

## 2 MegaRAID Configuration Utility

The MegaRAID Configuration Utility configures disk arrays and logical drives. Because the utility resides in the MegaRAID BIOS, its operation is independent of the operating systems on your computer.

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**In This Chapter** The topics discussed in this chapter include:

- starting Configuration Utility
  - MegaRAID Configuration Utility menus
  - choosing a configuration method
  - designating drives as hot spares
  - creating physical arrays
  - defining logical drives
  - initializing logical drives
  - using logical drives in your operating system
  - rebuilding failed disk drives
  - using a pre-loaded SCSI drive as-is
- 

### Starting MegaRAID Configuration Utility

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When the host computer boots, hold the <Ctrl> key and press the <M> key when the following appears:

```
Host Adapter-1 Firmware Version x.xx DRAM Size 4 MB
0 Logical Drives found on the Host Adapter
0 Logical Drives handled by BIOS
Press <Ctrl><M> to run MegaRAID BIOS Configuration Utility
```

For each MegaRAID adapter in the host system, the firmware version, DRAM size, and the status of logical drives on that adapter is displayed. If you do not press <Ctrl> <M> within a few seconds of the prompt, the computer continues the normal boot procedure.

#### ***Important***

MegaRAID supports one to four SCSI channels, but many of the screens in this manual show three SCSI channels. The utilities described in this manual also work with other MegaRAID models that support one, two, or three channels.

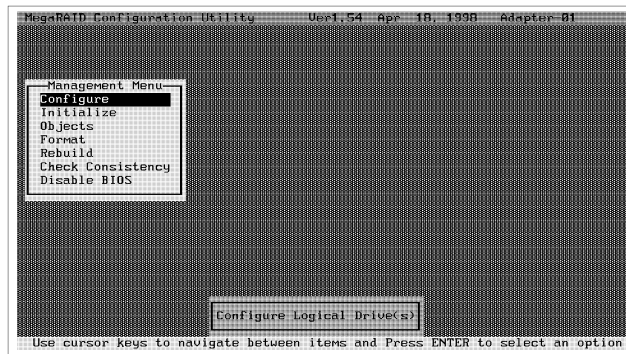
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## Starting MegaRAID Configuration Utility, Continued

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When you press <Ctrl> <M>, the following appears:



**Configuration Utility Menu Options** The Configuration Utility menu options:

Option	Description
Configure	Choose this option to configure physical arrays and logical drives.
Initialize	Choose this option to initialize one or more logical drives.
Objects	Choose this option to individually access controllers, logical drives, and physical drives.
Format	Choose this option to low-level format hard disk drives.
Rebuild	Choose this option to rebuild failed disk drives.
Check Consistency	Choose this option to verify that the redundancy data in logical drives using RAID level 1, 3, or 5 is correct.
Select Adapter	Choose this option to select a MegaRAID host adapter to work on. This menu item appears only if more than one MegaRAID host adapter is installed in the computer.
Disable BIOS	Choose this option to disable the MegaRAID BIOS.

### If Using MegaRAID Configuration Utility

To...	Use this menu	turn to...
configure arrays and logical drives	Configure	page 19
initialize logical drives	Initialize	page 36
format a disk drive	Format	page 38
rebuild a disk drive	Rebuild	page 40
use a pre-loaded SCSI drive as-is	Configure	page 42

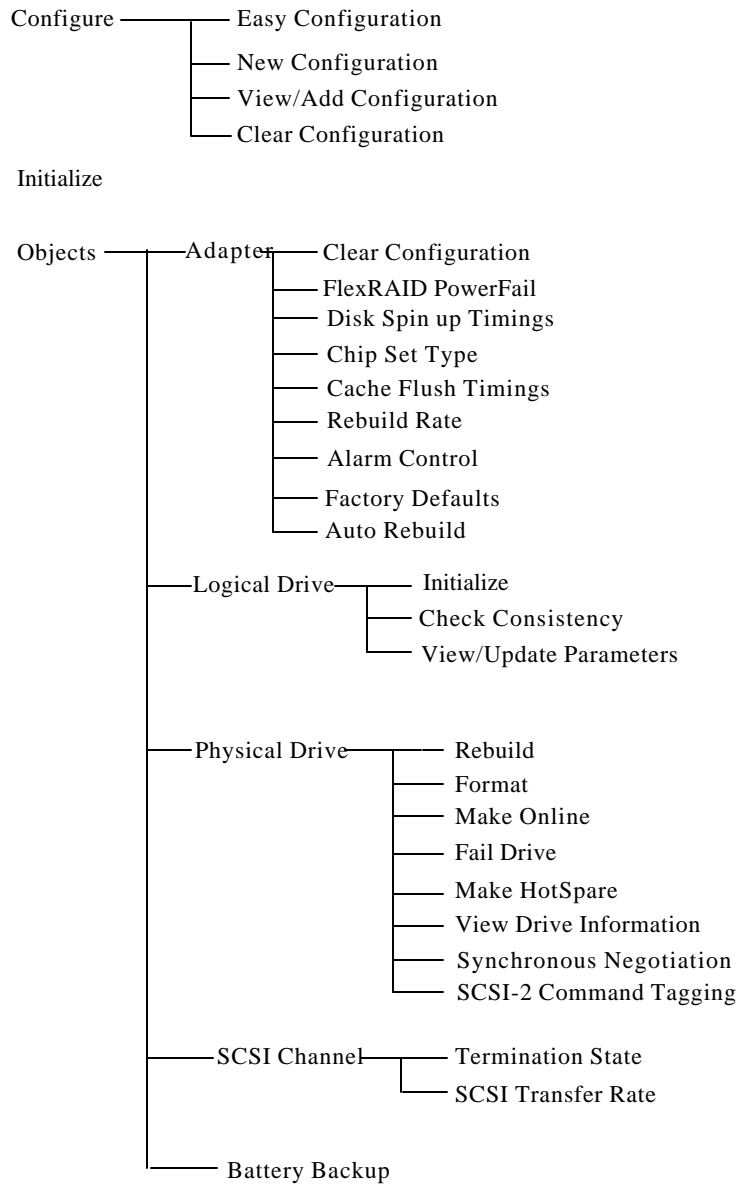
For information about other functions, see the following menu tree and menu descriptions.

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## MegaRAID Configuration Utility Menu Tree

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The following is an expansion of the menus in the MegaRAID Configuration Utility.



Format  
Rebuild  
Check Consistency  
Select Adapter  
Disable BIOS

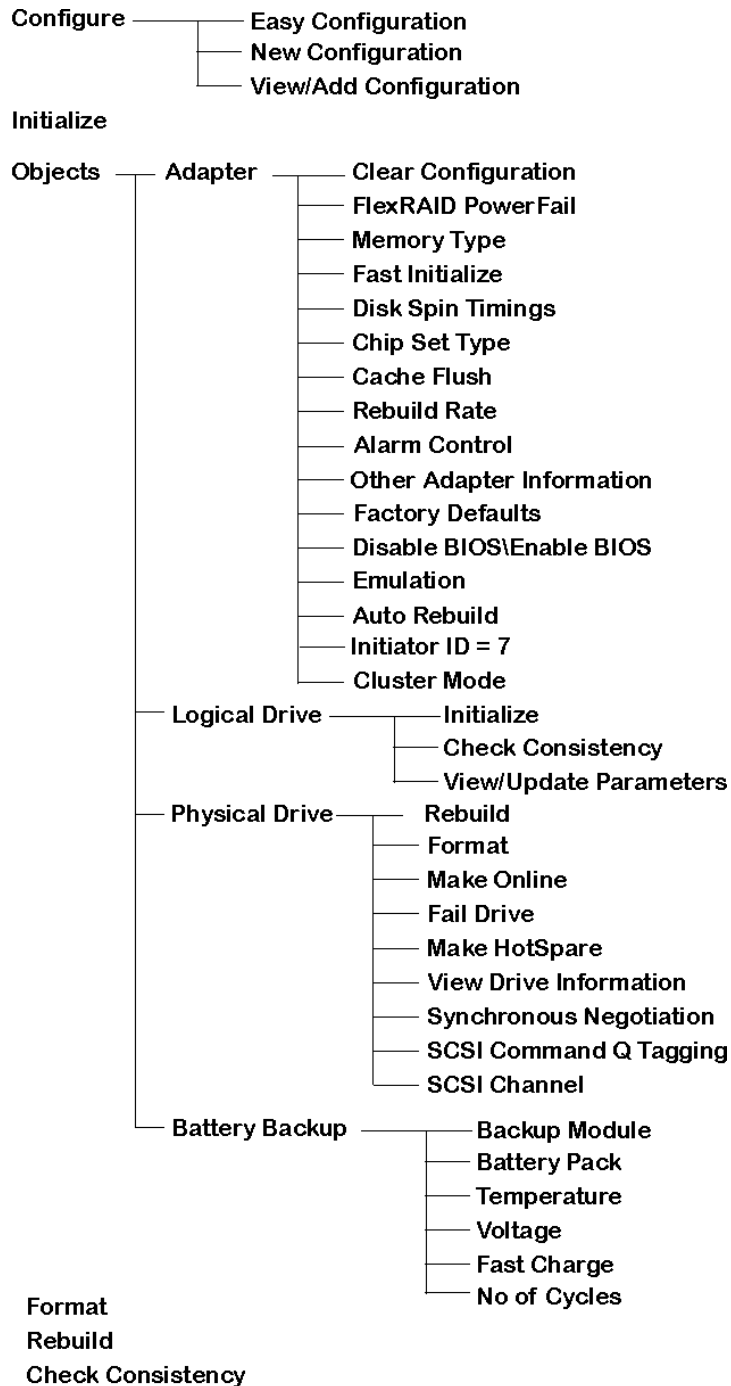
The menu items are explained on the following pages.

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## MegaRAID Configuration Utility Menu Tree for Ultra 160M Cards

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The following is an expansion of the menus in the MegaRAID Configuration Utility for boards that support Ultra 160M, and 40 logical drives: Enterprise 1600, Elite 1600, and Express 500.



## MegaRAID Configuration On Disk

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MegaRAID supports Configuration on Disk (drive roaming). Configuration on Disk saves configuration information both in the MegaRAID NVRAM and on the disk drives attached to MegaRAID. If MegaRAID is replaced, the new MegaRAID controller can detect the RAID configuration, maintaining the integrity of the data on each drive even if the drives have changed channel and/or target ID.

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**Adding Configuration on Disk Support** Perform the following steps:

Step	Action
1	Press <Ctrl> <M> at the MegaRAID POST screen to run the MegaRAID Configuration Utility.
2	Select the Configure Menu. Select View/Add Configuration. Select Disk when asked to use Disk or NVRAM and select Save.
3	Press <Esc> to exit MegaRAID Configuration Utility.
4	Reboot the computer.

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## Configuration Utility Configure Menu

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**Configure** Choose the Configure option to select a method for configuring arrays and logical drives.

Option	Description
Easy Configuration	Select this method to perform a basic logical drive configuration where every physical array you define is automatically associated with exactly one logical drive. See page 20 for additional information.
New Configuration	Select this method to discard the existing configuration information and to configure new arrays and logical drives. In addition to providing the basic logical drive configuration functions, New Configuration allows you to associate logical drives with multiple or partial arrays. See page 20 for additional information.
View/Add Configuration	Select this method to examine the existing configuration and/or to specify additional arrays and logical drives. View/Add Configuration provides the same functions available in New Configuration. See page 20 for additional information.
Clear Configuration	Select this option to erase the current configuration information from the MegaRAID controller non-volatile memory.

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## Configuration Utility Initialize Menu

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### Initialize

Choose this option from the Configuration Utility main menu to initialize one or more logical drives. This action typically follows the configuration of a new logical drive. See page 36 for additional information.

#### *Warning*

Initializing a logical drive destroys all data on the logical drive.

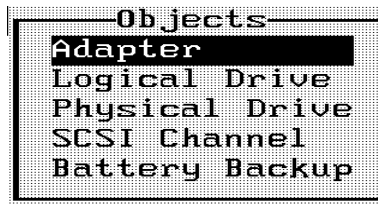
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## Configuration Utility Objects Menu

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### Objects

Choose the Objects option from the Configuration Utility main menu to access the controllers, logical drives, physical drives, and SCSI channels individually. You can also change settings for each object. The Objects menu options are as follows. *Battery Backup* appears shown on some Objects menus but you cannot select this option because MegaRAID does not support this feature.



### Adapter

Choose *Adapter* from the Objects menu to select a controller (if the computer has more than one) and to modify parameters. You can install only one MegaRAID controller, but you can also install other controllers. The menu options are:

- Clear Configuration
  - FlexRAID PowerFail
  - Disk Spin up Timings
  - Chip Set Type
  - Cache Flush Timings
  - Rebuild Rate
  - Alarm Control
  - Factory Defaults
  - Auto Rebuild
- 

Cont'd

## Configuration Utility Objects Menu, Continued

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**Adapter**, cont'd The Objects/Adapter menu options are:

Option	Description
Clear Configuration	Choose this option to erase the current configuration from the controller non-volatile memory.
FlexRAID PowerFail	Choose this option to enable the FlexRAID PowerFail feature. Choose this option to allow drive reconstruction to continue when the system restarts if a power failure occurs.
Disk Spin up Timings	Choose this option to set the method and timing for spinning up the hard disk drives in the computer.
Chip Set Type	Select the type of chipset used in the motherboard in the host computer.
Cache Flush Timings	Choose this option to set the cache flush interval to once every 2, 4, 6, 8, or 10 seconds.
Rebuild Rate	Choose this option to display and change the rebuild rate for drives attached to the selected adapter.
Alarm Control	Choose this option to enable, disable, or silence the onboard alarm tone generator.
Factory Defaults	Choose this option to load the default MegaRAID Configuration Utility settings.
Auto Rebuild	Choose this option to automatically rebuild drives when they fail.

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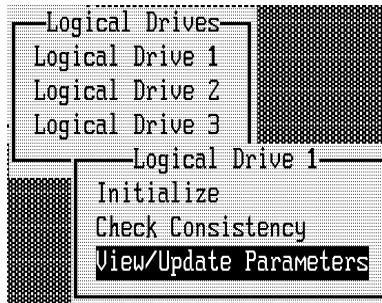
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## Configuration Utility Objects Menu, Continued

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**Logical Drive** Choose this option from the Configuration Utility Objects menu to select a logical drive and to perform the listed actions.



Logical Drive Options	Description
Initialize	Initializes the selected logical drive. Do this for every logical drive that is configured.
Check Consistency	Verifies the correctness of the redundancy data in the selected logical drive. This option is available only if RAID level 1, 3, or 5 is used. MegaRAID automatically corrects any differences found in the data.
View/Update Parameters	Displays the properties of the selected logical drive. You can modify the cache write policy, read policy, and the I/O policy and can enable Virtual Sizing from this menu.

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## Configuration Utility Objects Menu, Continued

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**Virtual Sizing** Virtual Sizing allows Power Console Plus to determine the drive capacity. The operating system reports the drive capacity as determined by Power Console Plus.

Select *Virtual Sizing* from the View/Update Properties option on the Logical Drive menu. The Logical Drive menu is selected from the Configuration Utility Objects menu. Select *Enabled* to enable Virtual Sizing. Set this option to *Enabled* before adding a physical drive to a logical drive.

After you have created a logical drive set, the partition of the drive should be as large as the virtual size of the logical drive. After you have created a logical array set, the drive partition can be as large as the full size of the logical drive. However, this is the full virtual drive size, not the actual physical drive size.

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### ***Important***

*The physical drive must be in the READY state before it can be added to a logical drive. No operation can be started while a drive is being reconstructed.*

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## Configuration Utility Objects Menu, Continued

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**Physical Drive** Choose this option from the Configuration Utility Objects menu to select a physical device and to perform the operations listed in the table below. The physical hard disk drives in the computer are listed. Move the cursor to the desired device and press <Enter> to display the following:

Physical Drive Options	Description
Rebuild	Rebuild the selected physical drive.
Format	Choose this option to low-level format the selected disk drive.
Make Online	Choose this option to change the state of the selected disk drive to Online.
Fail Drive	Choose this option to change the state of the selected disk drive to Fail.
Make HotSpare	Choose this option to designate the selected disk drive as a hot spare.
View Drive Information	Choose this option to display the drive properties for the selected physical device.
Synchronous Negotiation	Choose this option to enable or disable synchronous negotiation for the selected physical device. The default is Enabled.
SCSI-2 Command Tagging	Choose this option to set the number of queue tags per command to Disabled, 2, 3, 4, or Enhanced. The default setting is Enhanced.

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## Configuration Utility Objects Menu, Continued

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**SCSI Channel** Choose this option from the Configuration Utility Objects menu to select a SCSI channel on the currently selected controller. You can perform the following operations on the selected channel.

Channel Options	Description
Termination Enabled/Disabled	When set to Enabled, the MegaRAID controller is terminated. When set to Disabled, it is not. Normally, you will not need to change this setting. MegaRAID automatically sets this option.
SCSI Transfer Rate	The SCSI transfer rates are: Fast up to 20 MB/s Ultra up to 40 MB/s Ultra-2 up to 80 MB/s Ultra160M up to 160 MB/s Normally, you will not have to change this option. MegaRAID automatically uses the fastest possible data transfer rate based on the attached SCSI devices.

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## Configuration Utility Format Menu

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**Format** Choose the Format option from the Configuration Utility main menu to low-level format one or more physical drives.

***Warning***

Formatting a hard drive destroys all data on the drive.

See page 38 for additional information.

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**Formatting** Since most SCSI disk drives are low-level formatted at the factory, this step is usually not necessary. You must format a disk only if:

- the disk drive was not low-level formatted at the factory, or
- an excessive number of media errors have been detected on the disk drive.

You do not have to choose Format to erase existing information on your SCSI disks, such as a system partition. That information is erased when you initialize the logical drive(s).

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## Configuration Utility Rebuild Menu

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**Rebuild** Choose the Rebuild option from the Configuration Utility main menu to rebuild one or more failed disk drives. See page 40 for additional information.

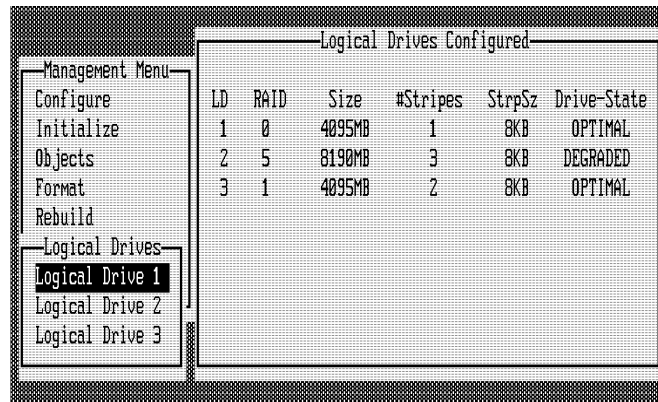
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## Configuration Utility Check Consistency Menu

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**Check Consistency** Choose this option to verify the redundancy data in logical drives that use RAID levels 1, 3, or 5.

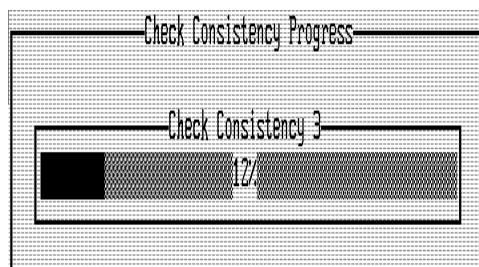
When you choose Check Consistency, the parameters of the existing logical drives on the current controller and a selection menu listing the logical drives by number appear. If a discrepancy is found, it is automatically corrected, *assuming always that the data is correct*. However, if the failure is a read error on a data drive, the bad data block is reassigned with the generated data.



LD	RAID	Size	#Stripes	StrpSz	Drive-State
1	0	4095MB	1	8KB	OPTIMAL
2	5	8190MB	3	8KB	DEGRADED
3	1	4095MB	2	8KB	OPTIMAL

Press the arrow keys to choose the desired logical drives. Press the spacebar to select or deselect a drive for consistency checking. Press <F2> to select or deselect all the logical drives.

Press <F10> to begin the consistency check. A progress indicator for each selected logical drive is displayed.



When the consistency check is finished, press any key to clear the progress display and press <Esc> to display the main menu.

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## Configuration Utility Select Adapter Menu

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This menu item appears only if more than one MegaRAID host adapter is installed in the computer. You can install only one MegaRAID controller, but you can install other MegaRAID controllers in the computer. The following appears when you choose the Select Adapter option:

<b>Sel. Adapter</b>
Adapter-1
Adapter-2
Adapter-3

Select the MegaRAID adapter that you want to configure from this menu.

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## Disable BIOS Menu

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Choose this option to disable the BIOS.

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## Configuring Arrays and Logical Drives

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You can configure physical arrays and logical drives with MegaRAID Configuration Utility using:

- Easy Configuration,
- New Configuration, or
- View/Add Configuration.

Each configuration method requires a different level of user input. The general flow of operations for array and logical drive configuration is:

Step	Action
1	Choose a configuration method.
2	Designate hot spares (optional).
3	Create arrays using the available physical drives.
4	Define logical drives using the space in the arrays.
5	Save the configuration information.
6	Initialize the new logical drives.

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## Choosing the Configuration Method

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**Easy Configuration** In Easy Configuration, each physical array you create is associated with exactly one logical drive, and you can modify the following parameters:

- RAID level
- stripe size
- cache write policy
- read policy
- I/O policy

If logical drives have already been configured when you select Easy Configuration, the configuration information is not disturbed. See page 22 for instructions on Easy Configuration.

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**New Configuration** In New Configuration, you can modify the following logical drive parameters:

- RAID level,
- stripe size,
- cache write policy,
- read policy,
- I/O policy,
- logical drive size, and
- spanning of arrays.

If you select New Configuration, the existing configuration information on the selected controller is *destroyed when the new configuration is saved*. See page 26 for instructions on New Configuration.

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**View/Add Configuration** View/Add Configuration allows you to control the same logical drive parameters as New Configuration *without disturbing* the existing configuration information. You can also choose to enable the Configuration on Disk feature. See page 31 for additional information.

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**Reserved Disk Space during Configuration** Up to 32 KB of disk space is reserved when a hard disk drive is being configured.

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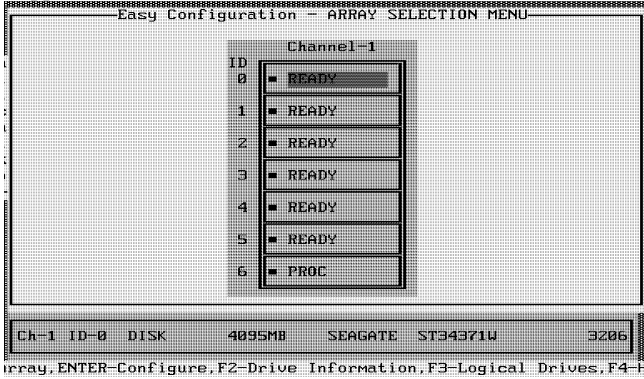
## Designating Drives as Hot Spares

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<b>Hot Spares</b>	<p>Hot spares are physical drives that are powered up along with the RAID drives and usually stay in a standby state. If a disk drive used in a RAID logical drive fails, a hot spare will automatically take its place and the data on the failed drive is reconstructed on the hot spare. Hot spares can be used for RAID levels 1, 3, 5, 10, 30, and 50. Each MegaRAID controller supports up to eight hot spares.</p> <p>The methods for designating physical drives as hot spares are:</p> <ul style="list-style-type: none"><li>• press &lt;F4&gt; while creating arrays in Easy, New or View/Add Configuration mode, or</li><li>• From the Objects/Physical Drive menu, select a physical drive and press &lt;Enter&gt;. Select Make HotSpare.</li></ul>
<b>Press &lt;F4&gt;</b>	<p>When you choose any configuration option, a list of all physical devices connected to the current controller appears, as shown below:</p> <p>Press the arrow keys to choose a disk drive that has a READY indicator and press &lt;F4&gt; to designate the drive as a hot spare. The indicator will change to HOTSP.</p>
<b>Objects Menu</b>	<p>Select Objects from the Management menu, then select Physical Drive. A physical drive selection screen will appear. Select a disk drive and press &lt;Enter&gt; to display the action menu for the drive.</p> <p>Press the arrow keys to select Make HotSpare and press &lt;Enter&gt;. The indicator for the selected drive changes to HOTSP.</p>

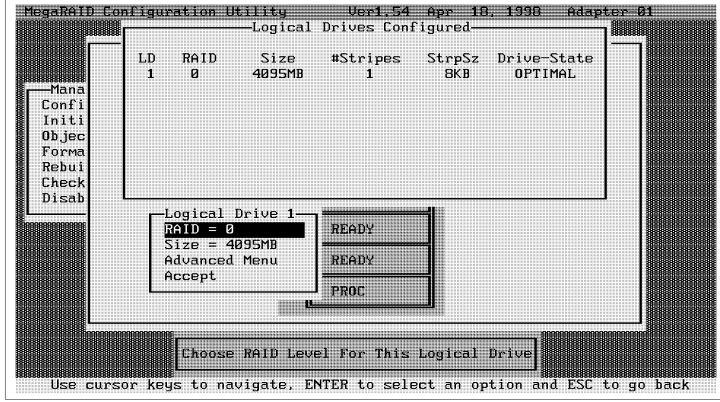
## Using Easy Configuration

In Easy Configuration, each array is associated with exactly one logical drive. Follow the steps below to create arrays using Easy Configuration. The following graphics often show 2 or 3 SCSI channels. MegaRAID Explorer supports up to 4 SCSI channels.

Step	Action
1	Choose Configure from the MegaRAID Configuration Utility main menu.
2	<p>Choose Easy Configuration from the Configure menu. The array selection menu appears:</p>  <p>Hot key information is displayed at the bottom of the screen. The hot key functions are:</p> <ul style="list-style-type: none"> <li>&lt;F2&gt; Display the manufacturer data and error count for the selected drive.</li> <li>&lt;F3&gt; Display the logical drives that have been configured.</li> <li>&lt;F4&gt; Designate the selected drive as a hot spare.</li> </ul>
3	<p>Press the arrow keys to choose specific physical drives. Press the spacebar to associate the selected physical drive with the current array. The indicator for the selected drive changes from READY to ONLIN A[<i>array number</i>]-[<i>drive number</i>]. For example, ONLIN A2-3 means disk drive 3 in array 2. Add physical drives to the current array as desired. Try to use drives of the same capacity in a specific array. If you use drives with different capacities in an array, all drives in the array are treated as if they have the capacity of the <i>smallest</i> drive in the array.</p>

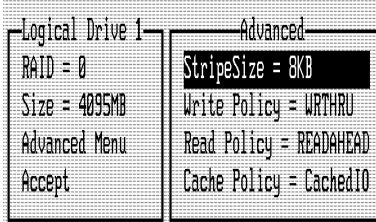
Cont'd

## Using Easy Configuration, Continued

Step	Action												
3 cont'd	<p>The number of physical drives in a specific array determine the RAID levels that can be implemented with the array.</p> <p>RAID 0 requires one or more physical drives,  RAID 1 requires exactly two physical drives,  RAID 3 requires at least three physical drives, and  RAID 5 requires at least three physical drives.</p>												
4	<p>Press &lt;Enter&gt; when you are finished creating the current array. The logical drive configuration screen appears.</p>  <p>The window from the top of the screen shows the logical drive that is currently being configured as well as any existing logical drives. The column headings are:</p> <table> <tbody> <tr> <td>LD</td><td>The logical drive number</td></tr> <tr> <td>RAID</td><td>The RAID level</td></tr> <tr> <td>Size</td><td>The logical drive size,</td></tr> <tr> <td>#Stripes</td><td>The number of stripes (physical drives) in the associated physical array</td></tr> <tr> <td>StrpSz</td><td>The stripe size</td></tr> <tr> <td>DriveState</td><td>The state of the logical drive</td></tr> </tbody> </table>	LD	The logical drive number	RAID	The RAID level	Size	The logical drive size,	#Stripes	The number of stripes (physical drives) in the associated physical array	StrpSz	The stripe size	DriveState	The state of the logical drive
LD	The logical drive number												
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Size	The logical drive size,												
#Stripes	The number of stripes (physical drives) in the associated physical array												
StrpSz	The stripe size												
DriveState	The state of the logical drive												
5	<p>Set the RAID level for the logical drive. Highlight <i>RAID</i> and press &lt;Enter&gt;. The available RAID levels for the current logical drive are displayed. Select a RAID level and press &lt;Enter&gt; to confirm. See the <i>MegaRAID Hardware Guide</i> for an explanation of the RAID levels.</p>												

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## Using Easy Configuration, Continued

Step	Action
6	<p>Set the stripe size, cache write policy, Read policy, and I/O (cache) policy from the Advanced Menu.</p>  <p><b>Stripe size</b> This parameter specifies the size of the segments written to each disk in a RAID 1, 3, 5, 10, 30, or 50 logical drive. You can set the stripe size to 2 KB, 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB. A larger stripe size produces better read performance, especially if your computer does mostly sequential reads. If you are sure that your computer does random read requests more often, choose a small stripe size. The default is 64 KB.</p> <p><b>Write Policy</b> This option sets the caching method to write-back or write-through.</p> <p>In <i>Write-back</i> caching the controller sends a data transfer completion signal to the host when the controller cache has received all the data in a transaction.</p> <p>In <i>Write-through</i> caching, the controller sends a data transfer completion signal to the host when the disk subsystem has received all the data in a transaction. This is the default setting.</p> <p>Write-through caching has a data security advantage over write-back caching. Write-back caching has a performance advantage over write-through caching. <i>You should not use write-back for any logical drive that is to be used as a Novell NetWare volume.</i></p> <p><b>Read-ahead</b> This option enables the SCSI read-ahead feature for the logical drive. You can set this parameter to <i>Normal</i>, <i>Read-ahead</i>, or <i>Adaptive</i>.</p> <p><i>Normal</i> specifies that the controller does not use read-ahead for the current logical drive. This is the default setting.</p> <p><i>Read-ahead</i> specifies that the controller uses read-ahead for the current logical drive.</p> <p><i>Adaptive</i> specifies that the controller begins using read-ahead if the two most recent disk accesses occurred in sequential sectors. If all read requests are random, the algorithm reverts to Normal; however, all requests are still evaluated for possible sequential operation.</p>

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## Using Easy Configuration, Continued

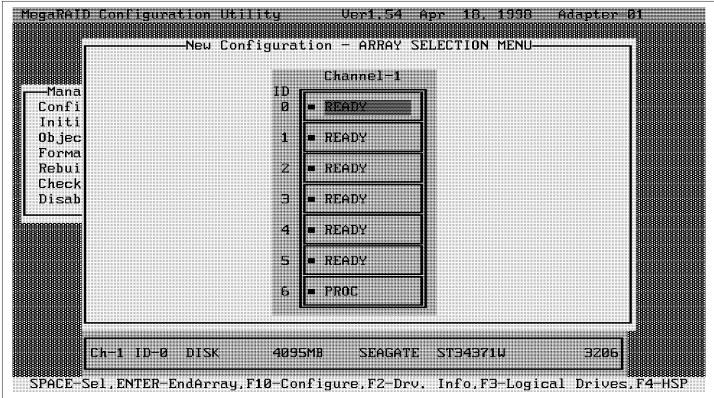
Step	Action																								
6, cont'd	<p><b>Cache Policy</b> This parameter applies to reads on a specific logical drive. It does not affect the Read ahead cache.</p> <p><i>Cached I/O</i> specifies that all reads are buffered in cache memory.</p> <p><i>Direct I/O</i> specifies that reads are not buffered in cache memory. Direct I/O does not override the cache policy settings. Data is transferred to cache and the host concurrently. If the same data block is read again, it comes from cache memory. This is the default setting.</p> <p>Press &lt;Esc&gt; to exit the Advanced Menu.</p>																								
7	<p>When you have defined the current logical drive, choose <i>Accept</i> and press &lt;Enter&gt;. The array selection screen appears if any unconfigured disk drives remain.</p>																								
8	<p>Repeat steps 3 through 7 to configure another array and logical drive. MegaRAID supports up to 40 logical drives per controller. If you are finished configuring logical drives, press &lt;Esc&gt; to exit Easy Configuration. A list of the currently configured logical drives appears:</p> <div><div><div>Configure</div><div>Easy Configuration New Configuration View/Add Configuration Clear</div></div><div><div>Save Configuration?</div><div>YES NO</div></div><div><div>Logical Drives Configured</div><table><thead><tr><th>LD</th><th>RAID</th><th>Size</th><th>#Stripes</th><th>StrpSz</th><th>Drive-State</th></tr></thead><tbody><tr><td>1</td><td>0</td><td>4095MB</td><td>1</td><td>8KB</td><td>OPTIMAL</td></tr><tr><td>2</td><td>1</td><td>4095MB</td><td>2</td><td>8KB</td><td>OPTIMAL</td></tr><tr><td>3</td><td>5</td><td>8190MB</td><td>3</td><td>8KB</td><td>OPTIMAL</td></tr></tbody></table></div></div> <p>After you respond to the Save prompt, the Configure menu appears.</p>	LD	RAID	Size	#Stripes	StrpSz	Drive-State	1	0	4095MB	1	8KB	OPTIMAL	2	1	4095MB	2	8KB	OPTIMAL	3	5	8190MB	3	8KB	OPTIMAL
LD	RAID	Size	#Stripes	StrpSz	Drive-State																				
1	0	4095MB	1	8KB	OPTIMAL																				
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3	5	8190MB	3	8KB	OPTIMAL																				
9	<p>Initialize the logical drives you have just configured. See Initializing Logical Drives on page 36.</p>																								

# Using New Configuration

The New Configuration option allows you to associate logical drives with partial and/or multiple physical arrays (the latter is called spanning of arrays).

**Erases Configuration** Choosing the New Configuration option *erases* the existing configuration information on the selected controller.

To use the spanning feature and keep the existing configuration, use View/Add Configuration (see page 31).

Step	Action
1	Choose Configure from the MegaRAID Configuration Utility main menu.
2	Choose New Configuration from the Configure menu. An array selection window is displayed showing the devices connected to the current controller. <div></div>

Hot key information appears at the bottom of the screen. The hot key functions are:

<F2>

Display the manufacturer data and MegaRAID error count for the selected drive.

<F3>

Display the logical drives that have been configured.

<F4>

Designate the selected drive as a hot spare.

<F10>

Display the logical drive configuration screen.

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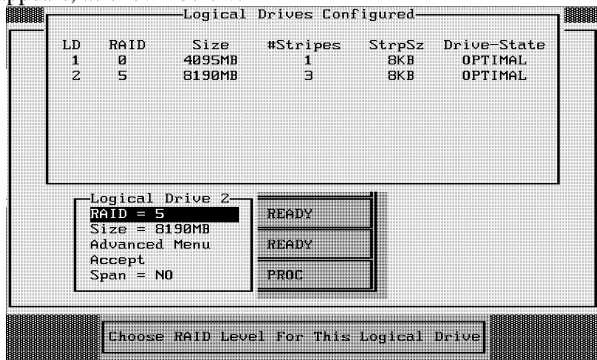
## Using New Configuration, Continued

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Step	Action
3	<p>Press the arrow keys to choose specific physical drives. Press the spacebar to associate the selected physical drive with the current array. The indicator for the selected drive changes from READY to ONLIN A[<i>array number</i>]-[<i>drive number</i>]. For example, ONLIN A2-3 means disk drive 3 in array 2.</p> <p>Add physical drives to the current array as desired. Try to use drives of the same capacity in a specific array. If you use drives with different capacities in an array, all the drives in the array are treated as though they have the capacity of the <i>smallest</i> drive in the array.</p> <p>The number of physical drives in a specific array determines the RAID levels that can be implemented with the array.</p> <p>RAID 0 requires one or more physical drives per array. RAID 1 requires 2, 4, 6, 8, 10, 12, 14, 16, 18 or 20 physical drives per array. RAID 3 requires at least three physical drives per array. RAID 5 requires at least three physical drives per array.</p>
4	<p>Press &lt;Enter&gt; when you are finished creating the current array. To continue defining arrays, repeat step 3. To begin logical drive configuration, go to step 5.</p>

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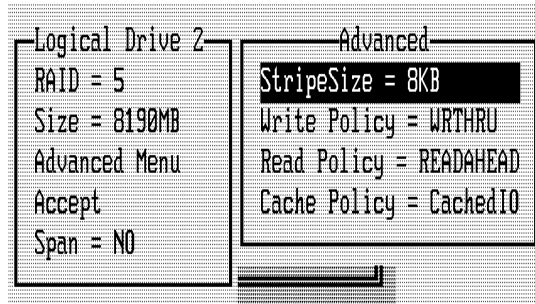
## Using New Configuration, Continued

Step	Action												
5	<p>Press &lt;F10&gt; to configure logical drives. The logical drive configuration screen appears, as shown below:</p>  <p>The window from the top of the screen shows the logical drive that is currently being configured as well as any existing logical drives. The column headings are:</p> <table> <tr> <td>LD</td><td>The logical drive number,</td></tr> <tr> <td>RAID</td><td>The RAID level,</td></tr> <tr> <td>Size</td><td>The logical drive size,</td></tr> <tr> <td>#Stripes</td><td>The number of stripes (physical drives) in the associated physical array,</td></tr> <tr> <td>StrpSz</td><td>The stripe size, and</td></tr> <tr> <td>Drive-State</td><td>The state of the logical drive.</td></tr> </table>	LD	The logical drive number,	RAID	The RAID level,	Size	The logical drive size,	#Stripes	The number of stripes (physical drives) in the associated physical array,	StrpSz	The stripe size, and	Drive-State	The state of the logical drive.
LD	The logical drive number,												
RAID	The RAID level,												
Size	The logical drive size,												
#Stripes	The number of stripes (physical drives) in the associated physical array,												
StrpSz	The stripe size, and												
Drive-State	The state of the logical drive.												
6	<p>Set the RAID level for the logical drive. Highlight <i>RAID</i> and press &lt;Enter&gt;. A list of the available RAID levels for the current logical drive appears. Select a RAID level and press &lt;Enter&gt; to confirm. See the <i>MegaRAID Hardware Guide</i> for an explanation of the RAID levels.</p>												
7	<p>Set the spanning mode for the current logical drive. Highlight <i>Span</i> and press &lt;Enter&gt;. The choices are:</p> <p>CanSpan Array spanning is enabled for the current logical drive. The logical drive can occupy space in more than one array.</p> <p>NoSpan Array spanning is disabled for the current logical drive. The logical drive can occupy space in only one array.</p>												

Cont'd



## Using New Configuration, Continued

Step	Action
7, cont'd	For two arrays to be spannable, they must have the same stripe width (they must contain the same number of physical drives) and must be consecutively numbered. For example, assuming Array 2 contains four disk drives, it can be spanned only with Array 1 and/or Array 3, and only if Arrays 1 and 3 also contain four disk drives. If the two criteria for spanning are met, MegaRAID automatically allows spanning. If the criteria are not met, the <i>Span</i> setting makes no difference for the current logical drive. Highlight a spanning option and press <Enter>.
8	Set the logical drive size. Move the cursor to <i>Size</i> and press <Enter>. By default, the logical drive size is set to all available space in the array(s) being associated with the current logical drive, accounting for the <i>Span</i> setting and for partially used array space. For example, if the previous logical drive used only a part of the space in an array, the current logical drive size is set to the remaining space by default.
9	<p>Open the Advanced menu to set the remaining options.</p>  <p><b>Stripe size</b> This parameter specifies the size of the segments written to each disk in a RAID 1, 3, 5, 10, 30 or 50 logical drive. You can set the stripe size to 2 KB, 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB. A larger stripe size produces higher read performance, especially if your computer does mostly sequential reads. However, if you are sure that your computer does random read requests more often, select a small stripe size. The default stripe size is 64 MB.</p>

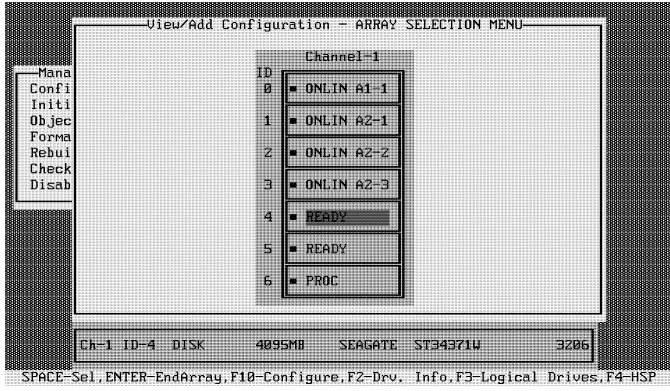
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## Using New Configuration, Continued

Step	Action
9, cont'd	<p><b>Write Policy</b> This option sets the caching method to write-back or write-through.</p> <p>In <i>Write-back caching</i>, the controller sends a data transfer completion signal to the host when the controller cache has received all the data in a transaction.</p> <p>In <i>Write-through caching</i>, the controller sends a data transfer completion signal to the host when the disk subsystem has received all the data in a transaction. This is the default setting.</p> <p>Write-through caching has a data security advantage over write-back caching, whereas write-back caching has a performance advantage over write-through caching. <i>You should not use write-back for any logical drive that is to be used as a Novell NetWare volume.</i></p> <p><b>Read-ahead</b> This option enables the SCSI read-ahead feature for the logical drive. You can set this parameter to <i>Normal</i>, <i>Read-ahead</i>, or <i>Adaptive</i>.</p> <p><i>Normal</i> specifies that the controller does not use read-ahead for the current logical drive.</p> <p><i>Read-ahead</i> specifies that the controller uses read-ahead for the current logical drive. This is the default setting.</p> <p><i>Adaptive</i> specifies that the controller begins using read-ahead if the two most recent disk accesses occurred in sequential sectors. If all read requests are random, the algorithm reverts to Normal, however, all requests are still evaluated for possible sequential operation.</p> <p><b>Cache Policy</b> This parameter applies to reads on a specific logical drive. It does not affect the Read ahead cache.</p> <p><i>Cached I/O</i> specifies that all reads are buffered in cache memory.</p> <p><i>Direct I/O</i> specifies that reads are not buffered in cache memory.</p> <p>Direct I/O does not override the cache policy settings. Data is transferred to cache and the host concurrently. If the same data block is read again, it comes from cache memory. This is the default setting.</p> <p>Press &lt;Esc&gt; to exit the Advanced Menu.</p>
10	<p>After you define the current logical drive, choose <i>Accept</i> and press &lt;Enter&gt;. If space remains in the arrays, the next logical drive to be configured appears. Repeat steps 6 to 9 to configure another logical drive. If the array space has been used, a list of the existing logical drives appears. Press any key to continue and respond to the Save prompt.</p>
11	<p>Initialize the logical drives you have just configured. See Initializing Logical Drives on page 36.</p>

## Using View/Add Configuration

View/Add Configuration allows you to associate logical drives with partial and/or multiple physical arrays (this is called spanning of arrays). The existing configuration is left intact, so you can also use View/Add Configuration simply to look at the current configuration.

Step	Action
1	Choose Configure from the MegaRAID Configuration Utility main menu.
2	Choose View/Add Configuration from the Configure menu. An array selection window is displayed showing the devices connected to the current controller. <div></div>

Hot key information appears at the bottom of the screen. The hot key functions are:

- <F2> Display the manufacturer data and MegaRAID error count for the selected drive.
- <F3> Display the logical drives that have been configured.
- <F4> Designate the selected drive as a hot spare.
- <F10> Display the logical drive configuration screen.

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## Using View/Add Configuration, Continued

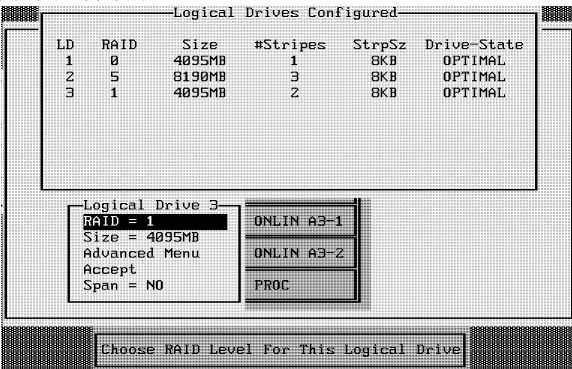
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Step	Action
3	<p>Press the arrow keys to choose specific physical drives. Press the spacebar to associate the selected physical drive with the current array. The indicator for the selected drive changes from READY to ONLIN A[<i>array number</i>]-[<i>drive number</i>]. For example, ONLIN A2-3 means disk drive 3 in array 2.</p> <p>Add physical drives to the current array as desired. Try to use drives of the same capacity in a specific array. If you use drives with different capacities in an array, all the drives in the array is treated as if they have the capacity of the <i>smallest</i> drive in the array.</p> <p>The number of physical drives in a specific array determine the RAID levels that can be implemented with the array.</p> <p>RAID 0 requires one or more physical drives per array. RAID 1 requires 2, 4, 6, or 8 physical drives per array. RAID 3 requires at least three physical drives per array. RAID 5 requires at least three physical drives per array.</p>
4	<p>Press &lt;Enter&gt; when you are finished creating the current array. To continue defining arrays, repeat step 3. To begin logical drive configuration, go to step 5.</p>

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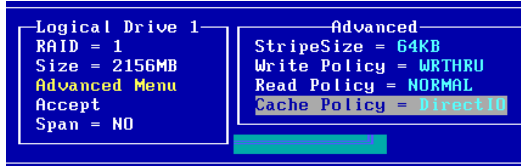
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## Using View/Add Configuration, Continued

Step	Action												
5	<p>Press &lt;F10&gt; to configure logical drives. The logical drive configuration screen appears, as shown below:</p>  <p>The logical drive that is currently being configured and any existing logical drives are displayed. The column headings are:</p> <table> <tr> <td>LD</td><td>The logical drive number</td></tr> <tr> <td>RAID</td><td>The RAID level</td></tr> <tr> <td>Size</td><td>The logical drive size,</td></tr> <tr> <td>#Stripes</td><td>The number of stripes (physical drives) in the associated physical array</td></tr> <tr> <td>StrpSz</td><td>The stripe size</td></tr> <tr> <td>Drive-State</td><td>The state of the logical drive</td></tr> </table>	LD	The logical drive number	RAID	The RAID level	Size	The logical drive size,	#Stripes	The number of stripes (physical drives) in the associated physical array	StrpSz	The stripe size	Drive-State	The state of the logical drive
LD	The logical drive number												
RAID	The RAID level												
Size	The logical drive size,												
#Stripes	The number of stripes (physical drives) in the associated physical array												
StrpSz	The stripe size												
Drive-State	The state of the logical drive												
6	<p>Set the RAID level for the logical drive. Highlight <i>RAID</i> and press &lt;Enter&gt;. The available RAID levels for the current logical drive appear. Select a RAID level and press &lt;Enter&gt; to confirm. See the <i>MegaRAID Hardware Guide</i> for an explanation of the RAID levels.</p>												
7	<p>Set the spanning mode for the current logical drive. Highlight <i>Span</i> and press &lt;Enter&gt;. The choices are:</p> <p><i>CanSpan</i> Array spanning is enabled for the current logical drive. The logical drive can occupy space in more than one array.</p> <p><i>NoSpan</i> Array spanning is disabled for the current logical drive. The logical drive can occupy space in only one array.</p>												

Cont'd

## Using View/Add Configuration, Continued

Step	Action
7, cont'd	<p>For two arrays to be spannable, they must have the same stripe width (they must contain the same number of physical drives) and they must be consecutively numbered. For example, assuming Array 2 contains four disk drives, it can be spanned only with Array 1 and/or Array 3, and only if Arrays 1 and 3 also contain four disk drives. If the two criteria for spanning are met, MegaRAID automatically activates spanning. If the criteria are not met, the <i>Span</i> setting makes no difference for the current logical drive. Highlight a spanning option and press &lt;Enter&gt;.</p> <p><b>Configuring RAID 10, RAID 30, or RAID 50 Logical Drives</b></p> <p>Configure RAID 10 by spanning two contiguous RAID 1 logical drives. The RAID 1 logical drives must have the same stripe size.</p> <p>Configure RAID 30 by spanning two contiguous RAID 3 logical drives. The RAID 3 logical drives must have the same stripe size.</p> <p>Configure RAID 50 by spanning two contiguous RAID 5 logical drives. The RAID 5 logical drives must have the same stripe size.</p>
8	<p>Set the logical drive size. Move the cursor to <i>Size</i> and press &lt;Enter&gt;. By default, the logical drive size is set to all available space in the array(s) being associated with the current logical drive, accounting for the <i>Span</i> setting and for partially used array space. For example, if the previous logical drive used only a part of the space in an array, the current logical drive size is set to the remaining space by default.</p>
9	<p>Open the Advanced menu to set the remaining options.</p>  <p>The screenshot shows two side-by-side menu boxes. The left box is titled 'Logical Drive 1' and contains the following options: 'RAID = 1', 'Size = 2156MB', 'Advanced Menu' (highlighted in yellow), 'Accept', and 'Span = NO'. The right box is titled 'Advanced' and contains the following options: 'StripeSize = 64KB', 'Write Policy = WRTHRU', 'Read Policy = NORMAL', and 'Cache Policy = DirectIO' (highlighted in yellow).</p> <p><b>Stripe size</b> This parameter specifies the size of the segment written to each disk in a RAID 1, 3, 5, 10, 30 or 50 logical drive. You can set the stripe size to 2 KB, 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB. A larger stripe size produces higher read performance, especially if your computer does mostly sequential reads. However, if your computer does random read requests more often, choose a smaller stripe size. The default is 64 MB.</p>

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## Using View/Add Configuration, Continued

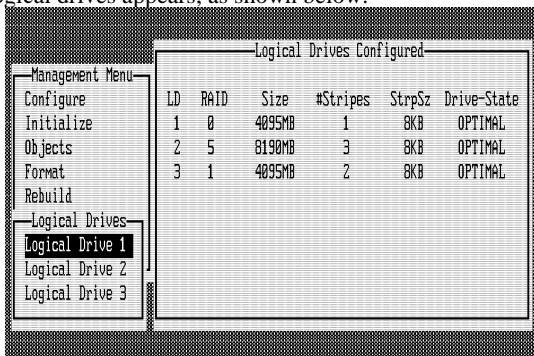
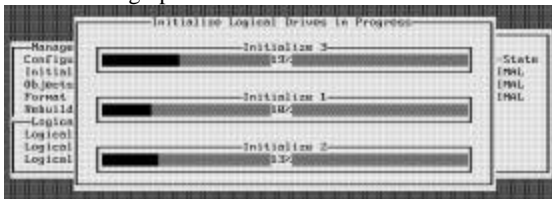
Step	Action
9, cont'd	<p><b>Write Policy</b> This parameter specifies the cache write policy. You can set the write policy to write-back or write-through.</p> <p>In <i>Write-back</i> caching, the controller sends a data transfer completion signal to the host when the controller cache has received all the data in a transaction.</p> <p>In <i>Write-through</i> caching, the controller sends a data transfer completion signal to the host when the disk subsystem has received all the data in a transaction. This is the default setting.</p> <p>Write-through caching has a data security advantage over write-back caching, whereas write-back caching has a performance advantage over write-through caching. <i>You should not use write-back for any logical drive to be used as a Novell NetWare volume.</i></p> <p><b>Read-ahead</b> This parameter enables the SCSI read-ahead feature for the logical drive. You can set this parameter to <i>Normal</i>, <i>Read-ahead</i>, or <i>Adaptive</i>.</p> <p><i>Normal</i> specifies that the controller does not use read-ahead for the current logical drive. This is the default setting.</p> <p><i>Read-ahead</i> specifies that the controller uses read-ahead for the current logical drive.</p> <p><i>Adaptive</i> specifies that the controller begins using read-ahead if the two most recent disk accesses occurred in sequential sectors. If all read requests are random, the algorithm reverts to Normal, however, all requests are still evaluated for possible sequential operation.</p> <p><b>Cache Policy</b> This parameter applies to reads on a specific logical drive. It does not affect the Read ahead cache.</p> <p><i>Cached I/O</i> specifies that all reads are buffered in cache memory.</p> <p><i>Direct I/O</i> specifies that reads are not buffered in cache memory.</p> <p>Direct I/O does not override the cache policy settings. Data is transferred to cache and the host concurrently. If the same data block is read again, it comes from cache memory. This is the default setting.</p> <p>Press &lt;Esc&gt; to exit the Advanced Menu.</p>
10	<p>After you define the current logical drive, choose <i>Accept</i> and press &lt;Enter&gt;. If space remains in the arrays, the next logical drive to be configured appears. Repeat steps 6 to 9 to configure another logical drive. If all array space is used, a list of the existing logical drives appears. Press any key to continue. Respond to the Save prompt.</p>
11	<p>Initialize the logical drives you have just configured. See Initializing Logical Drives on page 36.</p>

## Initializing Logical Drives

Initialize each new logical drive you configure. You can initialize the logical drives using:

- *Batch Initialization.* The Initialize option in the main menu lets you initialize up to 40 logical drives simultaneously.
- *Individual Initialization.* The Objects/Logical Drive action menu for an individual logical drive has an Initialize option.

**Batch Initialization** To initialize logical drives using the batch initialization procedure:

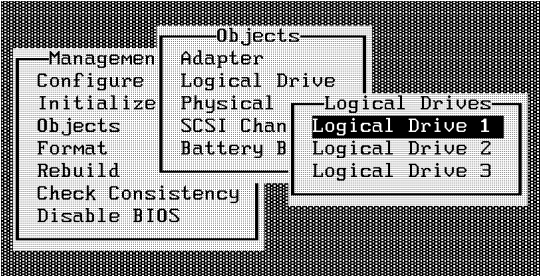
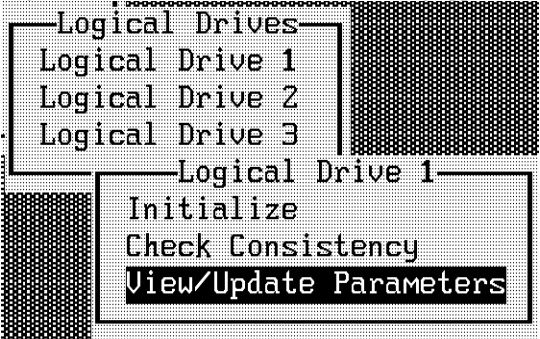
Step	Action																								
1	<p>Choose Initialize from the Configuration Utility main menu. A list of the current logical drives appears, as shown below:</p>  <table><thead><tr><th>LD</th><th>RAID</th><th>Size</th><th>#Stripes</th><th>StrpSz</th><th>Drive-State</th></tr></thead><tbody><tr><td>1</td><td>0</td><td>4895MB</td><td>1</td><td>8KB</td><td>OPTIMAL</td></tr><tr><td>2</td><td>5</td><td>8190MB</td><td>3</td><td>8KB</td><td>OPTIMAL</td></tr><tr><td>3</td><td>1</td><td>4895MB</td><td>2</td><td>8KB</td><td>OPTIMAL</td></tr></tbody></table>	LD	RAID	Size	#Stripes	StrpSz	Drive-State	1	0	4895MB	1	8KB	OPTIMAL	2	5	8190MB	3	8KB	OPTIMAL	3	1	4895MB	2	8KB	OPTIMAL
LD	RAID	Size	#Stripes	StrpSz	Drive-State																				
1	0	4895MB	1	8KB	OPTIMAL																				
2	5	8190MB	3	8KB	OPTIMAL																				
3	1	4895MB	2	8KB	OPTIMAL																				
2	<p>Press the arrow keys to select all drives. Press the spacebar to select the selected logical drive for initialization. Press &lt;F2&gt; to select/deselect all logical drives.</p>																								
3	<p>When you are done selecting logical drives, press &lt;F10&gt; and choose <i>Yes</i> from the confirmation prompt. The progress of the initialization for each drive is shown in bar graph format.</p> 																								
4	<p>When initialization is complete, press any key to continue. Press &lt;Esc&gt; to display the main menu.</p>																								

Cont'd



## Initializing Logical Drives, Continued

### Individual Initialization

Step	Action
1	<p>Choose the Objects option from the MegaRAID Configuration Utility main menu. Choose the Logical Drive option from the Objects menu.</p> 
2	<p>Select the logical drive to be initialized. The following appears:</p> 
3	<p>Choose the Initialize option from the action menu. Initialization progress appears as a bar graph on the screen.</p>
4	<p>When initialization completes, press any key to display the previous menu.</p>

## Using Logical Drives in the Operating System

For information on an operating system other than DOS, see the software manual accompanying the drivers for that operating system. To use the logical drive(s) in DOS:

Step	Action
1	Exit MegaRAID Configuration Utility and reboot the computer.
2	Run DOS FDISK. Configure one or more partitions using the logical drives.
3	Format the partitions with the FORMAT command.

## Formatting Physical Drives

---

You can do low-level formatting of SCSI drives using Configuration Utility.

Since most SCSI disk drives are low-level formatted at the factory, this step is usually not necessary. Usually, you must format a disk if:

- the disk drive was not low-level formatted at the factory, or
  - an excessive number of media errors have been detected on the disk drive.
- 

**Media Errors** Check the View Drive Information screen for the drive to be formatted. You can view this screen by choosing Objects from the Management menu. Select the Physical Drives option, and choose a device. Press <F2>.

The error count is displayed at the bottom of the properties screen. If you feel that the number of errors is excessive, you should probably format the disk drive. If more than 32 media errors were detected, MegaRAID automatically puts the drive in FAIL state. This occurs even in a degraded RAID set. The errors are displayed as they occur. In cases such as this, formatting the drive can clear up the problem.

You do not have to choose Format to erase existing information on your SCSI disks, such as a DOS partition. That information is erased when you initialize logical drives.

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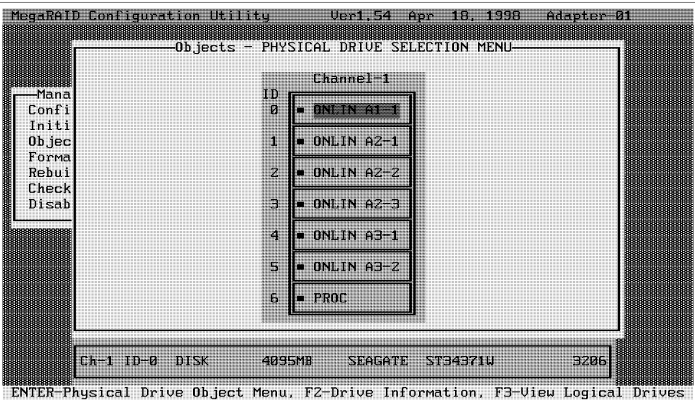
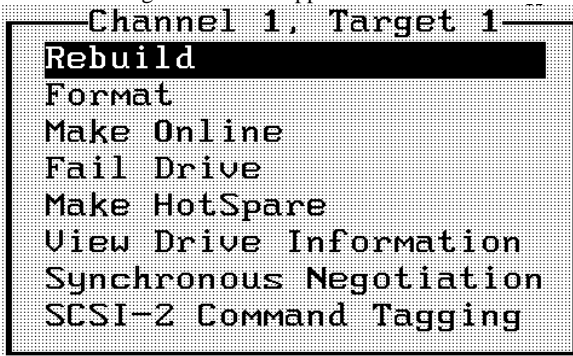
**Formatting Drives** You can format the physical drives using:

- *Individual Formatting.* Choose the Format option from Objects on the Physical Drive action menu for an disk physical drive.
- 

Cont'd

## Formatting Physical Drives, Continued

### Individual Formatting

Step	Action
1	<p>Choose the Objects option from the MegaRAID Configuration Utility main menu. Choose the Physical Drive option from the Objects menu. A device selection window is displayed showing the devices connected to the current controller, as shown below:</p> 
2	<p>Press the arrow keys to select the physical drive to be formatted and press &lt;Enter&gt;. The following action menu appears:</p> 
3	<p>Choose the Format option from the action menu and respond to the confirmation prompt. Formatting can take some time, depending on the drive capacity.</p>
4	<p>When formatting completes, press any key to display the previous menu.</p>

## Rebuilding Failed Disk Drives

---

If a disk drive fails in an array that is configured as a RAID 1, 3, or 5 logical drive, you can recover the lost data by rebuilding the drive.


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**Rebuild Types** The rebuild types are:

Type	Description
Automatic Rebuild	If you have configured hot spares, MegaRAID automatically tries to use them to rebuild failed disks. Display the Objects/Physical Drive screen while a rebuild is in progress. The drive indicator for the hot spare disk drive has changed to REBLD A[ <i>array number</i> ]-[ <i>drive number</i> ], indicating the disk drive being replaced by the hot spare.
Manual Rebuild	Manual rebuild is necessary if no hot spares with enough capacity to rebuild the failed drives are available. Select the MegaRAID Configuration Utility main menu Rebuild option or the Rebuild option on the Objects/Physical Drive menu.

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### Manual Rebuild – Rebuilding an Individual Drive

Step	Action
1	Choose the Objects option from the MegaRAID Configuration Utility main menu. Choose Physical Drive from the Objects menu. A device selection window is displayed showing the devices connected to the current controller.
2	Press the arrow keys to select the physical drive to be rebuilt and press <Enter>. The following action menu appears: 
3	Choose the Rebuild option from the action menu and respond to the confirmation prompt. Rebuilding can take some time, depending on the drive capacity.
4	When rebuild completes, press any key to display the previous menu.

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Cont'd

## Rebuilding Failed Disk Drives, Continued

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### Manual Rebuild– Batch Mode

Step	Action
1	Choose Rebuild from the MegaRAID Configuration Utility main menu. A device selection window is displayed showing the devices connected to the current controller. The failed drives have FAIL indicators.
2	Press the arrow keys to select all drives to be rebuilt. Press the spacebar to select the selected physical drive for rebuild.
3	After selecting the physical drives, press <F10> and select Yes at the confirmation prompt. The indicators for the selected drives changes to <i>REBLD</i> . Rebuilding can take some time, depending on the number of drives you have selected and the drive capacities.
4	When rebuild is complete, press any key to continue. Press <Esc> to display the main menu.

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## Using a Pre-loaded SCSI Drive “As-is”

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### ***Important***

To use a pre-loaded system drive in the manner described here, you must make it the first logical drive defined (for example: LD1) on the controller it is connected to. This will make the drive ID 0 LUN 0. If the drive is not a boot device, the logical drive number is not critical.

You may have a SCSI disk drive that is already loaded with software. The drive may be a boot disk containing an operating system. You can use the MegaRAID controller as a SCSI adapter for such a drive by performing the following steps:

Step	Action
1	Connect the SCSI drive to the channel on the MegaRAID controller, with proper termination and TID settings.
2	Boot the computer and start Configuration Utility by pressing <Ctrl> <M>.
3	Choose <i>Easy Configuration</i> from the Configure menu.
4	Press the cursor keys to select the pre-loaded drive.
5	Press the spacebar. The pre-loaded drive should now become an array element.
6	Press <Enter>. You have now declared the pre-loaded drive as a one-disk array. Display the logical drive configuration screen.
7	Set the read policy and cache option on the Advanced menu.
8	Exit the Advanced menu. Highlight <i>Accept</i> and press <Enter>.
9	Press <Esc> and choose <i>Yes</i> at the Save prompt.
10	Exit Configuration Utility and reboot.
11	Set the host system to boot from SCSI, if such a setting is available.

## Exiting MegaRAID Configuration Utility

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Press <Esc> when the MegaRAID Configuration Utility management menu is displayed to exit MegaRAID Configuration Utility. Choose Yes at the prompt. You must then reboot the computer. The MegaRAID BIOS message appears again. Press <Esc> when the BIOS Configuration Utility prompt appears.

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