

ELEGANCY
ELA-1400
Hardware
User's Guide

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Manual Reversion :	1.0
Release Date :	DEC. 2001

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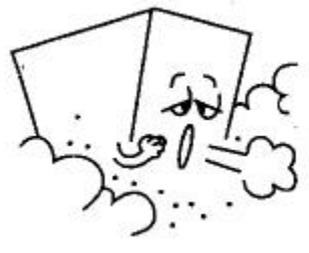
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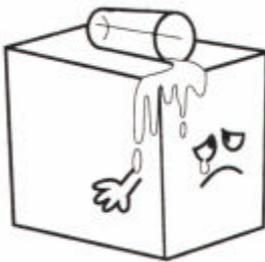
General Safety Guidelines



DO NOT place the ELA-1400 on uneven or unstable work surfaces. Seek servicing if the casing has been damaged.



DO NOT expose ELA-1400 to dirty or dusty environments.



DO NOT expose ELA-1400 to liquids, rain, or moisture.



DO NOT expose ELA-1400 to magnetic field.



DO NOT expose ELA-1400 to extreme temperatures (below 5°C or above 45°C) or to direct sunlight.

About your User's Guide

Welcome to your ELA-1400 Storage System User's Guide. This manual covers everything you need to know in learning how to connect and configure your system on an assumption that you know the basic concepts of FC-AL storage technology. For the detail information on the configuration and use of the RAID controller, please refer to the 'Generic Operation Manual'.

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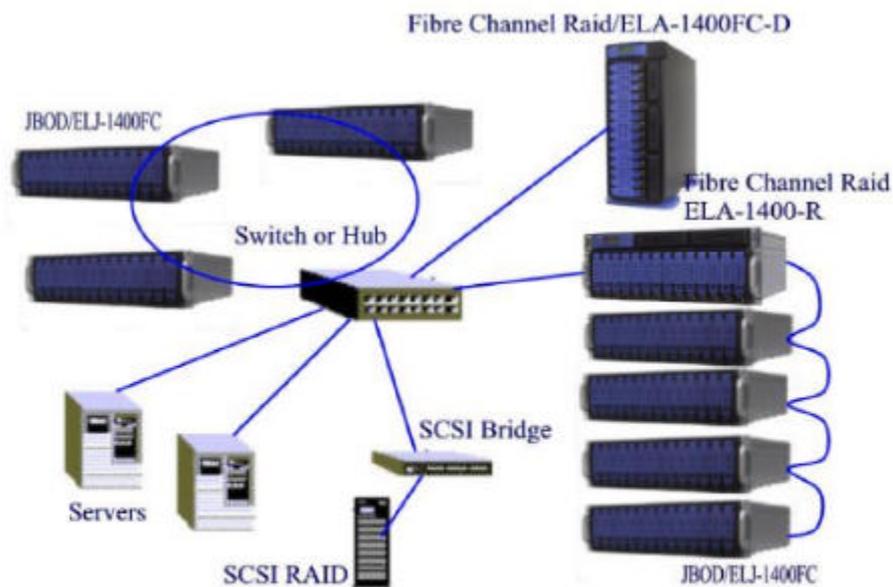
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CHAPTER 1. INTRODUCTION

1.1 INTRODUCTION

Thank you for purchasing the ELA-1400-FC. ELA-1400-FC is an innovative Fibre Channel RAID subsystem. Design with no single point of failure, high performance, modular and scalable designs, as features that you found in the ELJ-1400FC JOB. ELA-1400FC RAID subsystem inherit all the ELJ-1400FC JBOD advanced features, in addition it comes with active/active Fibre Channel RAID controller “ELC-1400FC” for the best in fault tolerance and performance. ELC-1400FC is the performance champion among all RAID controllers. Powered by a high performance 64-bit RISC PowerPC CPU and RAID ASICs, I/Os are rapidly processed and distributed to array hard drives. Data is transferred between host and drives through a high-speed 64-bit data path at a burst rate of 533MB/sec. The result is a controller which excels in applications that require high sustained data rates and I/O turnaround. ELC-1400FC can be flexible configured with single or optional redundant controllers to meet your various IT requirements.



Elegancy EL-1400 Fibre to Fibre SAN Ready Solutions

1.2 FEATURE HIGHLIGHT

The Elegancy ELA-1400 is designed to meet today's demand for higher storage solutions to cope with the emerging needs of databases, e-mail, web servers and imaging systems. It provides a maximum data protection and exceptional performance in a storage subsystem. The ELA-1400 is equip with easy integration, smooth data expansion and server migration.

The ELA-1400 supports the following features:

- Raid Controller with 64-bit PowerPC RISC microprocessor, Host/drive 64-bit data path at a burst rate of 533 MB/sec.
- Selectable RAID levels 0, 1 (0+1), 3, 5, 10, 30, 50Dynamic RAID expansion capability (by adding drives, or by copying and replacing drives)Dynamic load balancing for FC loop ports A & B
- SAN mapping support
- Redundant FC loop support
- FC Loop IDs aliases
- SAN Functions:
LUN Filtering, DMEP for Global File System, Disaster Tolerance-Remote Redundant Controller & Remote Mirroring (in development), SAN Backup-Remote Replication & Local Snapshot Backup (in development), Redundant Loop Balancing
- Supports Concurrent I/O and Tagged Command Queuing, bad sector reassignment
- 32MB to 1GB maximum cache size on one SDRAM DIMM with ECC support
- Intelligent read-ahead/write-back cache option
- RS-232C terminal interface to set controller features, RAID configuration, and direct Modem connection for remote management
- Powerful and user-friendly RAIDWatch™ manager for any platform that supports Java 2.0 or higher
- Up to 8 logical drives with different RAID levels; up to 32 LUN's per Loop ID (multiple ID per Loop are supported)
- Flash Memory for easy Firmware upgrading
- Active-active redundancy capability with synchronized write-back cache feature
- Optional battery back-up module for data cache memory
- Text RAID Manager for MS-DOS, Windows 95/98, Windows NT (for x86 and DEC Alpha platforms), NetWare, OS/2, SCO OpenServer, SCO UnixWare, Sun Solaris, and Linux
- Simple Enclosure Management Service (SEMS) via I²C environmental monitoring of temperature, fan, UPS, and power supply status
- Push-button interface and LCD front panel allows a full access to all RAID

configurations and monitoring

- Controller CPU temperature monitoring, controller voltage monitoring and self-Diagnostics
- Failed Drive Rebuilding: Hot Spare with automatic background rebuild; Hot-Swap and on-line background rebuild
- Fibre Channel-Arbitrated Loop Interface, up to 1Gb/sec.
- Supports up to 14 hot swappable 1-inch half-height disk drivers per shelf.
- 4 U, 19" standard Rackmount system.
- Cables and Passive backplane design.
- Redundant 2+1 power supplies system with PFC (Power Factor Correction) function.
- Redundant and Hot Swap cooling Fans.
- Auto-sensing FC-AL bypass circuitry.
- Aluminium device cartridge for heat dissipation and emissions protection.
- Expandable system, up to 1 of ELA-1400 + 7 of ELJ-1400 JBOD enclosures for very high capacity configuration.

CHAPTER 2. GETTING STARTED

2.1 UNPACKING & CHECKING THE EQUIPMENT

Before unpacking the ELA-1400, prepare a clean, stable surface to put on the contents of your ELA-1400 shipping container . Altogether, you should find the following items in the package :



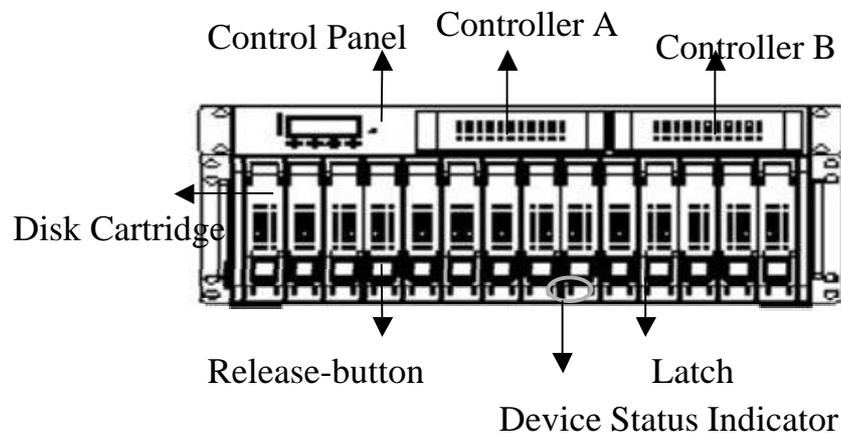
Remove all the items from the container. If anything is missing or broken, please inform your dealer. It is advice to keep the packaging, as you might ever need to ship your ELA-1400 or send it in for service, you will need the shipping container.

2.2 IDENTIFYING PARTS OF THE ELEGANCY

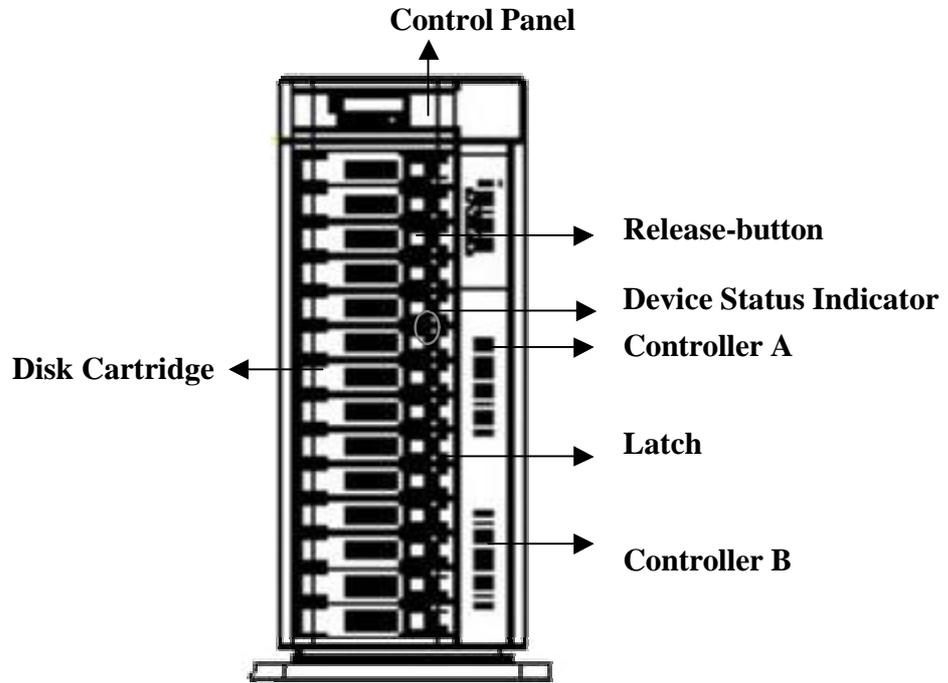
The illustrations below identify the various features of the system . Get yourself to familiar with these terms as it will help you in further reading the sections.

2.2.1 Front View

ELA-1400-FC-R

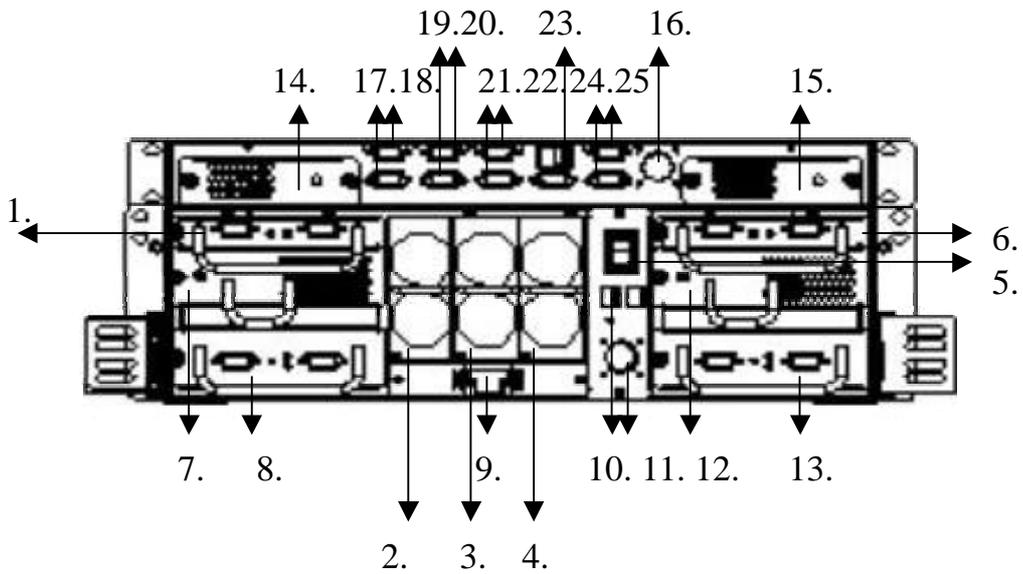


ELA-1400-FC-D

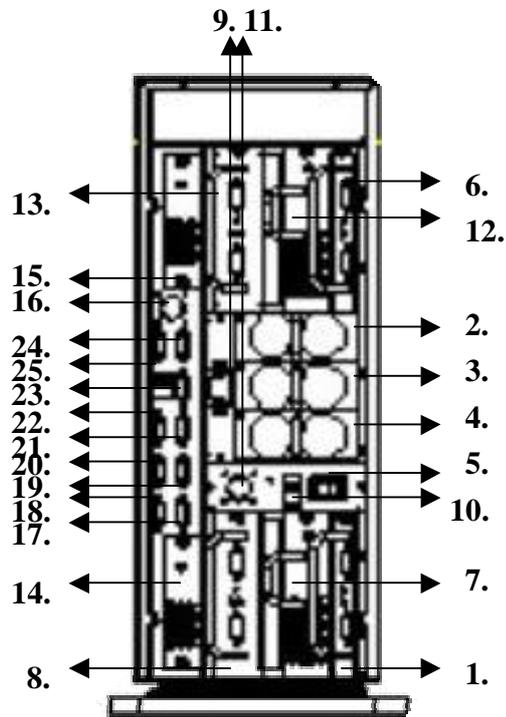


2.2.2 REAR VIEW

ELA-1400FC-R



ELA-1400-FC-D

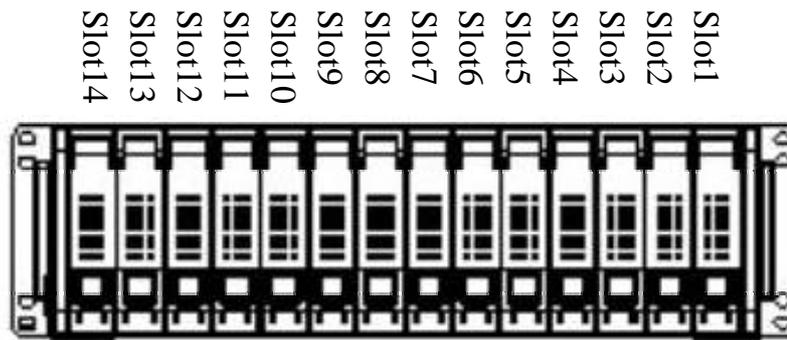


1. Fibre Channel Interface Module A.
2. Power Module 1.
3. Power Module 2.
4. Power Module 3.
5. Power Switch
6. Fibre Channel Interface Module B.
7. Blower A.
8. SES Module or I 2C module
9. Power Inlet
10. Fibre ID setting switch
11. DC Power Extended Connector (Output)
12. Blower B.
13. Secondary SES monitoring Module.
14. Brower A for controller box.
15. Brower B for controller box.
16. DC Power Extended Connector (Input)
17. Fibre Channel 0
18. Fibre Channel 1
19. Fibre Channel 2
20. Fibre Channel 3
21. Fibre Channel 4 (Option)

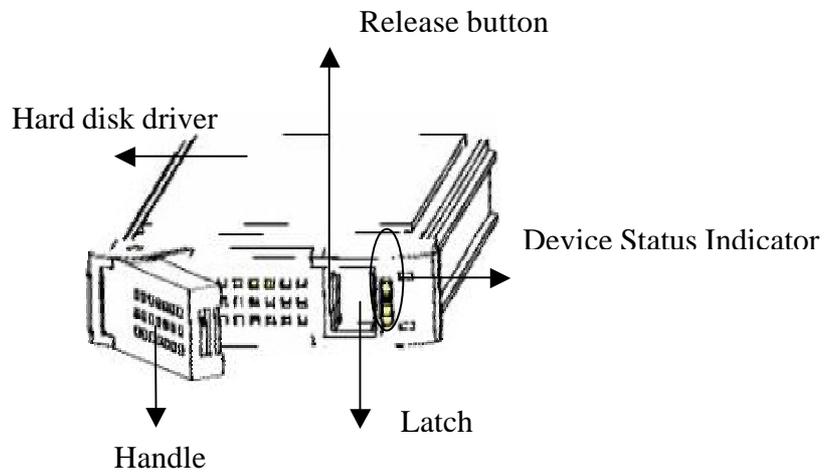
- 22. Fibre Channel 5 (Option)
- 23. I2C Connector
- 24. Serial Port COM2
- 25. Serial Port COM1

2.2.3 Drive Cartridge

The Elegancy ELA-1400 includes 14 hot swappable disk cartridges. The following section describes how to install disks into ELA-1400 subsystem.



Location of devices in ELA-1400



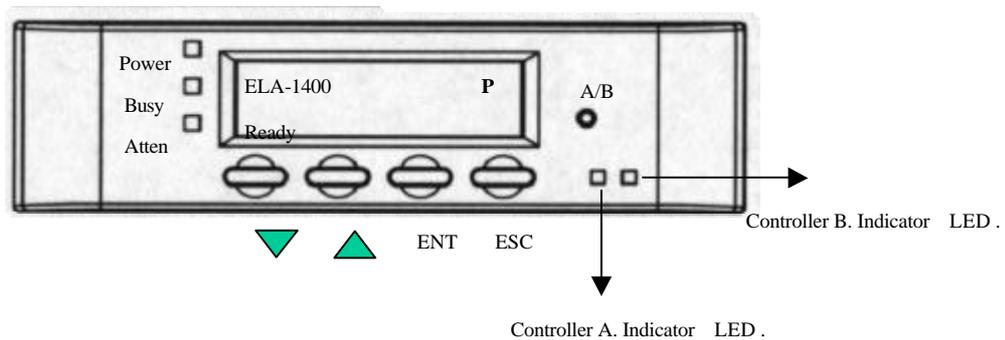
Latch

LOCK	
UNLOCK	

Device Status Indicator

LED	Colors	Indicate
	Green	HDD On Line
	Green & Flash	HDD Access
	Red	HDD Error

2.2.4 LCD Panel



The LCD panel is installed to the front of ELA-1400. It provides a keypad interface for controller configuration and a LCD screen for message display. The controller is designed for active-active redundancy. In redundant mode, all configuration data is mirrored between controller units. You can use the “A/B switch bottom” to interchange the LCD panel in between the two controllers, the LED indicator of selected controller shown light as green for selected controller. Each controller’s operating status is indicated by the flashing digit on the upper right of the LCD screen as “P” or “S,” primary or secondary respectively. Once come on-line, the controller automatically resolves the primary-secondary relation between the two units.

Front Panel Key Descriptions:

POWER	Lighted LED indicates that power is on.
BUSY	Unlit indicates no activity. Blinking indicates data is being accessed. Lighted LED indicates unprocessed cached data is still in the memory.
ATTEN	Lights when an error message appears or service is required, e.g., when a drive fails and needs to be replaced.
A	Lighted LED Indicates the LCD panel is

	connected to Controller A.
B	Lighted LED Indicates the LCD panel is connected to Controller B.
▼ ▲ Buttons	Scroll through available options.
ENT button	Choose or execute an option.
ESC button	Return to previous menu or cancel the selection.
A/B Switch button	Interchange the LCD panel in between Controller A and Controller B.
2 x 16 LCD	Displays throughput during normal operation, Displays message for configuration and management.

CHARPER 3. HARDWARE INSTALLATION

This chapter covers all the information for the installation and configuration of ELA-1400FC

3.1 Power requirements

The ELA-1400FC nominal input voltages of 115 VAC or 230 VAC. It's designed to work with single-phase power systems that have a grounded conductor. Contact a qualified electrician or facilities manager if you are not sure what type of power is supplied to your building.

WARNING: Do not use household extension cords with the system or related equipment. Household extension cord do have the same current ratings or overload protection, and are not meant for use with computer equipment.

3.2 Steps For The Hardware Installation

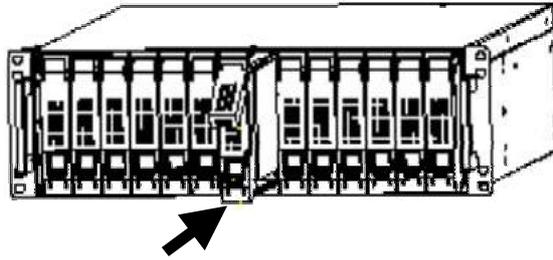
1. Install the Hard disks
2. Cable connecting and FC ID setting.
3. Install the controller software utilities or RAIDWatch manager. If you want to use RAIDWatch to start the configuration, establish either through in-band-Fibre or RS-232. you may choose to start configuring your RAID using front panel keypad or terminal emulation without additional configurations.
4. Configure and initialize your RAID.

3.2.1 Installing The Disk

1. Insert HDD into the cartridge.
2. Fasten the screws to mount the drive in the disk cartridge. Make sure the drive is properly tightened

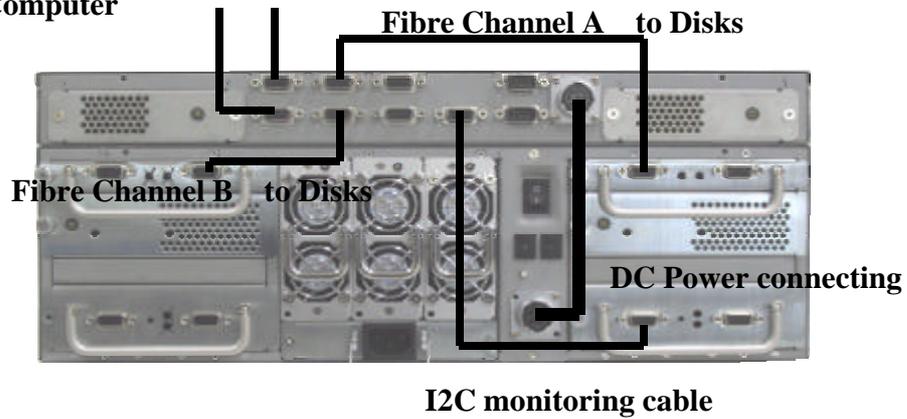
3.2.2 Installing The Disk Cartridge

1. Make sure the handle is up and the latch is on the position of unlock .
2. Gently slide the disk cartridge to the end of the slot then firmly push until the face plate of the disk cartridge is flush with the front panel of the ELA-1400.
3. Push down the handle to secure the disk cartridge into the ELA-1400
NOTE: If the ELA-1400 is powered up, the disk LED will turn from red to green to indicate that power has been applied to the disk drawer.
4. Slide the latch to the position of lock.

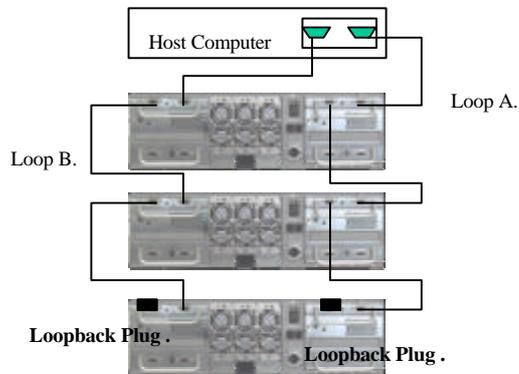


3.2.3 Cabling

Fibre Channel A & B to Host Computer

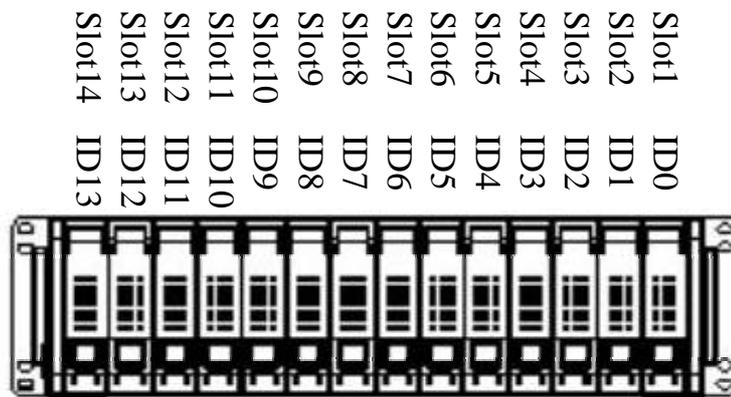


The Fibre channel Interface module at the rear panel provide the connectivity between the host computer and disk drives by a DB9 connector on a Fibre channel cable. Each and every ELA-1400 install 2 Fibre channel Interface module as the standard, representing that there is a full redundancy and hot swappable for the Fibre channel Loop. In a daisy chain configuration, up to 8 of ELA-1400 can be connected on the loop.

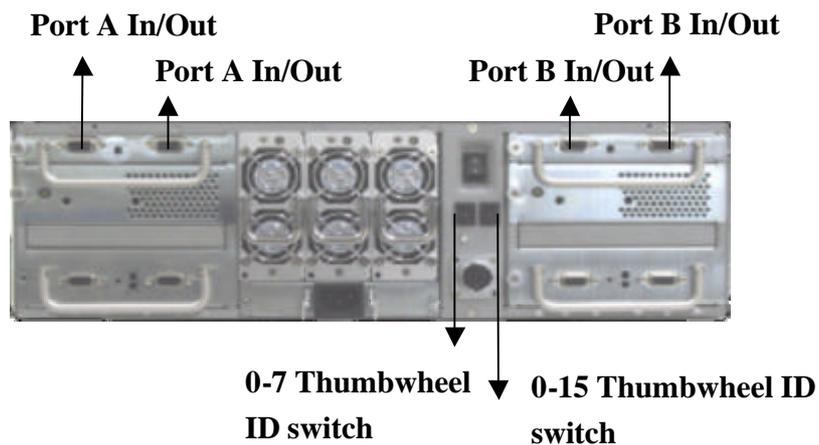


3.2.4 Setting Fibre ID

There are two thumbwheel switches located on the rear panel. These switches set the drive IDs within the enclosure. 0-7 thumbwheel switch, control the drive ID addresses which is multiplied by 16, the 0-15 thumb wheel switch is using to set the offset to the 0-7 thumb wheel switch. The Slot 0 starting address is set by both switches. The default setting for both switches is “0”. Following show the slot numbering sequence and the default ID setting.



Slot number and default ID mapping.



Rear View of ELA-1400-FC

		0-15 Thumbwheel ID switch															
0-7 Thumbwheel ID Switch		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
	3	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
	4	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
	5	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	6	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
7	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	0	

Drive ID address Switch Setting (Slot 0 Starting)

3.3 Connecting RS-232C Terminal Emulation

The controller can be configured via a PC running a VT-100 terminal emulation program, or a VT-100 compatible terminal. Use the provided serial cable to connect either COM 1 or COM2 header to the ELA-1400-FC. The pin layout of the 9-pin D-Sub male connectors is similar to that of a PC's serial port and is set as a DTE device. Both COM1 and COM2 can be used for accessing firmware-embedded manager and for the connection to a dial-out modem. However, only COM1 can be used for downloading firmware.

3.3.1 Guidelines On Using The Serial Port:

- The serial port's default is set at 38400 baud, 8 bit, 1 stop bit and no parity.
- In most cases, connecting RD, TD and SG are enough to establish the communication with a terminal.
- If you are using a PC as a terminal, any of the VT-100 terminal emulation software will suffice. Microsoft® Windows includes a terminal emulation program with the "HyperTerminal" icon in the Accessories menu.
- On the Hyper Terminal of Windows 2000, arrow keys may not work properly. The following key combinations can be used instead.

Ctrl-J	=	Down arrow
Ctrl-K	=	Up arrow
Ctrl-H	=	Left arrow
Ctrl-L	=	Right arrow

Thebaud rate can be changed using the front panel. To change the baud rate :

Operation	LCD screen display
Press ENT for two seconds to enter the Main Menu. Press ▼ or ▲ to select "View and Edit Configuration Parameters," then press ENT .	View and Edit Config Parm's ↑
Select "Communication Parameters," and then press ENT .	Communication Parameters ..
Select "RS-232C Configuration," then press ENT .	RS-232C Configuration ..
Select "COM1 Configuration," and then press ENT .	COM1 Configuration ..
If the baud rate appears as "38400" press ESC .	Baud-rate 38400 ..
If there is a need to change to the baud rate, press ▼ or ▲ to select the baud rate, then press ENT for 2 seconds to confirm the selected baud rate.	Baud-rate 38400 Change to xxxxx?

The following baud rates are available: 2400, 4800, 9600, 19200, and 38400. Baud rate settings on the controller and terminal must be identical.

3.4 In-band Connection

3.4.1 What Is It and Why Do You Need It?

External devices require communication with the host computer for device monitoring and administration. This is usually done through RS-232C ports. ELA-1400-FC offers an alternate means of communication for its RAID controllers—In-band Fibre. However, the host computer can "see" the controller only when certain number of drives are assembled into logical units and mapped to host ID/LUNs. The other way to communicate is to set the controller as a peripheral device.

3.4.2 How does It Work with the Fibre Cable?

In-band Fibre technology translates the original commands into standard SCSI

commands. These SCSI commands are then received by the RAID controller. It can be used to communicate between host and controller. The configuration utility can thus administrate the controller without additional communicational interfaces. (Note: It is assumed that users of In-band Fibre possess the following: a third-party Fibre adapter and a channel on their RAID controller that can be designated as a host channel). Both of these are required for In-band Fibre communications between the host and the RAID controller.

3.4.3 How do You Configure the Controller to Use In-band Fibre?

RAID Controller Adjustments

Use the front panel to configure the In-band Fibre settings.

From the Main Menu, press ▼ or ▲ to select "View and Edit Configuration Parameters. "	View and Edit Config Params
Press [ENT]; and then use the ▼ or ▲ keys to select "Host-side FC Parameters." Then press [ENT].	Host-side FC Parameters ..

You will need to make adjustments in the following four submenu's: "Peripheral Device Type," "Peripheral Device Qualifier," "Device Support for Removable Media," and "LUN Application." Refer to the table below to find the proper settings for your host operating system.

Peripheral Device Type Parameters Reference for Various Operating Systems:

Operating System	Peripheral Device Type	Peripheral Device Qualifier	Device Support for Removable Media	LUN Applicability
Windows NT® 4.0	0x1f	connected	Disabled	All Undefined LUNs
NetWare® 4.x/5.x/ Windows2000	0x03	connected	Disabled	All Undefined LUNs
SCO OpenServer 5.0x	0x7f	connected	either is okay	All Undefined LUNs
SCO UnixWare 2.1x, UnixWare 7	0x03	connected	either is okay	All Undefined LUNs
Solaris 2.5.x/ 2.6 (x86 and SPARC)	0x7f	connected	either is okay	All Undefined LUNs
Linux	0x03	connected	Enabled	All Undefined LUNs

Cross References for the Meaning of Peripheral Device Type

Device Type	Setting
No Device Present	0x7f
Direct-access Device	0
Sequential-access Device	1
Processor Type	3
CD-ROM Device	5
Scanner Device	6
MO Device	7
Storage Array Controller Device	0xC
Unknown Device	0x1f

3.4.5 Example: Settings for Windows NT 4.0

The settings for Windows NT 4.0 are provided here as an example. For the settings for other operating systems, please refer to the table above, *Peripheral Device Type Parameters Reference for Various Operating Systems*.

On the front panel, use ▼ or ▲ to select "Peripheral Device Type Parameters"; and then press [ENT]."	Periph Dev Type Parameters
(For this example, we assume that there are currently no peripheral devices.)	Device Type – No Device (0x7f)
Press ▼ or ▲ to choose "Unknown Device - 1f".	Set Device Type? Unknown (0x1f)
Press [ENT] to confirm the selection. Use the arrow keys to scroll down to Device Qualifier., press ▼ or ▲ to select "Device Qualifier Connected. "	Device Qualifier Connected
The default setting is "Connected." If your Front Panel reads "Disconnected," press [ENT] and you will be prompted to change to "Connected". If your Device Qualifier setting reads "Connected," press [ESC] to return to the Host-side SCSI	

submenu's.	
Use the ▼ or ▲ to select Support for Removable Media. The default setting is "Disabled." If the LCD reads "Enabled," press [ENT] and you will be prompted to accept a change. If the screen reads "Disabled," press [ESC] to return to the Host-side SCSI submenu's.	Support Removable Media - Disabled
Press ▼ or ▲ to select "LUN Application"; and then press [ENT]. The default setting is "All Undefine LUN."	LUN Application- All Undefine LUN
Press [ENT] and use ▼ or ▲ to select "Undefine LUN-0's."	Applies to ? Undefine LUN-0's
Press [ENT] to accept. The screen should display the following message.	LUN Application- Undefine LUN-0's

The RAID controller adjustments necessary to use In-band Fibre have been completed.

3.5 Using TextRAID Manager

Connection—Using RS-232C

To configure your RAID through TextRAID Manager, use RS-232 or the existing host bus connection to connect your host computer to the controller. Download the program from Infortrend's FTP site and execute the program - Raidman.exe. The program is located under the directory "3102." The initial screen will prompt. Change the COM port number to where you have connected the RS-232C serial



and also set the baud rate identical to the baud rate setting of your controller. In-band connection can also be used for a better connection speed. You may refer to the *Generic Operation Manual* for details on the proceeding configurations.

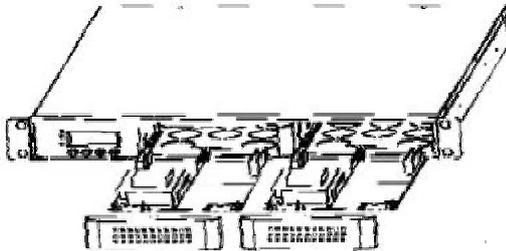
When finished with configuring the COM port and baud rate, press [ESC] to proceed.



Chapter 4. DUAL REDUNDANT CONTROLLER MODE

4.1 Overview

The ELA-1400-FC is a hot-swappable, and single or dual redundant solution based on the 64-bit Infortrend EonRAID controller architecture. The 1U height controller box can support up to two independent controllers and provides controller hot-swap capability for both. Each controller can be easily inserted and removed via two docking connectors without signal glitches. Single controller failure is totally transparent to host and the restoration of the original configuration requires only the minimum effort.



In the past, integrating two independent controllers into the redundant mode meant complex cabling, configuration difficulties, and the risk of bus failure. Cabling between the two controllers usually includes host and drive I/O paths, controller communications channel for write-back cache synchronization, and the failover/failback connection. With these connections interfaced through a controller backplane, system integrators need only to connect host(s) and drives. No additional cabling between the two controllers is required.

Solutions:

ELA-1400-FC	Redundant 4 Fibre channels
ELA-1400-FC + Option daughter board	Redundant 6 Fibre channels

4.1.1 Automatic Redundant Controller Configuration:

Default settings are altered appropriately to reflect the redundant configuration. When controllers are installed, they will come online with settings that allow for normal operation in a redundant controller context. If these default settings do not fit with the external configuration (e.g. host versus drive channels), they can be modified manually.

4.1.2 Manual Redundant Controller Configuration:

Users may choose to configure the ELA-1400-FC manually. The configuration procedure is very similar to that of configuring two independent

controllers into the redundant mode.

Before two controllers can work as a redundant pair active-actively, configure each controller separately. Configure each controller by removing one of the two controllers from the main chassis. When both controllers are ready for redundant operation, install both into the main chassis. The two controllers will start the negotiation between and come online in the redundant configuration.

Follow the steps listed below to configure your dual redundant controller.

- A. Power down the ELA-1400-FC.
- B. Set different IDs to your drives and install them into the drive bays of your ELA-1400-FC. Please refer to Chapter 2. Installation to get more detail information on Fibre ID setting.
- C. Connect the host channel of your ELA-1400-FC to the host computer or ports on a Fibre hub or a Fibre switch. The controller can auto-detect the WWN number of host HBA for using the LUN Filtering function. You may also check the WWN number that is printed on your HBA card or reboot the host system to check HBA BIOS.

The WWN number will be necessary when assigning LUN Filtering entries. The LUN filtering configuration decides if a SAN server is allowed the access to your RAID. Different servers in a SAN environment can be included or excluded from the access route.

Each controller in this configuration has a default unique ID. If this ID is missing, you will be prompted to enter a unique controller identifier during the configuration process. The unique identifier you enter will be generated into a device-unique node name. The controller FC ports will all appear with this node name.

- D. Remove one of the controllers from the main chassis and start to configure the remaining controller.
- E. Create logical drives, logical volumes, or logical partitions and assign logical units to either the primary or the secondary controller. Map logical units to either the primary or the secondary controller ID on different host channels. Set drive channel primary controller ID as 119

and secondary controller ID as 120.

- F. Enable the "redundant controller" function from "View and Edit Peripheral Devices/Set Peripheral Device Entry" and set the controller as the primary controller.
- G. Power down and then remove the controller you have configured from the main chassis, then insert the other controller. Enable the "redundant controller" function from "View and Edit Peripheral Devices"/"Set Peripheral Device Entry" and set the controller also as the primary controller. Set drive channel primary controller ID as 119 and secondary controller ID as 120.
- H. Remove the controller from the main chassis, and then install both controllers into the main chassis. Power on both controllers. Firmware will decide which is the primary and which is the secondary controller.
- I. After the controller negotiation process is completed and the host is rebooted, the host should be able to access the storage capacity in RAID. You may also refer to the *Generic Operation Manual* for more details on redundant controller configuration.

4.1.3 Supported Fibre Topologies:

Point-to-Point Topology: direct server-to-storage connection.

- FC-AL, Private Loop Topology: a Fibre Hub is required.
- FC-AL, Public Loop Topology:
An arbitrated loop using Hub with a port connected to switched fabric.
- Fabric Topology: Switched Fabric

The host-storage connection should be properly defined via firmware setting. The controller default is FC-AL, which is appropriate for most Fibre channel applications.

4.1.4 ELA-1400-FC's Channel Bus

Each of the controllers in ELA-1400-FC is installed with an expansion daughterboard. The IFT-9282FA adds another two channels and expands the number of Fibre channels to 6. SCSI channels 6 and 7 are used as the

communication paths. Fibre channel 0 to 5 can be used for host and drive. The defaults for host are 0 and 1. By-pass circuits are implemented to maintain loop integrity.

The controller backplane integrates all signal paths and the communications between controllers. Logical units can be assigned either to the primary or to the secondary controller via firmware configuration. The result is the divided workload. In the event that one of the controllers fails, the other will take over within seconds. The process is transparent to host regardless of the surviving controller's original configuration.

4.2 Redundant Controller Operation:

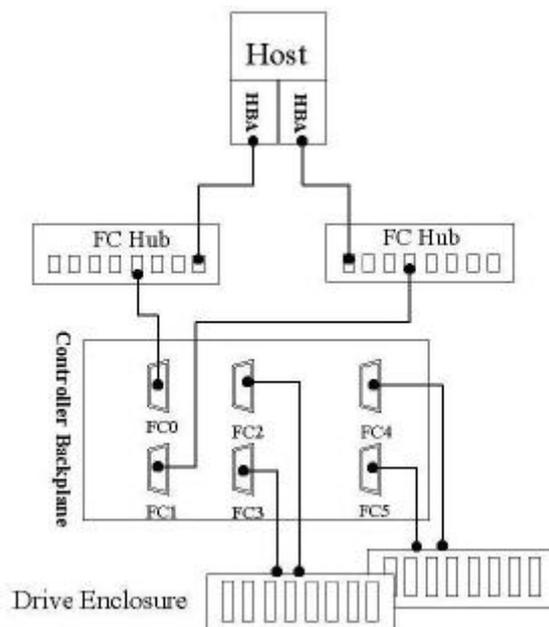
4.2.1 Requirements:

Requirements for redundant controller operation:

- Both controllers must have the same memory size.
- Both controllers should be installed with an independent battery module for data security with cached write operation.
- Active-to-active redundant mode requires two host adapters, each constituted as a dedicated data path for one controller.

4.2.2 Sample Configuration: ELA-1400-FC

The diagram below depicts the configuration of ELA-1400-FC with a single host. With host software support, host channels can be configured into redundant paths to ensure data availability.



Host ID/LUN mapping decides the distribution of I/O traffic between host and drive. Listed below are tasks to be performed for configuring an active-active redundant system:

- A. Create logical units from independent disk drives and assign these logical units to different controllers. This is done by assigning logical units to the primary or secondary IDs on host channels. Note that there is one active ID on each host channel.
- B. Before logical unit assignment, designate host channel IDs as primary or secondary. The logical units mapped to a primary ID will be managed by the primary controller, and vice versa.
- C. Channel path redundancy is already implemented with controller backplane. Simply connect a cable to host channel's DB-9 female connector on the backplane. Every Fibre port runs through the controller backplane to the same host channel on both controllers.
- D. Mapping different logical units to the primary or the secondary controller IDs can distribute the workload between controllers. As shown in the diagram above, a host channel is a dedicated data path managed by the specified controller. If channel 0 has been configured with a primary ID and channel 1 a secondary ID, both controllers can actively share the workload. You may manually change the operation mode of each channel to activate up to 5 host channels.
- E. The "primary ID" on channel 0 (chip) of a controller will be inherited by channel 0 of its pair controller if the controller should fail. Since only one loop ID is supported on each host channel, set secondary ID to "NA" on channel 0 and primary ID to "NA" on channel 1.
- F. There is no external SCSI connectors on the dual redundant chassis and no need to modify its parameters.

The controller failover and failback operation is transparent to the host. Should one controller fail, the other will serve the I/Os originally destined to the failed one by bringing the "standby" channel to an active status. The once "standby" connection will become the "active" I/O channel. Cached writes will be completed for the cache data has already been synchronized between the two controllers.

The diagram can be viewed as a miniature of SAN environment for there is little limitation on the Fibre channel extension using FC-AL or switched fabric topologies. It shows a server and a disk array combination. The configuration provides performance and data path redundancy for the RAID controllers. The diagrammed configuration has the following benefits:

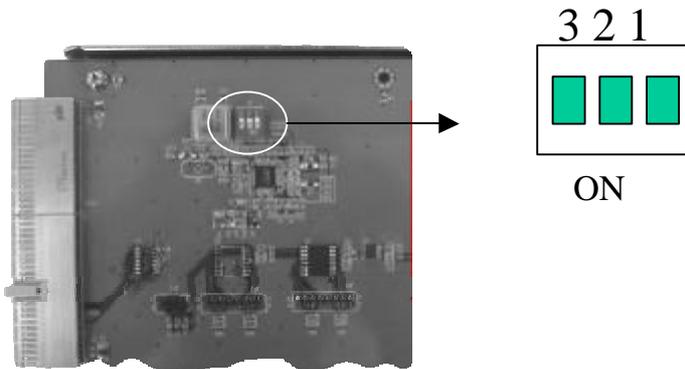
1. The host accesses the array via two independent Fibre loops, each occupying a host channel. Accordingly, two host bus adapters should be used on the host platform. Separating the host access enables the host to perform at a broader bandwidth with the redundant I/O paths. Software support is necessary to direct I/O traffic from one adapter to another if any of the data paths should fail.
2. Drives are configured in dual-loop configurations. Each dual-loop is comprised of two Fibre channels. As shown in the diagram, channel 2 and 3 are configured in a drive-side dual loop, channel 4 and 5 another. Each dual loop can sustain a single loop failure.
3. Dual-loop connection guarantees loop integrity should one of the two loops fail. During normal operation, the controller automatically balances the traffic load between members of a dual-loop. Each dual-loop configuration operates with a 200MB/sec bandwidth.

Chapter 5. Environment Monitoring

The ELA-1400 supports two type of monitoring module, one is the SES monitoring module, another is I2C module, this chapter covers all the information require for both modules :

5.1 I2C monitoring module :

The I2C monitoring module is an interface that enables the communications between the ELA-1400 and the RAID controller. It utilizes the I2C as the physical interface, and proprietary software protocols for Inter-communication. If there is more than one JBOD enclosures that are daisy chained together, then use the I2C DB9 connector to daisy chained all I2C modules to provide the monitoring of all enclosures in one. To avoid a I2C ID conflict occurs, every enclosure must set as a different ID numbers.



Switch 1	Switch 2	Switch 3	ID Number
OFF	OFF	OFF	0
ON	OFF	OFF	1
OFF	ON	OFF	2
ON	ON	OFF	3
OFF	OFF	ON	4
ON	OFF	ON	5
OFF	ON	ON	6
ON	ON	ON	7

5.2 SES Monitoring Module

N/A

CHAPTER 6. HOT SWAP COMPONENTS

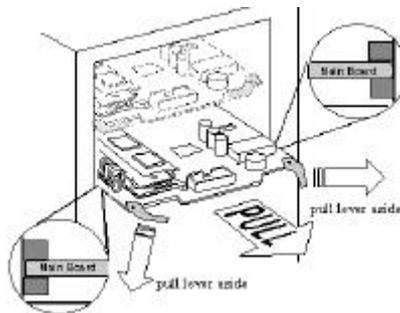
The ELA-1400-FC supports the hot-swappable controller, disk cartridges, power supply modules and cooling fan unit. The following sections describe how to use the hot swap feature.

6.1 Hot Swapping the RAID controller

Replacement controllers are provided as the adequate combinations of controllers and daughterboards. A replacement running newer release of firmware (ver. 3.21 and above) can shift I/Os temporarily with the existing controller and complete the upgrade without user's intervention.

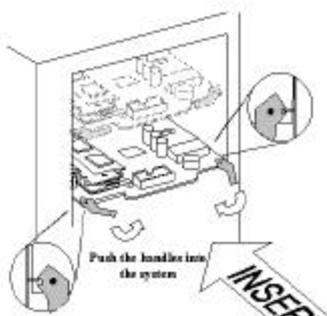
Removing and Installing Controllers

1. To prevent damage to components caused by ESD, it is recommended that an anti-static wristband be worn.
2. To remove the front panel. Pull the “eject levers” located in the front of the controller on both sides, to the side. Make sure to pull each lever outwards as far as it will go.



To install a controller board in the main chassis, do the following:

1. Appropriate anti-ESD methods should be applied.



2. Gently slide the main board into the main chassis. Make sure the controller main board reaches the end of the chassis and is inserted properly into the metal grooves on each side of the chassis.
3. Push the eject levers toward the center, moving them inward as shown above. Also make sure the square-shaped notches on the eject levers lock onto the edge of the metal groove.
4. Install the front panel module back to its original position by pushing it gently into the front opening of the controller chassis.

6.2 Hot Swapping the Disk Drive

To hot swap a disk, perform the following steps (Refer to “Installing the disk”).

1. Slide the latch to the position of unlock.
2. Open the cartridge handle by sliding the release button and wait for the drive to spin down.
3. Lift the handle to disengage the disk cartridge from the slot.
4. Gently pull the disk cartridge out of the slot.
5. Replace the HDD.
6. Holding the cartridge handle, insert the cartridge into the bay along the plastic guides until the handle begins to close.
7. Push down the handle to secure the cartridge into the ELEGANCYsystem.
8. Slide the latch to the position of lock.

The drive is now replaced. Once the drive has powered on, it will be added to the RAID configuration automatically.

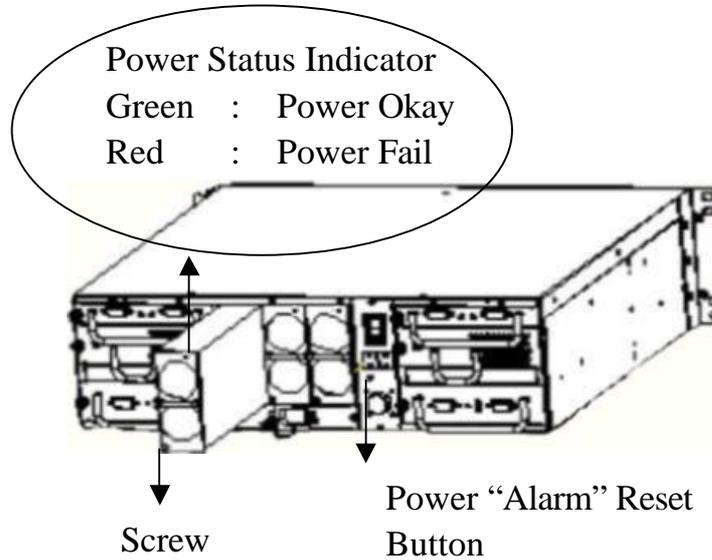
6.4 Hot Swapping the Power Supply

Once the power supply has defective, the LED on front panel will turn from green to Red and the power supply buzzer will sound.

To hot swap a power supply module perform the following steps.

1. Push the reset button to stop the audible alarm on the rear panel.
2. Unscrew the defective power module unit.
3. Pull the handle to disengage the module from the power supply base.
4. Slide the module out completely from the power supply base.
5. Insert the new power supply module.
NOTE: Use the handle to slide the module in to the base until it engages to the base.

6. The LED will turn bright green to indicate it has powered on.

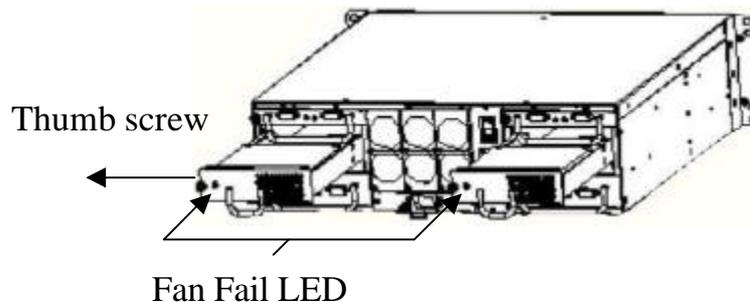


6.4 Hot Swapping The Cooling Fan Module

Once the system cooling fans module has defective, the LCD on front panel will display "Fail Fan" and audible alarm will be sound.

To hot swap a system cooling fan module perform the following steps.

1. Release the thumb screws on the fan module, the Fan fail LED on the module should be turn bright red.
2. Slide the module out completely from the cooling Fan module base.
3. Replace with a new Fan module and insert it into the cooling fan module base.
4. The error message on LCD will be turn to normal and the audible alarm will be stopped automatically after above processes.
5. Fasten the thumb screws.



APPENDIX A. SPECIFICATION

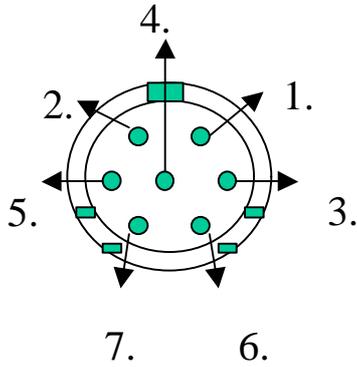
Specifications

	 ELA-1400FC-D	 ELA-1400FC-R	 ELA-1400FC	 ELC-1400FC
RAID Controller		Same	no	Same
RAID Level	0, 1, 0+1, 3, 5, 10, 30, 50, NRAID, JBOD			
Catch Memory	Up to 1GB maximum cache size on single SDRAM DIMM socket with ECC support per controller board			
LUN Support	Multiple host support and host-LUN mapping for multiple server environments, up to 8 logical drives of variable RAID levels			
Online Raid expansion	Online RAID expansion, add drive or replace drives with drive of larger capacity			
Redundant controller	Support optional active/active redundant dual controllers			
Fault Detection, Monitor and Recovery	Auto rebuilding, background rebuilding, hot spare drive operation, disk hot swapping, memory parity check			
Host Interface	Up to two Fibre Channel interfaces, 100MB/s each, 200MB/s total Media Interface Adapter (MIA) support	Same	Same	Same
Disk Drive Interface	Dual, independent Fibre Channel Interfaces, 100MB/s each. With optional daughter board support up to four Fibre Channel interface.	Same	Dual, independent Fibre Channel Interfaces, 100MB/s each.	Same
Number of FCAL Disk drive	40Pin SCA-2 HDD x 14 bays, 1" HDD supported	Same	Same	No
Monitoring System	I2C interface (default)	Same	Same	Same
	SES (SCSI Enclosure services) Compliant enclosure Monitoring (optional)	Same	Same	No
Cooling System	2 x Blower Module	Same	Same	Same
Power System	2+1 Power Module, 600w+300w (3 bays) Input: 90~230 VAC; 50~60HZ Output: +5V 60A, +12V 30A	Same	Same	Power supply from ELA-1400FC
Redundant and Hot Swappable parts	Disk Drives, Cooling Modules, Up to two FCAL loop modules, Power Supply modules, Raid Controllers	Same	Disk Drives, Cooling Modules, Up to two FCAL loop modules, Power Supply modules.	Cooling Modules, Raid Controllers
Failure Notification	Fault LED indicators Audible alarms Monitoring system notification	Same	Same	Same
Dimensions	Height: 133.35mm(3U) Width: 446mm Depth: 500mm	H x W xD 527x241x483 (unit: mm)	H x W x D 133x445x483 (unit:mm)	H x W x D 44x445x483 (unit:mm)
Operating Environment	Temperature: 5j C~ 40j C Relative Humidity: 10% ~ 90% (none condensing)	Same	Same	Same

*Specification subject to change without notice, all trademarks or registered trademarks are properties of their respective owners.

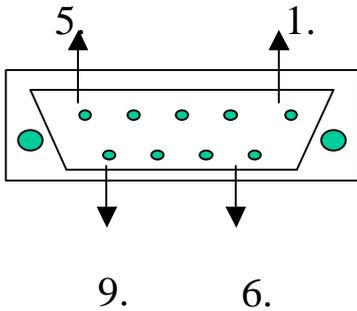
APPENDIX B. CONNECTORS

DC Power Connector.



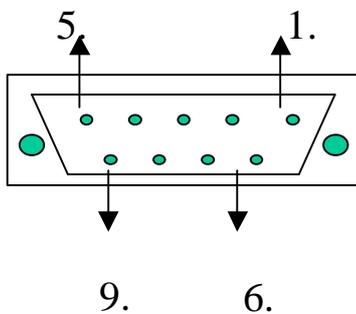
Pin#	Signal	Pin#	Signal
1	+5V	6	GND.
2	+5V	7	GND
3	GND		
4	+12V		.
5	GND		

I2C Connector



Pin#	Signal	Pin#	Signal
1	I2CCLK	6	N.C.
2	VCC	7	GND
3	N.C.	8	GND
4	N.C.	9	N,C.
5	I2C DATA		

Fibre Channel



Pin#	Signal	Pin#	Signal
1	TX+	6	TX-
2	VCC	7	GND
3	N.C.	8	GND
4	N.C.	9	RX-
5	RX+		

APPENDIX B. HARDWARE TROUBLESHOOTING

We provide a list of the common problems you may encounter during or after hardware installation.

<u>PROBLEM</u>	<u>CHECK</u>
LCD is off	<ol style="list-style-type: none"> 1. Check the DC Power Extended cable. 2. Check the AC Inlet and Power Cord. 3. Is power within specifications 4. Requires a minimum of 32 MB SDRAM DIMM installed; and the same size of memory installed to both controllers in the redundant configuration.
Fibre channel failure detected upon start-up (Fibrecables connected) Message on LCD	<ol style="list-style-type: none"> 1. Check ID settings 2. Check the Fibre cabling
Fibre CHLs fail	
Initialization failure	<ol style="list-style-type: none"> 1. Check ID addressing and cable connection. 2. In redundant mode, this may be caused by incompatible hardware versions. Make sure both are using compatible hardware. 3. Check hardware installation of all major components, i.e., if DIMM is properly seated. 4. In a system newly installed with a replacement controller, make sure the replacement is pre-configured as a “secondary” controller.
Cannot detect drive	<ol style="list-style-type: none"> 1. Check if device is properly installed in enclosure. 2. Check drive bus cabling. 3. Check ID settings.

Host cannot detect ELA-1400-FC	<ol style="list-style-type: none"> 1. Check host cable connections. 2. Check Fibre port to LUN assignment. 2. Check logical drive mapping to LUN's. 3. If management software is to be used when there is no logical units mapped to host ID/LUN, host parameters should be properly tuned for the host to see the controller.
Parity error detected	Reseat or replace the SDRAM module if necessary.
Logical drive failure detected during boot-up	Check controller installation and the connection to drives (use the "View and Edit SCSI Drives" function to help locate the problem).
System is not stable after running for a period of time.	<ol style="list-style-type: none"> 1. Fibre signal quality and cable length must be within the range of specifications. Possible noises should be avoided with further investigation. 2. Power supply voltage must be within specification. 3. Check the enclosure's inner temperature.
The RS-232C Terminal Interface does not work.	<ol style="list-style-type: none"> 1. Check RS-232C cable connections. 2. Check if the Baud Rate settings on both ends identical. 3. Enable Terminal Emulation through firmware configuration via LCD panel: "View and Edit Configuration Parameters," → "Communication Parameters," → "RS-232 Port Configuration," → "COM1 Configuration," → "Terminal Emulation Enabled." 4. Data Routing Direct to Port.
When choosing "Configure Modem Port", the screen is full of "Comm Buffer Overflow".	"Terminal Emulation" should be enabled after all modem configurations are completed.

<p>The logical drive states “INVALID”</p>	<ol style="list-style-type: none"> 1. Once the optimization mode is selected, the same mode will be applied to all logical drives and that changing the optimization mode is not allowed unless data is moved to a backup system and logical drives rebuilt. 2. “Optimization for ... I/O”, when creating the logical drive in "Cache Parameter," is different from the current setting. 3. Change “Optimization for ...I/O” to the opposite setting and reset the controller.
<p>All settings are too complex to remember.</p>	<ol style="list-style-type: none"> 1. After system installation is completed, write down all the settings and related information in Chapter 10 of your “Generic Operation Manual” for future reference. 2. Use the "Save NVRAM" function to save your configuration profile to a file or a logical drive.
<p>Upon replacing the failed controller with a new one during Redundant controller connection, nothing appears on the LCD of the new controller.</p>	<ol style="list-style-type: none"> 1. Make sure the new controller is set as “redundant controller enabled” and as a “secondary controller” before connecting to the active controller. 2. The new controller should come in exactly the same configuration as the active controller. 3. Refer to “Chapter 12 Redundant Controller” in your “<i>Generic Operation Manual</i>” for more details.
<p>Having trouble when spinning up multiple drives connected to the controller using the same power supply. Spinning up all drives all at one causes problem.</p>	<p>There are options with spin-up sequence in firmware. Please your firmware manual or access the firmware function “View and Edit Configuration Parameters”/Drive-side Parameters”/”SCSI Motor Spin up” via terminal emulation or LCD control.</p>
<p>Error: Check</p>	<p>Check to see if a DIMM module is properly seated.</p>

ER2000 v3.21	This is a normal message if no logical drive has been created or no logical drive has been mapped to a host channel ID/LUN.
ER2000 v3.21	This is a normal message when a logical drive has been created and mapped to a host channel ID/LUN.
[Other error messages]	Please refer to the "Appendix D" of your <i>Generic Operation Manual</i> or contact your vendor for assistance with any other error messages.