCSI Bus

```
VERIFY SCSI BUS
Same Bus: Y
```

Verifies that the SCSI devices within your Scalar 218FC (the library robotics *and* the drives) are connected to a single SCSI channel. Some network operating systems need to know if the Scalar 218FC SCSI devices are connected to more than one SCSI channel.

❒ To verify that the SCSI devices are connected to more than one SCSI channel use the **UP** or **DOWN** keys to select "N". Press **ENTER** to execute the change.

> **Note**
>
> VERIFY SCSI BUS default setting is Y.

Enable Mailbox

```
ENABLE MAILBOX
Yes
```

Enables/disables the Mailbox as a cartridge input/output element. When your Scalar 218FC Mailbox is enabled, there are 17 storage slots available to store data cartridges. The application software will use the Mailbox slot to move cartridges into, and out of the library storage slots. When the Mailbox is disabled, the slot is configured as storage slot number 18 and is available to store a data cartridge.

❒ To disable the Mailbox, and configure the slot as a storage location, use the **UP** or **DOWN** keys to select "N". Press **ENTER** to execute the change.

***

Note

ENABLE MAILBOX default setting is Y.

***

Adjust Slot Count

```
ADJUST SLOT COUNT
Num Slots:   18
```

Adjusts the number of storage slots available to the application. Dependent upon the setting of ENABLE MAILBOX (see above). If the Mailbox is disabled, choices are 18 slots or 16 slots. If set for 16 slots, slots 17 and 18 (Mailbox slot) are disabled. If the Mailbox is enabled, choices are 17 slots or 16 slots. If set for 16 slots, slot 17 is disabled. Adjust Slot Count setting affects the maximum slot available to Pos Picker At Slot, Pick From Slot, and Place In Slot functions available under the Diagnostics Menu. Refer to Appendix B for a detailed description of these functions.

❒ To adjust the slot count, use the **UP** or **DOWN** keys to select between "18" or "16" if the Mailbox is disabled, or select between "17" or "16" if the Mailbox is enabled. Press **ENTER** to execute the change.

***

Note

ADJUST SLOT COUNT default setting is 18 if Mailbox is disabled, and 17 if Mailbox is enabled.

***

Diagnostics Menu

```
OFF-LINE MENU
Diagnostics Menu
```

The following functions are available under the Diagnostics Menu:

Open Drive Door	Close Drive Door
Firmware Revision	Map Slots & Drives
Pos Picker at Slot	Pos Picker at Mbox
Pos Picker at Drv	Pick From Slot
Pick From Mbox	Pick From Drv
Place In Slot	Place In Mbox
Place In Drv	Event Counters
Operation Log	Calibrate Position
Display Sensors	Run Demo

For detailed descriptions of these functions, refer to Appendix B.

Note

We strongly recommend that only a qualified service technician use these diagnostic functions. Some diagnostic functions assume the Scalar Library has been configured correctly and many of the normal built-in safety checks are turned off. Misusing these diagnostic functions without the normal safety checks could result in improper operation (or damage to media and/or the Scalar Library).

Write Flash Memory

```
OFF-LINE MENU
Write Flash Memory⬆⬇
```

The Write Flash Memory mode is not applicable to the Scalar 218FC Library.

Serial Dnld Flash

```
OFF-LINE MENU
Serial Dnld Flash   ▲
```

The Serial Dnld (Download) Flash mode is used whenever you upgrade the Scalar Library firmware using the serial port on the rear panel. When ADIC releases new firmware for the Scalar Library, complete instructions on using Serial Dnld Flash mode and performing the upgrade will be included with the firmware.

Chapter

6

Operation and Maintenance

This Chapter …

❒ describes normal operation features of the Scalar 218FC Library

❒ provides details on the media and drive head cleaning cartridge

❒ explains normal maintenance procedures

Normal Operations

General Guidelines

Once your Scalar 218FC Library and your choice of application software are installed and configured, you can automatically perform backup and restore operations via the application software. You do not need to intervene unless the application software instructs you to exchange data cartridges through the mailbox slot, or by reaching in through the sliding access panel.

Always follow these general-operating guidelines:

❒ Open the sliding access panel of the Scalar 218FC only when you must. Even if you power down your library, you should keep the door closed to protect the internal components from dust.

❒ Use only the recommended types of media cartridges, described earlier in this manual.

❒ Clean each of the DLT drives once a month, or whenever the **Use Cleaning Tape** LED is illuminated on a drive front panel (see the subsection titled *Cleaning the Drive Head* in the *Maintenance* section later in this chapter).

Power-Up Checks

When you apply power to your Scalar 218FC, the Fibre Channel subsystem will perform a Power-on Self-Test while the library (robotics) is performing the Power-Up Checks.

When you apply power to your Scalar 218FC, the library (robotics) will perform the following actions:

Verifies drive configuration and status.

Builds a valid cartridge inventory log.

Calibrates the positioning of the Media Picker.

When the library has completed the Power-Up Checks it will automatically place itself in On-Line Mode.

Drive Power-on Self-Test

When you power up your Scalar 218FC Library, the DLT drives each perform a Power-on Self-Test (POST) while the library is performing the Power-Up Checks. The sequence of events for each drive is:

1. The LEDs on the right front panel of the drive will turn on sequentially from top to bottom. All LEDs will remain ON for a few seconds.

2. The LEDs on the left front panel of the drive will turn ON at the same time for about three seconds and then turn OFF.

3. The **Operate Handle**, **Write Protected**, and **Use Cleaning Tape** LEDs will turn OFF. The **Tape in Use** LED will blink while the tape drive initializes.

✔ If your external SCSI bus terminator has a Term Power LED it should also be illuminated.

Drive Status

After completion of the drive POST and initialization, each drive will be in one of the four states listed in the following table:

Drive State	Indicator Displays and Actions
1. No cartridge is present	A. The **Tape in Use** LED turns OFF. B. The **Operate Handle** LED turns ON. C. The handle is unlatched. D. The drive beeps momentarily.
2. A cartridge is present and the handle is closed.	The drive loads the cartridge. When the **Tape in Use** LED stops blinking and stays ON, the tape's actual density lights. For example, if the actual tape density is 2.6, then the LED turns ON next to the 2.6 label. When the **Density Override** LED blinks, you can select a density. The drive is ready for use.
3. A cartridge is present, but the handle is open.	The **Tape in Use** LED turns OFF. The **Operate Handle** LED flashes. The Scalar Library will close the handle and the drive will load the cartridge. When the **Tape in Use** LED stops blinking and stays ON, the tape's actual density lights. For example, if the actual tape density is 2.6, then the LED turns ON next to the 2.6 label. When the **Density Override** LED blinks, you can select a density. The drive is ready for use.
4. The drive detects an error condition.	Then all right or left side LEDs blink repeatedly. You may try to unload the tape and reinitialize the drive by pressing the **Unload** key or turn power OFF and then ON again. The right or left side LEDs stop blinking and the drive tries to reinitialize. The LEDs turn ON steadily again and then turn OFF if the test succeeds.

The drive POST completes in about 13 seconds on each drive, and the drives will respond normally to all commands. However, it may take longer for the media to become ready.

Drive Operating Conditions

Use the following table to determine each drive's operating condition:

LED Label (Right Indicator Panel)	Color	State	Operating Condition
Write Protected	Orange	ON	Tape is write-protected.
		OFF	Tape is write-enabled.
Tape in Use	Yellow	Blinking	Tape is moving.
		ON	Tape is loaded; ready for use.
Use Cleaning Tape	Yellow	ON	Drive head needs cleaning, or the tape is bad.
		Remains on after unloading cleaning tape	Cleaning attempted, but tape expired, so cleaning not performed.
		After cleaning, turns on again when reloading data cartridge	Problem data cartridge. Try another cartridge.
Operate Handle	Green	ON	OK to operate the Cartridge Insert/Release Handle.
		OFF	Do not operate the Cartridge Insert/Release Handle.
All Right Indicator Panel LEDs or, All Left Indicator Panel LEDs		ON	POST is starting.
		Blinking	An error has occurred.

LED Label (Left Indicator Panel)	Color	State	Operating Condition
2.6 (DLT4000, DLT7000)	Yellow	ON	Tape is recorded in 2.6 format.
		Blinking	Tape is recorded in another density. You selected this density for a write from BOT.
6.0 (DLT4000, DLT7000)	Yellow	ON	Tape is recorded in 6.0 format.
		Blinking	Tape is recorded in another density. You selected this density for a write from BOT.
10.0 (DLT4000)	Yellow	ON (default)	Tape is recorded in 10.0 format.
		Blinking	Tape is recorded in another density. You selected this density for a write from BOT.
10.0/15.0 (DLT7000, DLT8000)	Yellow	ON (default)	Tape is recorded in 15.0 format.
		Blinking	Tape is recorded in another density. You selected this density for a write from BOT.
20.0 (DLT4000, DLT7000, DLT8000)	Yellow	ON (default)	Tape is recorded in 20.0 format.
		Blinking	Tape is recorded in another density. You selected this density for a write from BOT.
35.0 (DLT7000, DLT8000)	Yellow	ON (default)	Tape is recorded in 35.0 format.
		Blinking	Tape is recorded in another density. You selected this density for a write from BOT.
40.0 (DLT8000)	Yellow	ON (default)	Tape is recorded in 40.0 format.
		Blinking	Tape is recorded in another density. You selected this density for a write from BOT.
Compress	Yellow	ON	Compression mode enabled. (Compression available only in 10.0, 15.0, 20.0, and 35.0 density.)
		OFF	Compression mode disabled.
Density Override	Yellow	ON	You selected a density from the front panel.
		OFF (default)	Density will be selected by the host (automatic).
		Blinking	You are in density selection mode.
All Right Indicator Panel LEDs, or, all Left Indicator Panel LEDs		Blinking	A POST error has occurred.

DLT Media

The data cartridge used in the DLT drive is housed in a four-inch plastic case and contains ½-inch metal particle tape.

Orange

Write-protect
Switch
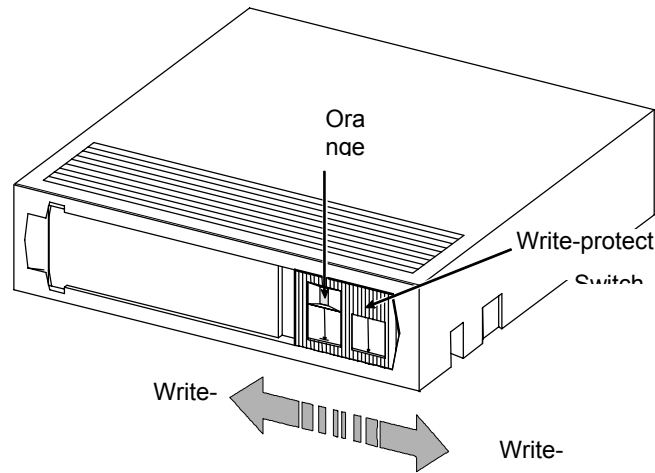
Write-

Write-

DLT Data Cartridge

The write-protect switch prevents or allows recording over existing data. To prevent recording or deleting, place the write-protect switch to the write-protected position. When installing cartridges in the library, place the switch in the write-enabled position (unless you do not wish to record on a specific cartridge).

Notes

A small orange rectangle is visible whenever the cartridge is write-protected (to the left).

The orange rectangle will not be visible whenever the cartridge is write-enabled (to the right).

Store data cartridges in a dry, cool environment.

Never reset or power down your computer or Scalar Library while a function is in process or a tape is moving.

Opening the Sliding Access Panel

> ### *Caution*
>
> Do not open the sliding access panel unless you need to replace data cartridges, or perform a maintenance operation.

Desktop Unit

A sensor monitors the position of the access panel. Whenever the panel is opened all Media Picker activity stops and a SCSI UNIT ATTENTION is returned to the host. Drive activity is unaffected by the position of the panel. When the panel is again closed, the Scalar 218FC resets, calibrates the Media Picker, and waits for a command from the host.

❒ Insert the key into the lock and turn it to the left to unlock.

> ### *Warning*
>
> Wait until any current application operations are completed.

❒ Turn the lock ¼ turn in either direction and hold while pushing the sliding access panel toward the rear of the Scalar 218FC.

Rack-mount Unit

A sensor monitors the position of the Scalar in the rack. Whenever the Scalar is pulled out from the rack, all Media Picker activity stops and a SCSI UNIT ATTENTION is returned to the host. Drive activity is unaffected by the position of the front panel. When the Scalar is pushed back into the rack, the Scalar 218FC resets, calibrates the Media Picker, and waits for a command from the host.

❒ Insert the key into the front panel slam lock and turn it to the left to unlock.

> ### *Warning*
>
> Wait until any current application operations are completed.

❒ Turn the slam lock knob ¼ turn in either direction and hold while pulling the Scalar out of the rack.

Using the Mailbox

On-Line Mode

> **Note**
>
> The application software can use the Mailbox as a cartridge input/output element only if it is first enabled. See *Off-Line Mode Menus, Configuration Menu, Enable Mailbox* in *Chapter 4* of this manual for additional information.

In the On-Line mode, the application software controls the Mailbox. The application may add, or remove, a single cartridge, or a complete backup data set may be exchanged, one cartridge at a time. The cartridge must be placed into or removed from the Mailbox slot manually, whenever the application requests. When adding or removing a cartridge to/from the Mailbox slot, open the plastic window covering the slot to provide access.

Off-Line Mode

Moving a Cartridge to a Drive or Storage Slot

Use the Mailbox to place a data or cleaning cartridge directly into a drive or a storage slot.

❒ Open the plastic door over the Mailbox slot.

❒ Place the cartridge into the slot with the write-protect switch up, and facing toward you.

❒ Close the plastic door.

❒ Use the **Off-Line** mode **Diagnostics Menu Pick from Mailbox** function to have the Picker move a cartridge from the Mailbox slot to a drive or storage slot. See *Appendix B Diagnostics Menu*, later in this manual, for complete descriptions of the Pick and Place functions.

Moving a Cartridge to the Mailbox Slot

Move a data or cleaning cartridge from a drive or storage slot to the Mailbox as follows:

❒ Use the **Off-Line** mode **Diagnostics Menu**, **Place in Mailbox** function to have the Picker move a cartridge from a drive or storage slot to the Mailbox slot. See *Appendix B Diagnostics Menu*, later in this manual, for complete descriptions of the Pick and Place functions.

❒ Open the plastic door over the Mailbox slot.

❒ Remove the cartridge from the Mailbox manually.

❒ Close the plastic door.

Manually Loading/Unloading Cartridges to/from the Storage Slots (Bulk Loading)

Media can be exchanged on a "bulk" basis by opening the access panel and exchanging any or all cartridges in the slots. The application software will have to re-map the slots and re-scan the barcodes to update its cartridge inventory log when the loading/unloading is completed.

Note

You can manually move the Media Picker assembly right or left to provide access to the storage slots. Push the Picker at the bottom only, pushing at the top will cause the bearings to bind and the Picker will resist movement.

Normal Maintenance

Cleaning the Drive Head

Cleaning Tape

The tape heads should be cleaned once a month, or when the **Use Cleaning Tape** LED is illuminated on the drive front panel. Use a DLT cleaning tape to clean the drive heads. A cleaning tape is shipped with your ADIC Scalar Library.
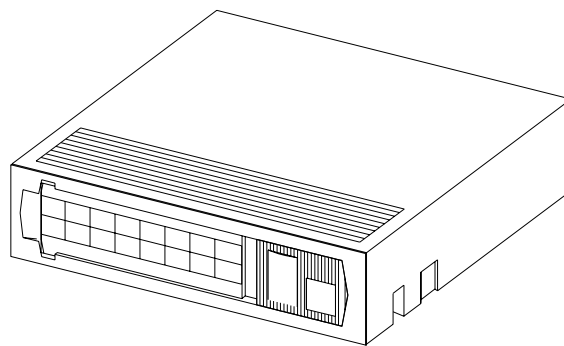
Figure 16:. DLT Cleaning Tape

Cleaning the head should always be performed as the first step if the **Use Cleaning Tape** LED is illuminated on the drive.

> **Note**
>
> The cleaning cartridge is exhausted after it has performed 20 cleanings. The cleaning tape includes a label with 20 small boxes printed on it. Always place a check mark in a box each time the tape performs a cleaning. Replace the cleaning cartridge when it has performed 20 cleanings (all boxes will be checked).

The following table tells you when to use the cleaning tape:

If . . .	It means . . .	You should . . .
1. The **Use Cleaning Tape** LED is illuminated on the drive front panel	The drive head needs cleaning or the tape is bad	Use the cleaning tape. Load the cleaning tape using the procedure in section *Using the Mailbox*, subsection *Off-Line Mode,* sub-subsection *Moving a Cartridge to a Drive or Storage Slot* earlier in this chapter.
		When cleaning is complete, the beeper will sound alerting you to remove the cleaning tape. Use the procedure in section *Using the Mailbox*, subsection *Off-Line Mode*, sub-subsection *Moving a Cartridge to the Mailbox* earlier in this chapter to remove the cleaning tape from the drive. Log the cleaning onto the label.
2. A data cartridge causes the **Use Cleaning Tape** LED on the drive front panel to blink	The data cartridge may be damaged	Back up the data from this cartridge onto another cartridge, it may be damaged. A damaged cartridge may cause unnecessary use of the cleaning cartridge.
3. The **Use Cleaning Tape** LED re-illuminates after performing a cleaning and reloading the data cartridge.	Cleaning was not accomplished because the cleaning tape has exhausted all cleaning cycles. **OR**	Replace the cleaning cartridge.
	The data cartridge may be damaged	Back up the data from this cartridge onto another cartridge, it may be damaged. A damaged cartridge may cause unnecessary use of the cleaning cartridge.

Manual Head Cleaning Procedure

If desired, you can manually insert and remove the cleaning tape into/from the drive. To do this you must open the drive door using the **Open Drive Door** function of the **OFF-LINE Mode**, **Diagnostics Menu**. You must also insert the cleaning cartridge into the drive by reaching down through the sliding access panel.

❐ Place the Scalar 218FC in **OFF-LINE Mode** by pressing the **MENU** key.

❐ Using the **Open Drive Door** function of the **Diagnostics Menu**, open the door to the drive that you wish to clean.

❐ Open the sliding access panel of the Scalar Library.

❐ Insert the cleaning cartridge into the drive you wish to clean.

❐   Using the **Close Drive Door** function of the **Diagnostics Menu**, close the drive door handle.

The cleaning cycle will be performed. When cleaning is completed, the drive will eject the cleaning cartridge. Remove the cleaning cartridge and check a usage box on the label.

❐   To resume normal operation, place the Scalar 218FC back in **ON-LINE** Mode by pressing the **MENU** key.

Cleaning the Enclosure

The outside of the enclosure can be cleaned with a damp towel. If you use a liquid all-purpose cleaner, apply it to the towel. <u>Do not directly spray the enclosure</u>.

Chapter

7

Troubleshooting and Diagnostics

This Chapter …

❒ contains some general suggestions to aid you in solving problems – should you ever run into them.

❒ includes information on error codes and the built-in diagnostics.

Installation Problems

Usually, problems encountered during the installation of your Scalar Library are caused by improper SCSI bus configuration, application software configuration errors or by an OS that has not been correctly configured. If the application software that you are attempting to use is not communicating with your library after installation, check the following:

✔ SCSI IDs

❒ Make sure that the IDs you selected for the library robotics and the two DLT tape drives are all different.

✔ SCSI Cabling

❒ Verify that all SCSI cables located between the fibre channel interface subassembly and the drives are securely connected at both ends.

✔ Fibre Channel Cabling

❒ Verify that the FC cabling is properly seated. Visually inspect the cable for any damage. The cable is made of glass fibers and will break if bent at a sharp angle.

✔ Compatibility

❒ Ensure that your library and its tape drives are compatible with the Fibre Channel host bus adapter card and application software you plan to use.

> ### Note
>
> For a list of compatible Fibre Channel adapters and application software, call the ADIC Technical Assistance Center at (800) 827-2822.

✔ Fibre Channel Host Bus Adapter Card Installation

❒ Verify that you have installed your FC adapter card correctly. Refer to the documentation that came with your card for installation and troubleshooting instructions. Pay particular attention to any steps describing the settings of various jumpers and/or switches on the card. Check that the card is seated fully in your computers I/O connector.

✔ Application Software Installation

❒ Refer to the documentation included with your software for instructions on how to verify installation.

Library and Drive Operational Problems

Most problems with the operation of your Scalar Library and/or DLT drives happen when the drives are not cleaned regularly or when you use incorrect data cartridges. If you have been successfully operating

the application software and library in the past, but are now experiencing problems reading and writing data, check the following:

✔ If you are writing data, make sure that the cartridge is write enabled (move the write-protect switch to the enabled position).

✔ Check the data cartridge you are using. If your library has DLT2000XT drives installed, you can only use DLTtape III and DLTtape IIIXT cartridges. The DLT4000 and DLT7000 drives can use DLTtape III, DLTtape IIIXT, and DLTtape IV cartridges.

✔ If the cartridge has been in use for a long time or if it has been used frequently, try using a new cartridge.

✔ Clean the drive head.

Library Error Codes

If, during operation of your Scalar Library an error occurs, the library will halt the current operation and an error code will be displayed on the operator's display. The error code is displayed at the beginning of the fourth line and will consist of two hexadecimal characters. The first three lines will not be changed.

In all cases, after removing the cause of the problem push **MENU** to return the Scalar Library to the On-Line Mode.

If you cannot find a cause for the error, try to return the Scalar Library to the On-Line Mode by pressing **ALT** and/or **ENTER**. If that does not work, or if the error code reappears, call ADIC Customer Assistance and be prepared to tell them what the error code is – and what the conditions are (see *When You Call ADIC Customer Assistance* later in this chapter).

See *Appendix C Error Codes* in this manual for a detailed description of each error code.

Environmental Considerations

For best performance of your Scalar Library, and to minimize the chance of condensation, please observe the following guidelines:

❒ If you expose cartridges to temperatures outside the operating limits – 40-113 F (5-40 C) – stabilize them by leaving the cartridges in the operating temperature for a minimum of two hours before you use them.

❒ Avoid temperature problems by ensuring that the Scalar Library rear panel is not obstructed so that the drives have adequate ventilation.

> **Note**
>
> The Scalar 218FC displays the current internal temperature (in degrees centigrade) of the library on the Operator Panel LCD. Whenever the internal temperature meets or exceeds 40 C, an alarm will sound and a message appears on the LCD stating that the safe operating temperature has been exceeded.
>
> Once the temperature falls below 40 C, the alarm quits and the message is removed from the LCD.

❒ Position the Scalar Library where the temperature is relatively stable (i.e., away from open windows, fan heaters, and doors).

❒ Avoid leaving cartridges in severe temperature conditions, for example, in a car standing in bright sunlight.

❒ Avoid transferring data (reading from and writing to cartridges) when the temperature is changing by more than 15 F (10 C) per hour.

When You Call the ADIC Technical Assistance Center

Before calling the ADIC Techniocal Assistance Center (ATAC), follow these steps – which will help you take full advantage of your call:

❒ Review all documentation carefully. (Experience has demonstrated that most questions are answered in your documentation.)

❒ Be prepared to explain whether the software or hardware has worked properly at anytime in the past. Have you changed anything recently?

❒ Pinpoint the exact location of your problem, if possible. Note the steps that led to the problem. Are you able to duplicate the same problem or is it a one-time occurrence?

❒ Note any error messages displayed on your PC screen or file server. Write down the exact error message.

❒ If at all possible, call while at your computer, with ADIC's system installed and turned on.

❒ If running on a network, have all relevant information available (i.e. type, version number, network hardware, etc.).

❒ Be prepared to provide:

Your name and your Company's name

Model number

Serial number of unit (located on the rear face by the AC input module)

Software version numbers

- – device driver

- – archive/restore

Hardware configuration, including firmware version, date and number

Type of server, OS version, clock speed, RAM, network type, network version, and any special boards installed

A brief description of the problem

Where you purchased the ADIC system

Having this information available when you call for customer assistance will enable ADIC to resolve your problem in the most efficient manner possible.

Note

Call the ADIC Technical Assistance Center at (800) 827-2822.

Troubleshooting and Diagnostics

Appendix
A

FC to SCSI Mapping

This Appendix …

❒ describes the method used to translate Fibre Channel addressing protocol to SCSI addressing protocol

Introduction

Your ADIC Scalar 218FC provides connectivity between Fibre Channel devices and SCSI devices. FCP and SCSI systems employ different methods of addressing devices. This appendix provides an overview of the addressing methods of both protocols, and the methods used to translate addresses of one type into addresses of the other type.

SCSI Device Addressing

The SCSI bus establishes bus connections between devices. Targets on the SCSI bus may internally address logical units (LUNs). The addressing of a specific SCSI device is represented by the **BUS:TARGET:LUN** triplet. The SCSI bus allows for up to 16 devices, with up to 8 LUNs per target. The initiator uses a SCSI ID, so typical configurations have up to 15 target IDs available for use.

BUS identification is intrinsic to the configuration: a SCSI device is attached to only one bus. Target selection is handled by bus arbitration. Target addresses are assigned to SCSI devices directly through some means of configuration, such as a jumper, thumb-wheel, or other setting. LUN selection is by means of the **IDENTIFY** message, which occurs after target selection.

Fibre Channel Device Addressing

Fibre Channel devices connected to a fabric—any case where 2 or more ports are directly communicating via switch or arbitrated loop—are addressed by a unique port identifier. This identifier is assigned to a port during certain well-defined states of the FC protocol. Individual ports are allowed to arbitrate for a known, user-defined address. If such an address is not provided, or if arbitration for a particular user address fails, the port is assigned a unique address by the FC protocol. This address is generally not guaranteed to be the same value between instances. Various scenarios exist where the **AL_PA** of a device will change, either after power cycle or loop reconfiguration.

The FC protocol also provides a logical unit address field within command structures to provide addressing to devices internal to a port. The **FCP_CMD** payload specifies an 8 byte **LUN** field. The **FCP_CMD** element is the first element of an exchange in FC protocol. Subsequent identification of the elements of the operation between devices is provided by the exchange identifier. This includes the **FCP_XFER_RDY**, **FCP_DATA**, and **FCP_RSP** frames.

Fibre Channel Initiators Addressing SCSI Targets

When a Fibre Channel initiator initializes on a loop, it must first determine what devices exist on the loop and build an FCP target device list. Each device is queried for FCP logical units. The logical units are the actual devices that the operating system will address. When an initiator addresses a logical unit, the **LUN** field used is consistent in form with the SCSI CC defined fields. All current Fibre Channel host bus adapter drivers are consistent with these methods. The addressing used is the SCC Logical Unit Addressing and Peripheral Device Addressing methods, shown in Table 1 through 4. First level addressing is supported, so only the first 2 bytes of the 8 byte FCP **LUN** are used.

Bit Byte	7	6	5	4	3	2	1	0
n	Address Method		Address Method Specific					
N+1	Address Method Specific							

SCC Addressing Structure

Codes	Description
00	Peripheral Device Addressing Method
01	Volume Set Addressing Method
10	Logical Unit Addressing Method
11	Reserved

Address Method Definitions

Bit Byte	7	6	5	4	3	2	1	0
n	1	0	Target					
N+1	Bus			LUN				

SCC Logical Unit Addressing

Bit Byte	7	6	5	4	3	2	1	0
n	0	0	Bus					
N+1	Target/LUN							

Peripheral Device Addressing

Your ADIC Scalar 218FC supports the Peripheral Device Addressing Method and the Logical Unit Addressing Method, depending on the configuration of the Fibre Channel device. Discussion of the behavior of the Fibre Channel device in the different addressing modes follows.

SCC Addressing Option

When an FCR device is configured to use SCC addressing, the unit is capable of responding as a controller device to the FCP Initiator, or routing the FCP request to a specified **BUS:TARGET:LUN**. When a request using the Peripheral Device Addressing Method is received (An FCP command with the **LUN** field with bits 7 and 6 of byte 0 are set to 0), the unit routes the request to the internal processor, which acts on the command directly. When a request using the Logical Unit Addressing Method is received (bits 7 and 6 set to 10b), the request is routed to the **BUS:TARGET:LUN** as specified in the defined field.

Host systems using SCC addressing typically use the Peripheral Device Addressing method to perform initial device discovery. On issuing an **INQUIRY** command, the host receives the FCR Inquiry data, indicating that the device type is a controller device. (Inquiry data indicates device type is 0xC.) On the basis of this data, the host then knows that subsequent commands to attached devices are to use the Logical Unit Addressing method. The host can perform discovery by either walking through the **BUS:TARGET:LUN** values as would a standard SCSI driver, or by issuing a **REPORT LUNS** command. This command is sent to the controller (using the Peripheral Device Addressing Method), and returns a table indicating attached devices. The host can then perform actions on these devices directly without having to perform discovery through all possible combinations.

Indexed Addressing Option

Indexed Addressing allows host bus adapter drivers that only use Peripheral Device Addressing to access SCSI devices attached to the FCR unit. This is done by use of a table that is indexed by sequential **LUN** values, indicating selected **BUS:TARGET:LUN** devices. It is not possible in this mode to address the FCR unit as a controller unit directly. The table has the structure as shown in Table 5. The maximum size of the table is equal to the number of busses times the number of targets per bus, less one initiator ID per bus, times the number of **LUN**s per target. The index table can be manually edited. Configuration tools allow for the table to be filled in order of increasing bus, target, or **LUN**, as may be desired for the specific requirements. A method is also provided to perform device discovery, and fill the table in the order that devices are discovered on the SCSI busses.

> **Note**
>
> For bus priority, each subsequent **FCP_LUN** in the table increments the bus selected. For Target priority, each subsequent target is incremented, etc.

FCP LUN Value	SCSI BUS:TARGET:LUN
0	0:0:0
1	0:1:0
2	0:2:0
3	0:3:0
4	0:4:0
5	0:5:0
	(0:6:0 occupied by Initiator ID)
6	0:7:0
(…)	(…)
13	0:14:0
14	0:15:0
15	1:0:0
16	1:1:0
17	1:2:0
(…)	(…)

Indexed Addressing Table

Auto-Assigned Addressing Option

The Auto-assigned option is similar to Indexed Addressing, except that the table used is created through SCSI device discovery on power up or reset, and not otherwise retained. As the unit performs device discovery on the SCSI bus, the Index table relating FCP **LUN** values is filled with adjacent FCP **LUN**s referencing each subsequent SCSI device. The host system will then detect every attached device without voids, providing full device discovery to the host. This allows easy configuration in environments where device ordering is not important, and hot plugging of SCSI devices will not occur. Tape libraries are excellent candidates for using Auto-assigned Addressing. Configuration allows for discovery to be performed in order of bus, target, or LUN as desired for the specific environment.

SCSI Initiators to Fibre Channel Targets

SCSI Initiators addressing Fibre Channel targets require that the **BUS:TARGET:LUN** selected be associated with a given Fibre Channel destination ID and FCP **LUN** field. When a command is received on the SCSI bus, the routing table for that unit is accessed to determine the destination ID, and thus, the FCP target device to which the command is routed. When the **FCP_CMD** is issued, the **LUN** field associated with that entry is used, to provide the additional **LUN** addressing behind the FCP target. Further identification in the later phases of the command processing is by the exchange identifier. The table used is shown in Table 6. The table can be manually edited, for both the Loop ID (**AL_PA**) and **LUN** field. Two bytes are provided for the

LUN field, so that devices using SCC addressing can be used. In these cases, the bit fields used must be manually configured.

For example, it may be desirable to address a FCP RAID controller using SCC Volume set addressing. In this case, **LUN** 0 would be addressed by using the **LUN** value 0x4000. Using Logical Unit Addressing, the **LUN** value would be 0x8000. Similarly, Bus 1, Target 2, **LUN** 3 would be represented as 0x8243.

SCSI Address	FC Address
SCSI Bus 0, Target 0, LUN 0	Loop ID 0, LUN 0x0000
SCSI Bus 0, Target 1, LUN 0	Loop ID 1, LUN 0x0000
SCSI Bus 0, Target 2, LUN 0	Loop ID 2, LUN 0x0000
(…)	(…)
SCSI Bus 0, Target 0, LUN 1	Loop ID 16, LUN 0x0000
SCSI Bus 0, Target 1, LUN 1	Loop ID 17, LUN 0x0000
SCSI Bus 0, Target 2, LUN 1	Loop ID 18, LUN 0x0000
(…)	(…)
SCSI Target 7 Unavailable (Bridge Initiator ID)	

SCSI-to-FCP Routing Table

Host Driver Considerations

There are a number of cases in which the host operating system or device driver expects a particular device mapping. This is usually due to mappings being used from SCSI bus configurations. Some operating systems map devices into internal tables that are represented as SCSI type **BUS:TARGET:LUN** triplets. Applications that depend on this structure can be problematical. If a Fibre Channel driver is used that does not use SCC mapping, typically devices are mapped at the Source ID (**AL_PA**) level to target devices in the internal device map. This causes all devices behind the controller device to appear as **LUN**s to a single target. This can have the effect of limiting the number of devices that a driver can support, or cause applications to not address certain devices when they expect to be addressing target devices instead of **LUN** devices. Drivers that support devices with multiple **LUN**s are particularly at risk. Flexibility in how devices are internally mapped is necessary.

The ideal case is for host drivers to recognize controller devices from **INQUIRY** response data, and respond by using SCC addressing to discover and map devices internally. In this type of environment, the **BUS:TARGET:LUN** combination can map directly, with a possible offset to the Bus number from that used on the FCR router.

Appendix

B

Diagnostics Menu

This Appendix …

❐ describes the built-in diagnostic functions available via the Off-Line mode,
Diagnostics Menu

One of the most valuable features of the Scalar Library is the extensive built-in diagnostics. In this Appendix we discuss each of the Diagnostic functions available through the front panel keypad.

```
OFF-LINE MENU
Diagnostics Menu  ▼▲
```

The following functions are available under the Diagnostics Menu:

Open Drive Door   Close Drive Door

Firmware Revision   Map Slots & Drives

Pos Picker at Slot   Pos Picker at Mbox

Pos Picker at Drv   Pick From Slot

Pick From Mbox   Pick From Drv

Place In Slot   Place In Mbox

Place In Drv   Event Counters

Operation Log   Calibrate Position

Display Sensors   Run Demo

Warning

We highly recommend that these diagnostic functions be used only by a qualified service technician (or on the instruction of a qualified technician). Some of these functions assume that the unit has been set up correctly and thus many of the normal built-in safety checks are turned off. Misusing these diagnostic functions without the normal safety checks could result in improper operation (or even damage to media or the Scalar Library).

Open Drive Door

```
OPEN DRIVE DOOR
  Drv dd
```

The **Open Drive Door** function will cause the Scalar Library to open the door of the selected drive. If the door is already open the drive door motor will run for a short time. If a tape is present in the drive,

and it has not been logically unloaded, an error will occur and an error message will be displayed on the Operators Panel.

❒ Use **LEFT** or **RIGHT** to select the desired field. Select the drive row and drive using **UP** or **DOWN**. Press **ENTER** to activate.

dd　　=　　Drive number (01 - 02)

Close Drive Door

```
CLOSE DRIVE DOOR
 Drv dd
```
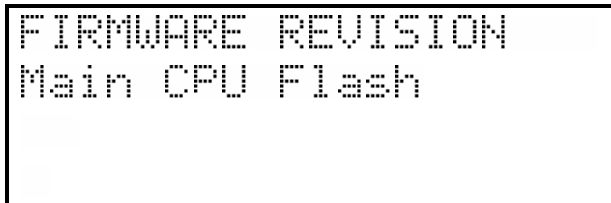
The **Close Drive Door** function will cause the Scalar Library to close the door of the selected drive. If the door is already closed the drive door motor will run for a short time.

❒ Use **LEFT** or **RIGHT** to select the desired field. Select the drive row and drive using **UP** or **DOWN**. Press **ENTER** to activate.

dd　　=　　Drive number (01 - 02)
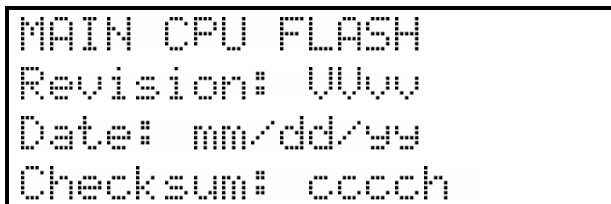
Firmware Revision

Provides a record of the internal revision date and number, and internal checksum value of the firmware for the Main CPU, Motion CPU, Picker CPU, and Servo Controller. This information is vital for troubleshooting problems.

```
FIRMWARE REVISION
Main CPU Flash
```

❒ Press **ENTER** to list the F/W revision information for the Main CPU.

```
MAIN CPU FLASH
Revision: VVvv
Date: mm/dd/yy
Checksum: ccch
```

VV　　=　　Major version number (00-99)

vv　　=　　Minor version number (00-99)
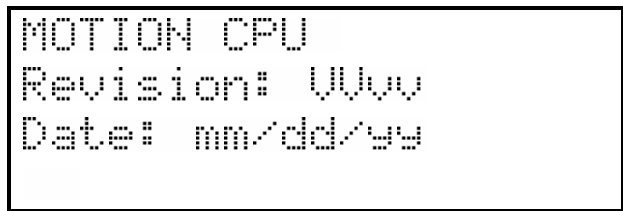
mm	=	Build date month (01-12)
dd	=	Build date day (01-31)
yy	=	Build date year (00-99)
cccc	=	Internal checksum (0000-FFFF) [hexadecimal]

❐ Press **ESC** to return to the **FIRMWARE REVISION** main screen.

❐ Press the **DOWN** arrow key to bring up the **Motion CPU** selection.

```
FIRMWARE REVISION
Motion CPU
```

❐ Press **ENTER** to select the **Motion CPU**.

```
MOTION CPU
Revision: VVvv
Date: mm/dd/yy
```

❐ Press **ESC** to return to the **FIRMWARE REVISION** main screen.

❐ Press the **DOWN** arrow key to bring up the **Picker CPU** selection.

```
FIRMWARE REVISION
Picker CPU
```

❐ Press **ENTER** to select the **Picker CPU**.

```
PICKER CPU
Revision: VVvv
Date: mm/dd/yy
```

❐ Press **ESC** to return to the **FIRMWARE REVISION** main screen.

❐ Press the **DOWN** arrow key to bring up the **Servo Controller CPU** selection.

```
FIRMWARE REVISION
Servo Controller
```

❐ Press **ENTER** to select the **Servo Controller**.

```
SERVO CONTROLLER F/W
Revision: VVvv
Date: mm/dd/yy
```

❐ Press **ESC** twice to return to the **Diagnostics Menu** main screen.

Map Slots & Drives

```
MAP SLOTS
Scan Barcodes: Y
```

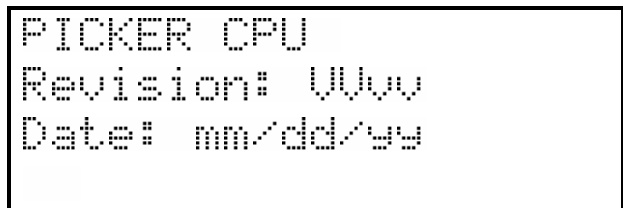The **Map Slots & Drives** function will cause the Scalar Library to update its cartridge inventory log. Selecting "N" in the **Scan Barcodes** field will prevent the library from updating its barcodes inventory log. If the Barcode Scanner configuration parameter is set to "N", the setting of the **Scan Barcodes** field is ignored.

❐ Use **LEFT** or **RIGHT** to select the **Scan Barcodes** field. Use **UP** or **DOWN** to select **Y** or **N**. Press **ENTER** to activate.

This function is usually used for diagnostics only by a trained technician.

Pos Picker at Slot

```
POS PICKER AT SLOT
  Slot ss
```

The **Pos Picker at Slot** function is used to position the Media Picker at a particular cartridge storage slot in preparation to either pick, or place a cartridge from/into the slot. The maximum slot number is dependent upon the setting of ADJUST SLOT COUNT under the Configuration Menu.

❒ Use **LEFT** or **RIGHT** to select the desired field. Select the row or slot using **UP** or **DOWN** Press **ENTER** to activate.

ss   =   Slot number (01 – 17, 01 – 16 if ADJUST SLOT COUNT set to 16)

Pos Picker at Mbox

```
POS PICKER AT MBOX
```

The **Pos Picker at Mbox** function is used to position the Media Picker at the Mailbox slot in preparation to either pick a cartridge from the Mailbox, or place a cartridge into the Mailbox.

❒ Press **ENTER** to activate.

> ### *Note*
>
> The application software can use the Mailbox as a cartridge input/output element only if it is first enabled. See *Off-Line Mode Menus, Configuration Menu, Enable Mailbox* in *Chapter 4* of this manual for additional information.

Pos Picker at Drv

```
POS PICKER AT DRV
  Drv dd
```

The **Pos Picker at Drv** function is used to position the Media Picker at a drive in preparation to either pick a cartridge from the drive, or place a cartridge into the drive.

❒ Use **LEFT** or **RIGHT** to select the desired field. Select the row or slot using **UP** or **DOWN**. Press **ENTER** to activate.

dd   =   Drive number (01 - 02)

Pick From Slot

```
PICK FROM SLOT
 Slot ss
```

The **Pick From Slot** function will cause the Media Picker to pick the cartridge from a particular cartridge storage slot in preparation to place it either in another storage slot, into a Mailbox slot, or in a drive. The maximum slot number is dependent upon the setting of ADJUST SLOT COUNT under the Configuration Menu.

❒ Use **LEFT** or **RIGHT** to select the desired field. Select the row or slot using **UP** or **DOWN**. Press **ENTER** to activate.

   ss   =   Slot number (01 – 17, 01 - 16 if ADJUST SLOT COUNT set to 16)

Pick From Mailbox

```
PICK FROM MAILBOX
```

The **Pick From Mailbox** function will cause the Media Picker to pick the cartridge from Mailbox in preparation to placing the cartridge either in a storage slot or in a drive.

❒ Press **ENTER** to activate.

Note

The application software can use the Mailbox as a cartridge input/output element only if it is first enabled. See *Off-Line Mode Menus, Configuration Menu, Enable Mailbox* in *Chapter 4* of this manual for additional information.
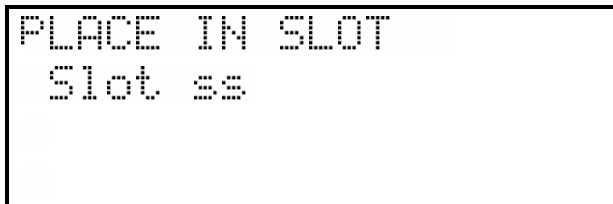

Pick From Drive

```
PICK FROM DRIVE
 Drv dd
```

The **Pick From Drive** function will cause the drive to unload and eject the cartridge and the Media Picker to pick the cartridge in preparation to placing the cartridge either in a storage slot or in a Mailbox slot.

❐ Use **LEFT** or **RIGHT** to select the desired field. Select the row or slot using **UP** or **DOWN**. Press **ENTER** to activate.

   dd   =   Drive number (01 - 02)

Place In Slot

```
PLACE IN SLOT
  Slot ss
```

The **Place In Slot** function will cause the Media Picker to place the cartridge into a storage slot. The maximum slot number is dependent upon the setting of ADJUST SLOT COUNT under the Configuration Menu.

❐ Use **LEFT** or **RIGHT** to select the desired field. Select the row and slot using **UP** or **DOWN**. Press **ENTER** to activate.

   ss   =   Slot number (01 – 17, 01 – 16 if ADJUST SLOT COUNT set to 16)

Place In Mailbox

```
PLACE IN MAILBOX
```

The **Place In Mailbox** function will cause the Media Picker to place a cartridge into the Mailbox.

❐ Press **ENTER** to activate.

Note

The application software can use the Mailbox as a cartridge input/output element only if it is first enabled. See *Off-Line Mode Menus, Configuration Menu, Enable Mailbox* in *Chapter 4* of this manual for additional information.

Place In Drive

```
PLACE IN DRIVE
 Drv dd
```

The **Place In Drive** function will cause the drive door to open and the Media Picker to place the cartridge into the drive.

❐   Use **LEFT** or **RIGHT** to select the desired field. Select the drive row and drive using **UP** or **DOWN**. Press **ENTER** to activate.

    dd   =   Drive number (01 - 02)

Event Counters

```
EVENT COUNTERS
nnnnnnnn:cccc
nnnnnnnn:cccc
nnnnnnnn:cccc
```

Provides a listing of the various Scalar Library operations and how many times they have occurred. Below is a listing of Event Counter listings with an indication of what each refers to:

    nnnnnnnn   =   Counter name

    cccc   =   Counter value (0 - 65535)

Operation Log

```
OPERATION NNN
SCSI selection        ▶
```

Provides a chronological logging (beginning with the latest) of up to 255 operations. These operations can be SCSI commands; operator requested operations, errors, and status operations. This information can be vital for troubleshooting problems. The following is a partial listing of some of the loggable operations. You may encounter other operations not included here.

    NNN   =   Logged operation number (1-255). When log is full, new operations are logged in as operation 255, scrolling the old operation 1 off the log.

Power on or user reset

Unit on-line due to user request

Unit off-line due to user request

Cmd: 03 00 00 00 20 00 (cmd is from SCSI host adapter)

SCSI selection by SCSI ID N (N = SCSI ID of host adapter)

SCSI reselection of SCSI ID N

SCSI disconnect from SCSI ID N

SCSI status = 00h (status to SCSI host adapter)

Door opened

Door closed

ERROR: Can't unload, media in drive(s)

ERROR: Source location empty

Retrying operation

Calibrate Position

```
CALIBRATE POSITION


```

The **Calibrate Position** function will cause the Scalar Library to move the Media Picker to the home position and update its home position constant.

❒   Press **ENTER** to activate.

This function is usually used for diagnostics only by a trained technician.

Display Sensors

```
DISPLAY SENSORS


```

The **Display Sensors** function causes the Scalar Library to display the present state of its sensors.

❒   Press **ENTER** to activate. The display will appear similar to the following:

```
SENSORS  HM 1 MBDR 0
SLOTS 111110  DOOR 0
1111101110111  DRV1 1
000000000000  DRV2 1
```

In the above display, 0 = closed, cartridge not present, or cartridge installed correctly; 1 = open, cartridge present, or cartridge incorrectly installed. The HM sensor is the sensor that the Media Picker homes to when calibrating. The DOOR sensor is the sensor that senses the state of the sliding access panel on the desktop Scalar, and the position of the rack-mounted Scalar (0 = Scalar pushed into rack, 1 = Scalar pulled out from rack). The SLOTS sensor display is organized as slots 13-18 on the second line (SLOT 18 is the Mailbox slot), and slots 1-12 on the third line. The 12 characters at the beginning of the fourth line represent the state of the state of the cartridges installed in slots 1-12. If the character is a 0, the cartridge is installed correctly in the slot; if a 1, the cartridge is not correctly installed (i.e., may be upside-down).

This function is usually used for diagnostics only by a trained technician.

Run Demo

```
RUN DEMO
```

The **Run Demo** function causes the Scalar Library to execute a demo program included in its firmware. The demo assumes that cartridge storage slots 1 through 12 are occupied, that slots 13 through 17 are empty, and that neither drive has a cartridge loaded. The program picks cartridges from the occupied slots and places them in empty slots and also the drives. The Demo continues to run until the **ESC** key is pressed. Pressing **ESC** a second time causes the Scalar 218FC to exit the program.

❒   Press **ENTER** to activate.

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Appendix

C

Error Codes

This Appendix …

❐ contains descriptions of the error codes that can be displayed on the
Scalar 218FC Library Operator's Panel.

Error Code Listing

The Scalar 218FC will display a 2-digit hex code on the bottom line of the LCD whenever certain types of errors occur. The characters will be placed in the first 2 columns on the line. A description of each of the error codes is provided below:

Code	Name	Description
06	Source location is empty	The source location was empty when the Picker attempted to pick from it during a pick and place operation.
07	Destination location is full	The destination was full when the Picker attempted to place a cartridge in it during a pick and place operation.
0C	Door is open	This code is displayed whenever the sliding access panel is open when the Picker is starting to execute a motion command.
0D	Door	Means that the door was open, but is now closed. This code will only appear on the serial port, it should never appear on the display. It should never be output on the serial port unless a 0C (see above) precedes it.
27	Invalid Picker response	This error code appears whenever the Picker CPU does not return the *proper* response to a Master CPU command.
28	Drive ready timeout	This error appears whenever the 'OK to Operate Handle' bit is not set within a specific time-out period.
29	No drive	During Power-up the drive did not output a serial data stream. This normally occurs during the Scalar 218FC boot process.
2A	No response from Picker	This error code appears whenever the Picker CPU does not return *any* response to a Master CPU command.
2B	Picker command timeout	This error appears whenever the Picker CPU does not return results from executing a command within a time-out limit.
2C	Barcode failure	All barcode errors return this code.
32	X-axis position error	An X-axis position error will occur whenever the X-axis position reported by the servo CPU does not match the position reported by the X-axis optical tachometer plus or minus a margin value.
FE or 7E	Framing error	An inter-processor communications error on the serial communications line.
FD or 7D	Jaw centering error	Picker jaw centering error. May be caused by something blocking the jaw.

FC or 7C	Not empty error		The Picker attempted a pick operation but already had a cartridge in it.
FB or 7B	Lost cartridge error		The Picker should already have a cartridge, but no cartridge is present.
FA or 7A	No cartridge error		The Picker attempted a place operation, but no cartridge was present in Picker.
F9 or 79	Can't place error		The Picker attempted a place operation, but the Picker carriage could not get to the correct location.
F8 or 78	Unknown Picker position error		The Picker carriage is not where it should be and the Picker cannot return it to a known location.
F6 or 76	Picker centering error		The Picker attempted to center the carriage, the jaw, and the gripper, but one or more of them would not center.
F5 or 75	Picker timeout error		The Picker attempted a pick operation, but could not complete the operation and timed-out.
F4 or 74	Cartridge jam error		This is a roller time-out error that occurs when the picker is rolling a cartridge out.
F3 or 73	Cartridge timeout error		This is a roller time-out error that occurs when the picker is rolling a cartridge in.
F2 or 72	Jaw frozen error		The jaws do not move at all.
F1 or 71	Jaw timeout error		The jaws are able to move, but cannot complete a function.
F0 or 70	Jaw positioning error		The jaws are not in the proper position.
EF or 6F	Jaw limit error		The jaws are moving and expecting to see sensor feedback to know when to stop movement, but the servo processor says that the jaws have reached a limit first.
EE or 6E	Mailbox empty error		Attempted Mailbox pick operation, but no cartridge is present.
ED or 6D	Barcode timeout error		The barcode reader did not return the barcode data in time.
EC or 6C	System fault error		This indicates that a Picker controller board error occurred.
EB or 6B	Picker position error		The Picker carriage is in the wrong position.
EA or 6A	Barcode termination error		This is an acknowledgment of a barcode read abort command.
E9 or 69	Barcode receiver error		Any serial data stream formatting error causes this.

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Appendix
D

Scalar 218FC Rack-Mount Installation

This Appendix …

❒   contains complete instructions on how to install your Scalar 218FC into
   your rack.

Preparing the Rack

Tools Required

— # 1 phillips screwdriver

— 11/32" nutdriver

❒ Match the holes in the mounting flange of an outer rail to the holes in your rack upright. You must use holes that have the same spacing when mounting the Scalar in your rack.

The rails will be secured to the uprights with a phillips screw and a spacer. There are two sets of spacers included in the rack mounting hardware. The largest spacers are to be used if the holes in your rack uprights are square. If the holes are round, use the small spacers.

Line up the holes in the rack upright
and the outer rail mounting flange
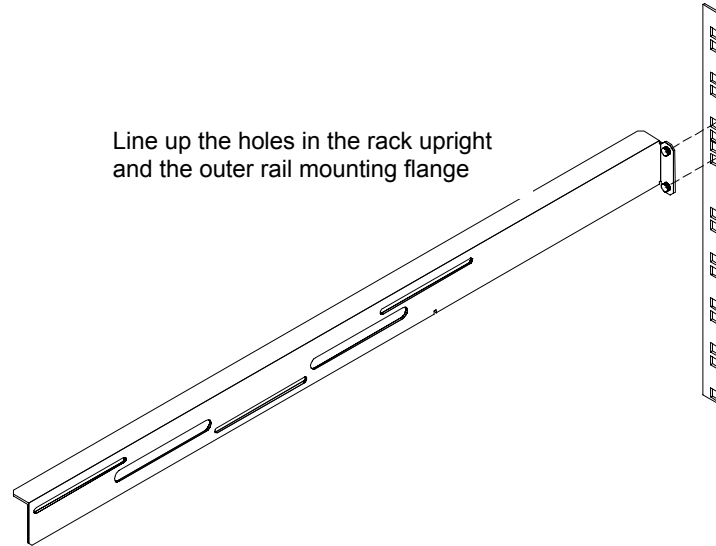
❐ Using a tape measure or other device, measure and record the inside distance between the rack uprights. See illustration below for an example:

Measure and record the inside distance
between the rack uprights
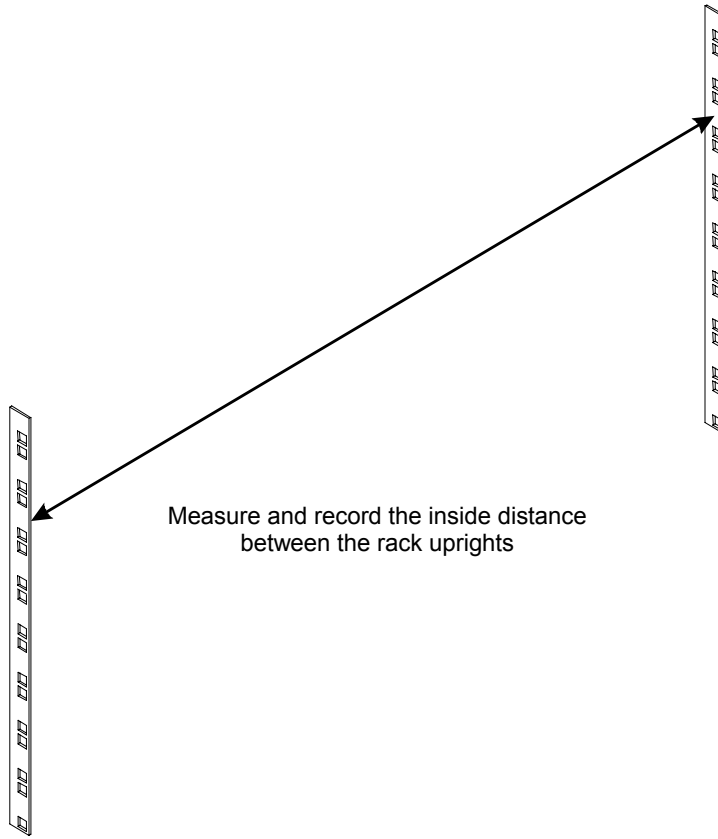
❐ Mount the outer rails to the Scalar 218FC by placing each rail over the three studs on each side of the unit. Loosely secure the outer rails to the studs using three nylock nuts. ***Do not*** tighten the nuts completely. The following illustration shows the location of the rail-mounting studs.


Mounting Stud (3 places)
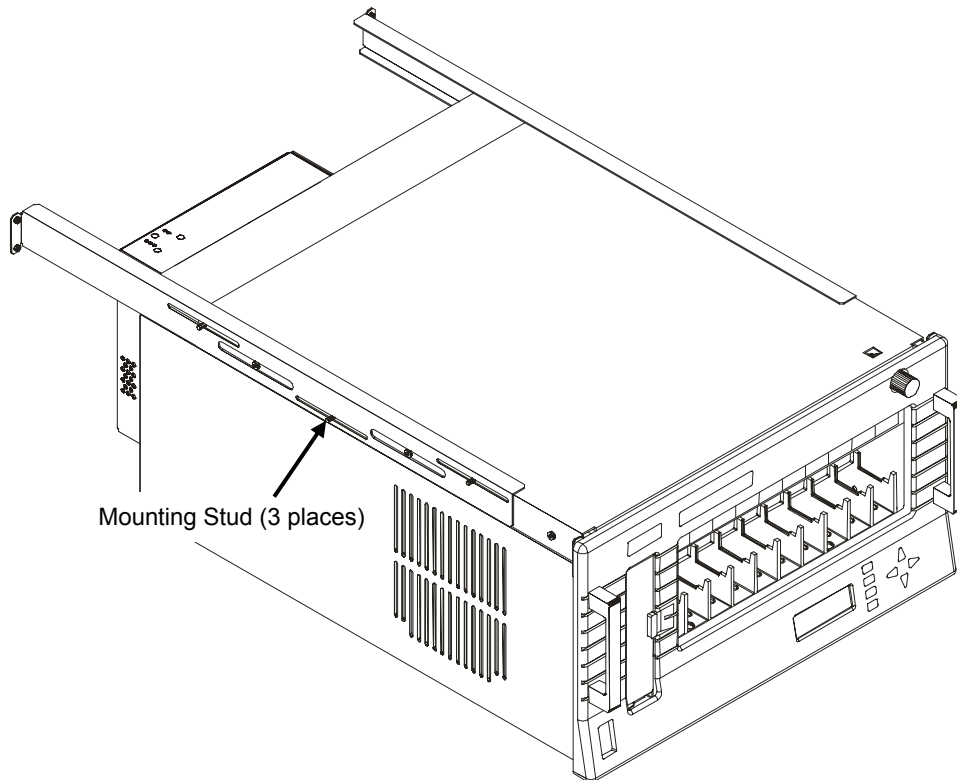
❐ Adjust the position of the outer rails until the distance between the outside surface of the mounting flanges is equal to the measurement you recorded when you measured the distance between the rack uprights.

❐ Once the rail length is adjusted, tighten the nylock nuts securely.

The next step in the installation process is to remove the Scalar from the rails so that you may install them in your rack.

For maximum protection, your rack-mount Scalar 218FC was shipped from the factory with the front panel locked in the closed (operating) position. The slam lock on the front panel serves two purposes; when engaged with the key, the Scalar 218FC cannot be pulled forward on its slides, preventing unauthorized access to the data cartridge storage bay; when disengaged, the lock works as a latch, holding the Scalar 218FC in the operating position.

❐   Using the key, unlock the front panel.



Slam lock
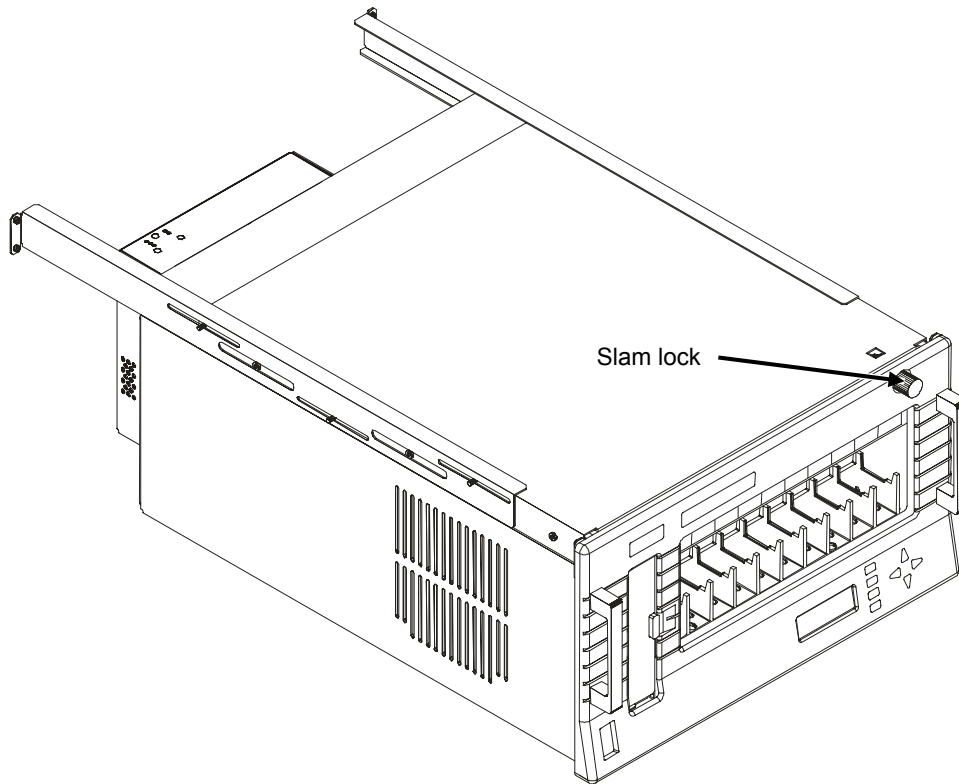
❐   Turn the lock ¼ turn in either direction while pushing the plate/rail subassembly rearward.

❐   Slide the plate/rail subassembly all the way rearward until the slide stops engage.

❐   While depressing both slide stop releases, slide the plate/rail subassembly off the inner slides.

If the holes in the uprights of your rack are square, you must install the plate/rail subassembly using the large collared spacers included in the hardware. If the holes in the uprights of your rack are round, you must install the plate/rail subassembly using the small collared spacers included in the hardware. This will position the rails correctly.

❒ While an assistant holds the plate/rail subassembly in position, secure each rail mounting flange to the rack upright with a spacer and a 10-32 x ½" phillips head screw. The spacers are positioned on the outside of the rails. Be sure that the small end of the spacer is inserted completely into the hole in the upright. Tighten the screws.
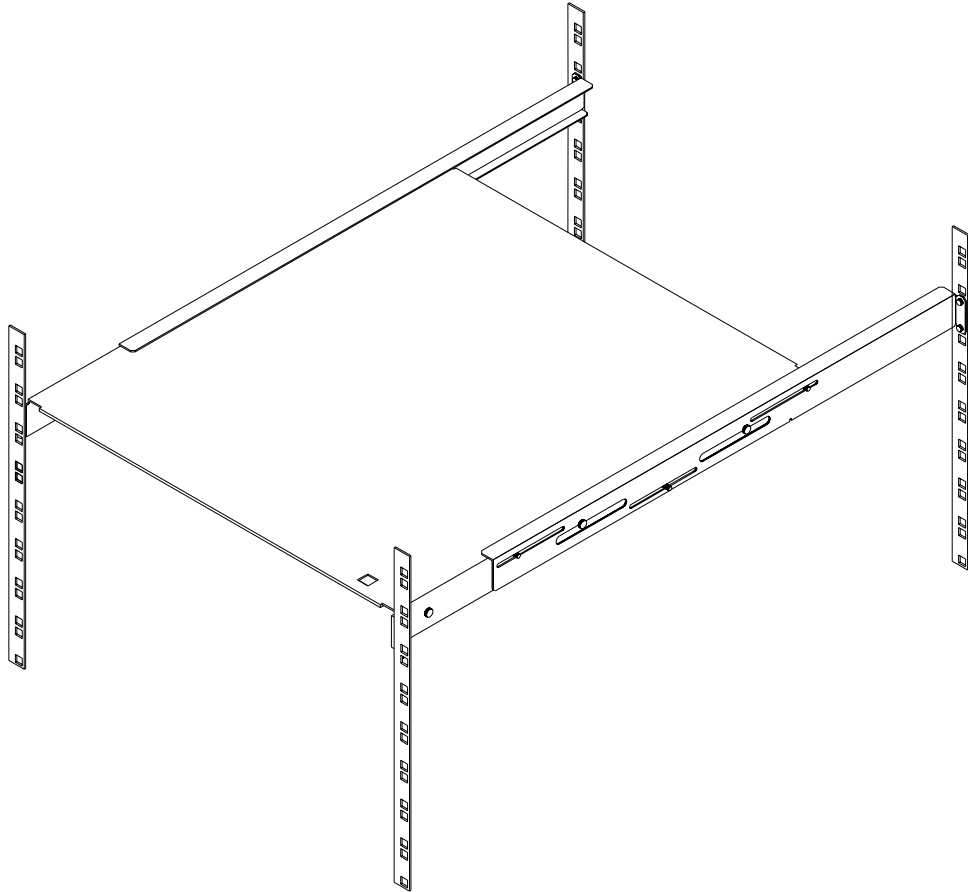
Installing the Scalar 218FC into the Rack

Warning

The Scalar 218FC weighs 60 pounds when it is equipped with two drives. ***Do Not*** attempt to lift the Scalar by yourself. To avoid possible injury, and damage to the equipment, always use two people to lift the Scalar.

❒ With your assistant, lift the Scalar 218FC up and slide the slides into the rails. The slides will continue past the slide stops. It is not necessary to depress them when pushing the Scalar into the rails.

Note

It may be necessary to slightly adjust the position of the plate/rail subassembly on the rack uprights after you have installed the Scalar 218FC.

To determine if you need to adjust the position, unlatch the front panel lock, slide the Scalar 218FC in and out on the rails, and listen for anything scraping.

If you hear scraping sounds, note which side they seem to be coming from, then slightly loosen both screws on the front or rear rail mounting flange on that side.

Again, slide the Scalar 218FC in and out, while continuing to listen for scraping. If the scraping stops, tighten the screws and recheck.

If necessary, try adjusting the mounting flange on the opposite end of the rail.

Installing the Cable Channel

The next step in the installation process is to install the cable channel bracket, cable channel, and channel stop at the rear of the rack. The cable channel will keep the SCSI and power cable(s) orderly and prevent them from hampering the movement of the Scalar 218FC whenever it is slid forward on the rails. The cable channel is secured to the channel bracket with a quick-release pin.

❒ At the rear of your rack, select the pair of holes in the rack upright where you wish to install the cable channel. ADIC recommends that you use a pair of holes that vertically is at about the same height as the AC power connector on the rear panel of the Scalar 218FC.

❒ Install the cable channel bracket using two 10-32 x ½" phillips head screws and two collared spacers.

❒ Install the channel stop using two 10-32 x ½" phillips head screws and two collared spacers.

❒ Secure the power cord and SCSI cable to the cable channel using the attached cable ties. Be sure to leave enough slack in the cables to allow the Scalar 218FC to be pulled away from the rack as far as the slide stops permit. The illustration on the following page shows how the channel should be installed in your rack.

Cable channel bracket

Channel stop
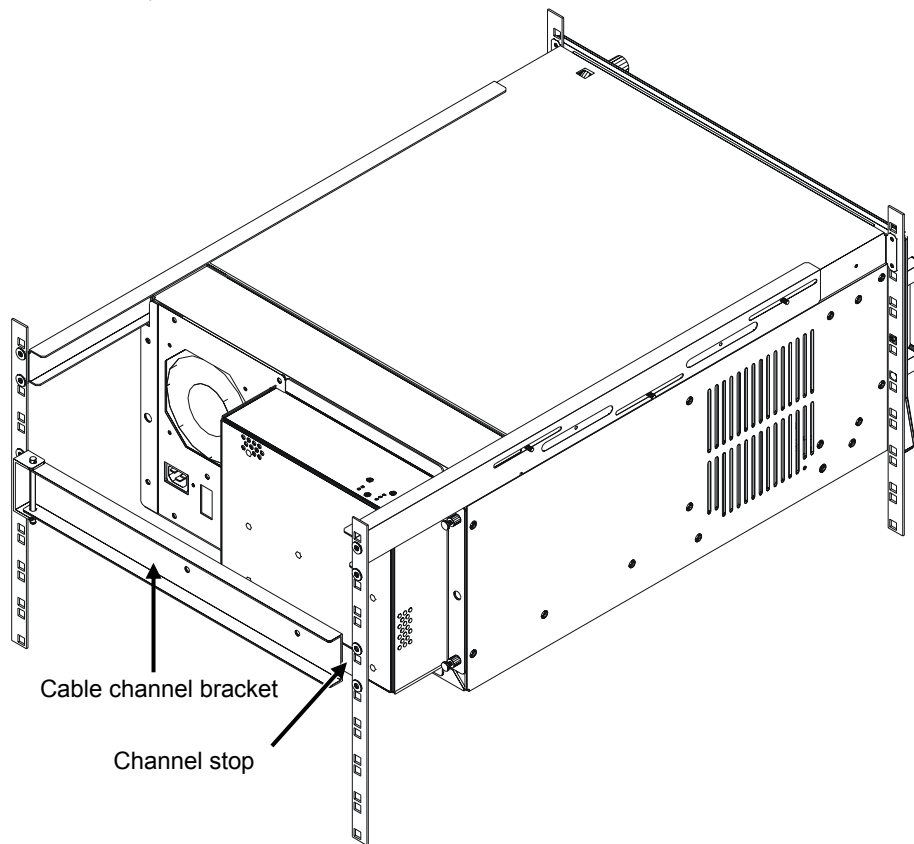
This completes the rack-mount Scalar 218FC installation process. Return to the *Preparing the Library* section in *Chapter 2: Getting Started*.

Appendix
E

Glossary

This Appendix …

❒ contains terms and definitions of common expressions used with the
   Scalar Library and the DLT drive.

Address	See *SCSI Addressing*.
Arbitrated Loop	See *Fibre Channel — Arbitrated Loop*.
AL_PA	Arbitrated Loop Protocol Address.
Area	The second byte of the N_Port Identifier.
Baud	The encoded bit rate per second.
Bus	A means of transferring data between modules and adapters or between an adapter and SCSI devices. For a SCSI bus definition, see *SCSI Bus*.
Cartridge	A storage medium item. A cartridge is sometimes called a tape or cassette and is capable of storing vast amounts of magnetically written data. The DLT drives in the Scalar Library uses DLTtape IV cartridges.
Channel	A general term for a path on which electronic signals travel.
Cleaning cartridge	Media used to clean the drive heads and tape path.
Clusters	Two or more computers sharing the same resources on a communication link.
Device	See *FC Device or SCSI Device*.
Diagnostics	A menu name. Accessed through the Configuration Program, it is used to select and test the fibre channel subsystem of the Scalar 218FC hardware.
	A menu name. Accessed through the Off-Line Mode menu, it is used to manually test the robotics subsystem of the Scalar 218FC hardware.
Differential	An electrical signal configuration using a pair of lines for transfer. The advantage of differential compared to single-ended is a relative high tolerance for common-mode noise and little crosstalk when used with twisted pair cables.
DLT	DLT™ (Digital Linear Tape) is the industry-standard data interchange recording format that supports the use of DLT for computer applications.
DLT media cartridge	Media used with the DLT tape drive in the Scalar Library unit. It is a 4-inch cartridge containing either 1100 or 1800 feet of ½-inch metal-particle tape. These cartridges require no formatting or other media conditioning before use.
DLT drive	Tape drive used in the Scalar 218FC.
Domain	The most significant byte in the N_Port Identifier for the FC device. It is not used in the FC-SCSI hardware path ID. It is required to be the same for all SCSI targets logically connected to a FC adapter.

Enclosure	The box, rack, or set of boxes containing one or more SCSI devices. It may provide the powering, cooling, mechanical support and external electronic interfaces for those devices.
Exchange	The basic mechanism used for managing an operation. An exchange identifies information transfers consisting of one or more related nonconcurrent sequences that may flow in the same or opposite directions, but always in half-duplex mode. An exchange may span multiple Class 1 dedicated connections. An OX_ID and an RX_ID identify an exchange.
Fabric	A FC term describing a crosspoint switched topology, which is one of the three existing FC topologies. Fabric elements interconnect various N_Ports and are responsible for frame routing.
Fast/Wide SCSI	"Fast" and "Wide" are relative terms in comparing previous SCSI standards and products. "Fast," as defined in SCSI-2, refers to a maximum synchronous transfer rate of 10 MHz. "Wide" refers to a 16-bit or 32-bit data path.
Fault LED	During power up and reboot, the Fault LED comes on. If this LED remains on or comes on, the FCR100 has a problem with one of its components. During normal operation, this LED should be off.
FC Admin	A menu name. It is used to reset the FC adapter and gracefully terminate all inputs/ outputs pending for this adapter.
FC-AL	See *Fibre Channel - Arbitrated Loop*.
FC adapter	A printed circuit assembly that translates data between the host processor's internal bus and the FC link. Also *Host Bus Adapter*.
FCC	Federal Communications Commission
FC Device	A device that uses Fibre Channel.
FC Port	An opening at the back of the FCR100 that provides connection between the FC adapter and the FC link.
Fiber	The fiber optic cable made from thin strands of glass through which data in the form of light pulses is transmitted (LASER, LED). It is used for high-speed transmission over medium to long distances.
Fibre	A generic FC term used to cover all transmission media types specified in the Fibre Channel Physical Layer standard (FC-PH), such as optical fiber, copper twisted pair, and copper coaxial cable.

Fibre Channel (FC)	Logically, Fibre Channel is a bi-directional, full-duplex, point-to-point, serial data channel structured for high performance capability. Physically, the Fibre Channel is an interconnection of multiple communication ports, called N_Ports, interconnected by a switching network, called a fabric, a point-to-point link, or an arbitrated loop. Fibre Channel is a generalized transport mechanism that has no protocol of its own or native input/output command set, but can transport any existing Upper Level Protocols (ULPs) such as SCSI and IPI. Fibre Channel operates at speeds of 100 Mbytes/sec (full speed), 50 Mbytes/sec (half speed), 25 Mbytes/sec (quarter speed) or 12.5 Mbytes/sec (eighth speed), over distances of up to 100 m over copper media or up to 10 km over optical links.
Fibre Channel - Arbitrated Loop (FC-AL)	One of three existing Fibre Channel topologies, in which 2 to 126 devices are interconnected serially in a single loop circuit. The arbitrated loop topology supports all classes of service and guarantees in order delivery of frames when the source and destination are on the same loop.
Fibre Channel Protocol for SCSI (FCP)	FCP defines a Fibre Channel mapping layer (FC-4) that uses FC-PH services to transmit SCSI command, data, and status information between a SCSI initiator and a SCSI target. Using FCP enables transmission and receipt of SCSI commands, data and status, across the Fibre Channel using the standard Fibre Channel frame and sequence formats.
Frame	The smallest, indivisible unit of information transfer used by FC-2. Frames are used for transferring data associated with a sequence. Frame size depends on the hardware implementation and is independent of the ULP or the application software. Frames begin with a 4-byte Start of Frame (SOF), end with a 4-byte End of Frame (EOF), include a 24-byte frame header and a 4-byte Cyclic Redundancy Checker (CRC), and can carry a variable data payload from 0 to 2112 bytes, the first 64 of which can be used for optional headers.
Gigabit Link Module (GLM)	A physical component that manages the functions of the FC-0 layer, which is the physical characteristics of the media and interface, including drivers, transceivers, connectors, and cables. Also referred to as a Physical Link Module (PLM).
Hardware Path	See *FC-SCSI Hardware Path ID*.
Host Bus Adapter	See *FC adapter*.
HSM	Hierarchical Storage Management – a system where different types of storage medium are used based on cost and time efficiency. For example, for fastest access, data is usually stored on a local drive. If you have a very large file that is needed occasionally, you may store it on a tape in the Scalar 218FC, or on an optical drive. In an HSM system, the data source should be transparent to the user.
Initiator	A SCSI device (usually a host system) that requests an operation to be performed by another SCSI device known as the target (e.g., a SCSI disk or tape drive).
LCD	Liquid Crystal Display, a commonly used alphanumeric display that responds to specified input voltages and signals

LED	Light Emitting Diode, a commonly used semiconductor device that glows when supplied with a specified voltage.
Link	For Fibre Channel, it is a connection between two nodes, each having at least one N_Port, interconnected by a pair of optical or copper links, one inbound and one outbound.
load	The process where the Scalar Library uses the Media Picker to pick a cartridge from either a cartridge storage slot location, or from the Virtual Mailbox slot and load it into a drive.
Long Wave	Lasers or LEDs that emit light with wave lengths around 1300 nm. Long wave lasers are used for long Fibre Channel links, from ~700 to 2000 m. They are typically used with single-mode fiber of a 9-micron core size.
Loop Address	The unique ID of a node in Fibre Channel loop topology sometimes referred to as a Loop ID. Also a status type in the FC Status Menu, showing the Loop Address of the FC-SCSI MUX.
Loop Port (L_Port)	A N_Port or F_Port that supports arbitrated loop functions associated with arbitrated loop topology.
LUN	Logical Unit Number or Logical Unit; a subdivision of a SCSI target. For SCSI-2, each SCSI target supports up to eight LUNs (LUN-0 to LUN-7). Using LUNs, the host can address multiple peripheral devices that may share a common controller.
POST	Power-On Self-Test is a built-in self-test for the DLT drive. POST automatically occurs each time the Scalar Library powers up.
N_Port	A "Node" port. A FC-defined hardware entity that performs data communication over the FC link. It is identifiable by a unique Worldwide Name. It can act as an originator or a responder.
N_Port Identifier	A unique address identifier by which a N_Port is uniquely known. It consists of a Domain (most significant byte), an Area, and a Port, each 1 byte long. The N_Port identifier is used in the Source Identifier (S_ID) and Destination Identifier (D_ID) fields of a FC frame.
Node Name	A field value under the FC Status Menu. The unique identifier, a 64-bit value, the factory assigns to the FCR100. For more detailed information, see N_Port or N_Port Identifier.
Originator	The Fibre Channel N_Port responsible for starting an exchange. A FC originator is comparable to a SCSI initiator.
Point-to-Point	One of three existing FC topologies, in which two ports are directly connected by a link with no fabric, loop, or switching elements present. The FCR100 supports only loop topology.
Responder	The logical function in a N_Port responsible for supporting the exchange initiated by the originator in another N_Port. A FC responder is comparable to a SCSI target. The FCR100 is often the responder.
RMA	Return Merchandise Authorization.

RMA number	An identifying number given to a customer who needs to return equipment for repair, whether under warranty or not.
SCSI	Small Computer System Interface. An industry standard for connecting peripheral devices and their controllers to a microprocessor. The SCSI defines both hardware and software standards for communication between a host computer and a peripheral.
SCSI Adapter	A 16-bit fast/wide differential or 8-bit narrow single-ended physical connection between the FCR100 and the SCSI devices. Each SCSI adapter supports up to sixteen (for fast/ wide) or eight (for narrow) SCSI devices, including itself.
SCSI Admin	A menu name used to reset the SCSI bus or take the SCSI bus offline.
SCSI ID	A fast/wide SCSI adapter supports up to 16 devices, including itself. Each device has its own unique SCSI ID. The SCSI ID of a device dictates the device's priority when arbitrating for the SCSI bus. SCSI ID "7" has the highest priority. The next highest priority ID is "6" followed by 5, 4, 3, 2, 1, 0, 15, 14, 13, 12, 11, 10, 9, 8, with "8" being the lowest priority ID. The fast/wide SCSI adapter is factory set to ID 7. A narrow SCSI adapter supports up to eight devices, including itself. SCSI ID "7" has the highest priority followed by 6, 5, 4, 3, 2, 1, and 0.
SCSI bus	Signal path or line shared by the devices on the same SCSI channel. Information is often sent to all devices throughout the same bus; only the device to which it is addressed will accept it.
SCSI Device	A single unit on the SCSI bus, identifiable by a unique SCSI ID. A SCSI device can act as an initiator or target. For SCSI-2, each SCSI device supports up to eight LUNs.
SCSI Port	An opening at the back of the FCR100 providing connection between the SCSI adapter and the SCSI bus.
Short Wave	Lasers or LEDs that emit light with wavelengths around 780 nm or 850 nm. Short wave lasers are used for FC links up to ~700 m. They are typically used with multimode fibre. The preferred fibre core size is 50 micron as this fibre has large bandwidth so that the distance is limited by the fibre attenuation. A 62.5-micron core size is also supported for compatibility with existing FDDI installations. Fibre of this type has smaller bandwidth and, in this case, the distance is limited by the fibre bandwidth.
Single-Ended	An electrical signal configuration using a single line for each signal referenced to a ground path common to the other signal lines. The advantage of single-ended configuration compared to differential is in using less circuitry and PCA area. Its disadvantage is higher vulnerability to common mode noise and limited cable distance.
slot	A slot is the place within the cartridge storage area where the media is placed. Each slot has a reference position, i.e. position 1 through position 18.
SNMP	Simple Network Management Protocol.

Target	A SCSI device (usually the peripheral) that responds to an operation requested by a SCSI initiator (usually the host system). SCSI peripherals are targets, but for some commands (for example, a COPY command), the peripheral may need to act temporarily as an initiator.
terminator	An electrical connection at each end of the SCSI bus composed of a set of resistors (or possibly other components). Its function is to provide a pull-up for open collector drivers on the bus, and also impedance matching to prevent signal reflections at the ends of the cable. The SCSI bus requires termination at both ends of the bus. One end of the SCSI bus is terminated by the adapter's internal termination. The other end should have a terminator placed on the 68-pin high density SCSI connector on the last SCSI peripheral. If this device is not terminated, data errors may occur.
Topology	The physical or logical layout of nodes on a network. FC topologies include point-to-point, FC-AL, and Fabric. The FCR100 supports FC-AL topology.
	A status type in the FC Status Menu showing the type of FC topology being used.
unload	The process where the Scalar Library causes a drive to eject a cartridge, then uses the Media Picker to move the cartridge to a storage slot location.
View Node Name	A status type in the FC Status Menu showing the identification of the node.
View Port Name	A status type in the FC Status Menu showing the identification of the port.

Appendix
F

Specifications

This Appendix …

❐   contains specification information on the Scalar Library and the DLT drive.

Drive:

Type:	Quantum® model DLT7000
	Quantum® model DLT8000
Data Capacity:	Up to 80 GB per 1800 ft cartridge (DLT8000)
(avg. 2:1 compression)	Up to 1.44 TeraBytes – Scalar 218FC (with 18 cartridge slots full)
Data Transfer Rate:	24.0 MB/sec. sustained (1.44 GB/min., 2 DLT8000 drives)
(avg. 2:1 compression)	

Library:

Media type:	DLT ½-inch, metal-particle cartridges
Cartridge Change:	8 seconds
Indicators/Controls:	8 key (4 menu keys, 4 direction keys) keypad with LCD display, to monitor and control system status, diagnostics and configuration
Interface:	Single-ended, Fast-Wide SCSI-2, Serial

Reliability:

Maintenance:	Use cleaning cartridge whenever **Use Cleaning Tape** message is announced on a drive front panel.
MSBF:	Greater than 1,000,000 cartridge changes (net, drive and media) with scheduled maintenance.
MTBF:	More than 80,000 power-on hours
MTTR:	Within 30 minutes

Physical:

Dimensions:	19.0" (w) x 27.6" (d) x 11.0" (h)
Weight:	60 lb. (w/2 drives)
Shipping Weight:	85 lb. (w/2 drives)

Power Consumption:

Less than 350 Watts

Environment:

Electrical:	100-240 Vac, 476-63 Hz, 1.25 A max
Temperature:	10° C to 40° C (Operating)
	-40° C to 70° C (Storage/Shipping)
Humidity:	5% to 80% RH, non-condensing (Operating)
	90% maximum (Storage/Shipping)
Vibration:	0.3 g peak, 5-500 Hz, swept sine; 0.0002 g (sq.)/Hz, 5-350 Hz (Operating)
	0.01 g continuos, 0.50 g peak (Storage/Shipping)
Shock:	3 g for 15 ms, ½ sine (Operating)
	20 g peak 3 ms ½ sine (Storage/Shipping)

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