RAID AND STORAGE PRODUCTS

OEM REFERENCE MANUAL

EMBEDDED CONFIGURATION UTILITY USER'S GUIDE

Part Number 775107-00, Rev. B
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ABOUT THIS MANUAL

The *Embedded Configuration Utility User's Guide* provides operational instructions and reference information for using the disk array configuration utility. The disk array configuration utility is embedded in the firmware that provides the operation instruction for a Mylex controller in a disk array system. This user's guide is designed for the experienced system administrator or computer technician who is familiar with the principles and conventions of Small Computer System Interface (SCSI), Fibre Channel Interface, and Redundant Array of Independent Disks (RAID) technology.

This user's guide supports the following Mylex controllers:

- FF—Fibre Channel to Fibre Channel RAID Controller
- FFx—Fibre Channel to Fibre Channel RAID Controllers
- FF2—Fibre Channel to Fibre Channel RAID Controller

This user's guide supports firmware versions 7.7 and greater.

Beginning with firmware version 7.0, the LCD interface is no longer supported. The LCD is a status-only display. Keypad support provided in previous firmware releases is no longer functional.

This user's guide consists of the following chapters:

Chapter 1, "Introduction and Quick Start," provides an overview of the embedded configuration utility interface navigation and associated menus. This chapter also contains brief roadmaps of commonly used procedures and troubleshooting guides.

Chapter 2, "Setting Up a New Configuration," provides an overview of configuration capabilities and limitations. This chapter provides step-by-step instructions for creating, saving, and initializing a configuration.

Chapter 3, "Array Management and Configuration Editing" provides an overview of the administration and management features available through the embedded configuration utility. This chapter provides step-by-step instructions for managing the array configuration, making changes to the configuration, and monitoring the array status.

Appendix A, "Messages and Error Codes," lists and defines error messages and error codes that can be displayed when running the embedded configuration utility.

Appendix B, "Controller, Logical Device, and Physical Device Parameters," provides detailed descriptions of the controller, logical device and physical device parameters.

Appendix C, "Configuring for VT100 Terminal-Emulation Mode," explains how to connect a VT100 compatible terminal or PC operating in an equivalent terminal-emulation mode to run the embedded configuration utility.

Appendix D, "Glossary," lists and defines terms used in this guide.

RELATED DOCUMENTATION

The following documents are available from Mylex and provide additional information.

Global Array Manager Installation Guide and User Manual, PN 771961

OEM System Reference Manual, PN 771992

Firmware/Software Interface Reference Manual, PN 775067

Encyclopedia of Controller Fundamentals and Features, PN 775041

CONVENTIONS

Throughout this manual, the following conventions are used to describe user action with the embedded configuration utility.

For entering key strokes:

<Ctrl>	Press the key indicated using the keyboard.
Enter	Press the key labeled **Enter**.
Esc	Press the key labeled Esc or ESC.

The following indicate additional useful information or of situations where special care is required:

NOTE: Text marked as a Note indicates parenthetical information that may be helpful.

ATTENTION: Text marked as Attention indicates the possibility of damage to a program, device, system, or data.

CONTENTS

CHAPTER 1
Introduction and Navigation

Overview

After the hardware for a disk array has been set up, the array must be configured before it can be used for data storage. Also, when the disk array is operating, it must be managed to ensure it is running correctly and data integrity is being maintained. A disk array can be configured and managed through one of the following:

- Embedded configuration utility, running as part of the firmware that oversees the operation of a Mylex controller in a disk array system.
- Global Array Manager (GAM) software running on a PC. (Refer to the *Global Array Manager Client Software Installation Guide and User Manual*, PN 771961.)

This user's guide provides operational instructions and reference information for using the embedded configuration utility. Several methods can be employed to access the embedded configuration utility. These methods include serial access across an RS-232 interface and in-band access across a Fibre Channel interface. VT100 terminal-emulation is frequently used for serial access. (Refer to Appendix C, "Configuring for VT100 Terminal-Emulation Mode," for information on how to set up VT100 terminal emulation.)

This chapter provides a user with step-by-step instructions for accessing and navigating the embedded configuration utility. At the end of the chapter are a commonly used procedures and an outline of the steps necessary to perform each.

LCD Front Panel Support

Beginning with firmware version 7.0, LCD Front Panel functionality is limited to status-only display. The keypad support provided in previous firmware releases is no longer functional. The status messages are similar to those displayed on the embedded configuration utility menus. (Appendix A, "Messages and Error Codes," provides a list of status messages and message definitions.)

Using the Embedded Configuration Utility

NOTE: Although the embedded configuration utility provides safety prompts that alert you when you are about to take an action that can affect data or drive status, this interface is meant to be used only by persons with appropriate training and responsibility for the system. This book is written for an audience that possesses a working knowledge of SCSI, Fibre Channel, serial communications, and RAID technologies.

Making changes to an existing configuration requires caution and planning – the embedded configuration utility cannot prevent the user from reconfiguring and initializing disk areas where data reside. For best results, have on hand a written plan that identifies the system resources and the logical drive configuration you intend to create or modify.

Use the embedded configuration utility to:

- Configure, save, and initialize arrays
- Administer, manage, and monitor arrays

Configure, Save, and Initialize Arrays

The primary purpose of the embedded configuration utility is to create logical devices, addressable by the operating system, from an array of physical disk drives. The Mylex controller serves as the interface between the operating system and the logical devices.

Using the embedded configuration utility, you can define the size of logical devices, assign RAID levels, and define customized LUN (Logical Unit Number) mapping schemes. Controller Parameters enable you to change settings as needed for your configuration.

After you create the logical devices, you save the configuration to the physical disk drives on the array. The saving process writes configuration information to each physical disk drive and controller in the configuration. This is called configuration on disk (COD). The configuration information is retrieved from the physical disk drives if you replace a controller.

Initializing the new configuration clears all data currently on the devices and synchronizes the parity and mirror information, making the logical devices readable. Failure to initialize logical devices results in a parity error.

The embedded configuration utility does not provide for automatic configuration. The user is responsible for determining all configuration parameters for newly created arrays.

Administer, Manage, and Monitor Arrays

After configuring and initializing an array, continue to use the embedded configuration utility to manage the array when system or hardware malfunctions occur that can put stored data at risk. The embedded configuration utility provides the tools to change device states, and to rebuild (reconstruct) data on a replacement drive. If you experience a power loss resulting in possible data corruption, use the embedded configuration utility after power restoration to perform a consistency check. The consistency check can locate and correct, if necessary, any data errors on the drives.

The embedded configuration utility displays error or status messages showing the current status of the logical devices, physical drives, and controllers.

Again, the embedded configuration utility does not provide for automatic operation of many of these features. The user is responsible for determining the parameters for managing and changing arrays.

Commonly Used Keys and Command Options

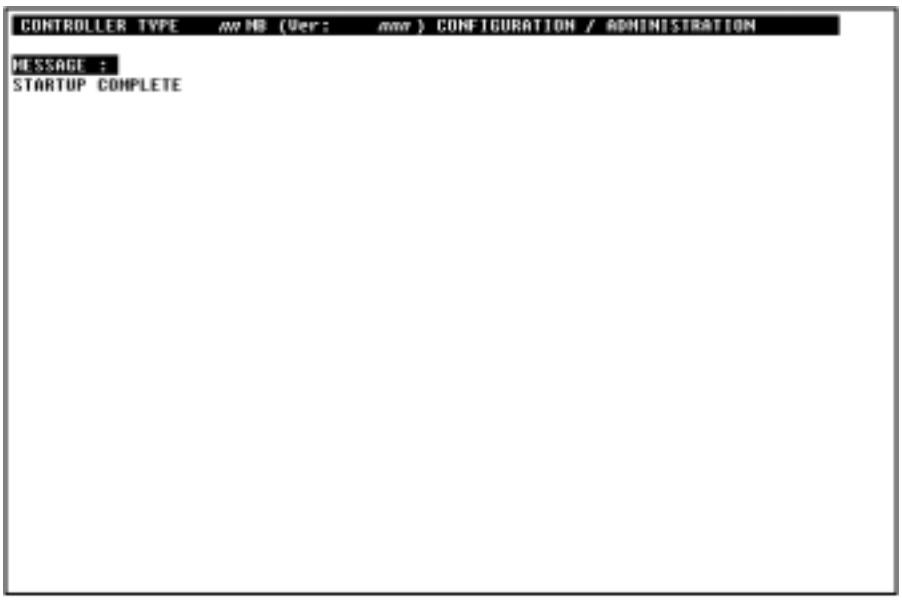
The embedded configuration utility uses the following keys and command options for several procedures:

- **Esc** – Enables the user to go back to a previous menu or exit the current procedure.
- **Enter** – Runs the selected functions.
- **Number and Letter Keys** – Used to enter a value or to select an option as prompted on the menu.

Navigating the Embedded Configuration Utility Screens

Starting the User Interface

After the controller is powered on, the `STARTUP COMPLETE` message is shown on the terminal or the LCD. The terminal monitor shows the status messages in the line below the **`MESSAGE:`** prompt.



Startup Complete Screen

Any status message shown in this line remains on the menu until one of the following occurs:

- Controller operations generate a new status message in its place.
- You issue a *Break* command to start the Main Menu screen. (The command to start the Main Menu depends on the tool you use to access the embedded configuration utility. For example, when using a VT100 terminal emulator, type **<@>** (the ASCII equivalent is 0x40 or <**Shift+2**> on keyboards configured for North America).
- You press **Esc**, causing the controller to exit the utility.

Start the embedded configuration utility by issuing the *Break* command. The embedded configuration utility shows the following screen (Main Menu screen).

Main Menu Screen

Respond to the prompts to select the desired menu.

Typing the number associated with a menu item in the OPTIONS: list (such as **1**) causes the number to appear next to the ENTER PARAMETER: prompt.

Pressing **Enter** activates the selected function.

When a menu item is selected, its number appears next to the OPTIONS: prompt to verify its selection.

Pressing the **Esc** key enables you to go back to a previous menu at nearly any point in the menus.

Menu Screen Structure

Table 1-1 provides a quick-reference guide to the embedded configuration utility menu screen structure. This table also provides reference pages for locating the description of each menu item.

Table 1-1. Controller Menu Screen Locator

Main Menu Selection	Submenu Title
"Configure, Check Drive States" on page 2-7	"View Current Configuration" on page 3-2
	"Create New Disk Packs" on page 2-10
	"Clear Configuration" on page 2-8
	"Show Drives, Change Drive State" on page 3-9
	"Search for Physical Devices" on page 3-15
	"Add Logical Drive to Existing Physical Device Packs" on page 3-15
"SANmapping™" on page 2-23	
"Controller Parameters" on page 2-1	"Get Controller Information" on page 3-21
	"Get Logical Device Information" on page 3-25
	"Get Physical Device Information" on page 3-27
	"Get and Set Controller Parameters" on page 2-4
	"Get and Set Logical Device Parameters" on page 3-31
	"Get and Set Physical Device Parameters" on page 3-34
	"Get Physical Device Statistics" on page 3-38
"Start or Stop Long Ops" on page 3-41	"Start Foreground Initialization" on page 2-34
	"Stop Foreground Initialization" on page 2-36
	"Start Consistency Check" on page 3-41
	"Stop Consistency Check" on page 3-43
	"Start Consistency Check with Restore" on page 3-43
	"Stop Consistency Check with Restore" on page 3-45
	"Start Rebuild" on page 3-46
	"Stop Rebuild" on page 3-49
"Controller and Host Operations" on page 3-54	"Get Dual Controller Status" on page 3-54
	"Kill Partner" on page 3-58
	"Relinquish Controller" on page 3-60
	"Reset Controller or Channel" on page 3-62
	"Get/Modify Host WWN Table" on page 3-64
"Change Serial Port Usage" on page 3-68	(Use this menu selection to exit the embedded configuration utility and return to the debug menu.)

Commonly Used Procedures and Troubleshooting Guide

This section provides roadmaps for some of the most commonly used procedures and emergency situations. Use these roadmaps to make sure you cover required steps when using the embedded configuration utility to configure a new array, replace a failed disk drive, or replace a failed controller.

Creating a New Configuration

Use this procedure when you want to set up a new system or clear an existing configuration and replace it with a different configuration.

Step No.	Action	Description	Where to find instructions
1.	Check and change any parameters, if necessary.	Make any required changes to controller parameter settings. Controller reset will be required for some parameter changes. Refer to Table 2-1 on page 2-2 for a description of parameters and resetting requirements.	"Get and Set Controller Parameters" on page 2-4.
2.	Clear the configuration.	Clear any existing configurations before creating a new configuration. (This step may not be necessary.)	"Clear Configuration" on page 2-8.
3.	Create the configuration.	Manually configure physical devices into an array.	"Create New Disk Packs" on page 2-10.
4.	Alter the logical device accessibility.	Make any changes to logical device accessibility through SANmapping™.	"SANmapping™" on page 2-23.
5.	Initialize the logical devices.	Initialize the newly created logical devices.	"Start Foreground Initialization" on page 2-34.

Adding New Disk Drives to Your Controller

Use this procedure to expand your array's storage capacity by adding disk drives.

Step No.	Action	Description	Where to find instructions
1.	Install the new disk drive(s).	Follow the hardware instructions to install the new disk drives. (For most reliable operation, use only vendor approved drives.)	Disk drive installation guide.
2.	OPTIONAL Supply power to drive enclosure.	Power must be supplied to the enclosure if installing a new enclosure with drives.	Your enclosure guide.
3.	Show the drive(s).	Verify that the controller recognizes the new drive(s).	"Show Drives, Change Drive State" on page 3-9.
4.	OPTIONAL Reset the controller(s).	A controller reset is required if the new drive(s) are not recognized by the controller. This step is dependent on the enclosure.	"Reset Controller or Channel" on page 3-62.
5.	Show the drive(s).	Verify that the controller recognizes the new drive(s).	"Show Drives, Change Drive State" on page 3-9.
6.	Create a new array.	Create a new configuration using the additional drives now available.	"Creating a New Configuration" on page 1-6.

Replacing a Failed Simplex Controller

Replacing a controller in a simplex (single controller) system is relatively easy. The replacement controller obtains the configuration information from the COD from the existing disk drives. This procedure may require a controller reset during the COD update process.

Step No.	Action	Description	Where to find instructions
1.	Power off the controller.	If possible, leave power to the disk drives; otherwise, power off the entire enclosure.	Your controller installation guide or your enclosure guide.
2.	Remove the failed controller.	Follow the hardware instructions to remove the failed controller.	Your controller installation guide and/or your enclosure guide.
3.	Insert the replacement controller.	Follow the hardware instructions to insert the replacement controller.	Your controller installation guide and/or your enclosure guide.
4.	Power on the controller, and/or enclosure if powered off in step 1.	The controller accepts the configuration from the disk drives.	Your controller installation guide and/or your enclosure guide.

Replacing a Failed Dual-Active Controller

The LCD front panel, LEDs, or other on-line monitoring tools indicate when a controller has failed. When you replace a controller it recovers its configuration from the surviving controller. This procedure can be performed with power supplied to the controllers or power turned off.

> **NOTE:** Both controllers in a dual-active configuration must be identical with respect to memory and firmware version and type.

The following controller parameters affect the amount of user intervention necessary when replacing failed controllers:

- Auto Failback
- Node Name Retention

Step No.	Action	Description	Where to find instructions
1.	Identify the failed controller.	The enclosure indicator lights show which controller has failed. The embedded configuration utility message line also provides a partner controller status message. (The surviving controller displays a “Partner Failed” message. The failed controller displays no message and the VT100 user interface is unresponsive.)	Your enclosure guide.

Step No.	Action	Description	Where to find instructions
2.	(OPTIONAL) Power off the failed controller, if performing a cold (power off) replacement.	If possible, leave power to the disk drives on; otherwise, power off the entire enclosure.	Your controller installation guide or your enclosure guide.
3.	Insert the replacement controller.	Follow the hardware instructions to insert the replacement controller. If the power has remained on, the replacement controller accepts the configuration from the surviving controller.	Your controller installation guide and/or your enclosure guide.
4.	(OPTIONAL) Power on the controller, if performing a cold (power off) replacement.	The controller accepts the configuration from the disk drives. The replacement controller accepts the configuration from the surviving controller during the startup	Your controller installation guide and/or your enclosure guide.
5.	Relinquish the replacement controller.	If Automatic Failback is disabled, use the Relinquish Controller option to bring the controller online. If Automatic Failback is enabled, no action is required. Proceed to the next step.	“Relinquish Controller” on page 3-60.
6.	Reboot the host.	Rebooting the host enables the host to recognize the controller as a replacement.	Host computer user guide.
7.	Access the embedded configuration utility user Interface.	Enter the *Break* command to access the embedded configuration utility user Interface.	"Configuring for VT100 Terminal-Emulation Mode" on page C-1

Replacing a Failed Disk Drive

All RAID 1, 3, 5 or 0+1 logical devices associated with a failed disk show an online critical status in the Logical Device States menu. A failed disk drive shows an offline failed status in the Physical Device States menu. Refer to “Show Drives, Change Drive State” on page 3-9.

The Automatic Rebuild feature replaces a failed disk drive without user intervention if the following conditions are met:

- An online spare disk drive of identical or larger size is found attached to the same controller
- All system drives (logical drives) that are dependent on the failed disk drive are configured as a redundant array; RAID 1, RAID 3, RAID 5, or RAID 0+1
- Automatic Rebuild controller parameter is enabled
- Operational Fault Management controller parameter is enabled

NOTE: If a replacement drive of the exact size is not available, the controller selects the smallest replacement drive found with a capacity that is at least as large as the consumed capacity of the failed drive. (The consumed capacity is the capacity assigned to the configured system drives). If the consumed capacity of the failed disk drive is a percentage of the total capacity, a larger physical disk drive can be rebuilt with a much smaller physical disk drive.)

ATTENTION: Removing the wrong physical disk drive constitutes a second point of failure and forces the logical drive offline resulting in potential data loss.

Step No.	Action	Description	Where to find instructions
1.	Identify the failed physical disk drive.	Verify the failed physical disk drive through LED indicators on the enclosure or by performing the Show Drives, Change Drive State function.	Your disk drive user guide; enclosure guide; or "Show Drives, Change Drive State" on page 3-9.
2.	Remove and replace the failed physical disk drive in the same location.	Follow the hardware instructions to remove the failed physical disk drive and replace it. (For most reliable operation, use only vendor approved drives.)	Your disk drive installation guide.
3.	Start the rebuild procedure.	If Automatic Rebuild and Operational Fault Management are enabled, the rebuild starts within a few minutes of detecting the replacement physical disk drive.	“Controller Parameters” on page 2-1.

If the conditions for an automatic rebuild are not met, perform the following steps to insert a new physical disk drive and start a rebuild.

Step No.	Action	Description	Where to find instructions
1.	Identify the failed physical disk drive.	Verify the failed physical disk drive through LED indicators on the enclosure or by performing the Show Drives, Change Drive State function.	Your disk drive user guide, enclosure guide or “Show Drives, Change Drive State” on page 3-9.
2.	Remove and replace the failed physical disk drive in the same location.	Follow the hardware instructions to remove the failed physical disk drive and replace it. (For most reliable operation, use only vendor approved drives.)	Your disk drive installation guide.
3.	Change the replacement physical disk drive’s state.	The drive state for the replacement physical disk drive is Offline Failed. The drive state must be changed to Online Spare.	“Show Drives, Change Drive State” on page 3-9.
4.	Start the rebuild procedure.	Initiate the rebuild procedure.	“Start Rebuild” on page 3-46.

Recovering Multiple Failed Disk Drives

Instances occur when several disk drive states are set to offline failed. This can occur when replacing a failed disk drive and a working drive is inadvertently removed forcing the logical device to an offline failed status. This can also occur when adding an enclosure of drives and inadvertently leaving power off to the enclosure.

While the following procedure does not guarantee full data recovery, in most instances the data is restored without significant loss.

ATTENTION: This recovery procedure must be implemented before any data is written to the disks. The working disk drive must be re-inserted before the failed disk drive or potential data loss may occur.

Step No.	Action	Description	Where to find instructions
1.	Replace the working physical disk drive, or supply power to disk drives.	Verify through LED indicators on the enclosure that power is supplied to the disk drives.	Your disk drive user guide, enclosure guide.
2.	Change the drive(s) state(s).	The default drive state for new disk drives is Unconfigured Offline. Since these disk drives were functioning normally, return the drive state to Online Optimal.	"Show Drives, Change Drive State" on page 3-9.
3.	Continue with failed disk drive replacement procedure, or continue as usual.	After returning devices to Online Optimal state, logical devices also return to Online Optimal or Online Critical state and continue functioning as usual.	"Replacing a Failed Disk Drive" on page 1-8.

Recovering From Lost Logical Device Accessibility

Logical devices are accessible to the host through the controller. SANmapping™ determines which controller, controller/host port, and host has access to each logical device. During controller failure, this accessibility is assumed by the surviving controller. When a replacement controller is inserted into the system, the replacement controller assumes the logical device access of the failed controller. Several controller parameters make this process transparent to the user. If these parameters are not set appropriately, the replacement controller may not have access to the failed controller's logical devices. The easiest way to recover from this situation is to restart the host computer operating

system. This enables the host to recognize the replacement controller and forward logical device accessibility from the failed controller to the replacement controller. The following procedure guides you through the steps necessary to recover from this situation.

Step No.	Action	Description	Where to find instructions
1.	Remove and replace the failed controller.	Follow the hardware instructions to remove the failed controller and replace it.	"Replacing a Failed Simplex Controller" on page 1-7 or "Replacing a Failed Dual-Active Controller" on page 1-7.
2.	Reboot the host system.	Cycle power or restart the host computer.	Host computer user guide.

CHAPTER 2
Setting up a new Configuration

This chapter provides instructions for creating, saving, and initializing a new configuration.

NOTE: In the instructions in this chapter, the number of physical and logical devices shown in the screen captures are used as an example configuration to show the embedded configuration utility features. These examples may not reflect your system or configuration.

Configuring Simplex and Dual-Active Controllers

If you are using two controllers and have installed the hardware in a dual-active configuration, you need to configure only one controller. When the configuration is saved, it is automatically saved to both controllers.

If you are using multiple simplex controllers, you must configure each controller separately.

Controller Parameters

Each Mylex controller is shipped from the factory with initial settings that have been found to work well in a majority of applications and environments. These settings are the controller, logical device, and physical device parameter default settings. These settings vary depending on the product and user requirements. You can modify parameter settings to meet your system requirements. Additionally, if you are going from a simplex configuration to a dual-active controller configuration, certain controller parameters must be changed to accommodate the new dual-active configuration. Table 2-1 on page 2-2 lists the controller parameters, if a reset is required to have a parameter change become effective, default setting for the parameter, and a description of the parameter.

NOTE: Logical device and physical device parameters are discussed in Chapter 3, "Array Management and Configuration Editing." These parameters cannot be modified until after a configuration has been created. Refer to “Get and Set Logical Device Parameters” on page 3-31 and “Get and Set Physical Device Parameters” on page 3-34 for more information.

Table 2-1. Controller Parameters

Parameter	Reset Required	Default	Description
"1. Reassign Restricted to One Block"	Yes	0 – Disabled	Set: All reassigns are for the single failing block. Clear: All reassigns are for the entire current I/O.
"2. True Verify"	Yes	0 – Disabled	Set: If enabled and data is transferred, then a true verify with data comparison is performed. Clear: No data comparison.
"3. Disk Write Through Verify"	Yes	0 – Disabled	During error handling this turns on Force Unit Access for reads and writes.
"4. Read Ahead Enable"		1 – Enabled	Enables the controller to read into cache a full stripe of data at one time.
"5. Automatic Rebuild Management"	Yes	1 – Enabled	Enables the controller to take autonomous actions when a failed disk has been replaced.
"6. Operational Fault Management"	Yes	1 – Enabled	Enables the controller to take autonomous actions when a failure occurs.
"7. Super Read Ahead"	Yes	0 – Disabled	The Super Read Ahead function increases performance by always reading an extra cache line on a read request, and reading a further cache line when a cache hit occurs on a pre-fetched cache line.
"8. Rebuild and Check Consistency Rate"	No	50	Sets the initial value of the Rebuild and Consistency Check rate. Range=0-50
"9. Device Combing"	No		Enables data traffic coalescing on the traffic of each device, joining data from adjacent I/Os into a single I/O to improve performance.
"10. Disk Startup Mode"	Yes	0 – Autospin	AUTOSPIN: Issues start to all devices automatically PWRSPIN: Devices spin on power application. WSSUSPIN: Await SSU, then start devices per AUTOSPIN. 0=Autospin 1=Pwrspin 2=Wssuspin
"11. Startup Number of Devices"	Yes	2	Sets the number of physical devices that spin-up at one time.
"12. Startup Delay 1"	Yes	6	Specifies the number of seconds between physical device spin-ups or start-up commands. Range=0-255
"13. SCSI Startup Delay 2"	Yes	0	Can be set to a number of seconds for a motor spin delay or sets the number of seconds between start-up cycles. Range=0-255
"14. Vendor Unique Test Unit Ready"	Yes	0 – Disabled	Set: A TUR command sent to an offline LUN returns hard error status. Clear: A TUR command sent to an offline LUN returns Not Ready Status.
"15. Disable Check Condition for Invalid LUN"	Yes	1 – Enabled	Set: The Inquiry command returns "Perifpheral Not Connected" for invalid LUN. Clear: The Inquiry command returns "Illegal Request, LUN Not Supported" for invalid LUN.
"16. No Pause on Controller Not Ready"	Yes	0 – Disabled	Set:Turns off the pause for the affected commands when the controller is not fully started. Clear: Turns on the pause for the affected commands when the controller is not fully started. Affected commands are: Prefetch, Read/Write, Read/Write Extended, TUR, Verify, and Write Verify.
"17. Disable Queue Full Status"	Yes	0 – Disabled	Set: Returns Busy status when controller detects a queue full condition. Clear: Returns Queue Full status when controller detects a queue full condition.
"18. Disable BUSY Status During Failback"	Yes	0 – Disabled	Set: Drops new requests during failback/cache flush operation. Clear: Returns Busy status during failback/cache flush operation.
"19. SAF-TE Data for UPS Support"	No	0 – Enabled	Set: SAF-TE monitoring of UPS is disabled. Clear: SAF-TE monitoring of UPS is enabled if supported by the system enclosure.
"20. Node Name Retention"	Yes	0 – Disabled	Set: A replacement controller assumes the node name of the failed controller after failback. Clear: A replacement controller uses its own node name after failback.

Parameter	Reset Required	Default	Description
"21. Failover Topologies"—Transparent Inactive Port Failover	Yes	0	Requires the use of 2 ports, an active port for normal traffic and an inactive port for the partner controller's traffic when it is failed over. Recommended only for FF controller.
"21. Failover Topologies"—Multiport Failover	Yes	1	Requires alternate path software. All four host ports are connected to individual fibre loops.
"21. Failover Topologies"—Clustering Failover	Yes	2	Requires Clustering operating system. This topology is not supported at this time.
"21. Failover Topologies"—Transparent, Multiple TID Failover	Yes	3	Requires ISP2200 (FFx and FF2). All ports are active with 2 ports sharing a loop.
"21. Failover Topologies"—Master-Slave	Yes	4	Controller 0 has both ports active while controller 1 has both ports inactive. Controller 1 becomes active if controller 0 fails. Not recommended with FW version > 5.4.
"22. Override Multiport Reset"	No	0 – Disabled	Set: An internal reset is executed by a port only if a logical device has been reserved through that port. Clear: Internal resets are not qualified by logical device reservations.
"23. Reset Propagation"	No	0 – Disabled	Set: A port that executes an Internal Reset propagates the reset by causing a Reset Event to occur on its attached interface. Clear: A port will not cause a Reset Event on its attached interface as part of executing an Internal Reset.
"24. Serial Port Baud Rate"	Yes	6 – 19200	This item sets the baud rate of the serial port when in VT100 or Debug modes. 3=2400 4=4800 5=9600 6=19200
"25. Serial Control"	Read Only	Not Applicable	Serial parameters such as data bits, stop bits, parity on/off.
"26. Serial Port Usage"	Yes	1 – SLP/VT100	Sets the serial port to either debug mode or SLP/VT100 mode. Debug mode is for development use only. 0=Debug 1=SLP/VT100
"27. Frame Size Control"	Yes	0 – Long, 2KB	Enables adjustment of the Fibre Channel chip's frame size. 0=long, 2KB 1=short, 512 bytes 2=medium, 1KB
"28. Smart Large Host Transfers"	No	0 – Enabled	Enables selection of Coalesce on host data tranfers. This takes affect for transfers larger than the stripe size. 0=Coalesce into one transfer 1=Transfer as available
"29. PCI Latency Control"	Yes	0 – Short	Enables adjustment of the Fibre Channel chip's use of the PCI bus. This takes effect only when both ports are active. 0=short 1=medium 2=long
"30. Automatic Failback"	Yes	0 – Disabled	Enables the surviving controller to automatically sense and place an inserted replacement controller back in service.
"31. Force Simplex"	Yes	0 – Disabled	Enables dual-active firmware to serve in a single controller environment.
"32. Conservative Cache Mode"	No	0 – Disabled	Enables a controller an extra degree of data safety when operating in failed over condition. This turns off Write-Cache while the failed over condition persists.
"33. Duplex Fault Signals"	Yes	0 – Disabled	Informs a controller that certain signals should be used to detect the presence or absence of a partner controller.
"34. Duplex Fault Signals on Channel 4"	Yes	0 – Disabled	SX Hardware only.
"35. Host SCSI Reset Delay"	Yes	0 – No Reset	SCSI only Enables a controller to reset the host in failover and failback situations. 0=No Reset 1-14=Reset delayed 15=Resets immediately

Parameter	Reset Required	Default	Description
"36. Simplex – No Reset"	Yes	0 – Disabled	Simplex only. Enables a controller to not assert the reset signal to the partner controller.
"37. Queue Limit"	No	32	Sets the maximum queue depth for tagged commands to each attached drive. Range=1-230
"38-41. Hard Loop IDs"	Yes	Set for each controller/host port	Provides for the use of the same Loop IDs all the time.
"42-43. Controller Name"	Read Only	Not Applicable	Enables the controllers to have user assigned names.
44. Maximum Reboot Count	No	Never reboot on failure	Sets the number of times the controller will be rebooted when a controller failure occurs in the rearm interval. If this count is exceeded in the rearm interval, no more reboots on failure will occur.Do not set the Reboot Count and Rearm Interval both to 0 as results can be unpredictable.
45. Rearm Interval (minutes)	No	0	Sets interval of time, in minutes, during which controller reboot will be attempted.
46. Enable Debug Dump	No	0 – No debug Dump	Enables the controller to write debug dump data to a disk.
47. Enable Background initialization	No	Enabled	Sets the Background Initialization process.

Get and Set Controller Parameters

Before making any changes to the default parameter settings, please read the descriptions of the parameter settings provided in Appendix B, "Controller, Logical Device, and Physical Device Parameters," and fully understand the implications of the change that is about to be made. Refer to Table 2-1 on page 2-2 for a listing of all controller parameters.

ATTENTION: Saving parameter changes causes the controller's working parameters to change. This can produce unpredictable results if it occurs during host/drive activity. Stop all controller activity before saving parameter changes. Inappropriate changes to the parameter settings can result in degraded performance or data loss.

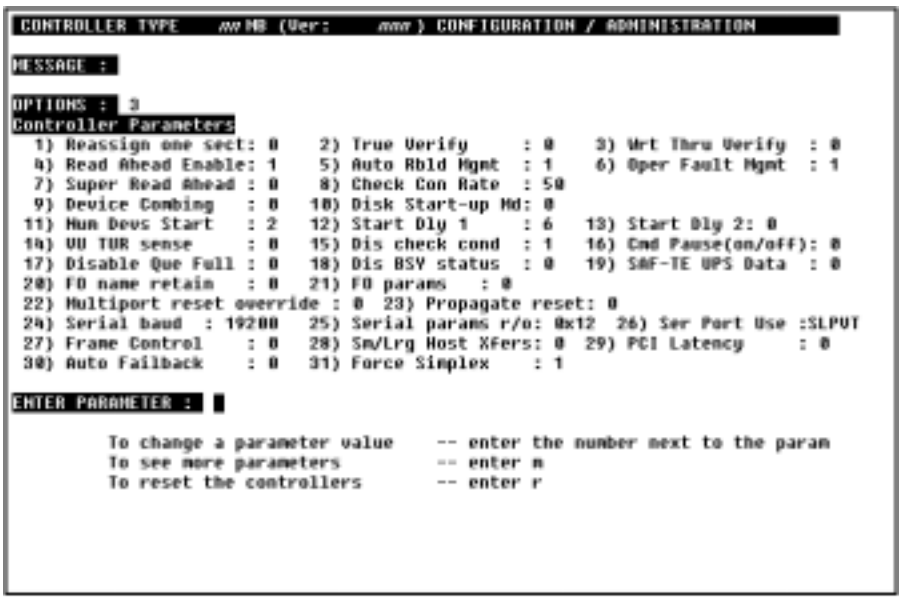
If you intend to change any of the controller parameters, it is beneficial to do so *before* creating your array configuration.

To change a controller parameter:

1. Find the parameter you want to change in Table 2-1.
2. Select Information and Parameters from the Main Menu by typing **<2>**. Press **Enter**. The following menu appears.

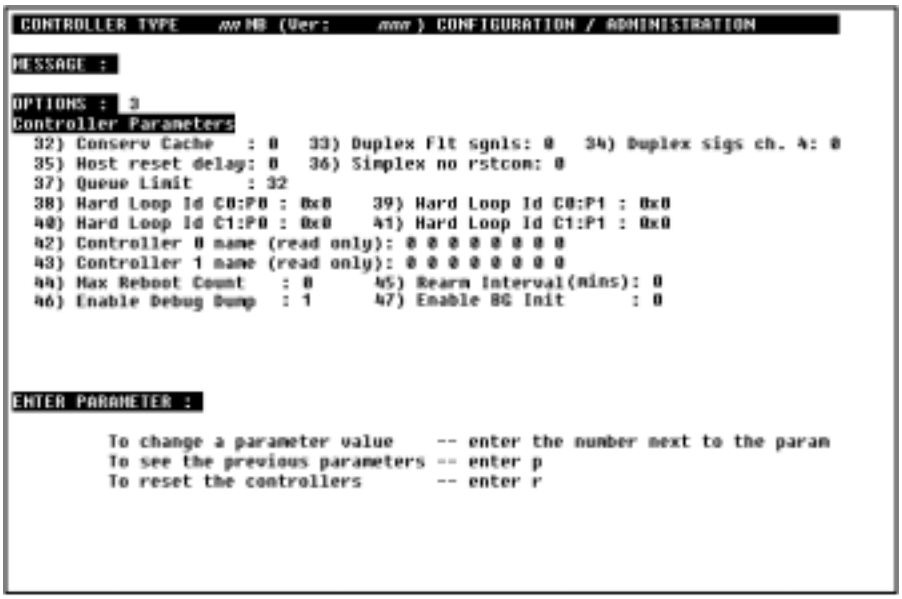
Information and Parameters Screen

3. Select Get and Set Controller Parameters by typing **<3>**. Press **Enter**. A partial list of controller parameters appears showing the current settings.



Controller Parameters
First Screen

4. Type **<m>** to see additional controller parameters. Press **Enter**. The remaining list of controller parameters appears showing the current settings.



Controller Parameters
Second Screen

5. Select the controller parameter you want to change by typing the number shown next to the parameter. Press **Enter**. A new screen appears prompting you to enter a new value for the parameter you selected.

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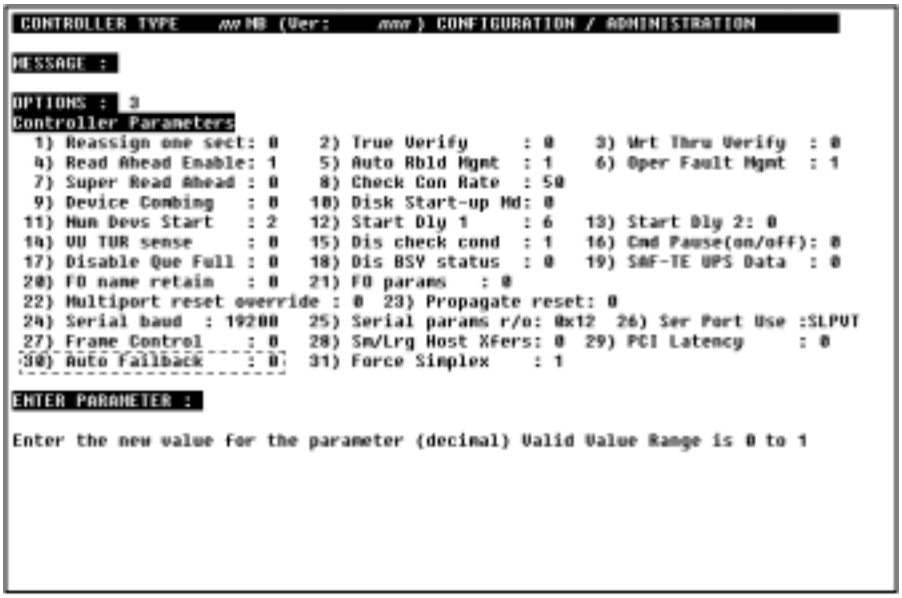
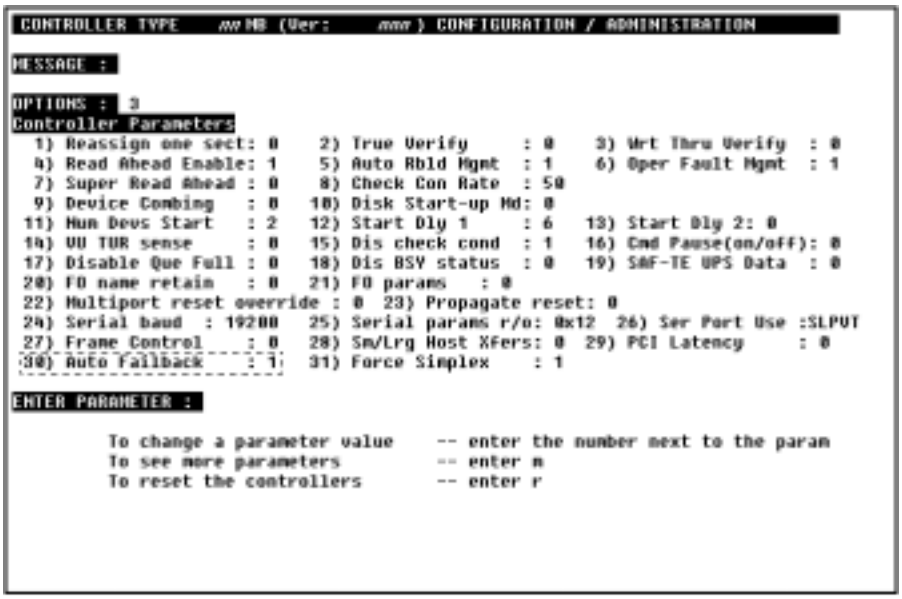


Controller Parameters
Enter New Parameter Value Screen

6. A range of values is shown for the controller parameter you selecected. Enter the new value for the controller parameter. Press **Enter**. The first controller parameter screen appears again, enabling you to change additional controller parameters.



Controller Parameters
Updated Parameter Screen

7. Continue changing controller parameters until you have made all the necessary changes.

ATTENTION: Mylex recommends performing a controller reset following controller parameter changes. The embedded configuration utility does not prompt for this reset, but provides an option in the controller parameter screens.

8. If a controller reset is required for the controller parameter changes to take effect, type <**r**>. Press **Enter**. The controllers reset immediately. If a controller reset is not required, press **Esc** to return to a previous screen.

   NOTE: Depending on the disk drive spin up settings, a controller reset can take several minutes to complete.

   After the controllers have finished resetting, the `STARTUP COMPLETE` message appears. Re-enter the embedded configuration utility by typing <**@**> or the appropriate key sequence for your terminal-emulation application.

Configure, Check Drive States

The Configure, Check Drive States screen provides options for viewing, creating, and deleting a configuration. This screen also provides options for changing device states, searching for devices, and adding a logical device to an existing, configured pack. The following procedures guide you through the steps necessary to create and/or modify a configuration. The options for viewing, changing device states, searching for devices, and adding a logical device are described in Chapter 3, "Array Management and Configuration Editing."

Clear Configuration

ATTENTION: This procedure clears the entire configuration. You cannot clear only one logical device or a select group of physical drives.

Data on the drives is destroyed when the configuration is cleared.

If you want to create a new configuration, but another configuration already exists, you need to clear the existing configuration before creating a new configuration. To clear a configuration:

1. Select Configure, Check Drive States from the Main Menu by typing **<0>**. Press **Enter**. The following screen appears.

Configure, Check Drive States Screen

2. Select Clear Configuration by typing **<2>**. Press **Enter**. The configuration is not immediately cleared. Instead, the following screen appears. This screen asks if you are sure that you want to clear the configuration.

Clear Configuration Screen

3. If you are not sure you want to clear this configuration, type **<n>**. Press **Enter**, and return to the previous screen.

   If you are sure you want to clear this configuration, type **<y>**. Press **Enter**. The configuration is cleared immediately and the following screen appears.

Clear Configuration Confirmation Screen

4. A prompt appears notifying you that the configuration cleared. Press any key to continue or return to the Configure, Check Drive States screen.

Create New Disk Packs

The Create New Disk Packs function combines selected physical devices into a device group. The device group can be divided into one or more logical devices, each with its own RAID level, write policy, and capacity. (A logical device is called a “system drive” on the following embedded configuration utility screens.)You can create logical devices until the maximum capacity of the device group is fully used or 32 logical devices are defined.

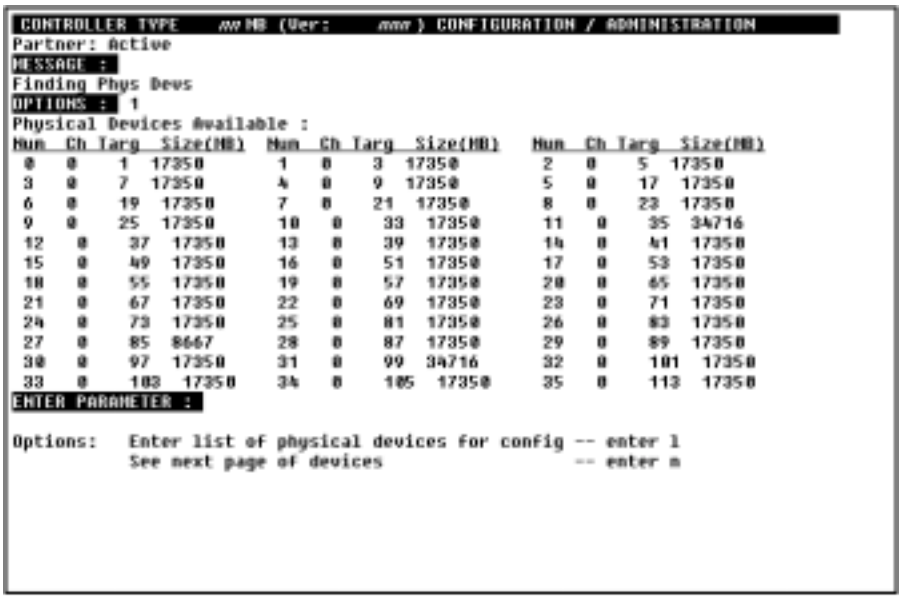
To create a new configuration:

1. Select Configure, Check Drive States from the Main Menu by typing **<0>**. Press **Enter**. The following screen appears.

Create New Disk Packs;
Configure, Check Drive States Screen

The message at the bottom of the screen tells you that this array does not have a configuration.

2. Select Create New Disk Packs by typing **<1>**. Press **Enter**. The following screen appears.

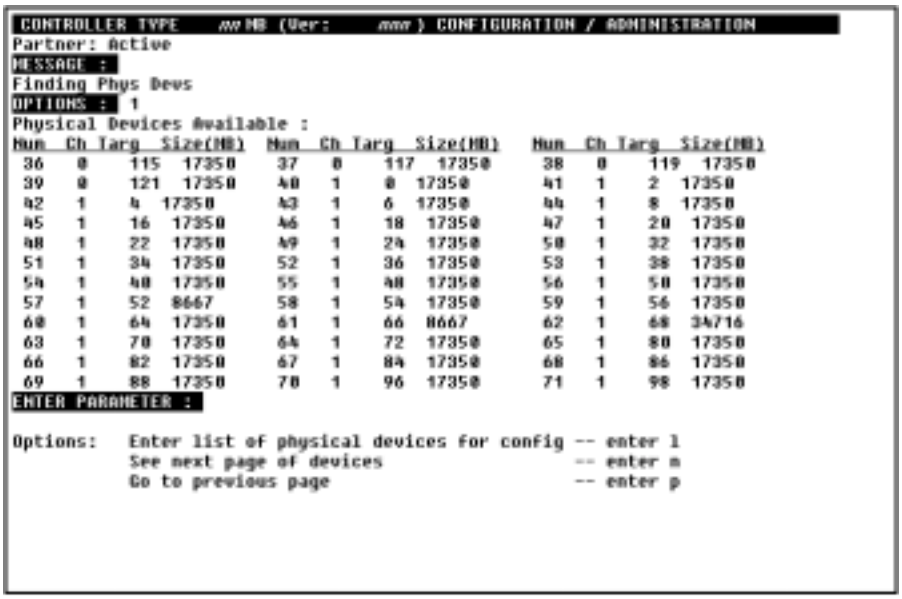


Create New Disk Packs,
Available Physical Devices, First Screen

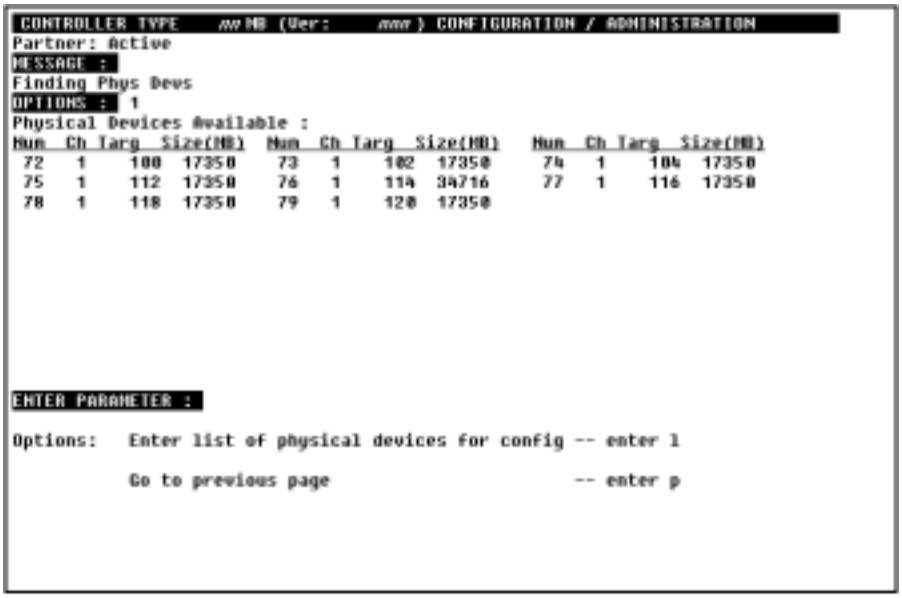
This screen shows a list of available physical devices. As in this example, the list can extend over several screens depending on the number of devices associated with your system. You can navigate through the screens by typing <**n**> (for next) or <**p**> (for previous) then pressing **Enter**. You do not, however, need to navigate through the screens before you can list the physical devices for the configuration. When you are in these screens, you can create a list of physical devices for a configuration at any time by typing <**l**> and pressing **Enter**.

The information shown in these screens includes a physical device number (that is arbitrarily assigned by the controller), the channel ID, target ID, and the physical device size (MB).

3. Navigate through the screens, by typing <**n**> for next page of devices or <**p**> for previous page. Press **Enter**.

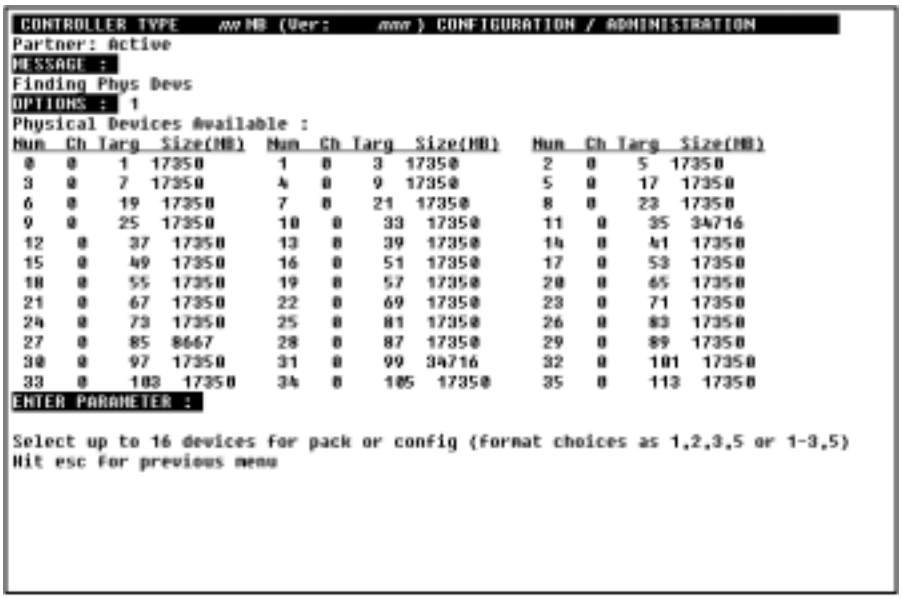


Create New Disk Packs
Available Physical Devices, Second Screen



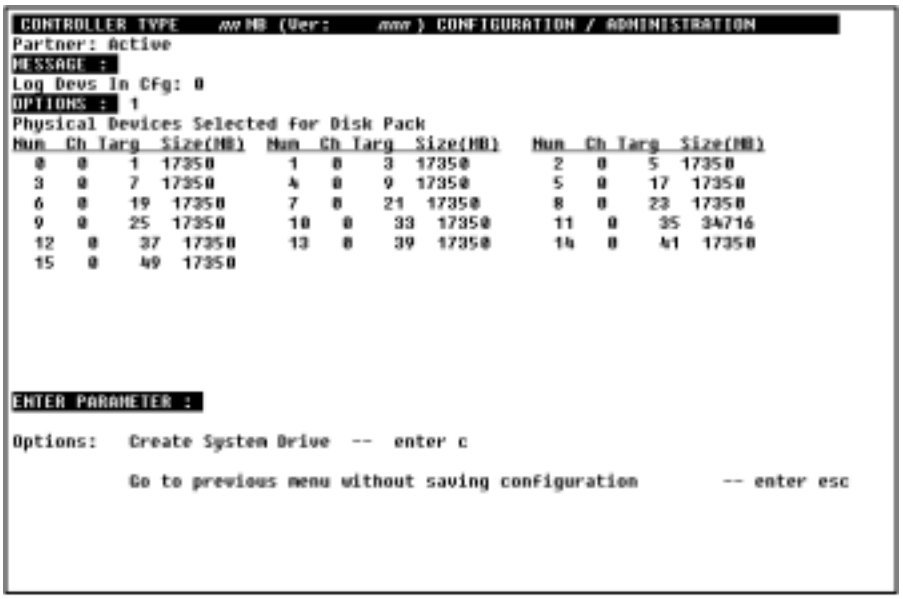
Create New Disk Packs
Available Physical Devices, Final Screen

4. Enter a list of physical devices for a new configuration by typing <**l**>. Press **Enter**. The following screen appears.



Create New Disk Packs
Select Physical Devices Screen

5. Select the physical devices you want to use in your new configuration by typing the physical device numbers. You can select physical devices one at a time, separated by a comma; or you can select a range of physical devices listing the first and last devices, separated by a hyphen; or you can use a combination of both formats. Press **Enter**. The following screen appears.

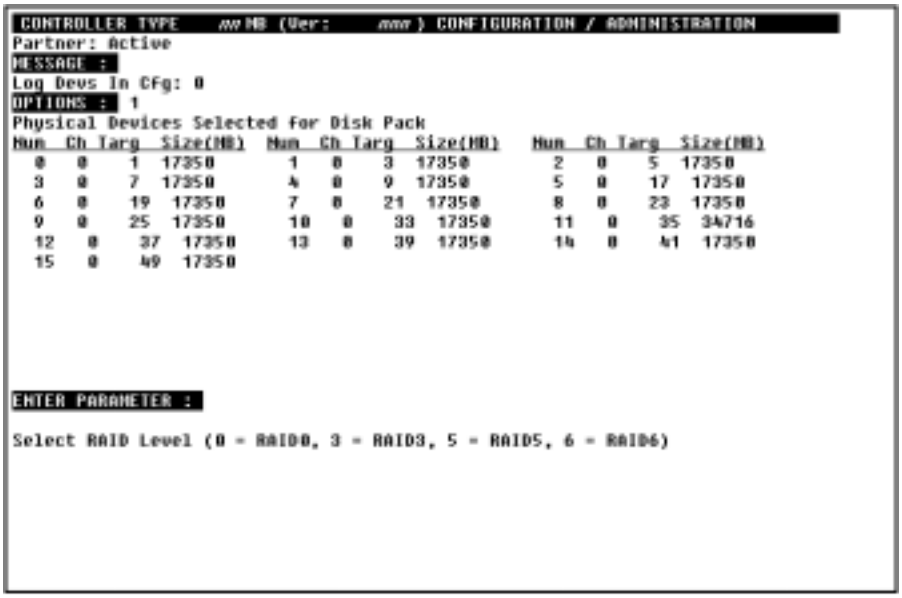


Create New Disk Packs
Create Logical Device Screen

This screen shows a list of the physical devices you selected. For each physical device you selected, this list shows a physical device number (that is arbitrarily assigned by the controller), the channel ID, target ID, and the physical device size (MB).

6. If you do not want to create a logical device (system drive), or if you want to return to the previous screen without saving the configuration, press **Esc**.

   To create a logical device from the physical devices shown, type **<c>**. Press **Enter**. The following screen appears.



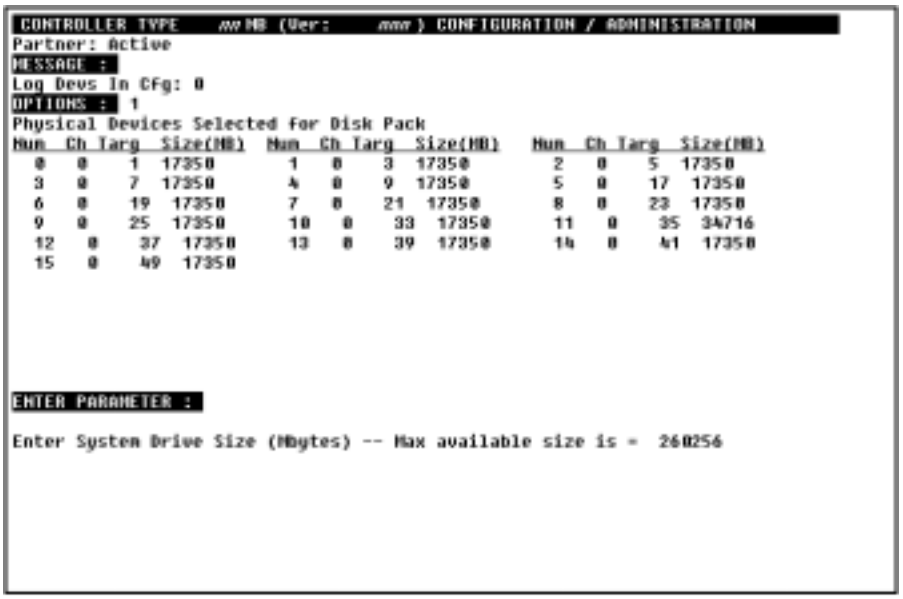
Create New Disk Packs
Select RAID Level Screen

A prompt appears at the bottom of the screen asking you to select a RAID level. A list of valid RAID levels is shown. The number of physical devices you selected determines the valid RAID levels that are listed. Mylex supported RAID levels and a short description for each are listed in Table 2-2. For more detailed information, refer to the *Encyclopedia of Controller Fundamentals and Features*, PN 775041.

Table 2-2. Mylex Supported RAID Level

RAID Level	Description	# of Drives Min.	# of Drives Max.	Fault Tolerant
0	Block striping is provided, which yields higher performance than is possible with individual disk drives. No redundancy is provided.	2	16	No
1	Disk drives are paired and mirrored. All data is 100% duplicated on an equivalent disk drive.	2	2	Yes
3 and 5	Data is striped across several physical disk drives. Parity protection is used for data redundancy.	3	16	Yes
0+1 (Mylex RAID 6)	Combination of RAID levels 0 and 1. Data is striped across several physical disk drives. This level provides redundancy through mirroring.	4	16	Yes
JBOD (Mylex RAID 7)	"Just a Bunch of Drives." Each disk drive is operated independently like a normal disk drive; or multiple disk drives may be spanned and seen as a single large drive. This level does not provide data redundancy.	1	1	No

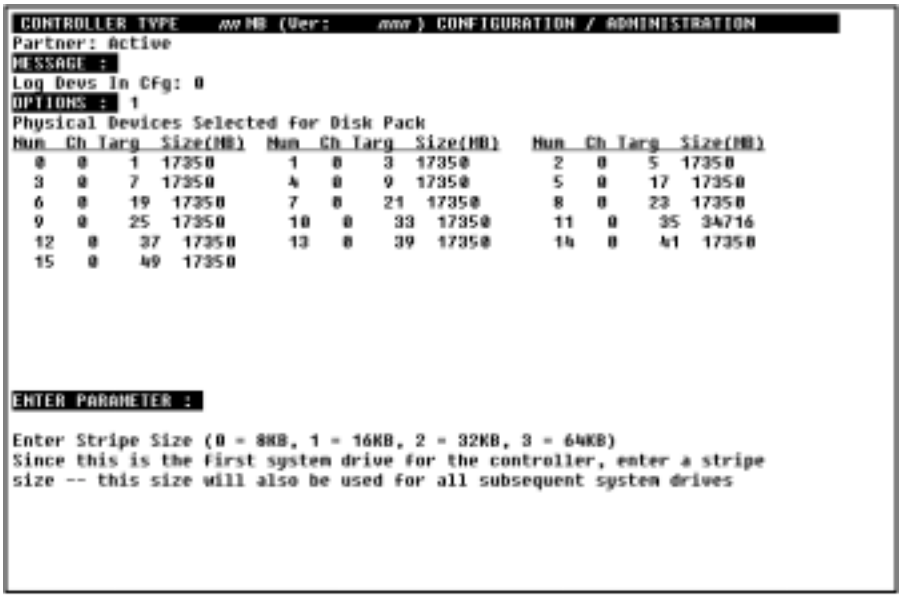
Type the parameter number for the appropriate RAID level. Press **Enter**. The following screen appears.



Create New Disk Packs
Enter Logical Device Size (MB) Screen

A prompt at the bottom of the screen asks you to enter a logical device size in megabytes.

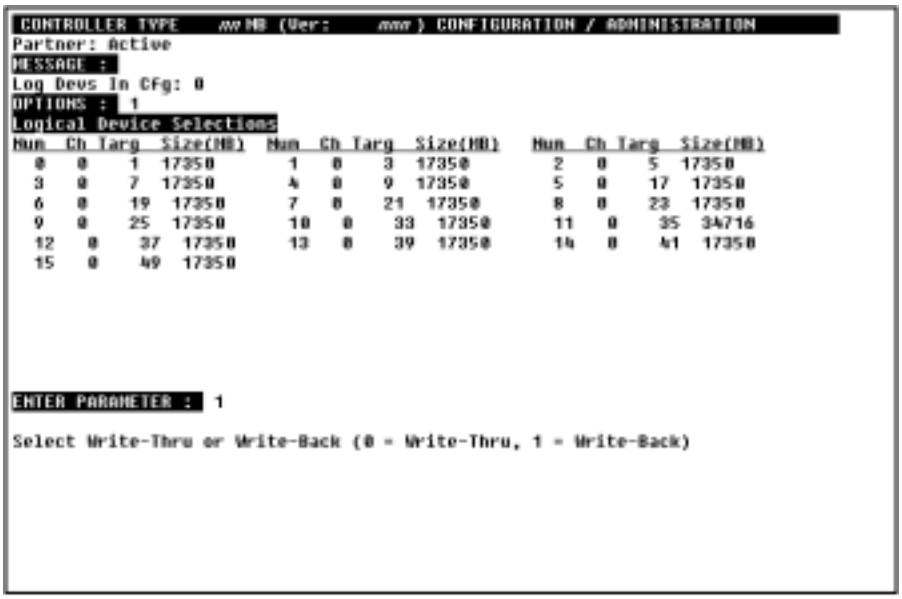
7. Type the value for the drive size in megabytes. Press **Enter**. The following screen appears.



Create New Disk Packs
Enter Stripe Size Screen

A prompt at the bottom of the screen asks you to enter a stripe size. The parameters for the possible stripe sizes are shown. You are prompted to select a stripe size for the first logical device created. All other logical devices and configurations will use this stripe size.

8. Type the value (0, 1, 2, or 3) for the stripe size. Press **Enter**. The following screen appears.



Create New Disk Packs
Select Write Policy Screen

A prompt at the bottom of the screen asks you to select the write policy for the logical device. The write policy determines the caching strategy for write operations. “Write-Thru” writes data to the device before returning completion status to the host.”Write-Back” returns a completion status to the host as soon as the cache receives the data. The target device receives the data at a more appropriate time. For more detailed information, refer to the *Encyclopedia of Controller Fundamentals and Features*, PN 775041.

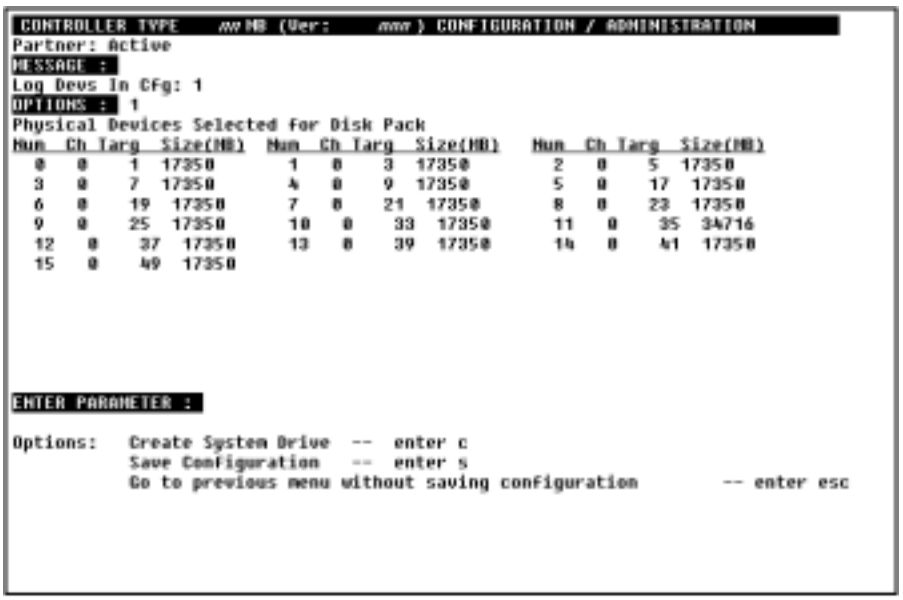
9. Type the value (0 or 1) for the write policy. Press **Enter**. The following screen appears.

Create New Disk Packs
Save Selections Screen

This screen provides you the opportunity to review your selections and ensure the selections reflect the configuration you want to set up.

10. If these selections are not correctly type <**n**>. Press **Enter**. The embedded configuration utility returns you to the "Create New Disk Packs Create Logical Device Screen" on page 2-13. From this screen you can re-enter your configuration.

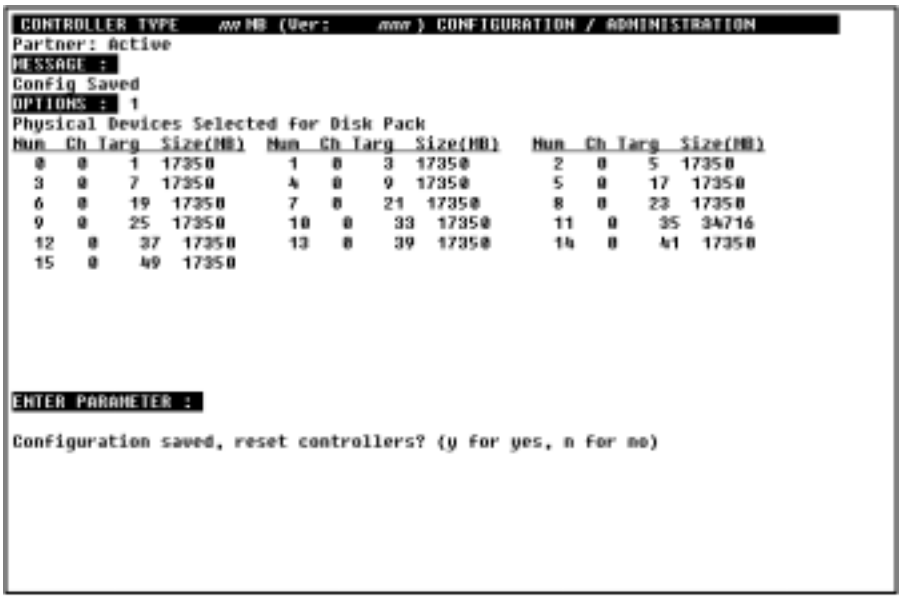
    If these selections are correct, type **<y>.** Press **Enter**. The following screen appears.



Create New Disk Packs
Create Another Logical Device or Save Screen

From this screen you can create additional system drives, save the configuration, or return to the "Create New Disk Packs Save Selections Screen" on page 2-17 without saving the configuration.

11. To create more logical devices from the same group of physical devices, type **<c>**. Press **Enter**. This returns you to Step 6 and the "Create New Disk Packs Create Logical Device Screen" on page 2-13. Perform Step 6 through Step 10 (skipping Step 8 for all subsequent logical devices) for each logical device you want to create.
12. To save the final, completed, configuration type **<s>**. Press **Enter**. This immediately saves the configuration. The following screen appears confirming your configuration was saved.



Create New Disk Packs
Reset Controllers Screen

A prompt notifies you that the configuration is saved, and asks if you want to reset the controllers. You can reset the controllers at this time or continue setting up the configuration and reset the controllers after you have completely set up the configuration.

13. To reset the controllers, type **<y>**. Press **Enter**. The controllers immediately start resetting after pressing Enter.

    NOTE: Depending on the drive spin up settings, a controller reset can take several minutes to complete.

14. After the controllers have finished resetting, the `STARTUP COMPLETE` message appears. Restart the embedded configuration utility by typing the *Break* command.

Create an Online Spare Disk Drive

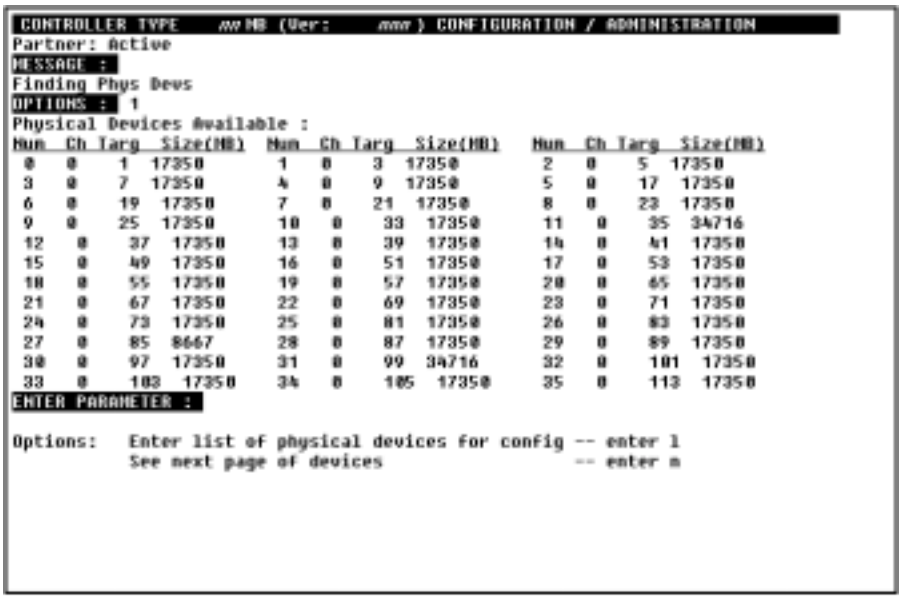
You can create an online spare disk drive through the Create New Disk Packs function. An online spare disk drive is necessary in order to use the automatic rebuild process if a physical device fails. An online spare disk drive must be of identical or larger size than the largest drive it will replace. When using the embedded configuration utility, a drive pack consisting of one drive is created and configured as an online spare.

To create an online spare disk drive:

1. Select Configure, Check Drive States from the Main Menu by typing **<0>**. Press **Enter**. The following screen appears.

Create New Disk Packs
Configure, Check Drive States Screen

2. Select Create New Disk Packs by typing **<1>**. Press **Enter**. The following screen appears.

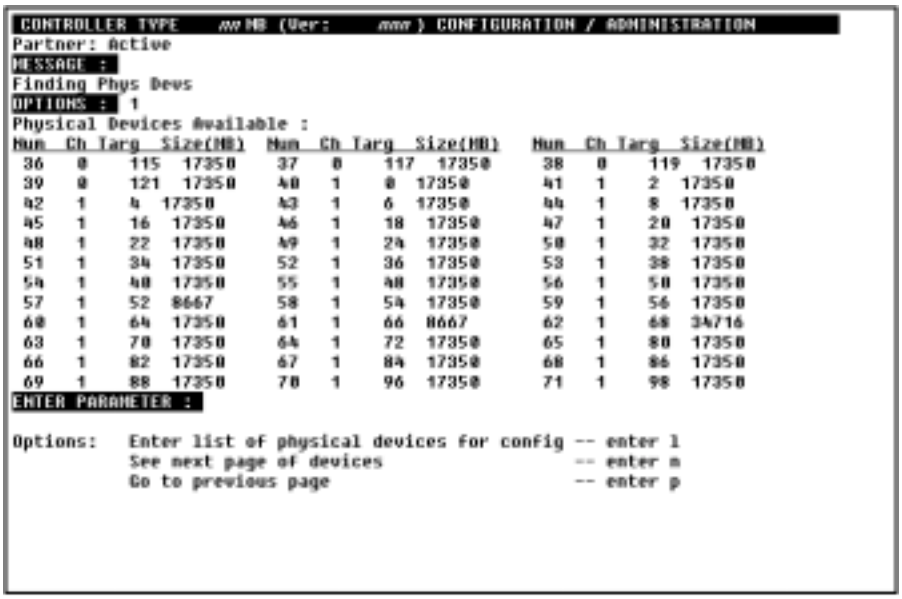


Create New Disk Packs
Available Physical Devices, First Screen

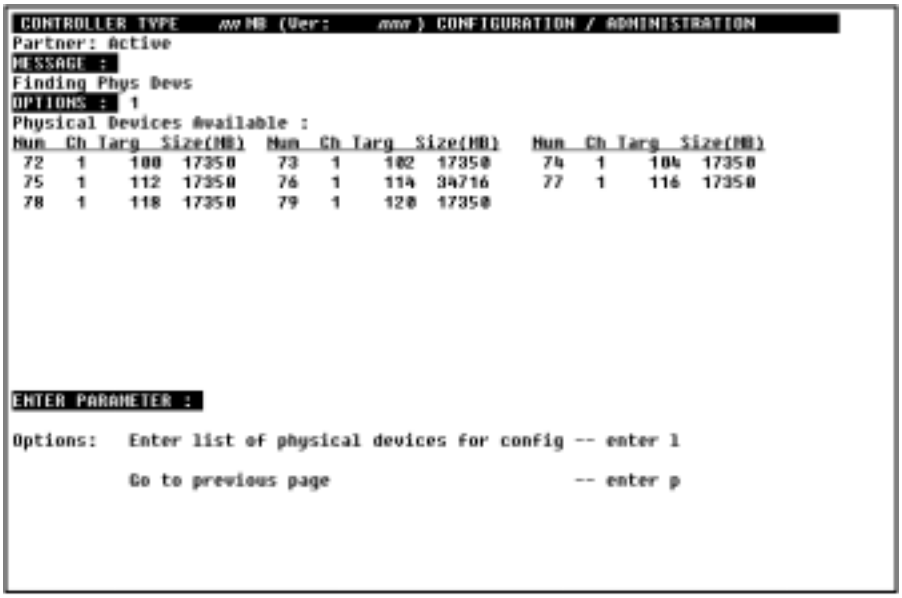
A list of available physical devices appears. As in this example, the list can extend over several screens depending on the number of devices associated with this system. You can navigate through the screens by typing <**n**> (for next) or <**p**> (for previous) then pressing **Enter**. You do not, however, need to navigate through the screens before you can list the physical device for the online spare disk drive. When you are in these screens, you can list the physical devices for an online spare disk drive at any time by typing <**l**> and pressing **Enter**.

The information shown in these screens includes a physical device number (that is arbitrarily assigned by the controller), the channel ID, target ID, and the physical device size (MB).

3. Navigate through the screens, by typing <**n**> for next page of devices or <**p**> for previous page. Press **Enter**.

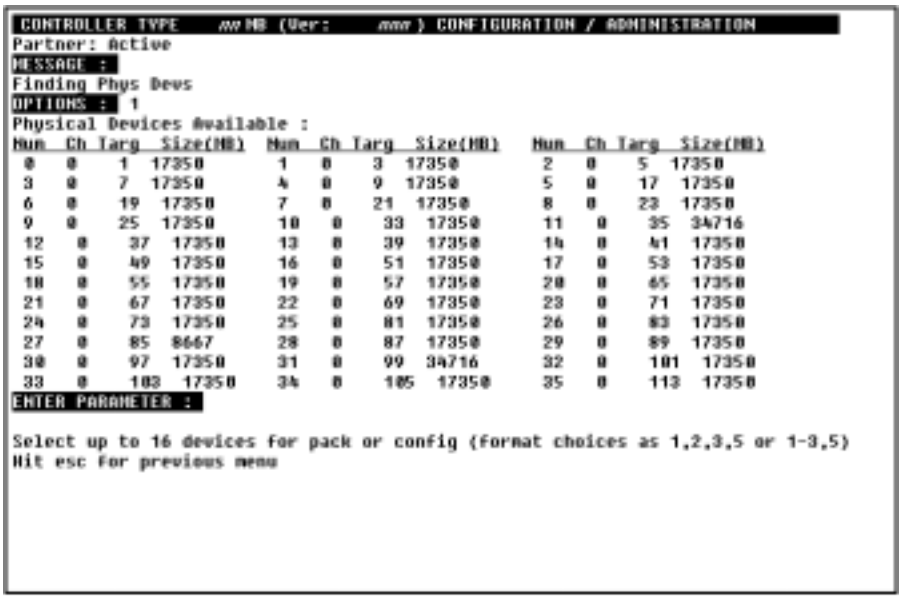


Create New Disk Packs
Available Physical Devices, Second Screen



Create New Disk Packs
Available Physical Devices, Final Screen

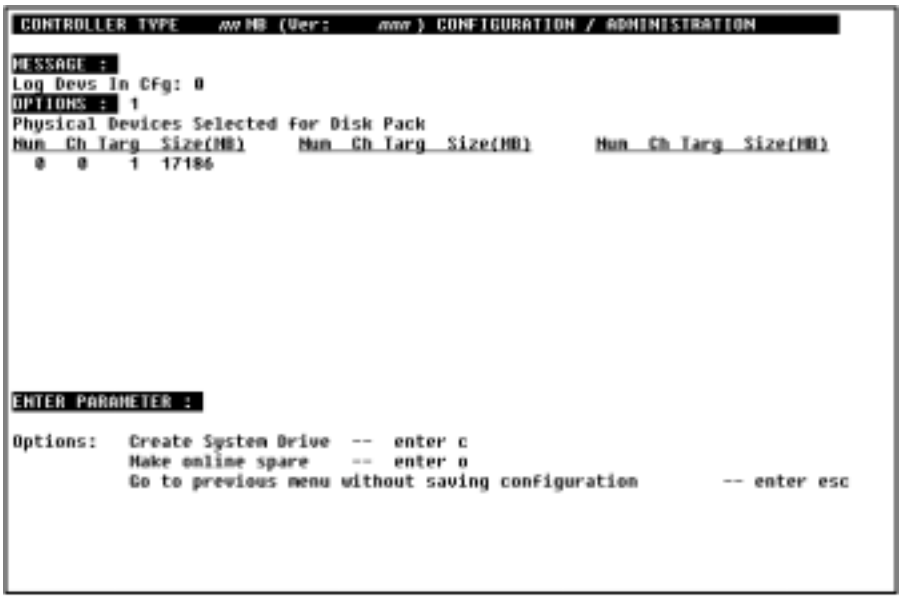
4. After reviewing the available physical devices shown in the screens, type <**l**>. Press **Enter**. The following screen appears.



Create New Disk Packs
Select Physical Device Screen

NOTE: When using the embedded configuration utility to create an online spare disk drive, you can select only **one** physical device for the online spare.

5. Select only **one** physical device to be configured as an online spare by typing the appropriate device number. Press **Enter**. The following screen appears.



Create Online Spare
Select Option Screen

If you do not want to create an online spare, you can return to the previous screen without saving the configuration by pressing **Esc**.

6. If you want to make the selected physical device an online spare, type <**o**>. Press **Enter**. The following screen appears.

Create Online Spare
Reset Controllers Screen

A prompt notifies you that the device (configuration) is saved as an online spare, and asks if you want to reset the controllers.

7. To reset the controllers, type **<y>**. Press **Enter**. The controllers immediately reset after pressing **Enter**.

   NOTE: Depending on the drive spin up settings, a controller reset can take several minutes to complete.

8. After the controllers have finished resetting, the `STARTUP COMPLETE` message appears. Restart the embedded configuration utility by typing the *Break* command.

SANmapping™

SANmapping™ enables you to define LUN assignments and whether a logical device is accessible by one or both host ports on a single controller, or accessible by all host ports on all controllers in a dual-active controller system. Using SANmapping™ you can also define which host(s) has access to a specific logical device in a multi-host, or SAN (Storage Area Network) environment.

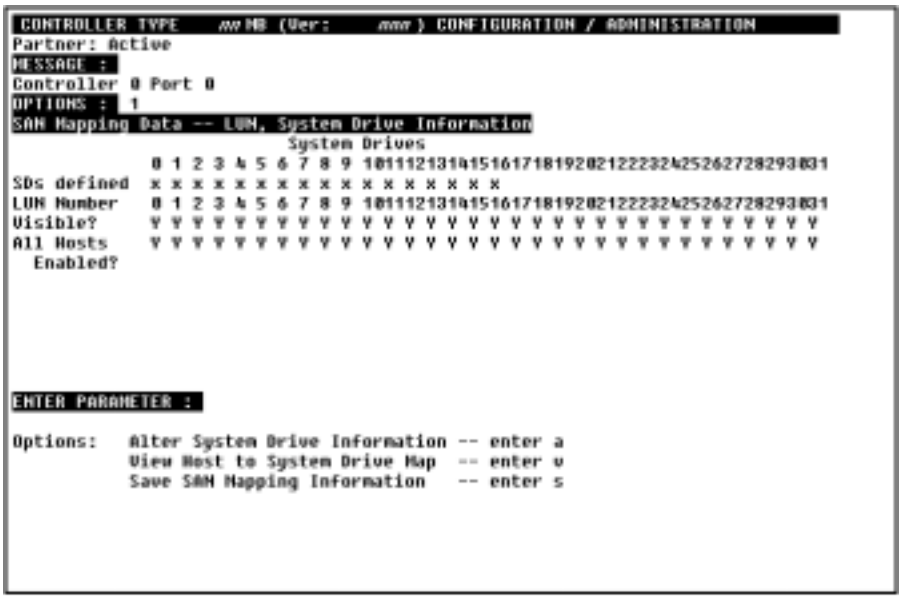
You can use the SANmapping™ function in the embedded configuration utility to alter, view, or save SANmapping™ information. The first time you create SANmapping™ information, you will follow the procedure for altering SANmapping™ information.

1. Select SANmapping™ from the Main Menu by typing <**1**>. Press **Enter**. The following screen appears.

SANmapping™
Enter Controller/Host Port Combination Screen

Use this screen to select the controller and port for which you want to create a new SAN map. To return to the previous screen, press **Esc**.

2. Select the controller/host port combination for which you want to create a new SAN map by typing the controller port combination number. Press **Enter**. The following screen appears.



SANmapping™
Enter SANmapping™ Action Screen

This screen shows a LUN, System Drive Information table listing the current system drive information including which system drives have been defined, the LUN number, whether this system drive is visible through the controller/host port combination, and whether this system drive is accessible to all hosts.

To return to the previous screen, press **Esc**.

Continue with Step 3 for instructions on how to alter the current LUN and system drive information. (To set up a new SAN .map, follow the same steps as altering existing SAN map information.)

Go to Step 7 for instructions on how to view the current host-to-system drive table.

Go to Step 12 for instructions on how to save SANmapping™ information.

3. To alter the current LUN and system drive information, type <**a**>. Press **Enter**. The following screen appears.

SANmapping™
Enter System Drive Screen

Use this screen to select the system drive you want to map. To return to the previous screen, press **Esc**.

4. Type the system drive number for which the SANmapping™ is to be altered. Press **Enter**. The following screen appears.

SANmapping™
Enter LUN Number Screen

Use this screen to enter the LUN number for this system drive. To return to the "SANmapping™ Enter SANmapping™ Action Screen" on page 2-24, press **Esc**.

5. Type the LUN number for this system drive. Press **Enter**. The following screen appears.

SANmapping™
Enter Visibility Screen

Use this screen to set the Visibility for this system drive. By default all system drives are visible to all hosts. To return to the "SANmapping™ Enter SANmapping™ Action Screen" on page 2-24, press **Esc**.

If you want to make a system drive "invisible" type <**n**> and press **Enter**. A screen similar to the following appears. This screen shows that system drive 1 is now "invisible," as indicated by the letter N in the column. Also, the screen shows that system drive 1 is no longer accessible by all hosts, as indicated by the blank position in the column.

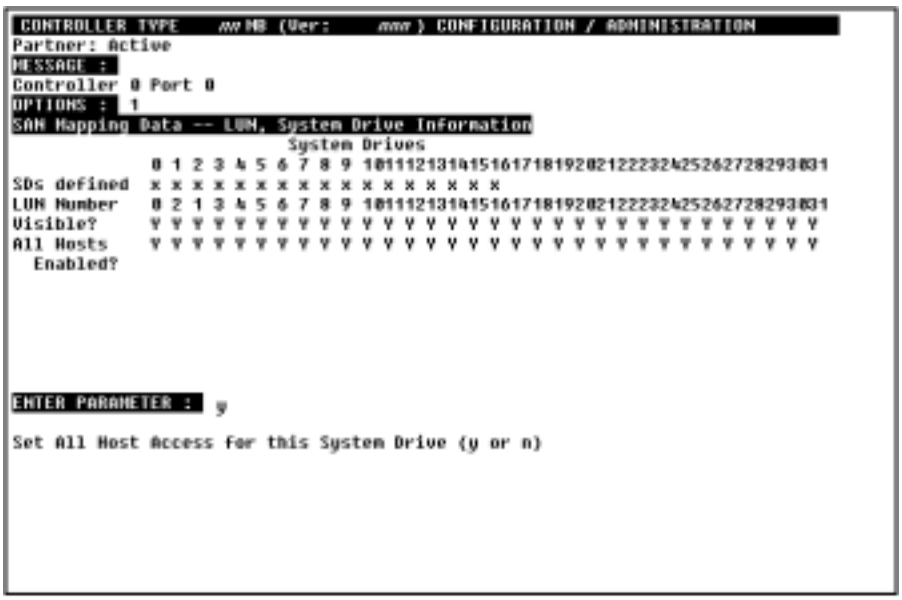
SANmapping™
Visibility Set to N for System Drive 1

If you have an array in which drives are already set to "invisible," the "Enter Lun Number" screen appears similar to the following.

SANmapping™
Enter LUN Number Screen
With Invisible System Drives

Type the system drive number. Press **Enter**. If you want to make a system drive ”visible” type <**y**> and press **Enter**.

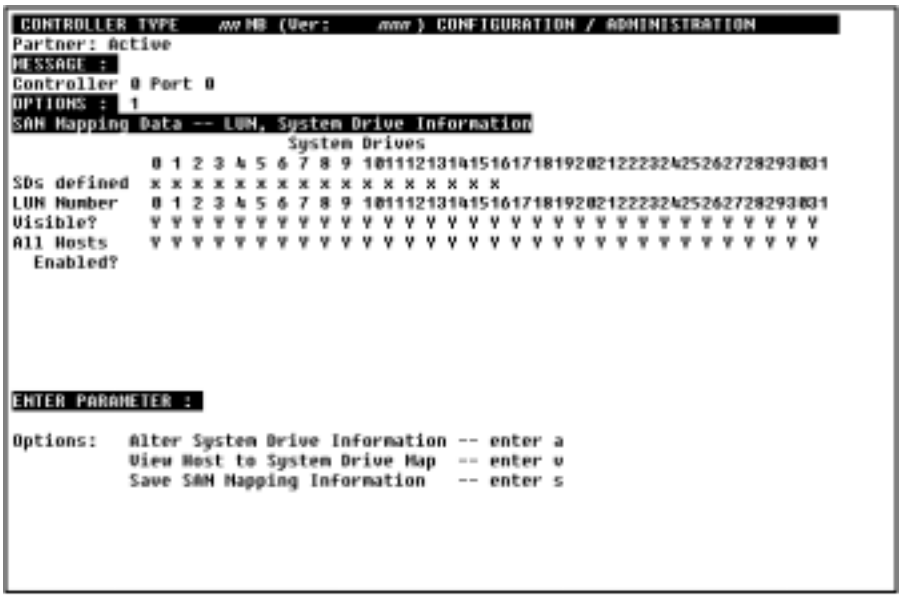
After you set system drive visibility, A screen similar to the following appears.



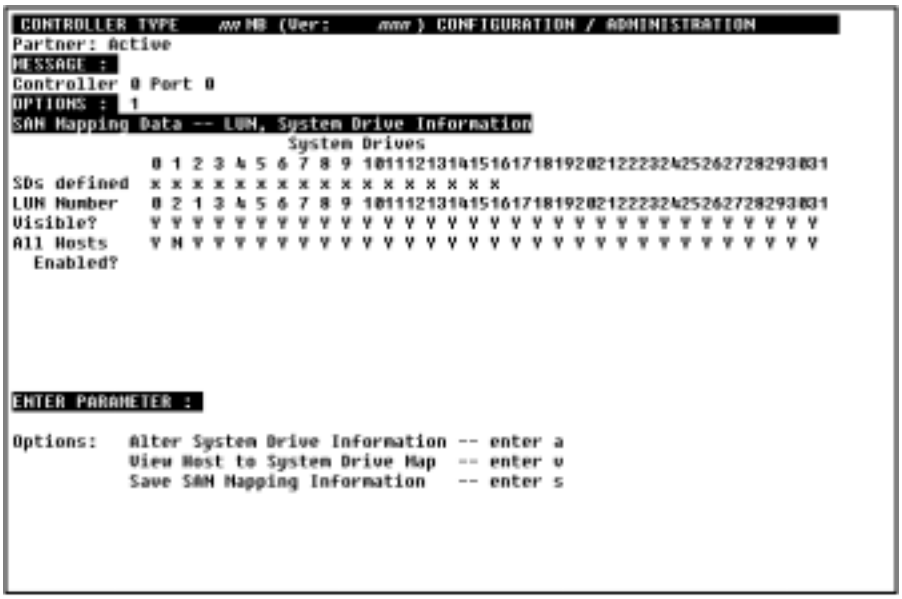
SANmapping™
Set All Host Access Screen

Use this screen to set host accessibility. If you do not want to set accessibility, press **Esc** to return to "SANmapping™ Enter SANmapping™ Action Screen" on page 2-24.

6. To set accessibility for this system drive to all hosts, type <**y**>. Press **Enter**. The following screen appears.



SANmapping™
Accessibility Set to Y for System Drive 1

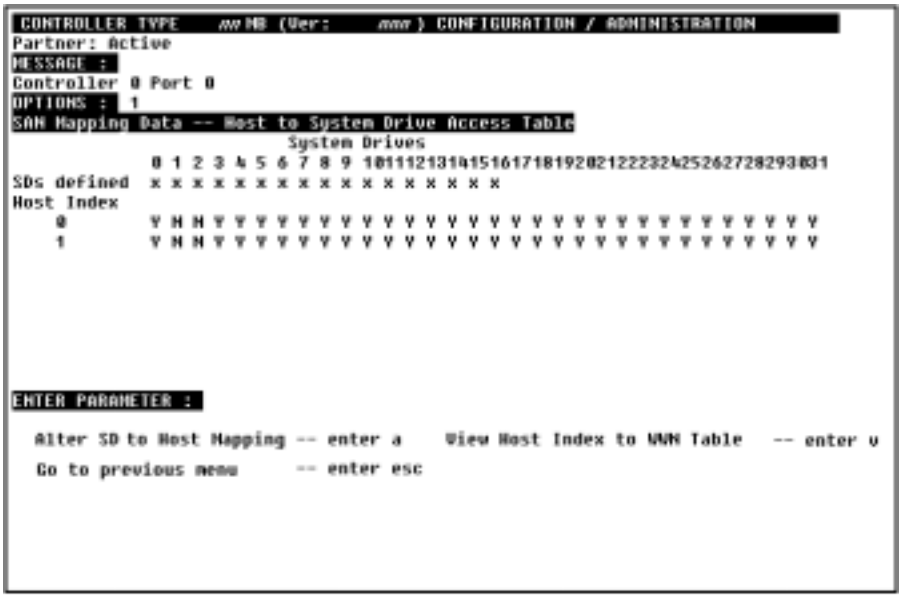


SANmapping™
Accessibility Set to N for System Drive 1

From either of these screens you can make additional changes to LUN mapping for other system drives, view the host-to-system drive map, or to save the SANmapping™ information.

You must save the SANmapping™ information before it can take effect. To leave these screens without saving SANmapping™ information changes, press **Esc**. The "SANmapping™ Enter Controller/Host Port Combination Screen" on page 2-24 appears.

7. To View the Host to System Drive Map, type <**v**>. Press **Enter**. The following screen apprears.



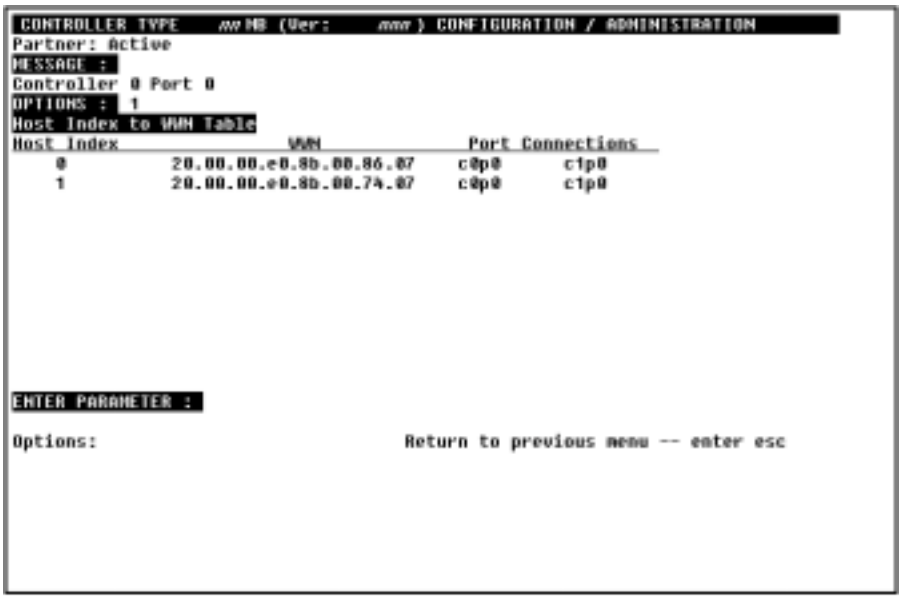
SANmapping™
View Host-to-System Drive Access Table

This screen shows a table of how the hosts are mapped to the system drives. The system drive identification numbers (0 through 31) are listed across the top of the table. (The system drive identification numbers are also called logical drive unit numbers [LUNs].) An "x" below the system drive identification number (LUN) indicates that the system drive is assigned. The hosts are listed down the left column of the table (Host Index). The controllers are capable of supporting up to 64 host initiators, however, the embedded configuration utility currently only supports up to eight hosts. A "Y" indicates that a host can access the system drive; an "N" indicates a host cannot access the system drive.

To return to the previous screen, press **Esc**.

To alter the current host-to-system drive mapping, continue with Step 8.

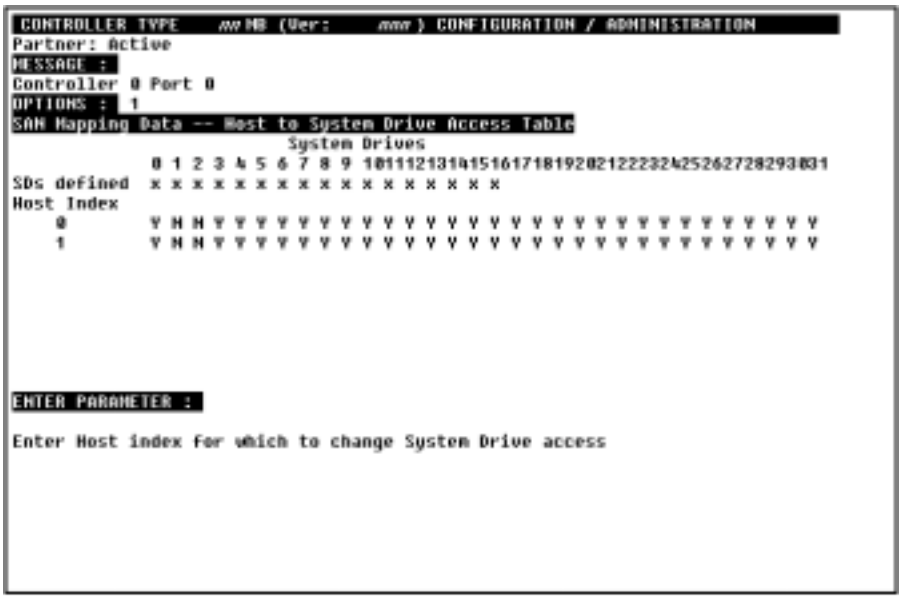
To view the host index-to-WWN table, type **<v>**. Press **Enter**. The View Host Index-to-WWN Table includes the Host Index number, the Host WWN identifier, and the controller/host port connections associated with that host. This table is recreated every time the configuration is cleared.



SANmapping™
Host Index to WWN Table Screen

After viewing the Host Index to WWN table, press **Esc** to return to the previous screen.

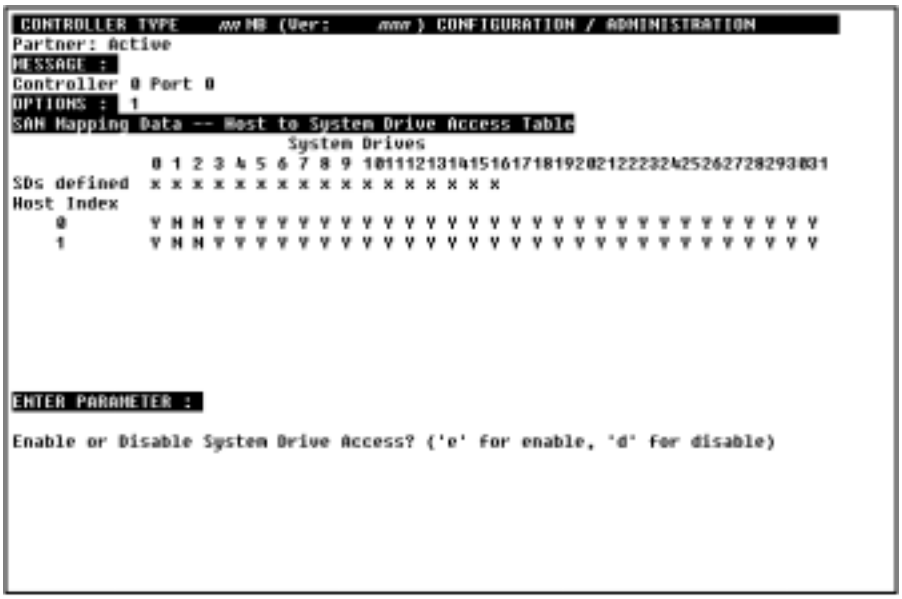
8. To alter the host-to-system drive mapping, from the "SANmapping™ View Host-to-System Drive Access Table" on page 2-30 type <**a**>. Press **Enter**. The following screen appears.



SANmapping™
Enter Host Index Screen

Use this screen to choose the host for which the mapping to a system drive will be altered. To return to the previous screen, press **Esc**.

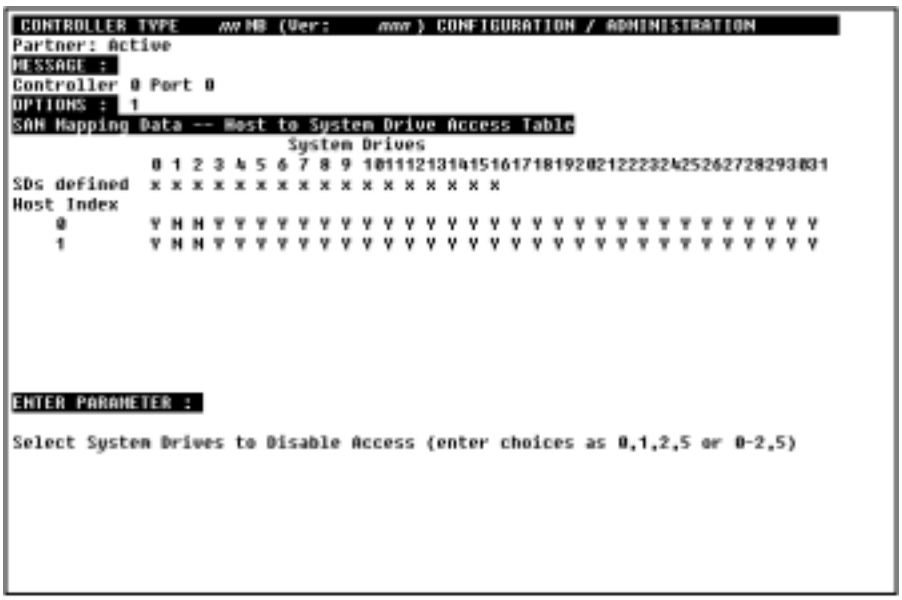
9. Type the number of the host, listed in the Host Index column, for which system drive access is to be changed. Press **Enter**. The following screen appears.



SANmapping™
Enable or Disable System Drive Access Screen

If you do not want to change the system drive access, press Esc to return to "SANmapping™ View Host-to-System Drive Access Table" on page 2-30.

10. To enable system drive access type <**e**>; to disable system drive access type <**d**>. Press **Enter**. The following screen appears.



SANmapping™
Select System Drive Screen

Use this screen to select the system drive for which access will be enabled or disabled. Pressing **Esc** at this time will take you completely out of the SANmapping™ function and return you to the Main Menu. Any changes you have made will not be saved.

11. Type the number of the system drives for which you want to change access status. Press **Enter**. The following screen appears.

SANmapping™
Enter SANmapping™ Action Screen

12. To save SANmapping™ information, type <**s**>. Press **Enter**. The SANmapping™ information is saved and takes effect immediately.

    To return to the "SANmapping™ Enter Controller/Host Port Combination Screen" on page 2-24 without saving any changes, press **Esc**.

Initialize Logical Devices

Mylex recommends initializing the new logical devices, or system drives, before using them. The initialization process aligns the drives and sets the parity on RAID 3 and 5 arrays.

ATTENTION: Failure to initialize a newly created or modified logical device can result in loss of data.

NOTE: **Dual-active only.** The logical device must be initialized from the controller to which it has been assigned.

Start Foreground Initialization

To perform an initialization:

1. Select Start or Stop Long Ops from the Main Menu by typing **<3>**. Press **Enter**. The following screen appears.

Start or Stop Long Operations Screen

To return to the Main Menu, press **Esc**.

2. Select Start Foreground Initialization by typing **<0>**. Press **Enter**. The following screen appears.

Start Foreground Initialization
Enter System Drive Screen

To return to the previous screen, press **Esc**.

3. Enter the system drive number that you would like to initialize. Press **Enter**. The following screen appears.

Start Foreground Initialization
Successfully Started Screen

ATTENTION: Selecting **Yes** immediately begins the initialization function. Initializing the wrong system drives results in data loss.

The foreground initialization starts immediately. The option prompt indicates that the initialization has started successfully. The message line provides a progressive report on the percentage of initialization completed. When foreground initialization has finished, the message line indicates that initialization has completed as shown in the following screen.

Start Foreground Initialization
Completed Screen

4. Press any key to continue. Select additional system drives for initialization as described in Step 3.
5. Press **Esc** to return to the Main Menu.

Stop Foreground Initialization

To stop a foreground initialization that is in progress:

1. From the Start or Stop Long Ops screen, select Stop Foreground Initialization by typing <**1**>. Press **Enter**. The following screen appears.

Start Foreground Initialization
Stopped Screen

The foreground initialization stops immediately.

2. Press **Esc** to return to the Main Menu.

CHAPTER 3
Array Management and Configuration Editing

This chapter provides instructions for managing and editing a disk array configuration. The instructions are presented in the sequence listed under “Options” in the Main Menu.

NOTE: In the instructions in this chapter, the number of physical and logical devices shown in the screen captures are used as an example configuration to show the embedded configuration utility features. These examples may not reflect your system or configuration.

Main Menu

Configure, Check Drive States

The Configure, Check Drive States menu provides options for viewing, creating, and deleting a configuration. This menu also provides options for changing device states, searching for devices, and adding a logical device to an existing, configured pack.

View Current Configuration

Whether you are creating a new configuration or modifying an existing configuration, viewing the current configuration provides you with useful information. Viewing the current configuration provides information about physical devices and logical devices used in the configuration.

To view the current configuration:

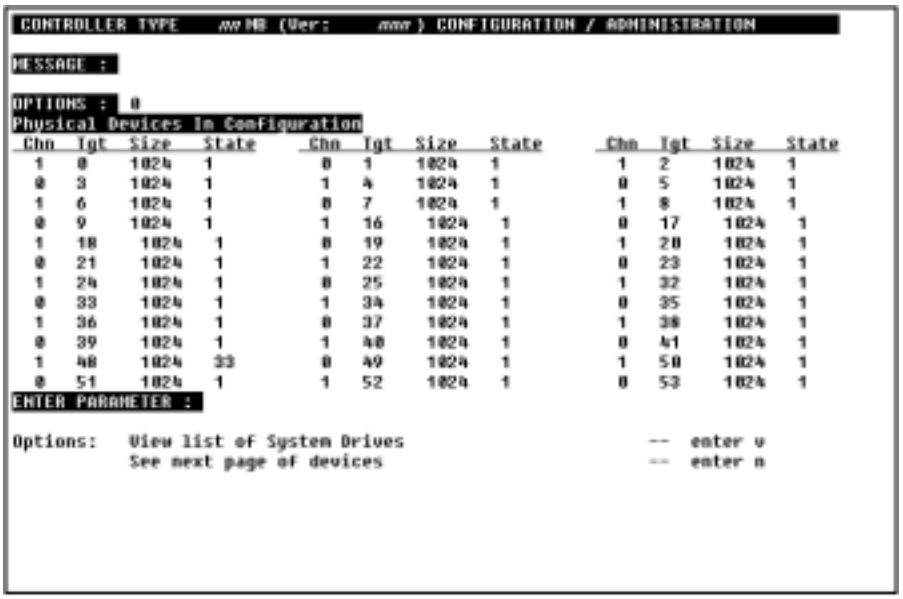
1. Select Configure, Check Drive States from the Main Menu by typing **<0>**. Press **Enter**. The following screen appears.

Configure, Check Drive State Screen

2. Select View Current Configuration by typing **<0>**. Press **Enter**. If no configuration is available, the following message appears at the bottom of the screen:

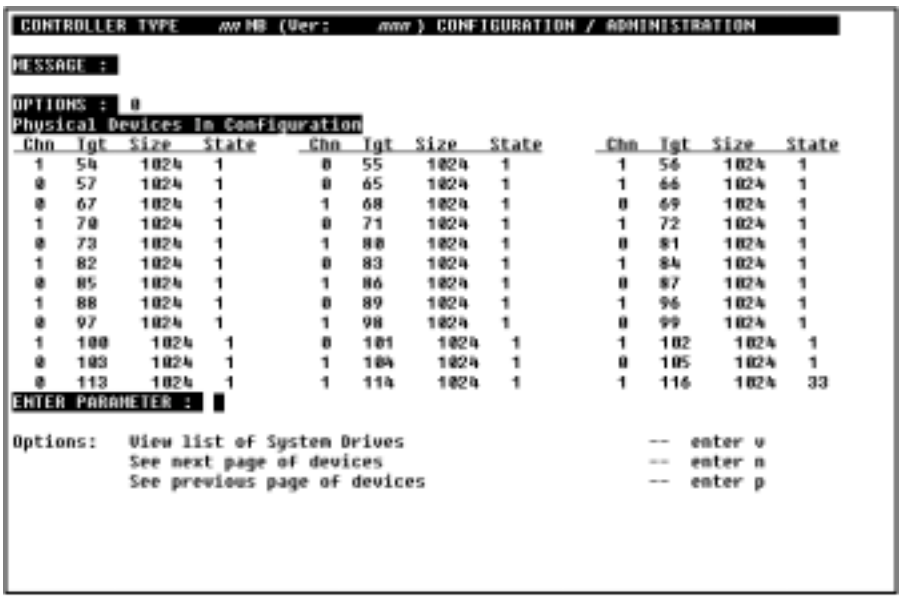
   No configuration available
   Press any key to continue

   If a configuration has been previously defined, the "View Configuration Physical Devices in Configuration, First Screen" on page 3-3 appears. This screen lists the physical devices used in the current configuration. This list can extend over several screens depending on the number of devices associated with this system. This information includes channel ID, target ID, device size (MB), and the device state. (Refer to "Show Drives, Change Drive State" on page 3-9 for more information on device states.)

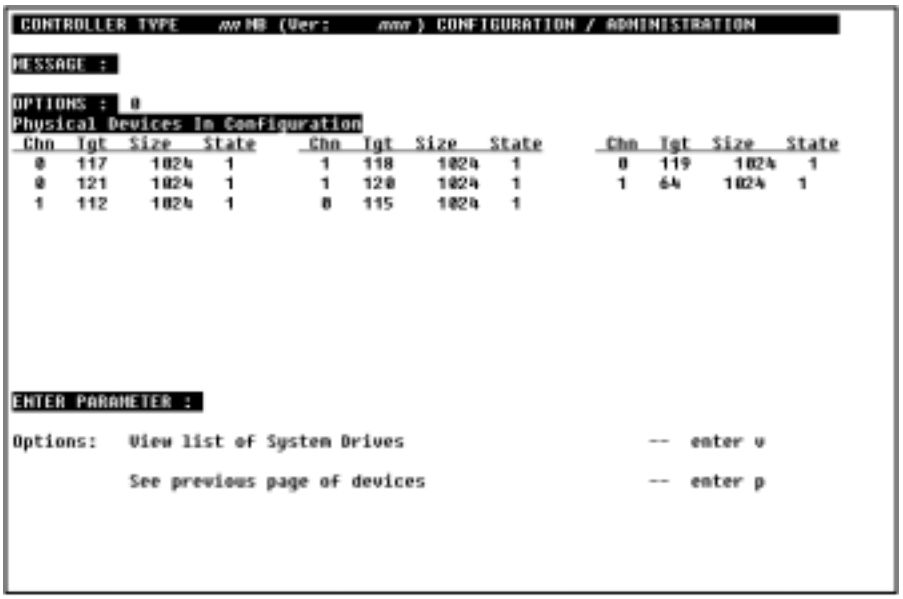


View Configuration
Physical Devices in Configuration, First Screen

3. Navigate through the screens, by typing <**n**> for next page of devices or <**p**> for previous page. Press **Enter**.



View Configuration
Physical Devices in Configuration, Second Screen



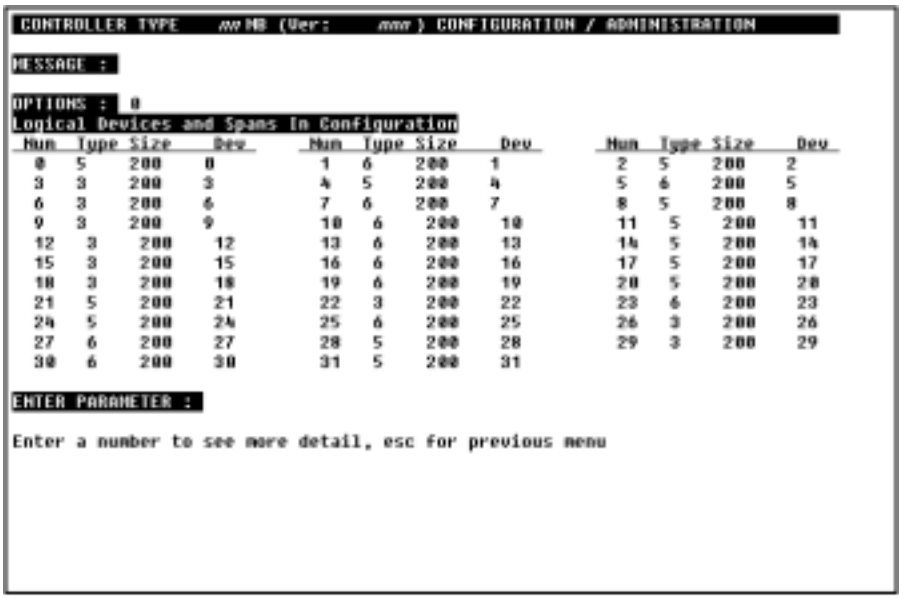
View Configuration
Physical Devices in Configuration, Final Screen

When all the physical drives in a configuration can be listed on a single "View Configuration, Physical Devices in Configuration" screen the following prompt appears at the bottom of the screen:

Display System Drives in this Configuration? (enter y or esc for previous menu)

When this message appears, type **<y>** then press **Enter** to see the system drives (logical devices) in the configuration.

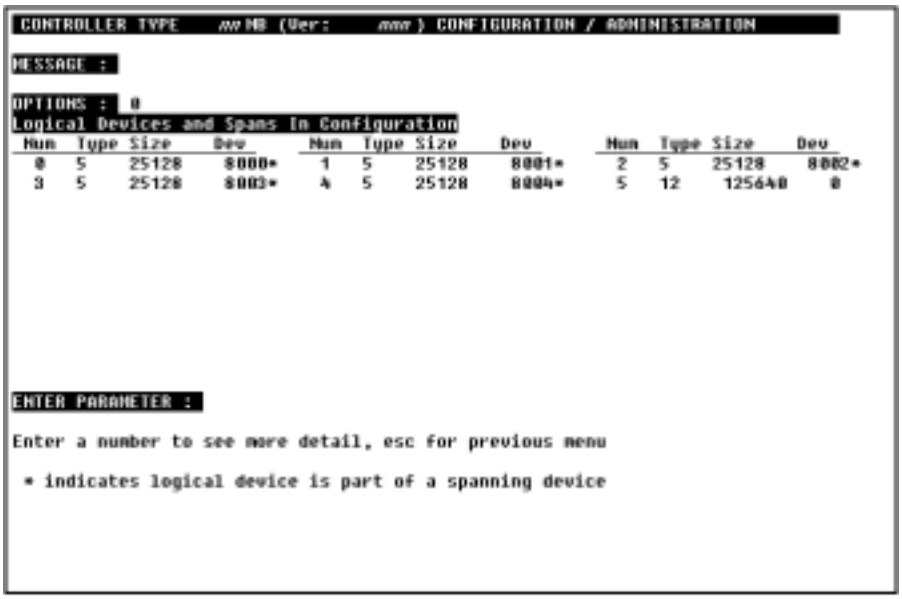
4. View the system drives associated with the physical devices in the configuration by typing **<v>**. Press **Enter**. The following screen appears.



View Configuration
Logical Devices in Configuration Screen

A list of system drives (logical devices) is created from the previously displayed physical devices. This information includes logical device number (arbitrarily set for embedded configuration utility selection purposes), RAID type, virtual size (MB), and RAID device number. The RAID device number is assigned by the firmware and is related to the RAID device type. For more information on RAID devices, refer to the *Firmware/Software Interface Reference Manual*, PN 775067.

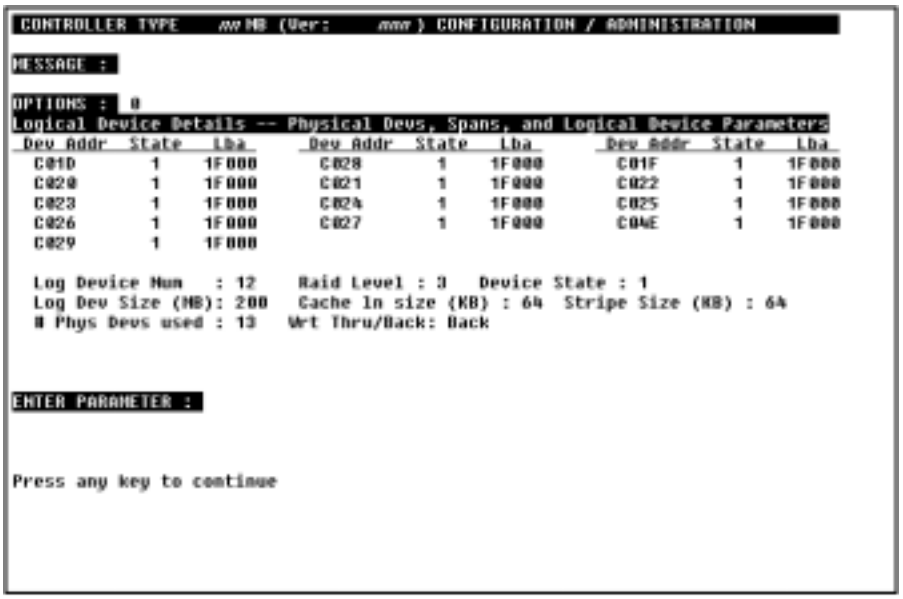
If spanned system drives exist in the configuration, a screen similar to the following appears.



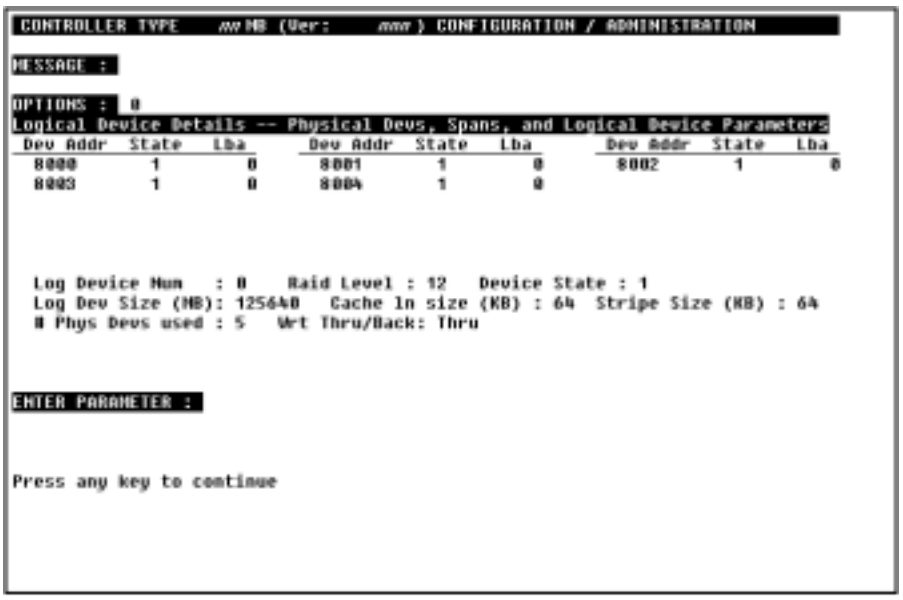
View Configuration
Logical Devices with Spans in Configuration Screen

Spanned logical devices are indicated by an asterisk (*), and have a RAID device number starting at 8000. Creating spanned logical devices is currently not supported through the embedded configuration utility; however, the embedded configuration utility recognizes spanned logical devices that have been created using other configuration tools. (For more information on spanning, refer to the *Encyclopedia of Controller Fundamentals and Features*, PN 775041.)

5. To view more information about individual logical devices or spanned logical devices, type the logical device number (Num). Press **Enter**. For configurations without spanned drives, a screen similar to the “View Configuration Logical Device Details Screen” on page 3-7 appears. For configurations with spanned drives, a screen similar to the “View Configuration Spanned Logical Device Details Screen” on page 3-7 appears.

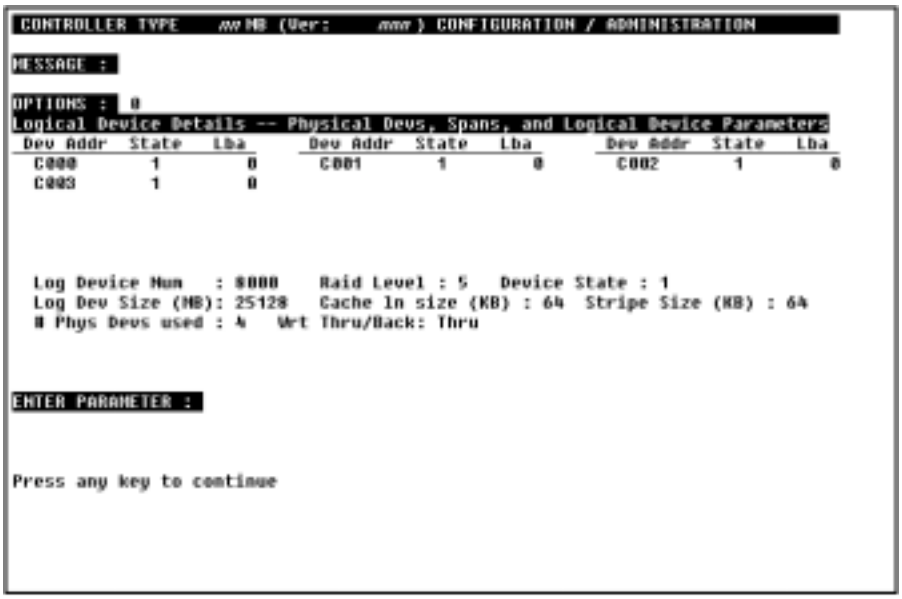


View Configuration
Logical Device Details Screen



View Configuration
Spanned Logical Device Details Screen

6. For spanned configurations: To view more information about a specific logical device within the spanned logical device, type the device address number (Dev Addr). Press **Enter**. The following screen appears.



View Configuration
Logical Devices Within a Span Details Screen

The information shown in the "detail" screens is presented in two parts: a table of physical device or spanned logical device information, and a list of detail information for the specified physical or logical device. The following table defines the information shown on the screens.

Physical Device/Spanned Logical Device Information	
Dev Addr Device Address	This is a RAID device number randomly assigned to the physical devices that make up this logical device. For spanned logical devices, this is a RAID device number randomly assigned to the logical devices that make up the spanned logical device.
State Device State	This represents the physical device state (such as unconfigured offline or online optimal). (Refer to "Show Drives, Change Drive State" on page 3-9 for more information.)
Lba	This represents the logical block address of the physical device where the logical device begins.
Detail Information for a Specific Logical Device	
Logical Device Number	This is the randomly assigned RAID device number associated with this device.
RAID Level	This represents a valid RAID level. RAID level 12 represents a spanned configuration.
Device State	This represents the logical device state (such as offline failed or online optimal). (Refer to "Show Drives, Change Drive State" on page 3-9 for more information.)
Log Dev Size Logical Device Size	This is the size, in MB, assigned to this logical device when the logical device was originally configured.

Cache In size Cache Line Size	This represents the size of the data "chunk," in KB, that can be read or written at one time and is based on the stripe size.
Stripe Size	This is the stripe size, in KB, assigned to the configuration when the logical device was origifnally configured.
# Phys Devs used Number of Physical Devices Used	This is the number of physical devices assigned to this logical device. For spanned logical devices, this is the number of individual logical devices used to create the spanned logical device.
Wrt Thru/Back Write Policy	This indicates whether write-through or write-back caching is used for writing data to disk.

7. To repeat Step 5 for detail information about other logical devices, press any key. For nonspanned logical device configurations, the "View Configuration Logical Devices in Configuration Screen" on page 3-5 appears. For spanned logical device configurations the "View Configuration Logical Devices with Spans in Configuration Screen" on page 3-6 appears.

   Press **Esc** twice to return to the "Configure, Check Drive State Screen" on page 3-2.

Create New Disk Packs

The Create New Disk Packs function combines selected physical devices into a device group. The device group can be divided into one or more logical devices, each with its own RAID level, write policy, and capacity. Logical devices can be created until the maximum capacity of the device group is fully used or 32 logical devices are defined. (Refer to "Create New Disk Packs" on page 2-10 for more information.)

Clear Configuration

If you want to create a new configuration, but another configuration already exists, you need to clear the existing configuration before creating a new configuration. (Refer to "Clear Configuration" on page 2-8 for more information.)

ATTENTION: Data on the drives is destroyed when the configuration is cleared.

Show Drives, Change Drive State

The Show Drives, Change Drive State function enables you to:

- View the current logical device and physical device states
- Change the current physical device state

Occasions arise when it is necessary to change the state of a physical device. Some examples are given in the "Commonly Used Procedures and Troubleshooting Guide" on page 1-5. When you change the state of a physical device, you also change the state of the logical device that contains the physical device. For example, if you change a physical device state from online to offline the logical device state is also changed to offline.

You can also use the Change Drive State function to recover from accidental physical device state changes. If you change a failed physical device to an online state by mistake, data integrity can be compromised.

The controller stores the state of the attached drives in its nonvolatile memory as well as on the disks. This information is retained even after power is turned off.

Possible devices states are described in Table 3-1 on page 3-10.

ATTENTION: Changing the state of a drive can result in data loss.

Table 3-1. Possible Device States

Device State	Physical Device	Logical Device	Description of Device State
0	Unconfigured Offline	Offline Failed	Physical Device: The device has been inserted and powered on into an unconfigured slot, or the configuration has just been cleared. The device is not part of a configuration. Logical Device: The logical device has suffered failures that exceed the limit for the configured RAID level.
1	Online Optimal	Online Optimal	Physical Device: The device is powered on, part of a configuration, and functioning normally. Logical Device: All devices associated with the configured logical device are powered on and functioning normally.
3	Online Rebuild	Not Applicable	The device is powered on, part of a configuration, and in the process of being rebuilt.
8	Offline Failed	Online Critical	Physical Device: The device has failed to operate properly. Logical Device: The logical device has suffered a device failure within the limit for the configured RAID level.
9	Not Applicable	Online Critical and Rebuilding	The logical device is in the process of rebuilding a failed device.
33 (21h)	Online Spare	Not Applicable	The device is part of a configuration and operating as a spare drive and will be used for automatic rebuild.
NA	Not Approved by Vendor	Not Applicable	The device is not a supported drive type.

To display the devices and change device states:

1. Select Configure, Check Drive States from the Main Menu by typing **<0>**. Press **Enter**. The following screen appears.

Configure, Check Drive State Screen

2. Select Show Drives, Change Drive State by typing **<3>**. Press **Enter**. The following screen appears.

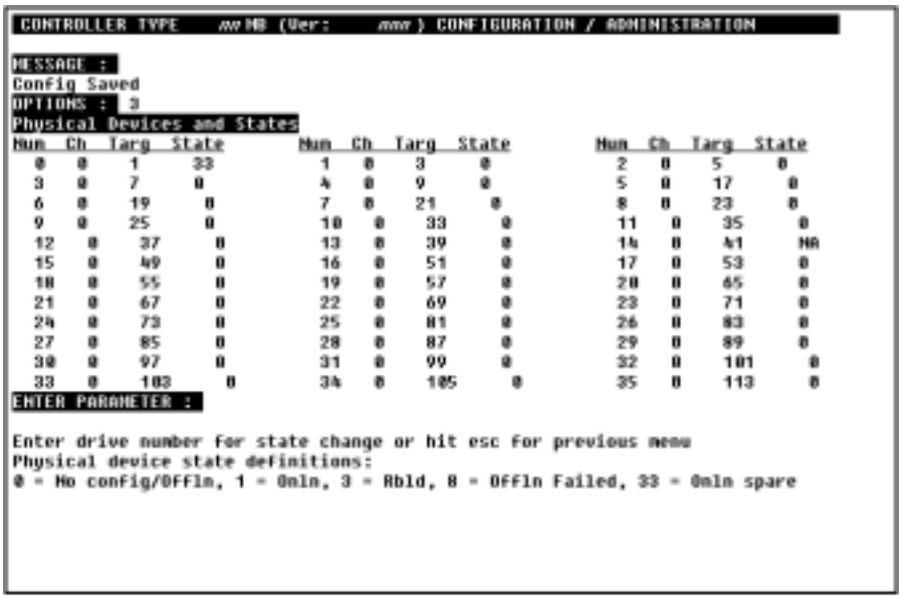
Show Drives, Change Drive State
Select Device Type Screen

3. To see the logical device state, type **<l>**. Press **Enter**. The following screen appears.

Show Drives, Change Drive State
Logical Device States Screen

A list of logical devices and associated device states appears. If logical devices have not yet been created, the Logical Devices and States list is blank. A list of possible logical device state definitions is shown below the command line. A message serves to alert you that logical device states cannot be changed through this screen. To change the logical device state you must change the physical device state.

4. Press any key to return to the “Show Drives, Change Drive State Select Device Type Screen” on page 3-11.
5. To view or change the physical device state, type **<p>**. Press **Enter**. The following screen appears.



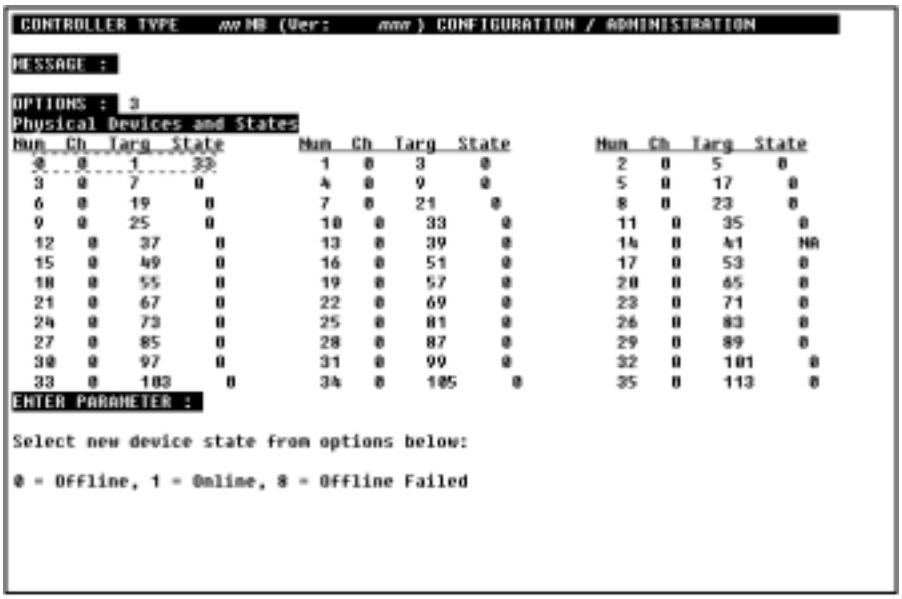
Show Drives, Change Drive State
Physical Device States Screen

A list of physical devices appears. This list includes an arbitrarily assigned device number, channel ID, target ID, and the device state. A list of possible device states is shown below the command line.

6. Type of number of the device (Num) whose state you want to change.

   NOTE: The device state for only one device can be changed at a time.

   Press **Enter**. The following screen appears.



Show Drives, Change Drive State
Enter New Device State Screen

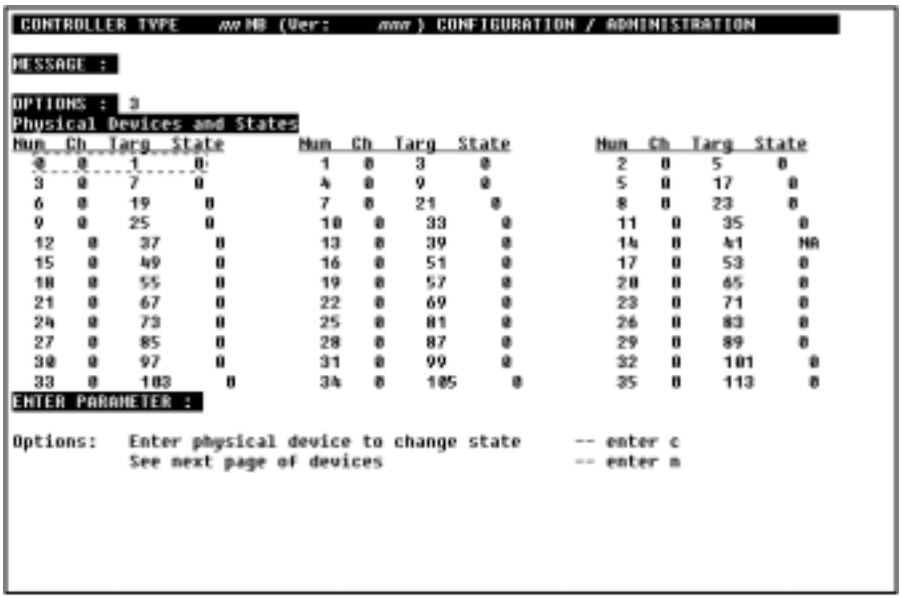
A prompt at the bottom of the screen asks you to select a new device state. Below the prompt is a list of possible device states.

If you enter a device number that is not listed, the following error message appears:

> Selection out of range, choose again
> Press any key to continue

Press any key and you return to the “Show Drives, Change Drive State Physical Device States Screen” on page 3-13 and you can re-enter the device number.

7. Type the number (0, 1, or 8) for the new device state. Press **Enter**. The embedded configuration utility immediately changes the state of the physical device. The following screen appears.



Show Drives, Change Drive State
Device State Changed Screen

This screen shows the new device state. You can make additional device state changes by typing **<c>** and pressing **Enter**.

8. Press **Esc** when finished changing device states to return to the "Configure, Check Drive State Screen" on page 3-2.

Search for Physical Devices

The Search for Physical Devices function performs a search for new devices. This feature is used for controllers with a SCSI drive interface. Controllers with a fibre channel drive interface are scanned regularly for new devices through SES and SAF-TE devices. The Search for Physical Devices is invoked immediately and does not return any status.

Add Logical Drive to Existing Physical Device Packs

The Add Logical Drive to Existing Physical Device Packs function enables you to create a new logical device with unused space available on configured device packs. If you attempt to add a logical device before any device packs have been configured, the following message appears at the bottom of the "Configure, Check Drive State" screen:

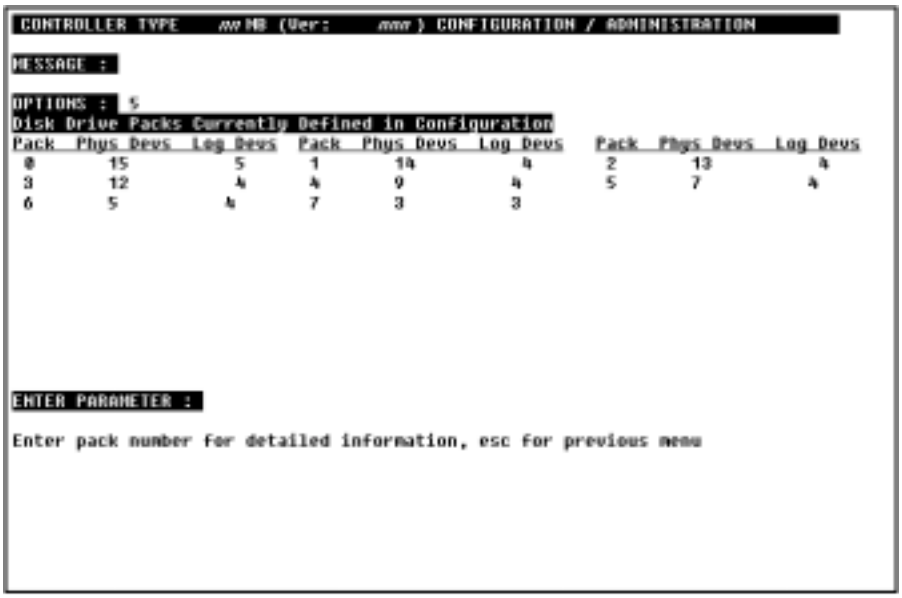
No Packs Found
Press any key to continue

To Add Logical Drives to Existing Physical Device Packs:

1. Select Configure, Check Drive States from the Main Menu by typing **<0>**. Press **Enter**. The following screen appears.

Configure, Check Drive State Screen

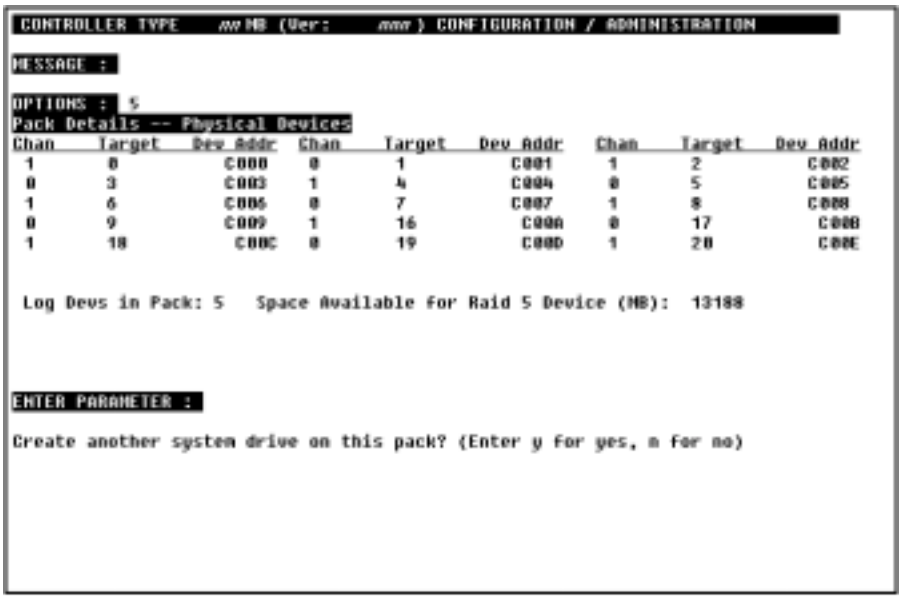
2. Select Add Logical Drive to Existing Physical Device Packs by typing **<5>**. Press **Enter**. The following screen appears.



Add Logical Drive to Existing Physical Device Packs
Currently Defined Disk Drive Packs Screen

The screen shows a list of disk drive packs currently defined in the configuration. The information includes the pack number, the number of physical devices in the pack and the number of logical devices associated with the pack.

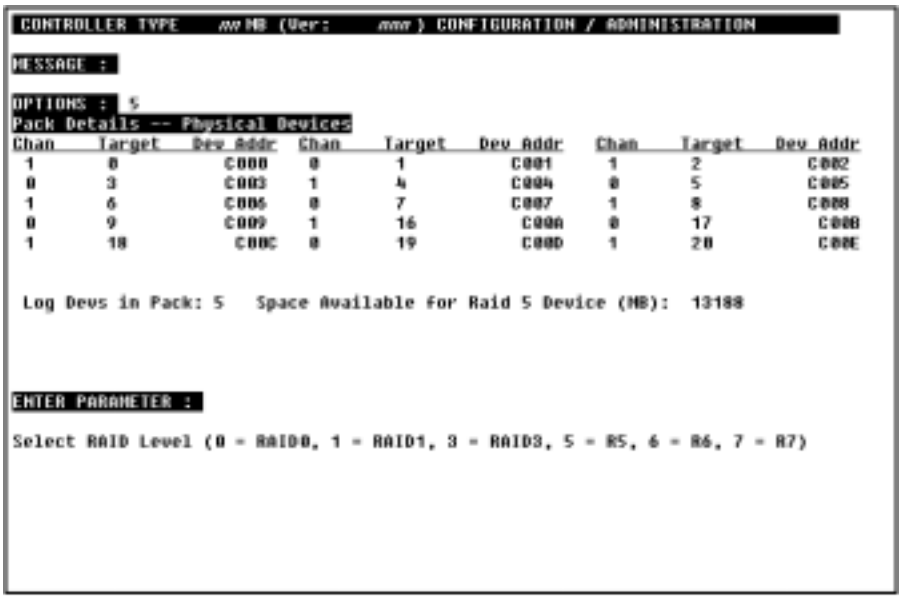
3. For more information on a specific pack, type the pack number. Press **Enter**. The following screen appears.



Add Logical Drive to Existing Physical Device Packs
Create Another System Drive Screen

A list of physical devices associated with the drive pack appears. The list includes channel ID, target ID, and RAID device address information for each physical device. Logical device information also appears, including the number of logical devices in the pack and the amount of space (in MB) available for additional *RAID n* devices. The *RAID n* device is the RAID level of the last logical device defined in the device pack. Although logical devices can have only one RAID level, RAID levels can be mixed within a device pack. Possible combinations include RAID 3 and RAID 5, RAID 5 and RAID 0+1 (Mylex 6), and RAID 3 and RAID 0+1. Refer to Table 2-2 on page 2-14 for a description of Mylex supported RAID levels. (Refer to the *Encyclopedia of Controller Fundamentals and Features*, PN 775041 for more information on RAID levels and device packs.)

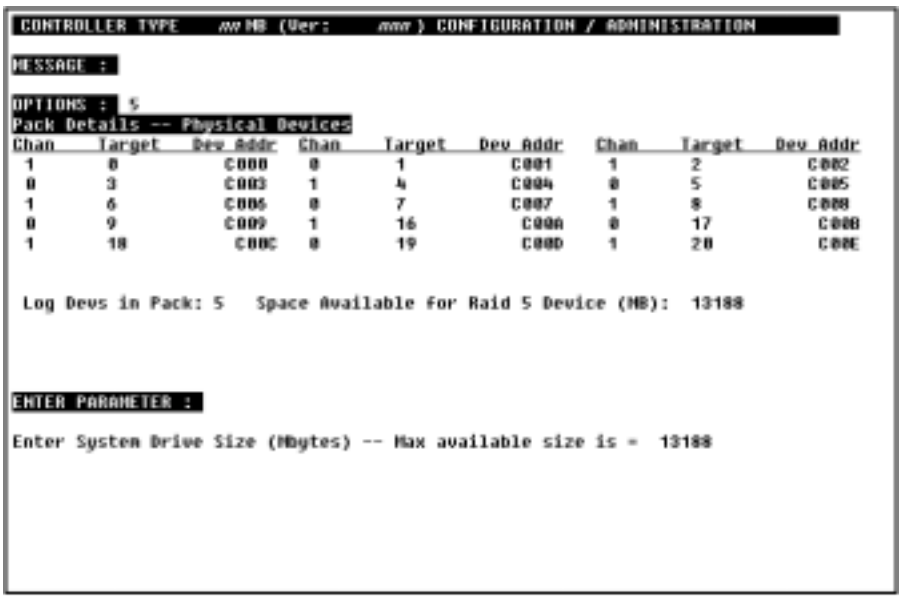
4. Type <**n**> to return to the previous menu or <**y**> to create another system drive (logical device). Press **Enter**. The following screen appears.



Add Logical Drive to Existing Physical Device Packs
Select RAID Level Screen

A prompt at the bottom of the screen asks you to select a RAID level. Values for possible RAID levels are listed.

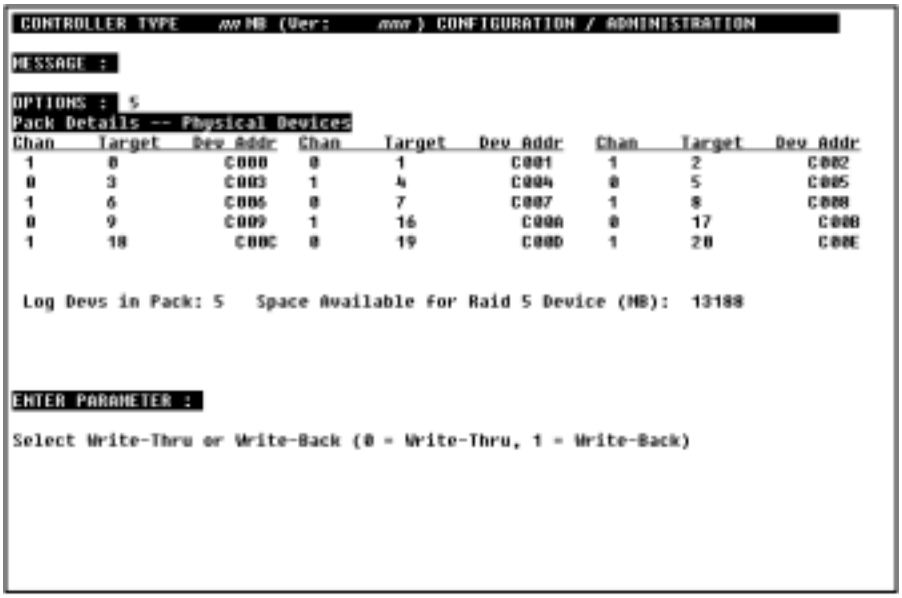
Type the number (0, 1, 3, 5, 6, or 7) for the RAID level. Press **Enter**. The following screen appears.



Add Logical Drive to Existing Physical Device Packs
Enter Logical Device Size (MB) Screen

A prompt at the bottom of the screen asks you to enter a system drive (logical device) size.

5. Type the value (in megabytes) for the system drive size. Press **Enter**. The following screen appears.



Add Logical Drive to Existing Physical Device Packs
Select Write Policy Screen

A prompt at the bottom of the screen asks you to select the write policy for the logical device. The write policy determines the caching strategy for write operations. “Write-Thru” writes data to the device before returning completion status to the host. “Write-Back” returns a completion status to the host as soon as the cache receives the data. The target device receives the data at a more appropriate time. (For more information, refer to the *Encyclopedia of Controller Fundamentals and Features*, PN 775041.)

6. Type the number (0 or 1) for the write policy. Press **Enter**. The following screen appears.

Add Logical Drive to Existing Physical Device Packs
Confirm Addition of System Drive to Configuration Screen

The information on this screen includes the logical device number, the RAID level, the logical device state, the logical device size (MB), the stripe size (KB), the number of physical devices used, and the write policy.

7. To add this system drive (logical device) to the configuration and save the changes, type **<y>**; if not, type **<n>**. Press **Enter**. The embedded configuration utility immediately saves the new configuration and displays the message shown in the following screen.

Add Logical Drive to Existing Physical Device Packs
Reset Controllers Screen

The message notifies you that the configuration is saved, and asks you to reset the controllers. You do not need to reset the controllers to make the new configuration operational. The new configuration is operational as soon as it is saved.

8. To reset the controllers, type **<y>**. Press **Enter**. The controllers immediately reset.

   NOTE: Depending on the drive spin up settings, a controller reset can take several minutes to complete.

9. After the controllers finish resetting, the `STARTUP COMPLETE` message appears. Restart the embedded configuration utility by entering the *Break* command.

SANmapping™

SANmapping™ enables you to define complex LUN assignments. SANmapping™ defines whether a logical device is accessible through one or both host ports on a single controller, or accessible through all host ports on all controllers in a dual-active controller system. SANmapping™ also defines which hosts have access to a specific logical device in a multi-host environment. (Refer to "SANmapping™" on page 2-23 for more details.)

Information and Parameters

The Information function provides information about the controllers, physical devices, and logical devices including device states, firmware versions, drive size, number of devices present, channel IDs, and target IDs. All values shown on the screens are information only and cannot be changed through these screens; however, the information can be useful for creating or editing a configuration.

The Parameter function provides changeable settings that affect the operation of the controller. Each Mylex controller is shipped from the factory with initial settings that have been found to work well in a majority of applications and environments. These settings are listed as the controller, logical device, and physical device parameter default settings and vary depending on the product and user requirements. User requirements are not always the same as the suggested default settings, so you may want to modify certain settings.

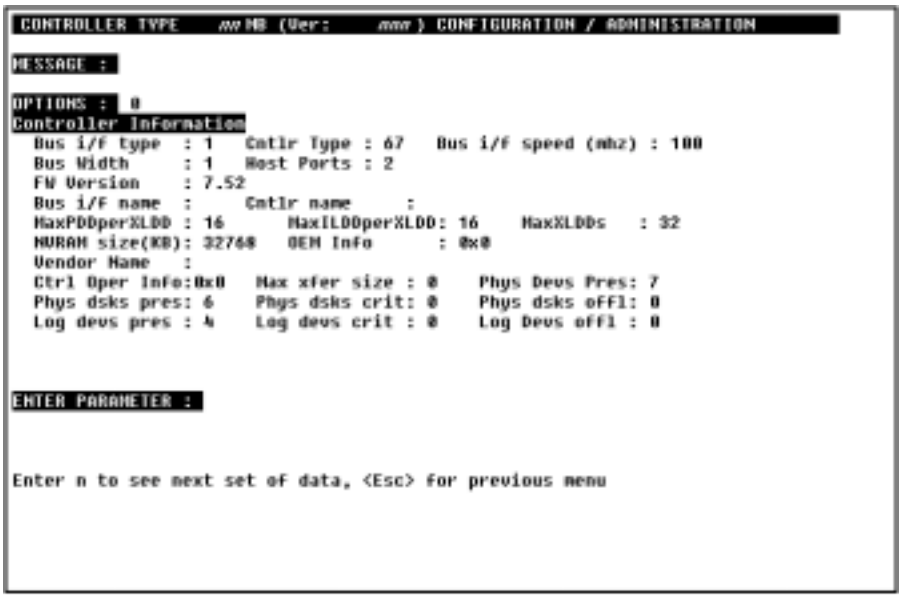
Get Controller Information

To view controller information:

1. Select Information and Parameters from the Main Menu by typing **<2>**. Press **Enter**. The following screen appears.

Information and Parameters Screen

2. Select Get Controller Information by typing **<0>**. Press **Enter**. The following screen appears.



Controller Information
First Screen

3. To see the next screen of information, type **<n>**. Press **Enter**. The following screen appears.

Controller Information
Second Screen

Controller information shown on the screen and possible values are defined in Table 3-2.

4. To return to the previous menu, press **Esc**.

Table 3-2. Controller Information

Information Selection	Definition and Possible Values
Bus i/f type	Bus Interface Type 00=SCSI, 01=Fibre, 03=PCI
Cntlr Type	Controller Type 67=DACFF, 6B=FFx
Bus i/f speed	Bus Interface Speed (MHz)
Bus Width	Bus Width Size (bits) 1=Fibre, 8&16=SCSI/LVD
Host Ports	Number of Host Ports present
FW version	Firmware Version
Bus i/f name	Bus Interface Name (actual string vaule)
Cntlr name	Controller Name (actual string value)
Max PDD per XLDD	Maximum number of physical device definitions per external or internal logical device definition
Max ILDD per XLDD	Maximum number of internal logical device definitions per external logical device definition
Max XLDDs	Maximum number of external logical device definitions
NVRAM Size (KB)	Non-volatile RAM, Size in KB
OEM Info	OEM Information (from Controller Parameters)
Vendor Name	Vendor Name (actual string vaule)
Ctrl Oper Info	Other Physical/Controller/Operation Information Bit 0 = 1 if IBBU is present Bit 1 = 1 if controller is wroking in Active-Active Clustering mode
Max xfer size	Maximum Transfer size in 512 byte blocks

Information Selection	Definition and Possible Values
Phys Devs pres	Physical Devices Present (connected devices includes SAF-TE devices, controllers and drives.
Phys dsks pres	Physical Disks Present Range = 0-124 per disk channel
Phys dsks crit	Physical Disks Critical (marked critical if PFA is received)
Phys dsks offl	Physical Disks Offline
Log devs pres	Logical Devices (XLD) Present Range = 0-32
Log devs crit	Logical Devices (XLD) Critical
Log devs offl	Logical Devices (XLD) Offline
Max Parallel Cmds	Maximum Parallel commands supported
Phys Chns Pres	Number of physical channels present on the controller Range = 2-4
Phys Chans Poss	Maximum number of physical channels possible on this controller Range = 2-6
Max Targs Ch0	Maximum targets possible on physical channel 0 Range = 0-124
Max Targs Ch1	Maximum targets possible on physical channel 1 Range = 0-124
Max Targs Ch2	Maximum targets possible on physical channel 2 Range = 0-124
Max Targs Ch3	Maximum targets possible on physical channel 3 Range = 0-124
Max Targs Ch4	Maximum targets possible on physical channel 4 Range = 0-124
Max Targs Ch5	Maximum targets possible on physical channel 5 Range = 0-124
Mem Size (MB)	Memory size in MB
Cache Size (MB)	Cache size in MB
Long Op Active Flags: 0x0	Bitmap showing which LUNs are running long ops; the bitmap position corresponds to the LUN (bit position 0 corresponds to LUN 0, bit position 255 corresponds to LUN 255)
FG Inits Active	Number of logical device initializations active
ConChks Active	Number of consistency check active
Rebuilds Active	Number of reubilds active
MOREs Active	Number of MORE active (This feature is not supported at this time.)
BG Inits Active: 0	This bit controls the Background Initialization process. (0=Disabled)
FG Init Rate	Initialization Rate
Con Check Rate	Consistency Check rate
Rebuild Rate	Rebuild Rate
Num of COD Groups	Number of Configured Groups
Max IOP	Maximum IOP
Enquiry stat byte	Enquiry Status Byte 10=BBU_NORESPONSE 40=BBU_POWER_LOW 80=DEFERRED_WRITE_ERROR
Enquiry Misc Flag	Enquiry Misc Flag
Partner FW mismatch	Partner Controller FW Mismatch Code

Information Selection	Definition and Possible Values
Partner FW Version	Partner Controller FW Version
Controller slot 0 WWN	Controller Identification - Slot0 Node Name—WWN
Previous Loop ID	Previous Loop ID last acquired by each port
Controller slot 1 WWN	Controller Identification - Slot1 Node Name—WWN
Previous Loop ID	Previous Loop ID last acquired by each port

Get Logical Device Information

To view logical device information:

1. Select Information and Parameters from the Main Menu by typing **<2>**. Press **Enter**. The following screen appears.

Information and Parameters Screen

2. Select Get Logical Device Information by typing **<1>**. Press **Enter**. The following screen appears.

Get Logical Device Information Screen

3. To obtain information on a specific logical device (system drive), type the appropriate system drive number from the list provided. Press **Enter**. The following screen appears.

Logical Device Information Screen

Logical device information shown on the screen and possible values are defined in Table 3-3.

Table 3-3. Logical Device Information

Information Selections	Definition and Range of Values
Log Dev State	Logical Device State
Raid Level	RAID Level
Stripe Size	Stripe Size (KB)
Cache Line Size	Cache line size (KB)
RW Ctrl	Logical Device Read/Write Control
Log Dev Op St	Logical Device Operations Status Bit 0=1 if consistency check is in progress Bit 1=1 if rebuild is in progress Bit 2=1 if making data consistent is in progress Bit 3=1 if logical device initialization is in progress Bit 4=1 if data migration is in progress
R5 Write Update	RAID5 write update (ar5_limit)
R5 Algorithm	RAID5 algorithm (ar5_algo)
Log Dev Num	Logical device number
Device Blk Size	Device block size in bytes
Orig Dev Size	Original device size in 512 byte blocks or MB
Device Size	Device size (configured/configurable) in 512 byte blocks or MB
Inquiry Data	First 36 bytes of SCSI INQUIRY data
Con Chk Blk Num	Consistency check block number
Reb Blk Num	Rebuild block number
BG Init Blk Num	Background initialization block number
FG Init Blk Num	Logical device initialization block number
MORE Blk Num	Data migration block number
Reb Raid Dev	RAID Device Number of Physical Device running Long Op
Con Check Stat	Consistency Check Op Status
Rebuild Stat	Rebuild Long Op Status
BG Init Stat	Background initialization status
FG Init Stat	Logical Device Initialization Long Op Status
MORE Stat	MORE Long Op Status

Get Physical Device Information

To view physical device information:

1. Select Information and Parameters from the Main Menu by typing **<2>**. Press **Enter**. The following screen appears.

Information and Parameters Screen

2. Select Get Physical Device Information by typing **<2>**. Press **Enter**. The following screen appears.

Get Physical Device Information
Enter Channel Number Screen

3. To get information on a specific physical device, type the channel number of the physical device. Press **Enter**. The following screen appears.

Get Physical Device Information
Enter Target ID Screen

4. Type the target ID number of the specific device. Press **Enter**. The following screen appears.

Physical Device Information Screen

Physical device information shown on the screen and possible values are defined in Table 3-4.

Table 3-4. Physical Device Information

Information Selection	Definition
Channel	Channel Number Range = 0-5
Target ID	Target ID Range = 0-126 (excluding 112 and 113)
Config Status	Configuration status bits Bit 0=1 if the physical device is part of a fault tolerant RAID configuration Bit 2=1 if the device is local to the controller Bit 2=0 if the device is remote to the controller.
Dev State	Physical device state (valid only if device is part of a RAID/Fault-Tolerant configuration)
Data Width	Negotiated data width size in bits
Device Speed	Negotiated physical device speed in MHz per second.
# Ports	Number of port connections available for this device
Chan Connect Info	Channel Connection Information Bit 7: ChnB MSb Bit 6: ChnB Bit 5: ChnB Bit 4: ChnB LSb Bit 3: ChnA MSb Bit 2: ChnA Bit 1: ChnA Bit 0: ChnA LSb
Max Tags	Maximum Number of tags. If the number is 0, device is working in non-tagged mode.
MAC Address	Network address (MAC address). 0 if MAC address is not valid.
Oper Status	Physical device operations status Bit 0=1 if consistency check is in progress Bit 1=1 if rebuild is in progress Bit 2=1 if making data consistent is in progress Bit 3=1 if physicla device initialzation is in progress Bit 4=1 if data migratio is in progress
Parity Errors	Number of Parity Errors
Soft Errors	Number of soft errors
Hard Errors	Number of hard errors
Misc Errors	Number of miscellaneous errors
PFAs Detected	Number of Product Failure Analysis detected
Dev Blk Size	Device block size in bytes. The vaule is 0 for non-block devices
Orig Dev Size	Original device size in 512 byte block or MB. A vaule of 0 for a disk device indicatesthat the device is connected but is not usable.
Device Size	Device size (configurable) in 512 byte block or MB. A vaule of 0 for a disk device indicatesthat the device is connected but is not usable.
Inquiry Data	First 36 bytes of SCSI INQUIRY data.
Serial #	Serial number of the physical device

Get and Set Controller Parameters

Controller parameters affect the functionality of the controller. These parameters are initially set at the factory with default values that have been found to work well in a majority of applications and environments. Refer to “Controller Parameters” on page 2-1 for a detailed procedure for modifying

the default settings. Descriptions of the parameters and associated settings are provided in Appendix B, “Controller, Logical Device, and Physical Device Parameters,” and Table 2-1 on page 2-2.

Get and Set Logical Device Parameters

Changing the logical device parameters cannot be performed until you create logical devices. The write policy parameter is the only logical device parameter that you can change using the Get and Set Logical Device Parameters function.

To change the write policy parameter:

1. Select Information and Parameters from the Main Menu by typing **<2>**. Press **Enter**. The following screen appears:

Information and Parameters Screen

2. Select Get and Set Logical Device Parameters by typing **<4>**. Press **Enter**. The following screen appears.

Get and Set Logical Device Parameter
Enter Logical Device Screen

3. Type the number for the system drive (logical device) whose parameters you want to change. Press **Enter**. The following screen appears.

Get and Set Logical Device Parameter
Change Parameter Screen

This screen shows the logical device parameters in two sections: Read Only Parameters and Read-Write Parameters. The read only parameters are provided only to show the current settings for the logical device. The following table lists the read only parameters:

RAID Level	The RAID level associated with the configuration. Refer to Table 2-2 on page 2-14 for more information.
Dev State Logical Device State	The current device state. Refer to “Show Drives, Change Drive State” on page 3-9 for more information.
RAID Dev Num RAID Device Number	The RAID device number is assigned by the firmware and is related to the RAID device type.
Stripe Size	The stripe size assigned to the configuration during the create configuration process.

The Read/Write parameter provides a way to configure the write policy. The write policies are write-through or write-back. Write-through writes data to the device before returning completion status to the host. Write-back returns a completion status to the host as soon as the cache receives the data. The target device receives the data at a more appropriate time. (For more detailed information, refer to the *Encyclopedia of Controller Fundamentals and Features*, PN 775041.)

4. To change the read/write control type <**1**>. Press **Enter**. The following screen appears.

Get and Set Logical Device Parameter
Enter Read/Write Control Value Screen

5. Type the number (1 or 0) for read/write control. Press **Enter**. The following screen appears.

Get and Set Logical Device Parameter
Changes Updated Screen

The embedded configuration utility immediately changes the read/write control and updates the information on the screen. This parameter does *not* require a controller reset to take affect.

Get and Set Physical Device Parameters

Changing the physical device parameters cannot be performed until the physical device has been configured into a RAID device.

To change a physical device parameter:

1. Select Information and Parameters from the Main Menu by typing **<2>**. Press **Enter**. The following screen appears.

Information and Parameters Screen

2. Select Get and Set Physical Device Parameters by typing **<5>**. Press **Enter**. The following screen appears.

Get and Set Physical Device Parameter
Enter Channel Number Screen

3. Type the channel number of the physical device for which the parameters are being changed. Press **Enter**. The following screen appears.

Get and Set Physical Device Parameter
Enter Target ID Screen

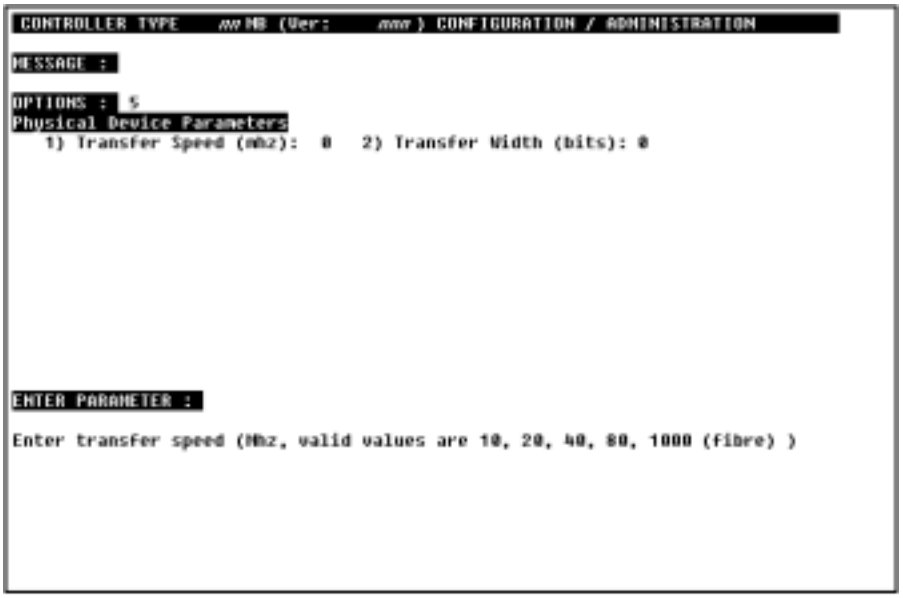
4. Type the target ID for the physical device for which parameters are being changed. Press **Enter**. The following screen appears.

Get and Set Physical Device Parameter
Enter Parameter Screen

The screen shows the values for the transfer speed and transfer width. The following table defines the values for transfer speed and transfer width.

Transfer Speed (MHz)	This parameter sets the maximum transfer rate for each device. The possible settings are 0 for asynchronous, 5, 10, 20, 40, 80, and 1000 for fibre.
Transfer Width (bits)	This parameter determines the maximum data transfer width size in bits. The possible settings are 0 = serial, 1 = 8 bits, and 2 = 16 bits.

5. Type the number (0 or 1) of the parameter you wany to change. Press **Enter**. Depending on the parameter you want to change, one of the following screen appears showing the selected parameter and a range of possible values.



Get and Set Physical Device Parameter
Transfer Speed Screen

Get and Set Physical Device Parameter
Transfer Width Screen

6. Type the new value for the physical device parameter. Press **Enter**. The physical device parameter is updated. If you want to update the other parameter, press **Esc**. The Information and Parameters screen appears. Repeat steps 2 through 6.
7. Reset the controllers. The changes do not take affect until the controllers have been reset. (Refer to “Reset Controller or Channel” on page 3-62.)

Get Physical Device Statistics

To view the physical device statistics:

1. Select Information and Parameters from the Main Menu by typing **<2>**. Press **Enter**. The following screen appears.

Information and Parameters Screen

2. Select Get Phys Device Stats by typing **<6>**. Press **Enter**. The following screen appears.

Get Physical Device Statistics
Enter Channel Number Screen

3. Type the channel number of the device. Press **Enter**. The following screen appears.

Get Physical Device Statistics
Enter Target ID Screen

4. Type the target ID of the device. Press **Enter**. The following screen appears.

Physical Device Statistics Screen

The physical device statistics definitions and possible values are listed in Table 3-5.

Table 3-5. Physcial Device Statistics

Statistic Parameter	Definition and Range of Values
Channel	Channel Number (Range = 0 – 5)
Target ID	Target ID (Range = 0 – 124)
Msec from startup	Number of milliseconds from last system/controller power up
Num Reads Done	Number of reads done
Num Writes Done	Number of writes done
Num Cmds Active	Number of commands active on device
Num Cmds Waiting	Number of commands waiting to go on device

Start or Stop Long Ops

Start Foreground Initialization

To perform a foreground initialization, refer to “Start Foreground Initialization” on page 2-34.

Stop Foreground Initialization

To stop a foreground initialization that is in progress, refer to “Stop Foreground Initialization” on page 2-36.

Start Consistency Check

NOTE: A consistency check cannot be performed on a device configured for RAID 0.

To perform a consistency check:

1. Select Start or Stop Long Ops from the main menu by typing <**3**>. Press **Enter**. The following screen appears.

Start or Stop Long Ops Screen

2. Select Start Consistency Check by typing <**2**>. Press **Enter**. The following screen appears.

Start Consistency Check
Enter System Drive Screen

3. Type the number of the system drive for which the consistency check is performed. Press **Enter**. The following screen appears.

Start Consistency Check
Successfully Started Screen

The consistency check starts immediately and a message at the bottom of the screen indicates that the consistency check has started successfully. The message line provides a progressive

report on the percentage of the consistency check completed. When the embedded configuration utility finishes the consistency check, it displays the following message:

CHK SD #x COMPLETE

SD #x is the system drive on which the consistency check was running.

4. Press any key to continue. Select additional system drives for consistency check as described in Step 3.

Stop Consistency Check

To stop a consistency check that is in progress:

From the Start or Stop Long Ops menu, select Stop Consistency Check by typing <**3**>. Press **Enter**. The following screen appears.

Start Consistency Check
Stopped (Failed) Screen

The consistency check stops immediately and returns an error code of 107, indicating that the operation was terminated. Refer to Appendix A, “Messages and Error Codes,” for a complete list of messages.

Start Consistency Check with Restore

To perform a consistency check with restore:

1. Select Start or Stop Long Ops from the Main Menu by typing <**3**>. Press **Enter**. The following screen appears.

Start or Stop Long Ops Screen

2. Select Start Consistency Check w/Restore by typing <**4**>. Press **Enter**. The following screen appears.

Start Consistency Check with Restore
Enter Logical Device Screen

3. Type the number of the system drive for which the consistency check with restore is performed. Press **Enter**. The following screen appears.

Start Consistency Check with Restore
Successfully Started Screen

The consistency check with restore starts immediately. The message line provides a progressive report on the percentage of the consistency check with restore completed. When the embedded configuration utility finishes the consistency check, it displays the following message:

CHK SD #x COMPLETE

SD #x is the system drive on which the consistency check was running.

4. Press any key to continue. Select additional system drives for consistency check with restore as described in Step 3.

Stop Consistency Check with Restore

To stop a consistency check with restore that is in progress:

From the Start or Stop Long Ops menu, select Stop Consistency Check w/Restore by typing <**5**>. Press **Enter**. The following screen appears.

Start Consistency Check with Restore
Stopped (Failed) Screen

The consistency check with restore stops immediately and returns an error code of 107, indicating that the operation was terminated. Refer to Appendix A, “Messages and Error Codes,” for a complete list of messages.

Start Rebuild

After you replace a drive that has failed, use the Rebuild function to restore the original data to the replacement drive. Use the Rebuild function if the automatic rebuild controller parameter is not enabled. (Refer to “Replacing a Failed Disk Drive” on page 1-8 for information about Automatic Rebuild.) Before rebuilding a replacement drive, the following must be met:

- RAID 0 cannot be rebuilt.
- The Rebuild function can be run only through C0.
- The replacement drive size must be the same or larger than the failed drive.
- Automatic Rebuild and Operational Fault Management must be disabled.
- Rebuilding a drive can impact controller performance. Use the Rebuild and Check Consistency Rate function described in Appendix B, “Controller, Logical Device, and Physical Device Parameters,” and Table 2-1 on page 2-2 to vary the resources that the controller allocates to the rebuild.

To perform a rebuild:

1. Select Start or Stop Long Ops from the Main Menu by typing <**3**>. Press **Enter**. The following screen appears.

Start or Stop Long Ops Screen

2. Select Start Rebuild by typing <**6**>. Press **Enter**. The following screen appears.

Start Rebuild
Enter Channel Screen

3. Type the channel number of the drive to be rebuilt. Press **Enter**. The following screen appears.

Start Rebuild
Enter Target ID Screen

4. Type the target ID of the drive to be rebuilt. Press **Enter**. The following screen appears.

Start Rebuild
Successfully Started Screen

The rebuild starts immediately. The message line provides a progress report on the percentage of the rebuild completed.

5. Press any key to continue. The following screen appears.

Start Rebuild
Completed Screen

When the embedded configuration utility finishes the consistency check, it displays the following message on the message line:

RBLD c:t COMPLETE

c:t are the channel and target IDs of the drive that was rebuilt.

If you enter an incorrect channel or target ID, the following error message appears on the message line:

CHK SD #3 COMPLETE

An additional message appears at the bottom of the screen:

Rebuild failed, invalid device address
Press any key to continue

Press any key to continue. The Start or Stop Long Ops screen appears enabling you to re-enter the information to rebuild the drive.

Stop Rebuild

To stop a rebuild that is in progress:

From the Start or Stop Long Ops screen, select Stop Rebuild by typing <**7**>. Press **Enter**. The following screen appears.

Stop Rebuild
Rebuild Stopped (Failed) Screen

The rebuild stops immediately and returns an error code of 107, indicating that the operation was terminated. Refer to Appendix A, “Messages and Error Codes,” for a complete list of messages.

Start Background Initialization

Background initialization makes uninitialized system drives consistent by setting parity while, simultaneously, the host has read and write access to the system drive. Background initialization can take place while the host is accessing the system drive. Array performance is degraded durning background initialization because every write operation requires access to all drives in the RAID goup. Array performance improves after the system drives have been initialized.

To perform background initialization:

1. Select Start or Stop Long Ops from the Main Menu by typing **<3>**. Press **Enter**. The following screen appears.

Start or Stop Long Operations Screen

To return to the Main Menu, press **Esc**.

2. Select Start Background Initialization by typing **<8>**. Press **Enter**. The following screen appears.

Start Background Initialization
Enter System Drive Screen

To return to the previous screen, press **Esc**.

3. Enter the system drive number that you would like to initialize. Press **Enter**. The following screen appears.

Start Background Initialization
Successfully Started Screen

ATTENTION: Selecting **Yes** immediately begins the initialization function. Initializing the wrong system drives results in data loss.

The background initialization starts immediately. The message line shows that the initialization has started successfully and provides a progressive report on the percentage of initialization completed. When background initialization has finished, the message line indicates that initialization has completed as shown in the following screen.

Start Background Initialization
Completed Screen

4. Press any key to continue. Select additional system drives for initialization as described in Step 3.
5. Press **Esc** to return to the Main Menu.

Stop Background Initialization

To stop a background initialization that is in progress:

1. From the Start or Stop Long Ops screen, select Stop Background Initialization by typing <**9**>. Press **Enter**. The following screen appears.

Start Background Initialization
Stopped Screen

The background initialization stops immediately and returns an error code of 107, indicating that the operation was terminated.

2. Press **Esc** to return to the Main Menu.

Controller and Host Operations

Get Dual Controller Status

To view dual controller status:

1. Select Controller and Host Operations from the Main Menu by typing <**4**>. Press **Enter**. The following screen appears.

Controller and Host Operations Screen

2. Select Get Dual Controller Status by typing <**0**>. Press **Enter**. The following screen appears.

Get Dual Controller Status Information Screen

3. To return to the Controller and Host Operations screen, press **Esc**. To refresh the Dual Controller Status Information screen, press carriage return (**Enter**).

The dual controller status information and possible values are listed in Table 3-6 through Table 3-10.

Table 3-6. Dual Controller Status Information

Information Selection	Definition and Range of Values
Status Format	The Format field indicates the presence of the LUN and logical device information. This is currently set to 2.
LUN	The LUN field identifies the LUN on which the Get Dual Controller Status command was received.
Sys Drive	The Sys drive field identifies the logical device to which the LUN maps.
Length	The Information Length field specifies the length of data following.
State (hex)	The Master/Slave State field spcifies the current state of the controller-controller nexus. For a list of values and descriptions for possible states, refer to Table 3-7 on page 3-56
State Info (hex)	The Master/Slave State Additional Information field gives more information on the relavant Master/Slave state. For a list of values and descriptions of the additional information, refer to Table 3-8 on page 3-57
Partner Status (hex)	The Partner Status field describes the current status of the partner controller. For a list of values and descriptions of the partner status, refer to Table 3-9 on page 3-57.
Controller Info (hex)	The Dual-Active Controller Information field provides information about the dual-active controller, refer to Table 3-10 on page 3-58.

Table 3-7. Master/Slave States

Value	Description
00h	Disabled or Simplex
10h	Initial State during Dual Active Boot
12h	Negotiation with Partner Complete
15h	Controller-Controller Nexus Established
17h	Negotiation with Partner Not Complete
20h	Controller in Slot 1 Failed
21h	Controller in Slot 1 Ejected
22h	Controller in Slot 1 Removal Detected
23h	Controller in Slot 1 Inserted
24h	Command Controller in Slot 1 Inserted
25h	Command Controller in Slot 1 to Pause
26h	Paused Controller Slot 1 Ready to Resume
27h	Paused Controller Slot 1 Failed
80h	Controller in Slot 0 Failed
81h	Controller in Slot 0 Ejected
82h	Controller in Slot 0 Removal Detected
83h	Controller in Slot 0 Inserted
84h	Command Controller in Slot 0 Inserted
85h	Relinquish Control of Slot 1

Table 3-8. Master/Slave State Additional Information

Value	Description
0000h	No additional information available.
0106h	Firmware Download to Slave Failed
0110h	Write Back Synchronization Failed on Channel 0
0111h	Write Back Synchronization Failed on Channel 1
0112h	Write Back Synchronization Failed on Channel 2
0113h	Write Back Synchronization Failed on Channel 3
0114h	Write Back Synchronization Failed on Channel 4
0115h	Write Back Synchronization Failed on Channel 5

Table 3-9. Partner Status

Value	Partner State	Description
0000h	No Partner	Controller is running in simplex mode
0100h	Booting	From Power-up
0101h	Booting	Partner is replacement controller
0200h	Active	Controller-Controller Nexus
0201h	Active	Partner is survivor
0300h	Failed	Ping Time-out
0301h	Failed	Negotiation - Get chunk failure
0302h	Failed	Negotiation - SCSI Communication Failed or Cables are wrong or Firmware versions/builds are different
0303h	Failed	Negotiation - Host ID mismatch
0304h	Failed	Negotiation - SLIP/DIFFL/FBF Mismatch
0305h	Failed	Negotiation - Disk Channels available mismatch
0306h	Failed	Negotiation - Host Channels available mismatch
0307h	Failed	Negotiation - Firmware version mismatch
0308h	Failed	Negotiation - Firmware type mismatch
0309h	Failed	Negotiation - Memory size mismatch
030ah	Failed	Negotiation - Memory read of partner failed
030bh	Failed	Negotiation - MS_INTNEG command to partner failed
030ch	Failed	Kill Partner command received
030dh	Failed	Partner failed during failback TID handover
030eh	Failed	Partner did not enter nexus after negotiation complete
030fh	Failed	Partner failed for unknown reason
0310h	Failed	Write Back Synchronization Failed on Channel 0
0311h	Failed	Write Back Synchronization Failed on Channel 1
0312h	Failed	Write Back Synchronization Failed on Channel 2
0313h	Failed	Write Back Synchronization Failed on Channel 3
0314h	Failed	Write Back Synchronization Failed on Channel 4
0315h	Failed	Write Back Synchronization Failed on Channel 5
0316h	Failed	Negotiation - Firmware build mismatch
0317h	Failed	Negotiation - Device Channel cables are crossed
0320h	Failed	Hot pull of partner detected while nexus active

Value	Partner State	Description
0321h	Failed	Partner absent at boot
0322h	Failed	Power failed before failover finished
0323h	Failed	Power failed before relinquish finished
0324h	Failed	Controller-Controller locking had unrecoverable SCSI error
0400h	Removed	Partner is removed
0500h	Inserted	Partner is inserted

Table 3-10. Dual-Active Controller Information

Field	Description
Navtive Slot Number	Identifies the controller slot number that services the Target ID (TID) used to send this command when there is no failed controller.
Controller Slot Number	Identifies the actual controller slot number.
Native TID	Set if this command was received on the controller's primary TID.
SCSI TID	Identifies the TID used to send this command.
Port ID	Identifies either the TID used to send this command (parallel SCSI) or the Loop ID used to send this command (Fibre SCSI).

Kill Partner

The Kill Partner function enables you to hold one controller in reset when operating in a dual-active configuration, forcing the system into simplex mode.

To kill a partner controller:

1. Select Controller and Host Operations from the Main Menu by typing <**4**>. Press **Enter**. The following screen appears.

Controller and Host Operations Screen

2. Select Kill Partner by typing <**1**>. Press **Enter**. The following screen appears.

Kill Partner Controller
Confirmation Screen

3. If you do not want to kill the partner controller, press **Esc** to return to the previous menu. If you want to kill the partner controller, type **<y>**. Press **Enter**. The partner controller is immediately held in reset. The following screen appears.

Kill Partner Controller
Partner Failed Notification Screen

A status message appears stating that the partner has failed due to error #12, indicating a Kill Partner command was received.

Relinquish Controller

The Relinquish Controller function enables you to restart a controller that has been held in reset in a dual-active configuration. Use the Relinquish Controller function to:

- Return a controll held in reset by the Kill Command to online
- Bring a replacement controller online

> **NOTE:** The Relinquish Controller function starts a failback operation that, depending on the drive spin up settings, can take several minutes. When the failback operation is complete, a message appears.

To relinquish a partner controller:

1. Select Controller and Host Operations from the Main Menu by typing <**4**>. Press **Enter**. The following screen appears.

Controller and Host Operations Screen

2. Select Relinquish Controller by typing <**2**>. Press **Enter**. The following screen appears.

Relinquish Partner Controller
Confirmation Screen

3. If you do not want to relinquish the partner controller, press **Esc** to return to the previous menu. If you want to relinquish the partner controller, type **<y>**. Press **Enter**. The partner controller is immediately brought online. The following screen appears.

Relinquish Partner Controller
Partner Active Notification Screen

A status message appears stating that the partner controller is now active.

Reset Controller or Channel

Some controller parameters do not take affect until the controllers have been reset. Mylex also recommends resetting the controllers after creating a new array configuration. The reset channel function issues a bus reset to the selected channel.

To reset the controllers or channel:

1. Select Controller and Host Operations from the Main Menu by typing **<4>**. Press **Enter**. The following screen appears.

Controller and Host Operations Screen

2. Select Reset Controller or Channel by typing **<3>**. Press Enter. The following screen appears.

Controller and Host Operations
Reset Controller or Channel Screen

3. To reset the controllers, type **<c>**. Press **Enter**. The controllers immediately reset and reboot.

   NOTE: Depending on the drive spin up settings, a controller reset may take several minutes to complete.

   After the controllers have finished resetting, the `STARTUP COMPLETE` message appears. Restart the embedded configuration utility by typing the *Break* command.

4. To reset a channel, type **<p>**. Press **Enter**. The following screen appears.

Controller and Host Operations
Reset Channel Screen

5. Type the number of the channel to be reset. Press **Enter**. The channel is immediately reset. The embedded configuration utility does not return any status, but immediately returns to the Controller and Host Operations screen.

Get/Modify Host WWN Table

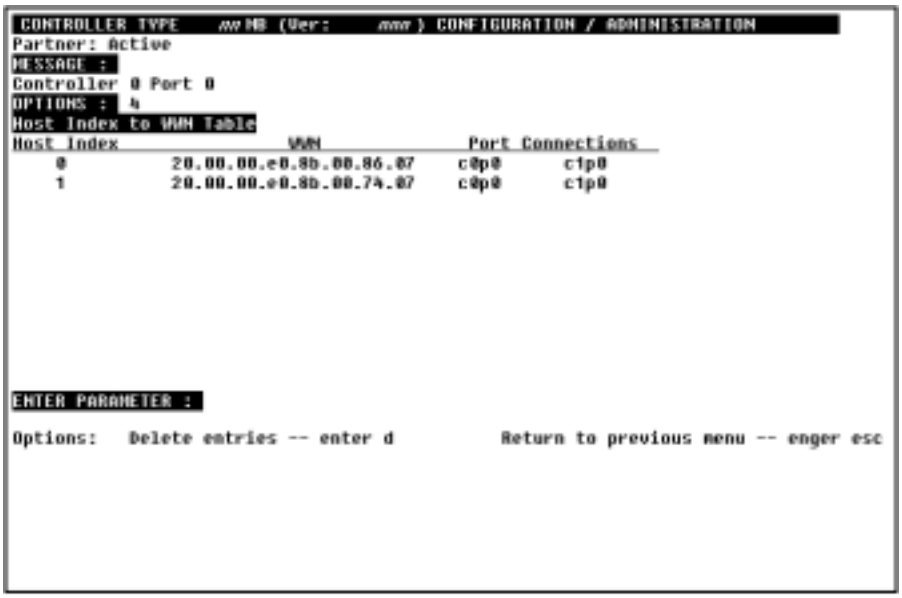
The controllers maintain a host WWN table until the configuration is cleared. Entries in the WWN table corresponding to hosts no longer logged into the controller remain consumed and unusable, potentially limiting the ability to provide storage access to newly added hosts. Using this function, you can delete unused host WWNs.

To view the Host Index-to-WWN table:

1. Select Controller and Host Operations from the Main Menu by typing <**4**>. Press **Enter**. The following screen appears.

Controller and Host Operations Screen

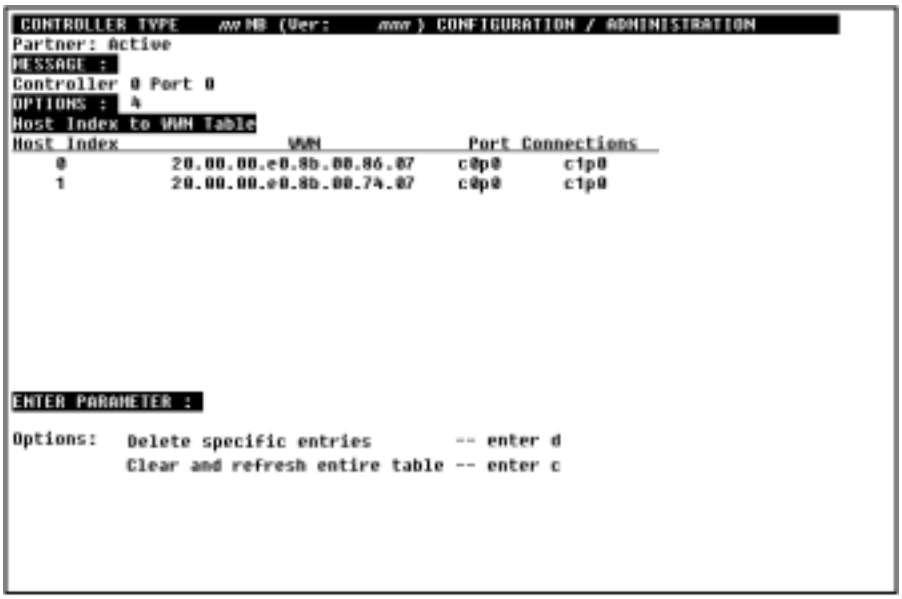
2. Select Get/Modify Host WWN Table by typing <**4**>. Press **Enter**. The following screen appears.



Host Index to WWN Table Screen

This screen shows the Host Index-to-WWN table. This table is also accessible through the "SANmapping™" function described on 2-23. This table is recreated every time the configuration is cleared. Throught this screen you can delete entries in the Host Index-to-WWN table. If you do not want to delete a Host Index-to-WWN table entry press **Esc**. The "Controller Host Operations" screen appears.

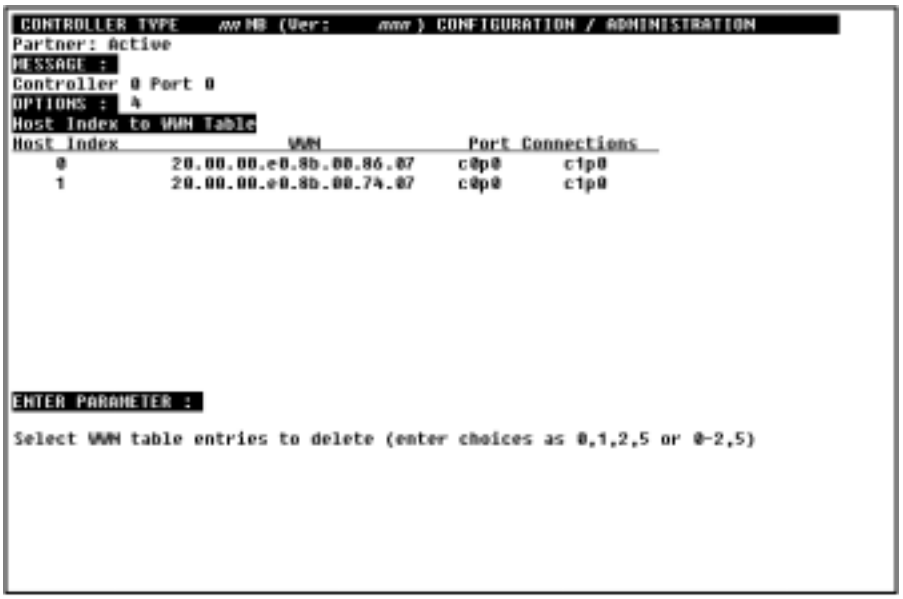
3. To delet the entries in Host Index -to-WWN table, type **<d>**. Press **Enter**. The following screen appears.



Host Index to WWN Table
Delete Options Screen

4. This screen gives you the option of deleting all the unused WWN entries at one time or deleting specific, unused WWN entries. If you want to delete all the unused WWN entries, type **<c>**. Press **Enter**. All unused WWN entries are removed from the table and the new list of WWN entries is saved. Only the WWN entries of hosts currently attached to the controller remain. The “Controller and Host Operations Screen” on page 3-65 appears.

   If you want to delete a specific WWN entry, type **<d>**. Press **Enter**. The following screen appears.

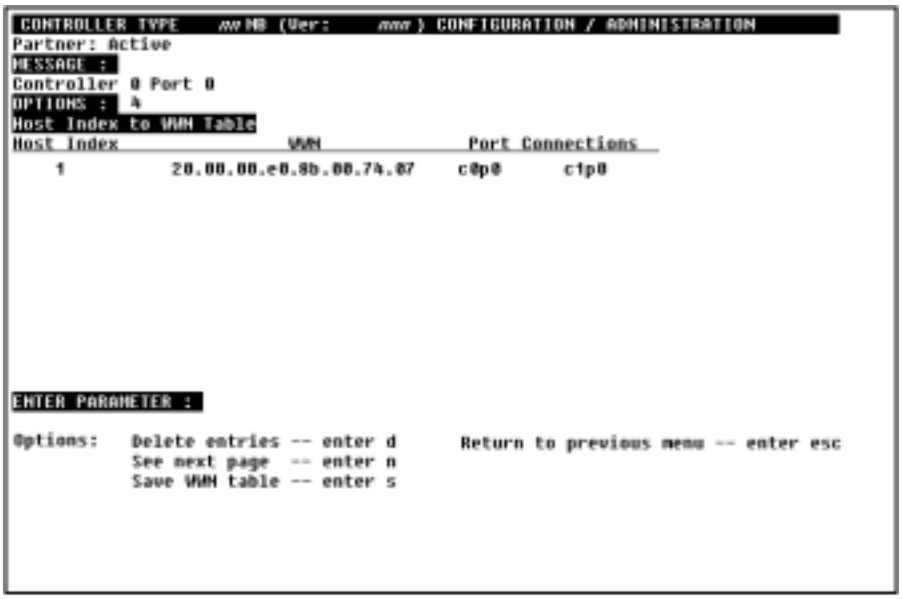


Host Index to WWN Table
Select Table Entries Screen

Type the host index number of the unused WWN entry that you want to delete. If you want to delete more thant one entry you can type:

- Each host index number seperated by a comma (0,1,2,5)
- A range of consecutive host index numbers separating the first host index number from the last with a hyphen (0-2)
- A combination of range and individual host index numbers (0-2,5)

Using the configuration in the screen shown above as an example, if you wanted to delete Host Index entry **0**, type **<0>**. Press **Enter**. The following screen appears.



Host Index to WWN Table
Save Table Entries Screen

The screen shows that Host Index entry **0** has been removed; however, before the new WWN table can take effect, you must save it. If you were to return to the previous menu by pressing **Esc**, the Host Index entry you attempted to delete would reappear. To save the new WWN table type **<s>**. Press **Enter**. The embedded configuration utility updates the WWN table and the "Controller and Host Operations Screen" on page 3-65 appears.

Other actions you can perform from this screen are:

- Deleting additional WWN entries: Type **<d>**. Press **Enter**. The "Host Index to WWN Table Select Table Entries Screen" on page 3-67 appears enabling you to select additional WWN entries to delete.
- Viewing additional pages of WWN entries: In some cases the WWN table can take several screens to show all of the entries. To see other screens, type **<n>**. Press **Enter**. The next screen of entries appears.

Change Serial Port Usage

The serial port can be configured as a VT100 Terminal Emulation interface or as a trouble shooting debug tool. Temporarily switching the serial port to debug mode is performed only under recommendation and direction from a technical service representative. A password is required to enter debug mode.

> **NOTE:** Returning to VT100 mode after being in debug mode requires assistance from a technical service representative.

To configure the serial port for temporary debug mode:

1. Select Configure Serial Port from the Main Menu by typing <**5**>. Press **Enter**. The following screen appears.

Configure Serial Port Screen

ATTENTION: You cannot escape from this action after pressing **Enter**.

2. Select Switch to Debug Mode by typing <**0**>. Press **Enter**.
3. Press **Enter** a second time to activate the debug menu. The following screen appears.

Debug Password Request Screen

You are prompted for a password to enable the debug menu. This password is only available from a technical service representative.

Appendix A
Messages and Error Codes

This appendix provides a list of possible error messages and a list of error codes. The messages appear on the LCD screen, if one is present, or under the MESSAGE: bar on the screen. The messages provide the user with information, error conditions, and command progress. The messages are described in Table A-1, and the error codes are described in Table A-2 on page A-4. Certain features associated with some of the messages and error codes are not supported at this time.

Messages

Table A-1. Messages

Message	Description
AEMI scan reject #	AEMI scan was rejected
CHCK Failed: Code #	Parity check failed
Check SDRV #: %	Status monitoring the progress of parity check on system drive #. The LCD must be in monitor mode to receive this message.
CHK SDRV # Complete	Parity check on system drive # has completed
CHK Started SDRV #	Parity check on system drive # has started
DRV Replaced by C:I	A drive has been replaced by Channel:ID
Error Code : *nnnn*	Diagnostics failed, number indicates type of failure
Fail:Chk/Rbl in Prog	Failure due to a parity check or rebuild already in progress
Failed: Bad EEPROM	Failure saving the configuration to EPROM
Failed: Bad NVRAM	Failure saving the configuration to non-volatile RAM
Failed: Channel Busy	Drive channel is busy
Failed: Check in Prog	A parity check is in progress on the addressed system drive
Failed: Disk failed	New disk failure
Failed: Drive Dead	Failure due to a dead dependent drive
Failed: Drv Not Ready	Unable to start drive
Failed: Init in prog	Failed because an initialization is in progress
Failed: Invalid Dev	Failure due to an invalid device
Failed: Invalid SDRV	Failure due to a non-redundant or non-existent system drive
Failed: No Device	Drive or other device not available
Fail: Rbl/Chk in Prog	Rebuild failed; another rebuild or parity check is in progress
Failed: Start failed	Rebuild failed; drive could not start or is online

Message	Description
Failed: Unknown SDRV	System drive operation failed; affinity is not assigned to this controller
Failed: State Changed	A change of state has occurred
Fan Failure #	A failed fan has been detected
Fatal Err: RAM Failed	The memory has failed
Fatal Err: RAM Parity	A parity error has occurred on the memory
Fatal Err: FW Chksum	A checksum reveals corrupted firmware
Hardware Err: #	A hardware error has occurred
ID C:I Can't Rebuild	Drive with ID Channel: ID can't perform a rebuild
ID C:I Drive Failed	Drive with ID Channel:ID has failed
ID C:I Not Responding	Drive with ID Channel:ID is not responding
ID C:I Removed	Drive with ID Channel:ID has been removed
ID n:n Set to RBLD	Drive with ID Channel:ID has had a state change to rebuild
ID n:n Set to SBY	Drive with ID Channel:ID has had a state change to standby
ID n:n Unconfigured	Drive with ID Channel:ID is not configured
ID Mismatch at n:n	An ID mismatch has occurred with drive Channel:ID
Illegal Request	Operation is no longer supported
Illegal Operation	Operation is illegal; there is no Master/Slave configuration
Init SDRV #: %	Status monitoring the progress of initalization on system drive #. The LCD must be in monitor mode to receive this message.
Init SDRV Complete	Initialization on system drive # has completed
Invalid drive	Invalid choice of drive
Invalid Device #	Invalid device address
Invalid Option	A submenu was not selected when required
Mirror-Race Checksum	Following a power cycle, a check is performed on the Mirror-Race Table for valid data and parity
Mirror-Race CR SD #	A mirror-race is being performed on critical system drive #
New COD Config	A new COD configuration has been detected and will be accepted by the controller
No arrays defined	There are no system drives to delete
Non-Redundant Power	SES and SAF-TE systems only—multiple power supplies are no longer functioning, the system is operating with one power supply and has been forced in conservative cache mode
No SDRVs defined	Invalid configuration
OVR-TEMP Failure	The enclosure has detected a temperature above limit
Operation complete	The invoked operation has successfully completed
Parity Check Error	A drive parity error has been detected
Partner : booting	From power-up or Partner is replacement controller
Partner : active	Controller-Controller nexus is established or Partner is survivor
Partner : failed 0	Ping Time out
Partner : failed 1	Negotiation—unable to allocate chunk of memory
Partner : failed 2	Negotiation—SCSI communication failed or cables are wrong
Partner : failed 3	Negotiation—host ID jumper mismatch
Partner : failed 4	Negotiation—SLIP/DIFFL/FBR jumper mismatch
Partner : failed 5	Negotiation—number of disk channels available mismatch
Partner : failed 6	Negotiation—number of host channels available mismatch

Message	Description
Partner : failed 7	Negotiation—firmware version mismatch
Partner : failed 8	Negotiation—firmware type mismatch
Partner : failed 9	Negotiation—memory size mismatch
Partner : failed 10	Negotiation—memory read of partner failed
Partner : failed 11	Negotiation—cache memory size mismatch
Partner : failed 12	Kill Partner command received
Partner : failed 13	Partner failed during failback TID handover
Partner : failed 14	Partner didn't enter nexus after negotiation complete
Partner : failed 15	Partner failed for unknown reason
Partner : failed 16	Write Back Synchronization Failed on Channel 0
Partner : failed 17	Write Back Synchronization Failed on Channel 1
Partner : failed 18	Write Back Synchronization Failed on Channel 2
Partner : failed 19	Write Back Synchronization Failed on Channel 3
Partner : failed 20	Write Back Synchronization Failed on Channel 4
Partner : failed 21	Write Back Synchronization Failed on Channel 5
Partner : failed 22	Negotiation—firmware build mismatch
Partner : failed 23	Negotiation—device cables are crossed
Partner : failed 31	Room for channel expansion
Partner : failed 32	Hot pull of partner detected while nexus active
Partner : failed 33	Partner absent at boot
Partner : failed 34	Power failed before failover finished
Partner : failed 35	Power failed before relinquish finished
Partner : removed	Partner is removed
Partner : inserted	Partner is inserted
Possible Data Loss	Possible data loss has occurred
PWR-SPLY Failure #	A power supply failure has been detected
Race Recovery Begun	Mirror-race recovery has begun
RBLD C:I Complete	The rebuild process has completed on drive Channel:ID
RBLD Failed: Code #	The rebuild process has failed
RBLD SDRV #: %	Status monitoring the progress of a rebuild operation on system drive #. The LCD must be in monitor mode to receive this message
RBLD Started SDRV #	A rebuild operation has started on system drive #
RestoreCf1 NVR2>NVR1	A configuration mismatch has been detected between NVRAM1 and NVRAM 2
RestoreCf1 NVR1>NVR2	A configuration mismatch has been detected between NVRAM1 and NVRAM 2
RestoreCf2 NVR2>NVR1	A configuration mismatch has been detected between NVRAM1 and NVRAM 2
RestoreCf2 NVR1>NVR2	A configuration mismatch has been detected between NVRAM1 and NVRAM 2
SBY size too small	Standby Drive is too small for the existing configuration
SEr: *n*	The number of drive soft errors
SSU Fail C:I	A start spin up (SSU) command has failed on drive Channel:ID
Standby Created	A standby drive has been successfully created
STARTUP COMPLETE	The controller(s) has successfully completed a power-on self test

Message	Description
UPS AC Power Failure	AC power to the UPS failed, displayed if UPS is supported and enabled
Warm Start Complete	A power cycle occurred and successfully completed while the controller is performing I/O and has a BBU present
Write Policy SD#—Wx	The write policy for system drive # is set to write through (WT) or write back (WB)

Error Codes

Table A-2. Error Codes

Error Code	Description
0x0001	Media error
0x0002	At least two physical drives offline
0x0003	Operation failed with bad blocks on drive
0x0004	Operation failed because drive offline
0x0006	Error occurred while transfering data from host
0x0102	Physical drive not present
0x0103	Host block count is zero
0x0104	Operation requested is not implemented (invalid operation code)
0x0105	Parameter specified is out of bounds or not running
0x0106	Controller or system drive or physical device is busy
0x0107	Operation has been terminated
0x0109	Illegal parameter specified in command
0x010a	First command to system drive
0x010b	Physical drives not yet spun up
0x010c	Initialization is in progress or already done
0x010d	Check consistency is in progress
0x010e	Bad data found in specified read range
0x010f	Firmware slave operation failed
0x0110	Migration already in progress
0x0111	Maximum number of system drives already defined
0x0112	System drive to migrate is in CRITICAL mode
0x0113	System drive to migrate is not in ONLINE state
0x0114	Controllers are in dual active mode for Simplex MORE
0x0115	Failover still in progress
0x0116	Migrate command issued to system drive with more than one span
0x0117	Disk drive to add is already part of a system drive
0x0118	Disk drive to add is not in STANDBY mode
0x0119	Multiple system drives defined on pd's to enlarge
0x011a	Invalid parameter in MORE data list
0x011b	The rebuild/migrate "rate" is set to 0xff
0x011c	A drive in system drive to expand is also in other system drive with more than 1 span
0x011d	The drive to add is too small
0x011e	No memory available to complete the command

Error Code	Description
0x011f	COD write to disk failed
0x0120	Device trying to get ready
0x0121	Waiting for start unit command
0x0122	Device not be able to get ready
0x0123	Command didn't complete because controller not active
0x0124	No more devices to report status or information on
0x0125	Max number of enclosures reached (32) enclosures
0x0126	More Get Environmental data than space to return data
0x0127	Parameter is valid, but not supported currently
0x0128	Device scan in progress
0x0129	RAID device type specified is not valid
0x012a	RAID device specified is not found
0x012b	Maximum number of COD groups (64) already used
0x0150	RAID device not available for configuration
0x0151	Maximum number of physical devices reached
0x0152	Maximum number of system drives reached
0x0153	Requested data length larger than allocation length
0x0154	No space available for new configuration
0x0155	Invalid field in configuration data
0x0156	Physical device already in use
0x0157	Data transfer count too small for command
0x0158	Device type specified in configuration data is invalid
0x0159	Device number specified in configuration data is invalid
0x015a	Device name already in use
0x015b	Device specified does not correspond to a RAID device
0x015c	Cannot change RAID device type
0x015d	Cannot change RAID device stripe size
0x015e	Cannot change RAID device number
0x015f	Physical device not connected
0x0160	No COD groups present
0x0161	Bad number of drives to add with MORE
0x0162	User attempted spanning with MORE
0x0163	Physical device must be configured prior to MORE
0x0164	Physical device address was not at LBA 0 in MORE data
0x0165	Physical device only partially used - must used entire physical device
0x0166	System drive definition in MORE data has bad field(s)
0x0167	No SES device found running
0x0168	The configuration data containing the logical device definition is invalid
0x0169	RAID device numbers are out of sequence
0x016a	RAID device is found, but is not configured
0x016b	Configuration data contains an invalid stripe size

Appendix B
Controller, Logical Device, and Physical Device Parameters

This appendix describes the controller, logical device, and physical device parameters in greater detail than is provided in "Get and Set Controller Parameters" on page 2-4, "Get and Set Logical Device Parameters" on page 3-31, and "Get and Set Physical Device Parameters" on page 3-34.

Each Mylex controller is shipped from the factory with initial settings that have been found to work well in a majority of applications and environments. These settings are listed as the controller, logical device, and physical device parameter settings and vary depending on product and user requirements. Some parameters are product or configuration dependent and do not have a recommended default setting provided.

Default values are provided; however, these are only examples of the most common settings. User requirements are not always the same as the suggested default settings, so you may want to modify certain settings. Additionally, if you are going from a simplex configuration to a dual-active controller configuration, certain controller parameters must be changed to accommodate the new dual-active controller configuration.

A thorough understanding of the parameters and settings is strongly recommended before modifying the current settings and creating a configuration.

Controller Parameters

The controller parameters are described individually in greater detail than is provided in Table 2-1 on page 2. Some parameters include notes of special interest and known side effects of using certain parameter settings

1. Reassign Restricted to One Block

Default = Disabled (0)
Requires controller reset

The Reassign Restricted to One Block function limits reassigning failures to the single failed block. This parameter is limited to recovered errors and medium errors. If the sense on the error does not indicate one of these errors, this setting does not apply. When Reassign Restricted to One Block is disabled, all reassigns are for the entire I/O process, possibly a large number of blocks where not all have failed.

2. True Verify

Default = Disabled (0)
Requires controller reset

If this option is disabled, the Verify command returns a status without data comparison. If this option is enabled, the Verify command compares data before returning a status. Enabling this parameter compromises performance.

3. Disk Write Through Verify

Default = Disabled (0)
Rrequires controller reset

The Disk Write Through Verify function enables Force Unit Access for reads and writes during error handling. Force Unit Access bypasses the cache and forces all reads and writes directly to or from the disk.

Side Effect: For some devices, enabling Force Unit Access reduces sequential write performance by 86%.

4. Read Ahead Enable

Default = Enabled (1)

The Read Ahead Enable function improves data retrieval performance by enabling the controller to read into cache a full stripe of data at a time. This greatly improves the percentage of cache hits. For small transfers, the read ahead algorithm helps with performance.

For example, if the stripe size is set to 8 K and the host requests 1 K of data, when this function is enabled the controller reads ahead the full 8 K. When the host requests the next 1 K block, that data is already in the controller's cache. For best performance this function needs to be enabled during normal controller operation.

5. Automatic Rebuild Management

Default = Enabled (1)
Requires controller reset

The Automatic Rebuild Management function enables the controller to take autonomous actions when a failed disk has been replaced or a configured online spare disk drive is present.

The Automatic Rebuild Management function works in conjunction with Fault Management and features in SAF-TE and SES certified disk array enclosures to detect the removal of a failed disk drive. The Automatic Rebuild Management function also performs an automatic rebuild after a replacement disk drive is installed into a redundant (fault tolerant) array (RAID 1, RAID 3, RAID 5, and RAID 0+1).

Side Effect: Without Automatic Rebuild Management enabled, a host must issue the rebuild command.

6. Operational Fault Management

Default = Enabled (1)
Requires controller reset

The Operational Fault Management function enables the controller to take autonomous actions when a failure occurs. Actions that the Operational Fault Management function monitors and reports include drive failures, background activity completion status, and enclosure events. To help ensure array performance and reliabilty, this function needs to be enabled during normal controller

operation. Do not disable this function unless specifically instructed to do so as part of a trouble-shooting diagnostic activity. The Operational Fault Management function works in conjunction with Automatic Rebuild Management and features in SAF-TE and SES certified disk array enclosures to detect the removal of a failed disk drive. A controller reset is required before this parameter takes effect.

Side Effects: Without Operational Fault Management enabled, a host program or operator must handle all failure cases.

7. Super Read Ahead

Default = Disabled (0)
Requires controller reset

The Super Read Ahead function increases performance for applications that must access large blocks of sequential data. This option only improves performance for large sequential read operations and has no effect on write operations. This function incorporates intelligent data request monitoring to track data requests by the host. With Super Read Ahead enabled, the controller detects requests for data that are stored in sequence on the drives. It reads the data into the cache so that the cache remains at least one request ahead of the host. For best array performance this function needs to be disabled during normal controller operation.

8. Rebuild and Check Consistency Rate

Default = 50

The Rebuild and Consistency Check Rate function defines the amount of resource the controller CPU allocates to rebuild, consistency checks, and MORE operations. Controller CPU usage is always shared with data traffic. The valid range of integer values is from 0 to 50; a value of 50 means that all of the resources that can be dedicated for the operations are used. For low priority and high array performance, specify a lower value. For high priority and reduced array performance, select 50. This parameter takes effect immediately, without resetting the controllers.

9. Device Combing

The Device Combing function provides device queuing coalescing optimization. The function enables data traffic coalescing on the traffic of each device. Coalescing combines the addresses of adjacent I/Os. This joins the data from adjacent I/Os into a single I/O to improve performance. This parameter takes effect immediately, without resetting the controllers.

10. Disk Startup Mode

Default = Autospin (0)

The Disk Startup Mode function controls how the disk drives in the array are started (spun up). This function has three different startup modes:

- AUTOSPIN (0) – The AUTOSPIN mode issues start commands to all devices automatically. This mode waits the amount of time specified in Startup Delay 1, issues Start Unit commands to the devices as specified in Startup # Devices, then waits the specified Startup Delay 1 again. This cycle repeats until all devices have been issued Start Unit commands. This mode proceeds with a sequence delay, specified by the SCSI Start Delay 2 parameter, while the drives become ready. Ready is equal to the *on power* spin-up mode. The sequence delay will not exceed a maximum of 75 seconds. The sequence delay is normally 0 when drive jumpers are set to spin immediately on power-up, but can be set to a number of seconds for a target ID-based motor spin delay (where the drive has power immediately, but waits n seconds multiplied by its target ID before starting its motor).

- PWRSPIN (1) – Devices spin on power application. This mode is designed for systems where drives are powered on in sequence by the drive enclosure. This mode waits the amount of time specified in Startup Delay 1, after which the first bank of devices is expected to be ready. The first bank of drives are then checked. This wait-check cycle repeats for each subsequent bank of drives. Startup # Devices is ignored for this mode. The Startup Delay 1 is set to the drive power-on-to-spin time and the SCSI Startup Delay 2 is set to the enclosure delay between powering banks of drives. This mode assumes all drives with the same target ID are in a bank.
- WSSUSPIN (2) – The controller waits for the host to issue a Start/Stop Unit (SSU) command then performs the AUTOSPIN mode described above. This mode causes the drive initialization to stall until the host sends the controller a start unit command, then proceeds with the AUTOSPIN mode.

Table 2-1 details the relationship between Disk Startup Mode, Startup Number of Devices, Startup Delay 1, and SCSI Startup Delay 2.

Table 2-1. Disk Startup Mode Parameters

Disk Startup Mode=	AUTOSPIN	PWRSPIN	WSSUSPIN
Startup # Devices=	#Devices/spin	Undefined	#Devices/spin
Startup Dly 1=	Device spin wait	Initial delay	Device spin wait
SCSI Start dly 2=	(0)	Sequence delay	(0)

11. Startup Number of Devices

Default = 2
Requires controller reset

This option specifies the number of physical disk drives to be spun up at one time. Possible settings are 1 through 8. This parameter is ignored if PWRSPIN mode is selected.

12. Startup Delay 1

Default = 6
Requires controller reset

The Startup Delay 1 function varies with the selection of the Disk Startup Mode parameter. If AUTOSPIN selected, this function specifies the number of seconds between physical device spin-up cycles. If PWRSPIN is selected, this function sets the number of seconds before the controller issues start up commands. For best array performance this value needs to be set to the device's power-on-to-spin time. Possible settings are 0 to 255 seconds.

13. SCSI Startup Delay 2

Default = 0
Requires controller reset

This parameter is also referred to as sequence delay.

For AUTOSPIN mode, the SCSI Startup Delay 2 function sets the number of seconds for a SCSI device motor spin delay. The device has power immediately, but waits a calculated amount of time before starting its motor. The calcuted time is

n x SCSI-ID

where "n" is the number of seconds entered using this function and "SCSI-ID" is the ID number of the SCSI device. The SCSI Startup Delay 2 function is normally set to 0 for AUTOSPIN mode.

For PWRSPIN mode, the SCSI Startup Delay 2 function sets the number of seconds between physical device startup cycles. For best array performance the setting value needs to be set to the enclosure's power delay between powering banks of devices.

Possible setting values for the AUTOSPIN and PWRSPIN modes are 0 to 255 seconds.

14. Vendor Unique Test Unit Ready

Default = Disabled (0)
Requires controller reset

The Vendor Unique Test Unit Ready (TUR) function enables a vendor unique TUR response sent to an offline LUN. If disabled, a hard error status (4/00/00) is returned. If enabled, a Not Ready status (2/04/03) is returned.

15. Disable Check Condition for Invalid LUN

Default = Enabled (1)
Requires controller reset

The Disable Check Condition for Invalid LUN function disables check condition for an invalid LUN. This affects the handling of the Inquiry command when the referenced LUN is invalid. If this function is enabled, the Inquiry command returns data with the peripheral qualifier indicating that the peripheral device is not connected. If this function is disabled: the Inquiry command fails with a check condition of "Illegal Request, LUN Not Supported."

16. No Pause on Controller Not Ready

Default = Disabled (0)
Requires controller reset

The No Pause on Controller Not Ready function turns the pause off or on for certain commands when the controller is not ready. Normally, when the controller is starting up, certain commands encounter a pause. This only happens when the controller has not reached STARTUP COMPLETE. The pause lasts one second. The affected commands are:

Prefetch	SCSI OP 0x34
Read/Write	SCSI OP 0x08 / 0x0a
Read/Write Extended	SCSI OP 0x28 / 0x2a
TUR	SCSI OP 0x00
Verify	SCSI OP 0x2f
Write Verify	SCSI OP 0x2e

17. Disable Queue Full Status

Default = Disabled (0)
Requires controller reset

Enabling this parameter sets the controller to return a busy status when a queue full condition is detected. Disabling this parameter sets the controller to return a queue full status. When a command is received and the controller detects a queue full condition, it normally returns queue full status. This parameter is intended to help hosts that are confused by queue full.

18. Disable BUSY Status During Failback

Default = Disabled (0)

Requires controller reset

The Disable BUSY Status During Failback function enables the controller to disregard new requests without returning a BUSY status. If enabled, during failback the surviving controller ignores all new requests and does not return any status. If disabled, the surviving controller returns a BUSY status to new commands received from the host during the cache flush operation.

19. SAF-TE Data for UPS Support

Default = Enabled (0)

The SAF-TE Data for UPS Support function provides UPS monitoring using the SAF-TE vendor unique bytes described in the SAF-TE specification. The current state of all SAF-TE inputs can also be determined using SAF-TE passthru commands.

Enabled (0)—UPS monitoring is enabled if it is also supported by the system enclosure.

Disabled (1)—UPS monitoring is disabled.

UPS monitoring currently supports the following input/outputs.

- AC FAIL (input)—The UPS has detected a loss of ac. The controller switches to conservative cache for this event.
- BAT LOW (input)—The UPS has detected that its battery power is now limited. The controller switches to conservative cache for this event.
- Shutdown (output)—If AC FAIL and BAT LOW are active and the cache has been flushed, the controller issues a shutdown signal to the UPS.

This parameter takes effect immediately, without resetting the controllers.

20. Node Name Retention

ATTENTION: If the host uses node names to locate logical devices (system drives) this option must be enabled, or access to data can be lost.

Default = Disabled (0)
Requires controller reset

The Node Name Retention function determines if a failed controller's node name is to be retained after a controller failure. When disabled, each controller shares its node name with its partner controller through failover; however, when failback occurs, the replacement controller uses its own (new) node name. When enabled, each controller shares its node name with its partner controller and those names are used through all phases of failover and failback, the new controller assuming the replaced controller node name.

Side Effects: Not having this function set has serious ramifications if the controllers are connected to a host that uses node names to locate logical devices.

21. Failover Topologies

Requires controller reset.

This option sets the Fibre Channel port topology. The choices are:

- Inactive Port (0) – One active and one inactive port per controller. The active port is for normal traffic while the inactive port is for the partner's traffic when it is failed over. This topology is only recommended for the FF controller.
- Multiport (1) – All host ports are active and connected to individual fibre loops. This topology requires alternate path software and does not support transparent controller failover/failback.
- Clustering (2) – This topology requires a clustering operating system. This topology is not currently supported.
- Multi-TID (3) – Provides the controller with the ability to function as multiple target ports on a single arbitrated loop. During failover, the surviving controller enables a virtual port, impersonating the ports from the failed controller. This topology requires ISP2200 processors, available on the FFx and FF2.
- Master-Slave (4) – Master/Slave topology requires one active controller while the other controller remains inactive. If the active controller fails in the Master/Slave topology, the surviving controller joins the loop and assumes the responsibilities for the failed controller. This topology is not recommended for use with firmware version greater than 5.4.

22. Override Multiport Reset

The Override Multiport Reset function restricts internal resets to ports that have logical devices reserved through that port. If enabled, an internal reset is executed by a port only if a logical device has been reserved through that port. If disabled, internal resets are not qualified by logical device reservations. This parameter takes effect immediately, without resetting the controllers.

Side Effects: When this function is set, only the Reset Event receiving port and the reserved port are reset.

23. Reset Propagation

Default = Disabled
Requires controller reset

The Reset Propagation function enables a port to issue an Internal Reset without causing a Reset Event to occur on its attached interface. If enabled, a port that issues an Internal Rest propagates the reset by causing a Reset Event to occur on its attached interface. If disabled, a port will not cause a Reset Event on its attached interface as part of issuing an Internal Reset.

Side Effects: This is a legacy command. This parameter is not applicable to fibre host controllers and has no effect.

24. Serial Port Baud Rate

Default = 19200
Requires controller reset

The Serial Port Baud Rate function sets the baud rate of the serial port when in VT100 or Debug mode. This is ineffective when in SLP mode. Options are 3 = 2400, 4 = 4800, 5 = 9600, and 6 = 19200.

25. Serial Control

Read Only

The Serial Control function is a read-only function that controls the following serial port parameters.

CBITS7	0x01	/* 1=> 7 bits */
CSTOP1	0x02	/* 1=> 1 stop bit */
CSTOP15	0x04	/* 1=> 1.5 stop bits */

CPARDIS	0x10	/* 0=> parity enabled */
CPARODD	0x20	/* 0=> parity even if enabled */
C2_SLP_CTL_UNUSED_BITS	0xc8	

26. Serial Port Usage

Default = SLP/VT100 (3)
Requires controller reset

The Serial Port Usage function sets the serial port to be used as either the SLP/VT100 port or the debug port. The debug port is for development use only. Select SLP/VT100 if you are using the serial port.

27. Frame Size Control

Default = 2KB (0)
Requires controller reset

The Frame Size Control function sets the host fibre channel data frame size to either 512 bytes, 1 KB or 2 KB. A frame size of 2 KB is recommended because it provides the largest packet transfers and the most throughput.

28. Smart Large Host Transfers

Default = Enabled (0)

The Smart Large Host Transfers function enables selection of Coalesce (fewer disconnects on large transfers) or As Available (more disconnects) on host data transfers. This function is most effective on SCSI, but has some benefit on fibre channel systems. The Smart Large Host Transfers function takes effect for transfers larger than the stripe size. This parameter takes effect immediately, without resetting the controllers.

29. PCI Latency Control

Default = Short (0)
Requires controller reset

The PCI Latency Control function provides for adjustment of the Fibre Channel processor usage of the PCI bus. This function controls the amount of data each processor can burst across the primary bus before relinquishing bus ownership to the next device. PCI Latency Control takes effect only when both ports are active and are arbitrating for the bus. PCI Latency Control enables the integrator to tune the controller's operating parameters for specific applications. For maximum throughput, Long is recommended and is equivalent to the time necessary to transfer 1024 bytes; Medium is equivalent to 684 bytes and Short is equivalent to 512 bytes.

30. Automatic Failback

Default = Disabled (0)
Requires controller reset

When enabled in a dual-active controller system, Automatic Failback provides automatic recovery of a partner controller when a replacement is inserted. If you enable this option, you must also enable the Duplex Fault Signals function (see "33. Duplex Fault Signals" on page B-9).

31. Force Simplex

Default = Disabled (0)

Requires controller reset.

The Force Simplex function enables duplex (dual-active controller) firmware to function in a simplex (single controller) environment. The Force Simplex function forces the duplex firmware to ignore some of the dual-active operations.

ATTENTION: Do not enable Force Simplex unless it is required. Disabling Force Simplex and returning to a dual-active mode requires that each controller be reconfigured independently of the other controller. This is accomplished by removing one controller from the system, reconfiguring the remaining one, swapping the controller positions, reconfiguring the second controller, then reinstalling the first controller.

32. Conservative Cache Mode

Default = Disabled (0)

The Conservative Cache Mode function provides a controller an extra degree of data safety when operating in a degraded state. This function switches write-back caching to write-through operation after a critical system component fails or a degraded state is detected. When the degraded condition is resolved, write-back caching operations resume. This parameter takes effect immediately, without resetting the controllers.

NOTE: Conservative Cache Mode is entered automatically when the UPS signals ac failure or a low battery, power supply failure, over temperature condition, partner controller failure, MORE operation, or SES failure exists.

Side Effect: During Conservative Cache mode array performance is reduced. Enabling this option has no effect during normal operation.

33. Duplex Fault Signals

Default = Disabled (0)
Requires controller reset.

The Duplex Fault Signals function informs a controller that certain signals should be used to detect the presence or absence of a partner controller.

NOTE: If you have enabled Automatic Failback, select Enabled for this function also. (See “30. Automatic Failback” on page B-8.) This function is necessary for hot plugging controllers and automatic failback.

34. Duplex Fault Signals on Channel 4

Default = Disabled (0)
Requires controller reset

The Duplex Fault Signals on Channel 4 function informs a controller to use certain signals to detect the presence or absence of a partner controller. This function is only supported on the DACSX controller. A controller reset is required before this parameter takes effect.

Side Effects: This is a legacy command. This parameter is not applicable to fibre host controllers and has no effect.

35. Host SCSI Reset Delay

Default = No Reset (0)
Requires controller reset

The Host SCSI Reset Delay function enables a controller to rest the host in failover and failback situations. If this function is set to "No Reset" (0), a SCSI bus reset is not generated on the host channel(s) after a failover or failback. If this function is set to "Reset Delayed" (1-14), a SCSI bus reset is generated on the host channel(s) approximately 1-14 seconds after a failover or failback. If this function is set to "Reset Immediately" (15), a SCSI bus reset is generated immediately without delay.

NOTE: If you are using the Solaris™ operating system, set this parameter to 5.

Side Effects: This is a legacy command. This parameter is not applicable to fibre host controllers and has no effect.

36. Simplex – No Reset

Default = Disabled (0)
Requires controller reset

The Simplex – No Reset function inhibits the reset signal normally sent from one controller to another controller in a dual-active controller system. This function is intended for use in simplex environments only.

37. Queue Limit

Default = 32

The Queue Limit function specifies the queue depth for tagged commands to all attached physical device. This is further limited to the device's own tag limit. The valid range for tagged commands is 1 to 230. A setting of 1 is equivalent to no tags. If using coalescing, set the queue tag limit to 2. This parameter takes effect immediately, without resetting the controllers.

38-41. Hard Loop IDs

Default = Disabled, (0)
Requires controller reset

The Hard Loop IDs function enables or disables use of the controller/host port and, if enabled, defines the hard loop ID. Specifying the hard loop ID means that the same ID is always used. The valid range for loop IDs is 0 to 127. A value greater than 128 + n or 0x80 + n indicates that hard loop IDs are enabled and n is equal to the loop ID.

Side Effects: Fibre Channel arbitrated loop nodes acquire loop IDs in this order: Previous (LI_PA), Hard (LI_HA), Soft (LI_SA). Any soft ID is used in the next LIPA cycle.

42-43. Controller Name

Read only

The Controller Name function enables you to assign names to the controllers. This parameter takes effect immediately, without resetting the controllers. This parameter is not supported by VT100 at this time.

Logical Device Parameters

Changing the Logical Device Parameters cannot be performed until logical devices have been created. Several of the Logical Device Parameters are not changeable, or are set during the creation of a new configuration. These parameters are provided for informational purposes only. The write policy parameter is the only Logical Device Parameter that can be modified.

RAID Level

Read Only

This parameter is the RAID level associated with the configuration. You can set the RAID Level when creating a new configuration. (Refer to "Create New Disk Packs" on page 2-10 for instruction on how to set the RAID level. Refer to Table 2-2 on page 14 for a list and description of valid RAID levels.)

Logical Device State

Read Only

This parameter is the current logical device state. Refer to "Show Drives, Change Drive State" on page 3-9 for more information.

Raid Device Number

Read Only

This parameter is the RAID device number that is assigned by the firmware. This number is related to the RAID device type.

Stripe Size

Read Only

This parameter is the stripe size assigned to the configuration when configuration is originally created.

Read-Write Control

This parameter can be modified

This parameter changes the configured write policy. Write-Through writes data to the device before returning completion status to the host. Write-Back returns a completion status to the host as soon as the cache receives the data. The target device receives the data at a more appropriate time. This parameter takes effect immediately, without resetting the controllers.

Physical Device Parameters

Changing the Physical Device Parameters cannot be performed until The physical device has been configured into a RAID device.

Transfer Speed

Default = depends on device type
Requires controller reset

The Transfer Speed parameter sets the maximum transfer rate for each device. The possible settings are 0 for asynchronous, 5, 10, 20, 40, 80, and 1000 for fibre.

> **NOTE:** Change the default setting only if problems are encountered in communicating with a device. Do not change the default setting unless you are doing so as part of a trouble-shooting activity.

Transfer Width

Default = 16 bits (2)
Requires controller reset

The Transfer Width parameter determines the maximum data transfer width size in bits. The possible settings are serial, 8 bits, and 16 bits.

Appendix C
Configuring for VT100 Terminal-Emulation Mode

Refer to the appropriate controller installation guide for requirements to configure the serial port for terminal emulation. Some controllers require jumper settings. The jumpers are located on the distribution board and vary between controllers. Some controllers require configuration bit settings and firmware header settings.

By connecting a VT100 compatible terminal, or a PC operating in an equivalent terminal-emulation mode, basic controller functions can be exercised from the VT100 terminal. Mylex has tested the VT100 User Interface with the following terminal-emulation programs: Terminal.exe, available with Windows NT version 3.5; Hyperterminal.exe, available with Windows NT version 4.0, Tip available on Solaris systems, and CU available on IRIX systems. Tip and CU require the user to open an Xterm window then run Tip and CU to the open serial ports.

Configure the host settings to the values shown in Table 3-1 to ensure proper communication between the terminal emulation program and the controller.

Table 3-1. Terminal-Emulation Interface Requirements and Settings

Terminal	Requirement
Connection	Null-modem cable
Protocol	Asynchronous, RS232
Baud rate	19,200
Data bits	8
Stop bits	1
Parity	None
Flow control	None

Access the user interface by typing **<@>** (the ASCII equivalent is 0x40 or shift-2 on keyboards configured for North America) or the <**Ctrl**> and <**Break**> keys together.

Appendix D
Glossary

Array

Multiple physical disks configured to behave has a single, independent disk.

Cache

Controller memory used to speed up data transfer to and from a disk.

Cache Flush

Refers to an operation where all unwritten blocks in a Write-Back Cache are written to the target disk. This operation is necessary before powering down the system.

Channel

A path for the transfer of data and control information between drives and the drive controller. Mylex disk array controllers have one or two host channels and up to six drive channels. Each drive channel can support up to 124 drives.

Consistency Check

Also referred to as a parity check. The Consistency Check function verifies the integrity of data on a system drive. It verifies that mirror or parity information matches the stored data on the redundant arrays (RAID 1, RAID 3, RAID 5, or RAID 0+1). If the parity block information is inconsistent with the data blocks, the controller has the ability to correct the inconsistencies using Consistency Check with Restore function.

Disk Striping

The practice of dividing data into blocks and writing them across multiple drives for increased performance.

Drive Group (or Drive Pack)

A drive group is a group of individual disk drives (preferably identical) that are logically tied to each other and are addressed as a single unit.

Dual-Active

A disk array system with two identical controllers handling host I/O requests. Both controllers are capable of taking over the host traffic operations of the other controller in the event of a failure. Also referred to as *duplex*.

Environmental Device

AEMI, SAF-TE, or SES. Environmental monitoring devices that detect drive insertion or removal, power supply malfunction, fan malfunction, temperature extremes, and UPS ac failure.

Failback

A process by which a controller releases its partner controller from reset and allows it to re-assume its duties.

Failed Drive

A physical disk drive that has failed to operate properly or has been marked offline failed by the controller.

Failed Controller

One of the controllers in a dual-active configuration has been determined to be malfunctioning by its partner.

Failover

A process by which a controller puts its partner controller in reset and assumes its duties.

Fibre Channel

A data transfer interface technology that provides high-speed I/O and networking functionality in a single connectivity technology.

GAM (Global Array Manager)

A software utility developed by Mylex for use with Mylex controllers. This utility is used to configure, manage, and monitor RAID arrays connected to one or two Mylex controllers.

Hard Loop ID

A controller's preferred loop ID (as specified by the saved configurations). The controller attempts to acquire hard loop IDs during the LIHA (Loop Initialization Hard Address) phase of loop initialization.

Hot plug

The action of removing and inserting a controller while system power is applied. Insertion and removal can occur while the other controller in a dual-active system is active. Hot plug **does not** include the removal of a functioning controller.

Hub

A Fibre Channel device that connects nodes into a logical loop. Hubs connect multiple drive channels to one or two host channels. The hub detects when a node has been inserted or failed and automatically adds the new node or removes the failed node while maintaining the loop.

I/O

Input/Output. Refers to disk reads and writes.

LCD

Liquid crystal display on the front panel of the controller enclosure. The LCD provides a monitor display for error and status messages.

Logical Device

Disk storage space on one or more physical drives which appears to the computer as one drive. Sometimes referred to as a system drive.

Logical Device States

The current operational state of a system drive: Offline Failed, Online Optimal, Online Critical, or Online Critical and Rebuilding.

Logical Unit

Disk storage space on one or more physical drives that appears to the computer as one drive. Sometimes referred to as a system drive or a logical drive.

Logical Unit Number (LUN)

A SCSI representation of a system drive on a given channel and target ID. This may be a single device or an array of devices configured to behave as a single device.

LUN Mapping

A method whereby a LUN ID is assigned to a system drive. With a LUN ID the system drive is accessible through one or more host ports. The LUN assignments are per host port and are independent of the assignments on other host ports. System drives can be assigned only one LUN per host port.

By not assigning a LUN ID to a system drive on a particular host port, that system drive is not accessible to that host port.

LUN mapping is a component of SANmapping™.

Mirroring

Refers to the 100% duplication of data on one disk drive to another disk drive. Each disk is the mirror image of the other; RAID Level 1.

MORE

Mylex Online RAID Expansion.

Parity

Refers to a method of providing complete data redundancy while requiring only a fraction of the storage capacity of mirroring. All data and parity blocks are divided between the drives in such a way that if any single drive is removed (or fails), the data on it can be reconstructed using the data on the remaining drives.

Partner Controller

In a dual-active configuration, the partner controller is the controller that is not being accessed. Convention has assigned controller 1 as the partner controller.

Physical Device States

Refers to the drives current operational status: Unconfigured Offline, Commanded Offline, Offline Failed, Offline Missing, Offline Warm Spare (not supported at this time), Online Optimal, Online Critical, Online Hot Spare, or Online Rebuild.

Physical Disk Drive

A single hard disk drive. Each physical disk drive is assigned a unique identification address. Sometimes referred to as a physical device.

Previous Loop ID

The loop ID acquired during a prior loop initialization. The controller acquires previous loop IDs during the Loop Initialization, Previous Address (LIPA) phase of loop initialization.

Primary Controller

In a dual-active configuration, the primary controller is the controller that is currently being accessed. Convention has assigned controller 0 as the primary controller.

Online Hot spare

A physical drive not part of a system drive that the controller can use to automatically rebuild a critical system drive. The hot spare drive must have at least as much capacity as the largest drive in the array or the rebuild may not start.

RAID

Redundant Array of Independent Disks.

RAID levels

Mylex disk array controllers support four RAID Advisory Board approved levels (RAID 0, RAID 1, RAID 3, RAID 5) and two special RAID levels (RAID 0+1, and JBOD).

RAID 0

The controller stripes data sequentially across multiple drives without redundancy.

RAID 1

Disk mirroring—controller duplicates data from one drive to another.

RAID 3

Stripes blocks of data across all drives. Maintains parity information that can be used for data recovery.

RAID 5

Stripes blocks of data and parity information across all drives.

RAID 0+1 (Mylex RAID 6)

Combines the benefits of disk mirroring (RAID 1) and data striping (RAID 0).

JBOD (Mylex RAID 7)

The controller treats a single drive as a stand-alone disk and provides a high-performance cache.

Rebuild

Refers to a physical drive state where the drive is in the process of being rebuilt. During this process, data is regenerated and written to the disk drive.

Redundant Array

A RAID level that provides complete data redundancy. In the event of a drive failure or removal, the data can be reconstructed using the data on the remaining drives.

Replacement Controller

A controller that replaces a failed controller.

Replacement Disk Drive

A drive that replaces a failed drive. See also hot spare.

Reset Controllers

This operation performs a “warm” power cycle on the controllers. A controller reset is required after changing some controller parameters and is recommended after making any changes to the configuration.

SAF-TE

SCSI Access Fault-Tolerant Enclosure. SAF-TE provides monitoring of power supplies, fans, and temperature in the cabinet.

SANmapping™

The SANmapping™ feature restricts host access to configured system drives similarly to the Programmable LUN Mapping feature. Programmable LUN Mapping is incorporated into SANmapping™. SANmapping™ is intended for use in configurations in which multiple host computers attach to one or more Mylex controllers or a Storage Area Network (SAN) configuration. The host computers are attached to the controllers through a fibre channel arbitrated loop or through a switch.

SES

SCSI-3 Enclosure Services. SES provides support for disk drives, power supply, temperature, door lock, alarms, UPS, and enclosure services controller electronics. The SES process polls each SES device once every 10 seconds.

Simplex

A system with only one controller or a mode of operation where only one controller is active or present. To perform a MORE (Mylex Online RAID Expansion) operation, a dual-active system must be in simplex mode.

SCSI (Small Computer System Interface)

A technological standard that defines connections between computers and peripheral devices.

Stripe Size

The stripe size is defined as the size, in kilobytes (1024 bytes) of a single I/O operation. A stripe of data is divided over all disks in the drive group.

Striping

Refers to the storing of a sequential block of incoming data across multiple drives in a group. This storage method increases the disk system throughput by ensuring a balanced load among all drives.

Surviving Controller

A controller that has determined that its partner controller in a dual-active pair has failed and has assumed the duties of both controllers.

System Drive

Disk storage space on one or more physical drives which appears to the computer as one drive. Sometimes referred to as a logical device or logical drive.

System Drive Affinity

System drive affinity defines the host ports and controllers through which a particular system drive can be accessed. System drives are presented to the host as LUNs.

Target ID (TID)

Refers to the SCSI ID or the Fibre ID of a device attached to a controller. Each drive channel can have up to 15 attached devices.

VT100

Terminal-emulation interface that enables a user to access the controller through a PC without an additional utility.

Write-Back Cache

Refers to a caching strategy whereby write operations result in a completion signal being sent to the host operating system as soon as the cache receives the data to be written. The target drive receives the data at a more appropriate time in order to increase controller performance.

Write-Through Cache

Refers to a caching strategy whereby data is written to the drive before completion status is returned to the host operating system. This caching strategy is considered more secure than Write-Back caching because a power failure is less likely to cause a loss of data; however, a Write-Through cache results in a slightly lower performance.

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