ATTO

ATTO Technology, Inc.

ATTO Utilities
Installation and Operation Manual
ATTO Configuration Tool for Windows, Linux and Mac OS X
ATTO BIOS Utilities
ATTO Utilities for Windows

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Contents

1.0   ATTO Configuration Tool

The ATTO Configuration Tool is a utility program which displays information about installed adapters, drivers and devices and provides a mechanism to configure installed adapters.

The ATTO Configuration Tool executes under

- Windows® Server 2008, 2003, 2000; Vista, XP
- Linux® 2.4 and 2.6 kernels, x86 and x64
- Mac® OS X 10.4.x, 10.5.x
- Sun Java version 1.5 or later
  - The latest runtime for Windows and Linux can be obtained from
    http://java.sun.com/javase/downloads/index.jsp
  - The latest OS X build can be obtained through **Software Update**. Java 1.5 is only available in 10.4.1 and later.

The ATTO Configuration Tool displays

- The names of ATTO adapters installed in the system.
- Information about the devices attached to ATTO adapters.
- Information about the drivers controlling the adapters, including version information for both the currently executing driver and the flash image.

You may also use the Configuration Tool to

- Update the flash image when a new version is released by ATTO.
- Modify the NVRAM settings (refer to Fibre Channel NVRAM settings on page 6, SCSI NVRAM settings on page 8, and SAS NVRAM settings on page 11).
- Manage RAID groups (refer to Set up RAID on page 13).
- Configure RAID notifications (refer to Set up ExpressSAS RAID Notification on page 21).
- Revert to default factory settings.
- Update firmware on Huge® disk arrays.

The factory settings should provide excellent performance for a wide range of applications. However, some applications may benefit from modification of the adapter NVRAM settings which tune the adapter for a specific performance range.

Installing from the ATTO website

1 Go to www.attotech.com.
2 Click on **Downloads.**
3 Register or log in if previously registered.
4 Click on the desired product in the left dialog.
5 Navigate to your specific model in the right dialog and click on it.
6 Scroll down to and click the desired ATTO Configuration Tool depending on the operating system.
7 A download window appears. Choose Save.

8 After the download has completed, process the downloaded file:
   - On OS X, mount the **.dmg** file, then double click on the installer icon located in the new volume.
   - On Windows, run the downloaded **.exe** file.
   - On Linux, expand the **.tgz** file, then run the **.bin** installer application.
9 Follow the instructions for installing the application.

Installing from the Installation CD

The CD which comes with your adapter contains drivers for your adapters and the ATTO Configuration Tool.

Follow the instructions for your operating system.

Windows
1 Verify Java Virtual Machine (Java) version 1.5 or later is installed. From the command line prompt, type **java -version**.

2 Insert the Installation CD into a CD or DVD drive. The CD begins automatically and displays the **Installation Guide**. If the CD fails to begin automatically, navigate to the root of the CD, and run **Autorun.bat.**
3 From the installation CD introductory screen, click on **Windows Applications.**
4 Click on **Install ATTO Configuration Tool.**
5 Launch the installer.

6   Follow the on-screen instructions until the installation completes.

OS X

1   Check **Software update** to ensure the latest Java updates have been applied.
2   Insert the Installation CD into a CD or DVD drive.
3   Open the newly mounted CD volume.
4   Select the **Configuration Tool** folder.
5   Launch the Configuration Tool.
6   Follow the on-screen instructions until the installation completes.

Linux

1   Verify in the terminal window that the installed Java Virtual Machine (Java) is from Sun by typing **java --version**. The GNU version JVM which may be installed by default does not work with the installer.
2   Insert the Installation CD into a CD or DVD drive.
3   In the **File Browser** window, browse to **/mnt/cdrom/Linux/Configuration Tool**
4   Double click **lnx_app_configtool_XXX.bin.**
5   Follow the on-screen instructions until the installation completes.

Using the Configuration Tool

To use the Configuration Tool, locate the application icon in the folder you created during installation and double-click the icon to start the application.

⚠ **CAUTION**

Back up system data when installing or changing hardware configurations.

The main page has three windows: **Device Listing, Configuration Options** and **Status**. See .

📝 Note

ATTO host adapters are designed to operate properly using factory settings. Entering invalid or incorrect settings when using an NVRAM configuration utility such as the ATTO Configuration Tool may cause your host adapter to function incorrectly.

Exhibit 1.0-1   The ATTO Configuration Tool opening page.
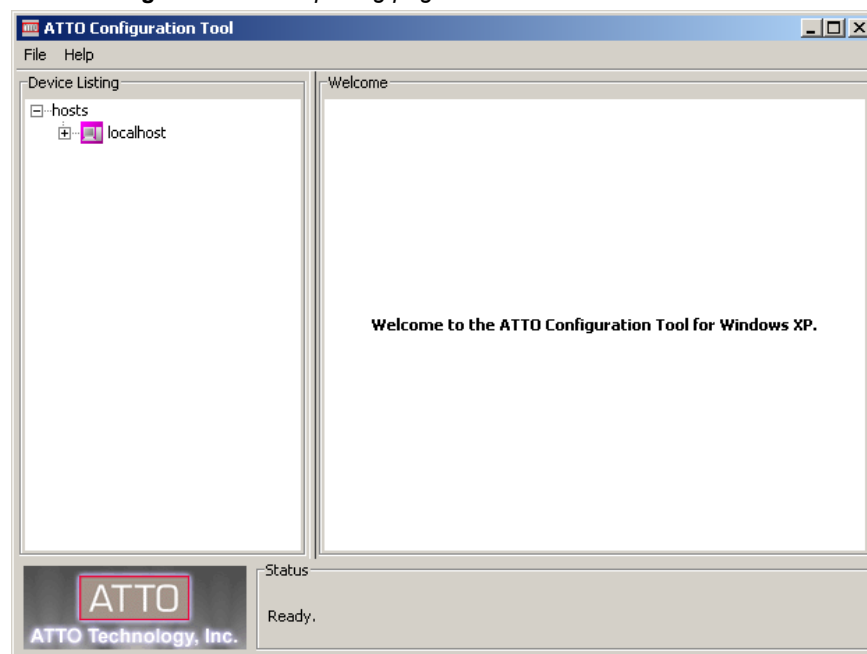
Navigating the Configuration Tool

The **Device Listing** window at the left of the display page lists all currently connected devices.

Expand the **device tree** to reveal additional details on connected devices.

The **Configuration Options** window in the right window pane provides information and options for a device highlighted in the device listing.

If you highlight a device in the **Device Listing,** tabs and panels display for that device.

The following chart lists tabs displayed for each device type in the device listing tree.

Tree node	Tabs displayed
Adapter	Basic Info, Flash, Advanced, RAID, RAID CLI
Channel	NVRAM, PCI info
Devices	Basic Info, Flash, SES
Local Host	Basic Info, Notifications

Select an adapter

The following tabs display in the **Configuration Options** window when you select a specific adapter in the **Device Listing** window.

- The **Basic Info** tab provides basic information about the device currently highlighted in the device listing or the host if the local host is highlighted. You cannot make changes from this page. See Exhibit 1.0-2 and Exhibit 1.0-3.
- The **Flash** tab provides information about the current revision of flash loaded on the highlighted host adapter. See Exhibit 1.0-4.

  Click on the Browse button at the bottom of the tab to search for new flash files on your system.

  Click on the Update button to initiate the firmware flashing process using the previously selected firmware.

  After the rescan is complete, all volumes detected during the rescan are mounted. If an OS or an adapter does not support this feature, the panel displays a message.
- The **RAID** tab displays information about the drive inventory, existing RAID groups and Hot

Spare devices. From the RAID tab you can create, modify and delete RAID groups.
- The **RAID CLI** tab allows experienced users to enter RAID Command Line Interface commands to the SAS RAID adapter.

Select a channel

The following tabs display in the **Configuration Options** window when you select a specific channel in the **Device Listing** window:

- The **NVRAM** tab displays the NVRAM parameters of the selected channel. Refer to Fibre Channel NVRAM settings on page 6, SCSI NVRAM settings on page 8, and SAS NVRAM settings on page 11.
- The **PCI** tab displays PCI information for the selected channel.

Select a device

The following tabs display in the **Configuration Options** window when you select a specific device in the **Device Listing** window:

- The **Basic Info** tab displays information about the selected device.
- The **SES** tab displays SES (SCSI Enclosure Services) status information for SES devices such as power supplies and fans.

Select Local Host

The following tabs display in the **Configuration Options** window when you select a specific local host in the **Device Listing** window:

- The **Basic Info** tab displays information about the booted operating system.
- The **Notification** tab allows you to set up notification of certain events in the ExpressSAS RAID adapter. Refer to Set up ExpressSAS RAID Notification on page 21.

About panel

The **About** panel, selected from the **About** menu item in the **Help** menu, is an informational page which displays a list of components installed for the ATTO Configuration Tool, the tool's version number and ATTO Technology contact information.

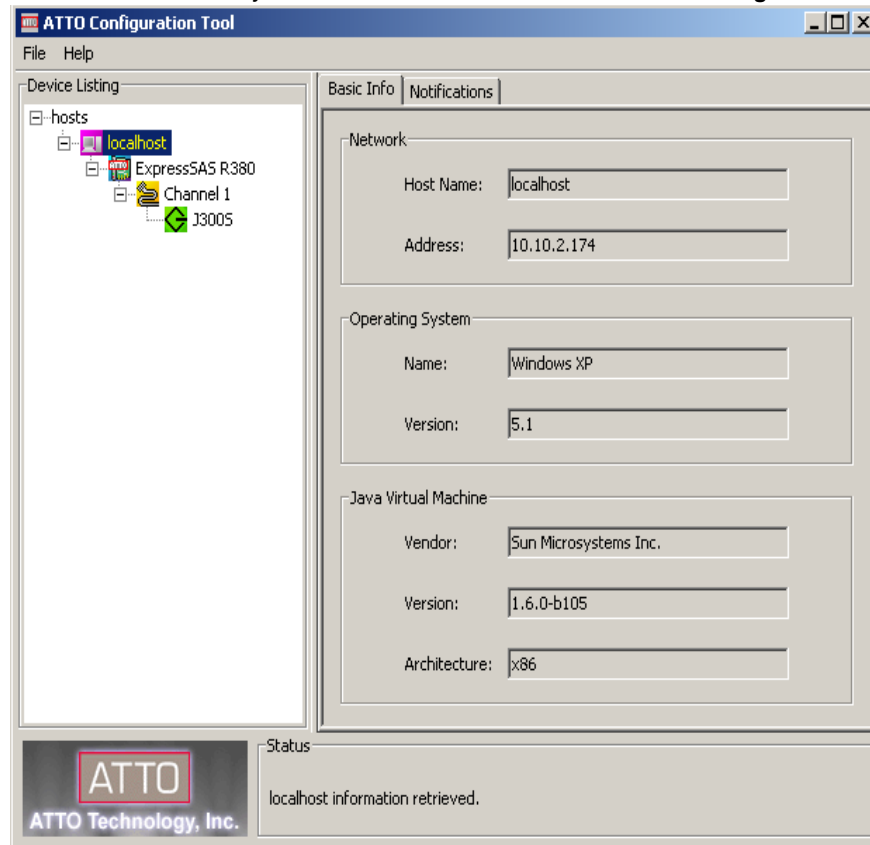*Exhibit 1.0-2   The **Basic Info** tab when you choose **Local Host** from the **Device Listing**.*

*Exhibit 1.0-3   The **Basic Info** tab when a device is chosen from the **Device Listing.***
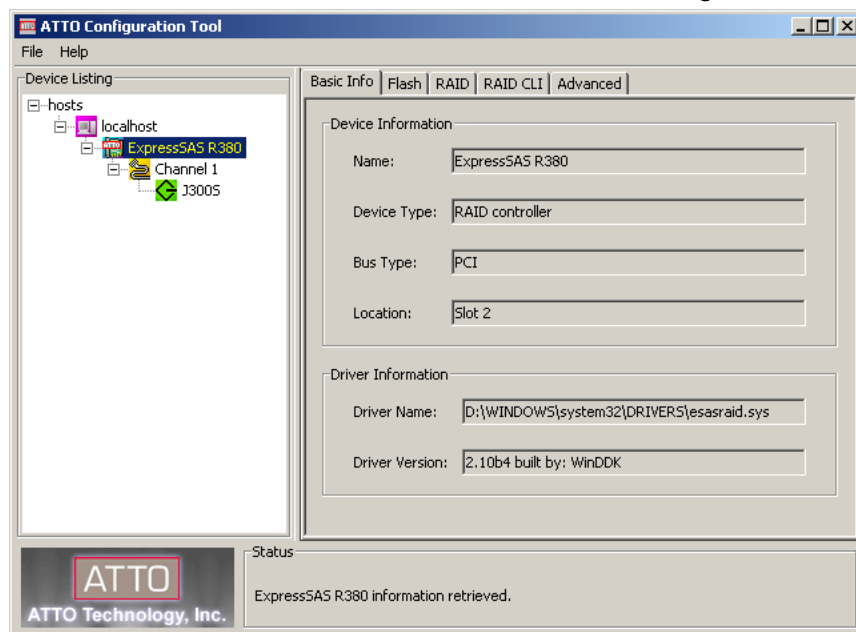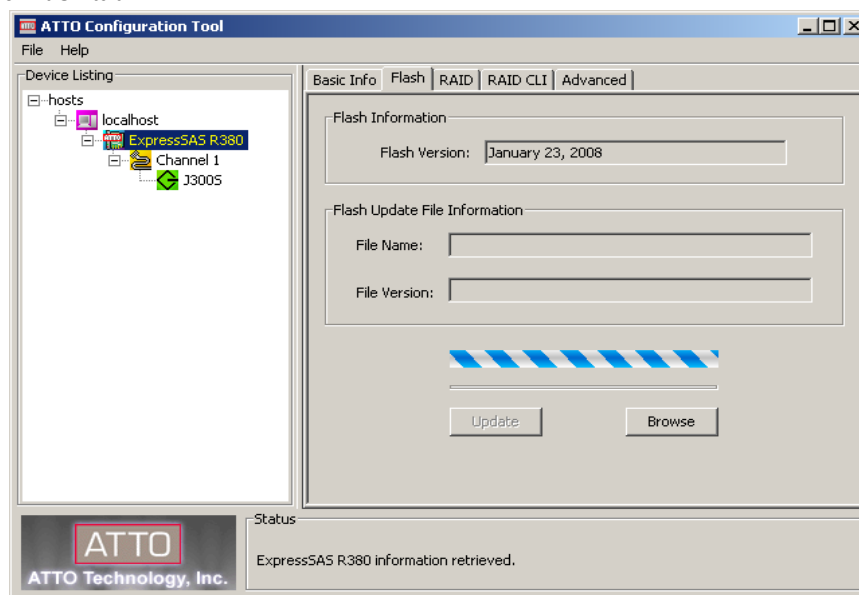
*Exhibit 1.0-4   The **Flash** tab.*

*Exhibit 1.0-5   The **NVRAM** information page.*
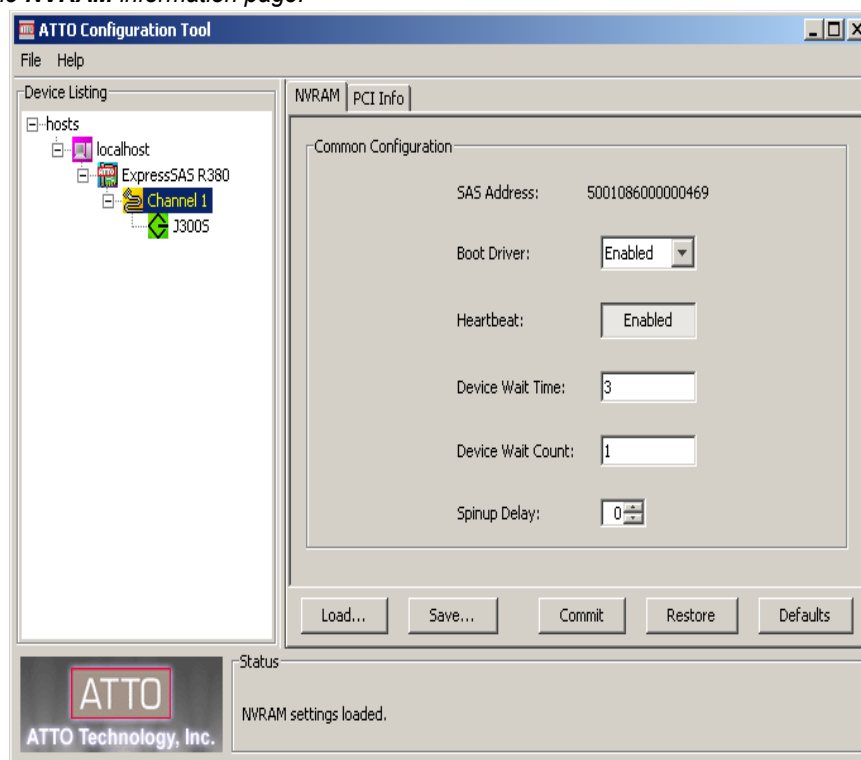
1.1   Fibre Channel NVRAM settings

The settings in the NVRAM tab vary depending upon the selected adapter and the operating system. Settings unsupported by that OS are not displayed.

ATTO host adapters are designed to operate properly using factory settings. Entering invalid or incorrect settings when using an NVRAM configuration utility such as the ATTO Configuration Tool may cause your host adapter to function incorrectly.

⚠️   **CAUTION**

Back up system data when installing or changing hardware configurations.

Use caution when making changes to NVRAM settings and only make changes to those with which you are familiar. Once you have made the desired changes, click **Commit** to save the changes. Changes do not take effect until you reboot the system.

If you do not want to make any changes, you may choose one of the following:

* **Defaults**: restores the adapter to factory default settings. The **Commit** button must be clicked to save any changes.
* **Restore**: reverts to the NVRAM settings saved the last time the **Commit** button was used. Clicking **Commit** is not necessary.

Node Name

The Node WWN assigned to this channel of the adapter.

Port Name

The Port WWN assigned to this channel of the adapter.

Boot Driver
Choices: enabled, scan only, disabled
Default: disabled

If enabled and disk drives or a bootable CD are detected during the bus scan, the BIOS driver remains resident. If disabled, the BIOS starts, resets the adapter chip and unloads the driver.

*If **Scan Only** is selected, the BIOS driver scans the bus and displays the devices attached, then unloads itself after a brief delay.*

Hard Address Enable Button
Choices: enabled, disabled
Default: disabled

*When a Fibre Channel loop is initialized, each device selects and configures itself to an available ID. **Hard Address Enable** permits the host to select the value entered in the **Hard Address** field.*

Hard Address
Choices: None, 0-125
Default: 0

The value used as the FC-AL hard address. A value to represent the address if hard addressing is enabled.

Frame Size
Choices: 512, 1024, 2048
Default: 2048

Changes the size of the FC packet of information being sent. Typically, the initiator and target negotiates the desired frame size, starting with the largest value. The frame size should be set to the largest value for normal operation.

Device Discovery
Choices: Node WWN, Port WWN
Default: Port WWN

*Specifies the type of device discovery the adapter performs. Use the **Port WWN** when the adapter requires separate paths to a device and the device is dual ported. A dual ported device has one path when the **Node WWN** is specified and two paths when the **Port WWN** is specified.*

Connection Mode options
Choices: AL, PTP, AL Preferred, PTP Preferred
Default: PTP Preferred
* *Arbitrated Loop (AL): Connects to either an Arbitrated Loop or a Fabric Loop Port (FL Port) on a switch.*
* *Point-to-Point (PTP): Connects to a direct Fabric connection, such as an F port on a switch.*
* *AL Preferred: Allows the card to determine what kind of connection to use, but tries to connect in Loop mode first, then Point-to-Point mode.*

- *PTP Preferred: Allows the card to determine what kind of connection is to use, but tries to connect in Point-to-Point mode first, then Loop mode.*

Data Rate

Choices for 4 Gig: 1 Gb/sec., 2 Gb/sec., 4Gb/sec, Auto
Choices for 8 Gig: 2 Gb/sec., 4Gb/sec., 8Gb/sec, Auto
Default: Auto

*Selects the Fibre Channel transmission rate. **Auto** indicates the adapter determines the rate based upon the devices connected.*

Interrupt Coalesce

Choices: None, Low, Medium, High
Default: None

Specifies the time period an adapter chip delays an interrupt. This allows the adapter chip to queue up more than one interrupt before interrupting the CPU. When this methodology is chosen there is less overhead to service the interrupts. However, the coalescing time may delay the delivery of the completion for a single interrupt.

Port Down Retry Count

Choices: 0-255
Default: 8

The number of times the driver retries a command to a port which is currently logged out.

Note

Not all driver versons support this on 4 gig Celerity. This feature requires 2.63 or later on Windows and Linux, and 3.25 or later on OS X. All version of the 8 gig Celerity driver support this.

Link Down Timeout

Choices: 0-255
Default: 0

The number of seconds the driver waits for a link that is down to come up before reporting it to the operating system.

Note

Not all driver versons support this on 4 gig Celerity. This feature requires 2.63 or later on Windows and Linux, and 3.25 or later on OS X. All version of the 8 gig Celerity driver support this.

Spinup Delay

Choices: 0-255
Default: 0

Specifies number of seconds the driver waits for the first device to be logged in and become ready.

Note

This is only honored by the Celerity BIOS driver in 3.20 and later.

PCI Memory Write/Invalidate Button (PCI-X models only)

Choices: Default, disabled
Default: Default

The hosts BIOS setting is overwritten and the PCI memory write/invaludate setting is diabled.

PCI Latency Timer (PCI-X models only)

Choices: 8, 16, 24, 32, 40, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 248
Default: see below

Specifies how long the host adapter maintains control of the PCI bus. Larger values allow the adapter to remain on the bus longer, improving performance, especially for large files. However, controlling the PCI bus for too long can starve IO to other devices, adversley affecting their performance.As a default, the computer system firmware/BIOS automatically sets this vaule. However, adjusting the value for the ATTO adapter overrides the system default, allowing you to achieve specific performance results.

*Exhibit 1.1-1   The Celerity **NVRAM** settings page.*

1.2   SCSI NVRAM settings

The settings in the NVRAM tab vary depending upon the selected adapter and the operating system.

ATTO host adapters are designed to operate properly using factory settings. Entering invalid or incorrect settings when using an NVRAM configuration utility such as the ATTO Configuration Tool may cause your adapter to function incorrectly.

⚠️   **CAUTION**

Back up system data when installing or changing hardware configurations.

Use caution when making changes to NVRAM settings and only make changes to those with which you are familiar. Once you have made the desired changes, click **Commit** to save the changes. Changes do not take effect until you reboot the system.

If you do not want to make any changes, you may choose one of the following

*   **Defaults**: restores the adapter to factory default settings. The **Commit** button must be clicked to save any changes.
*   **Restore**: reverts to the NVRAM settings saved the last time the **Commit** button was used. Clicking **Commit** is not necessary.

The upper part of the **NVRAM Config** panel contains common NVRAM settings which pertain to the entire channel. The lower part contains settings which can be set for each SCSI ID on the channel. See Exhibit 1.2-2.

Controller ID
Choices: 0-15
Default: 7

The ExpressPCI SCSI adapter is normally set to SCSI ID 7 because ID 7 has the highest priority on the bus. The setting should remain at ID 7 unless you are instructed to change it by an ATTO Technical Support representative.

Termination
Choices: Auto, High
Default: Auto

*Set to **Automatic** unless there is narrow SCSI cable connected to either the internal or external connector.*

Selection Timeout (ms)
Choices: 1ms - 1 sec.
Default: 250 ms

Specifies the amount of time a device has to respond to being selected. The time value can be lowered to speed up the boot process. If the value is lower than the recommended 250 ms, some devices may not have enough time to respond.

Fallback Sync Rate (MB/sec.)
Choices: 40/20, 20/10 and 10/5
Default: 40/20

Specifies the maximum synchronous transfer rate to be negotiated when the adapter detects a Single-Ended SCSI bus. The bus is Single-Ended when UltraSCSI devices are connected to the bus.

Bus Reset Delay (sec.)
Read only; no choices
Default: 3

Sets the time delay between the reset of the SCSI bus and the scanning of the SCSI bus. This is a read only parameter.

Quick Arbitrate & Select
Choices: disabled, enabled
Default: enabled

*If enabled, improves performance by reducing the time required to gain control of the SCSI bus. QAS can only be enabled if all target settings are set to **Sync DT-IU** and all devices on the bus support QAS.*

Wide IDs
Choices: enabled (targets 0-15), disabled (targets 0-7)
Default: enabled

This setting is available only in Mac OS X and for Ultra160 or Ultra/WIDE ExpressPCI host adapters.

Boot Driver
Choices: enabled, scan only, disabled
Default: enabled

If enabled and disk drives or a bootable CD are detected during the bus scan, the BIOS driver remains resident. If disabled, the BIOS starts, resets the adapter chip and unloads the driver.

*If **Scan Only** is selected, the BIOS driver scans the bus and displays the devices attached, then unloads itself after a brief delay.*

Specified Target

Choices: 0 to 15 or 0 to 7 if Wide ID is disabled
Default: 0

Specifies the target ID to which settings are applied.

LUNs

Choices: Disable ID, 0, 0-7, 0-63
Default: 0-7

Specifies the number of LUNs which the driver addresses when scanning for devices, determined as follows. This setting is not available in Mac OS X.

Disable ID: Target ID is bypassed and not scanned

0: Scan LUN 0 for this target ID

0-7: Scan LUNs 0 to 7 for this target ID

0-63: Scan LUNs 0 to 63 for this target ID

Allow Disconnect

Choices: enabled, disabled
Default: enabled

Specifies if a device is allowed to disconnect from the SCSI bus during SCSI command processing. The device determines when it disconnects. This setting does not force the device to disconnect.

Tagged Command Queuing

Choices: enabled, disabled
Default: enabled

Specifies to the driver if SCSI commands can use the Tag Command feature to send multiple commands to a device.

Sync Offset

Choices: 0-127
Default: 127

The defaults offer the best performance possible. The value should not be changed unless instructed by an ATTO Technical Support representative.

Sync enabled for this ID

Choices: enabled, disabled
Default: enabled

Specifies whether the selected target transfers data at synchronous transfer rates or at the asynchronous rate. The maximum synchronous rate to negotiate is specified in the Sync Rate parameter.

Sync Rate (MB/s)

Choices: varies by adapter, see <u>Exhibit 1.2-1</u>
Default: varies by adapter, see <u>Exhibit 1.2-1</u>

*If synchronous transfers are enabled, the sync rate specifies the maximum rate at which the ExpressPCI host adapter negotiates with the selected target ID. Set the rate to the maximum value supported by the host adapter. If excessive SCSI errors occur, if you have long cables or if there are many devices on the bus, you may want to reduce the **Sync Rate** value. Slowing the transfer rate may increase the reliability of the SCSI bus.*

Wide Transfers

Choices: disabled, enabled
Default: enabled

*Specifies if the initiator negotiates wide data transfers. If the parameter is disabled, narrow data transfers are negotiated. Wide Transfers is automatically set to enabled when the **Sync Rate** specifies a DT rate. The DT sync rates must have wide data transfers.*

Exhibit 1.2-1   Possible sync rates for various ATTO host adapters.

*Exhibit 1.2-2   SCSI **NVRAM** panel.*

1.3 SAS NVRAM settings

The settings in the NVRAM tab vary depending upon the selected adapter and the operating system.

ATTO host adapters are designed to operate properly using factory settings. Entering invalid or incorrect settings when using an NVRAM configuration utility such as the ATTO Configuration Tool may cause your adapter to function incorrectly.

⚠ **CAUTION**

Back up system data when installing or changing hardware configurations.

Use caution when making changes to NVRAM settings and only make changes to those with which you are familiar. Once you have made the desired changes, click **Commit** to save the changes. Changes do not take effect until you reboot the system.

If you do not want to make any changes, you may choose one of the following:

- **Defaults**: restores the adapter to factory default settings. The **Commit** button must be clicked to save any changes.
- **Restore**: reverts to the NVRAM settings saved the last time the **Commit** button was used. Clicking **Commit** is not necessary.

See Exhibit 1.3-1 for an example of the NVRAM page.

*Exhibit 1.3-1   The ExpressSAS RAID **NVRAM** settings page.*
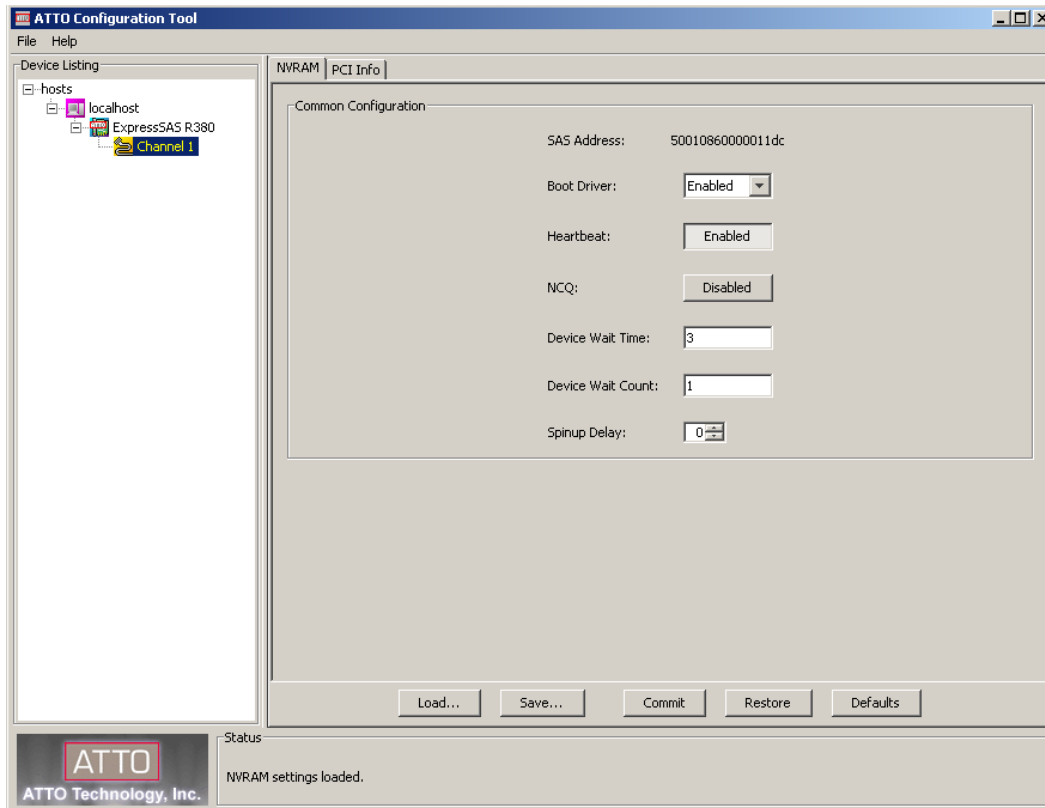
SAS Address

Read only

Displays the SAS address assigned to the adapter. The value cannot be modified.

Boot Driver

Choices: enabled, scan only, disabled
Default: enabled

If enabled and disk drives are detected during the bus scan, the BIOS driver remains resident. If disabled, the BIOS starts, resets the adapter chip and unloads the driver.

*If **Scan Only** is selected, the BIOS driver scans the bus and displays the devices attached, then unloads itself after a brief delay.*

Heartbeat

Choices: enabled, disabled
Default: enabled

When enabled, requires the firmware to respond to periodic activity. If the firmware does not respond, the system driver resets the firmware on the adapter.

NCQ

Choices: enabled, disabled
Default: disabled

When enabled, the HBA driver sends multiple simultaneous commands to NCQ capable SATA disk drvies.

Drive Wait Time

Choices: 1-255 seconds
Default: 3

Specifies the number of seconds which the driver waits for devices to appear.

Device Wait Count

Choices: 1-255 devices
Default: 1

Specifies the number of devices which must appear in order to cancel the Drive Wait Time period.

Port Configuration (R348 only)

Choices: 8 Internal or 4 Intrn, 4 Extrn
Default: 8 Internal

*Indicates the active port configuration for the ExpressSAS RAID R348 adapter. The **8Internal** parameter indicates the two internal SAS connectors are active and the external connector is not active. The **4Intrn, 4Extrn** indicates one internal connector is active and one external connector is active.*

Spinup Delay

Choices: 0-20 seconds
Default: 0

Specifies the number of seconds each SAS PHY waits for disk drives to spin up.

1.4   Set up RAID

The ATTO ExpressSAS RAID adapter provides the capability to configure disk storage into RAID groups or Hot Spare drives.

Use the ATTO Configuration Tool to set up RAID groups on your ExpressSAS RAID adapter in one of the following RAID levels:

- JBOD
- RAID Level 0
- RAID Level 1
- RAID Level 4
- RAID Level 5
- RAID Level 6
- RAID Level 10
- ATTO DVRAID™ (parity redundancy optimized for digital video environments: refer to Setting up DVRAID on page 14).

ATTO DVRAID is set up automatically by the ExpressSAS RAID adapter firmware. All other types of RAID require customized input.See Exhibit 1.4-1.

Each RAID group may be divided into one or more partitions; each partition appears to the host operating system as a virtual disk.

You may use the RAID Command Line Interface page from the **RAID CLI** tab in the ATTO Configuration Tool to set up or modify various parameters (Refer to Appendix A). However, the ATTO Configuration Tool procedures listed in this chapter are the preferred procedures for setting up RAID configurations for the ATTO ExpressSAS RAID adapter.

Note

The Configuration Tool screens are similar for all operating systems.

*Exhibit 1.4-1   Configuration Tool **RAID** page.*
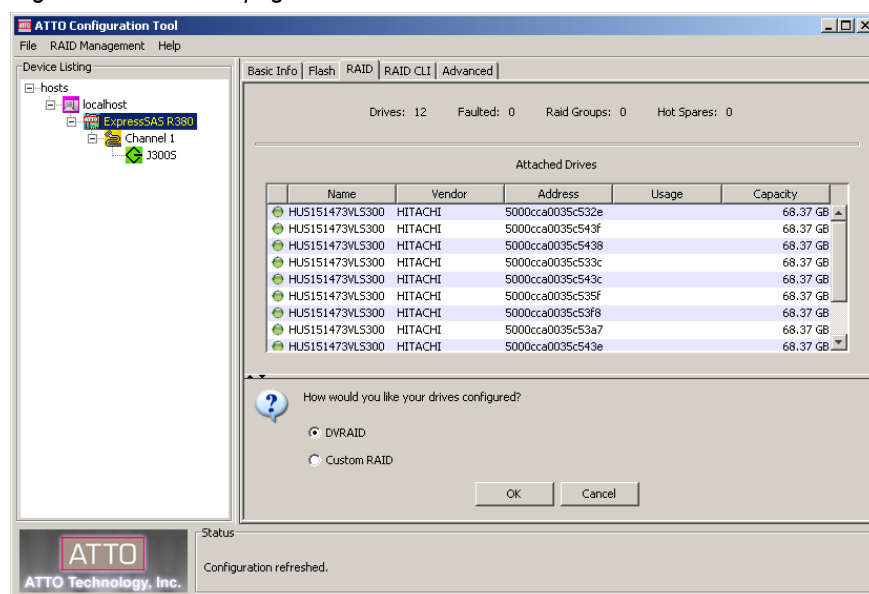
Preliminary steps

1 Locate the **Configuration Tool** icon in the folder you created during installation (Refer to).

2 Double click on the icon to start the application.

3 The **Welcome** screen appears.

4 From the left-hand panel **Device Listing**, expand all the elements in the **hosts** tree.

5 Click on **ExpressSAS R3XX**.
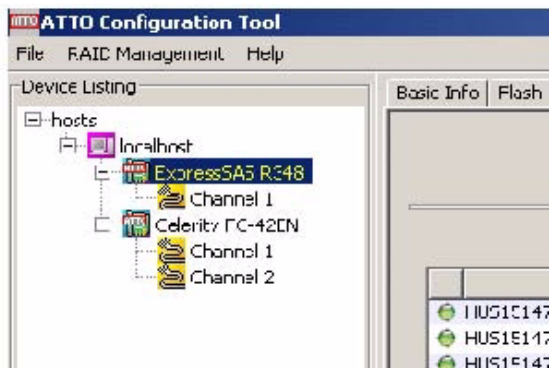
6 A new set of tabs appears in the right panel. Click on the **RAID** tab.
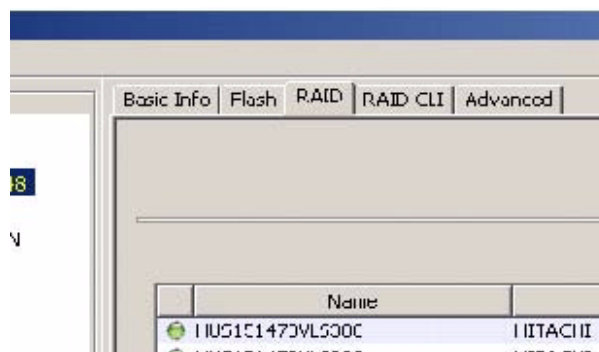
7 The application scans for drives.

A list of drives appears. Devices are displayed in the top panel and RAID groups and Hot Spares are displayed in the bottom panel.

If you have not yet defined any RAID groups, selecting the **RAID** tab automatically starts a RAID wizard. The wizard is displayed in the bottom panel.

If the RAID wizard does not start automatically, select the **RAID Management** menu item at the top of the screen, then select the **Create RAID Group** from the menu presented.

8 Select either **Setup DVRAID** (continue with) or **Custom RAID setup** (continue with).

Setting up DVRAID

DVRAID (Digital Video RAID) provides parity redundancy for your data. Optimized for performance for the high data transfer rates required in digital video environments, DVRAID is ATTO Technology proprietary technology which supports the editing of uncompressed 10-bit High Definition (HD) video and multiple streams of real-time, uncompressed Standard Definition (SD) video.

The DVRAID wizard automatically sets up DVRAID using all storage attached to the ATTO ExpressSAS RAID adapter based on the number of available drives. See .

Exhibit 1.4-2 The DVRAID wizard automatically sets up the number of RAID groups based on the number of available drives. Each RAID group uses one drive as a parity drive.

Available drives	RAID groups created	Drives in each group
6	1	6
7	1	7
8	1	8
12	2	6
14	2	7
16	2	8
24	4	6

If you do not have 6, 7, 8, 12, 14, 16 or 24 drives, you cannot use the DVRAID wizard.

If you do not want all storage set up in DVRAID or you do not have the correct number of drives, use Customizing a RAID setup.

1   After following Preliminary steps on page 14, select the **DVRAID** radio button in the Configuration Tool RAID wizard.

2   Click on **OK**.

3   The ATTO ExpressSAS RAID adapter firmware automatically uses all unassigned disks to create a DVRAID configuration.

4   A confirmation dialog box asks you to confirm the configuration you have chosen. Click **Yes**.

5   A message box displays while the RAID group is being created.
     When the RAID group is complete, the lower panel displays the RAID group(s).
     The DVRAID group begins to rebuild.

6   Double click on your RAID group in the lower panel to see more detail such as the status of the rebuild.
     Wait until the rebuild is complete before sending data to the storage.

> **Note**
> *A RAID rebuild may take several hours to complete.*

7   Click on **OK**.

Customizing a RAID setup

1   After following Preliminary steps on page 14, select the **Custom RAID** radio button. See Exhibit 1.4-1 on page 13.

2   Select the options to configure the new RAID group (see Exhibit 1.4-3 on page 16):
     - **RAID Group Name**: Assign a name to the RAID group or use the one assigned by the Configuration Tool. The name must be unique and no more than 14 characters.
     - **RAID Group Level:** Select a RAID group level from the drop-down box.
     - **RAID Group Interleave:** Select an interleave value. The default value is 128KB.
     - **RAID Group Mirror Count:** Select a mirror count, a copy of the original data stored on a separate disk, for RAID groups that have mirrors.
     - **Initialize:** Select the initialization method for the RAID group. The default is **Advanced**.
       Advanced initialization is recommended for new drives because the procedure erases and verifies the drive media. The RAID group is unavailable until initialization is complete.
       Express initialization performs RAID group setup in the background and the RAID group is immediately available for use.

3   Click **Next**. See Exhibit 1.4-4 on page 17.

4   Select the disk devices in the top panel and drag them into the device area in the bottom panel. See Exhibit 1.4-5 on page 17.

5   If you want the RAID group to be presented as one virtual disk (partition) with the default RAID group properties, click **Finish.**
     If you want to change other parameters from default values, click **Next** and select the desired property. See Exhibit 1.4-6 on page 18.
     - **Speed Read**, **Auto Rebuild** and **Rebuild Priority:** refer to Change RAID group properties on page 19 for specific information on these parameters.
     - **Sector Size:** specifies the sector size that each partition (virtual disk) within the RAID group presents to the host system. The sector size can be set to 512 bytes (default) or 4096 bytes. This parameter can only be set during RAID group creation. The available size is determined by the sector sizes of the physical disks selected for the RAID group. If the sector size for the physical disks is 512 bytes, then either 512 or 4096 is valid. If the sector size of the physical disks is 4096 bytes, then 4096 is the only valid value for this property.
       The selection of a sector size of 4096 bytes provides the capability to create a 16TB virtual disk that is supported on Windows XP 32-bit version.

6   If you want more than one virtual disk (partition) click **Next** and select one of the following:
     - **leave as one partition**
     - **partition by count**
     - **partition by size**

When you have made all your selections, click **Finish.**

7   A confirmation dialogue box asks you to confirm the configuration you have chosen. Click **Yes**.

8   The RAID group configuration you have chosen is initialized and completed. The time it takes to initialize the RAID configuration you have chosen depends on the RAID level selected, the capacity of the drives and the initialization method selected.

Exhibit 1.4-3   Selecting the options to configure the new RAID group.
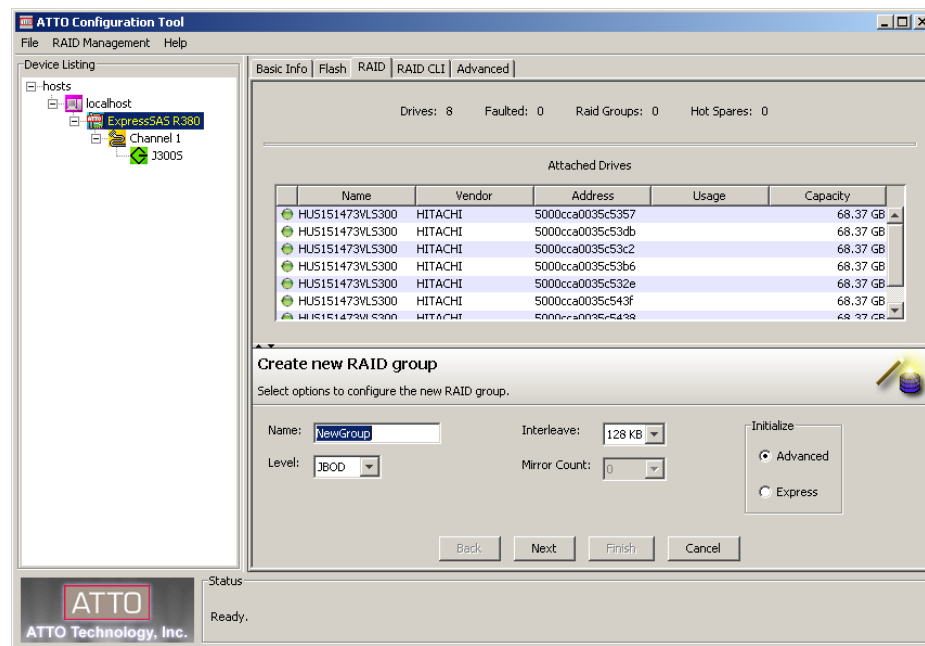
Exhibit 1.4-4   Selecting a RAID group option.
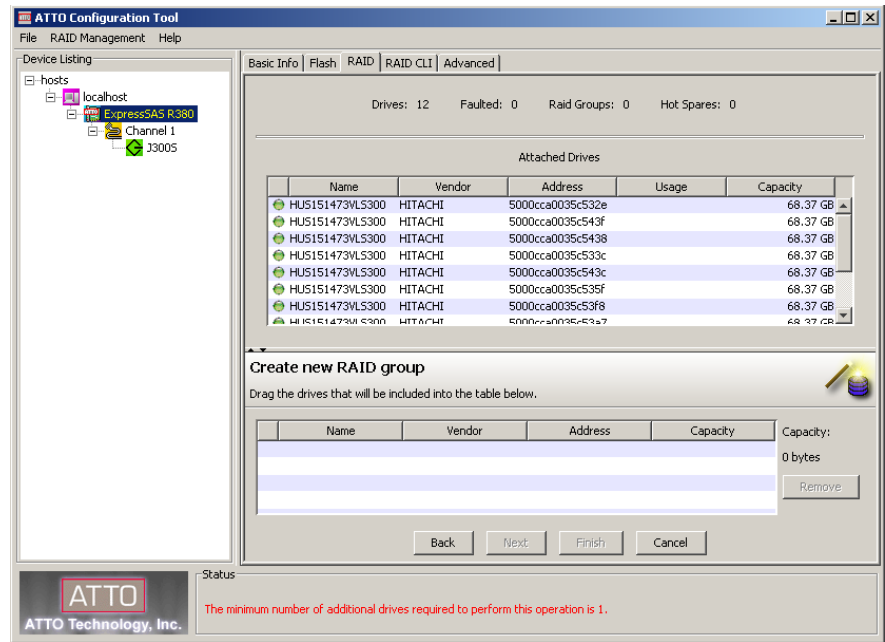
Exhibit 1.4-5   Selecting drives for a new RAID group.
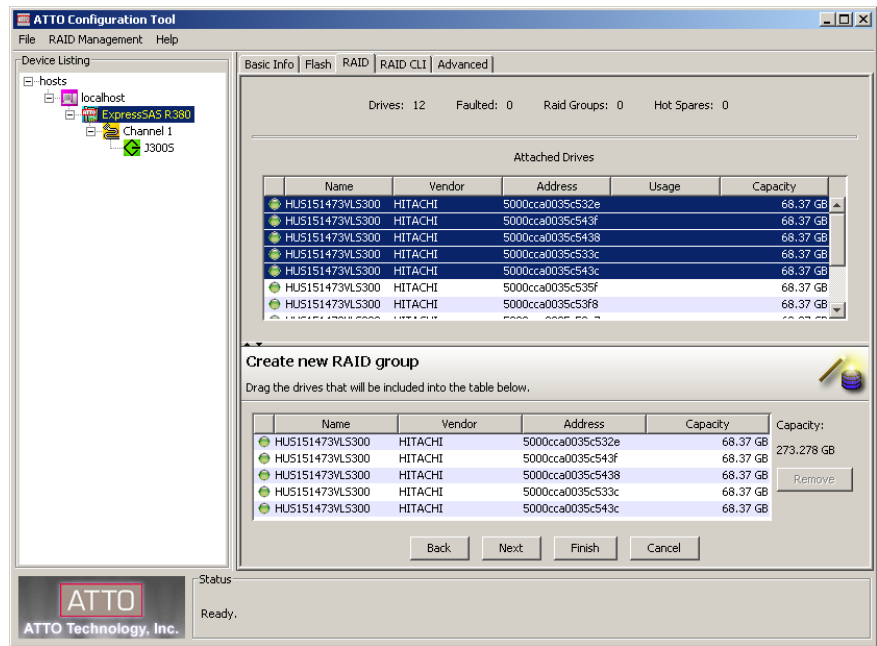
Exhibit 1.4-6   Continue to select options to create the new RAID group.
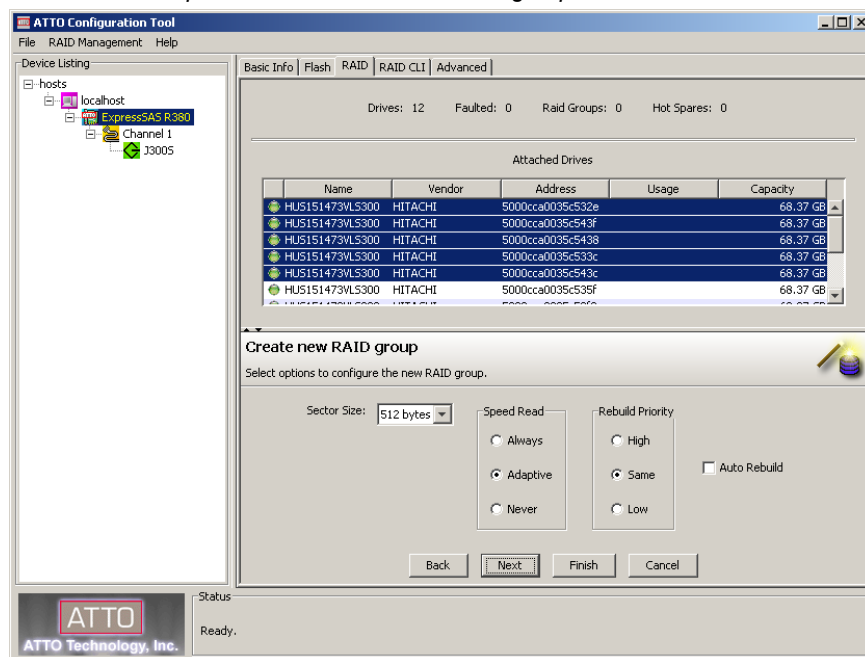
Creating a Hot Spare Pool

If a member of a RAID group becomes degraded or fails, you lose some redundancy in your RAID group until a new member is rebuilt into the RAID group.

You can set up a Hot Spare Pool with drives of different sizes which are designated as replacements for faulted devices at any time, either before or after creating RAID groups.

A degraded RAID group is automatically rebuilt if a suitable disk is available in the Hot Spare Pool.

1   After following the Preliminary steps on page 14, find the **Hot Spare** tab in the bottom panel within the **RAID** tab.

2   Select the **Hot Spare** tab to show existing members of the Hot Spare Pool.

3   To add drives to the Hot Spare Pool, select unallocated drives from the top panel and drag them to the Hot Spare Pool.

To remove a drive from the Hot Spare Pool, select the drive, click on it and click on **Delete Hot Spares**.

> Note
>
> *An unallocated drive or unallocated storage is storage which is not part of a RAID group, not already designated as a Hot Spare or was offline when you set up a RAID group using the ATTO Configuration Tool.*

Modifying RAID groups

The ATTO Configuration Tool interface may be used to replace a failed drive, add capacity to a RAID group, or change a RAID configuration from the current configuration to a new configuration.

> ⚠ CAUTION
>
> **Data can be compromised or lost when deleting storage or rearranging storage configurations.**

The ATTO Configuration Tool interface takes you step by step through many procedures which allow you to modify your storage and RAID configurations. Read all notes and cautions carefully as you go to ensure the best performance and use of your storage. Many of these procedures are only available using unallocated storage.

Begin each process by following the Preliminary steps on page 14 and clicking on the desired process in the **RAID Management** menu.

> **Note**
>
> *An unallocated drive or unallocated storage is storage which is not part of a RAID group, not designated as a Hot Spare or was offline when you set up a RAID group using the ATTO Configuration Tool.*

Expand capacity

Click on **Expand Capacity** in the **RAID Management** menu and follow the on-page instructions. Depending on the RAID configuration, you may need to add more than one device.

> ⚠️ **CAUTION**
>
> **Adding drives to an existing RAID group may adversely impact performance. You cannot reverse this operation unless you delete the RAID group.**

Change from one RAID level to a new RAID Level

Changing from one RAID level to another RAID level is called migration. The following migration levels are supported:

- JBOD to RAID Level 0
- JBOD to RAID Level 1
- RAID Level 0 to RAID Level 10
- RAID Level 1 to RAID Level 10

Select **Migrate RAID** in the **RAID Management** menu and follow the on-page instructions.

Delete a group

To delete a group using the ATTO Configuration Tool, click on **Delete Group** in the **RAID Management** menu and follow the on-page instructions.

> ⚠️ **CAUTION**
>
> **Data can be compromised or lost when deleting storage or rearranging storage configurations.**

Change RAID group properties

A RAID group has properties that are specific to the RAID group. The value of each property remains with the RAID group when it is moved from one computer to another. Some of the properties can only be specified during RAID group creation whereas others may be changed at any time during the life of the RAID group.

1   Select a RAID group in the **Groups** panel.
2   Click on **Properties** in the **RAID Management** menu.
3   View or change the current properties.

- **Speed Read** specifies the cache policy to be used during read operations. Once a read command is given, the ExpressSAS RAID code retrieves the next set of sequential data from the RAID group and caches it in internal memory. If you select **Never,** read caching is never performed. If you select **Always,** read caching is always performed. If you select **Adaptive**, the default, Speed Read is enabled or disabled depending on the sequential patterns detected in I/O requests.

- **Auto Rebuild** controls the replacement of a faulted drive with any available unallocated drive. When you click on the **Auto Rebuild** check box and the **Accept** button, Auto Rebuild is enabled. If a drive becomes

faulted, the ExpressSAS RAD adapter replaces the drive with an unallocated drive.

- **Rebuild Priority** specifies the ratio of rebuild I/O activity to host I/O activity. A rebuild priority of **Same** (default value) indicates that rebuild I/O and host I/O are treated equally. A rebuild priority of Low indicates that host I/O is given a higher priority than rebuild I/O. A rebuild priority of **High** indicates that rebuild I/O is given a higher priority than host I/O.

- **Prefetch** specifies the number of stripes that are read when Speed Read is enabled or adaptive. The valid values for prefetch are 0, 1, 2, 3, 4, 5 and 6, and the default value is 1. This property can only be changed after the RAID group is created. To access this property, select the RAID group and view its properties.

4   Click **Accept.**

Replacing a faulted drive

If a drive in a RAID group fails, the RAID group's status becomes degraded. To return to optimal functionality, replace the faulted drive using one of the following mechanisms.

> **Note**
>
> *All of these mechanisms start a RAID group rebuild after the drive is replaced. A RAID rebuild may take several hours to complete.*

Create a Hot Spare Pool

A faulted drive is automatically replaced if a suitable disk is available in the Hot Spare Pool. You set up a Hot Spare Pool with drives reserved until a RAID group member fails; they are not available when creating a RAID group. Refer to Creating a Hot Spare Pool on page 18.

Enable Auto Rebuild

A faulted drive is automatically replaced if Auto Rebuild is enabled and a suitable unallocated disk is available. Suitable unallocated drives are initialized, large enough to replace the degraded drive, and cannot contain any RAID group information. The unallocated drive may be a pre-existing drive or a newly-seated drive.

If a Hot Spare Pool exists, the ExpressSAS RAID adapter chooses a suitable Hot Spare drive before selecting an unallocated drive.

Refer to Change RAID group properties on page 19.

Manually replace a drive

You may replace a drive and rebuild a RAID group manually.

1   After following the Preliminary steps on page 14, double click on the degraded RAID group in the bottom panel.

2   A RAID group members tab displays in the bottom panel. Select an unallocated drive from the drive inventory and drag it over the degraded drive in the members tab.

    If the selected drive is appropriate, the faulted drive is replaced.

1.5   Set up ExpressSAS RAID Notification

The ATTO Configuration Tool provides a mechanism to issue notification when a RAID event occurs in ExpressSAS RAID adapters.

RAID events are divided into three categories

Critical events indicate a serious problem has occurred and the administrator of the RAID group should perform corrective action.

Warning events are less serious but still warrant recording and notification at some level.

Information alerts provide supportive information about warnings or critical events.

Drop-down boxes on the **Notifications** page allow you to choose the type of event which prompts an alert.

Critical: only critical events are reported.

Warning: all warnings and critical events are reported.

All: all critical, warning and information events are reported.

None: no event is reported. The **None** level is useful in Email notification because you can set up Email addresses to which alerts might be sent at some future time.

You may choose any combination of notifications on the **Notification** page as needed. The notifications are specified at the host system level and apply to all ATTO RAID adapters installed in the host system.

Basic alerts

You can select an audible alert, a visual alert, or both an audio and a visual alert for a particular category of events in the **Basic Alerts** section of the Notifications page. Select a notification level using the drop-down box next to the **Audible** and **Visual** labels.

Audible alert uses the system speaker to sound an alarm for 5 seconds. The alarm stops after 5 seconds.

Visual alert uses a system modal pop-up to display a message. You must close the pop-up using the pop-up's button.

Note

Audible and visual alerts are not available on Linux systems.
Audible alerts may not be available on your operating system.

Logging

The ATTO Configuration Tool provides a default location for event log files which you can change in the **Location**: field found under **Logging** on the Notifications page. The log file name is a combination of the adapter's SAS address, an underscore and a **0** or **1.**

You may limit the size of the log file by entering a number greater than 0 in the **Size Limit (KB)** field. Once the limit is reached, another log file is created. Once that log file's limit is reached, the Configuration Tool overwrites the first log file and continues to rotate between the two files.

If you do not want to limit the storage capability of the log file, enter a zero in the field.

Choose the type of event you want recorded in the event log from the **Events:** drop down box.

Email

Email notification sends an Email to the designated Email address when the event level from the drop down box next to the **Notification Addresses:** field is reached.

You may specify several notification addresses on each line in the **Email** section of the Notifications page, each separated by commas, for any event level. You must complete the IP address or name of the server and sender.

You may specify a user name and password for the mail server if one is required.

Critical event Email notification is sent after a 10-second delay . All other notification Emails are sent at 15-minute intervals.

*Exhibit 1.5-1   The **Notifications** page in the ATTO Configuration Tool.*

1.6   Use SCSI Enclosure Services (SES)

SAS/SATA drive enclosures may provide a SCSI Enclosure Processor which indicates enclosure health status, drive identification and drive fault identification.

The ATTO Configuration Tool recognizes drive enclosures that provide SCSI Enclosure Services (SES). You may use SES to identify individual drives, all the drives in the same enclosure, all the drives in a single RAID group, or faulted drives. You may also select drives and monitor the status of the enclosure. To uses SES, open the ATTO Configuration Tool and follow one of the procedures below.

Identifying drives

Drive Identification lights LEDs showing the drives you have selected using the ATTO Configuration Tool. Most drive enclosures blink an LED next to the drive in the enclosure.

The Configuration Tool provides a way to identify individually selected drives, all of the drives in the same enclosure, all drives in a RAID group and faulted drives.

1   Select one or more drives individually or in enclosures or drives in RAID groups:
   • Select individual drives in the **Attached Drives** panel.
   • Select one or more RAID groups in the **Groups** panel.
   • Select one or more drives in the **Attached Drives** panel, right click on one of the selected drives and select **Enclosure.**
2   Right click on one of the selected drives or RAID groups.

3   Select **Locate**.
   The status icon next to the selected drives blinks and the enclosure performs its specific identification method until you stop it.
4   To stop the drive identification, right click on one of the selected drives or RAID groups.
5   De-select **Locate**.

Identify faulted drives
Drive Fault Identification is performed automatically by the Express SAS RAID adapter when a member of a RAID group becomes degraded by exhibiting unrecoverable errors during I/O.

The RAID adapter reports the status of the drive and asks the SES device to perform fault identification. The SES device usually illuminates a blinking red LED as a fault identification.

The fault identification continues until the drive is replaced or the RAID group is deleted.

Selecting all drives in the same enclosure

Drive Selection selects all drives in the same enclosure using the Configuration Tool. You may use drive selection If you need to select all the drives in one enclosure which are attached to a RAID adapter without selecting other enclosures, or if you are selecting members for a RAID group during RAID group creation.

1   Right click on one drive in the **Attached Drives** panel.
2   Select **Enclosure**.
3   Select **Drives**. All drives in the same enclosure as the selected drive are selected.

Monitoring enclosure health

The Express SAS RAID adapter performs **Enclosure Health Monitoring** automatically when an SES device is present. The RAID adapter monitors the status of the enclosure's power supplies, fans and temperatures. If the status of any of these sub-systems indicates a failure, the adapter reports the problem.

The Configuration Tool shows the status of selected SES devices and reports the specific health of each sub-system.

1   Select the SES device from the **Device Listing** tree in the Configuration Tool. (See .)
2   Select the **SES** tab at the top of the right panel.

3 View the overall status of each component across the top of the right panel. (See Exhibit 1.6-2.)

4 Select a specific sub-system (power supply, fans and temperatures) and view the status of the reporting sub-system.

*Exhibit 1.6-1   The **Basic Info** tab when an SES device is chosen from the **Device Listing**.*
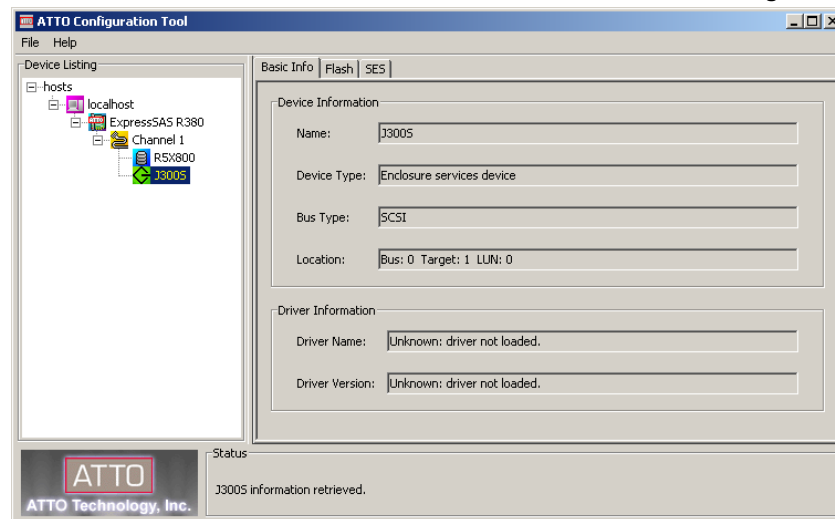
*Exhibit 1.6-2   The **SES** tab.*
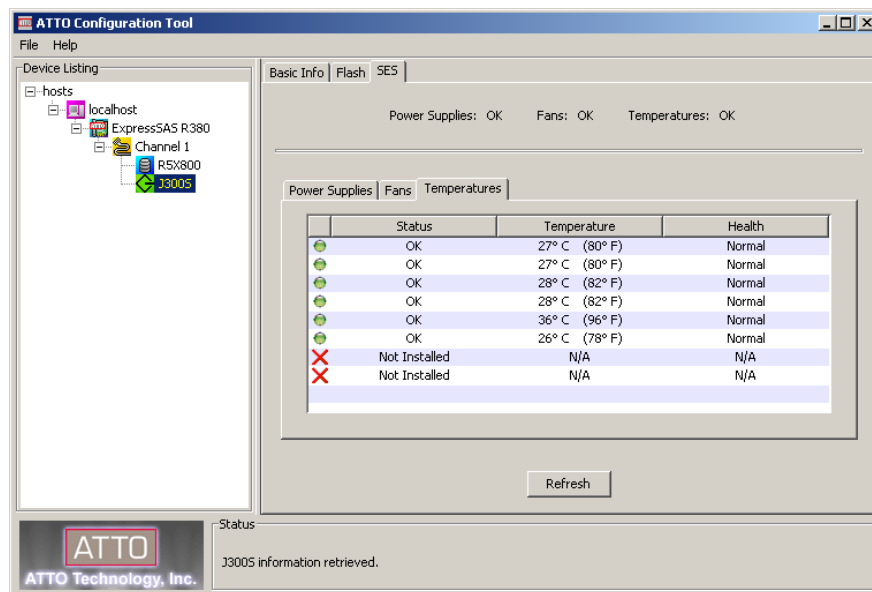
1.7   Monitor S.M.A.R.T. Data

Self-Monitoring, Analysis and Reporting Technology, or S.M.A.R.T., is a system built into SATA drives to detect and report on various indicators of drive health.

The S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) monitoring feature monitors and reports the status of SATA drives using certain parameters recorded by the drives. Notification is sent when the values exceed certain pre-determined values.

Use the ATTO Configuration Tool to view the files that record changes to S.M.A.R.T. parameters. The files are permanent and can be viewed independently whether you have enabled monitoring or not.

Enabling or disabling S.M.A.R.T. monitoring

You may enable or disable the monitoring feature at any time. Monitoring is disabled by default: if you want to use the feature, you must enable it.

1   Select the **ESAS RAID** adapter from the **Device Listing** panel.

disabled. Select the **Monitor S.M.A.R.T.** menu item to change the monitoring status.
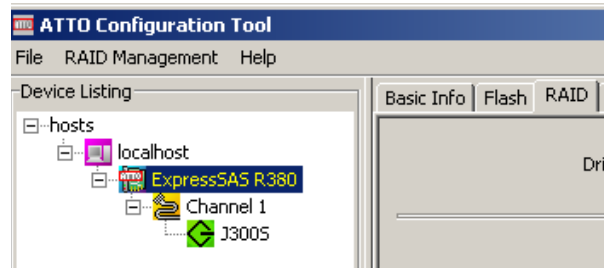
2   Select the **RAID** tab in the right panel.
3   Select the **RAID Management** menu item at the top of the screen.
4   The **Monitor S.M.A.R.T** menu item under **RAID Management** has a check mark when monitoring is enabled and no mark when it is
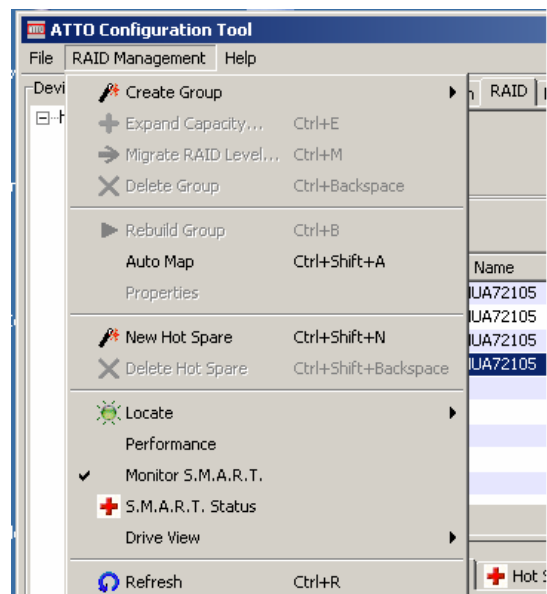
Checking S.M.A.R.T. status

The ATTO Configuration Tool interface displays the latest S.M.A.R.T. status record for a selected drive. All attributes reported by the drive are listed with each attribute's **Threshold, Worst, Current** and **Raw** value.

The threshold value is the value at which notification of a problem is generated by the software.

If there has been a change from a previous record of S.M.A.R.T. status, an arrow notes which way the change went, either higher or lower. For example, in the temperature listed in this record is lower than the temperature listed in a previous record and the arrow next to that attribute points downward.

The S.M.A.R.T. status display also contains information such as the date and time S.M.A.R.T. status was recorded, the total number of records for this drive, and the current monitoring status (enabled or disabled).

You may move to previous or subsequent records, query the drive or refresh the view using controls on the interface.

1   Select a single drive in the **Attached Drives** panel.
2   Right click on the selected drive.
3   Select **S.M.A.R.T. Status** in the sub-menu.
4   The **S.M.A.R.T. Status** box displays.

- Use the left arrow or right arrow control to move between S.M.A.R.T. status records
- Use the **Refresh** button to query the drive for the latest values. If any values are different from the most recent record, a new record is created and displays.

Exhibit 1.7-1   S.M.A.R.T. status for a selected drive.

Filtering S.M.A.R.T. attributes

Each of the S.M.A.R.T. status attributes is assigned one or more classification types:

- performance
- error rate
- event count
- critical

The **S.M.A.R.T. Status** dialog box can be filtered to display any combination of these types.

The default view is to display all types.

1   Open the **S.M.A.R.T**. **Status** box as described above.
2   Right click in the table area where the attribute values are displayed.
3   Each classification type that is visible has a check mark. (See S.M.A.R.T. Status box with classification types.Exhibit 1.7-2). Select any classification type to change the check mark.

Exhibit 1.7-2   ***S.M.A.R.T. Status*** *box with classification types.*
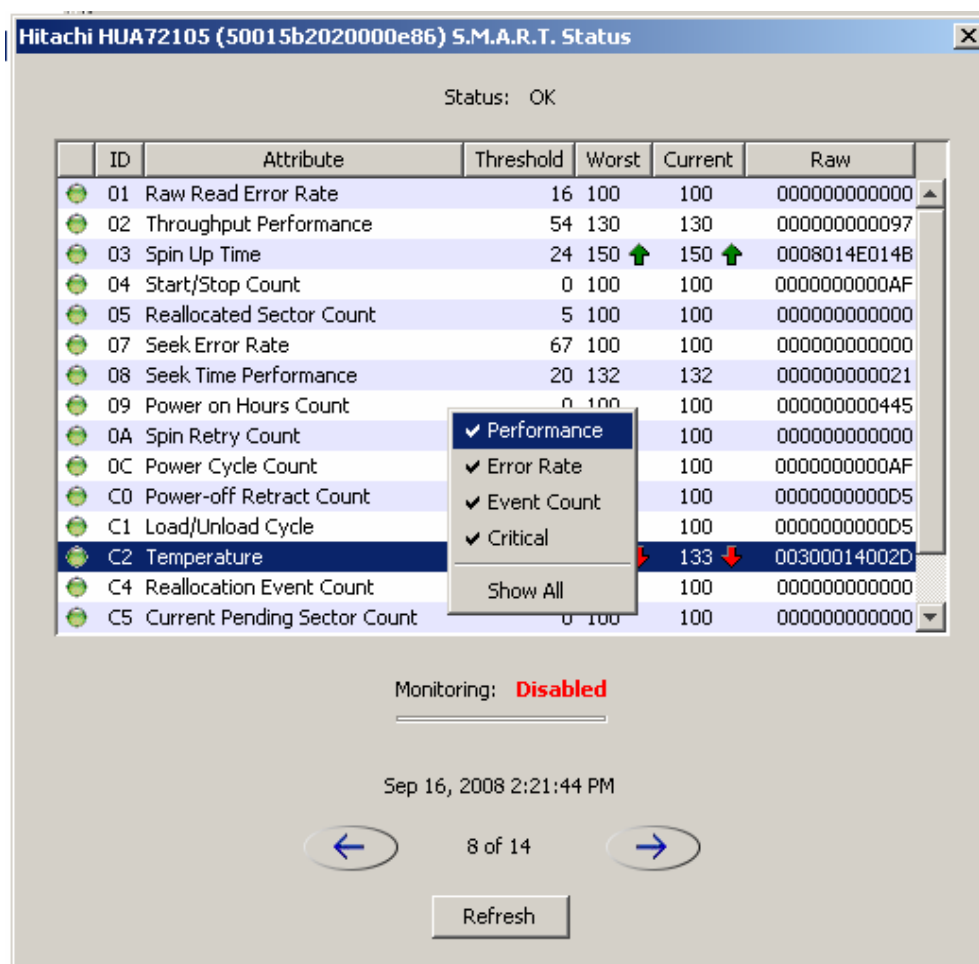
S.M.A.R.T. notifications

S.M.A.R.T. status is collected from each SATA drive at 60 minute intervals and, if the data is different than the previous status, a S.M.A.R.T. status record is added to the S.M.A.R.T. status file for that drive.

A notification of the S.M.A.R.T. status difference is generated based upon the current settings in the **Notifications** panel. Refer to Set up ExpressSAS RAID Notification on page 21.

The notification level of S.M.A.R.T. status is determined as follows:

INFO None of the status values was below the threshold value.

WARNING One or more of the status values was below a threshold value but none was classified as critical.

CRITICAL One or more of the status values was below a threshold value and one was classified critical.

1.8   Test Drive Performance

The performance testing feature in the ATTO Configuration Tool records the performance level of a drive in a RAID group under an I/O (input/output) load generated by a host application. The information can be used to compare the performance of each drive relative to others.

The performance feature of the Configuration Tool counts the Megabytes per second (MB/sec.) which elapse from the time a start button is clicked until a stop button is clicked,. Drive performance can be measured for any combination of single drives within a RAID group or across multiple RAID groups, or for all the drives in a selected RAID group.

> **Note**
>
> *The performance test can only be performed on drives which belong to a RAID group.*

The **Performance** dialog box contains individual statistics for each drive selected. You should start I/O to the drives to be tested before beginning the test.

The collection of these statistics begins when the **Start** button is pressed and continues until the **Stop** button is pressed. You may press the **Reset** button and restart a test at any time.

The Configuration Tool can be closed after starting the performance test and re-opened to show the statistics from the most recent test.

1   Start I/O from the host system.

2   Select the **ESAS RAID** adapter from the **Device Listing** panel.
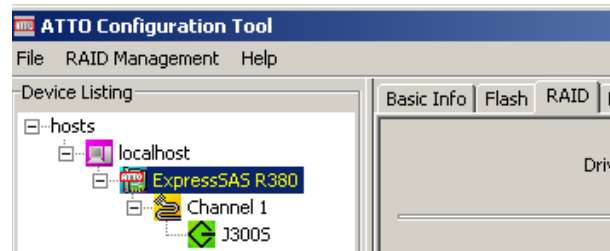
3   Select the **RAID** tab in the right panel.

4   Select the drives to be tested:
   • Select individual drives from the **Attached Drives** panel.
   • Select a single RAID group in the **RAID Group** panel.

5   Right click on the selected drive(s) or RAID group.

6   Select the **Performance** menu item.

7   The **Performance** dialog box displays. (See Exhibit 1.8-1.)

8   Click the **Start** button.

9   Click the **Stop** button to halt monitoring.

   Click the **Reset** button to reset the performance values to zero at any time.

   You can close the **Performance** box while monitoring is in progress, then open it later to see the performance results.

10 Stop I/O any time after you have stopped the performance test.

*Exhibit 1.8-1 Detail of the **Attached Drives** window and the **Performance** dialog box with performance results for the selected drives before a test has been run.*

	Name	Vendor	Address	Usage
	Attached Drives			
●	Hitachi HUA72105		50015b2020000e86	r5x4 (3)
●	Hitachi HUA72105		50015b2020000e87	r5x4 (4)
●	Hitachi HUA72105		50015b2020000e88	r5x4 (2)
●	Hitachi HUA72105		50015b2020000e89	r5x4 (1)

Performance for r5x4

Member	Transferred	Max Time	Read Rate	Write Rate	Errors
1	0.00 bytes	0.00 ms	0.00 bytes/s	0.00 bytes/s	0
2	0.00 bytes	0.00 ms	0.00 bytes/s	0.00 bytes/s	0
3	0.00 bytes	0.00 ms	0.00 bytes/s	0.00 bytes/s	0
4	0.00 bytes	0.00 ms	0.00 bytes/s	0.00 bytes/s	0

Groups

1.9   ExpressSAS RAID Media Scan Feature

The Media Scan feature scans disk drives for media errors and parity errors. All media errors are counted and fixed. All parity errors are reported in the event log. The two options are described below:

Media Scan - Media Scan works with parity RAID group members, Hot Spare drives and unallocated drives. Media Scan reads the selected drives and, if a Media Error is found, Media Scan re-writes the disk with the media error. The drive will relocate the bad sector to an alternate part of the drive. Media Scan re-writes the correct data for a disk that is a member of an on-line parity RAID group. Media Scan writes random data to Hot Spare drives and unallocated drives. The Media Scan feature records the number of media errors detected and corrected for each drive. These counts are stored persistently if the drive is a RAID group member or a Hot Spare drive. The counts are not persistently stored for any other drives.

Media Scan with Parity Verify - is a variation of Media Scan that is <u>available for on-line parity RAID groups only</u>. Parity Verification is performed on each RAID group stripe that has no detected media errors. The parity of the stripe is recalculated and compared to the original parity for the stripe. If there is a mismatch, an error is generated and recorded in the Event Log and System Log files.

Modes of operation for:

- On-line RAID Group – Media Scan performs SCSI Read commands to each stripe group. Parity verification is performed on a stripe that has no media errors. Media Scan activity is scheduled in accordance with the Rebuild Priority Level. Media Scan is restarted after reboot if the Media Scan did not complete.
- Degraded or Offline RAID Group – Media Scan performs SCSI Read commands for each stripe group of the on-line drives. No parity verification occurs. The Media Scan is restarted after a re-boot if the Media Scan did not complete.
- Hot Spares & Unallocated Drives – Media Scan performs SCSI Read commands for each selected drive. Media Scan is not restarted after a re-boot if the Media Scan did not complete.

Starting a Media Scan

1. Select the **ESAS RAID** adapter from the **Device Listing** panel.
2. Select the **RAID** tab in the right panel.
3. Select the RAID group, Hot Spare drive(s) or unallocated drive(s) which will have a Media Scan. One RAID group can be selected or multiple Hot Spare and unallocated drives can be selected.
4. Select the **RAID Management** menu item at the top of the screen.
5. Select the **Scanning** menu item.
6. Select the 🔍 **Media Scan** or 🔍 **Parity Verify** from the sub-menu.
7. The Media Scan starts as soon as the sub-menu item is selected.
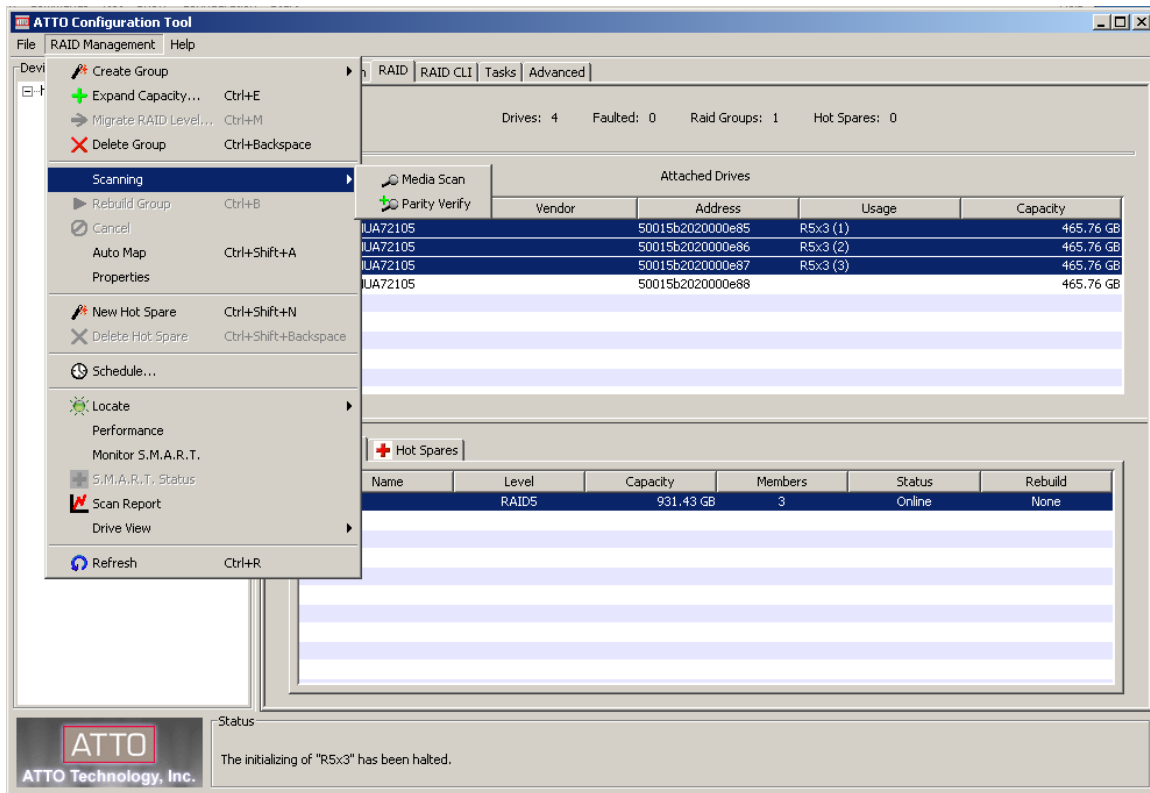
Media Scan Status

The Media Scan starts as soon as the menu item is selected. The **Attached Drives** panel displays a rotating icon ✳ next to each drive being scanned. The **RAID Group** panel displays the type of scan being performed and a status for percent complete.

Attached Drives

	Name	Vendor	Address	Usage	Capacity
✳	Hitachi HUA72105		50015b2020000e85	r5x3 (2)	465.76 GB
✳	Hitachi HUA72105		50015b2020000e86	r5x3 (1)	465.76 GB
✳	Hitachi HUA72105		50015b2020000e87	r5x3 (3)	465.76 GB
🟢	Hitachi HUA72105		50015b2020000e88		465.76 GB

Groups | **Hot Spares**

Name	Level	Capacity	Members	Status	Rebuild
r5x3	RAID5	931.43 GB	3	Online	Media Scanning (5%)

Viewing the Scan Report

1 Select the **ESAS RAID** adapter from the **Device Listing** panel.
2 Select the **RAID** tab in the right panel.
3 Select the RAID group, Hot Spare drive(s) or unallocated drive(s) whose scan report should be displayed. One RAID group can be selected or multiple Hot Spare and unallocated drives can be selected.

4 Select the **RAID Management** menu item at the top of the screen.
5 Select the ![icon] **Scan Report** from the menu.
6 A **Media Scan Error Report** message box appears with the scan results. If a scan is currently in process the **Scanned** column indicates the percent complete for the operation.
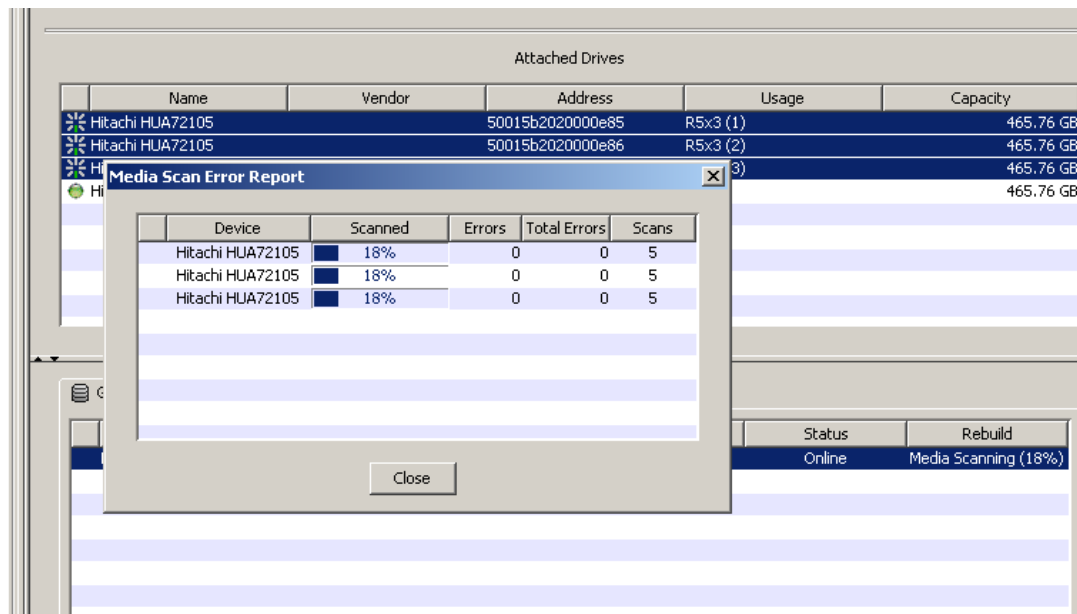
The Scan Report includes the counts for the most recent scan and the total results for all Media Scan operations. This information is persistent for RAID group drives and Hot Spare drives since it is stored in meta-data of the drive. The results may be erased from the drive when the meta-data is re-written. e.g. The information is lost from a Hot Spare when the Hot Spare is added to a RAID group. The results of a Media Scan for an unallocated drive are only available until a reboot occurs.

Media Scan provides the following metrics:

1 Media errors detected on most recent scan in the **Errors** column.
2 Media errors corrected on most recent scan.
3 Total stripe groups scanned on most recent scan. This data is not displayed in Configuration Tool.

4 Media errors detected on all scans in the **Total Errors** column.
5 Media errors corrected on all scans
6 Total number of all scans in the **Scans** column.

The **Media Scan Error Report** does not display the count of corrected errors. The corrected error count is displayed while the mouse pointer hovers over the **Errors** or **Total Errors** value for a specific drive. If the detected errors do not equal the corrected errors the warning icon ![icon] appears to the left of device name column.

The Scan Report is updated by the Configuration Tool every 10 seconds. The metrics are not updated when the Media Scan is paused.

Pausing or Resuming Media Scan

Media Scan for a parity RAID group can be paused, resumed and cancelled. The Configuration Tool provides menu items to pause and resume and CLI provides a command to cancel the Media Scan. The results of the Media Scan up to the time of the pause or cancel are saved persistently.

Media Scan for Hot Spare and unallocated drives can be cancelled and cannot be paused. Media Scan of Hot Plug and unallocated drives are run immediately and they are not scheduled. The Configuration Tool provides menu items to start and cancel Media Scan on these drives.
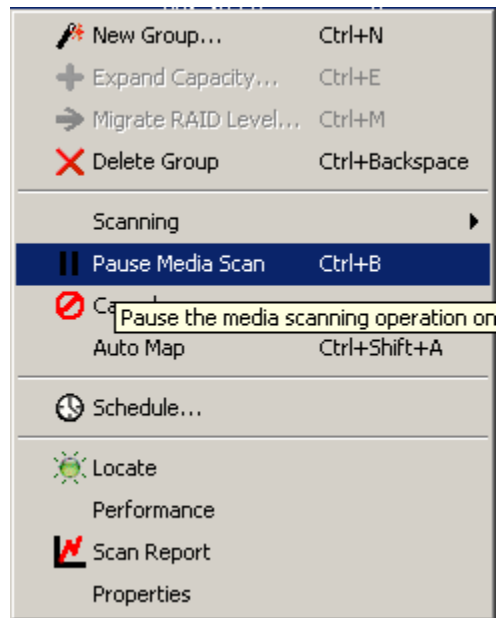
Scheduling Media Scan

Media Scan for a parity RAID group can be scheduled to occur at a specified time for a specified frequency. The scheduling mechanism provides the means to specify the following:
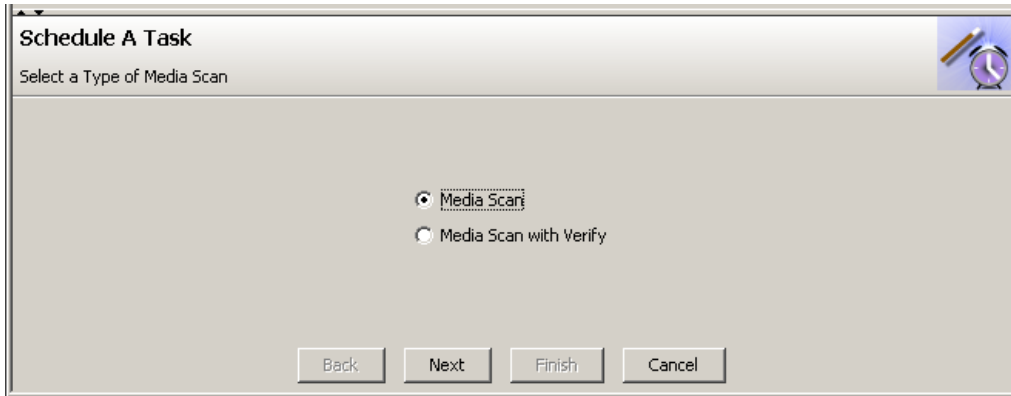
- Day of the week and the time of day to run a Media Scan once a week
- Day of the week and the time of day to run a media Scan once
- Time of day to run a media Scan every day of week

A media Scan is scheduled using the following procedure.

1   Select the **ESAS RAID** adapter from the **Device Listing** panel.
2   Select the **RAID** tab in the right panel.
3   Select the parity RAID group that should have a scheduled Media Scan.
4   Select the **RAID Management** menu item at the top of the screen.
5   Select the ⊙ **Schedule…** from the menu.
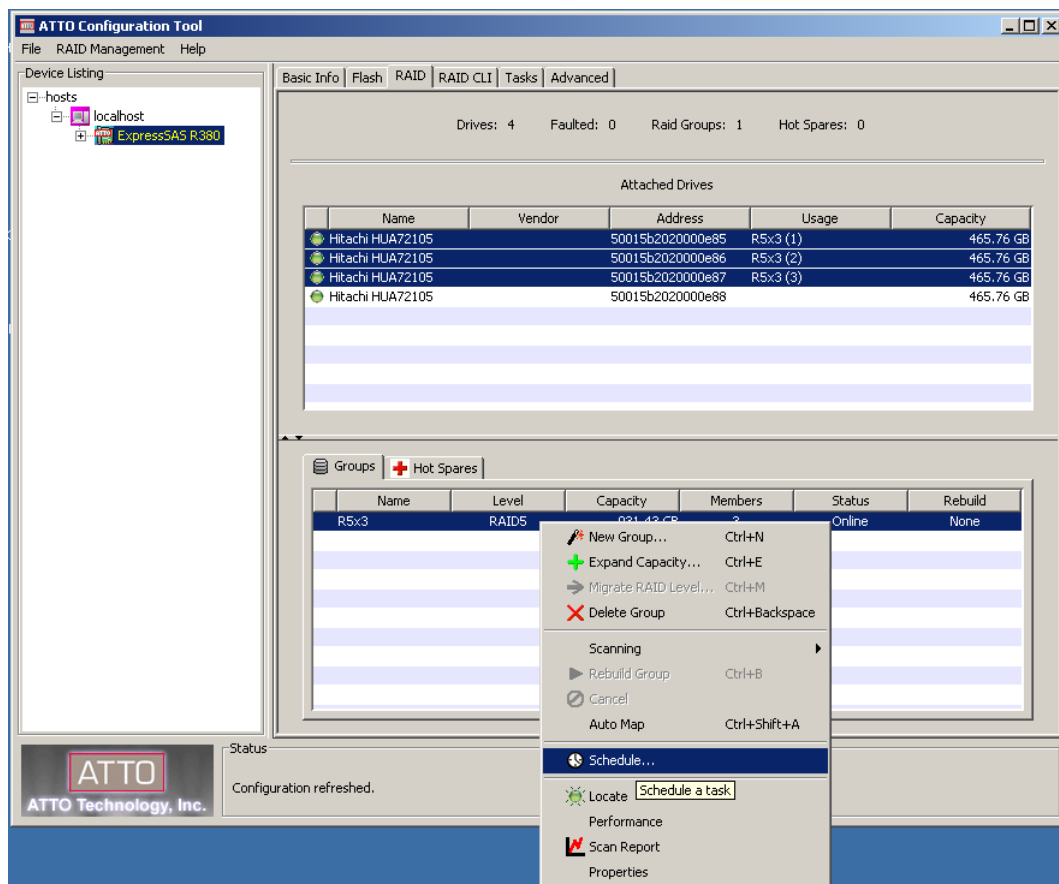
6   Select **Media Scan** or **Media Scan with Verify**
    and press the **Next** button.
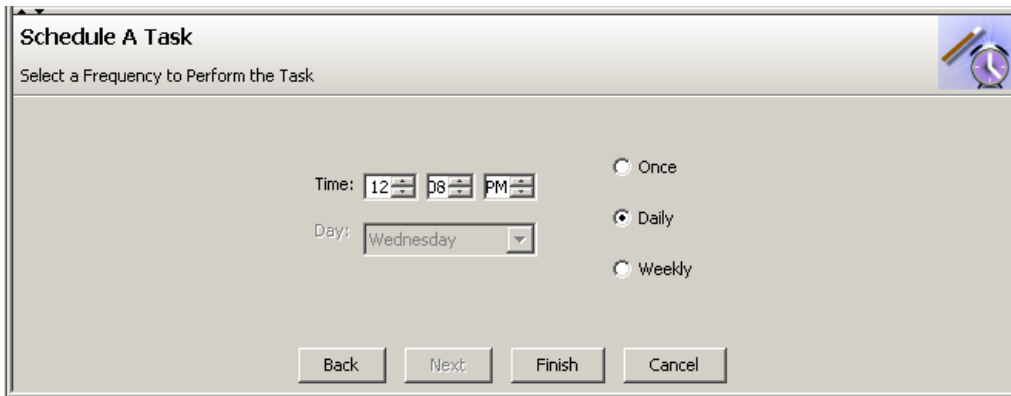
Schedule A Task
Select a Type of Media Scan

         ⦿ Media Scan
         ○ Media Scan with Verify

    Back   Next   Finish   Cancel

7   Select **Once**, **Daily** or **Weekly** as the frequency
    of the task.

Schedule A Task
Select a Frequency to Perform the Task

Time: 12 08 PM   ○ Once
Day: Wednesday   ⦿ Daily
                     ○ Weekly

    Back   Next   Finish   Cancel

8   Select the time of day to run the task.
9   Select the day of week to run the task. The day
    of week field is disabled when the frequency is
    daily.
10 Press the **Finish** button and a confirmation
    dialog box is displayed.
11 Press **Yes** to schedule the task.

Media Scan for Hot Spare and unallocated drives cannot be scheduled.

Viewing Scheduled Tasks

The Configuration Tool contains a Task tab for each RAID adapter present in the system. The tab contains a table that displays information for all of the currently scheduled tasks for the associated adapter. The table only contains an entry for items that have not occurred to date. It does not show any information for completed tasks. The table provides the capability to cancel a task or to change the schedule for the task. You cannot schedule a new task from this view.
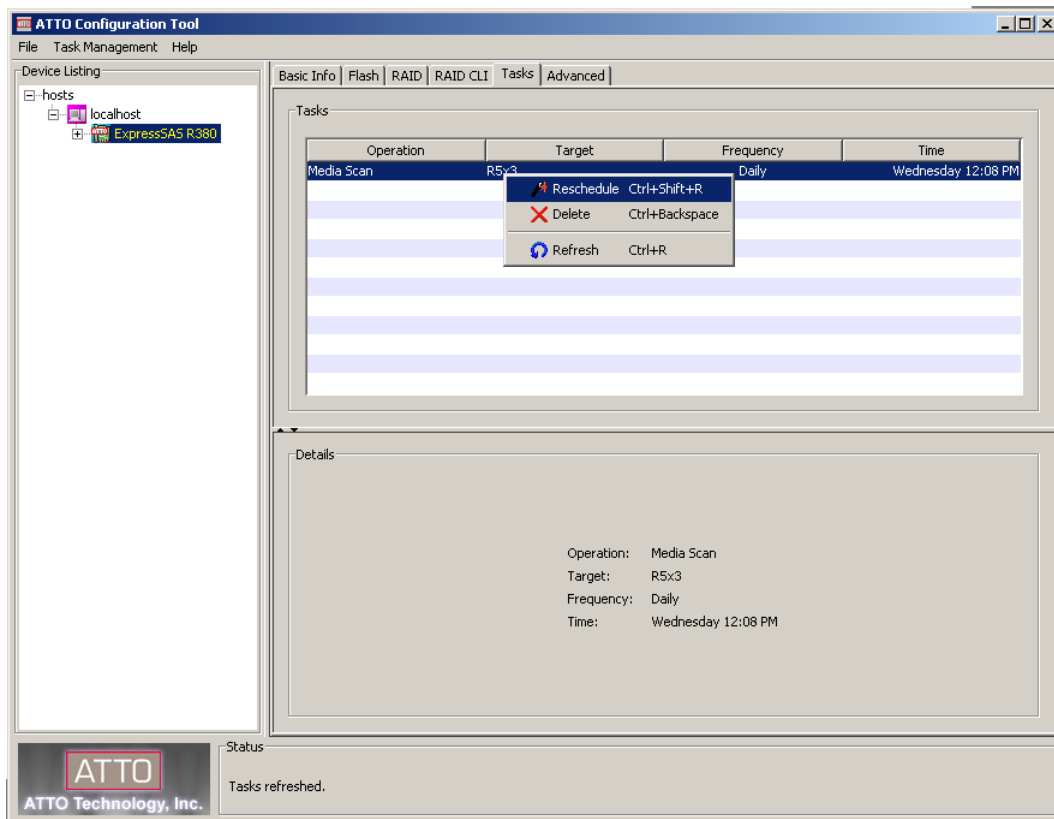
Automatic Cancellation of Media Scan

A Media Scan can be automatically cancelled by the FW for the following reasons.

- A parity RAID group is being scanned and it requires a rebuild operation
- A parity RAID group is being scanned and the last drive is marked 'Faulted'
- A Hot Spare is being scanned and it is needed for a RAID group rebuild
- An unallocated drive is being scanned and it is needed for a RAID group rebuild

A Media Scan is not cancelled in the following scenarios:

- An unallocated drive cannot be added to a RAID group when a Media Scan is active on the drive.

The Media Scan must be manually cancelled in the above scenario.

1.10   Troubleshoot the ATTO Configuration Tool

You may see an error message informing you about an unexpected event or incorrect information discovered by the application. Using the help text presented with the error message, correct the issue before proceeding.

Warnings and error messages are posted in the **Status** area of the configuration utility.

Messages from NVRAM tab actions
An error occurred loading NVRAM data.
The first time a channel is highlighted, the application tries to read NVRAM from the card. This message usually indicates the application could not communicate with the driver, probably because the application does not support the driver version in use.

Warning: NVRAM could not be read, defaults returned.
NVRAM is corrupt and the driver returns to the default configuration. The defaults are presented via the graphical user interface. These defaults may be modified but the defaults or modifications must be committed (saved) in order to correct NVRAM.

An error occurred updating the NVRAM.
The driver cannot put the new settings on the card; no changes are made to the card.

Feature bounds checking
*When the **Commit** button is clicked, each NVRAM feature is validated before being sent to the card. If any one of these features is deemed inappropriate based on the implemented checks, further NVRAM feature validation checks are stopped and the message is displayed.*

Execution Throttle is greater than the maximum allowable value of 255. No NVRAM configuration changes have been made to your card.
The exact message varies based on the first field with an out-of-range value.

Messages from Flash tab actions
This is not a flash file, or it is corrupt.
*The ATTO-created flash file is corrupt or the **Configuration Tool** does not recognize the file as a flash file. Only ATTO-created flash files may be selected using the flash file dialog box.*

This HBA is not compatible with the selected flash file.
ATTO flash files are created based on the type of card flashed. ATTO flash files are only compatible with certain ATTO cards. When a flash file is selected, the flash file is inspected to determine if it is compatible.

A valid file was not selected.
*You clicked the **Cancel** button on the flash file selection dialog.*

An error occurred reading from the flash file, the file may be corrupt.
You selected a compatible flash file but the contents are corrupt.

An error occurred updating the flash.
You tried to flash a card when the firmware was not able to accept a flash.

The card has been prepared for firmware updating, but the machine must be rebooted for the changes to take effect. You need to repeat this process after rebooting to actually update the firmware.
Some firmware upgrades need to prepare the existing firmware in order to successfully update the adapter. Rebooting allows the changes made during the preparation process to take effect, and the same file should be flashed again.

2.0   BIOS Configuration Utility

*The BIOS driver for all ATTO host adapters has a built-in **BIOS Configuration Utility** which manages the adapter and the devices connected to the adapter.*

The **BIOS Configuration Utility** for ATTO host adapters uses a standard menu/choice model. The **Main Menu** presents the functions available from the utility. Selecting an item on the menu may bring up a secondary menu or a dialog box. The dialog box displays the items managed by that dialog box.

The menus for SCSI and Fibre Channel adapters contain many choices with similar functions. Refer to Common BIOS Configuration Utility functions.

Other utility options for Fibre Channel adapters are described in FC BIOS Configuration Utility on page 54; for SCSI adapters in SCSI BIOS Configuration Utility on page 56, and parameters for ExpressSAS adapters are described in ExpressSAS BIOS Utility on page 59.

Accessing the Fibre Channel utility

Options for Fibre Channel adapter configuration are described in FC BIOS Configuration Utility on page 54.

1   During the Fibre Channel BIOS driver startup, press **Ctrl-F** at the prompt after the adapter boot string displays. If you do not press **Ctrl-F** within 3 seconds, you must reboot and start again.
2   The **Fibre Channel BIOS Configuration Utility** starts and displays the following menu:

Configure Adapter Channels

Selectable Boot Device

Reset All Parameters

Display Device List

Format Disk Drives

Update Flash ROM

Configure Stripe groups

Save Parameters and Exit

Discard Changes and Exit

Accessing the SCSI utility

Options for SCSI adapter configuration are described in SCSI BIOS Configuration Utility on page 56.

1   During the SCSI BIOS driver startup, press **Ctrl-Z** at the prompt after the adapter boot string displays. If you do not press **Ctrl-Z within 3 seconds, you must reboot and try again.**
2   The **SCSI BIOS Configuration Utility** starts and displays the following menu:

Adapter Menu

Display Device List

Format Disk Drives

Configure Stripe groups

Save Parameters and Exit

Discard Changes and Exit

Accessing the SAS utility

Options for ExpressSAS adapter configuration are described in ExpressSAS BIOS Utility on page 59.

1   During the SAS BIOS driver startup, press **Ctrl-Z** at the prompt after the adapter boot string displays. If you do not press **Ctrl-Z within 3 seconds, you must reboot and try again.**

2   The **SAS BIOS Configuration Utility** starts and displays the following menu

Configure Adapter Settings

Display Drive List

Configure RAID Groups (ExpressSAS RAID only)

Exit

Common BIOS Configuration Utility functions

Selectable Boot Device

*Allows you to select a disk drive or stripe group from which the system BIOS loads the operating system. Select the primary drive from any stripe set or any non-striped drive. Changing from **No** to **Yes** displays candidate disk drives.*

If the selectable boot option is enabled, the BIOS driver routes any drive 80h I/O requests to the designated selectable boot drive. The operating system is loaded from this drive.

*If a SCSI drive is selected as the Boot device, **Enable Selectable Boot** value becomes **Yes**. To disable a SCSI boot device, starting from IDE drive, press the **spacebar** to change the value to **No**. To choose another SCSI boot device, change the **Enable Selectable Boot** to **No**, then press the **spacebar** again to see the candidate drives.*

Update flash ROM

*Updates the flash ROM on your ATTO host adapter using a floppy diskette. The floppy disk can be created from the CD or from the latest download from the ATTO web site. You must boot into Windows or DOS to create the floppy. After creating the floppy disk, choose the **Update Flash ROM** from the appropriate menu. The host adapter flash is updated automatically after you confirm you want to proceed with the task.*

Display device list

Displays all devices detected in the bus scan. Scroll the list to see all devices.

Reset defaults

Resets all host adapter settings to the manufacturer's defaults.

*The **Fibre Channel Configuration Utility** presents this function on an adapter basis. All channels are affected.*

*The **SCSI Configuration Utility** presents this function on the **Configure Adapter Channels** dialog box and applies to currently selected channel.*

Format disk drives

1   Select drives to format by checking boxes for each drive.
2   Press the **Enter** key. A confirmation message displays.
3   Confirm the selected drives to be formatted.

    During the formatting process, the check boxes turn into status fields, displaying either **Formatting** (blinking, red) or **Completed** for each drive.

    When the format is complete, a message box displays.

    Close the message box is closed; the application returns to the main menu.

If an error occurs during the formatting, an error message displays and formatting for the drive which has the error does not complete. Formatting continues on all other drives.

More than one disk drive may be formatted at one time as long as each supports the SCSI disconnect feature.

Save parameters and exit

Saves all changes you have made and exits the utility. The host reboots.

Discard parameters and exit

Discards all changes you have made, defaulting back to previous settings, and exits the utility. The host reboots.

Configure Stripe groups

If the adapter has been enabled to manage stripe groups, creates or deletes stripe groups. To create a stripe group, supply a stripe group name, specify an interleave size be specified, and select disks to stripe.

2.1   FC BIOS Configuration Utility

*Default NVRAM settings work for most applications, but your particular hardware configuration may require some changes. Fibre Channel host adapter NVRAM settings may be changed from the **BIOS Configuration Utility.***

The **Configure Adapter Channels** menu selection displays a dialogue which contains the parameters for a specific adapter.

Adapter Node Name
The Node WWN assigned to this channel of the adapter.

Adapter Port Name
The Port WWN assigned to this channel of the adapter.

Adapter Number
Choices: Variable
Default: 0
*Choices depend upon the number of Fibre Channel adapters installed in your computer and the number of channels per adapter. If one single channel adapter is installed, **0** is the only choice. If two dual channel adapters are installed, choices are **0, 1, 2** and **3**.*

Data Rate
Choices for 4 Gig: 1 Gb/sec., 2 Gb/sec., 4 Gb/sec, Auto
Choices for 8 Gig: 2 Gb/sec., 4 Gb/sec., 8 Gb/sec, Auto
Default: Auto
*Selects the Fibre Channel transmission rate. If **Auto** chosen, the adapter determines the rate based upon the devices connected.*

Connection Mode options
Choices: AL, PTP, AL Preferred, PTP Preferred
Default: PTP Preferred
***Arbitrated Loop (AL)**: Connects to either an FCAL Arbitrated Loop or a Fabric Loop Port (FL Port) on a switch.*
***Point-to-Point (PTP)**: Connects to a direct Fabric connection, such as an F port on a switch.*
***AL Preferred:** Allows the card to determine what kind of connection to use, but tries to connect in Loop mode first, then Point-to-Point mode.*
***PTP Preferred:** Allows the card to determine what kind of connection is to use, but tries to connect in Point-to-Point mode first, then Loop mode.*

Current Boot Node Name
Displays the IEEE worldwide address assigned to the current boot device.

Current Boot LUN Number
Displays the LUN address assigned to the current boot device.

Device Discovery By
Choices: Node WWN, Port WWN
Default: Port WWN
Specifies the type of device discovery the adapter performs. Use the Port WWN when the adapter requires separate paths to a device and the device is dual ported. A dual ported device has one path when the Node WWN is specified and two paths when the Port WWN is specified.

Enable Selectable Boot
Choices: Yes, No
Default: No
*Specifies a boot device to use other than BIOS device 80. If you select **yes**, a page listing the devices connected to the host adapter displays. Select the device from which you wish to boot and press **Enter**.*

Execution Throttle
Choices: 1-255
Default: 16
Specifies the maximum number of concurrent commands active for a port. Increasing this value may increase performance, but you may saturate a drive with commands, decreasing performance.

Frame Size
Choices: 512, 1024, 2048
Default: 2048
*Changes the size of the FC packet of information being sent. Typically, the initiator and target negotiates the desired frame size, starting with the largest value. The frame size should be set to the largest value for normal operation. However, some older devices may not properly negotiate frame size: use **Frame Size** to specify the size rather than permitting negotiation.*

Hard Address
Choices: None, 0-125
Default: None
*When a Fibre Channel loop is initialized, each device selects and configures itself to an available ID. **Hard Address Enable** permits the host to select the value entered in the **Hard Address** field.*

Boot Driver

Choices: enabled, scan only, disabled
Default: disabled
If enabled and disk drives or a bootable CD are detected during the bus scan, the BIOS driver remains resident. If disabled, the BIOS starts, resets the adapter chip and unloads the driver.
*If **Scan Only** selected, the BIOS driver scans the bus and displays the devices attached, then unloads itself after a brief delay.*

I/O Address

Displays the PCI slot in which this host adapter is installed.

IRQ:

Displays the interrupt level assigned by the BIOS to the adapter.

Interrupt Coalescing

Choices: None, Low, Medium, High
Default: Low
Specifies the time period an adapter chip delays an interrupt. This allows the adapter chip to queue up more than one interrupt before interrupting the CPU. When this methodology is chosen there is less overhead to service the interrupts. However, the coalescing time may delay the delivery of the completion for a single interrupt.

PCI Latency Timer

Choices: 8, 16, 24, 32, 40, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 248
Default: see below
Specifies how long the host adapter maintains control of the PCI bus. Larger values allow the adapter to remain on the bus longer, improving performance, especially for large files. However, controlling the PCI bus for too long can starve I/O to other devices, adversely affecting their performance.
As a default, the computer system firmware/BIOS automatically sets this value. However, adjusting the value for the ATTO adapter overrides the system default, allowing you to achieve specific performance results.

> **Note**
>
> *Set the Latency timer to 32 for Media 100 Finish*

PCI Memory Write/Invalidate

Choices: Default, Disabled
Default: Default
Setting to disabled overrides the host's BIOS setting.

2.2   SCSI BIOS Configuration Utility

The default NVRAM settings work for most applications, but your particular hardware configuration may require some changes.

SCSI host adapter NVRAM settings may be changed from the BIOS Configuration Utility.

The default NVRAM settings work for most applications, but your particular hardware configuration may require some changes.

Select the Adapter Menu and the following menu displays:

>   **Select Adapter Channels**
>
>   **Configure Adapter Channels**
>
>   **Selectable Boot Device**
>
>   **Update Flash ROM**

Configuring adapter channels

The **Configure Adapter Channels** menu displays the parameters which are managed for the specific adapter. The parameters available vary by SCSI family and the specific adapter within a family.

Bus Reset Delay
Choices: 0-255 (seconds)
Default: 3

Sets the time delay between the reset of the SCSI bus and the scanning of the SCSI bus. You may need to modify if devices require a longer time to respond following reset.

Channel Number
Choices: Variable
Default: 0

*Choices depend upon the number of ExpressPCI adapters installed in your computer and the number of channels per adapter. If one single channel ExpressPCI adapter is installed, **0** is the only choice. If two dual channel adapters are installed, choices are **0, 1, 2** and **3**.*

Firmware Version
Displays the version of firmware loaded in onboard flash.

BIOS
Choices: enabled, scan only, disabled
Default: disabled

If enabled and disk drives or a bootable CD are detected during the bus scan, the BIOS driver remains resident. If disabled, the BIOS starts, resets the adapter chip and unloads the driver.

*If **Scan Only** is selected, the BIOS driver scans the bus and displays the devices attached, then unloads itself after a brief delay.*

Initiator ID
Choices: 0-15
Default: 7

The ExpressPCI SCSI adapter is normally set to SCSI ID 7 because ID 7 has the highest priority on the bus. The setting should remain at ID 7 unless you are instructed to change it by an ATTO technical support representative.

Interrupt Level
Displays the interrupt level assigned by the BIOS to the adapter.

I/O Address
Displays the PCI I/O memory address assigned by the BIOS to the adapter.

Max Single-Ended Sync Rate
Choices: Variable by adapter type
Default: 20 (Narrow)/40 (Ultra/Wide)

Specifies the maximum synchronous transfer rate to be negotiated when the adapter detects a Single-Ended SCSI bus. The bus is Single-Ended when UltraSCSI devices are connected to the bus.

PCI Burst Size
Choices: disabled, 8, 16, 32, 64, 128, 256 or 512 bytes
Default: 512 bytes

Sets the burst rate threshold for SCSI operations when moving data across the PCI bus.

PCI Bus Parity
Choices: Yes, No
Default: Yes

*Indicates if an interrupt should be generated for a PCI Bus Parity error. If you choose **Yes**, the interrupt is generated.*

Quick Arbitrate & Select (Ultra320 only)

Choices: disabled, enabled
Default: enabled

Reduces the time required to gain control of the SCSI bus if all target settings are set to Sync DT-IU and all devices on the bus support QAS.

Reset Bus on Startup

Choices: Yes, No
Default: Yes

If enabled, the SCSI bus is reset upon adapter initialization. If disabled, the SCSI bus is still scanned for devices, but the bus is not reset.

SCSI Termination

Choices: Automatic, High
Default: Automatic

*Set to **Automatic** unless there is narrow SCSI cable connected to either the internal or external connector.*

Selection Timeout

Choices: 1ms-1 sec
Default: 250ms

Specifies the amount of time a device has to respond to being selected. Lower the setting to speed up the boot process. If the value is lower than the recommended 250 ms, it may be too fast for some devices to respond.

SCSI device settings

*Select **SCSI Device Settings** and press **Enter** to display parameters for each SCSI Target ID. Set individual configuration parameters for each possible SCSI target for the current adapter from the **SCSI Target Parameter** page. The dialogue box displays a table with 16 rows, each representing a specific target ID for the SCSI bus attached to the selected channel.*

SCSI device settings

The **SCSI Device Settings** menu displays the parameters which are managed for the specific adapter. The parameters available vary by SCSI family and the specific adapter within a family.

Enable Disconnect

Choices: Yes, No
Default: Yes

Yes *allows the device to disconnect from the SCSI bus during SCSI command processing. The device determines when it disconnects. This setting does not force the device to disconnect.*

Enable LUNs

Choices: Checked, Unchecked
Default: Checked

*Indicates if the associated LUN scanned by ATTO drivers. Each available LUN has a check box; the default has a check in each LUN check box. Remove the check mark to leave a LUN undetected. Changes may be discarded and replaced with factory default settings by choosing **Reset to Defaults.***

Enable LUNs

Choices: Disable ID, 0, 0-7, 0-63
Default: 0-7

Specifies the number of Logical Unit Numbers (LUNs) the driver addresses when scanning for devices. The number of LUNs to scan is determined as follows:

Disable ID: Target ID is bypassed and not scanned

0: Scan LUN 0 for this target ID

0-7: Scan LUNs 0 to 7 for this target ID

0-63: Scan LUNs 0 to 63 for this target ID

Enable Synchronous SCSI

Choices: Async, Sync ST, Sync DT, Sync DT-IU
Default: Variable by adapter type

*Specifies whether the selected target transfers data at synchronous transfer rates or at the asynchronous rate. The maximum synchronous rate to negotiate is specified in the **Sync Rate** parameter.*

Enable Wide SCSI

Choices: Yes, No
Default: Yes

*If enabled, the ExpressPCI adapter tries to transfer SCSI data in a Wide mode to all devices to aid compatibility with older, narrow devices which do not respond to Wide transfer negotiation. If the synchronous SCSI parameter is set to **Sync DT** or **Sync DT-IU**, only WIDE negotiation is permitted.*

Sync Offset

Choices: 1-127
Default: 127

⚠️ **CAUTION**

The default values offer the best performance possible. Do not change

this setting unless instructed by an ATTO technical support representative.

Sync Rate
Choices: varies by adapter, see Exhibit 1.2-1
Default: varies by adapter, see Exhibit 1.2-1

If synchronous transfers are enabled, sets the maximum rate at which the ExpressPCI host adapter negotiates with each device attached to it. Set the rate to the maximum value supported by the host adapter. If excessive SCSI errors occur, you have long cables or there are many devices on the bus, you may want to reduce the **Sync Rate** *value. Slowing the transfer rate may increase the reliability of the SCSI bus.*

Tagged Command Queuing
Choices: Yes, No
Default: Yes

Specifies to the driver which SCSI commands can use the **Tag Command** *feature. The driver can send multiple commands to a device when tag commands are enabled.*

Exhibit 2.2-1   Sync rate parameters for various ATTO host adapters.

2.3   ExpressSAS BIOS Utility

The BIOS driver for the ATTO ExpressSAS host adapters has a built-in BIOS Utility which manages the adapter and the devices connected to the adapter.

The ExpressSAS BIOS Utility uses a standard menu/choice model. The **Main Menu** presents the functions available from the utility. Selecting an item on the menu may bring up a secondary menu or a dialog box. The dialog box displays the items managed by that dialog box.

Accessing the SAS utility

1   During the ExpressSAS BIOS driver startup after the adapter boot string displays, press **Ctrl-Z** at the prompt. If you do not press **Ctrl-Z** within 3 seconds, you must reboot and try again.

2   The **SAS BIOS Configuration Utility** starts and displays the following menu:

1. Configure Adapter Settings (refer to Configuring adapter settings on page 59)

2. Display Drive List (refer to Displaying the drive list (ExpressSAS RAID adapter only) on page 60)

3. Configure RAID groups (refer to Configuring RAID groups (ExpressSAS RAID adapter only) on page 60)

4. Exit

Configuring adapter settings

The **Configure Adapter Settings** menu displays:

1   **Edit Adapter Settings:** customizes the ExpressSAS adapter settings.

2   **Reset All Parameters to Defaults**: resets the ExpressSAS adapter settings to the factory default.

3   **Save Settings and Return to Main:** permanently saves the adapter settings and returns to the Main Menu.

4   **Discard Settings and Return to Main:** discards any changes to the adapter settings and retains the original settings.

Selecting the **Configure Adapter Settings** page displays information about the ExpressSAS adapter, including:

Adapter #: allows you to select a specific ExpressSAS adapter from a list of installed ExpressSAS adapters.

Model: displays the model number of the selected ExpressSAS adapter.

FW Version: displays the firmware version of the selected ExpressSAS adapter.

SAS Addr: displays the SAS Address assigned to the selected ExpressSAS adapter.

Select the following functions from this menu:

Boot Driver

Choices: enabled, scan only, disabled
            Default: disabled

*If enabled and disk drives are detected during the bus scan, the BIOS driver remains resident. If disabled, the BIOS starts, resets the adapter chip and unloads the driver. If **Scan Only** is selected, the BIOS driver scans the bus and displays the devices attached, then unloads itself after a brief delay.*

Device Wait Time

Choices: 1-255 seconds
            Default: 3

This field specifies the number of seconds which the driver waits for devices to appear.

Device Wait Count

Choices: 1-255 devices
            Default: 1

This field specifies the number of devices which must appear in order to cancel the Device Wait period.

Spinup Delay

Choices: 0-20 seconds
Default: 0

Specifies the number of seconds each SAS port waits for disk drives to spin up.

Heartbeat

Choices: enabled, disabled

      Default: enabled

When enabled, requires the firmware to respond to periodic activity. If the firmware does not respond, the system driver resets the firmware on the adapter.

Port Configuration (R348 only)

      Choices: 8 Internal or 4 Intrn, 4 Extrn

      Default: 8 Internal

*Indicates the active port configuration for the ExpressSAS R348 adapter. The **8Internal** parameter indicates the two internal SAS connectors are active and the external connector is not active. The **4Intrn, 4Extrn** indicates one internal connector is active and one external connector is active.*

Reset to Defaults

Returns all settings to the factory defaults.

Displaying the drive list (ExpressSAS RAID adapter only)

Selecting the **Display Drive List** menu displays a list of all disks which are connected to the adapter with the following information for each:

Adp# indicates the adapter number for the ExpressSAS RAID adapter to which the drive is connected.

ID displays the drive ID number within the adapter.

Vendor ID displays the drive manufacturer's vendor name.

Product ID displays the drive's product name.

Capacity displays the drive's byte capacity.

RAID Group contains the name of the RAID group to which the drive is assigned. The field may be blank or can indicate a RAID group name or Hot Spare status.

Member State displays the drive's current state.

The **Display Drive List** menu highlights the first drive in the list. Use the up and down arrows to highlight other disks. The highlighted drive is accessed and its activity light blinks. Select the following functions from this menu:

Show Drive Detail

*Type **Enter** or **D** to display more information about the highlighted drive.*

Select Drive

*Type **Space Bar** to allow multiple drives to be selected. The selection is removed by typing **Space Bar** a second time.*

Scan

*Type **S** to clear and refresh the drive list.*

Clean

*Type **C** to clean all metadata from the selected drives. Drives must be selected by typing **Space Bar.***

Hot Spare

*Type **H** to assign the selected drives to the Hot Spare pool. Drives must be selected by typing **Space Bar**.*

Remove Spare

*Type **R** to remove the selected drives from the Hot Spare pool. Drives must be selected by typing **Space Bar**.*

Configuring RAID groups (ExpressSAS RAID adapter only)

Selecting the **Configure RAID Groups** menu displays a list of all detected RAID groups with the following information for each:

Group Name: RAID group name

Drives: number of drives in the RAID group

Capacity: the RAID group's total capacity

Status: the RAID group's current status

RAID Level: the RAID group's RAID level

The **Configure RAID Groups** menu highlights the first RAID group in the list. Use the up and down arrows to highlight other RAID groups. Select the following functions:

View Selected RAID Group

*Type **Enter** to display more information about the highlighted RAID group. If a RAID group is rebuilding, the command displays the completion percentage of the rebuild.*

Create

*Type **Insert** to build a new RAID group.*

Delete

*Type **Delete** to delete the highlighted RAID group. A confirmation prompt must be answered.*

Rebuild

*Type **R** to rebuild the highlighted RAID group. A confirmation prompt must be answered to start the rebuild.*

Partition

*Type **P** to change the current partitions of the RAID group. The Partition function can split a selected partition or merge two partitions. Partitions which are currently mapped cannot be split or merged.*

Map RAID Groups

*Type **M** to map or remove mapping of selected partitions. You may select automatic mapping of all unmapped partitions, map or remove mapping from specific partitions, or remove mapping from all partitions.*

Create a RAID group

Selecting **Create RAID Group** starts a wizard.

1   Type a RAID group name.
2   Select a RAID level: 0, 1, 4, 5, 6, 10 or JBOD.
3   Select an Interleave: 8KB, 16KB, 32KB, 64KB, 128KB, 256KB, 512KB or 1MB.
4   Type **Insert** to add drives into the RAID group.
5   A drive list box of available drives is displayed. Press the **Space Bar** to select the drives to include in the new RAID group. The selected drives are highlighted.
6   Type **Enter** to create the RAID group.

⚠️   **CAUTION**

A rebuild occurs after creating a RAID Level 4, RAID Level 5 or RAID Level 6 group. The length of time required for the rebuild depends upon the size of the RAID group. Do not reboot the adapter until the rebuild process is complete.

7   Type **Enter** to map the partitions of the new RAID group.

📝   Note

A RAID group is created with default properties which may be changed using the Configuration Tool. Refer to ATTO Configuration Tool on page 1.

3.0   ATTO Utilities for Windows

The ATTO Utilities for Windows is a collection of programs which provide adapter management, device management and SAN management. These utilities execute on the Windows Server 2008, 2003, 2000; Vista and XP operating systems for x86 and x64 platforms.

The ATTO Utilities for Windows are included in the CD which was delivered with your adapter.

The suite content varies according to the adapter purchased. The Fibre Channel specific utilities are not present in the SCSI suite and the SCSI specific utilities are not present in the FC suite.

An easy-to-use HTML-based menu is launched automatically upon inserting the CD in your system CD-ROM drive. The adapter tools can be installed from this menu.

Configuration Tools

ATTO provides a full suite of configuration tools and supplemental utilities to enhance the performance of ATTO host adapters. The suite is comprised of the following utilities.

Alamode configures disk mode pages.

Bench32, a disk benchmark program, measures disk performance.

SNIA FC AP installs the ATTO Vendor library needed to access the SNIA metrics for ATTO FC adapters.

FC LUN Masking selects devices on a SAN visible to the system.

SCSI Domain Validation tests the connection between an adapter and the devices on the SCSI bus.

ExpressPCI Setup Utility sets up the NVRAM parameters for SCSI ExpressPCI adapters.

3.1   Configure Mode Pages: Alamode Utility

Alamode is a Windows utility to optimize disk drive performance by configuring mode pages without requiring specific knowledge of mode page parameters.

A mode page or mode parameter page is a group of related settings or parameters which govern certain aspects of how a disk drive operates. Most drives come from the factory set for maximum compatibility to work safely and reliably with the widest range of hosts and systems. However, these out-of-the-box settings may disable some high-performance features which your ATTO host adapter could use. Depending on your requirements, mode pages can be configured to affect performance, computability, data integrity and other characteristics.

Alamode optimizes all mode pages at once. You do not have to select which pages to optimize or which parameters to optimize. Changing mode page settings is quite safe. However you may change the drive's mode pages back to **Factory Defaults** without losing data.

Notes
*   You cannot optimize IDE drives because they don't have mode pages.
*   You cannot optimize drives which are striped in a RAID group. You may optimize the drives before striping them, or break up the group into individual drives, optimize them, and then rebuild the group. The second method, however, destroys any data on the existing RAID volume.
*   If you plan on formatting the drive and setting its mode pages, set the mode pages first using **Alamode**.

Using Alamode
1   Launch the application.
2   Select the drive you want to optimize.
3   Click the button corresponding to the type of application the drive uses:
    *   **Digital Video**
    *   **Pre-press**
    *   **Default** (return the drive to its factory default settings)

You should shut down and restart the system before continuing to use the drive to ensure the drive behaves according to the new settings.

*Exhibit 3.1-1   The **Alamode** page.*
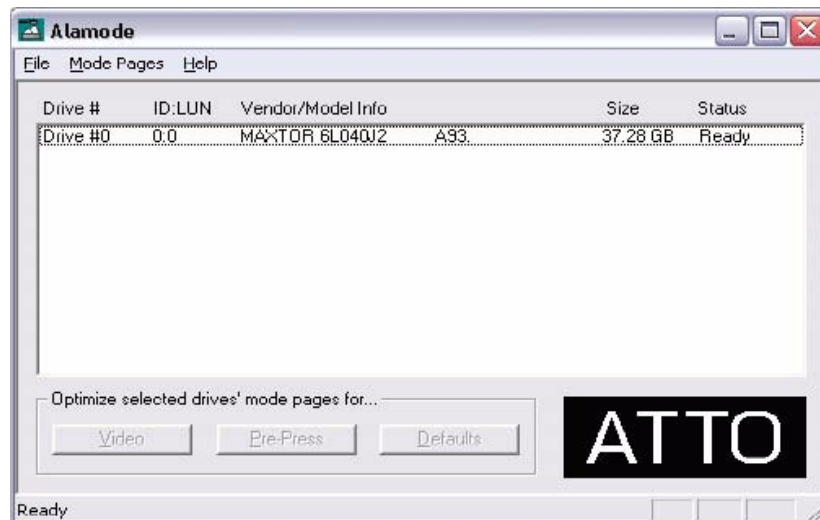
3.2   ATTO Disk Benchmark

*The **ATTO Utilities for Windows** suite includes a utility to measure peak and sustained throughput for disk reads and disk writes.*

The ATTO Disk Benchmark measures peak and sustained throughput for disk reads and writes.

1   Launch the application.
2   Select the drive letter for the disk to benchmark.
3   Select the transfer sizes to test.
4   Select the I/O option.
5   Click the **Start** button.
6   Wait for benchmark to run through the desired transfer sizes.
7   The **Test Results Display** at the bottom of the window is updated as the test progresses. The y-axis of the graph represents the transfer sizes in the selected range. The x-axis represents the transfer speeds in MB/sec. I/O speeds in KB/sec. for each transfer size are displayed textually to the right of the graph.
8   Click the **Stop** button to stop the test.

When the test completes, the results can be saved or printed.

If errors were detected, a dialog box displays the errors in a table with the following four columns and a button:

- **Benchmark Transfer Size**: transfer size at which the error occurred.
- **Buffer Index**: index into the data block at which the error occurred.
- **Actual Value**: the value read from the file.
- **Expected Value**: the value written to the file.
- **Log to File**: Logs the error table to a ***.log** file and closes the dialog. The file is given the same name as the test file and saved in the same directory. If the test was not previously saved, errors are logged to the generic file **Bench32Error.log** in the root of the test drive. If the log file already exists, the new errors are appended to the previously recorded errors. This is the only way to save detected errors. They are not saved in the test document file.

If the I/O comparison option was selected and errors were not detected, the message **No errors detected** is displayed.

> **Note**
>
> *Additional information on using **Bench32** is available by accessing the **Help** menu in the application.*

Benchmark fields

The benchmark fields include.

- **Drive**: Select the logical drive to benchmark. A test can be performed on any system drive.
- **Transfer Size**: Select the range of transfer sizes used for reading and writing data to the test drive. Transfer speeds are displayed for each size in the range. If the first size is greater than the second size, the test is not performed for any transfer size.
- **Total Length**: Select the total size of the data file to be created on the test drive. This file is deleted when testing completes.
- **Direct I/O:** If this option is checked, file I/O on the test drive is performed with no system buffering or caching. Combine this option with **Overlapped I/O** for maximum asynchronous performance.
- **Radio Button Group**
- **Overlapped I/O** performs queued I/O. Upon selection, the **Queue Depth** option displays to select the maximum number of read or write commands which may be executed simultaneously.
- **I/O Comparison** compares the data read from the test file to the data written on a per block basis. You can select the data pattern for comparison from the **Test Pattern** dropdown box.
- **Run Continuously** runs the test continuously for a specified number of minutes. The test stops before the specified time if any errors are detected.
- **Neithe**r: Select if you do not want to perform overlapped I/O or I/O comparisons.

The following fields do not affect the benchmark but are informational, providing documentation of the test environment.

- **Stripe Group**: If the test drive is a stripe group, select its name from the list box. The names and quantities of drives in the stripe group are printed to the **Description** box. Select **Clear** to clear the contents of the **Description** box.
- **Controlled by** displays all ATTO host adapters on the system.
- **Description**: Enter additional information about the test which can be saved or printed. Be sure to enter additional information after making a selection from the **Stripe Group** dropdown box, as this erases the current description.

Performing multiple benchmark tests

The ATTO Disk Bench supports four command line parameters for uninterrupted testing:

testfile opens and executes the test named **testfile** with the extension **.bmk** or **.tst** (older versions of **Disk Bench**).

textfile opens the text file named **textfile.** This file contains a list of test file names which have an extension of **.bmk** or **.tst**. Each test in this list is opened and executed in order. Stopping one test in the list prevents further tests from being executed. Error logging is the same as the command line parameter **testfile**, but all errors generated from all tests in the list are logged to one file: **textfile.log**.

/p testfile: Same as **testfile**, only the test is printed to the default system printer instead of being executed.

/p textfile: Same as **textfile**, only the tests in the list are printed to the default system printer instead of being executed.

*Exhibit 3.2-1   The **Bench 32** window before and after a test has been run.*
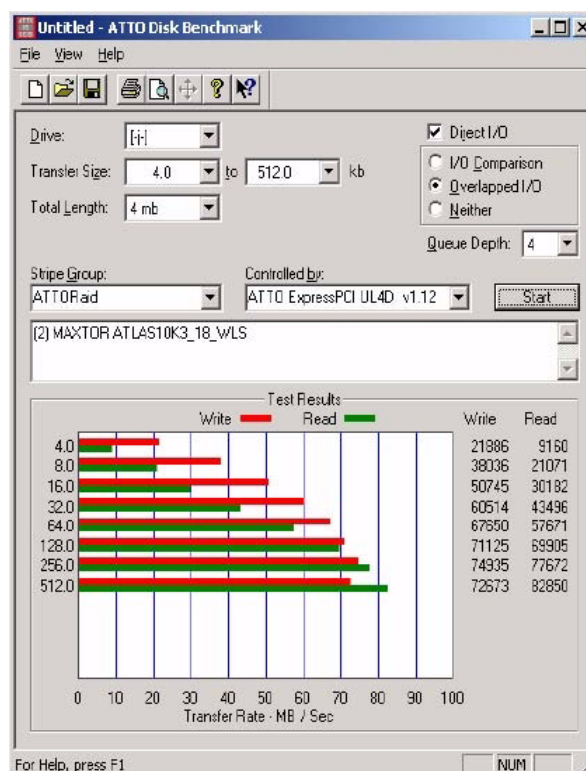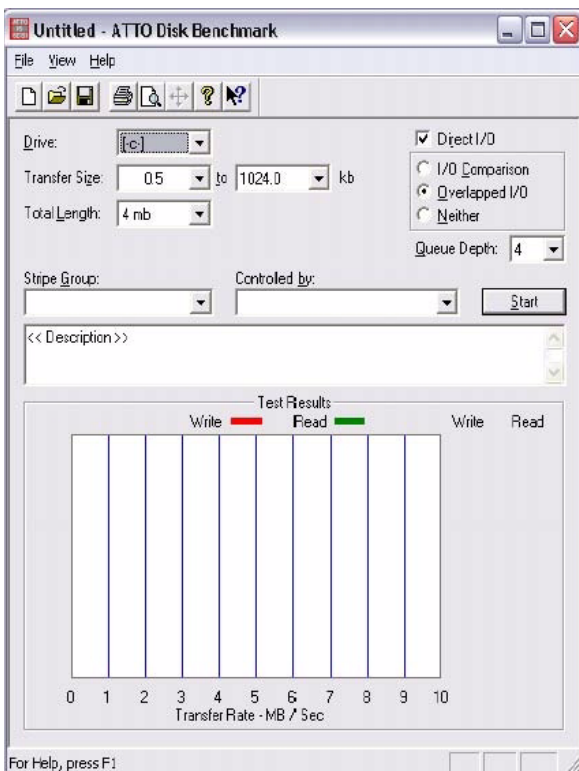
3.3   FC LUN Masking Utility

ATTO host adapter drivers allow you to select which devices and Logical Unit Numbers (LUNs) on a SAN are visible to Windows operating systems.

Many devices, including RAID controllers and SCSI-to-Fibre Channel bridges, use LUNs to allow access to multiple drive units through a single World Wide Name (WWN). However, you may not want to allow all users connected to one device to have access to all devices. The ATTO LUN masking utility allows you, as the administrator, to select which LUNs each user may access, allowing greater flexibility in configuring a Fibre Channel SAN.

The utility gives information, allows you to add a new device to an adapter or allows LUN masking using three windows:

Main Window   monitors and manages all LUN masking functions. The page is divided into two sub-sections: **Adapters** and **Devices**.

* **Adapter List** displays information about all the adapters detected or configured on this system.

  The first column displays the WWN of the adapter. If the adapter is installed, the second column displays the model of the adapter. Clicking on an adapter in the adapter list updates the device list.

* **Device List** displays information about all devices detected or configured for the adapter selected in the adapter list.

  The first column displays the device's WWN. The second column displays whether the first column refers to a **Node WWN**, **Port WWN**, **Any WWN** or is **Disabled**. The third column displays the current LUN mask configuration.

Adding a new device to an adapter
1   Select the adapter in the **Main Window** adapter list.
2   Click on the **Add Device** button at the bottom of the page.
3   Enter the **WWN** of the device or select a **WWN** from the drop down box.
4   Select the type of WWN to use:
   * Disabled
   * Node

* Port
* Any
5   Click **OK**.
6   The device name displays in that adapter's **Device List** on the bottom half of the main window. Click the **Save Changes** button on the bottom of the windows.

Using the Edit LUN Mask Dialog box
1   Double click the WWN of the device you wish to edit in the **Devices List** or select it and click the **Edit LUN Mask** button. If you do not see the device listed, you may need to add it.
2   Select **Mask all LUNs** or **Mask LUN List** to enter the specific LUNs you wish to mask.
3   When you have completed configuring the LUN mask for this device, click the **OK** button.

Saving and applying your changes
1   Click the **Save Changes** button on the bottom of the windows.

   Note
   *You must have **Write Access** to the registry key and all its sub-keys to save changes. Consult your system administrator if you cannot save changes.*

2   If you want the changes to take effect immediately, click the **Apply Changes** button before exiting but after saving. This causes the driver to reread the registry settings and alter its internal device database.

   Note
   If Windows is unable to see devices or LUNs which you have just unmasked, you may need to reboot the system.
   *In Windows 2000, you may need to run **Windows Volume Manager** to see devices which you have just unmasked.*

*Exhibit 3.3-1   ATTO **LUN Masking Utility** page.*
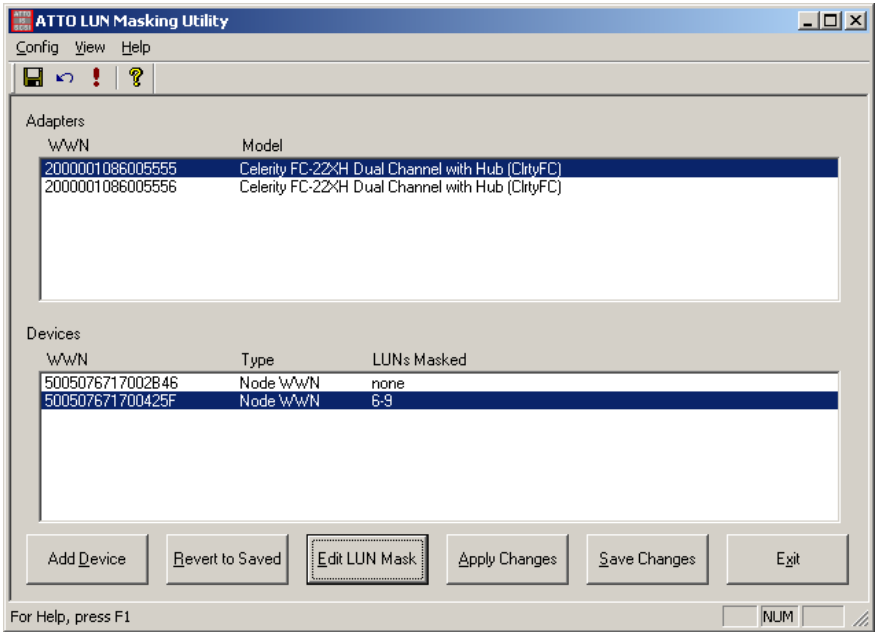
3.4   SNIA FC Host Adapter API

API, or Application Programming Interface, is a set of commands used by an application directing the operating system to perform certain tasks.

ATTO host adapters use API Version 1.0 as defined by the Storage Network Industry Association (SNIA) Fibre Channel Work Group.

The Common HBA API Version 1.0, released in October 2000, is a vendor-neutral format for reporting information about host adapters to upper level software applications. It is commonly used in applications which provide the following:

*   query information about adapter properties and port information
*   query information about attached storage resource
*   event notification

ATTO host adapters support the API on Windows Server 2008, 2003, 2000; Vista and XP operating systems, as well as Linux operating systems.

The API has two major parts: the ATTO library and the registry key.

The registry entry is made in **KEY_LOCAL_MACHINE\Software\SNIA** and points to the location of the ATTO library.

The ATTO vendor library is installed in the same location as the driver. A related component, the common library, is provided by the SAN-aware application provider.

3.5   Domain Validation Testing

Domain Validation tests the physical connection between host adapter and devices to ensure the desired data transfer speeds can be achieved.

Domain Validation verifies the connection between the host adapter and storage devices (i.e. cables, connectors, targets, etc.) is capable of handling high-speed data transfers.

The ATTO SCSIDV utility performs Domain Validation on your storage connection. The three DV tests can be selected in the **SCSIDV Main page**.

Basic Integrity Test   performs a simple integrity check to determine the fastest valid mode of operation between initiator and target, detecting most physical configuration problems such as:

*   path width errors
*   expander errors
*   gross cable errors
*   incorrect termination
*   damaged transceiver

Enhanced Integrity Test   performs a more advanced integrity check. A data pattern intended to stress the physical domain is written to and then read from memory on the device and compared with the original data pattern. If data compare errors are detected, fallback is attempted until a valid mode of operation is found.

Problems detected include:

*   cables with incorrect impedance
*   bad SCSI device spacing
*   poor termination
*   marginal transceivers
*   excessive crosstalk
*   excessive system noise

Margining Test varies driver signal strength by +/- 20% and verifies the integrity of the subsystem.

Failure indicates the subsystem is close to failure because inferior components are significantly degrading SCSI bus signals and thus lowering the signal margins. This can result in sudden subsystem failure or intermittent integrity errors.

Running the SCSI Application

1   Launch the application.
2   Select the SCSI bus adapter channel.
3   Select the test(s) to be run.
4   Select the negotiation parameters located in the **Fallback Scheme** grouping. The SDV test starts with the highest values and, if a problem is detected, tests with the next lower set of values.
5   Select the target device(s). The test is performed between the initiator and each target device selected.
6   Press the **Start** button.

When the test is complete, a message panel displays. The panel shows the negotiated SCSI parameters for each device. The left side of the page shows the negotiated value after the test runs and the right side shows the value before the test being run.

The column labelled **Changed?** indicates if the negotiated value changed as a result of the tests. If the value changed, the connection between the initiator and the target device may not have been optimized.

The application **help** text provides useful information about setting up the tests. Review the **help** text for more detailed explanation of the application.

*Exhibit 3.5-1   The **Domain Validation Utility** page.*
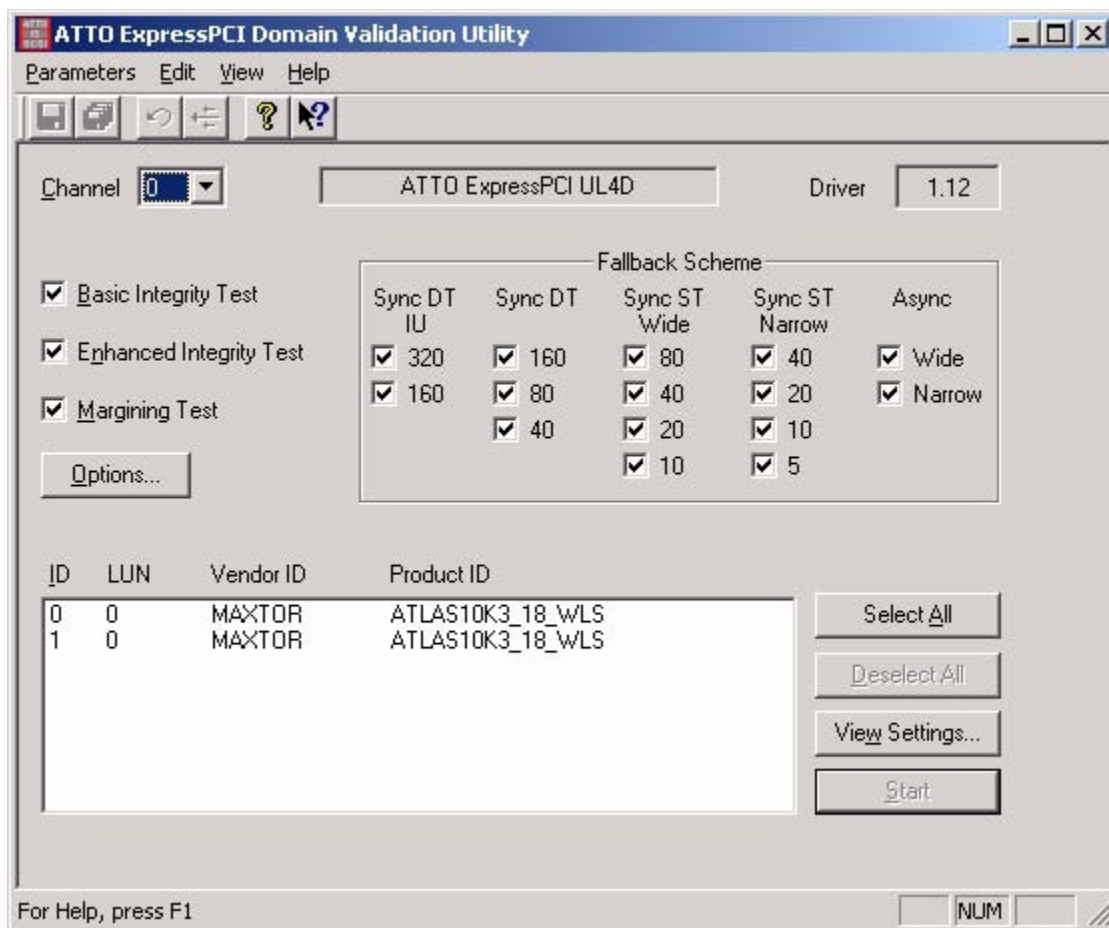
3.6   ExpressPCI SCSI Setup Utility

*The **ExpressPCI Setup Utility** changes the same NVRAM parameters as described for the **ATTO Configuration Tool** earlier in this manual.*

Modifying NVRAM settings

1   Locate the **ExpressPCI Setup Utility** application icon on your hard drive.

2   Double-click the icon to start the application.

3   Make the desired changed to the IDs. Multiple IDs can be modified simultaneously using the buttons at the bottom of the **Main Menu.**

Specific IDs may also be selected using the **CTRL** and **SHIFT** keys while left-clicking with the mouse.

Additional information on using SCSI Utility is available by accessing the **Help** menu in the application.

4   Save your changes and exit the application.

*Exhibit 3.6-1   The **SCSI Setup Utility** page.*

3.7   Troubleshoot ATTO Utilities for Windows

The following suggestions may help if you are having problems.

- Using the **Device Manager**, ensure all drives are visible to the operating system.
- If drives are not visible, check all cable connections and terminations on each device.
- Make sure each device is powered up and has completed its self check before booting your machine.
- Reboot your system any time you make changes to a stripe group.
- As a last resort, you may use the **ATTO Configuration Utility** to low level format a troublesome device. However, this erases all information on the disk.
- If you are installing a SCSI boot drive, check your CMOS setup and verify your **DRIVE TYPE** is set to **NOT INSTALLED**.
- Have you partitioned your drive, and then activated that partition?
- Did you format the drive for your operating system?

If problems persist, contact your ATTO Technology technical support representative.

Appendix A   CLI provides an ASCII-based interface

*The **RAID CLI** tab in the ATTO Configuration Tool allows experienced users to enter RAID Command Line Interface (CLI) commands to the SAS RAID adapter. The CLI uses ASCII commands typed while in CLI mode.*

⚠️ **CAUTION**

> **Do not use the CLI unless you are directed to by an ATTO technician.**
>
> **Changing parameters may cause loss of data and/or disruption to performance and reliability of the ExpressSAS Host Adapter.**
>
> **The ATTO Configuration Tool interface is the preferred method to operate and manage the ExpressSAS Host Adapter. Refer to Set up RAID on page 13 for details.**

The command line interface (CLI) is a set of ASCII-based commands which perform configuration and diagnostic tasks. Refer to Set up RAID on page 13.

- CLI commands are context sensitive and generally follow a standard format

`[Get|Set] Command [Parameter1|Parameter2]`

followed by the **return** or **enter** key.

- CLI commands are case insensitive: you may type all upper or all lower case or a mixture. Upper and lower case in this manual and the **help** page are for clarification only.
- Commands generally have three types of operation: get, set and immediate.

- The get form returns the value of a parameter or setting and is an informational command.
- Responses to get commands are followed by **Ready**.
- The set form is an action which changes the value of a parameter or configuration setting. It may require a **SaveConfiguration** command and a restart of the system before it is implemented. The restart can be accomplished using a separate **FirmwareRestart** command. A number of set commands may be issued before the **SaveConfiguration** command.
- Responses to **set** commands are either an error message or **Ready. *.** The asterisk indicates you must use a **SaveConfiguration** command to finalize the **set** command.
- Set commands which do not require a **SaveConfiguration** command, defined as immediate commands, are immediately executed.

📝 Note

> *Using certain CLI commands during normal operation can cause a performance drop. Once command actions are complete, performance should return to normal levels.*

Exhibit A-1   Symbols, typefaces and abbreviations used to indicate functions and elements of the command line interface used in this manual.

Symbol	Indicates
[ ]	Required entry
< >	Optional entry
|	Pick one of
n-n	A range (6 – 9 = 6, 7, 8, 9)
BlockDevID	Index designation of a block device not assigned to any other RAID group; the index of a block device provided by the BlockDevScan command. 0<=n<=63
GroupName	The name of the RAID group to which the block device is assigned, or blank if the block device is available
MemberIndex	Index designation of a RAID group member as found in the RMStatus command
PartIndex	Index designation of a partition as found in the PartitionDisplay command
SASIndex	Index designation of SAS drives as found in SASTargets
TID	Target ID: 0<=n<=255

CLI error messages

The following error messages may be returned by the
Command line Interface

```
ERROR Invalid Command. Type 'Help' for command list.
ERROR Command Not Processed
ERROR Wrong/Missing Parameters
ERROR Invalid Hot Spare Serial Number
ERROR Invalid RAID GroupName
ERROR Invalid RAID Group State
ERROR Insufficient number of RAID Group members
ERROR RAID Group does not exist
ERROR No RAID Groups found
ERROR Invalid RAID Type
ERROR RAID Group is already unmapped
ERROR Invalid Block Device Index
ERROR Invalid RAID MemberIndex
ERROR Invalid RAID Member State
ERROR Missing RAID Member
ERROR Invalid RAID Member Capacity
ERROR Invalid Partition Index
ERROR Maximum number of RAID Groups exceeded
ERROR Maximum number of Partitions exceeded
ERROR Invalid number of Partitions
ERROR Maximum number of RAID Members exceeded
ERROR Maximum stripe width
ERROR Invalid number of Partitions specified
ERROR Invalid Span Depth specified
ERROR Cannot perform operation on mapped Partition
ERROR Cannot perform operation. RAID Group has mapped Partitions
ERROR Cannot perform operation. RAID Group has Outstanding Commands
ERROR Block Device at specified index no longer available
ERROR Insufficient RAID Group members for RAID type
ERROR Incorrect number of RAID Group members for QuickVideo configuration
ERROR Invalid Virtual Drive ID
ERROR Specified capacity is invalid
ERROR Too many Indices specified.
ERROR Only one add storage operation is permitted at any given time.
ERROR No free block devices
ERROR Cannot benchmark a drive that is being initialized
ERROR Specified drive is not being monitored
```

CLI summary

The following chart summarizes the Command Line Interface commands, their defaults, and an example of how to enter the commands. Commands which have no default values have a blank entry in that column of the table.

⚠ **CAUTION**

Do not use CLI unless you are directed to by an ATTO technician.
Changing parameters may cause loss of data and/or disruption to performance and reliability of the ExpressSAS adapter.

Command	Default	Example
AutoMap		automap
AutoMapOnBoot	disabled	set automaponboot enabled
AutoResume	rebuild = enabled erase = disabled initialize = enabled	set autoresume erase enabled raidgroup1
BlockDevClean		blockdevclean 30
BlockDevIdentify		blockdevidentify 30
BlockDevIDStop		blockdevidstop
BlockDevScan		blockdevscan
ClearEventLog		cleareventlog
Date		
DeleteScheduledTasks		
DisplayScheduledTasks		
DriveHealth	disabled	set drivehealth enabled
DriveHealthDisplay		drivehealthdisplay all
DriveHealthStatus		drivehealthstatus
DriveTest		drivetest begin
DriveTestClearList		drivetestclearlist all
DriveTestConfig	not initiated	set drivetestconfig read
DriveTestList		get drivetestlist all
DriveTestStatus		get driveteststatus
DumpConfiguration		dumpconfiguration
DumpEventLog		dumpeventlog
EventLog	enabled	set eventlog disabled
EventLogFilter	all all all	set eventlogfilter gen info all
Help		help eventlog
HSAdd		hsadd 3
HSDisplay		hsdisplay
HSRemove		hsremove 3
Info		info
IsReserved		isreserved
MediaScanErrorReport		
Metrics		metrics display all
OEMConfigFile	ATTO	get oemconfigfile
Partition		partition alpha1 6 4 GB
PartitionDisplay		partitiondisplay alpha1
PartitionMerge		partitionmerge all

Command	Default	Example
PartitionSplit		partitionsplit alpha1 22 2
PartitionWriteCache		set partitionwritecache enabled
PassThroughMode		set passthroughmode all
PassThroughPersistent		passthroughpersistent
PassThroughRediscover		passthroughrediscover
RAIDRebuildPriority	same	set raidrebuildpriority low
RAIDSpeedWriteLimit	8	set raidspeedwritelimit 16
Reserve		reserve
RestoreConfiguration		restoreconfiguration default
RGAddStorage		rgaddstorage groupname1 span commit
RGAutoRebuild	disabled	set rgautorebuild all enabled
RGCancelAddStorage		rgcanceladdstorage groupname1
RGCancelMediaScan		
RGCommit		rgcommit all
RGCreate		rgcreate groupname1 raid0
RGDiskWriteCache	enabled	set rgdiskwritecache all disabled
RGDisplay		rgdisplay all
RGErase		rgerase groupname1
RGHaltConversion		rghaltconversion groupname1
RGHaltErase		rghalterase groupname1
RGHaltInitialization		rghaltinitialization groupname1
RGHaltMediaScan		
RGHaltRebuild		rghaltrebuild groupname1
RGMediaScan		
RGMediaScanErrorReport		set rghdparameter groupname1 30
RGMemberAdd		rgmemberadd groupname1 30
RGMemberRemove		rgmemberremove groupname1 30
RGPrefetch		
RGRebuild		rgrebuild groupname1
RGResumeConversion		rgresumeconversion groupname1
RGResumeErase		rgresumeerase groupname1
RGResumeInitialization		regresumeinitialization groupname1
RGResumeMediaScan		
RGResumeRebuild		rgresumerebuild groupname1
RGSectorSize	512	set rgsectorsize groupname1 4096
RGSpanDepth	1	set rgspandepth groupname1 8
RGSpeedRead	all disabled	set rgspeedread groupname1 enabled
RGUnmap		rgunmap groupname1
RGWaitTimeout	3	rgwaittimeout 30
RMStatus		rmstatus groupname1
Route		route host 1 raid groupname1 6
RouteDisplay		routedisplay host 0
SasPortList		
SASTargets		sastargets
SaveConfiguration		saveconfiguration

Command	Default	Example
SerialNumber		get serialnumber
SES	enabled	
SESAlarmTest		
SESDiskFailureAlarm	disabled	
SESEnclosures		
SESIdentify	off	set sesidentify all
SESIdentifyStop		sesidentifystop all
SESMute		
SESPoll	30	set sespoll 0
SESStartingSlot	1	
SESStatus		
Time		set time 03:32:30
TimeZone	EST	set timezone pst
VerboseMode	enabled	set verbosemode disabled
VirtualDriveInfo		virtualdriveinfo
WrapEventLog	enabled	set wrapeventlog disabled

Privileged OEM Defaults

Command	Default	Example
Close Port	none	
DefaultInterleave	128KB	
InquiryProductID	"ESAS R380"	
InquiryVBDevSN	""	
InquiryVendorID	ATTO	
ModelNumber		
oempassd		
OemReadOnlyUsern		
oemROpassd		
OemUsern		
ProductID	ESAS	
VendorID	ATTO	

CLI command explanations

Command Line Interface commands are listed alphabetically with explanations of what they are used for, their defaults and syntax.

⚠ **CAUTION**

Using CLI without contacting an ATTO technician is not recommended because changing parameters may cause loss of data and/or disruption to performance and reliability of the ExpressSAS adapter.

AutoMap (Immediate, Disabled on Error)

Automap automatically maps each RAID Partition to a Target ID on the host system (maximum 256 maps allowed). If the optional 'passthrough' parameter is entered then AutoMap stores maps for currently connected SAS/SATA Pass Through Devices.

Usage: AutoMap <passthrough>
SingleNode Mode Usage: AutoMap <passthrough>

AutoMapOnBoot (OEM Configurable, Disabled on Error)

Enables or disables automatic device detection and mapping (AutoMap (Immediate, Disabled on Error)) at startup.

Usage: set AutoMapOnBoot [enabled | disabled]
        get AutoMapOnBoot

AutoResume

Sets or gets the AutoResume features for interrupted rebuild, erase, and initialization operations at startup. Optional parameter GroupName specifies the RAID group to operate on. If no GroupName is specified, the command operates on all existing RAID groups.

Usage: set AutoResume
        [Rebuild|Erase|Initialization|MediaScan|all]
        [enabled|disabled] <GroupName>
        get AutoResume
        [Rebuild|Erase|Initialization|MediaScan|all]

BlockDevClean (Immediate, Disabled on Error)

BlockDevClean removes any RAID configuration data from the block device with the specified BlockDevID. BlockDevID is the index of a block device provided by the BlockDevScan CLI command. Caution: All RAID group setup information is lost and you lose all RAID group data.

Usage: BlockDevClean [BlockDevID]

BlockDevIdentify (Immediate, Disabled on Error)

Lights the LED of a disk drive. Use either RAID group name and member index, or BlockDevID. BlockDevID is the index of a block device provided by the BlockDevScan CLI command.

Usage: BlockDevIdentify [[Groupname MemberIndex] |
        BlockDevID]

BlockDevIdStop (Immediate, Disabled on Error)

Turns off the IO LED of a previously identified disk drive.

Usage: BlockDevIdStop

BlockDevScan (Immediate, Disabled on Error)

BlockDevScan lists all currently connected physical block devices along with any potential RAID Group association. Each block device listed is assigned a unique index at the time of the scan. This index is used to identify block devices for other CLI operations.

Usage: BlockDevScan
SingleNode Mode Usage: BlockDevScan

ClearEventLog (Immediate)

ClearEventLog clears the contents of the event log.

Usage: ClearEventLog

Date

Sets/displays the current date. The date range is 01/01/2000 to 12/31/2099.

Usage: set Date [MM/DD/YYYY]
        get Date

DeleteScheduledTasks (Immediate, Disabled on Error)

Deletes a scheduled task with the Id returned by DisplayScheduledTasks.

Usage: DeleteScheduledTasks [Id]

DisplayScheduledTasks (Immediate, Disabled on Error)

Immediate command that displays all outstanding scheduled tasks.

Usage: DisplayScheduledTasks

DriveHealth (OEM Configurable, Disabled on Error)

Changes the unit's ability to acquire drive health data from connected drives. Issuing this command during I/O operations may adversely affect performance.

Usage: set DriveHealth [enabled | disabled]
        get DriveHealth

DriveHealthDisplay (Immediate, Disabled on Error)

Retrieves and displays S.M.A.R.T. data from SATA disk drives, and MEDIUM DEFECT and INFORMATION EXCEPTIONS counts from other drives. Issuing this command during I/O operations may adversely affect performance.

Usage: DriveHealthDisplay [BlockDevID | all]

DriveHealthStatus (Immediate, Disabled on Error)

Displays the current S.M.A.R.T. support of specified SATA disk drives and MEDIUM DEFECT and INFORMATION EXCEPTION support in other disk drives.

Usage: DriveHealthStatus [BlockDevID | all]

DriveTest (Immediate, Disabled on Error)

Immediate command which starts or stops a drive test with the previously specified configuration and drive list. Drives which are in-use by the test are not available for RAID configuration or RAID operations. Only one test can be run at a time.

Usage: DriveTest [Begin | Cancel]

DriveTestClearList (Immediate, Disabled on Error)

Specifies drives to be removed from the drive test list. The 'drive BlockDevID' parameter will remove the specified drive from the list. The 'all' parameter automatically removes all drives from the list.

Usage: DriveTestClearList [drive [BlockDevID] | all]

DriveTestConfig (Disabled on Error)

Configures the drive test to perform one of the following operations: initialize (destructive write-only), mediascan (destructive for sectors with medium errors), read (non-destructive read-only), verify (destructive verify), or init-verify (destructive write-read-verify). The test is not started until the DriveTest Begin command is given. A new configuration may not be set while a drive test is being performed.

Usage: set DriveTestConfig [init | read | verify | mediascan | init-verify]
          get DriveTestConfig

DriveTestList (Disabled on Error)

Specifies drives to be run in the next drive test. DriveTestConfig should be setup prior to adding any drives into the test list. This command can be called with different eligible BlockDev IDs and each one will be added to the list. Drives which are part of a RAID group are only eligible for read drive tests. Additionally, Hot Spare drives are only eligible for mediascan and read drive tests. The 'all' parameter automatically chooses eligible drives. The test is not started until the DriveTest Begin command is given.

Usage: set DriveTestList [drive [BlockDevID] | all]
          get DriveTestList

DriveTestStatus

Displays the status of the currently running drive test. This command does not display performance metrics. If a block device ID is not running or cannot be found, its state will be 'idle' and percent complete will be 0.

Usage: get DriveTestStatus <drive [BlockDevID]>

DumpConfiguration (Immediate)

Dumps units configuration

Usage: DumpConfiguration

DumpEventLog (Immediate)

DumpEventLog can be used to dump the entire contents of the event log.

Usage: DumpEventLog
SingleNode Mode Usage: DumpEventLog

EventLog (OEM Configurable, Disabled on Error)

EventLog can be used to enable/disable the event logging feature. When enabled, various system events are recorded to the event log.

Usage: set EventLog [enabled | disabled]
          get EventLog

EventLogFilter (OEM Configurable, Disabled on Error)

EventLogFilter is used to filter data from specific subsystems and levels while event logging is enabled.

Usage: set EventLogFilter [subsys | all] [event level | all] [all | none]
          get EventLogFilter [subsys | all] [event level | all]

Help (Immediate)

The Help command issued with no parameters displays a list of available CLI commands. When a CLI Command name is specified, a command usage string and command description is presented on the CLI.

Usage: Help <command>

HSAdd (Immediate)

Assigns a Block Device to the Hot Spare pool.

Usage: HSAdd [BlockDevID]
SingleNode Mode Usage: HSAdd [BlockDevID]

HSDisplay (Immediate)

HSDisplay outputs a list of all of the devices in the Hot Spare pool.

Usage: HSDisplay

HSRemove (Immediate)

Removes a Block Device from the Hot Spare pool.

Usage: HSRemove [BlockDevID | all]

Info (Immediate)

Info displays version numbers and other product information for key components. Use the optional 'brief' parameter to show a more concise subset of system information.

Usage: Info <brief>

IsReserved (Immediate)

IsReserved displays the reservation status of the current services session/interface.

Usage: IsReserved

MediaScanErrorReport (Immediate, Disabled on Error)

Displays media scan error statistics for either a single block device or all block devices in the system.

Usage: MediaScanErrorReport [BlockDevID | all]

Metrics (Immediate)

The Metrics CLI command offers control over the collection of standard data metrics within a product via the command's 'Start', 'Stop', and 'Display' parameters.

Usage: Metrics [Start|Stop|Display|Clear] [[drive [BlockDevID]]|all|running]

OEMConfigFile (Disabled on Error)

This command returns the "name" (i.e., the contents of the first record) of the OEM configuration file stored in persistent memory.

Usage: get OEMConfigFile

Partition (Immediate)

Partition sets the specified partition to the specifed capacity in gigabytes (GB), megabytes (MB), or blocks. The specified capacity must be smaller than the specified partition's current capacity. A new partition is created to acquire the remainder of the original partition's space.

Usage: Partition [GroupName] [PartIdx] [capacity] [GB | MB | blocks]

PartitionDisplay (Immediate)

PartitionDisplay outputs a list of all of the partitions available in the specified RAID Group. The partitions are listed in order of contiguousness (as opposed to index order). GroupName is the ASCII name of the RAID Group for which partitions will be displayed.

Usage: PartitionDisplay [GroupName]

PartitionMerge (Immediate)

PartitionMerge merges the specified contiguous partitions into one partition. GroupName is the ASCII name of the RAID Group containing the partitions to merge. PartIdx is the index of a partition to merge, along with a number of contiguous partitions to merge to that index. 'All' indicates that all partitions in the RAID Group will be merged into a single Virtual Disk. The RAID Group must not be in a NEW state. None of the partitions to merge may be mapped.

Usage: PartitionMerge [GroupName] [[[PartIdx] [2-128]] | all]

PartitionSplit (Immediate)

PartitionSplit splits the specified partition into one or more partitions whose capacities are evenly distributed among the capacity of the original partition. GroupName is the ASCII name of the RAID Group containing the partition to split. PartIdx is the index of the partition to split. The partition to split cannot be mapped. The RAID Group must not be in a NEW state.

Usage: PartitionSplit [GroupName] [PartIdx] [2-128]

PartitionWriteCache

Enable RAID internal Write Cache for higher write performance with a small risk of data loss after a system failure. Disable RAID internal Write Cache for a higher level of data integrity with lower write performance.

Usage: set PartitionWriteCache [GroupName] [PartIdx] [enabled | disabled]
get PartitionWriteCache [GroupName] [PartIdx]

PassThroughMode (OEM Configurable, Disabled on Error)

PassThroughMode specifies the non-disk device types which will be automatically mapped at boot time. The "all" option allows all non-disk devices to be mapped. The "SES" option allows dedicated SES processor LUNs to be mapped. The "non-SES" option allows all non-SES devices to be mapped. The "disabled" option disables the pass-through mode.

Usage: set PassThroughMode [all | SES | non-SES | disabled]
get PassThroughMode

PassThroughPersistent (Immediate, Disabled on Error)

PassThroughPersistent stores maps for currently-attached passthrough devices to persistent memory.

Usage: PassThroughPersistent

PassThroughRediscover (Immediate, Disabled on Error)

PassThroughRediscover will make any previously deleted pass through target devices visible to the host

Usage: PassThroughRediscover

RAIDRebuildPriority

Set the RAID rebuild priority. A RAID rebuild priority that is set to high, will give higher priority to RAID rebuilds and lower priority to the processing of simultaneous I/O transactions. A RAID rebuild priority that is set to low, will give lower priority to RAID rebuilds and higher priority to the processing of simultaneous I/O transactions. A RAID rebuild priority that is set to same, will give equal priority to RAID rebuilds and the processing of simultaneous I/O transactions. If all or no groups are specified, the system default and all of the individual RAID groups are set. If a group name is specified, only the group specified is set.

Usage: set RAIDRebuildPriority <GroupName | all> [high | low | same]
get RAIDRebuildPriority <GroupName | all>

RAIDSpeedWriteLimit (OEM Configurable, Disabled on Error)

Set or get the limit on the coalescing factor. Warning: changing the default setting (8) may result in poor performance or timeouts. A lower setting is recommended when using multiple initiators. A higher setting may improve performance with multiple streams of sequential write I/O, but too high a setting will cause timeouts.

Usage: set RAIDSpeedWriteLimit [0 - 32]
          get RAIDSpeedWriteLimit

Reserve (Immediate)

Reserve reports the state of CLI reservation for the current CLI session. If the command reports that Reservations are enabled, then another CLI session has control of parameter modification.

Usage: Reserve

RestoreConfiguration (Immediate, Disabled on Error)

RestoreConfiguration issued with the 'default' option will force the NVRAM settings to their original defaults. The 'saved' option will undo any changes made to this session since the last save.

Usage: RestoreConfiguration [default | saved]
SingleNode Mode Usage:
          RestoreConfiguration [default | saved]

RGAddStorage (Immediate)

RGAddStorage adds additional storage to an existing RAID Group. GroupName is an ASCII name for the RAID Group. MIRROR|STRIPE|SPAN specifies the method used to expand the storage. Optional parameter list BlockDeviceID specifies up to 10 indices of available block devices, provided by the BlockDevScan CLI command, to be added to the RAID Group. If this list is omitted, the CLI command RGMemberAdd must be used. Optional parameter commit runs the RGCommit command automatically and all user data will be erased from each new member drive. If the parameter is omitted, the CLI command RGCommit must be entered. Any time before RGCommit is entered, the command RGCancelAddStorage can be used to cancel the process. NOTE: MIRRORs cannot be added to a RAID 5, RAID 4, or DVRAID group.

Usage: RGAddStorage [GroupName]
          [MIRROR|STRIPE|SPAN] < BlockDeviceID ... <commit> >

RGAutoRebuild

RGAutoRebuild enables and disables Auto-Rebuild functionality for one or more RAID Groups. Auto-Rebuild uses drives assigned as Hot Spares, followed by available drives, as automatic replacements for any member that fails. Auto-Rebuild is disabled by default.

Usage: set RGAutoRebuild [GroupName | all] [enabled | disabled]
          get RGAutoRebuild [GroupName | all]

RGCancelAddStorage (Immediate, Disabled on Error)

RGCancelAddStorage cancels the RGAddStorage command.

Usage: RGCancelAddStorage [GroupName]

RGCancelMediaScan (Immediate, Disabled on Error)

RGCancelMediaScan cancels a media scan that is running on the specified existing RAID Group.

Usage: RGCancelMediaScan [GroupName]

RGCommit (Immediate, Disabled on Error)

RGCommit stamps a NEW RAID Group's configuration to its member drives. Advanced Initialization is highly recommended for new drives; this erases and verifies the drive media. The RAID Group is unavailable until the operation completes. Express Initialization performs a background initialization and the RAID Group is immediately available for use. When RGCommit is issued after adding storage, it stamps an EXISTING RAID Group's configuration to the added drives, and initializes the drives if Advanced or Express are specified. GroupName is the ASCII name of the NEW RAID Group to commit.

Usage: RGCommit < GroupName <Advanced | Express> | all <Advanced | Express> >

RGCreate (Immediate)

RGCreate creates a NEW empty RAID Group. GroupName is an ASCII name for the RAID Group (14 chars max, no spaces). The optional value after the RAID Group type parameter represents the desired interleave for the RAID Group. KB denotes interleave in kilobytes; without the KB suffix, interleave is set in 512 byte blocks. If interleave is not provided, the system-default interleave is used.

Usage: RGCreate [GroupName] [RAID[0|1|10|4|5|6]|JBOD]

          <8KB|16KB|32KB|64KB|128KB|256KB|512KB|1024KB
          |16|32|64|128|256|512|1024|2048>

RGDiskWriteCache

Enable RAID member disk Write Cache for higher write performance with a small risk of data loss after a system failure. Disable RAID member disk Write Cache to force the drives to update the storage media at the expense of some write performance.

Usage: set RGDiskWriteCache [GroupName | all] [enabled | disabled]
          get RGDiskWriteCache [GroupName | all]

RGDisplay (Immediate)

RGDisplay displays RAID group status information. GroupName is an ASCII name for an existing RAID Group.

Usage: RGDisplay <GroupName | all>

RGErase (Immediate)

RGErase erases the data from the specified existing RAID Group. WARNING: All data will be lost!

Usage: RGErase [GroupName]

RGHaltConversion (Immediate)
RGHaltConversion halts the conversion on the specified existing RAID Group.

Usage: RGHaltConversion [GroupName]

RGHaltErase (Immediate)
RGHaltErase halts the erase on the specified existing RAID Group.

Usage: RGHaltErase [GroupName]

RGHaltInitialization (Immediate)
RGHaltInitialization halts the initialization of the specified RAID Group.

Usage: RGHaltInitialization [GroupName]

RGHaltMediaScan (Immediate, Disabled on Error)
RGHaltMediaScan halts a media scan on the specified existing RAID Group.

Usage: RGHaltMediaScan [GroupName]

RGHaltRebuild (Immediate)
RGHaltRebuild halts the rebuild(s) on the specified existing RAID Group. Optional parameter MemberIndex specifies the RAID Member whose rebuild will be halted. For RAID6 Groups, if a MemberIndex is specified, all rebuilding RAID Members on the span with that MemberIndex will halt as well. If no MemberIndex is specified, all rebuilds on that RAID Group will be halted.

Usage: RGHaltRebuild [GroupName] <MemberIndex>

RGMediaScan (Immediate, Disabled on Error)
RGMediaScan initiates a Media Scan. A Media Scan reads all member drives and corrects Media Errors by calculating the expected data and rewriting it, so the drive can relocate it to a good sector. The 'verify' option adds a data integrity check by verifying that the data and parity match. 'Verify' plus 'fix' causes the parity to be re-written when a verify mismatch occurs. Enter time (must be HH:MM in 24-hour time format) and day of week without the 'daily/weekly' option to schedule a one-time scan for a later date. Enter time, day of week and 'daily' or 'weekly' to schedule a scan on a recurring basis.

Usage: RGMediaScan [GroupName] <verify | verify fix>
         <[HH:MM] <day of week> <daily | weekly>>

RGMediaScanErrorReport (Immediate, Disabled on Error)
Displays error statistics for either a single RAID Group or all RAID Groups in the system.

Usage: RGMediaScanErrorReport [GroupName | all]

RGMemberAdd (Immediate)
RGMemberAdd adds available block devices to a NEW RAID Group or as part of an RGAddStorage operation. GroupName is the ASCII name of the RAID Group to receive the RAID Member. BlockDevID is the index of an available block device provided by the BlockDevScan CLI command. Up to 10 BlockDevIDs may be specified. If all is specified, then all available unused BlockDevIDs will be added to the RAID Group until the maximum number of RAID group members has been met. This command also resets the number of RAID Group partitions to 1.

Usage: RGMemberAdd [GroupName] [all | BlockDevID] ...

RGMemberRemove (Immediate)
RGMemberRemove removes a RAID Member from a NEW RAID Group. GroupName is the ASCII name of the NEW RAID Group from which to remove the RAID Member. MemberIndex is the index of the RAID Member to remove. This also resets the number of partitions to 1.

Usage: RGMemberRemove [GroupName] [MemberIndex]

RGPrefetch
Set or Get the prefetch for all or for the specified RAID Group. This command will fail if the RAID Group does not exist. GroupName is the ASCII name of the RAID Group for which the parameter will apply.

Usage: set RGPrefetch [GroupName | all] [Value 0 to 6]
         get RGPrefetch [GroupName | all]

RGRebuild (Immediate)
RGRebuild starts rebuilding the specified existing RAID Group. Optional parameters MemberN specify the members to rebuild. If no member is specified, all degraded members will be rebuilt. Optional parameters BlockDevIDN allows an available block device to be substituted for the RAID Member currently assigned to the Member Index. RAID 6 groups can rebuild two members using the optional 'and'.

Usage: RGRebuild [GroupName] <Member1>
         <BlockDevID1> <and> <Member2> <BlockDevID2>

RGResumeConversion (Immediate)
RGResumeConversion resumes the halted conversion on the specified existing RAID Group.

Usage: RGResumeConversion [GroupName]

RGResumeErase (Immediate)
RGResumeErase resumes the erase on the specified existing RAID Group.

Usage: RGResumeErase [GroupName]

RGResumeInitialization (Immediate)
RGResumeInitialization resumes the initialization of the specified RAID Group.

Usage: RGResumeInitialization [GroupName]

RGResumeMediaScan (Immediate, Disabled on Error)
RGResumeMediaScan resumes a media scan on the specified existing RAID Group.

Usage: RGResumeMediaScan [GroupName]

RGResumeRebuild (Immediate)
RGResumeRebuild resumes the rebuild(s) on the specified existing RAID Group. Optional parameter MemberIndex specifies the RAID Member whose halted rebuild will be resumed. For RAID6 Groups, if a MemberIndex is specified, all halted RAID Members on the span with that MemberIndex will resume as well. If no MemberIndex is specified, all halted rebuilds on that RAID Group will be resumed.

Usage: RGResumeRebuild [GroupName] <MemberIndex>

RGSectorSize
Set or get the sector size of the specified RAID Group. The desired RAID Group sector size must be evenly divisible by the sector size of any member disk. 512 bytes is the default size for most operating systems. Use 4 KB sectors to enable large volume support (greater than 2 TB) in Windows XP (32-bit).

Usage: set RGSectorSize [GroupName] [512-8192]
          get RGSectorSize [GroupName]

RGSpanDepth
Set or get the span depth on the specified existing NEW RAID Group. All RAID Group types are supported except JBOD, which implicitly supports spanning as members are added.

Usage: set RGSpanDepth [GroupName] [SpanDepth [1-16]]
          get RGSpanDepth [GroupName]

RGSpeedRead
Perform look-ahead during reads from RAID Group member disks for all or the specified RAID Group. GroupName is the ASCII name of the RAID Group for which look-ahead reads will be performed. Auto will choose the algorithm based on each I/O command.

Usage: set RGSpeedRead [GroupName | all] [enabled | disabled | auto]
          get RGSpeedRead [GroupName | all]

RGUnmap (Immediate)
RGUnmap removes all of the mapped partitions of the specified RAID group from the routing table. The partitions themselves will be unaffected, though they will now be inaccessible to any initiators.

Usage: RGUnmap [GroupName | all]

RGWaitTimeout (OEM Configurable, Disabled on Error)
RGWaitTimeout specifies the maximum time in seconds that will elapse to discover previously configured RAID Groups. The time out is used during system boot time and when the BlockDevScan command is issued.

Usage: set RGWaitTimeout [1-300]
          get RGWaitTimeout

RMStatus (Immediate)
RMStatus displays the status of all RAID Members within the specified RAID Group or a specific RAID member (if specified) within the specified RAID Group. This command will fail if the specified RAID Group does not exist or a specified member index within the RAID Group does not exist. GroupName is the ASCII name of the RAID Group for which status will be displayed.

Usage: RMStatus [GroupName] <MemberIndex>

Route (Immediate, OEM Configurable, Disabled on Error)
Route is used to map a RAID Partition or SAS/SATA Pass Through device to a Target ID on the host system. If a map with the specified Target Id already exists, then it will be overwritten. Use 'Delete' for a Target ID to remove the map.

Usage: Route host [tid] [[RAID [GroupName] [PartIdx]] | [SAS [SasIdx]] | Delete]
SingleNode Mode Usage:
          Route host [tid] [[RAID [GroupName] [PartIdx]] | [SAS [SasIdx]] | Delete]

RouteDisplay (Immediate)
RouteDisplay will display a list of host protocol address to target destination device mappings. The optional 'tid' parameter will limit the list to the maps which satisfy a search for the given Target ID. If the "Passthrough" parameter is entered then all SATA/SATA Pass Through devices are displayed. Otherwise all mapped RAID Partitions are displayed. If the "Persistent" parameter is entered then only persistent maps will be displayed. Otherwise both persistent and non-persistent maps will be displayed.

Usage: RouteDisplay host < <tid> | <<passthrough> <persistent>> >
SingleNode Mode Usage:
          RouteDisplay host < <tid> | <<passthrough> <persistent>> >

SasPortList (Immediate)
SasPortList lists the status of all available SAS ports.
Usage: SasPortList

SASTargets (Immediate, Disabled on Error)
This command lists the physical devices that are connected to all SAS ports.

Usage: SASTargets

SaveConfiguration (Immediate, Disabled on Error)
SaveConfiguration will save configuration changes. Please note that certain modifications require a system restart.

Usage: SaveConfiguration
SingleNode Mode Usage:
        SaveConfiguration

SerialNumber
SerialNumber displays the serial number. The serial number is a 13 character field. The first seven alphanumeric characters are an abbreviation representing the product name. The remaining six digits are the individual unit's number.

Usage: get SerialNumber

SES (OEM Configurable, Disabled on Error)
SES enables support for SES enclosures that have been discovered by the appliance.

Usage: set SES
        get SES [enabled | disabled]

SESAlarmTest (Immediate, Disabled on Error)
SESAlarmTest commands the specified enclosure's audible alarm to be turned on at the specified warning level. "Reset" turns off the alarm that has been set at any warning level. Note that SESEnclosures must be executed prior to executing SESAlarmTest.

Usage: SESAlarmTest [EnclIdx] [SET | RESET] [INFO | NON-CRIT | CRIT | UNRECOV]

SESDiskFailureAlarm (OEM Configurable, Disabled on Error)
SESDiskFailureAlarm when enabled, activates an audible alarm when the appliance determines that a RAID member disk drive has failed. The enclosure which contains the failed disk drive will be sounded, other enclosures will be unaffected.

Usage: set SESDiskFailureAlarm [enabled | disabled]
        get SESDiskFailureAlarm

SESEnclosures (Immediate, Disabled on Error)
SESEnclosures displays a list of SES-enabled enclosures which have been discovered by the appliance.

Usage: SESEnclosures

SESIdentify (Disabled on Error)
SESIdentify commands the appropriate SES enclosure to identify the specified element(s). "ALL" identifies all disks. "RAID" and RAID Group name identifies all disks in a RAID Group. If the MemberIndex is also specified, only that disk is identified. "DRIVE" and BlockDevID identifies the specified disk.

Usage: set SESIdentify [ALL | RAID GrpName
        <MemberIndex> | DRIVE BlockDevID]
        get SESIdentify
SingleNode Mode Usage:
        SESIdentify [ALL | RAID GrpName <MemberIndex> |
        DRIVE BlockDevID]

SESIdentifyStop (Immediate, Disabled on Error)
SESIdentifyStop commands the appropriate SES enclosure to stop identifying the specified element(s). "ALL" stops identifying all enclosures' drive slots. "RAID" and RAID Group name stops all of disks in a RAID Group. "DRIVE" and BlockDevID stops the specified drive.

Usage: SESIdentifyStop [ALL | RAID GrpName
        <MemberIndex> | DRIVE BlockDevID]
SingleNode Mode Usage:
        SESIdentifyStop [ALL | RAID GrpName
        <MemberIndex> | DRIVE BlockDevID]

SESMute (Immediate, Disabled on Error)
SESMute causes all known enclosures' audible alarms to be set to either the "mute" or "remind" state. The default action is "mute". The enclosure index qualifier is optional. The optional parameter "REMIND" may be specified to set the "remind" state, which causes an occasional audible reminder of the alarm condition (if supported). Note that SESEnclosures must be executed prior to executing SESMute.

Usage: SESMute <EnclIdx> <REMIND>

SESPoll (OEM Configurable, Disabled on Error)
SESPoll specifies the SES enclosure polling interval, in seconds. At the specified interval, all known SES enclosures are polled for their current status. A setting of 0 disables SES enclosure polling.

Usage: set SESPoll [0 | 30 - 3600]
        get SESPoll

SESStartingSlot (OEM Configurable, Disabled on Error)
SESStartingSlot establishes the starting slot/ID number for all attached SES enclosures.

Usage: set SESStartingSlot [0 | 1]
        get SESStartingSlot

SESStatus (Immediate, Disabled on Error)
SESStatus displays the last polled status of the specified element type in the specified enclosure. SupportLevel indicates the SES features supported by the specified enclosure: Fan,Power,Temp,Alarm, DriveLEDs. If no element type is specified, all status is displayed. Note that SESEnclosures must be executed prior to executing SESStatus.

Usage: SESStatus [EnclIdx] <ENC | DRIVE | FAN | POWER | TEMP | ALARM | SUPPORTLEVEL>

Time (Disabled on Error)
Time sets/displays the current time in 24 hour format.

Usage: set Time [HH:MM:SS]
           get Time

TimeZone (OEM Configurable, Disabled on Error)
Timezone sets/displays the time zone or an offset from GMT. GMT offset must be in the format +/-HH:MM

Usage: set TimeZone [[EST | CST | MST | PST] | [[+|-][HH]:[MM]]]
           get TimeZone

VerboseMode (OEM Configurable)
VerboseMode controls the level of detail in CLI 'Help' output and command response output for the current CLI session.

Usage: set VerboseMode [enabled | disabled]
           get VerboseMode

VirtualDriveInfo (Immediate)
VirtualDriveInfo displays characteristics and statistics for all the available virtual drives or any available virtual drive identified by it's virtual drive ID.

Usage: VirtualDriveInfo <VirtualDrive ID>

WrapEventLog (OEM Configurable, Disabled on Error)
WrapEventLog is used to enable/disable event log wrapping. When enabled, 2048 event entries will be logged before wrapping. When disabled, event logging will cease when the log buffer is full.

Usage: set WrapEventLog [enabled | disabled]
           get WrapEventLog

Privileged OEM Configuration Services Commands:

ClosePort
Enables/disables Telnet, FTP, and ExpressNAV functionality. The Telnet/FTP/ExpressNAV parameters are cumulative; to close all three, ports, issue the ClosePort command three times, once for each port. The parameter "none" re-enables all ports.

Usage: set ClosePort [Telnet | FTP | ExpressNAV | none]
           get ClosePort

DefaultInterleave
DefaultInterleave assigns or retrieves the system-default interleave size for new RAID Groups. KB denotes interleave in kilobytes; without the KB suffix, the default is set in 512-byte blocks. If an interleave is not explicitly specified when a RAID Group is created, then the DefaultInterleave value will be used instead.

Usage: set DefaultInterleave

    [8KB|16KB|32KB|64KB|128KB|256KB|512KB|1024KB
        |16|32|64|128|256|512|1024|2048]
        get DefaultInterleave

InquiryProductID
This command is used to display the Product ID of this product. The string displayed is used in the response to a SCSI INQUIRY command.

Usage: set InquiryProductID [0 - 16 chars]
           get InquiryProductID

InquiryVBDevSN
This command puts the specified prefix, max 10 characters, at the front of each virtual disk serial number, and compresses the original serial number into the remaining 10 digits. This string is displayed in the response to a SCSI INQUIRY command.

Usage: set InquiryVBDevSN [0 - 10 chars]
           get InquiryVBDevSN

InquiryVendorID
This command is used to display the Vendor ID of this product. The string displayed is used in the response to a SCSI INQUIRY command.

Usage: set InquiryVendorID [0 - 8 chars]
           get InquiryVendorID

ModelNumber
This command is used to display the Model Number of this product. The string displayed is used in the various CLI responses.

Usage: set ModelNumber [0 - 8 chars]
           get ModelNumber

oempassd
Usage: set oempassd

OemReadOnlyUsern
Usage: set OemReadOnlyUsern [username]

oemROpassd
Usage: set oemROpassd

OemUsern

Usage: set OemUsern [username]

ProductID

This command is used to display the Product ID of this product.
The string displayed is used in the various CLI responses.

Usage: set ProductID [0 - 16 chars]
          get ProductID

VendorID

This command is used to display the Vendor ID of this product.
The string displayed is used in the various CLI responses.

Usage: set VendorID [0 - 8 chars]
          get VendorID

Appendix B   Glossary

Some terms used in the Fibre Channel industry are defined below. More information is available through the ATTO Technology website (www.attotech.com), the Fibre Channel Industry Association (www.fibrechannel.com), Cern (www.cern.ch), the Storage Area Networking Industry Association (www.snia.org), and the Fibre Channel Consortium (www.iol.unh.edu/consortiums, click on FC).

Term	Definition
ANSI	American National Standards Institute.
arbitrate	The process of selecting one L_Port from a collection of ports which ask for use of the arbitrated loop at the same time.
arbitrated loop	A loop topology (FC-AL) in which two or more ports are interconnected, but only two ports can communicate at one time. Low-cost solution which may or may not use hubs and switches.
autonegotiation	A process when hardware senses and automatically responds depending on configuration.
BER	Bit Error Rate: a measure of transmission accuracy; the ratio of bits received in error to bits sent.
bit	The smallest unit of data a computer can process: a single binary digit, either 0 or 1.
bus	A collection of unbroken signal lines used to transmit information from one part of a computer system to another. Taps on the lines connect devices to the bus.
Byte	An ordered set of 8 bits.
channel	A Point-to-Point link which transports data from one point to another.
CPU	Central Processing Unit: the portion of the computer which performs computations.
CRC	Cyclic Redundancy Check: an error-correcting code which calculates a numeric value for received and transmitted data. If no error has occurred during transmission, the CRC for both received and transmitted data should be the same.
destination address	A value in the frame header of each frame which identifies the port in the node where the frame is being sent.
device driver	A program which allows a microprocessor to direct the operation of a peripheral device.
DMA	Direct Memory Access: a way to move data from a storage device directly to RAM without using the CPU's resources.
DMA bus master	Allows a peripheral to control the flow of data to and from system memory by block as opposed to allowing the processor to control the data by bytes (PIO or programmed I/O).
fabric	A Fibre Channel switch or two or more Fibre Channel switches interconnected to physically transmit data between any two N_Ports on the switch or switches.
FC	Fibre Channel.
F_port	A port in the Fibre Channel fabric where a N_port may attach.
FL_port	A port in the Fibre Channel fabric where a NL_port may attach in an arbitrated loop.
frame	An indivisible unit for transfer of information in Fibre Channel.
frame header	The first field in the frame containing the address and other control information about the frame.
full duplex	A communication protocol which allows transmission in both directions at the same time.
half duplex	A communication protocol which allows transmission in both directions, but only one direction at a time.
host	A processor, usually a CPU and memory, which communicates with devices over an interface.

Term	Definition
initiator device	A component which originates a command.
L_port	A port in an arbitrated loop, either a NL_port or a FL_port.
LED	Light-emitting diode: a type of diode which emits light when current passes through it. Visible LEDs are used as indicator lights on all sorts of electronic devices.
LUN	Logical Unit Number: an identifier for a logical unit (0-7).
multi-mode fiber	An optical fiber which can carry several beams of light at once.
N_port	A port attached to a node used with Point-to-Point or fabric configurations.
NL_ port	A port attached to a node in Fibre Channel arbitrated loop or fabric loop configuration.
originator	An initiating device; a component which originates a command.
parity checking	A method which verifies the accuracy of data transmitted over the SCSI bus by adding one bit in the transfer to make the sum of all the bits either odd or even (for odd or even parity). An error message occurs if the sum is not correct.
PCI	Peripheral Component Interconnect. Allows peripherals to be connected directly to computer memory, bypassing the slower ISA and EISA busses.
Point-to-Point	A topology where two ports communicate.
port	An access point in a device: see N_port, NL_port, etc.
port address	Also port number. The address, assigned by the PCI bus, through which commands are sent to a host adapter board.
receiver	The ultimate destination of data transmission; a terminal device.
SCSI	Small Computer Systems Interface: a processor-independent standard for system-level interface between a computer and intelligent devices including hard disks, floppy disks, CD-ROM, printers, scanners, etc.
SES	SCSI Enclosure Services: a processor which identifies individual drives, all the drives in the same enclosure, all the drives in a single RAID group and faulted drives; selects drives, and monitors the status of the enclosure.
single-mode fiber	An optical fiber with a small core which supports one wavelength (ray of light). The core radius is nearly equal to the wavelength of the source.
topology	The logical layout of the parts of a computer system or network and their interconnections.
transceiver	A transmitter/receiver module.
transfer rate	The rate at which bytes or bits are transferred, as in megabytes or gigabits per second.