.STBsuite

NVMe · SATA · ATA · SAS · FC · SCSI · iSCSI

Version 10.1

32 & 64 Bit Support

TM

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support: 303.972.2072
sales: 720.249.2641
www.stbsuite.com

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Introduction

The STB Suite is an engineering level diagnostic program used for testing, diagnosing, and qualifying disk, tape, jukebox, and CD devices. The industry-standard SCSI toolbox is based on solid, proved technology that has years of dependable service behind it from its installed base of thousands.

The SCSItoolbox tests devices on virtually all storage bus types – SCSI, Fibre Channel, ATA, SATA, SAS, and iSCSI.

The SCSItoolbox runs under Windows 2003, Server 2000, Server 2003 (32 and 64 bit), Windows XP (32 and 64 bit) , Server 2008, Server 2012, and Windows 7 & 8 and will operate using any SCSI, Fibre Channel, iSCSI, ATA, SATA, or SAS host bus adapter (HBA) that is supported by these operating systems.

The SCSItoolbox Suite includes a complete Manufacturing environment, the BAM Bus Analyzer Module, as well as development tools to develop test routines using Microsoft Visual Basic or Visual C++, and Linux OS environments.

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STB Suite v10.n Installation Instructions

1. Log into your test system locally (not via any remote method), as Administrator.

2. Uninstall any older versions of the STB Suite.

3. Browse to the CD and copy the file **INSERT PROPER FILE NAME HERE** to the hard drive on your test system.
4. Double-click on the zip file on your test system hard drive to unpack the installation package.
5. Run the program CkInstall.exe by double-clicking on it. This program will confirm that your installation package is not corrupt, and will confirm that your system DEP settings are correct.
6. Confirm that the md5 checksum is valid. If it is not valid contact support@stbsuite.com
7. Confirm that your DEP settings are correct. If you are running on a 64-bit OS this step is not necessary.
8. Install the STB Suite
9. Double-click on the program INSERT PROPER FILE NAME HERE Follow all on-screen instructions

Note: If you are running on a 64-bit OS you may receive a message stating that your DEP settings are incorrect or cannot be determined. If you see this message you must confirm that your DEP settings are correct, then you may tell the install to proceed.
Caution – if your DEP settings are not correct there will be problems running the STB Suite.

10. Reboot when the installation is finished

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Easy Upgrading from v8.5 - v8.7 to v10.n

If you have been running STB Suite version 8.5 - 8.7 you may simplify the upgrade process by copying the necessary files to two folders on your test system.

Browse to the "**Performa Files\Toolbox**" folder and copy the four files into your STB folder.

If you are running under a 64-bit OS your STB folder name will be "**Program Files (x86)\STB\SCSI Toolbox32**".

If you are running under a 32-bit OS your STB folder name will be "**Program Files\STB\SCSI Toolbox32**".

Now browse to the "**Performa Files\System32**" folder and copy the four files to your system32 folder.

If you are running under a 64-bit OS the folder name will be "**Windows\Sys WOW64**"

If you are running under a 32-bit OS the folder name will be "**Windows\System32**"

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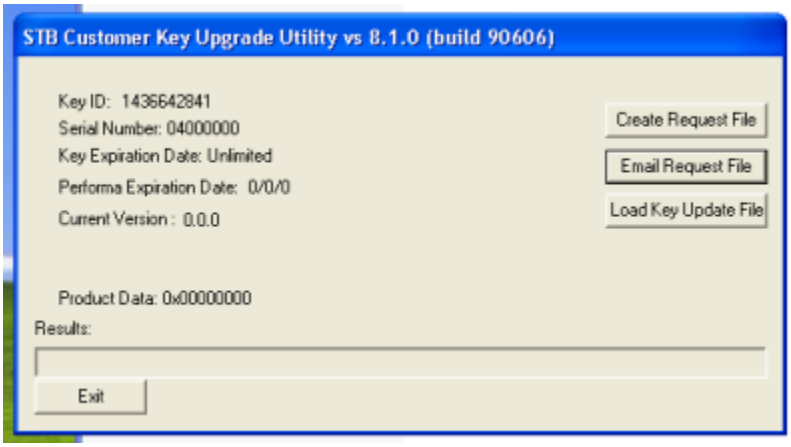
Updating your Hardware Key Performa information

- **If you have upgraded your Performa (support and maintenance coverage) please follow the instructions "Upgrade Hardware Key Performa Date" below then proceed to "STB Suite v8.8 Installation Instructions"**

Note: If you have been running STB Suite version 8.5 – 9.0 and your Performa coverage is current you do not need to do the key upgrade procedure. Your key will automatically be updated to version 8.8 during the installation process.

Upgrade Hardware Key Performa Date

1. ***Start the STB Performa key update program by double-clicking on "STBCustomerKeyUpdateVer81.exe"***
2. ***You will see this screen:***



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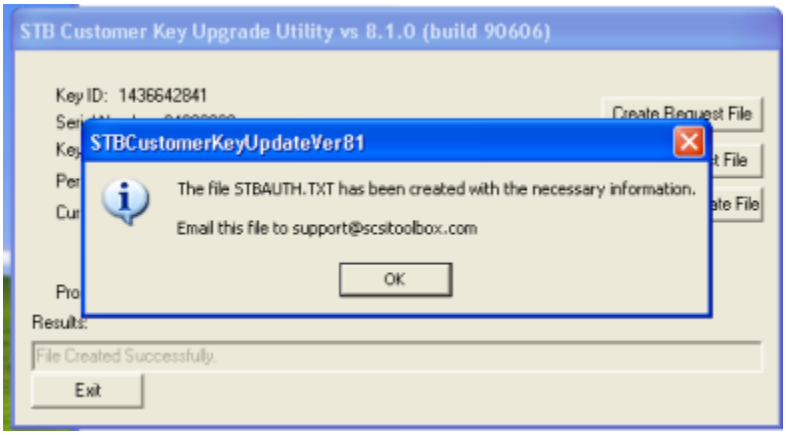
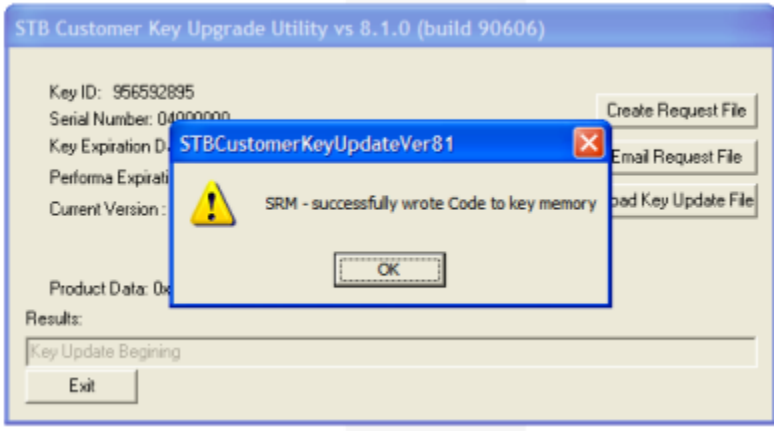
3. ***Click on "Create Request File" – and the screen will change to***



4. ***Email the file "STBAuth.txt" to support@stbsuite.com.***

5. ***Exit the STBCustomerKeyUpdateVer81.exe program***
6. Save the update file returned to you from STB Support
7. Restart the program "STBCustomerKeyUpdateVer81.exe"
8. Click the button "Load Key Update File", and use the browse feature to point to your update file which was just sent to you from support.
9. You should see this screen:
10. 

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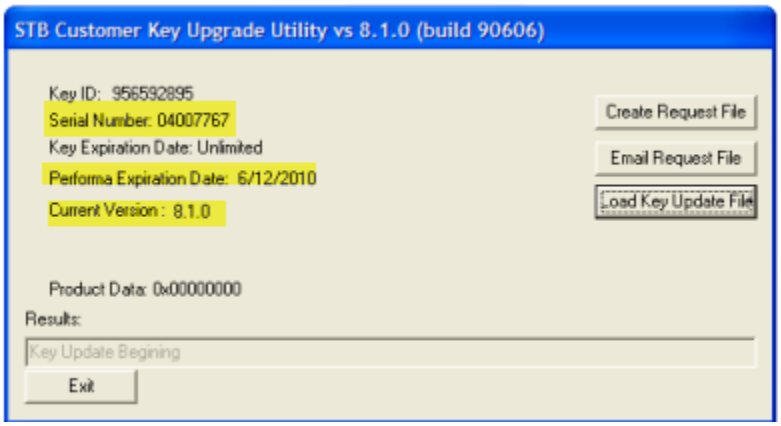
11. Click “OK” and you should now see your valid Serial Number, Performa date and version information like this:



12. If you do not see a screen indicating success please contact support@stbsuite.com

Troubleshooting

If the STB Suite fails to install with a HWK failure, please follow the instructions below to install the HWK drivers.

1. Installing the latest Aladdin SRM Runtime driver package
2. Install the Aladdin HWK Runtime drivers from:
   CDDRIVE:\Misc\USB_HASP_Driver\HASP_SRM_Runtime_setup.zip
   or
   http://www.scsitoolbox.com/downloads/HASP_SRM_Runtime_setup.zip
3. Install this package following all on-screen instructions
4. Checking your SRM installation
5. Point your web browser to http://localhost:1947
6. You should see the Aladdin Admin Control Center (ACC) displayed. If you do not see the ACC go back to step 1 and insure that you have properly installed the SRM runtime package
7. Be sure that your STB USB key (dongle) is plugged in to a USB port and that its red LED it lit.
8. In the ACC click on the HASP Keys choice under Administration Options at the left of the screen.

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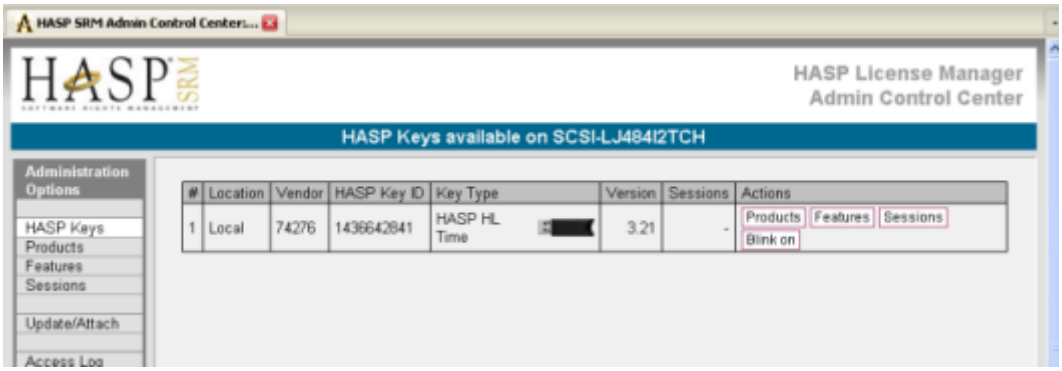
9. You should see something like this, showing your key information:



10. Note that the Version is 3.20 or above. If it is not please contact support@stbsuite.com
11. Note that the Key Type is a HASP HL Time or HASP HL Net. If it is not please contact support@stbsuite.com

Test System Requirements

Operating System:

The STB Suite runs under any current version of Windows.
Specifically the following OSs are supported:
-Windows 7 32 & 64 bit
-Windows 8 32 & 64 bit
-Windows 8.1 32 & 64 bit
-Windows 10 32 & 64 bit
-Server 2008
-Server 2012

Hardware requirements:

CPU :

The STB Suite takes advantage of multiple cores – use the best CPU your budget allows

Memory:

At least 8GB is suggested

Busses:

This is one of the most important test system factors to consider.

Use a motherboard with the most current PCIe slots – ***PCIe-3 is highly recommended***.

You will need one PCIe slot for each HBA.

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HBAs:

You will need a SAT-compatible SAS Host Bus Adapter in order to test SAS and SATA drives. Use the highest speed-rated HBA that you budget allows. This allows for future expandability and maximum test throughput.

If you will be testing many SAS or SATA drives at once it is much better to have multiple SAS HBAs and balance the drive enclosures evenly between the HBAs – try not to daisy-chain enclosures if at all possible.

Enclosures/Cables:

For SAS / SATA drive testing you want a drive enclosure which supplies sufficient power and keeps the drives cooled properly. As with the HBA, buy the highest speed-rated enclosures that your budget allows – for today that is 12G SAS. Be certain that your cables are rated for the same speed as your enclosure.

For help with drive enclosures and cables we recommend contacting PC Pitstop

www.pc-pitstop.com

Attention: Testing SATA drives

The STB Suite uses the SCSI->ATA Translation (SAT) protocol to test SATA drives. This requires that your SATA drives are connected to a SAT-compatible SAS Host Bus Adapter.

SAS HBA's which implement SAT are any LSI SAS HBA, any ATTO SAS HBA, Arica SAS HBA, and Adaptec HBA's which can operate in JBOD mode.

Original Mode Quick Start Guide

Introduction to Original Mode

STB Suite Original Mode is used to work with one drive at a time. The Device view will display all devices connected to the currently selected HBA.

Original Mode is used as an interactive "microscope" type of tool, to dig in to the details of a drives settings, history, and performance. It is device-type aware – if you select a disk drive you can choose from Disk drive commands and tests. If you select a tape drive you will have tape drive commands, tests, etc.

The Original mode menus are organized by Commands, Tests, and Other types of functions.

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In this example we will select a disk drive.

Select a drive

The device tree hierarchy is

HBA

Target

LUN

The Device view shows all Targets under the currently selected HBA, and any/all LUNs under their associated Targets.

There are two ways to select the drive to work with.

1. Click on the drive in the Device view. Depending on how device target address get assigned you may have gaps in the order of Targets so you may need to scroll down through the list of Targets to find all drives.

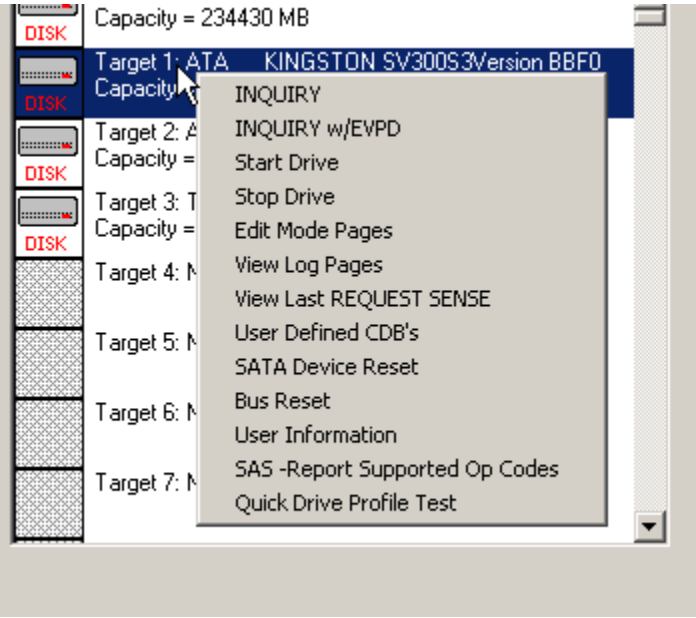
Clicking on a Target selects that Target drive to work with.

If there are LUNs beneath a Target they will be displayed and you can click the LUN you wish to work with.

2. Use the Scan System button to display all HBAs & drives and double-click on the drive you wish to work with.

Quick Commands

Right-clicking on a drive in the Device view will pop up the Quick Commands menu –



The Quick Commands feature lets you access frequently used commands, functions, and tests by right-clicking on the currently selected device.

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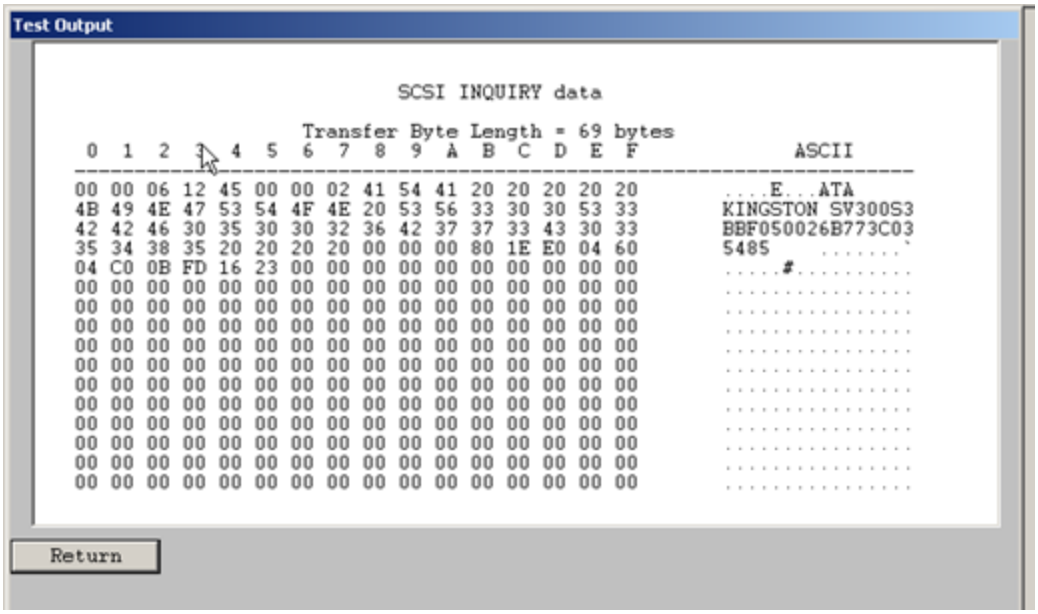
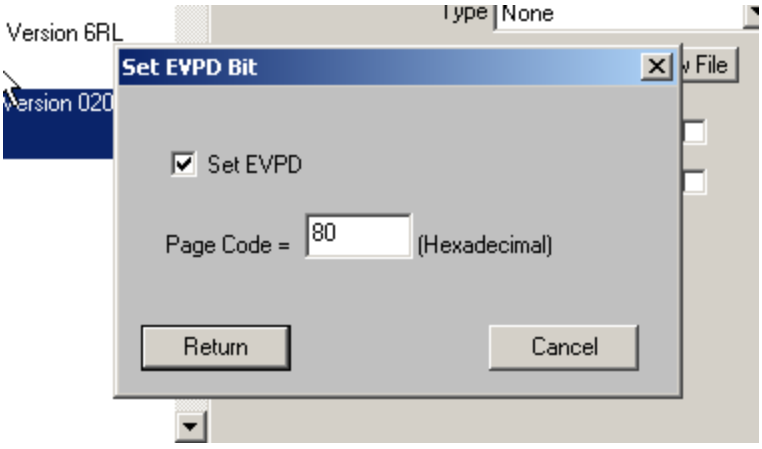
INQUIRY

The INQUIRY choice issues an INQUIRY command to the drive and displays the returned data in "raw" hex format –



INQUIRY w/EVPD

This choice allows you to specify an EVPD (Extended Vital Product Data) page. For example we will look at EVPD page 0x80 – the Serial Number EVP page – enter the Page Code for the desired EVD page



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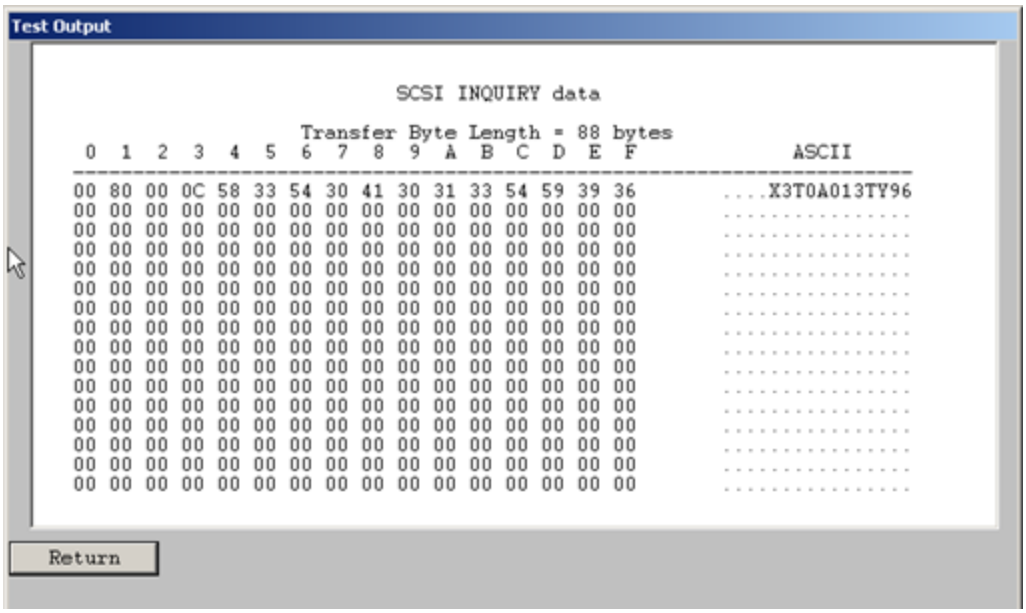
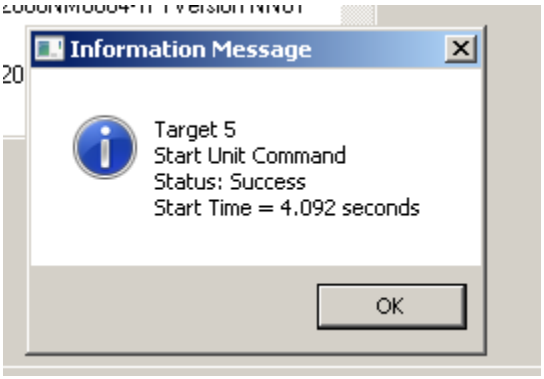
And the returned data will be displayed in hex format –



Start Drive

This will start or spin up the drive. The time to spin up will be displayed. Here is an example of spinning up a drive which was spun down –



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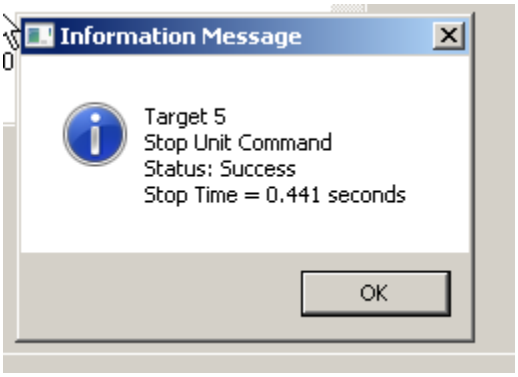
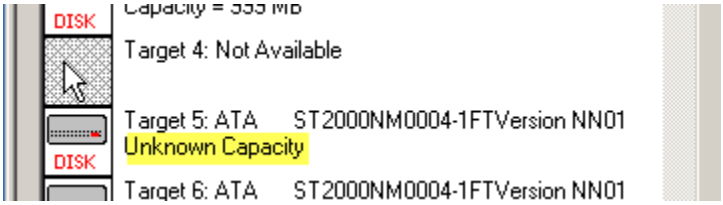
Stop Drive

This will spin down the drive – the time to spin down will be displayed –



Note: when a drive is spun down or stopped the Device view will show ***Unknown Capacity*** –



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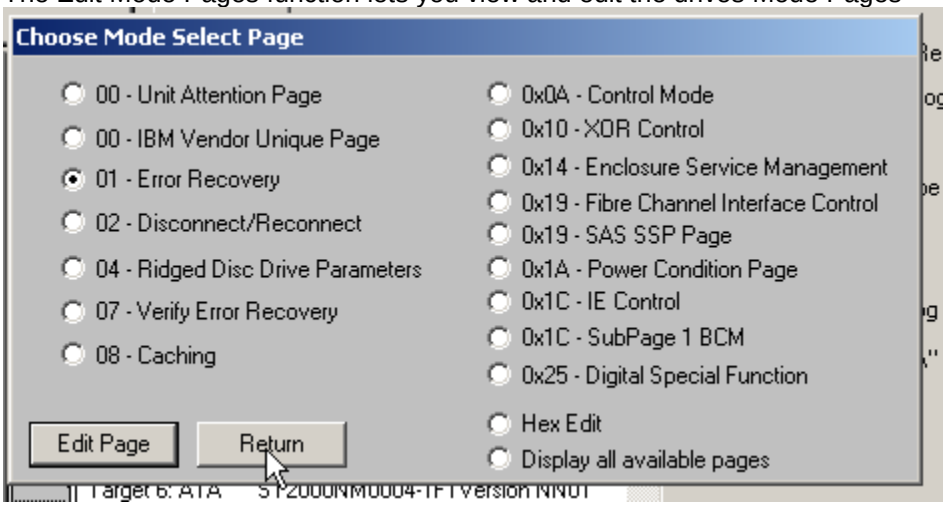
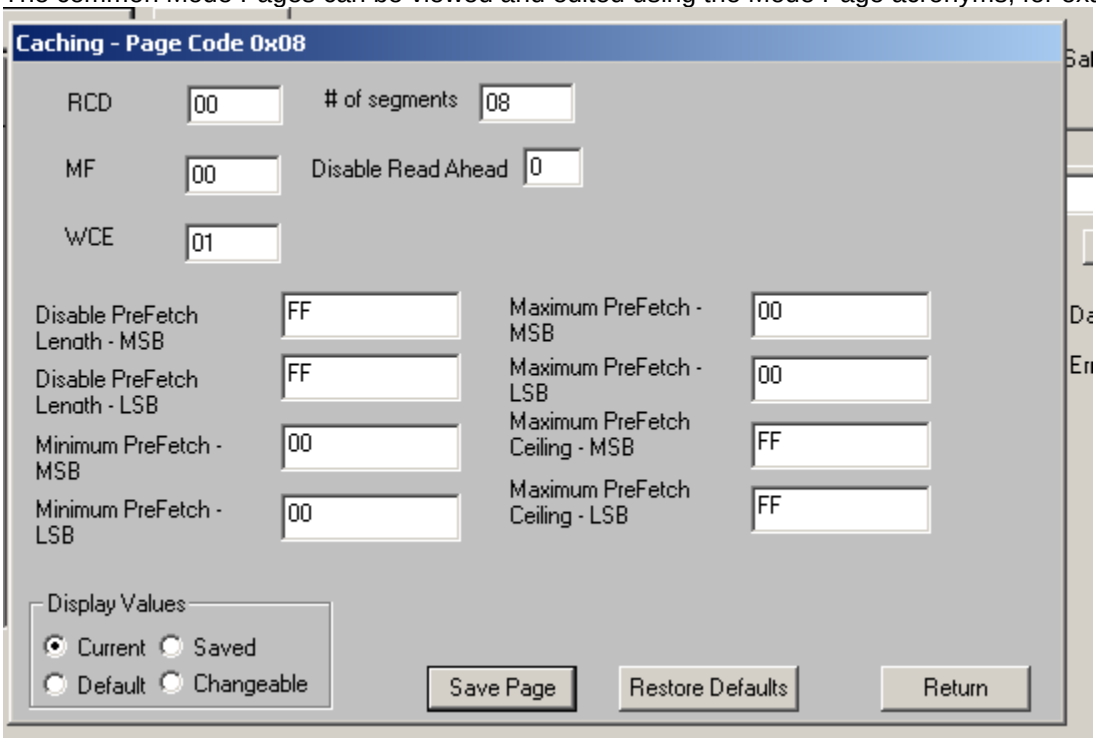
Edit Mode Pages

The Edit Mode Pages function lets you view and edit the drives Mode Pages –



The common Mode Pages can be viewed and edited using the Mode Page acronyms, for example –



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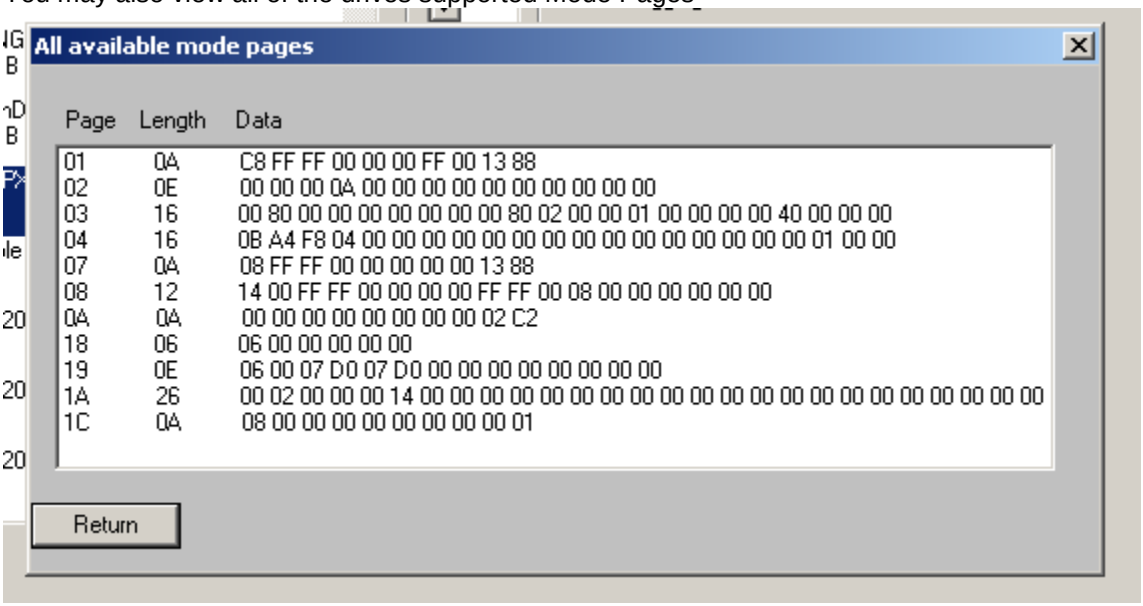
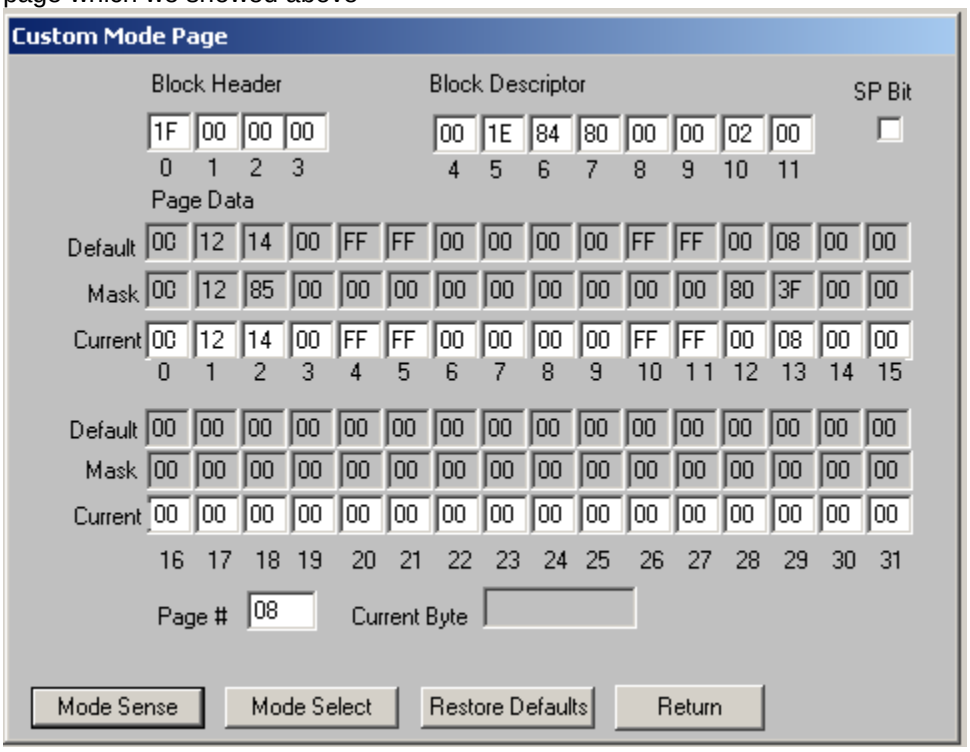
You may also view all of the drives supported Mode Pages –



And you may also view/edit any Mode Page in “raw” hexadecimal mode. Here is page 08 – the Caching page which we showed above –



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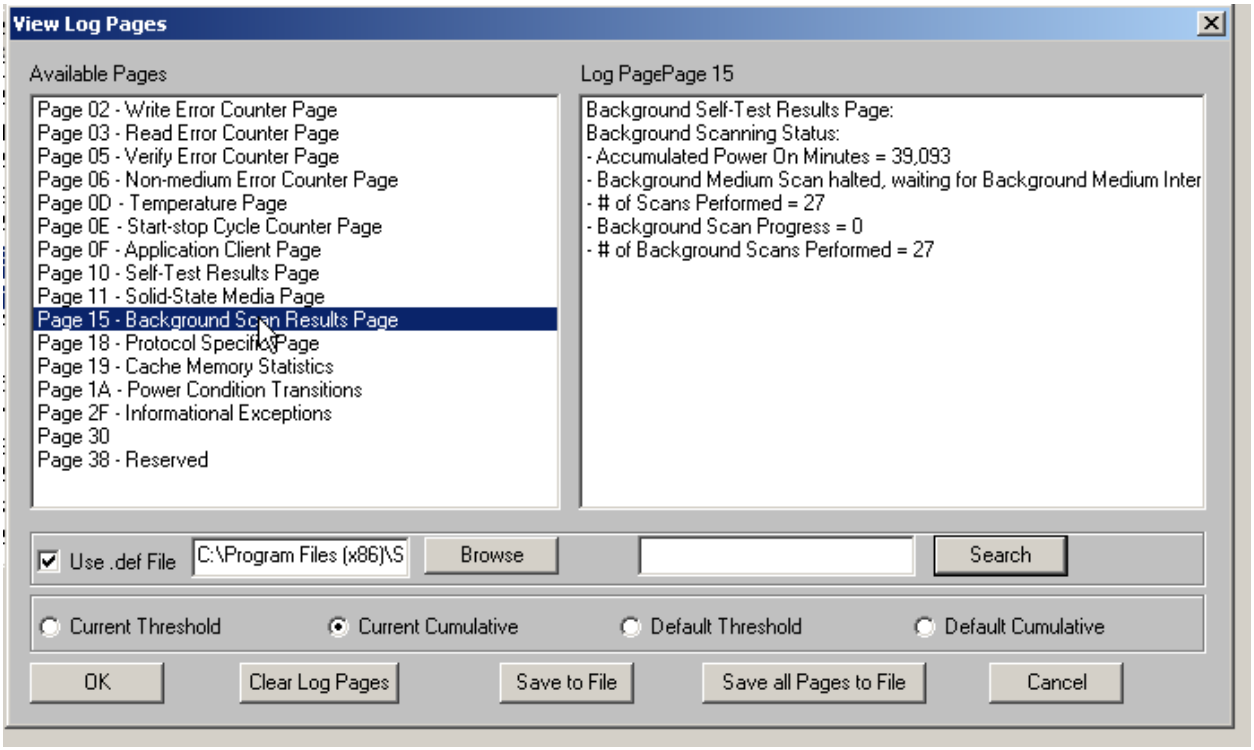
View Log Pages

All of the drives Log Pages are displayed, can be saved to a text file, and can optionally be cleared –



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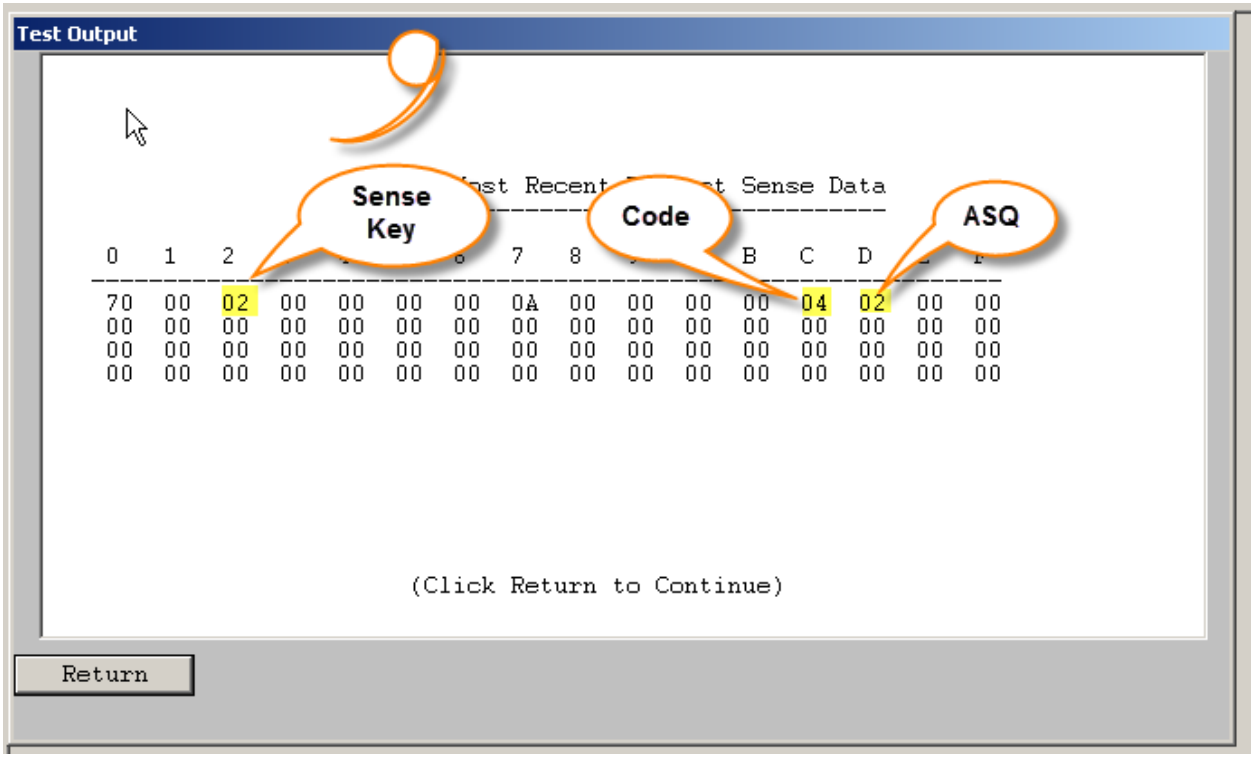
View last REQUEST SENSE data

The Sense Data returned by the last failed command (the CDB resulted in a CHECK CONDITION) may be viewed. Here is an example of Sense Data 02/04/02 – ***Logical Unit not Ready, Start Required***



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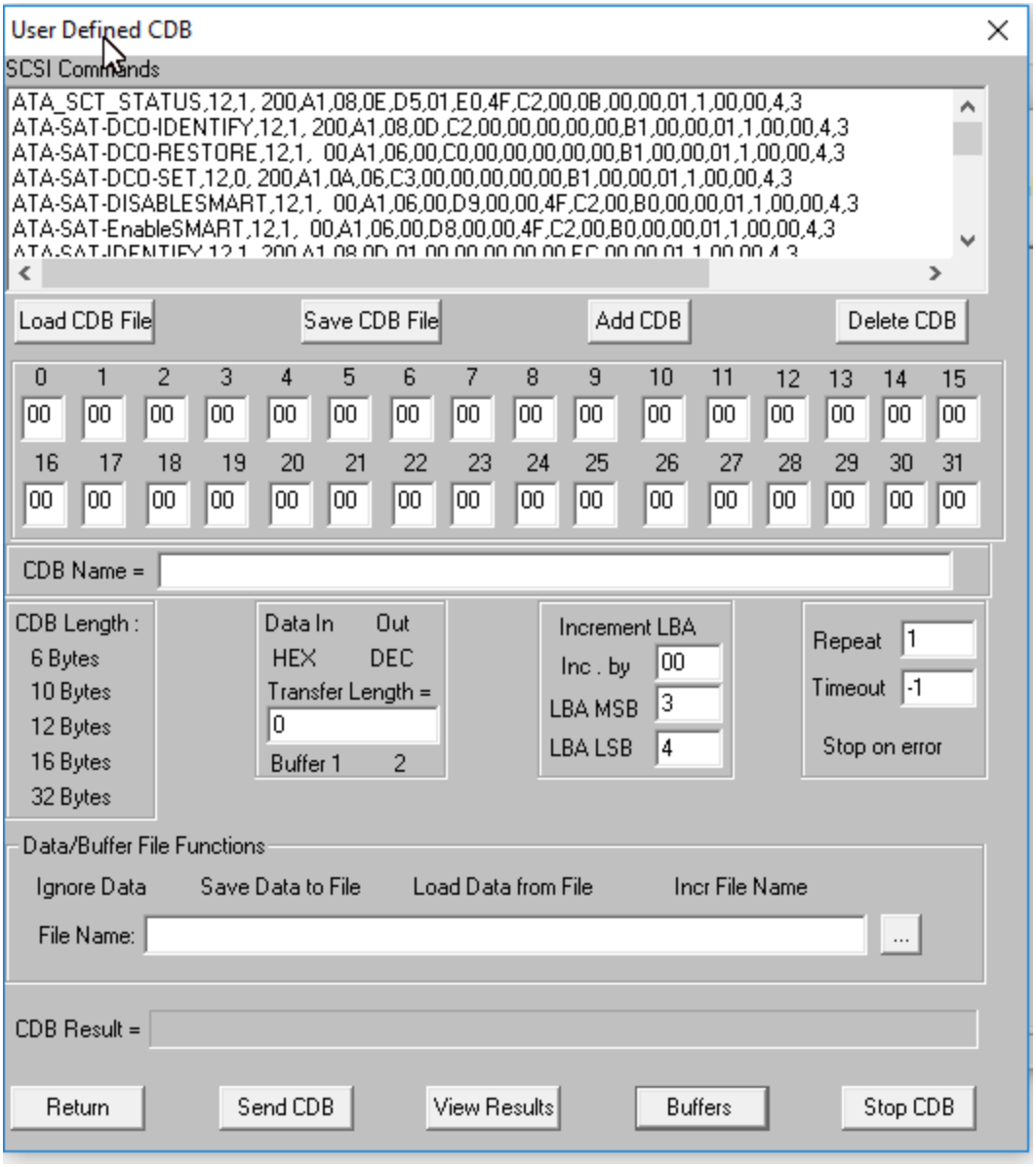
User Defined CDB's

The User Defined CDB function lets you send any CDB to a drive. See the full documentation for details on this function.



SATA Device Reset

This function issues a DEVICE RESET to the selected drive. As he name states it is only compatible with SATA drives.

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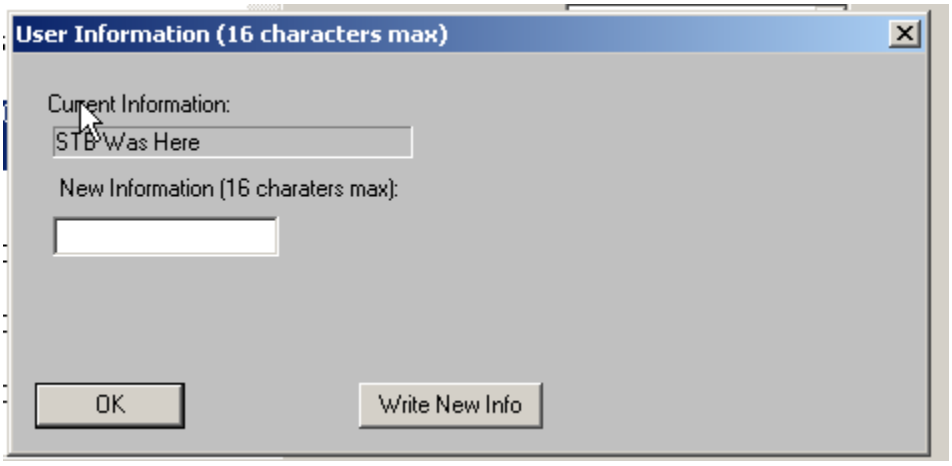
Bus Reset

The Bus Reset choice allows you to issue a hard bus reset to the bus that the device is attached to.

Note: this function may not work with all HBAs. You can confirm the Bus Reset by using the Bus Analyzer Module (BAM) being sure to select capture of "Reset" phases.

User Information

This function lets you view and edit information stored in the drives USER INFORMATION area-



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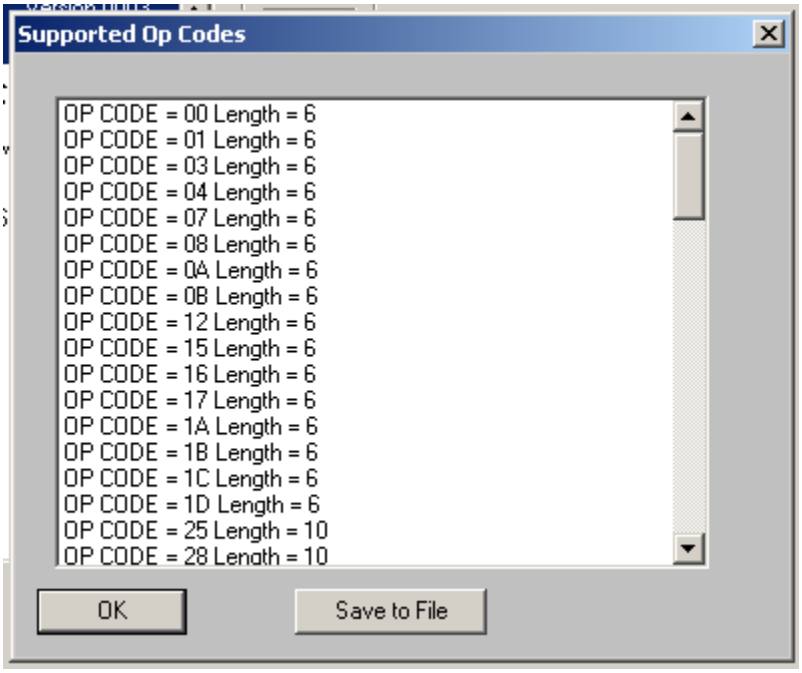
SAS-Report Supported Op Codes

This function, for SAS, SCSI, & Fibre Channel drives, displays all of the CDB Op Codes that the drive implements-



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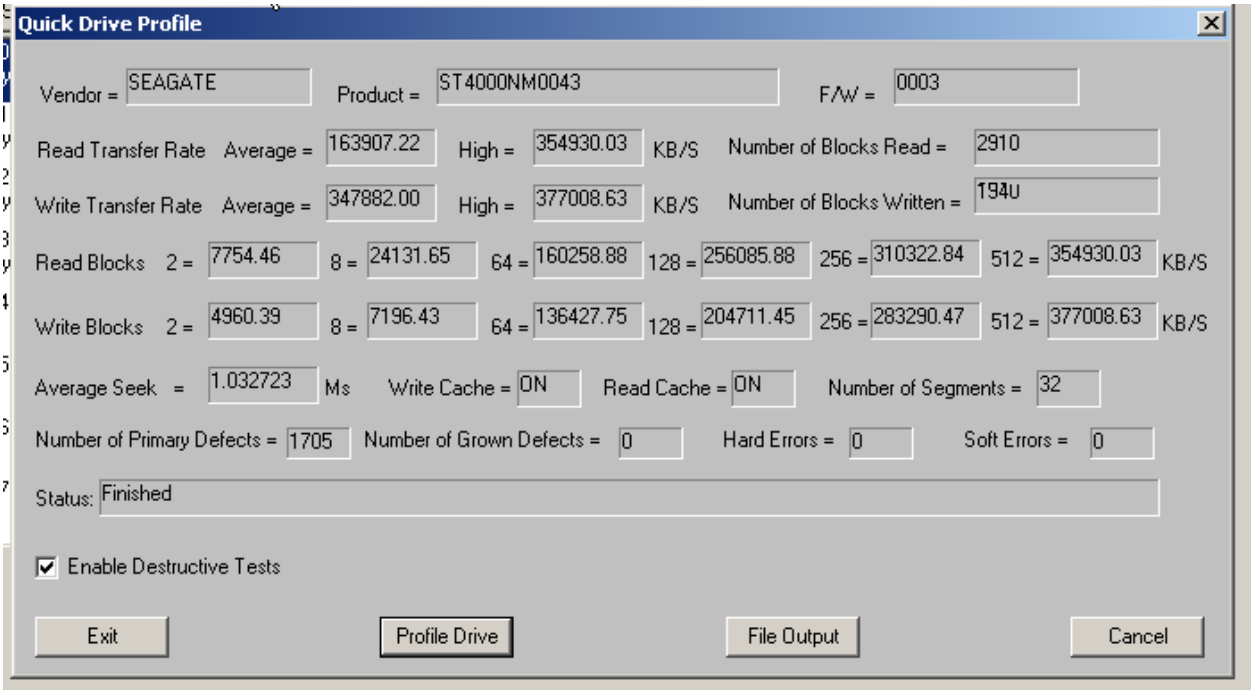
Quick Drive Profile test

Runs the Quick Drive Profile test which shows general drive information, Write 7 Read performance at various blocks-per-transfer settings, average Seek time, and common Mode Page settings –



This concludes the Original Mode Quick Start Guide

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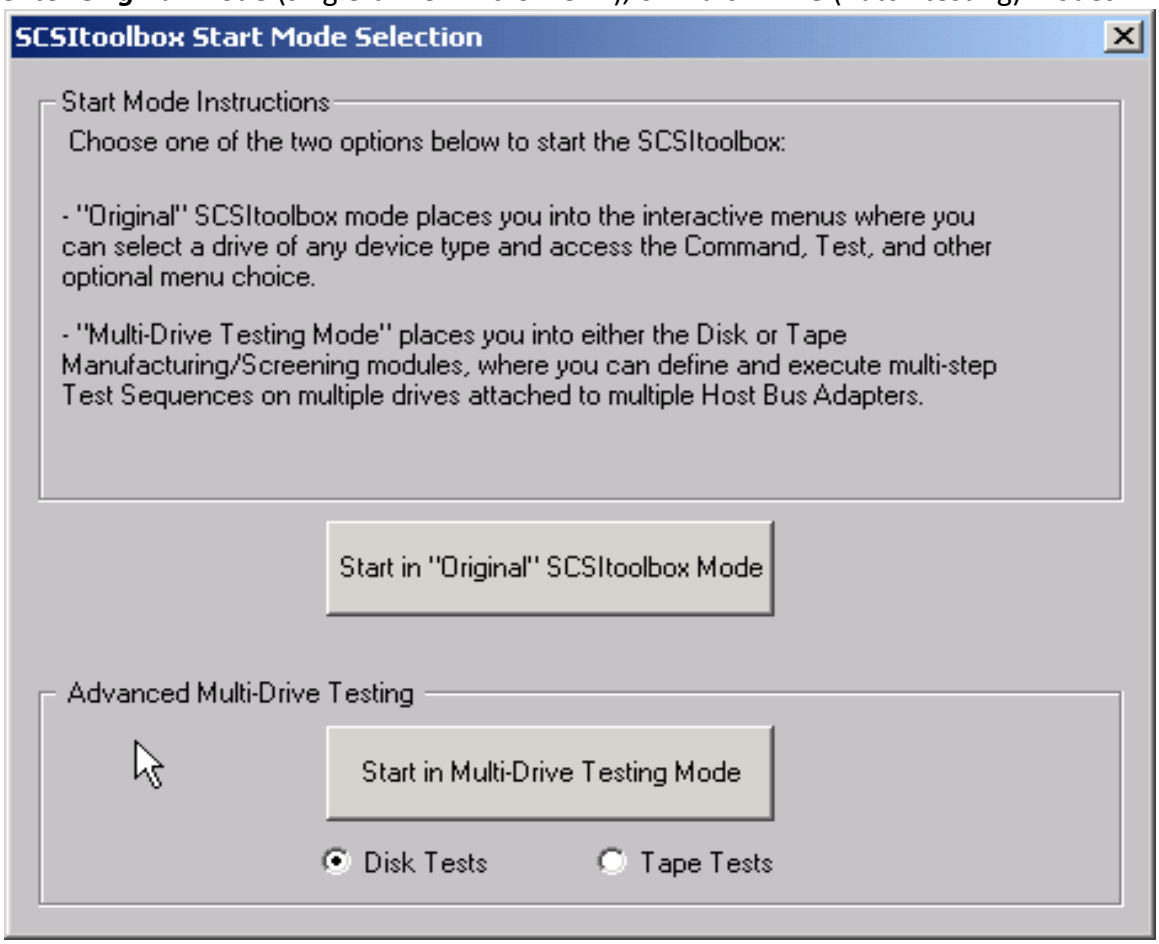
Starting the STB Suite

Start the STB Suite by double-clicking on the STB desktop icon. You will be given the choice to enter ***Original Mode*** (single-drive "micro view"), or ***Multi-Drive*** (Batch testing) modes.



The option "Start in Original SCSIToolbox Mode" will bring up the SCSIToolbox's Main Menu, as seen below.

The option "Start in Multi-Drive Testing Mode" will bring you straight the Disk/Tape Manufacturing Module.

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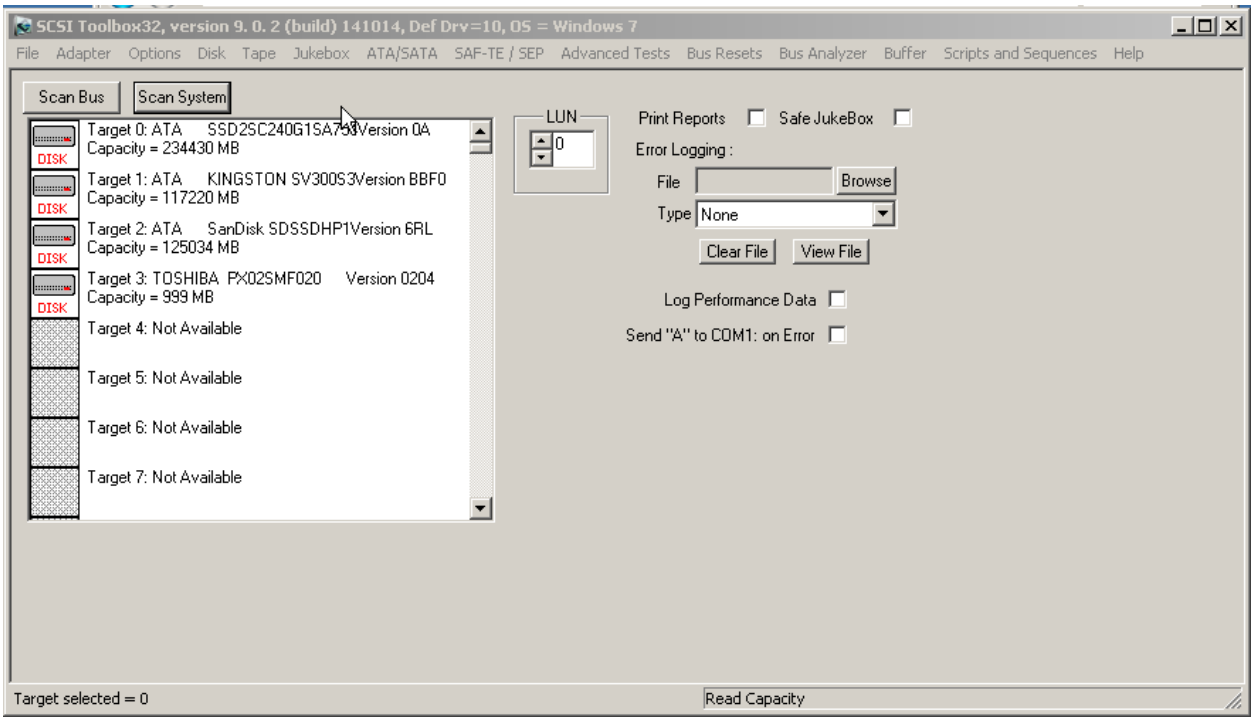

In order to proceed you must select the device you wish to work with.
Original mode works on the drives connected to one HBA at a time.
The STB Suite remembers which HBA you last worked with.
All drives connected to the currently selected HBA are shown in the Device view. You may need to scroll down through the list of Targets to see all connected drives.

You may double-click on any drive shown in the Device view, or you may click ***Scan System*** to see all drives connected to all HBAs.

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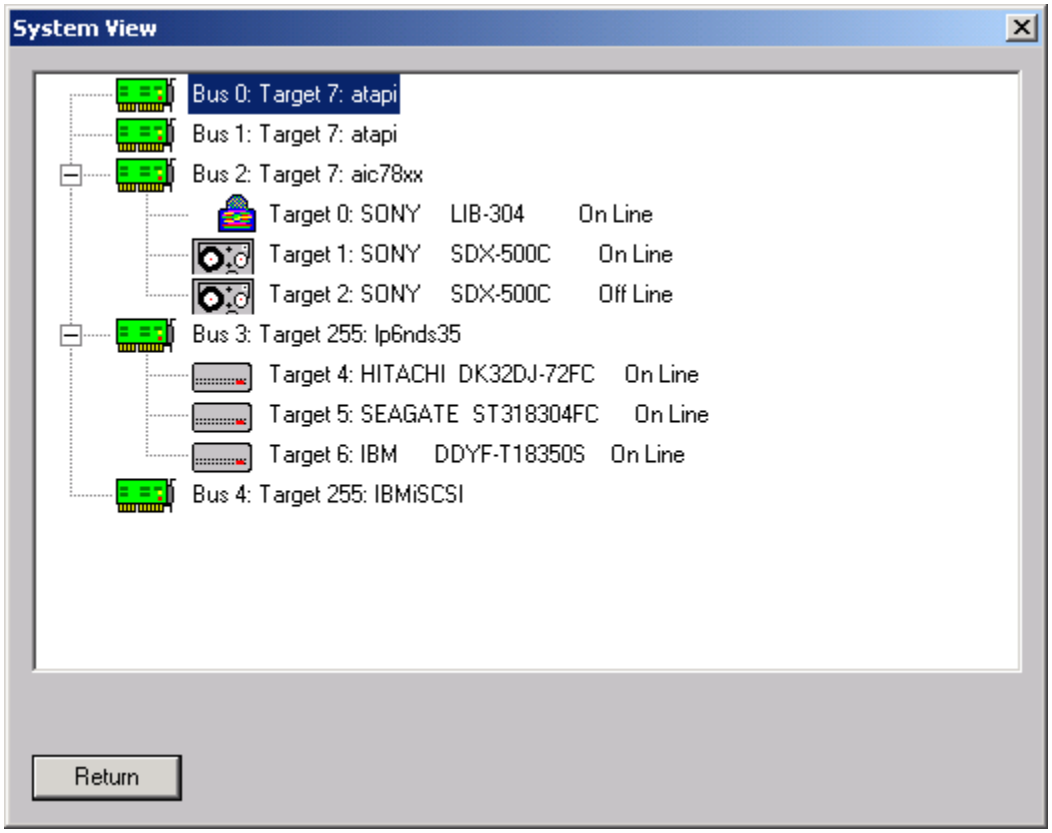
Clicking ***Scan System*** will display the **System View**.
The **System View** shows all HBA' s, all targets, and all LUN's attached to the system:



You may double-click on any device in the **System View** to select it.

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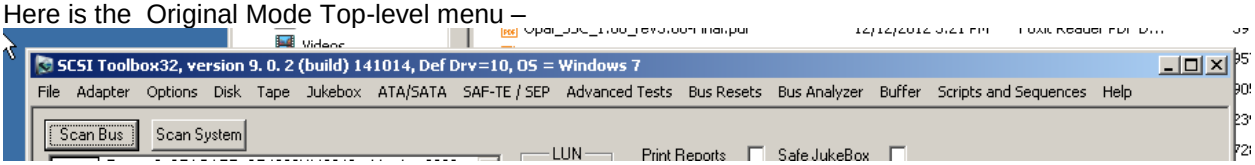
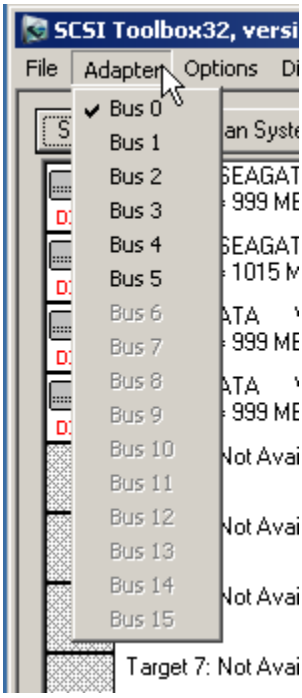
Original Mode Menu Organization

Here is the Original Mode Top-level menu –



The Adapter Menu

The STB Suite can work with up to 16 Host Bus Adapters in the test system. The menu choices which are in bold type are present in the test system and may be selected



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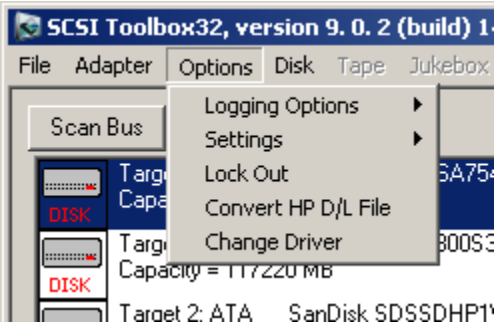
The Options Menu

The following options are available from the Options menu choice:



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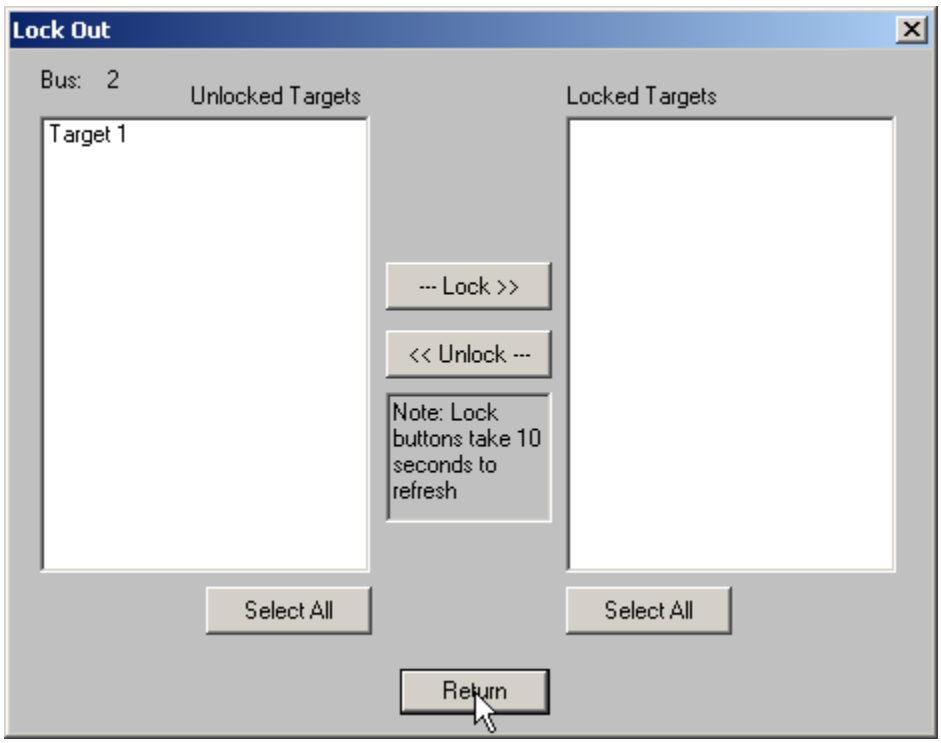
Lock Out (protecting drive(s))

The **Drive Locking** option allows you to specify which drives can be accessed for testing or commands. Select the drive to lock by clicking on it's target number in the left (Unlocked) box. Then click the Lock button to move this drive to the right (Locked) box.



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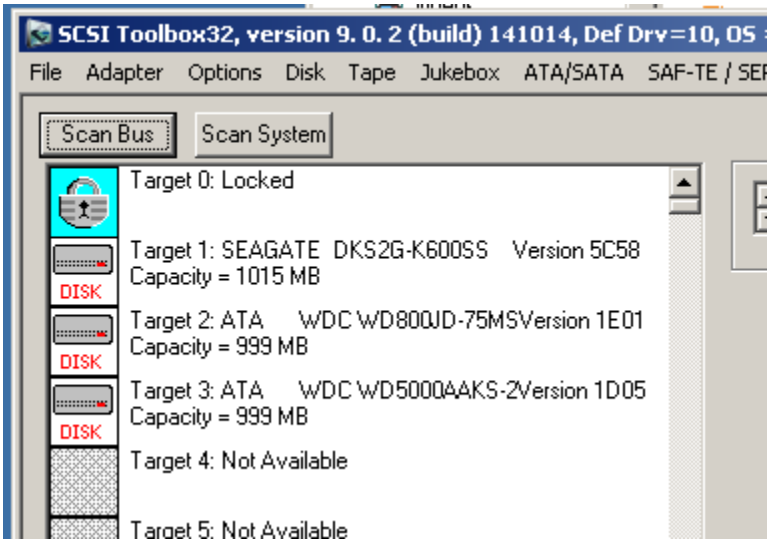
When a drive is locked it will appear like this:



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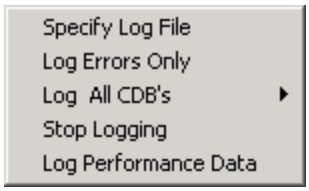
Logging Options



The logging options allow you to specify what type (if any) error logging is to be performed and to specify a file name for the log file.

The logging options are also available on the right side of the main program display.

Logging options are:

- *None* – when an error occurs the error information is displayed on the screen and not logged. If the error occurs during a test the test will stop until the error is acknowledged.

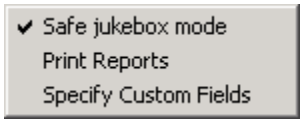
- *Errors only* – any time a SCSI command or test elicits a CHECK CONDITION the error information will be logged to the log file. No information will be displayed on the screen and if a test is running it will not stop.

- *All CDB's* – every CDB issued will be logged. CAUTION – this logging option can create very large log files!

The View File button will display the current log file.

The Delete File button will clear the contents of the log file.

Settings



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Safe Jukebox Mode

This option will control the operation of the JukeBox Module (if installed.) With **Safe Mode** enabled, all media moves (either by command or in a test process), will return the media to its original source. For example, a move from slot 2 to slot 3 will be followed automatically by a move from slot 3 to slot 2. This prevents the user from moving media which is being monitored by some type of system software. Also, moves to a drive must originate in a mailbox, thereby preventing the user from writing to active media in the jukebox.

If **Safe Mode** is turned off, all moves are one way, and no controls are placed on moves or writing to the media in the drives.

Print Reports

When this option is selected a report will be sent to the windows default printer after any test has been run. The reports are generated from one of two template files, report1.dat or report2.dat. The file "report1.dat" will be processed if the test was completed with no errors, the file "report2.dat" will be processed if any errors occurred during testing.

These files are template files that you create with and editor. You can embed the following tokens into these files and the report generator will fill the values in at print time:

%d	prints time and date
%v	prints SCSI VENDOR data
%p	prints SCSI PRODUCT data
%r	prints SCSI VERSION data
%s	prints SCSI serial number
%a	prints SCSI target address
%c	prints capacity
%n	prints name of last test run
%f	prints a form feed
%e	prints test error count
%k	prints SCSI Sense information
%u1	prints user defined field #1
%u2	prints user defined field #2

The sample report1.dat file is as follows (this report will print when a test passes):

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STB Quality Control Report

Todays Date :%d

Manufacturer :%v

Product :%p

Firmware :%r

SCSI Target :%a

Test results for %v %p

Drive PASSED %n

Tested by (Tech) %d

%f

Specify Custom Fields

This option allows the operator to specify two additional user defined fields for the report generator. A dialog box is displayed in which the user can type any character string to be assigned to user defined field 1 or 2.

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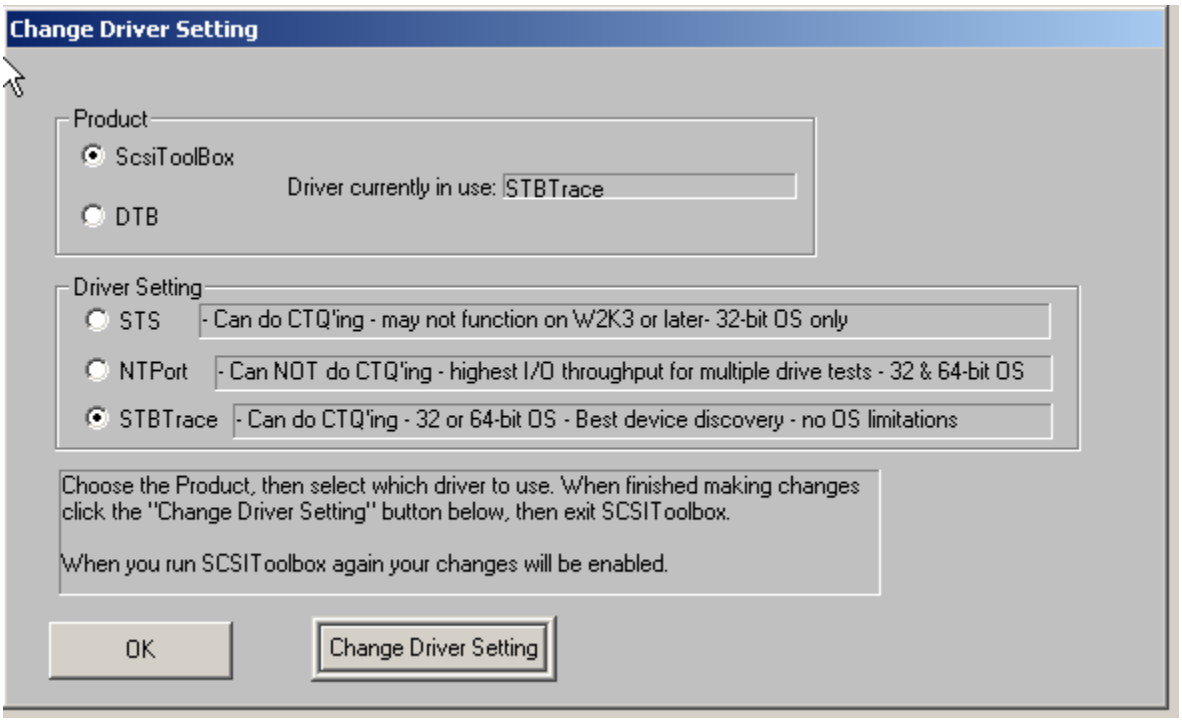
Change Driver

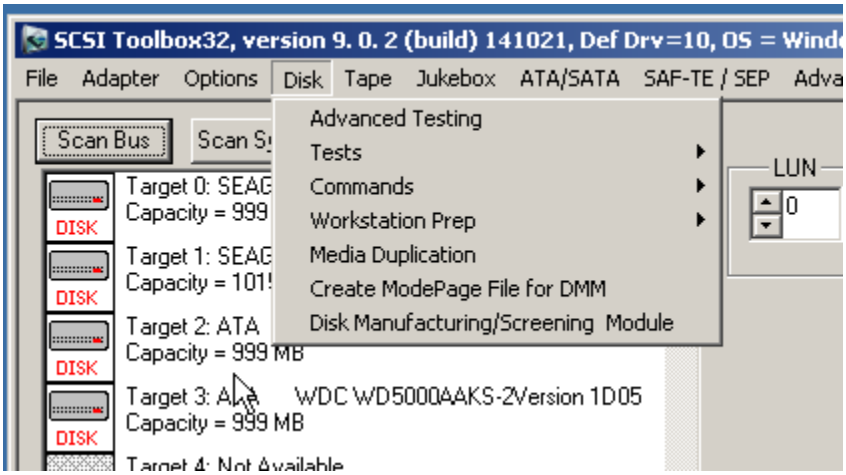
The Change Driver Option lets you specify which driver to use.

In older Operating Systems (prior to Windows 7) there was a need for various drivers. With current OS's the STBTrace driver should always be used.

This menu lets you specify which driver is used by both the SCSI Toolbox and by DTB (Developers Toolbox api) applications. Both should be set to use STBTrace –



The Disk Menu



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Advanced Tests

Launches the Disk Manufacturing Module (DMM)

See the specific DMM documentation

Tests

Choice of pre-defined tests.

See the full Disk Test documentation for details

Commands

Issue single CDB's

See the Disk Commands documentation for details

Workstation Prep

Media Duplication

Block-by-block disk duplication, from one source to many destinations.

See the Disk Media Duplication documentation for details

Create ModePage File for DMM

Creates a "Golden" file with all Mode Page/Parameter settings, for use in DMM.

See the DMM documentation for details

Disk Manufacturing/Screening Module

Identical to Disk->Advanced Tests

Launches the Disk Manufacturing Module (DMM)

See the specific DMM documentation

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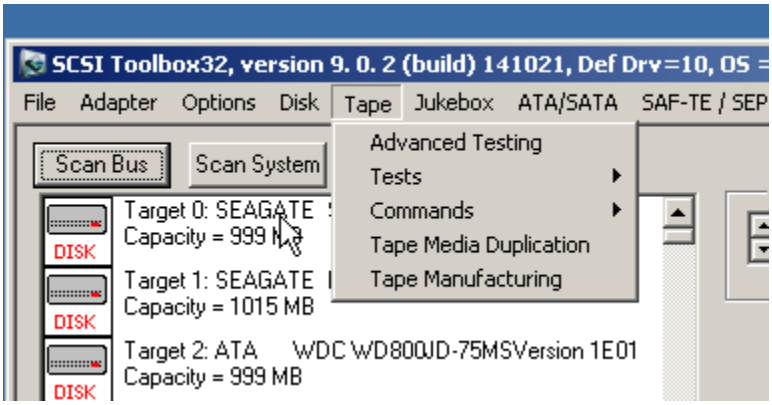
The Tape Menu



Advanced Testing

Launches the Tape Manufacturing Module (TMM)

See the specific TMM documentation

Tests

Various Tape Tests

See the specific Tape Commands documentation

Commands

Issue single CDB's

See the Disk Commands documentation for details

Tape Media Duplication

Block-by-block tape duplication, from one source to many destinations.

See the Tape Media Duplication documentation for details

Tape Manufacturing

Identical to Tape->Advanced Testing

Launches the Tape Manufacturing Module (TMM)

See the specific TMM documentation

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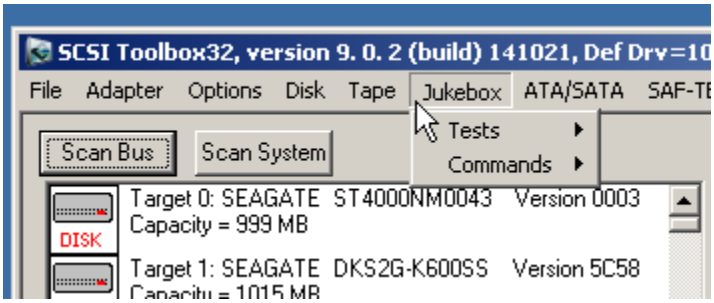
The Jukebox Menu



Tests

Various Jukebox-Library Tests

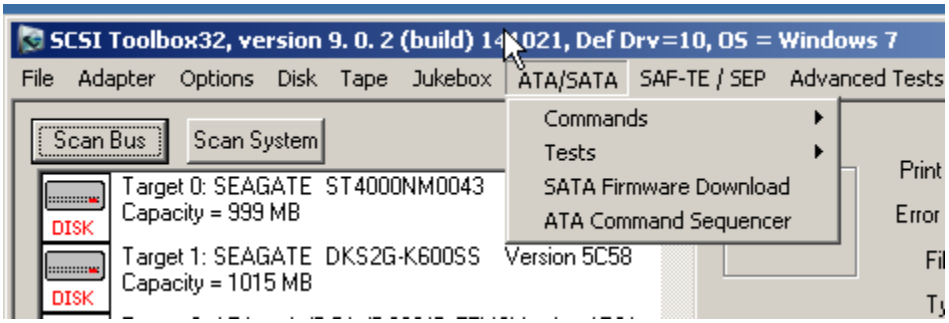
See the JukeBox Test documentation for details

Commands

Issue Jukebox-Library commands

See the Jukebox Commands documentation for details

The ATA/SATA Menu



Commands

Tests

SATA Firmware Download

ATA Command Sequencer

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The Advanced Tests Menu

Disk Tests

Launches DMM

See the DMM documentation for details

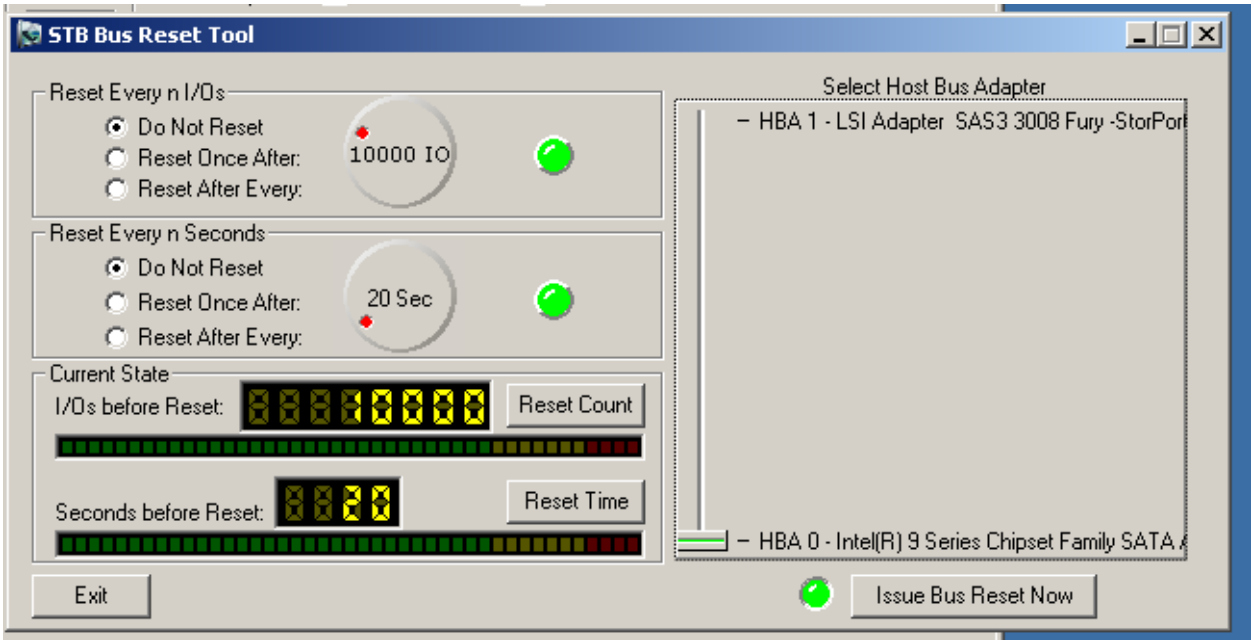
Tape Tests

Launches TMM

See the TMM documentation for details

The Bus Resets Menu

This menu choice launches the Bus Reset Tool –



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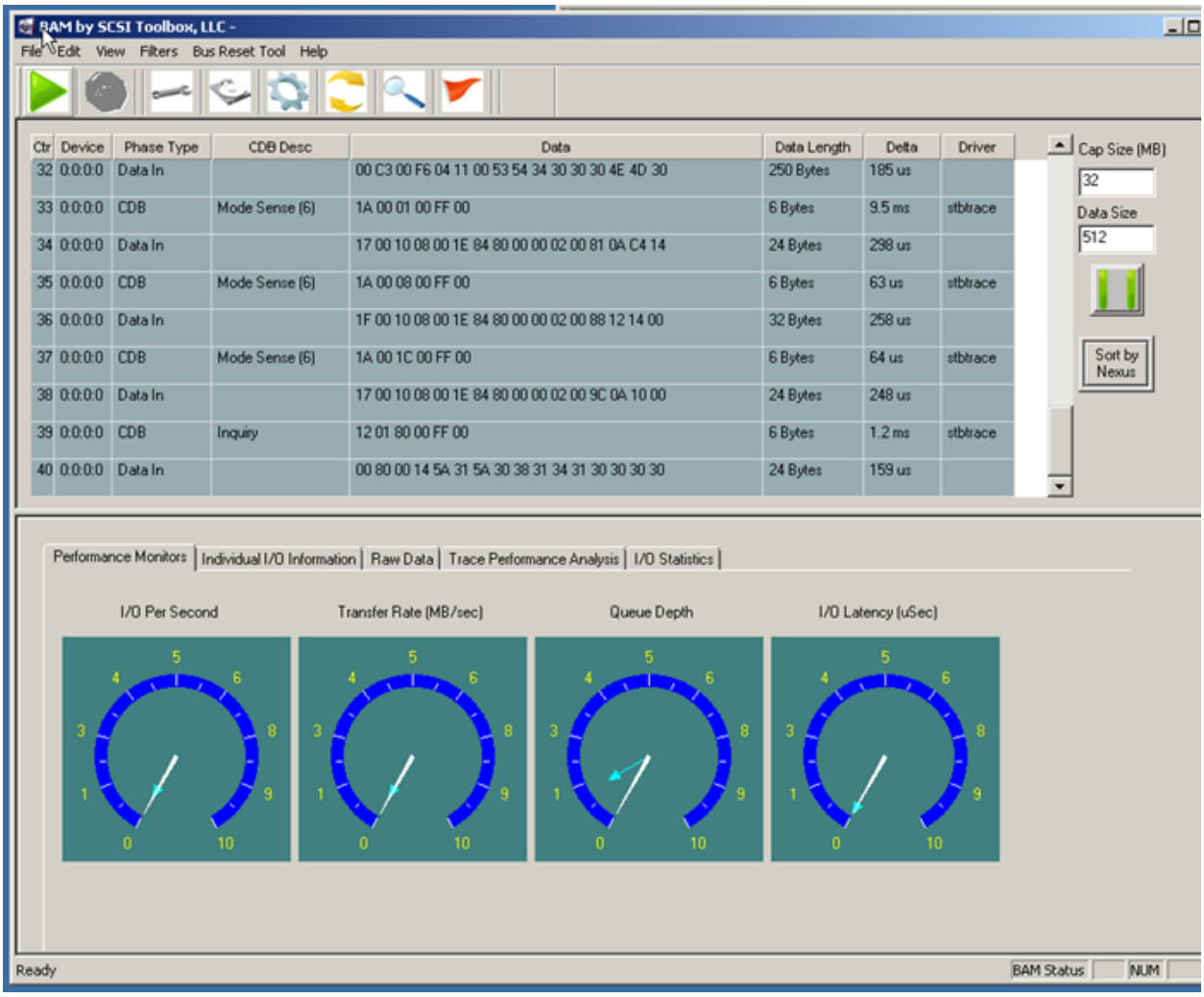
The Bus Analyzer Menu

Launches the Bus Analyzer Module (BAM)



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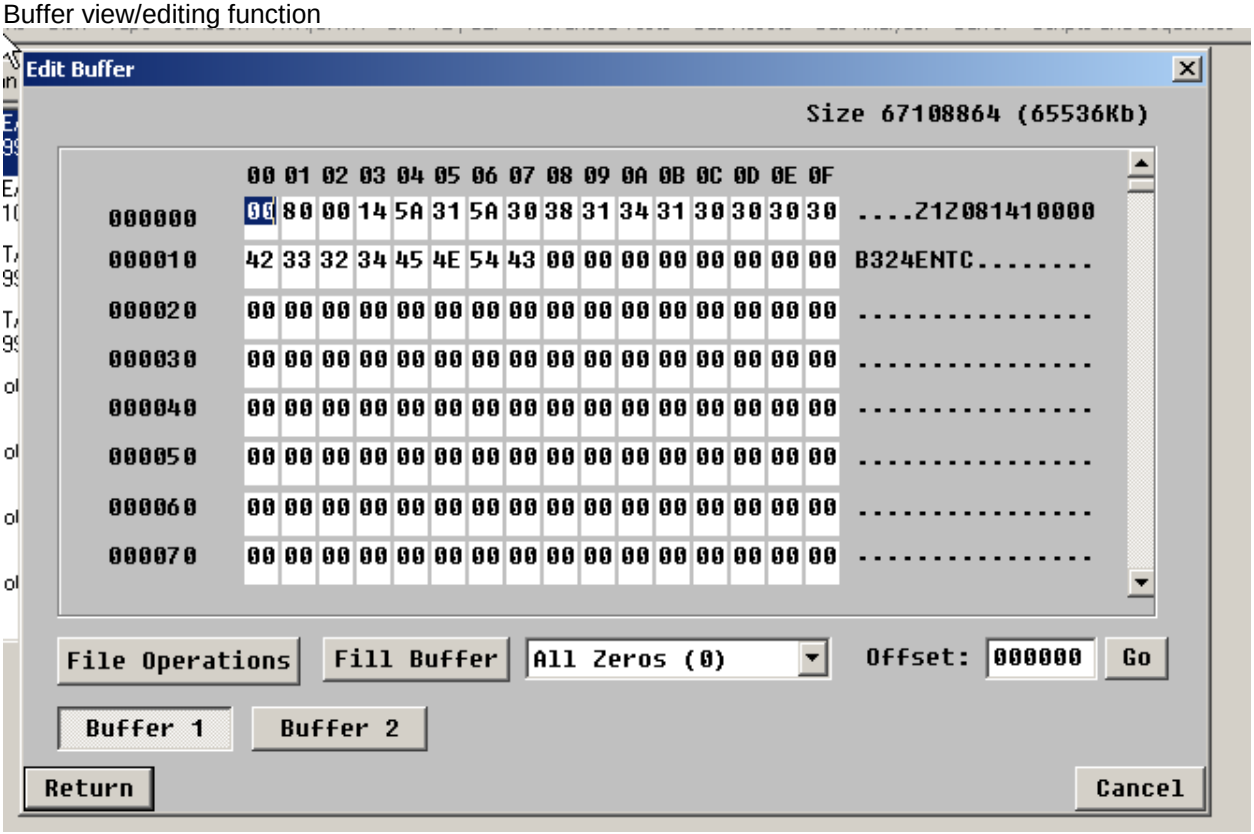
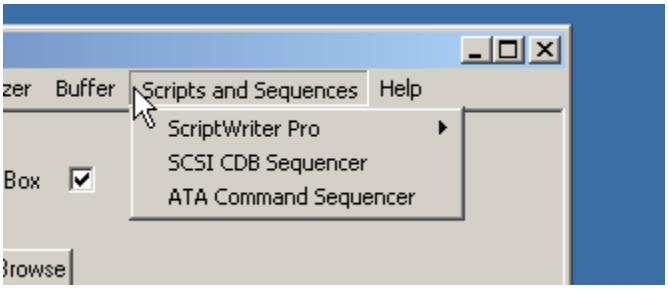
The Buffers Menu

Buffer view/editing function



The Scripts and Sequences Menu



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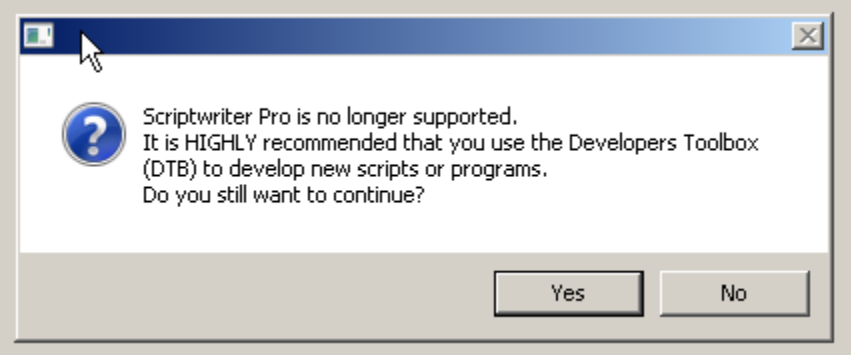
ScriptWriter Pro

Launches the ScriptWriter Pro programming environment. SWP is a Visual Basic for Applications (VBA) engine.

SWP is no longer supported –



See the SWP documentation for details

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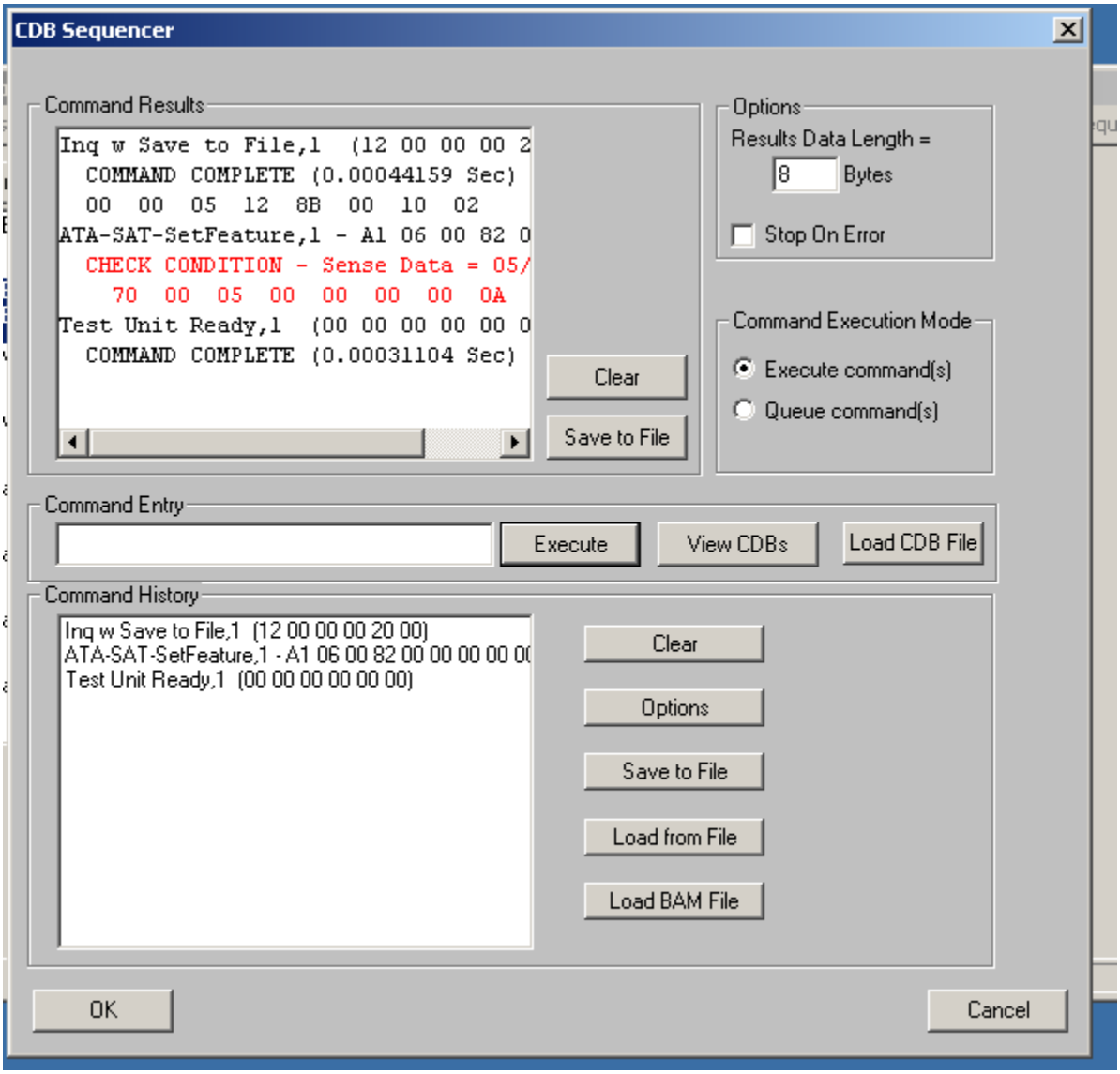
SCSI CDB Sequencer

Allows sequences of CDBs to be issued –



See the Disk->Commands->CDB Sequencer documentation for details

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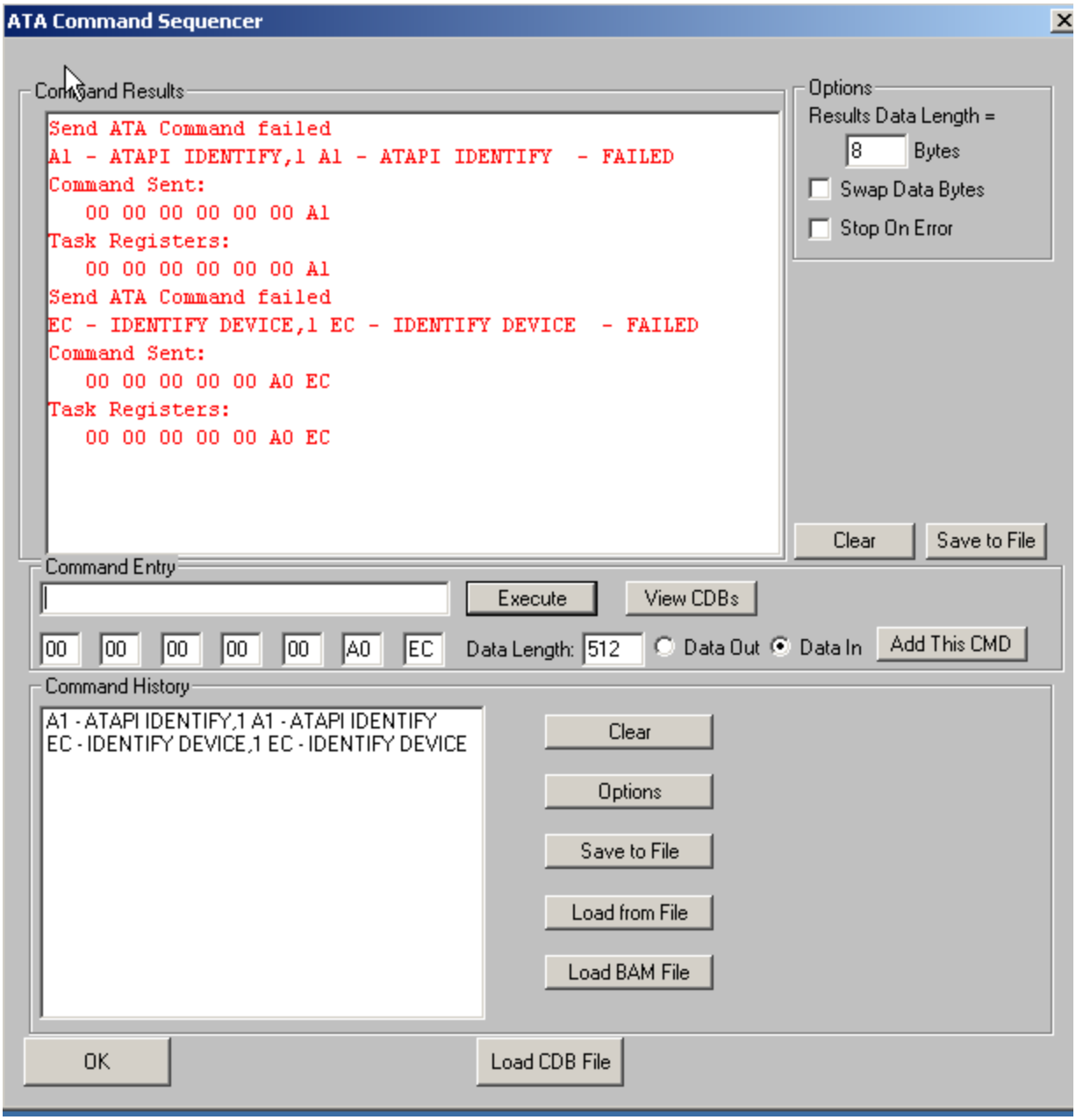
ATA Command Sequencer

Allows sequences of ATA commands to be issued.

Note: Not compatible with AHCI connected ATA devices



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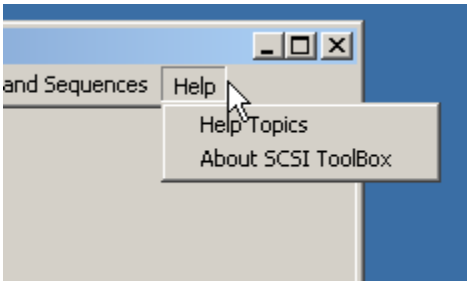
The Help Menu



Help Topics

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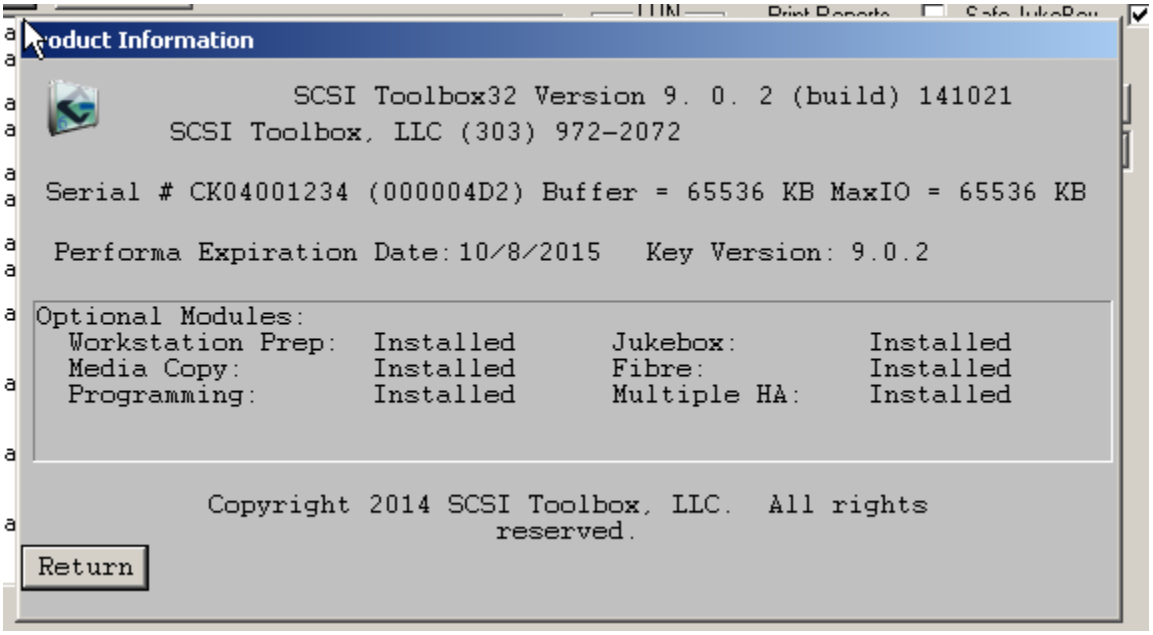
About

Information about the STB Suite version, your hardware key serial number, Performa expiration date, etc



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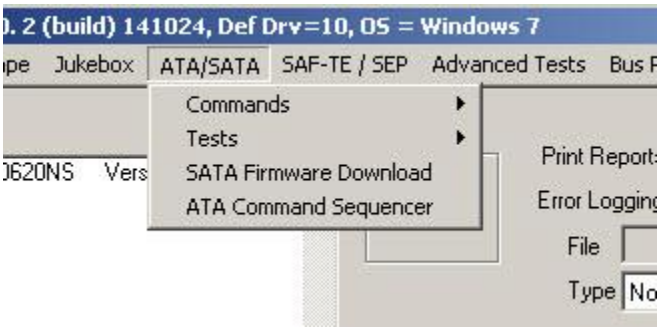
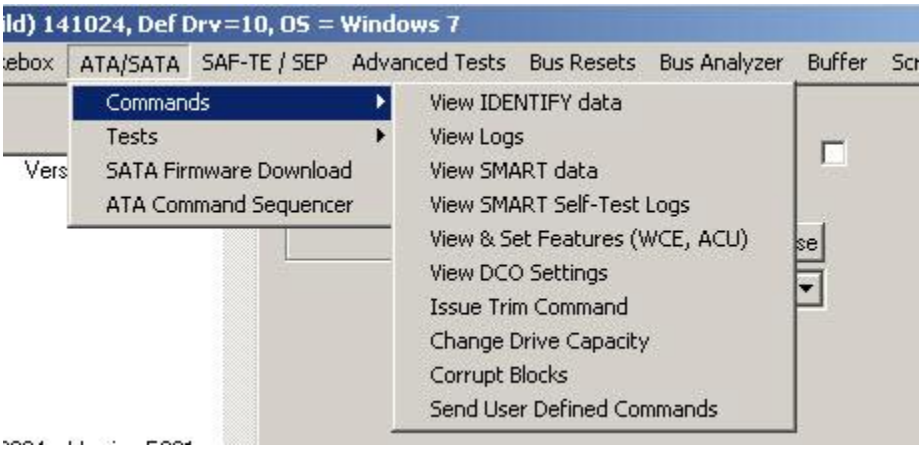
ATA & SATA Commands & Tests

Use the Main menu ATA Commands choice to choose an ATA function



SATA Commands



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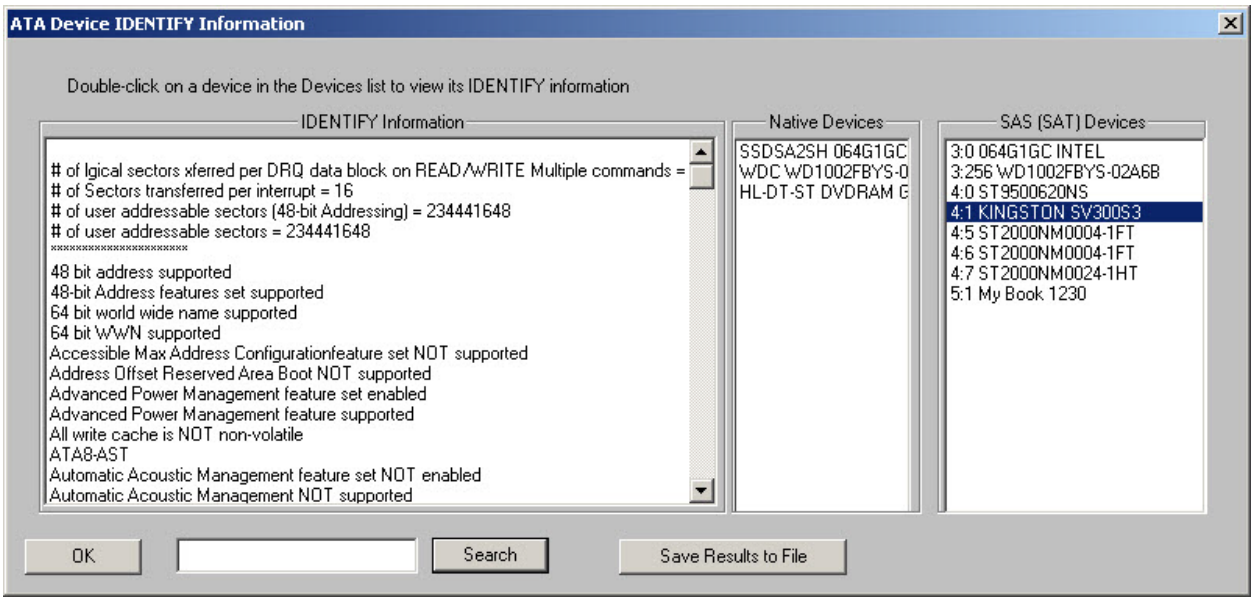
View Identify Data

Use this function to view and save a SATA drives INDENTIFY data

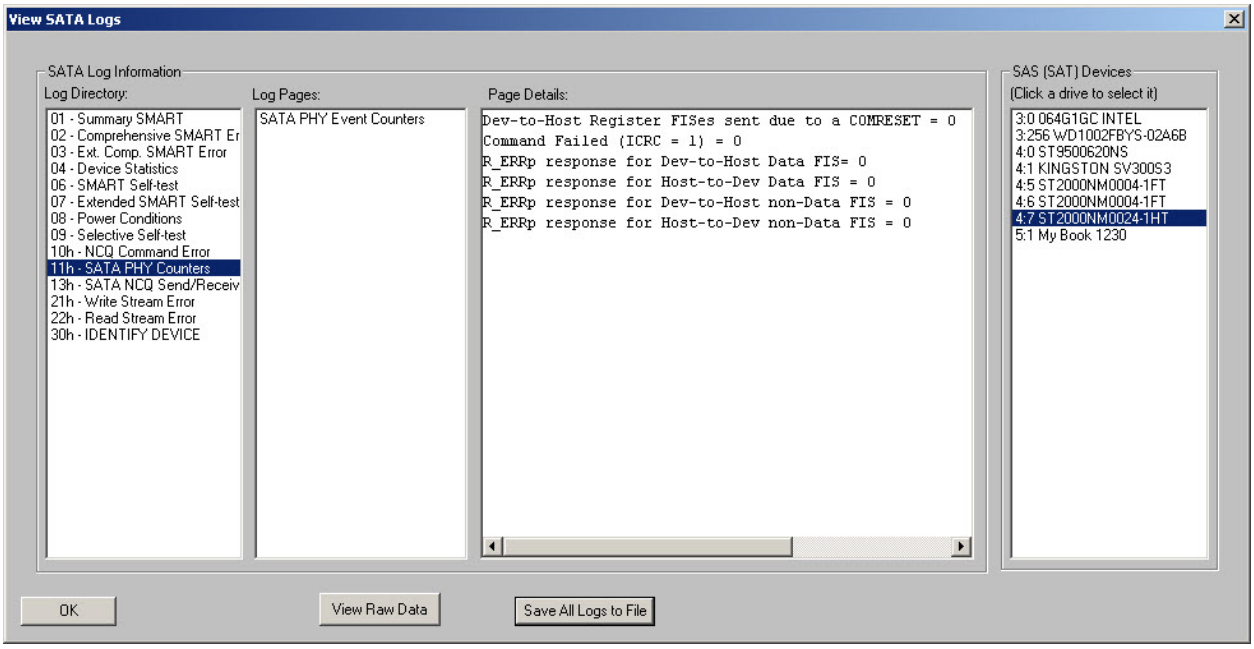
Select the drive to inspect from either of the two device lists by clicking on the drive



View Logs

Select the SAT-attached drive to examine from the drive list.

Then select the Log Page of interest. If the selected Log has multiple Pages then select the Page from the Log Pages list by double-clicking on it.



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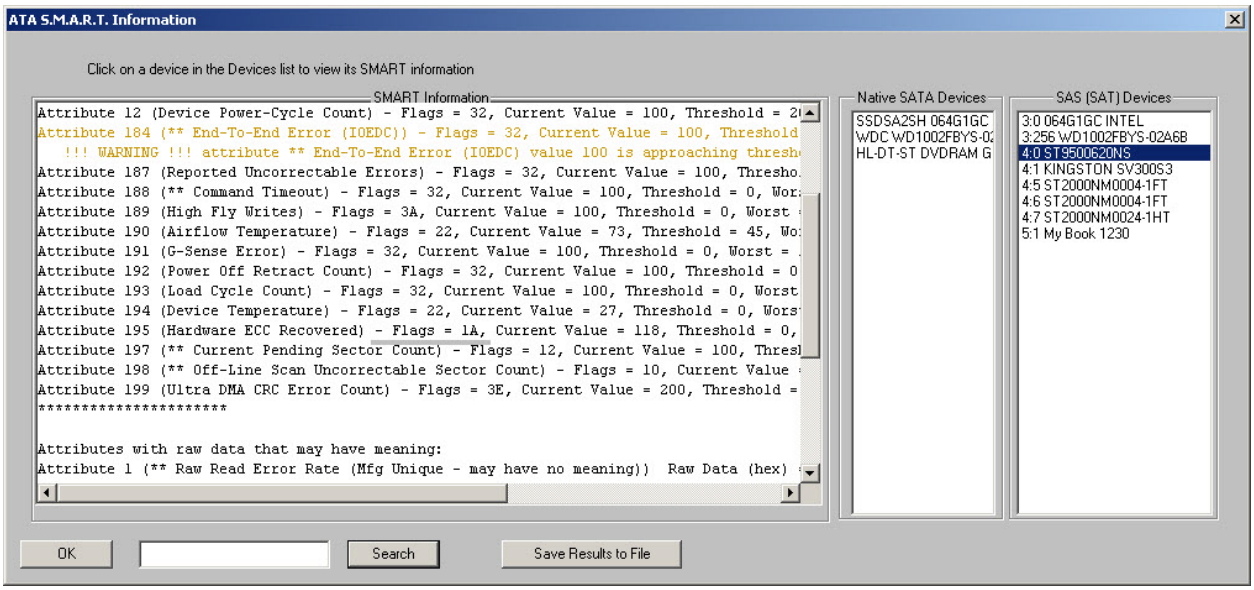
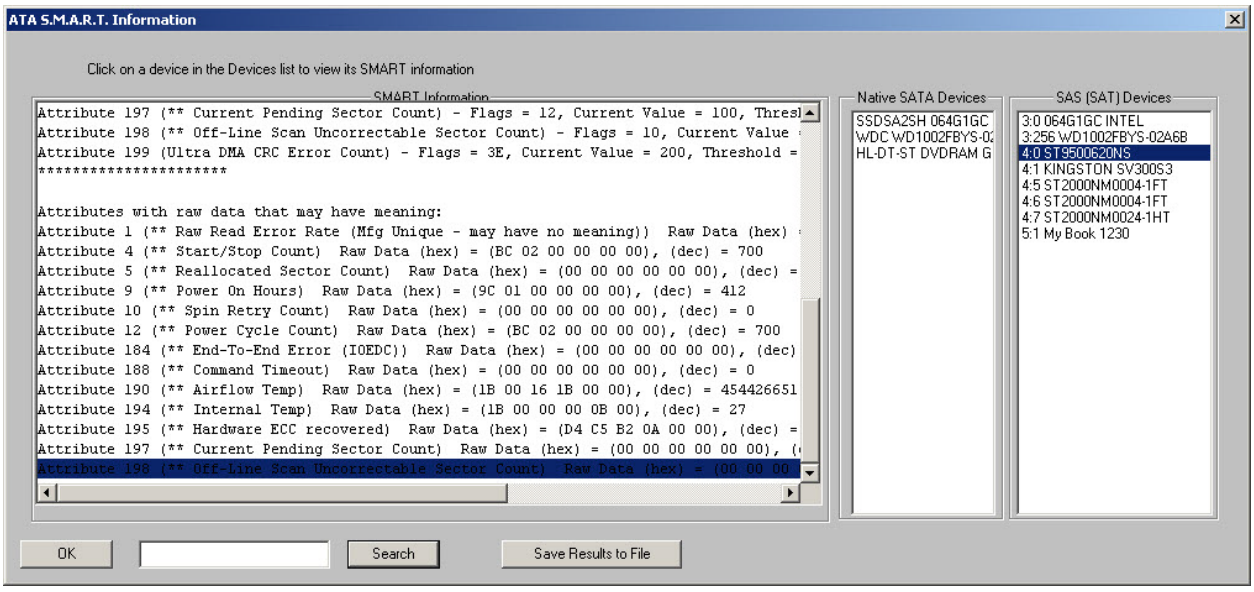
View SMART Data

Select the drive to examine from one of the drive lists.



The top of the SMART Information list shows each SMART ATTRIBUTE which the drive reports, showing its Flag value, Current Value, Threshold Value, and its RAW Value.

The bottom of the SMART Information list shows all ATTRIBUTES which likely have meaningful RAW data –



Note – there is no “official” documentation describing what any SMART ATTRIBUTES actually mean, nor how to interpret them. The best source of this information is found at the SATA SMART Wiki page –

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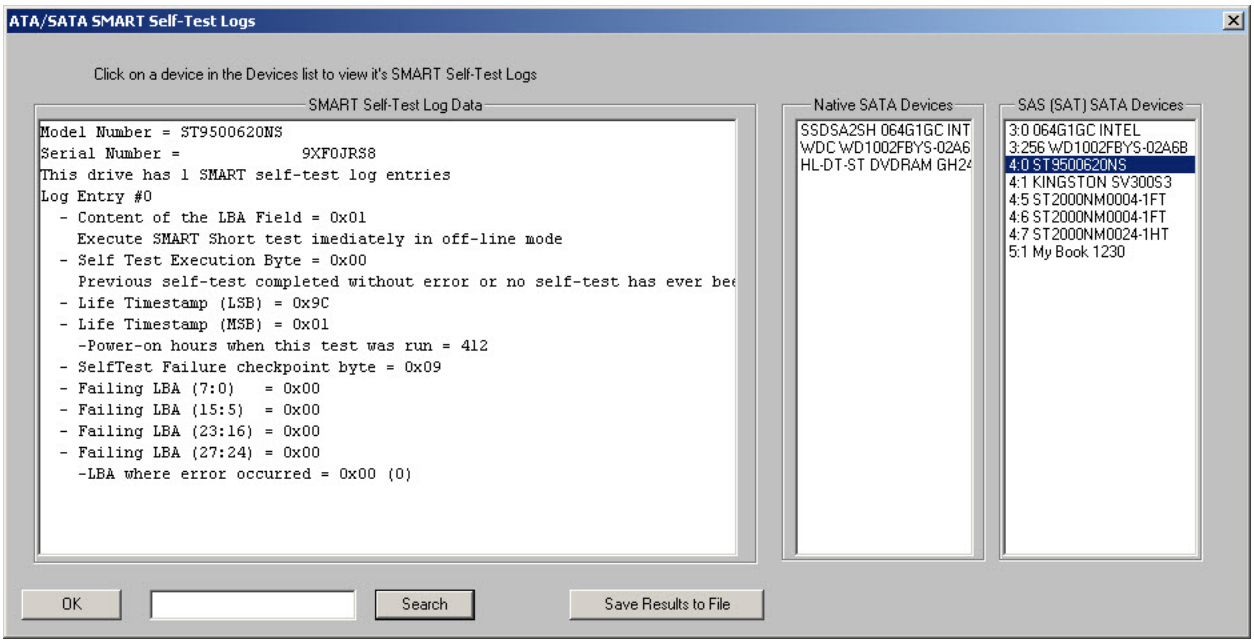
SATA SMART Wiki Page

View SMART Self-Test Logs

Select the drive to examine from the drive list by clicking on it



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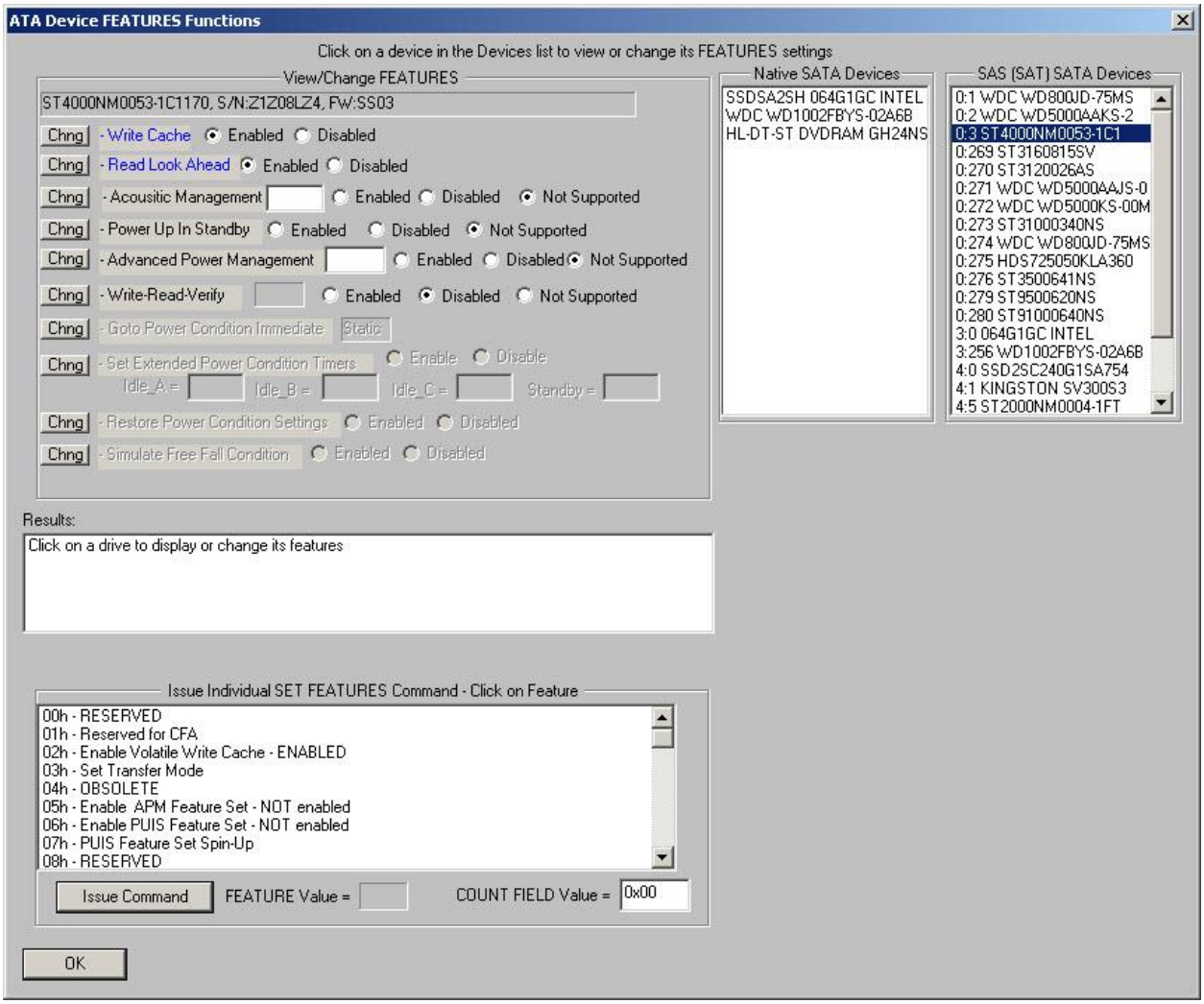
View & Set Features

Select the drive to examine from one of the drive lists. The top part of the display shows which FEATURE SET(s) are implemented, enabled or disabled. You may select a FEATURE, change its setting, and click ***Chng*** to save the change.



The bottom part of the display lists all defined FEATURE SETs and if the selected drive implements a particular FEATURE it will display if the FEATURE is enabled or disabled.

You may select any FEATURE and click Issue Command to try to set that FEATURE/setting

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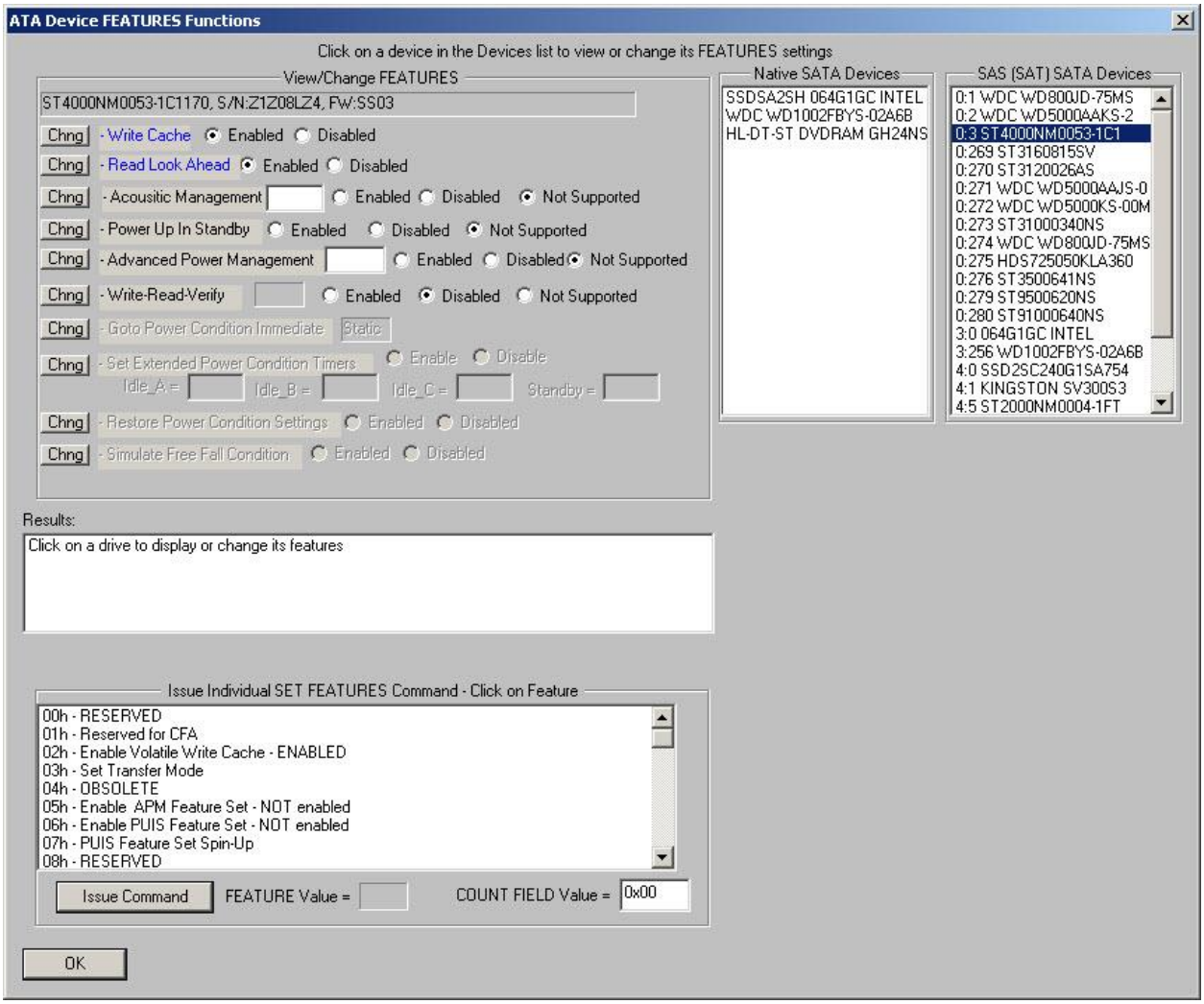

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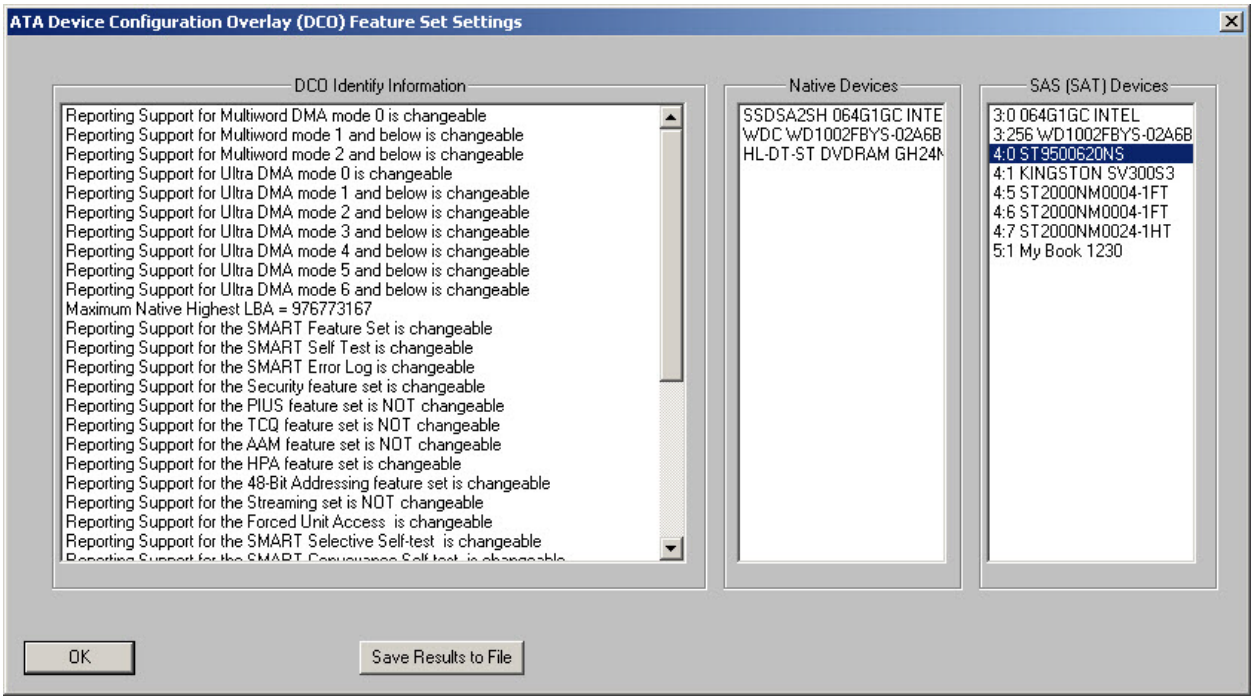
View DCO Settings

Click on a drive from one of the drive lists to examine its DCO settings



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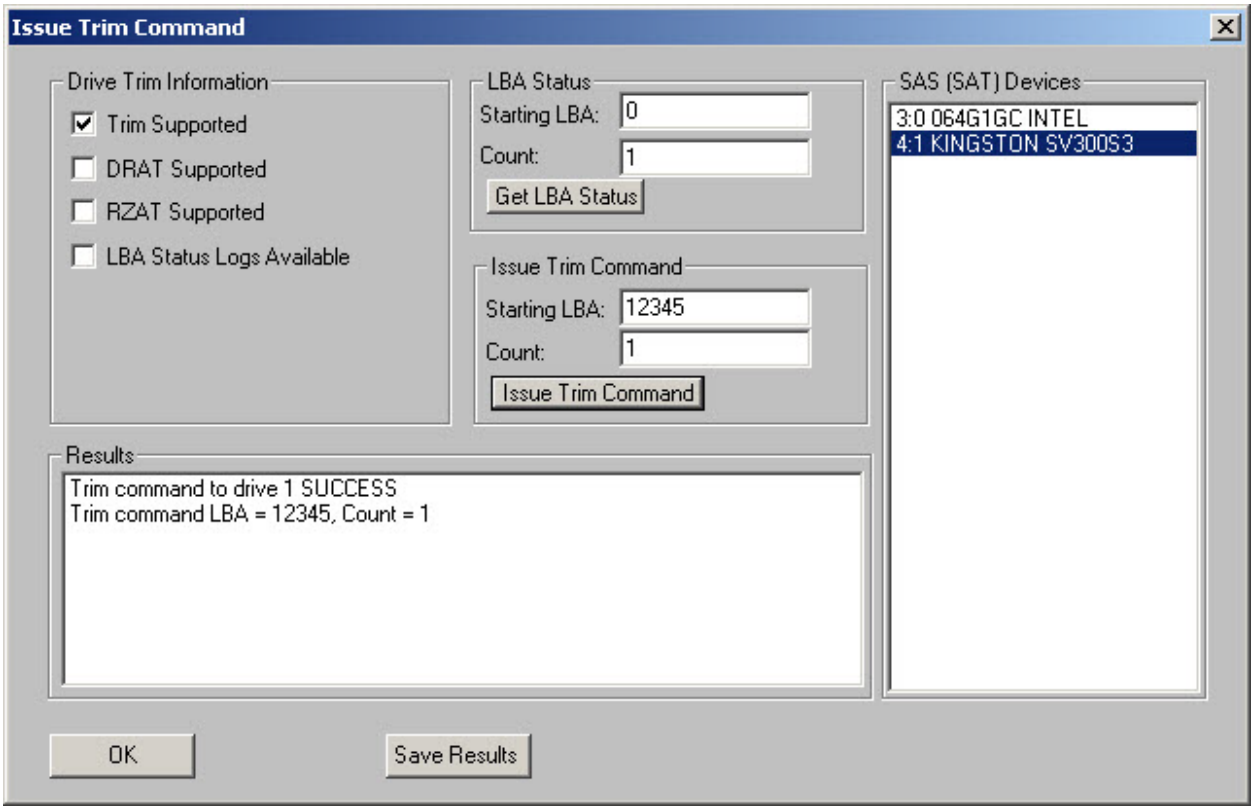
Issue Trim Command

Select a SSD drive from the list of SAT devices. Which Trim options are available will be shown via the check boxes.

If the SSD supports the SSD LBA STATUS Logs then you may check the Trim status of any LBA by entering the LBA and Count and clicking ***Get LBA Status***.

You may enter a starting LBA and a LBA count then clicking ***Issue Trim Command*** to issue Trim commands to the drive.



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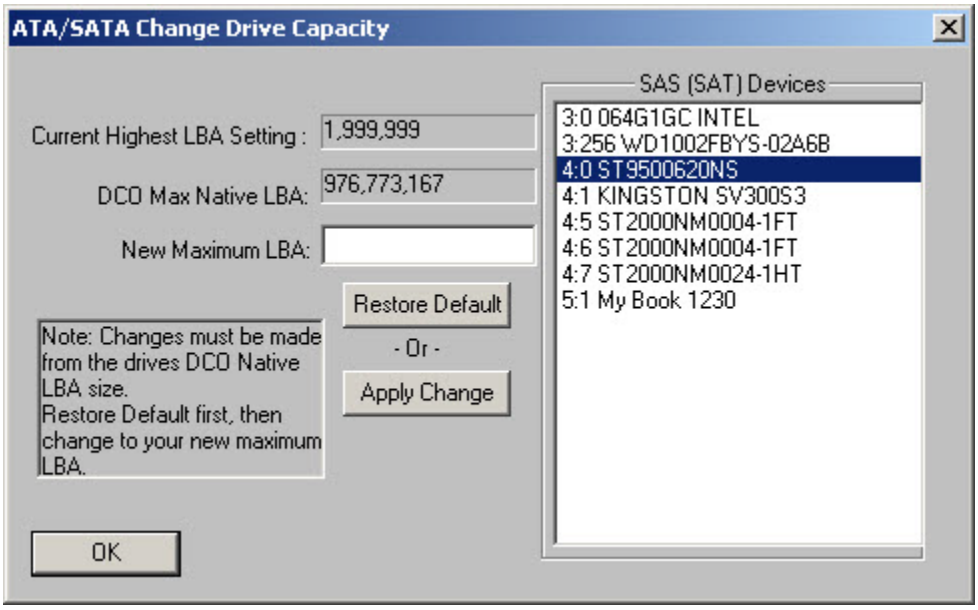
Change Drive Capacity

Select the drive to change from the SAT drive list.

The Current and CDO Maximum Highest LBA will be displayed.



Change Capacity

You may enter a new Maximum LBA value and change the drive to that by clicking Apply Change.

Restore Default

Clicking Restore Default will restore the drive to its native capacity.

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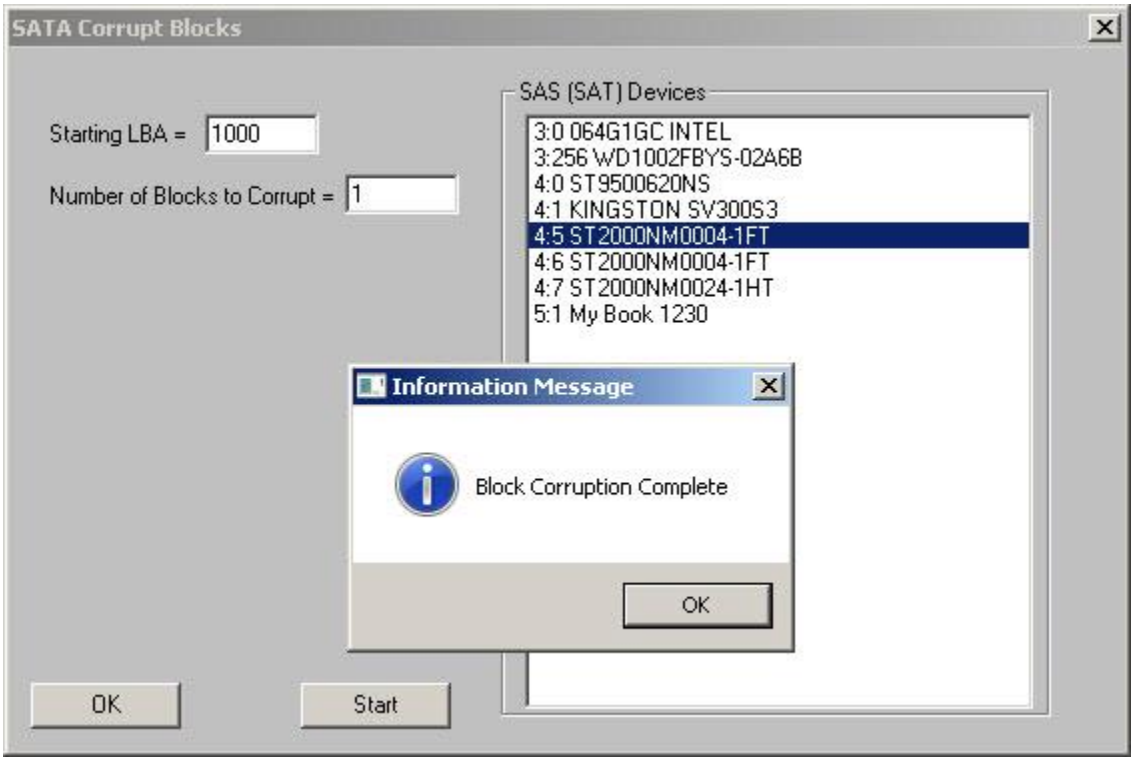
Corrupt Blocks

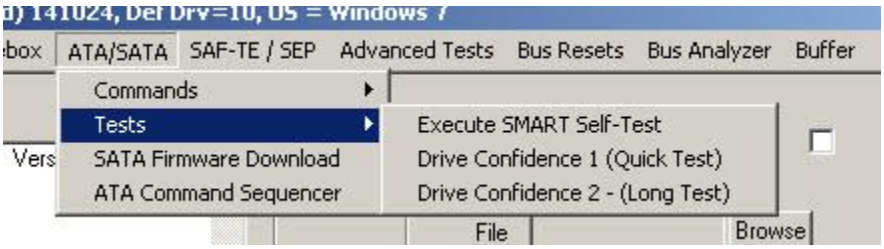
You may corrupt blocks on a drive using the Corrupt Blocks function.

Select the drive, enter the ***starting LBA*** and ***number of blocks to corrupt*** values, then click ***Start***



Send User Defined Commands

SATA Tests



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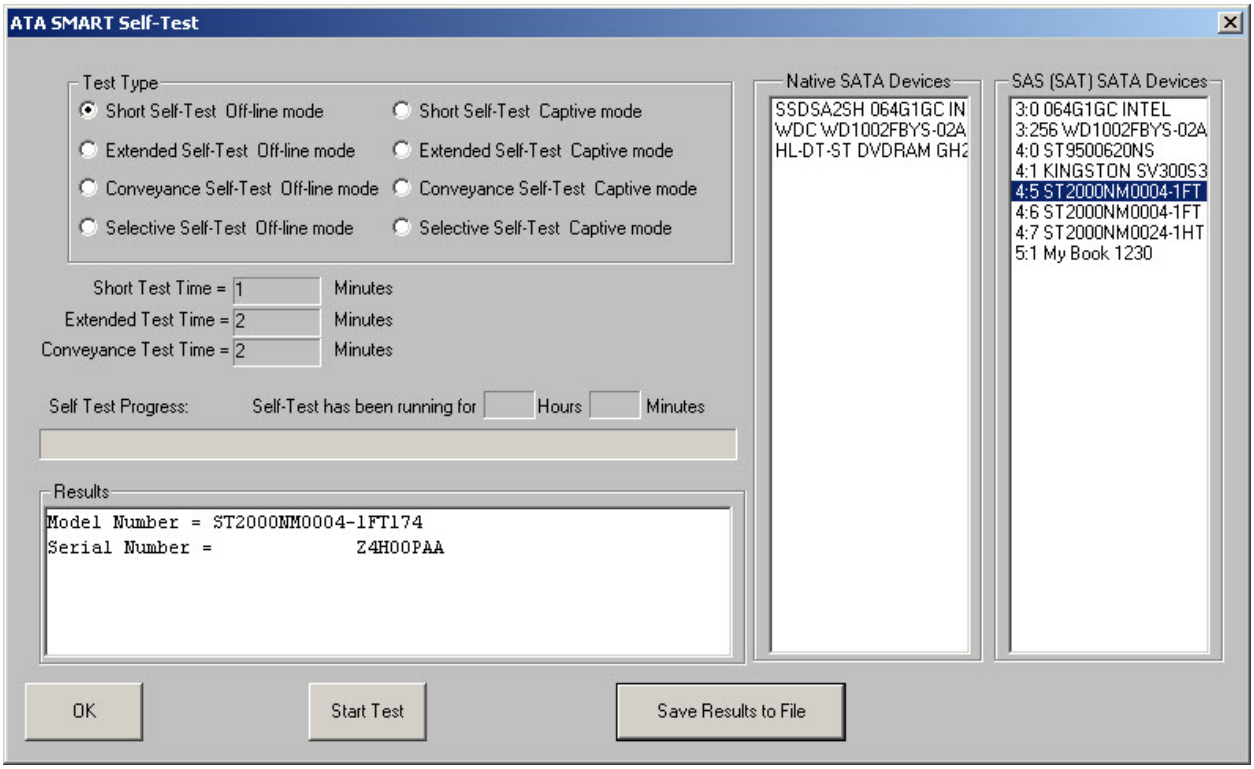
Execute Self-Test

Select the drive to examine from the drive lists.

The approximate time to complete the various Self-Tests will be displayed.

You may execute any supported SATA SMART Self-Test by selecting the Self-Test type then clicking ***Start Test.***

Self-test progress will be shown and once the Self-Test completes its status and test time will be displayed in the ***Results*** window



Drive Confidence Test 1

Drive Confidence Test 2

SATA Firmware Download

Use this function to download firmware to a native (motherboard) attached SATA port.

Note: a better choice for SATA Firmware download is the Disk Manufacturing Module (DMM) FW Download test step. It will allow you to download firmware to multiple SAT-attached (SAS HBA) SATA drives.

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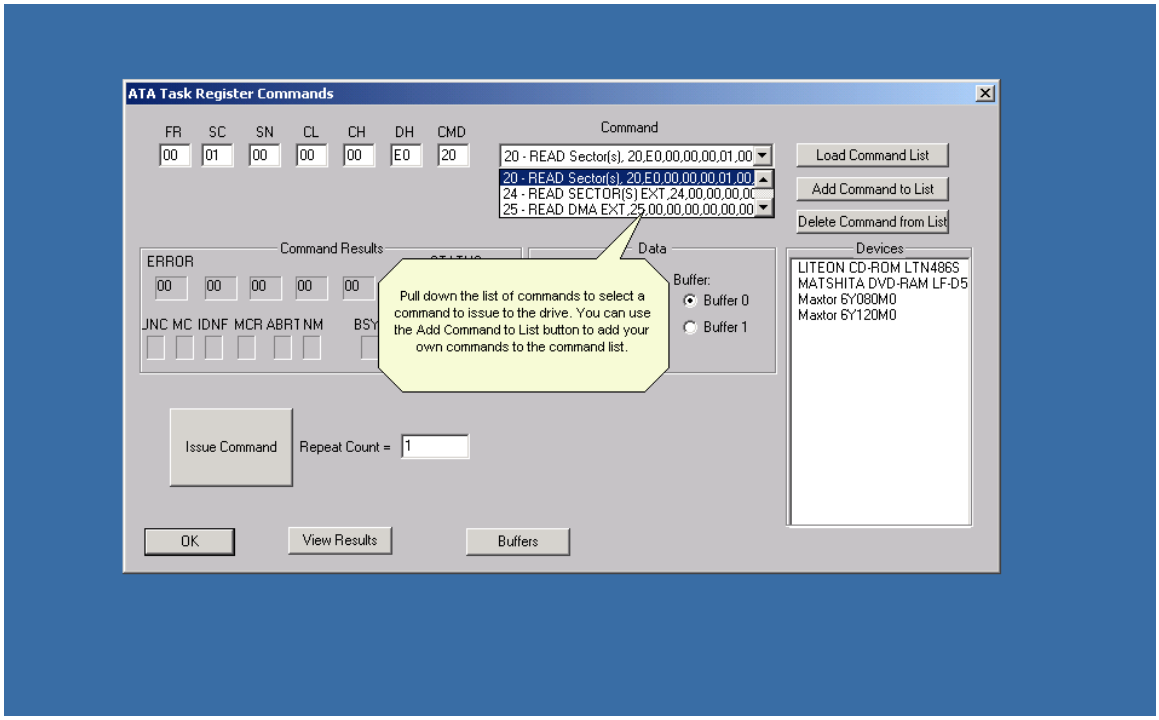
The ATA User-Defined Command menu

The User Defined Command menu lets you :

- choose commands from a list
- add new or custom commands to the command list
- issue commands to any ATA device
- view all status / error bytes
- view data

Note: This function will not work on AHCI configured SATA drives

Commands are accessed from the pull-down Command list. When you click on a command in the list the seven ATA task registers are filled with the data that defines that command.



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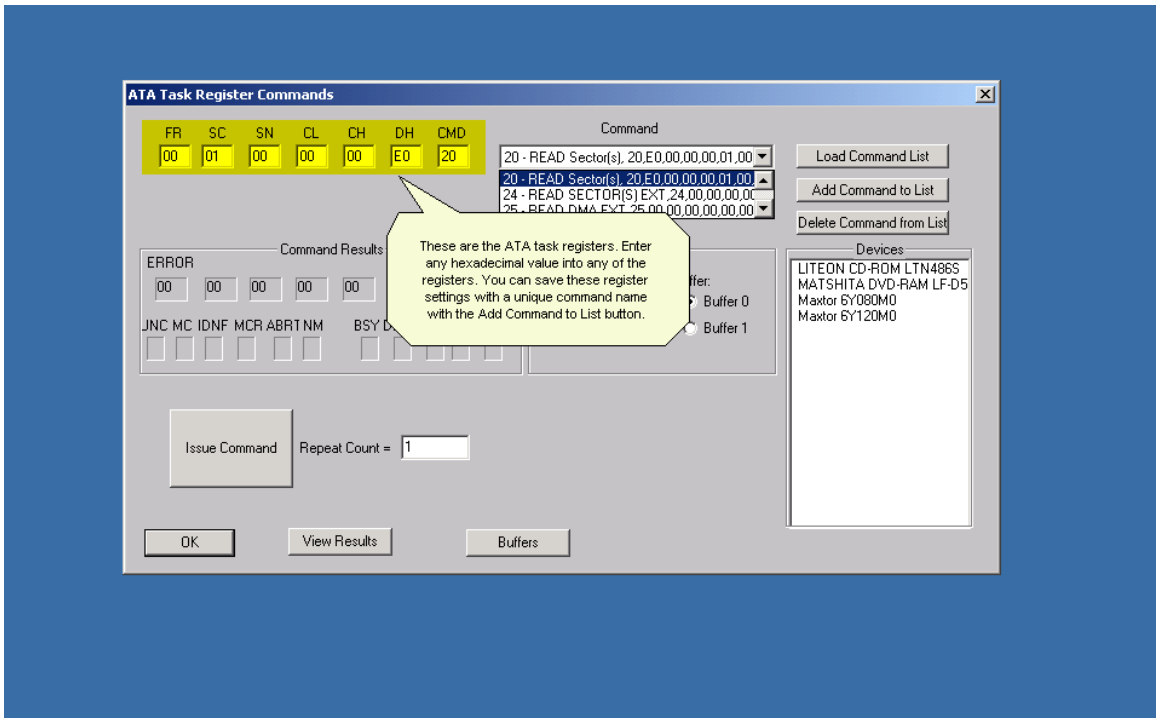
You can also enter any data you wish in the seven ATA task registers, and then add the new command to the Command list with a unique name. This allows any command, standard or vendor unique to be defined and saved for easy access.



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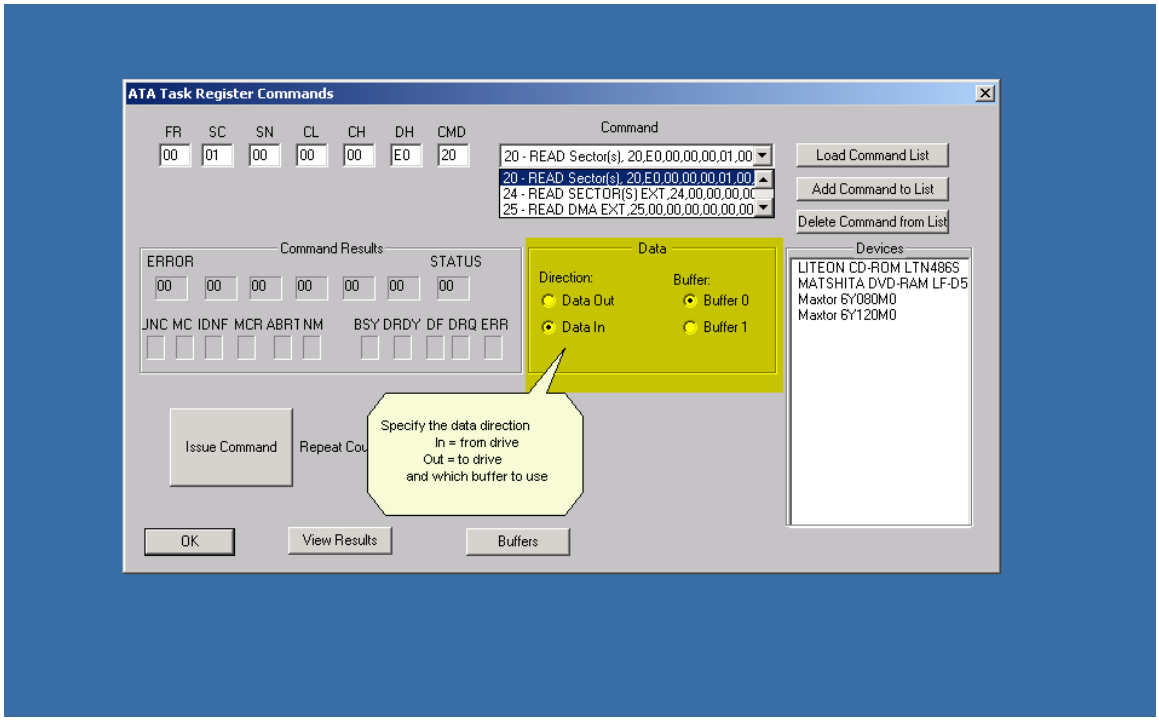
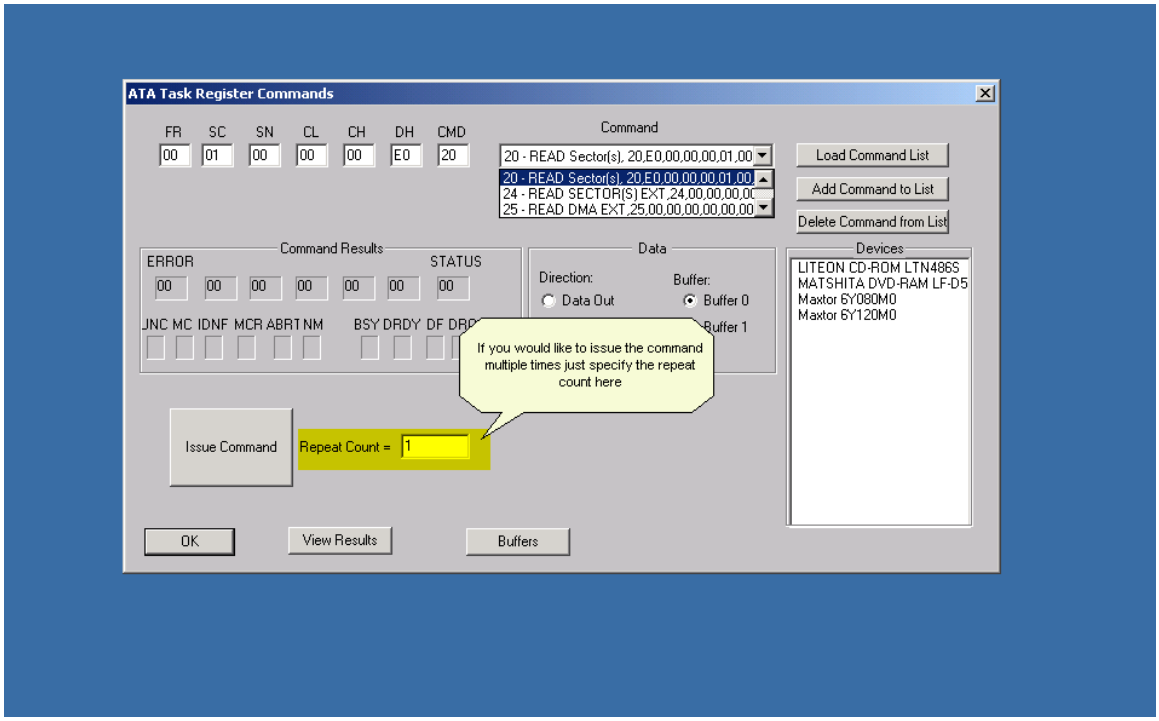
Specify the data direction (**In** from drive or **Out** to drive) and which of the two data buffers you wish to use.



If you want the command issued multiple times specify the repeat count



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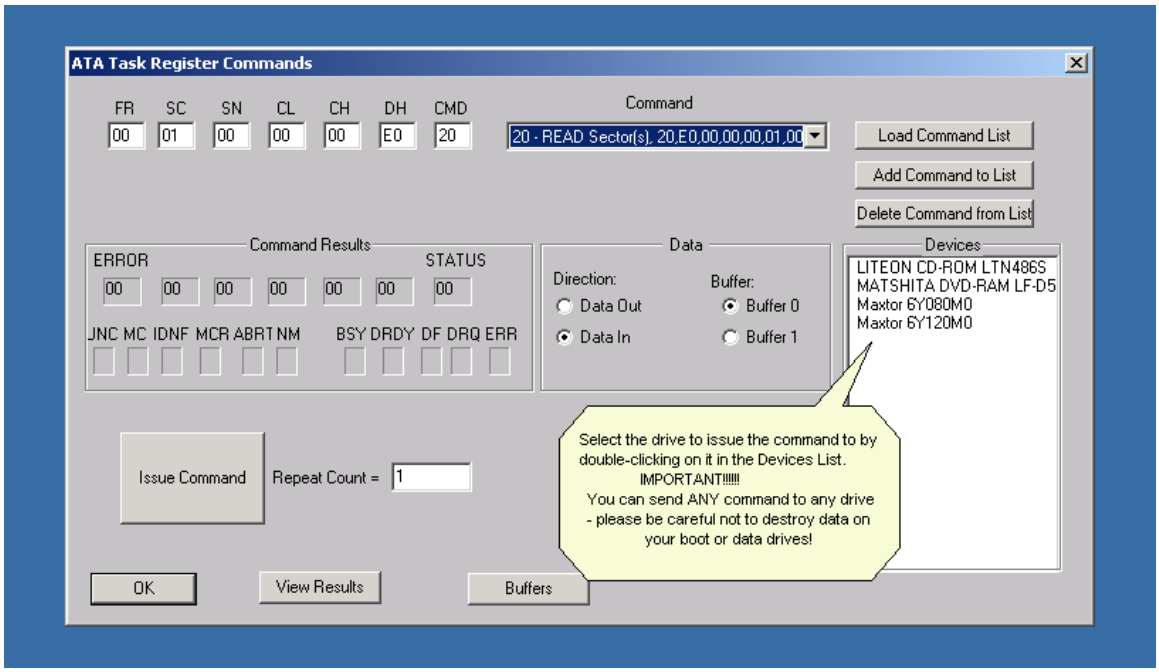
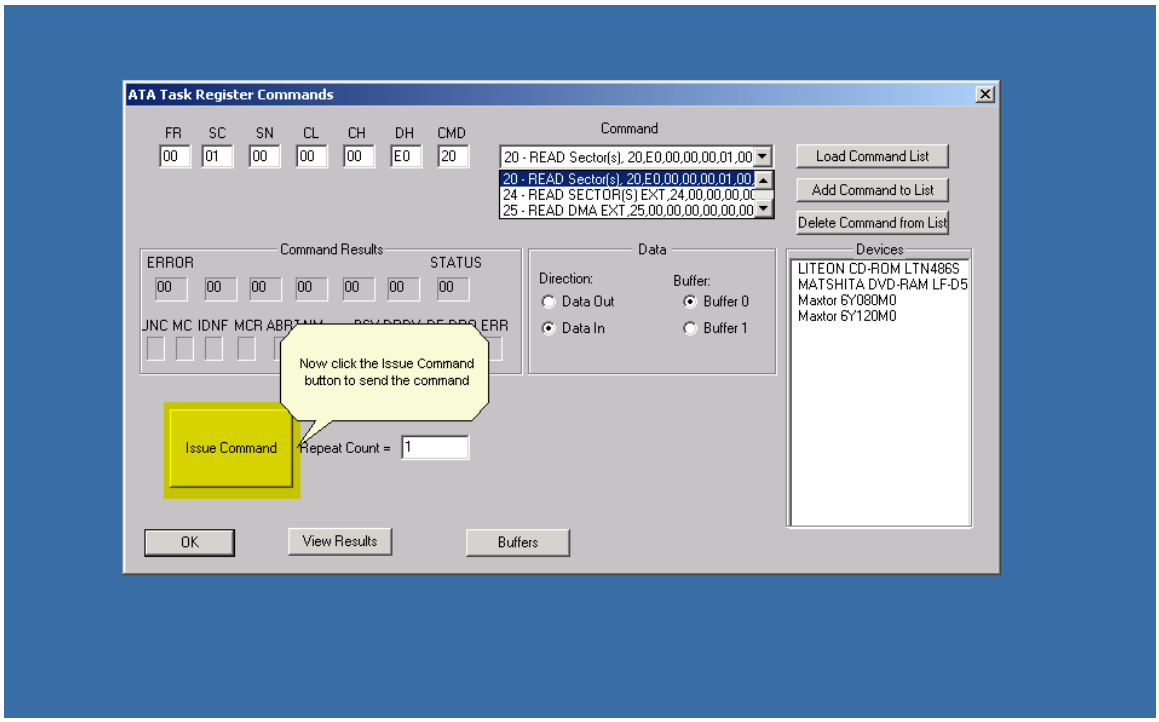
But first – you need to select which ATA device you want to send the command to. Do this by double-clicking on the device. Please – don't destroy data on a drive that you care about! You will be warned if you choose "Data Out" – don't be hasty!



Now you are ready to send the command – click the Issue Command button to do it



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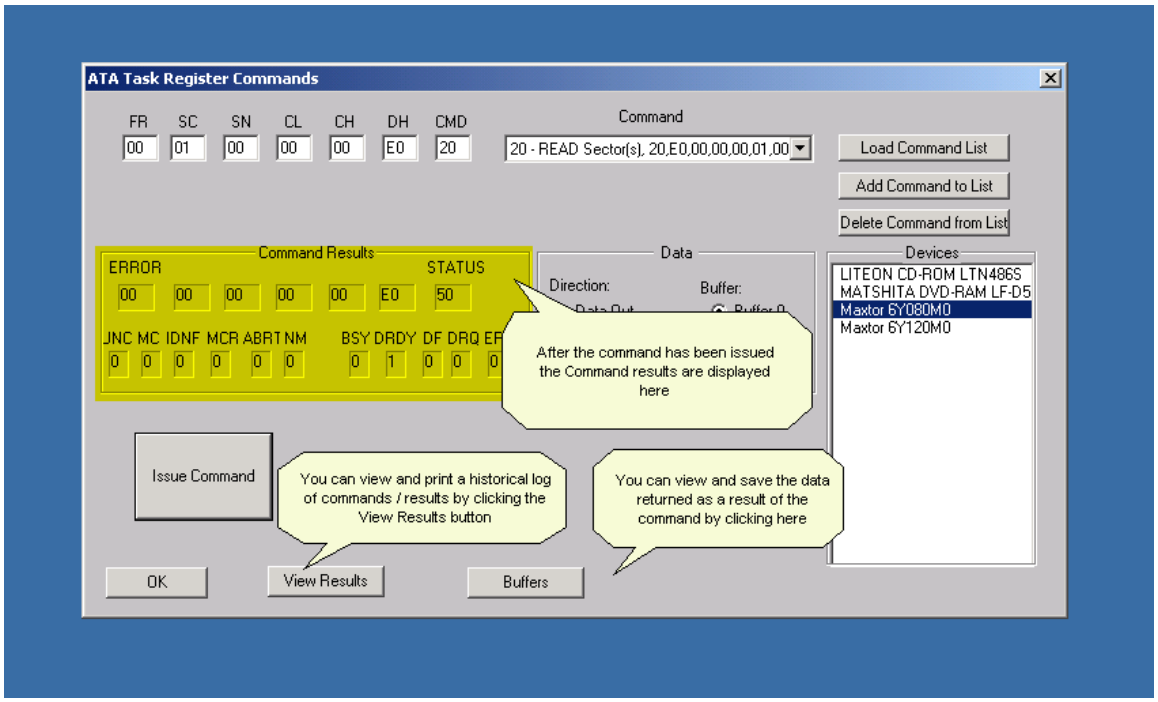
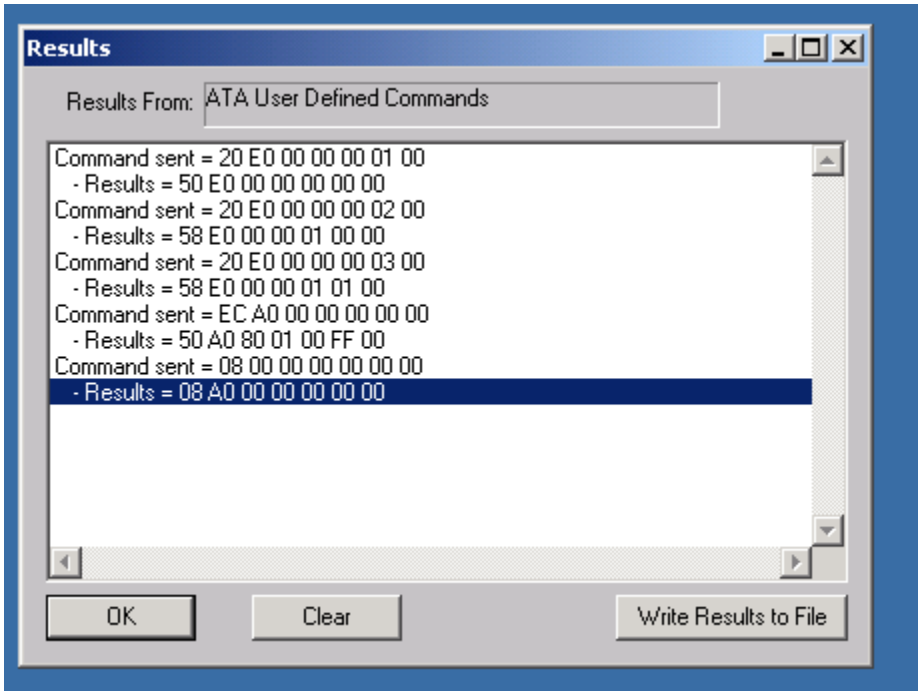
When you issue a command it can succeed or it can fail. The Error and Status indicators let you know what happened.



You can view or save a history of the commands you have issued and their results by clicking the View Results button



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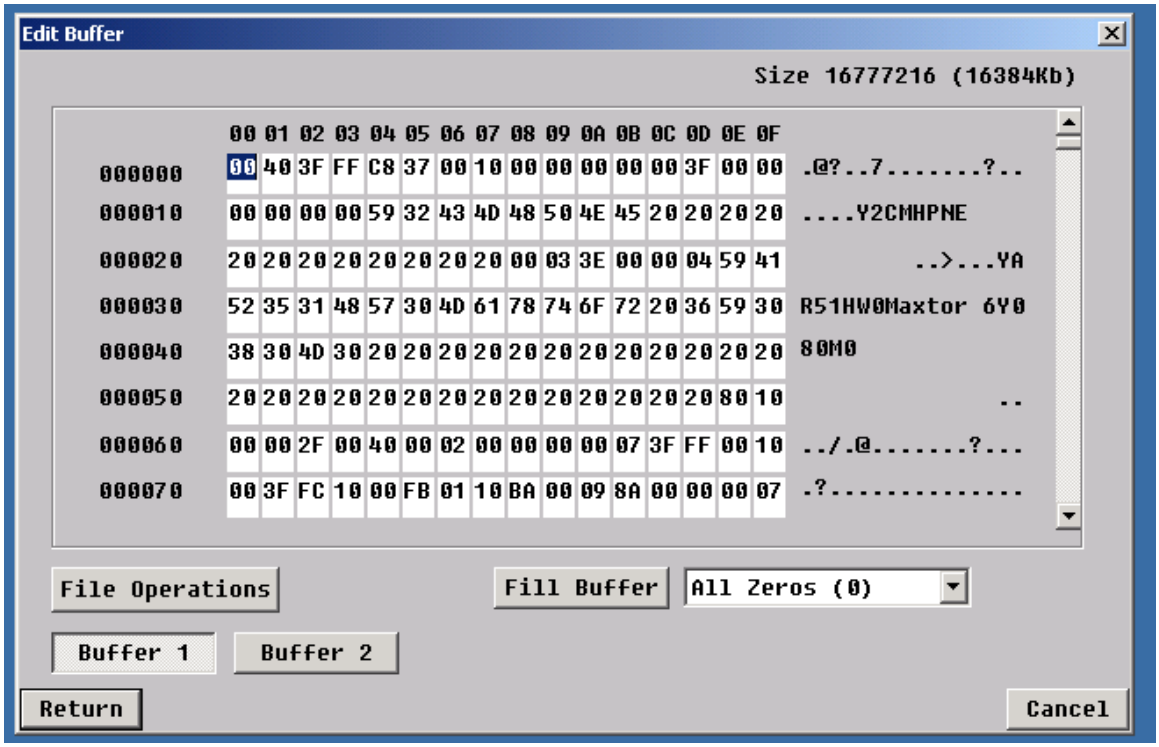
If you would like to view the data resulting from a command click the Buffers button – below is data from an ATA IDENTIFY command



Disk Tests

Disk Test Options

DriveWatch

DriveWatch is a real-time performance display that is accessible from any of the SCSItoolbox32 tests.

Information displayed:

- Average, minimum, and maximum read and write transfer rates, along with their respective LBA.
- Total number of blocks read and written
- Blocks per transfer currently in use

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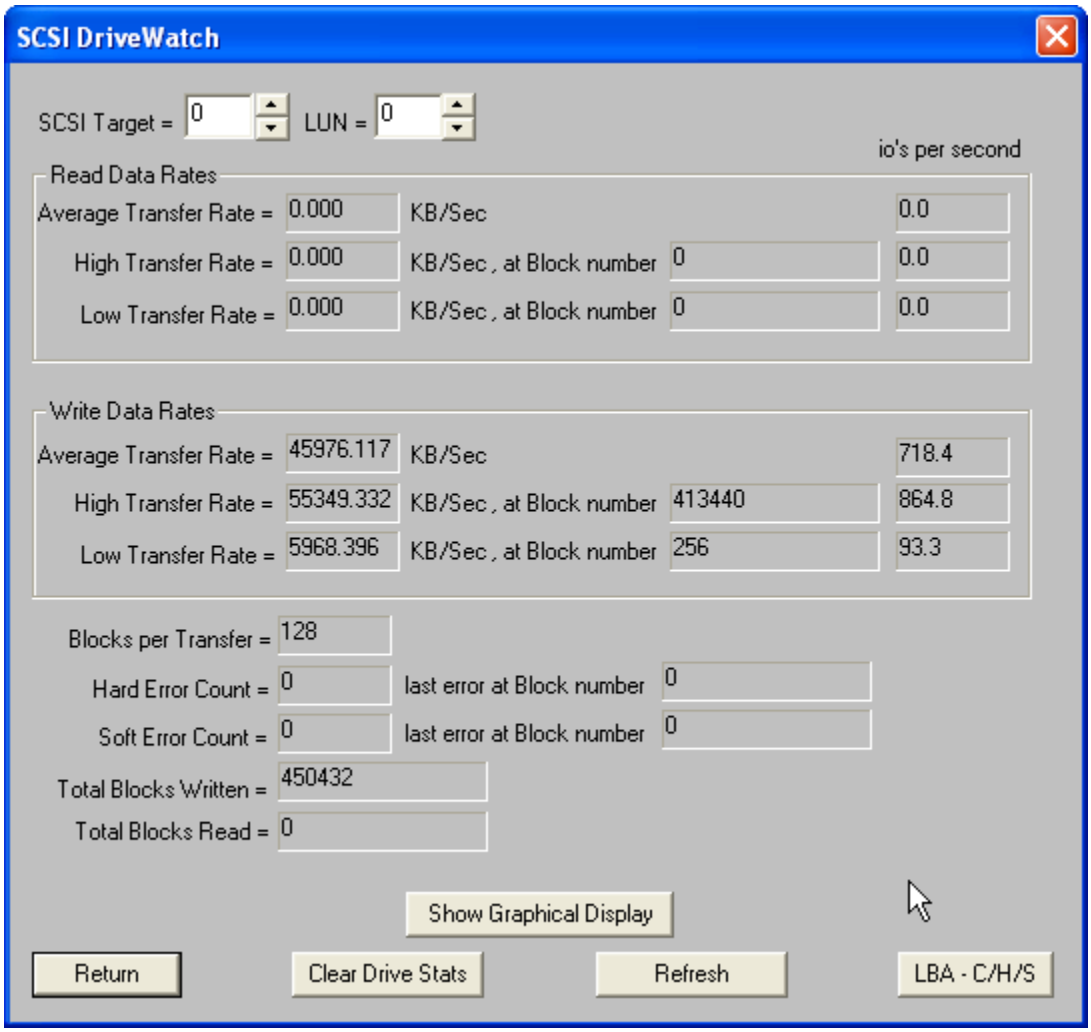
- Number of hard (uncorrectable) and soft (correctable) errors
- Number of read and write I/O's per second
- DriveWatch will graphically display performance and error information



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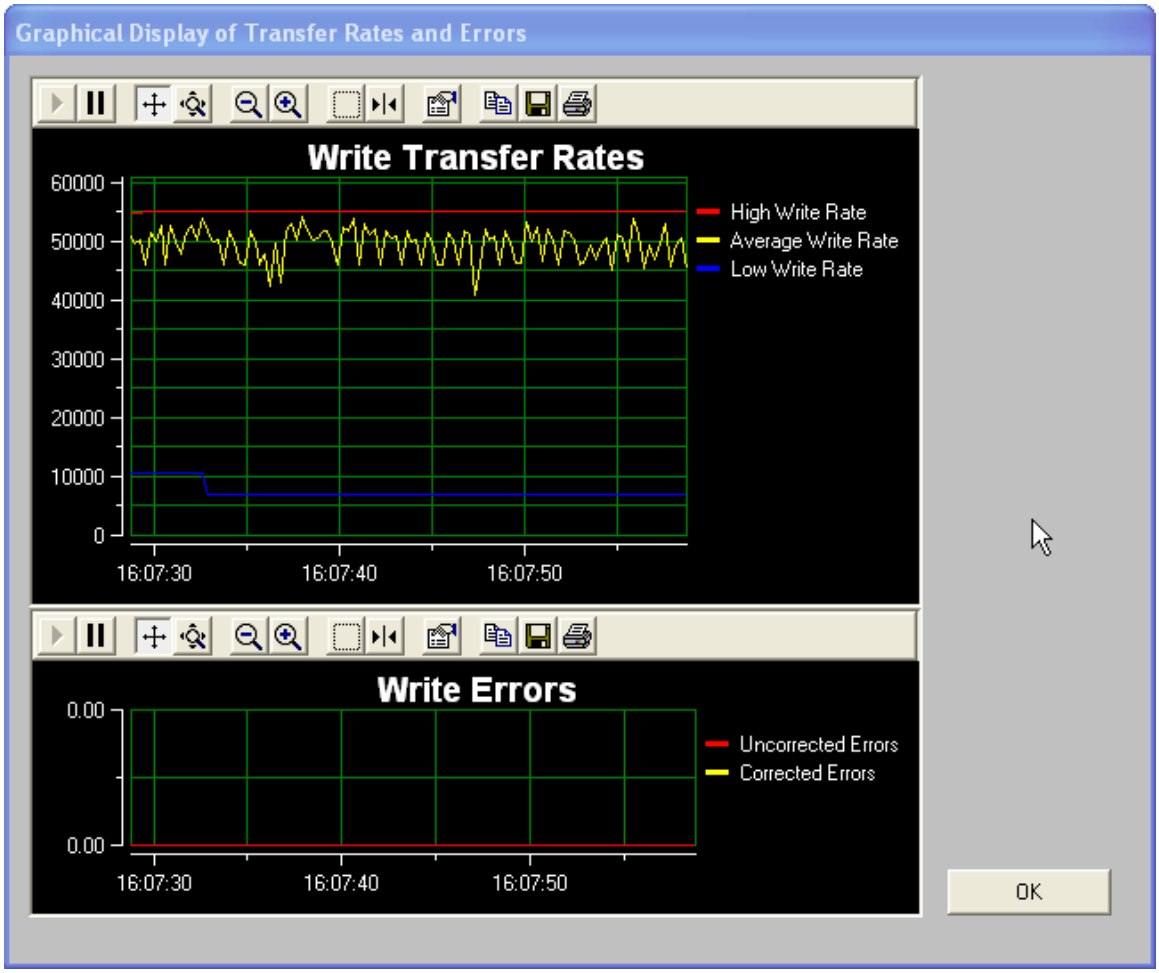
The Graphing display within DriveWatch:



Test Alarms

The test alarms allow all tests to be aborted upon the following conditions:

- If the number of hard errors exceeds a threshold
- If the number of soft errors exceeds a threshold
- If the high, low, or average read or write transfer rate falls below a threshold

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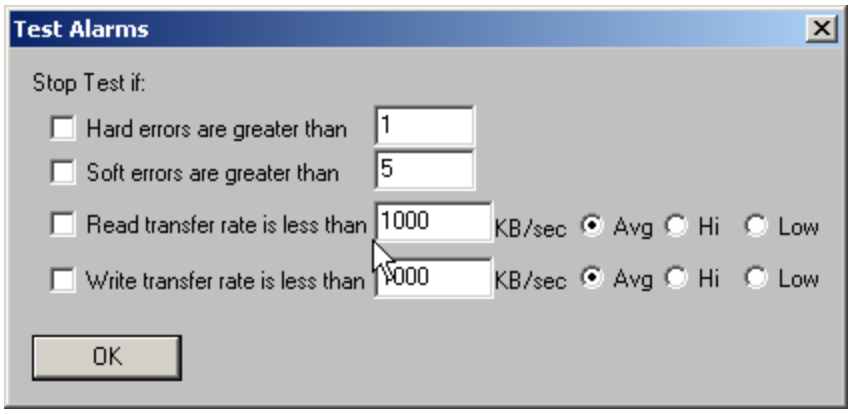

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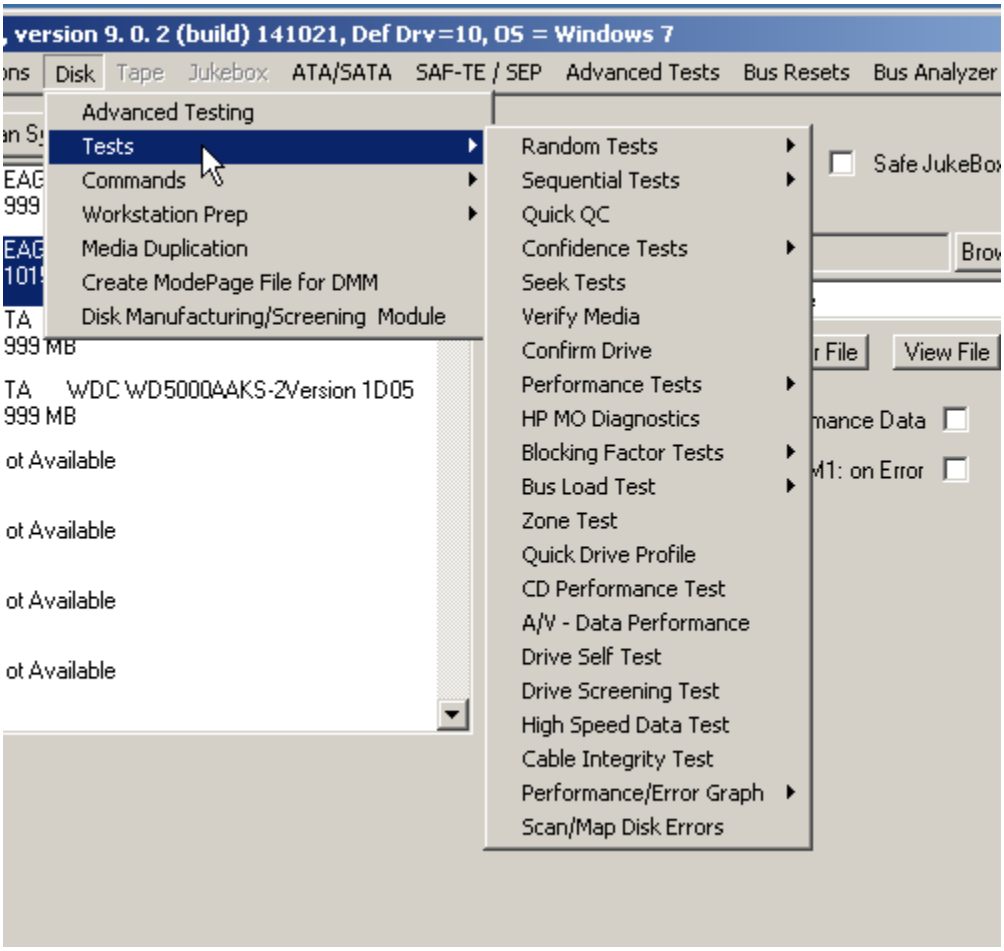
The following tests may be accessed from the Test Menu SCSItoolbox32 (details on each test follow):



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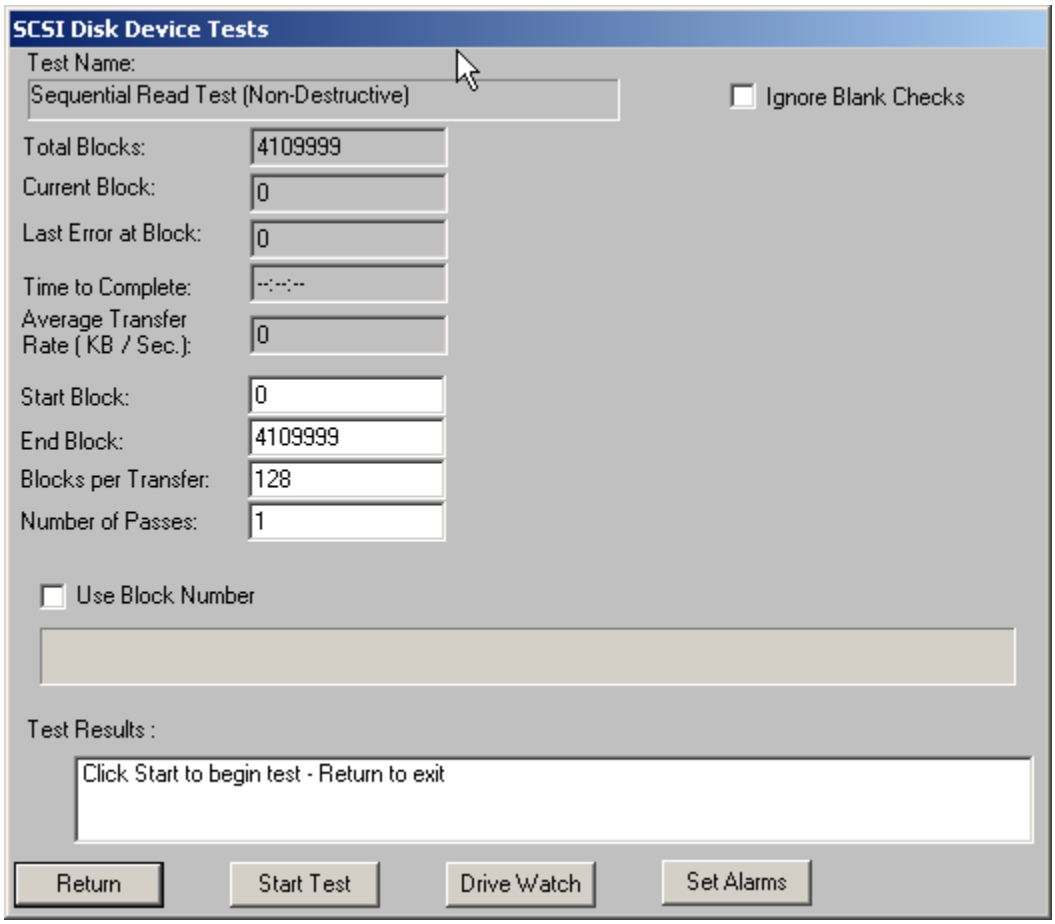
Sequential Read

This test will sequentially read all blocks between the Start Block and the End block. If a read fails the test will stop and the details of the error will be reported.



User Test Parameters:	
Parameter	
Start Block	Enter the LBA to start the sequential read test at
	Default = 0
End Block	Enter the LBA where the test should stop
	Default = highest LBA as reported by the READ CAPACITY command.
Blocks per Transfer	Enter number of blocks per CDB
	Default = 128 blocks (64K per transfer)
Number of Passes	Enter the number of test passes
	Default = 1
Ignore Blank Checks	Check this selection if you are testing WORM or MO media that has not had all blocks within the test range previously written.

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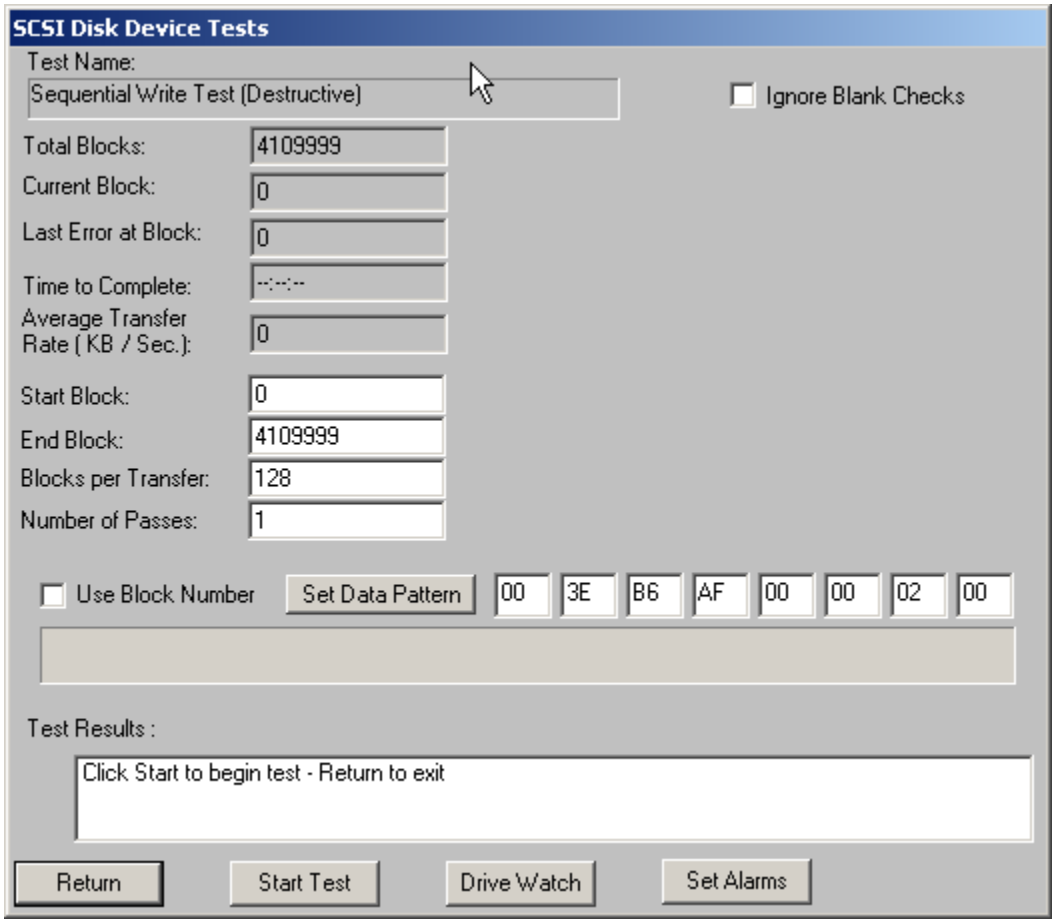
Use Block Number	If checked the read test will assume that the blocks being read have been written by the Sequential Write Test with this option checked. Each block will be checked to see that it contains a data pattern based on the LBA. If the data pattern does not compare the test will fail with a data compare error.

Sequential Write

This test will sequentially write all blocks between the Start Block and the End block. If a write fails the test will stop and the details of the error will be reported.



User Test Parameters:	
Parameter	
Start Block	Enter the LBA to start the sequential write test at
	Default = 0
End Block	Enter the LBA where the test should stop
	Default = highest LBA as reported by the READ CAPACITY command.
Blocks per Transfer	Enter number of blocks per CDB

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	Default = 128 blocks (64K per transfer)
Number of Passes	Enter the number of test passes
	Default = 1
Ignore Blank Checks	Used if testing WORM or MO disks.
Use Block Number	Checking this option will write a data pattern that contains the LBA to each block.
Set Data Pattern	Used to specify a data pattern to be written. Data patterns can also be set using the Buffer Menu choice.

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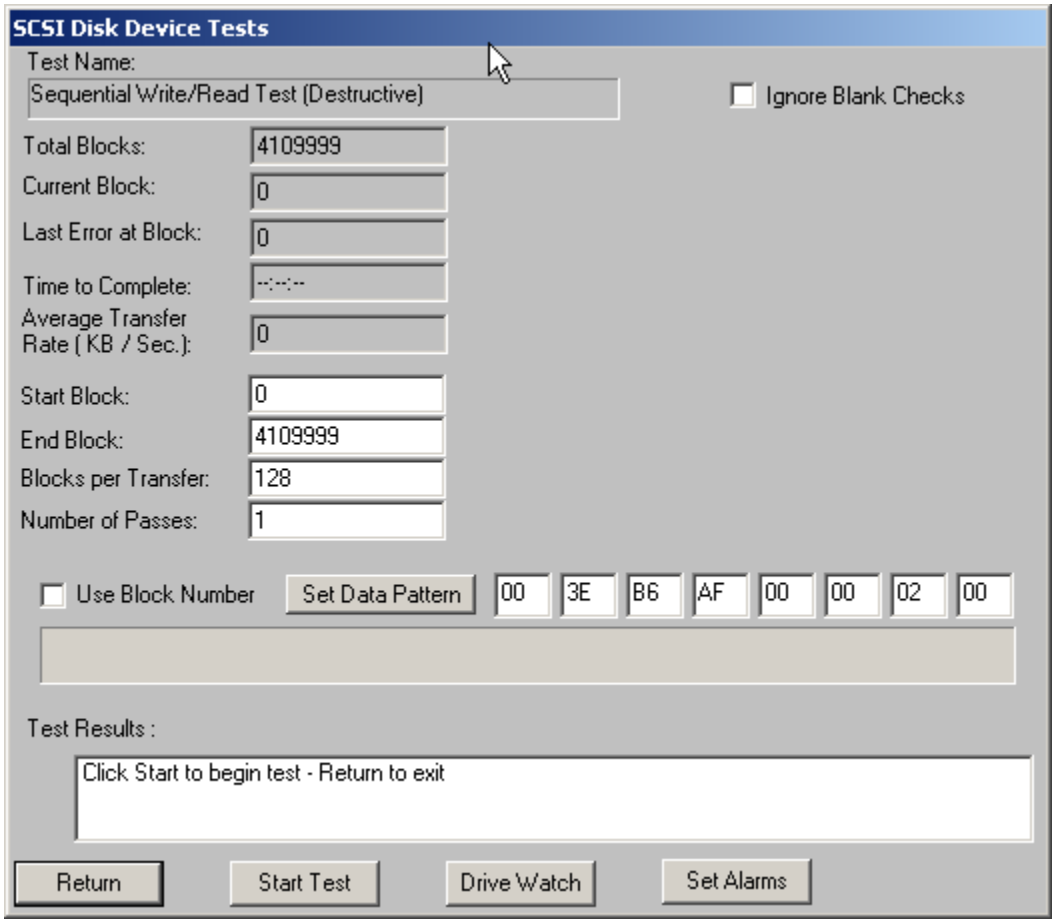
Sequential Write/Read

This test will sequentially write, then read all blocks between the Start Block and the End block. If a write or read fails the test will stop and the details of the error will be reported.



User Test Parameters:	
Parameter	
Start Block	Enter the LBA to start the test
	Default = 0
End Block	Enter the LBA where the test should stop
	Default = highest LBA as reported by the READ CAPACITY command.
Blocks per Transfer	Enter number of blocks per CDB
	Default = 128 blocks (64K per transfer)
Number of Passes	Enter the number of test passes
	Default = 1
Ignore Blank Checks	Used if testing WORM or MO disks

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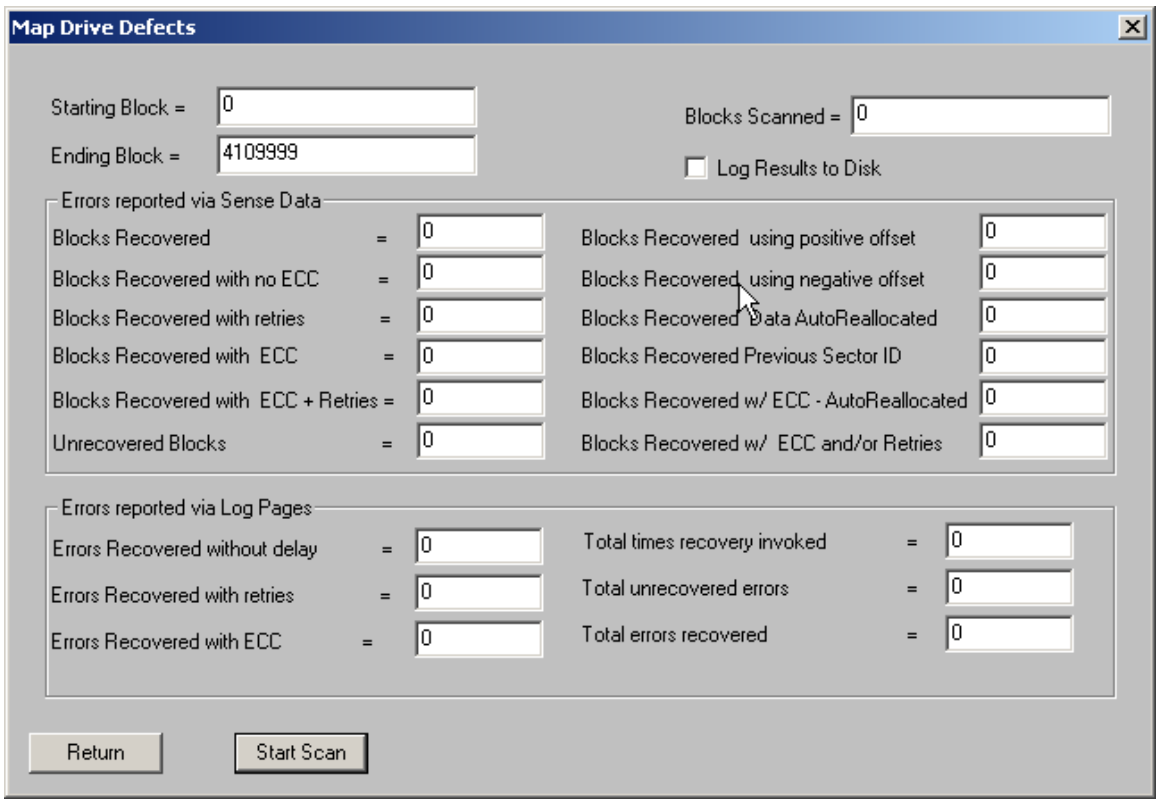
Use Block Number	Checking this option will write a data pattern that contains the LBA to each block
Set Data Pattern	Used to specify a data pattern to be written. Data patterns can also be set using the Buffer Menu choice

Map Drive Defects

This test sequentially reads all blocks between Start Block and End Block. The error recovery information reported by the drive via Sense Data and Log Pages is displayed and may be recorded to a log file using the Log Results to Disk option.



User Test Parameters:	
Parameter	
Start Block	Enter the LBA to start the test
	Default = 0
End Block	Enter the LBA where the test should stop
	Default = highest LBA as reported by the READ CAPACITY command.
Log Results to Disk	Check this box to specify a log file to record the results of the test

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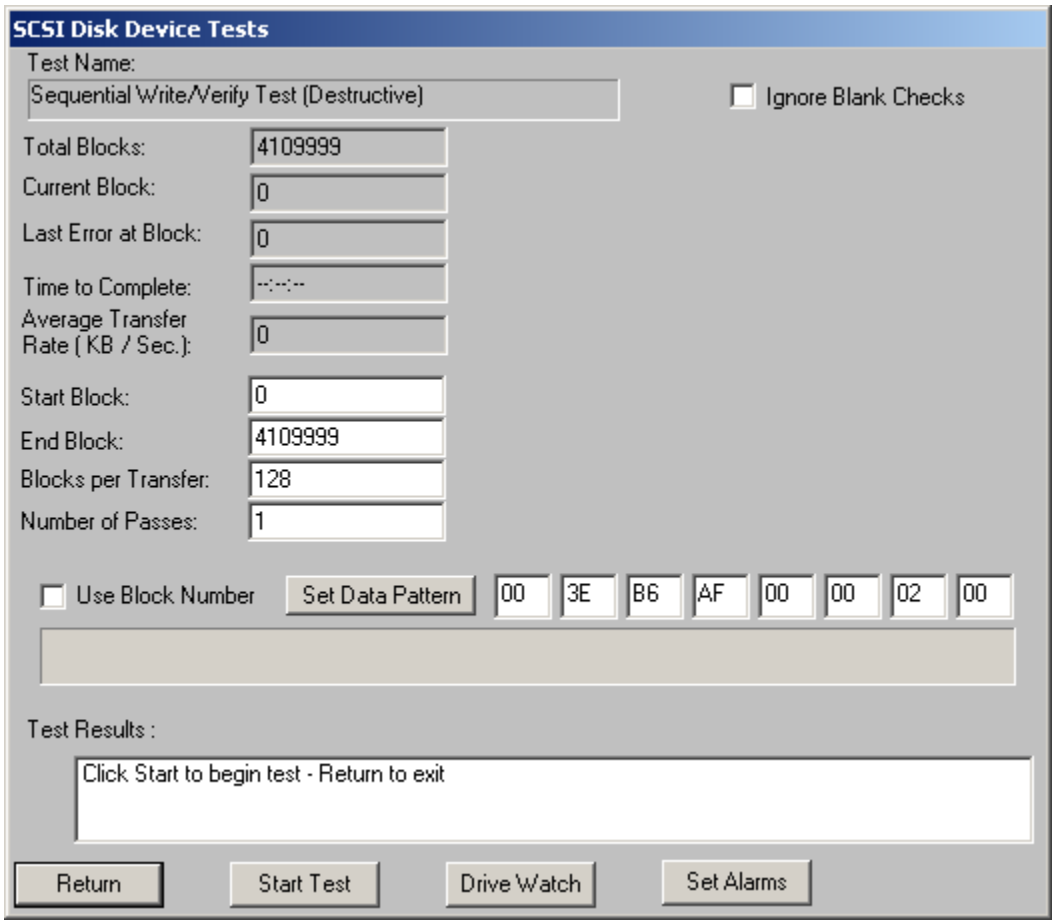
Sequential Write/Read

This test will sequentially write and verify all blocks between the Start Block and the End block. If a write or verify fails the test will stop and the details of the error will be reported.



User Test Parameters:	
Parameter	
Start Block	Enter the LBA to start the test
	Default = 0
End Block	Enter the LBA where the test should stop
	Default = highest LBA as reported by the READ CAPACITY command.
Blocks per Transfer	Enter number of blocks per CDB
	Default = 128 blocks (64K per transfer)
Number of Passes	Enter the number of test passes
	Default = 1
Ignore Blank Checks	Used if testing WORM or MO disks

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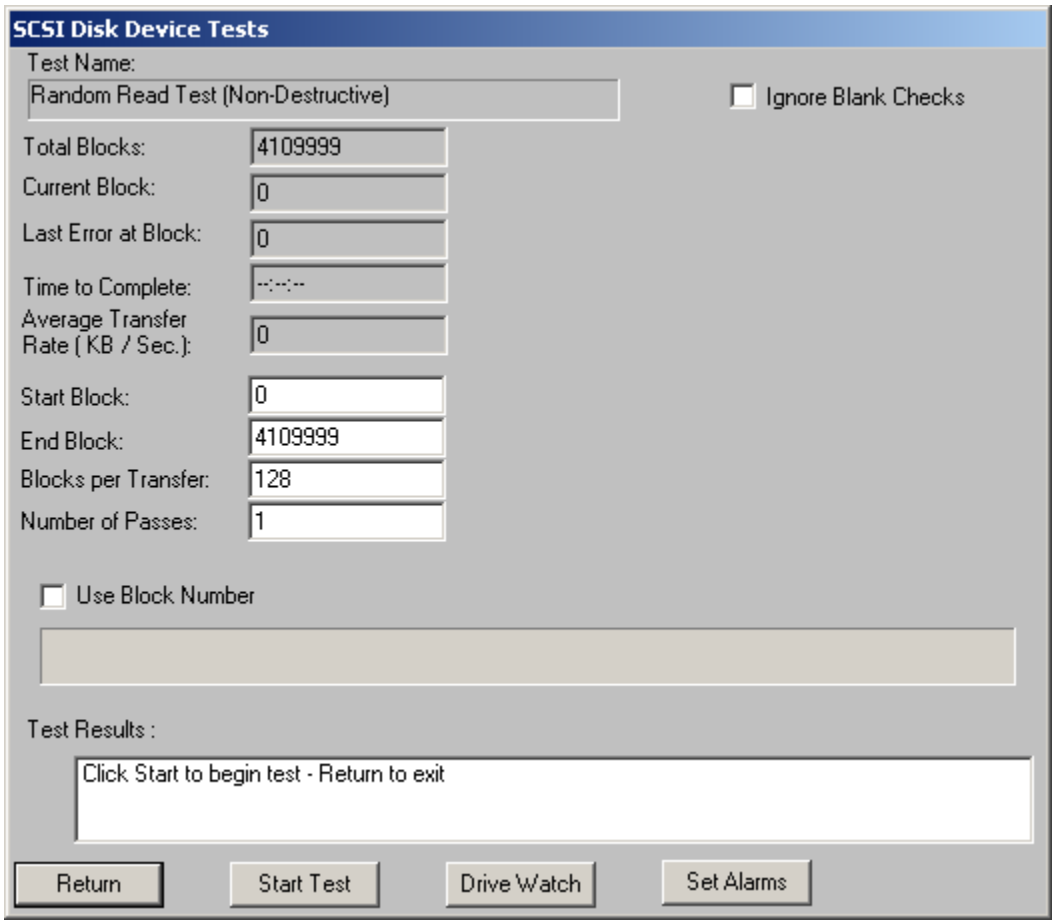
Use Block Number	Checking this option will write a data pattern that contains the LBA to each block
Set Data Pattern	Used to specify a data pattern to be written. Data patterns can also be set using the Buffer Menu choice

Random Read

This test will read random blocks between the Start Block and the End block. If a read fails the test will stop and the details of the error will be reported. This test will run until stopped by pressing the Cancel button.



User Test Parameters:	
Parameter	
Start Block	Enter the LBA to start the test
	Default = 0
End Block	Enter the LBA to define the high range of the test
	Default = highest LBA as reported by the READ CAPACITY command.
Blocks per Transfer	Enter number of blocks per CDB

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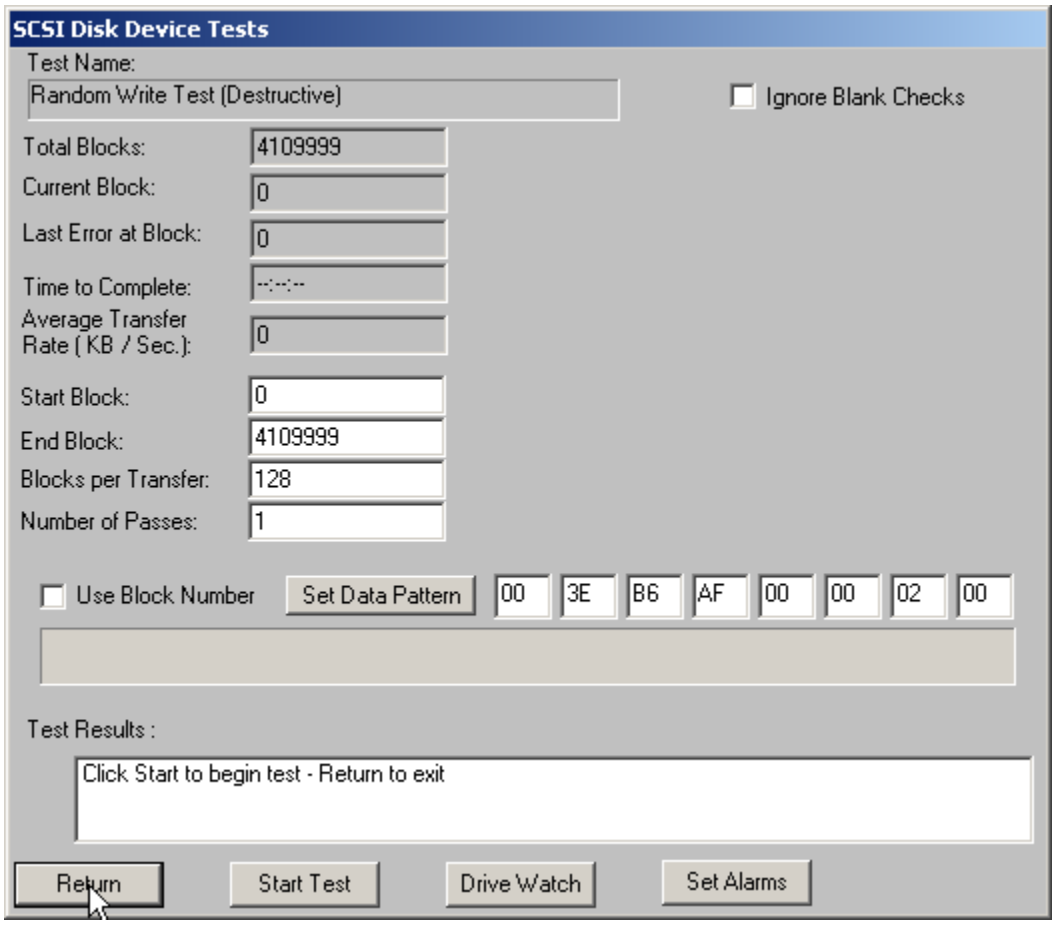
	Default = 128 blocks (64K per transfer)
Number of Passes	Enter the number of test passes
	Default = 1
Ignore Blank Checks	Used if testing WORM or MO disks
Use Block Number	If checked the read test will assume that the blocks being read have been written by the Sequential Write Test with this option checked. Each block will be checked to see that it contains a data pattern based on the LBA. If the data pattern does not compare the test will fail with a data compare error

Random Write

This test will write random blocks between the Start Block and the End block. If a write fails the test will stop and the details of the error will be reported. This test will run until stopped by pressing the Cancel button.



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User Test Parameters:	
Parameter	
Start Block	Enter the LBA to define the low range of the test
	Default = 0
End Block	Enter the LBA to define the high range of the test
	Default = highest LBA as reported by the READ CAPACITY command.
Blocks per Transfer	Enter number of blocks per CDB
	Default = 128 blocks (64K per transfer)
Number of Passes	Enter the number of test passes
	Default = 1
Ignore Blank Checks	Used if testing WORM or MO disks
Use Block Number	Check this selection if you are testing WORM or MO media that has not had all blocks within the test range previously written

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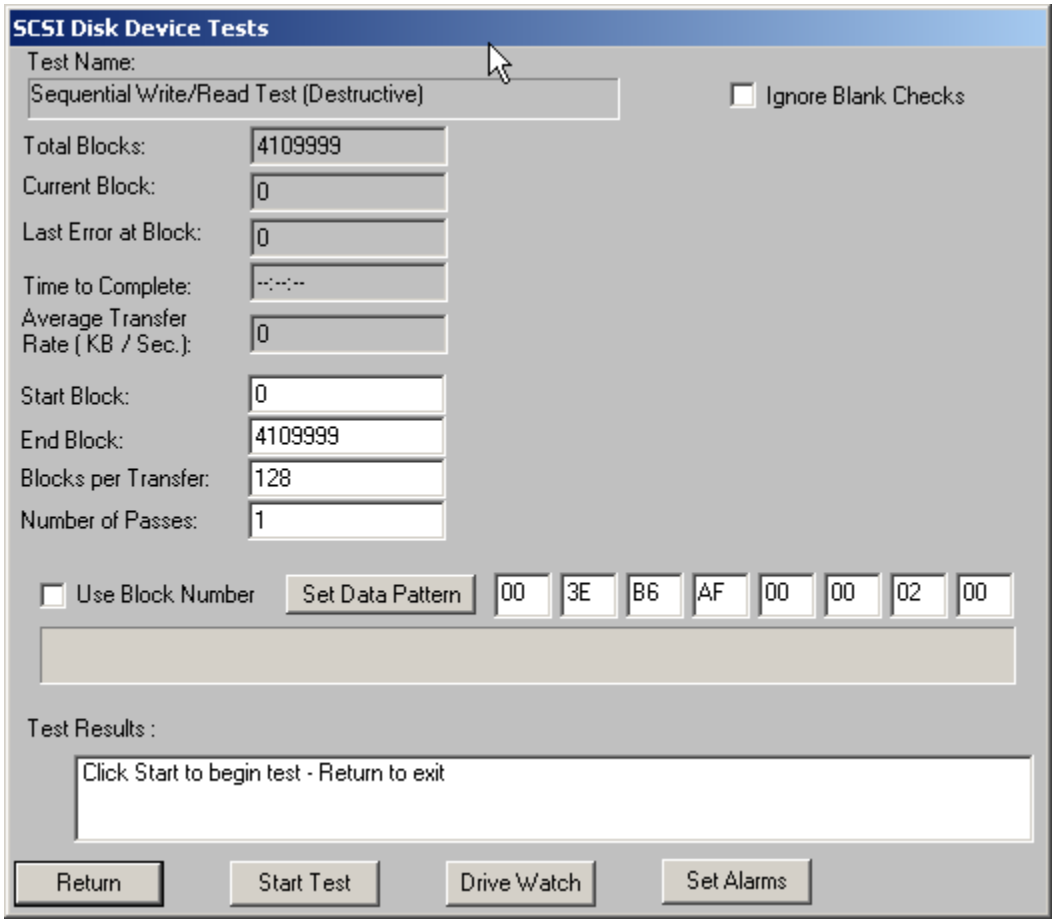
Random Write/Read

This test will write and read random blocks between the Start Block and the End block. If a write or read fails the test will stop and the details of the error will be reported. This test will run until stopped by pressing the Cancel button.



User Test Parameters:	
Parameter	
Start Block	Enter the LBA to define the low range of the test
	Default = 0
End Block	Enter the LBA to define the high range of the test
	Default = highest LBA as reported by the READ CAPACITY command.
Blocks per Transfer	Enter number of blocks per CDB
	Default = 128 blocks (64K per transfer)
Number of Passes	Enter the number of test passes
	Default = 1
Ignore Blank Checks	Used if testing WORM or MO disks
Use Block Number	Checking this option will write a data pattern that contains the LBA to

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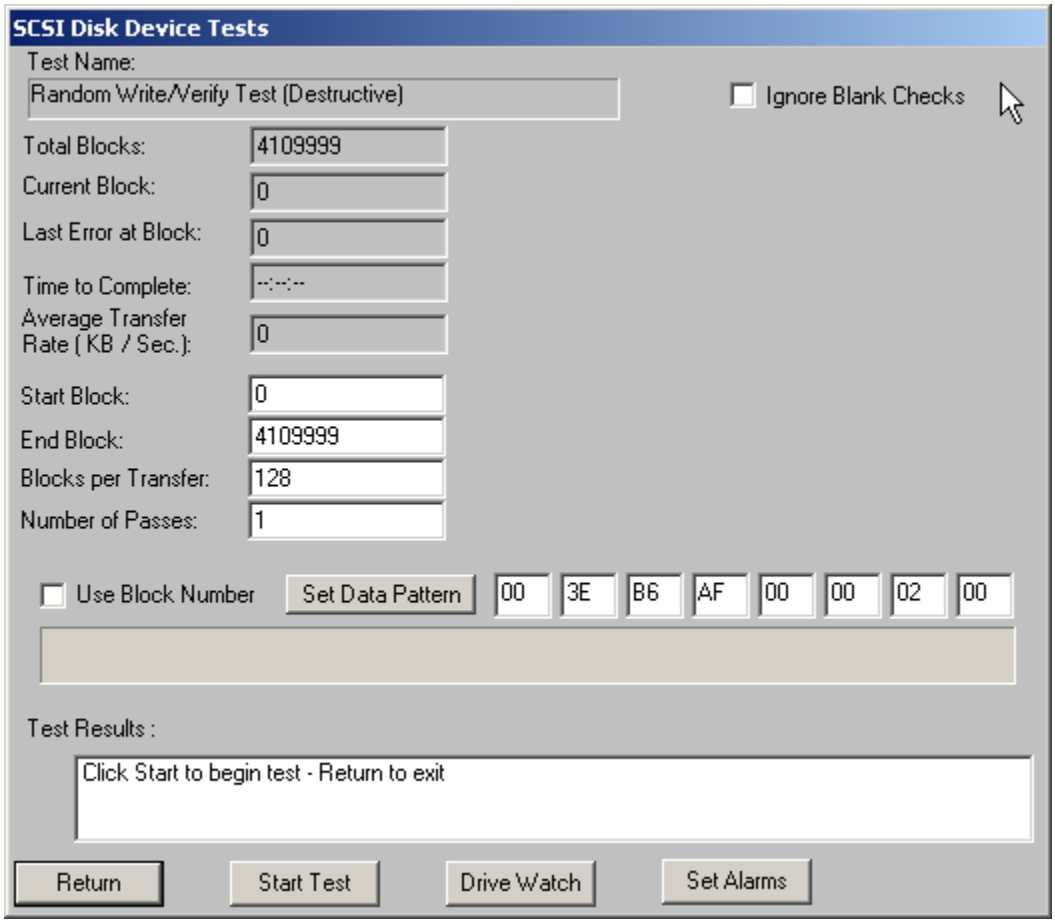
	each block. The read operation will confirm this data pattern and stop with a data compare error if the data is not correct
Set Data Pattern	Used to specify a data pattern to be written. Data patterns can also be set using the Buffer Menu choice.

Random Write/Verify

This test will write and verify random blocks between the Start Block and the End block. If a write or verify fails the test will stop and the details of the error will be reported. This test will run until stopped by pressing the Cancel button.



User Test Parameters:	
Parameter	
Start Block	Enter the LBA to define the low range of the test
	Default = 0
End Block	Enter the LBA to define the high range of the test
	Default = highest LBA as reported by the READ CAPACITY command.
Blocks per Transfer	Enter number of blocks per CDB

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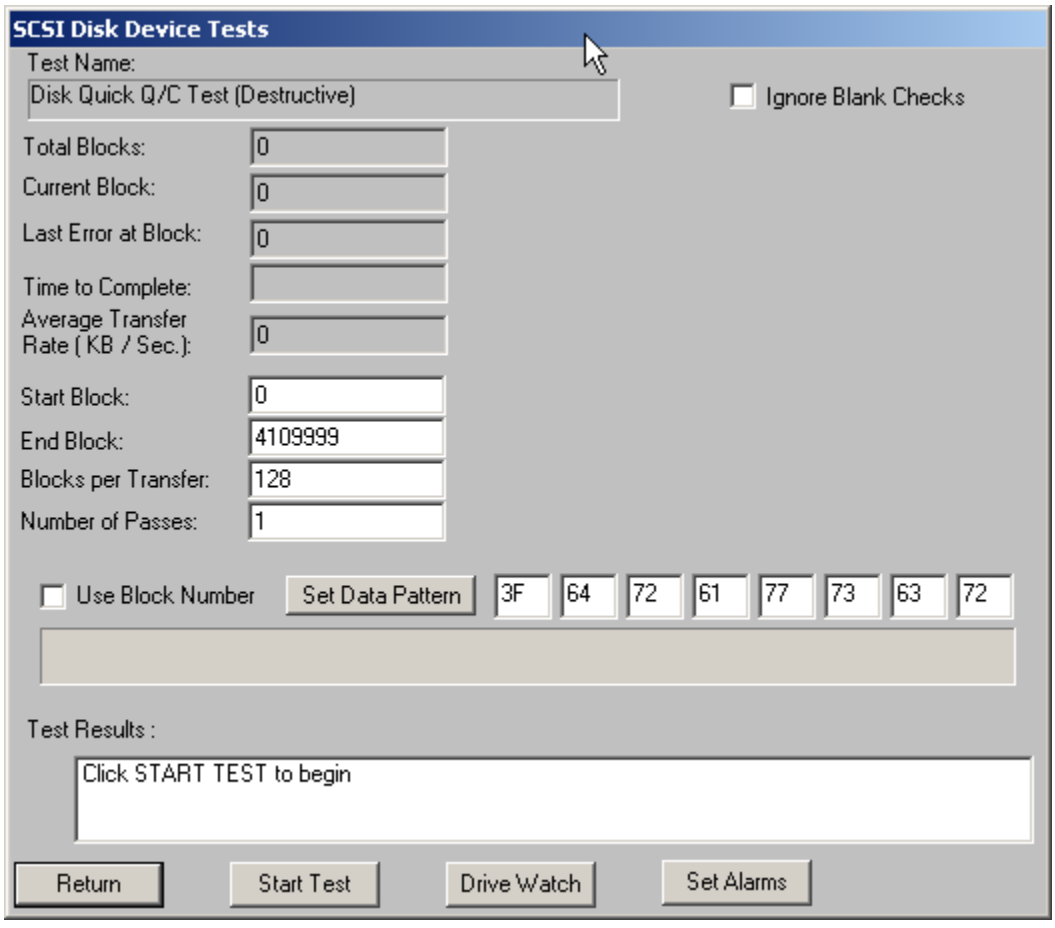
	Default = 128 blocks (64K per transfer)
Number of Passes	Enter the number of test passes
	Default = 1
Ignore Blank Checks	Used if testing WORM or MO disks
Use Block Number	Checking this option will write a data pattern that contains the LBA to each block. The read operation will confirm this data pattern and stop with a data compare error if the data is not correct
Set Data Pattern	Used to specify a data pattern to be written. Data patterns can also be set using the Buffer Menu choice.

Quick QC

This test will write and read 1000 blocks at the beginning, middle, and end of the drive. Any write or read errors will be reported.



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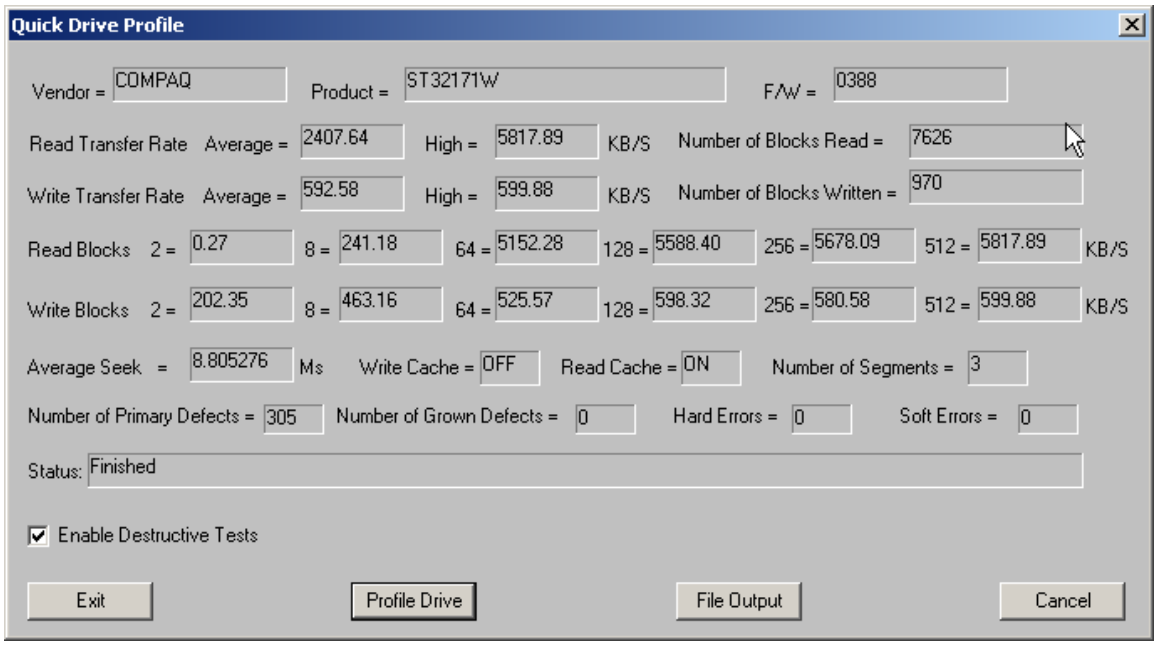
Quick Drive Profile



User Test Parameters:	
Parameter	
Enable Destructive Test	Checking this option will allow writes to the drive during this test. If not check only read operations will be executed.

Button	**Functionality**
Profile Drive	Executes a series of tests to measure the drives performance parameters. Parameters measured are Read and Write transfer rates at various blocks-per-transfer, and seek time. Various MODE PAGE settings are displayed, along with the number of Primary and Grown defects, and the number of correctable and uncorrectable errors.
File Output	Displays the Drive Profile File Output dialog box (see the next section).

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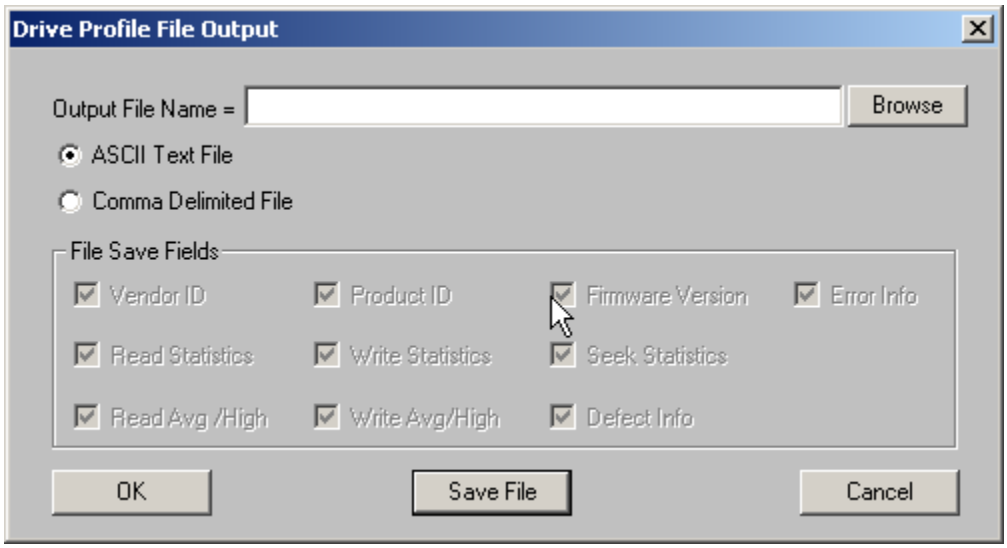
Drive Profile File Output

The options on the Drive Profile File output dialog allow the performance metrics data to be saved to a file. This file can be either an ASCII text file, or a comma-delimited file that can be used to graph data using Microsoft Excel compatible spreadsheets.

When outputting data to a comma-delimited file the fields of data that are saved can be specified with the check boxes.



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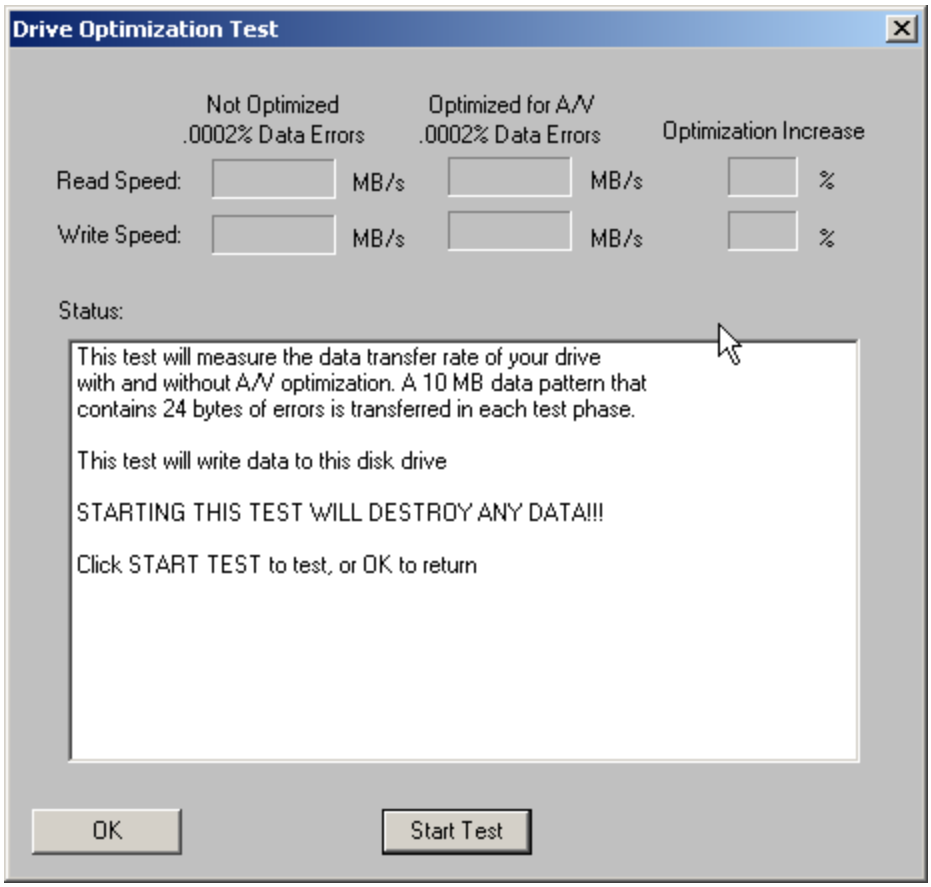
AV/Data Performance Comparison



User Test Parameters:	
Button	**Functionality**
Start Test	Introduces correctable (ECC) errors onto the drive. Then the test will configure the drive for A/V optimization, then execute a write and a read test. Then the drive will be configured for Data use and the tests run again. Then the correctable errors will be removed from the drive. The differences in read and write performance will be displayed in the Drive Optimization Test Dialog Box (see the next page).

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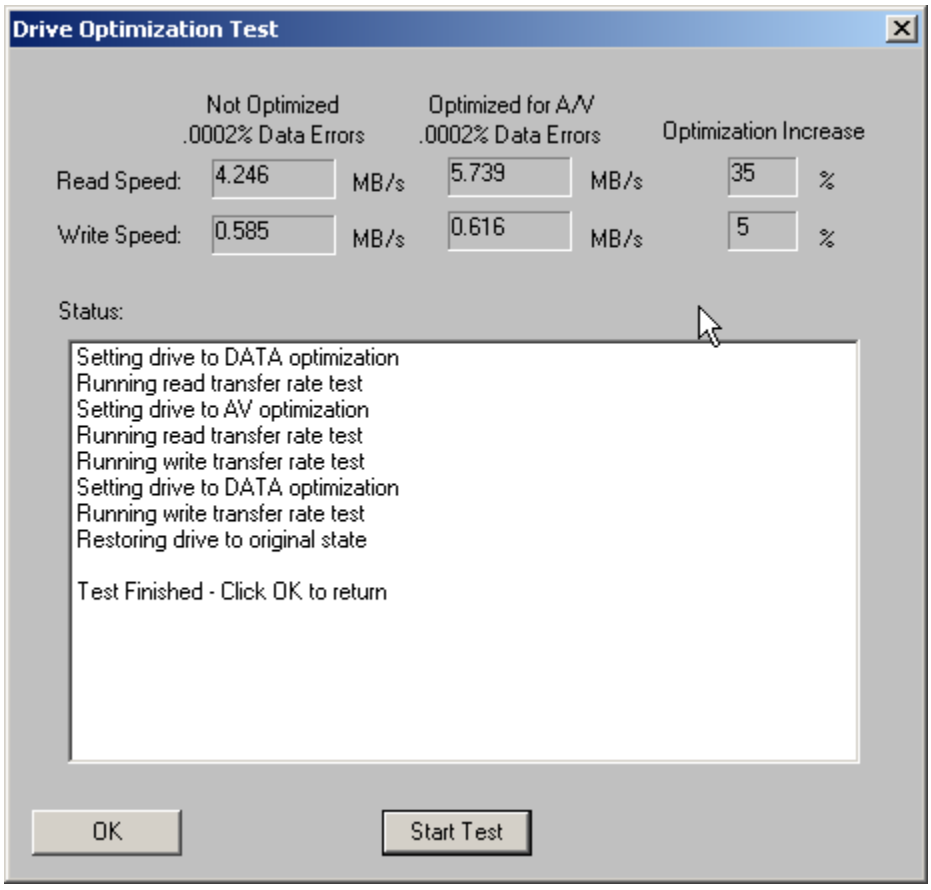
Drive Optimization Test Dialog

The Drive Optimization Test Dialog Box displays differences in read and write performance.



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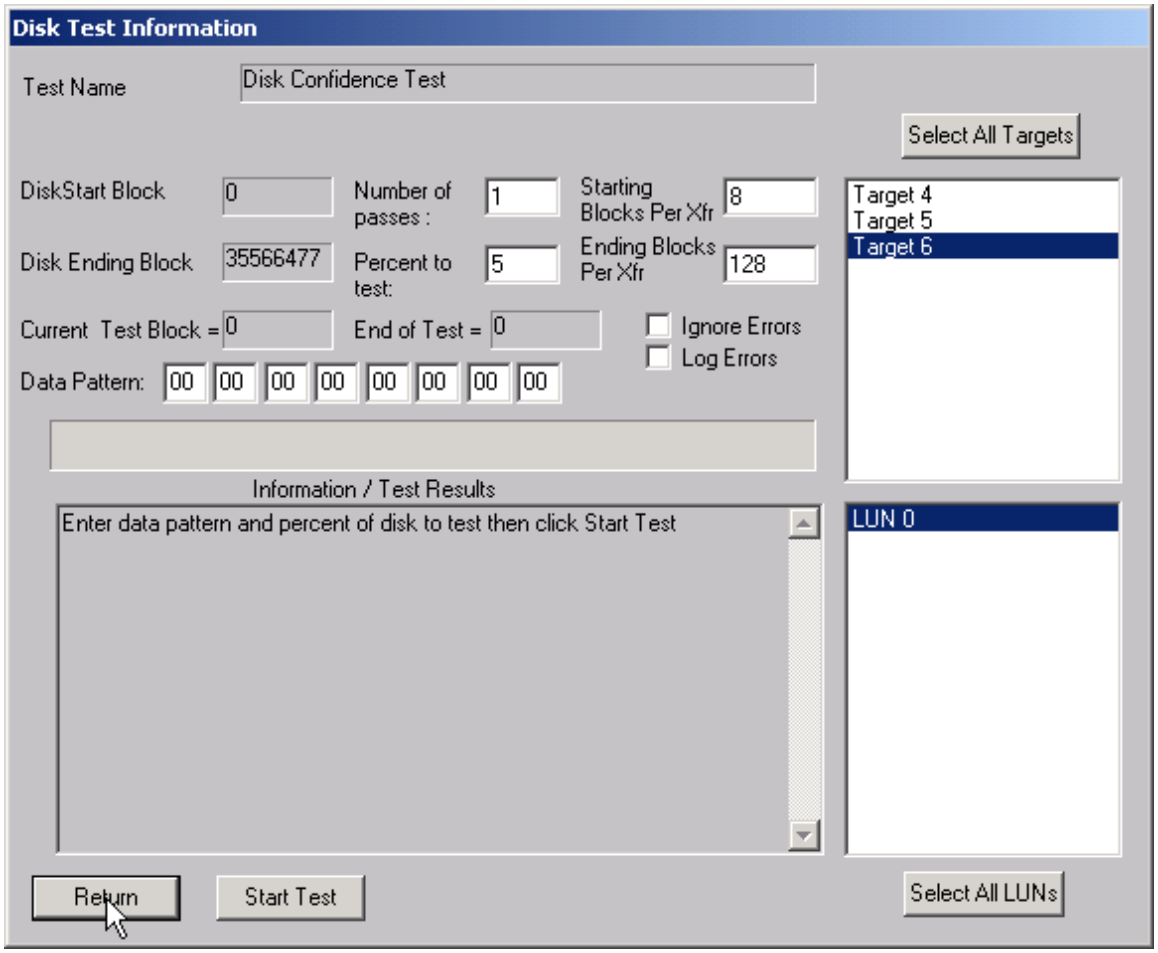
Drive Confidence Test 1



User Test Parameters:	
Button	**Functionality**
Start Test	Checks drive functionality by writing data patterns to the disk, executing random seeks, and starting/stopping the drive.

This test checks drive functionality by writing data patterns to the disk, executing random seeks, and starting/stopping the drive. The number of test passes, the data pattern, and the percentage of the disk to be tested may be specified. The specified data pattern will be written to the percentage of the disk that was specified (starting from the first block of the disk). The data then will be read back and compared for integrity. Following this, 5,000 random disk seeks will be performed on the drive. The final step of this test will start and stop the disk five times.

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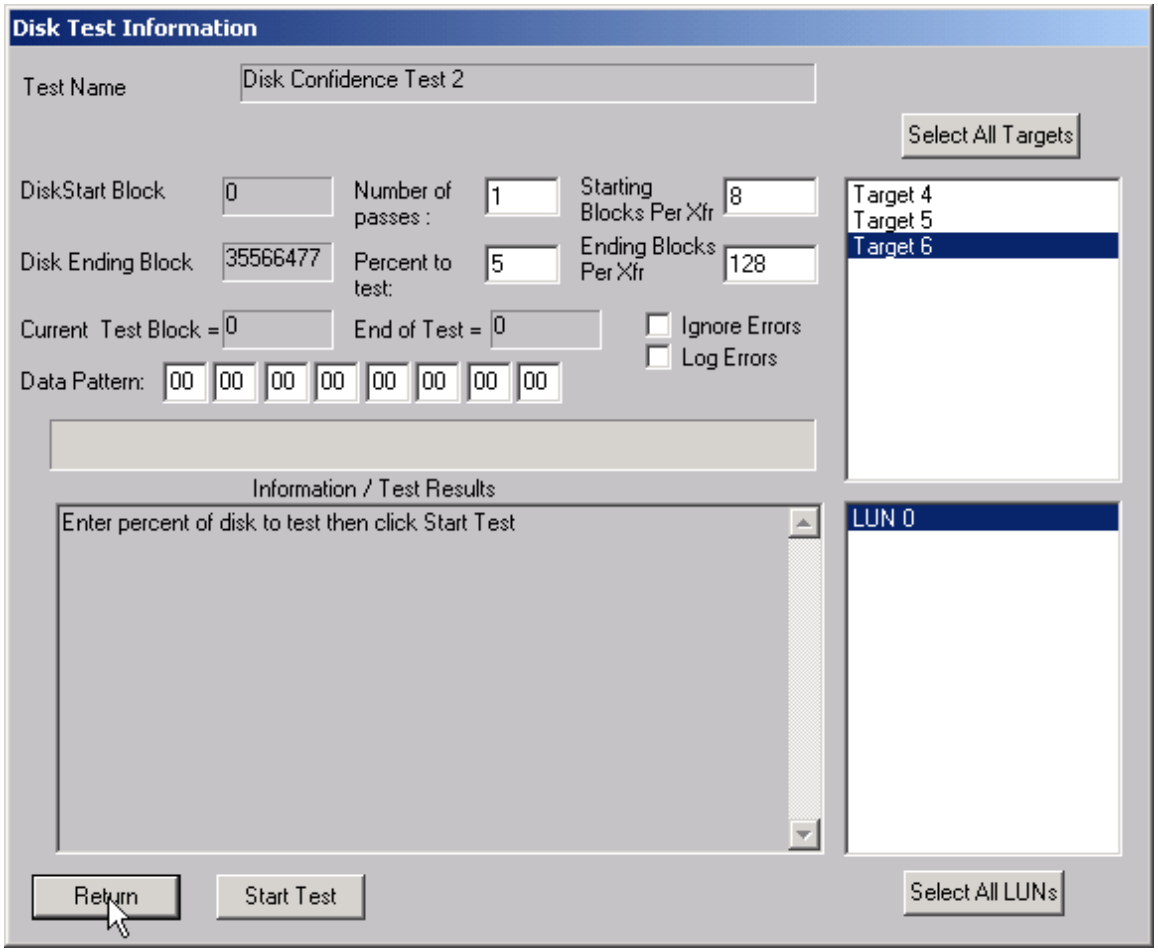
Drive Confidence Test 2



This test first sets the PER bit (Post Error, MODE SELECT page 1). With this bit set the drive will report any corrected errors to the host. Then the entire drive is written with two worst-case data patterns and the data is read back and compared. Finally, 10,000 random seeks with reads are executed. The results of this test are written to a disk file called "Fujitsu.log".

Seek Tests

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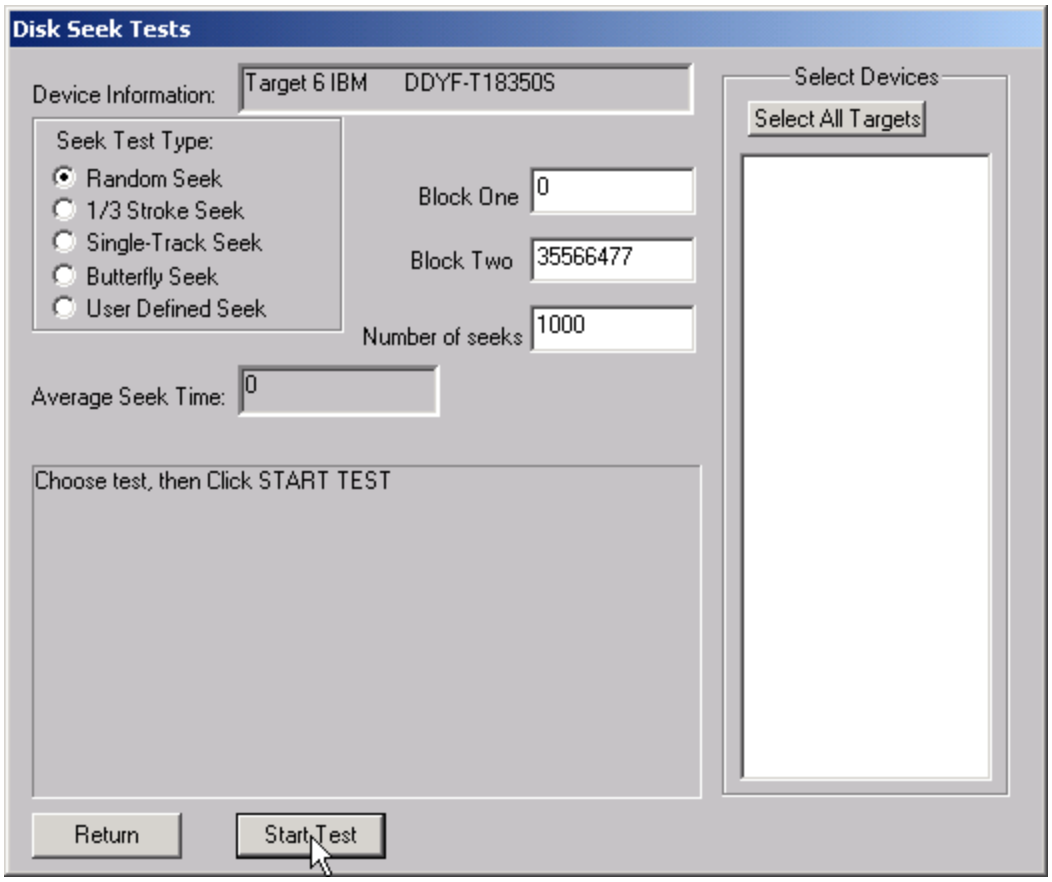

This test menu gives you access to several different seek test algorithms. Each seek test will first calculate the system overhead time for processing SCSI commands. Then it will perform 10,000 seeks of the type specified and calculate the total and average seek times. You may select one of the following seek tests:

Random — Seeks to random blocks across the block range of the device

1/3 Stroke Seek — Seeks from block 0 to a block 1/3 of the total block range of the device then back to block 0

Single Track Seek — Seeks from a block 0 to a block calculated to be within the same track then back to block 0

Butterfly — This test seeks between two initially specified blocks, subtracting one block from the high block and adding one block to the low block and seeking again until the high and low block are the same.

User Defined — You are allowed to specify two block numbers to seek back

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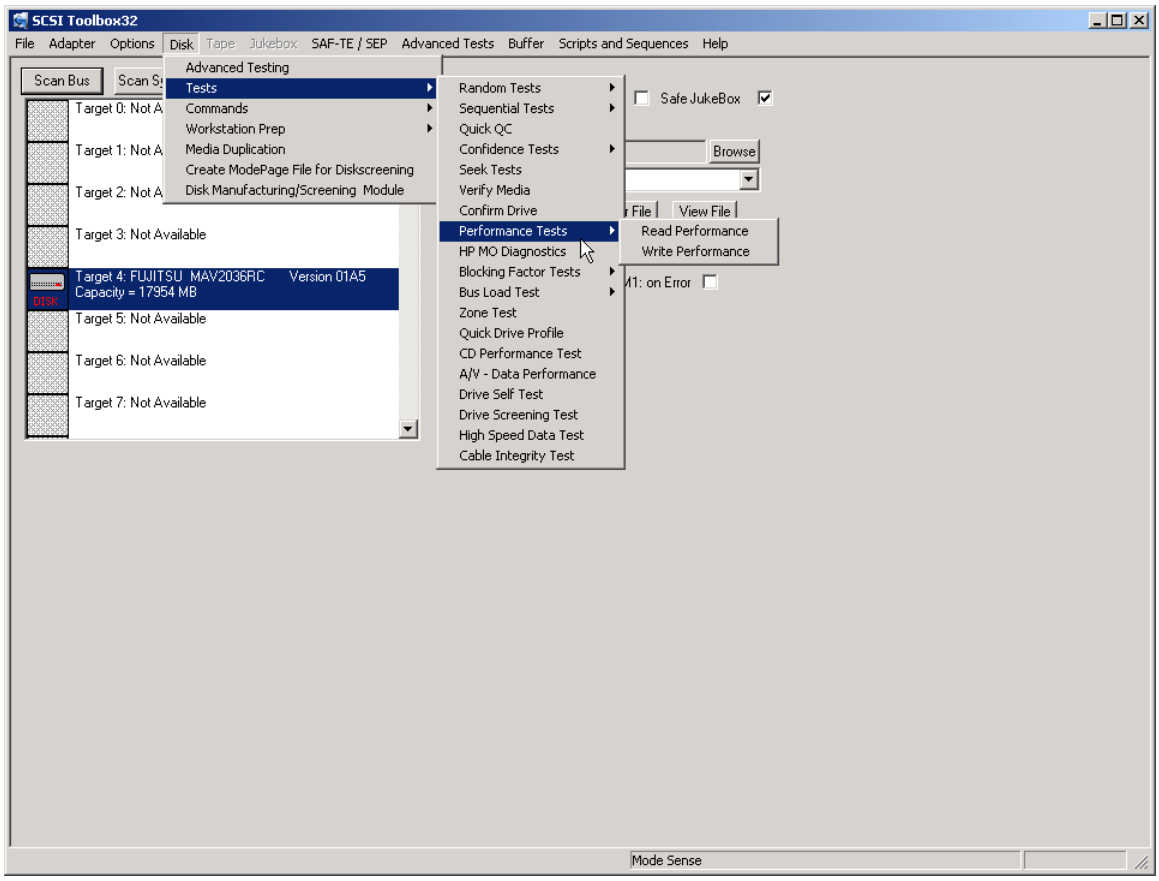
and forth between and the number of times to perform the seek.

Performance Tests

Both Read and Write Performance tests are available to measure drive transfer rate



The Read Transfer Rate Test

This test reads a specified amount of data (default: 10 MB) from the selected device with or without incrementing the block number and reports the sustained transfer rate during the transfer.

Reading 10 Mbytes from Target 2 Host Adapter 0
(156 Reads of 128 Blocks using 512 byte blocks)
Elapsed Transfer Time = 31 seconds
Sustained Average Transfer Rate = 1651 KB/sec

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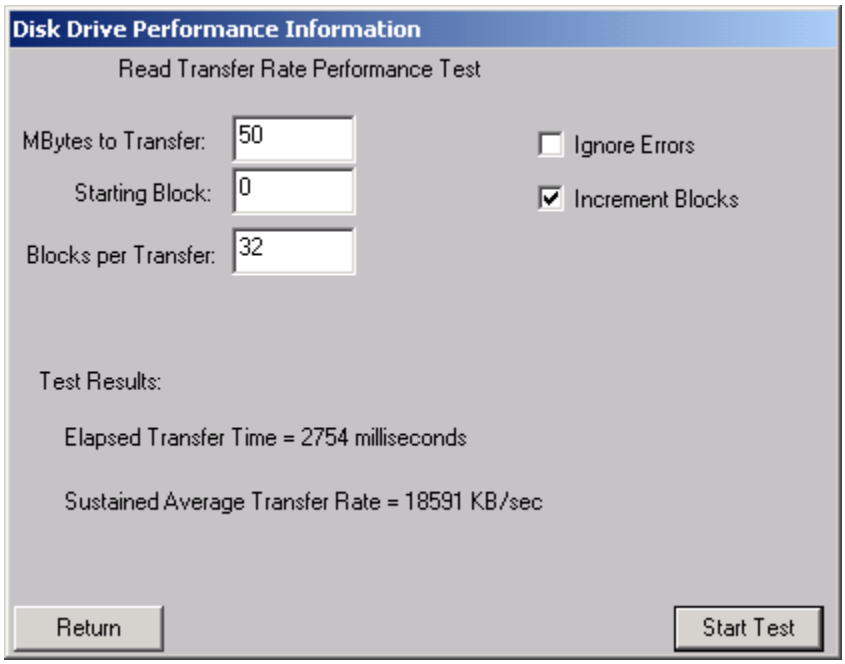
The Write Transfer Rate Test

This test writes a specified amount of data (default: 10 MB) from the selected device with or without incrementing the block number and reports the sustained transfer rate during the transfer.

Writing 10 Mbytes from Target 2 Host Adapter 0
(156 Reads of 128 Blocks using 512 byte blocks)
Elapsed Transfer Time = 31 seconds
Sustained Average Transfer Rate = 1651 KB/sec



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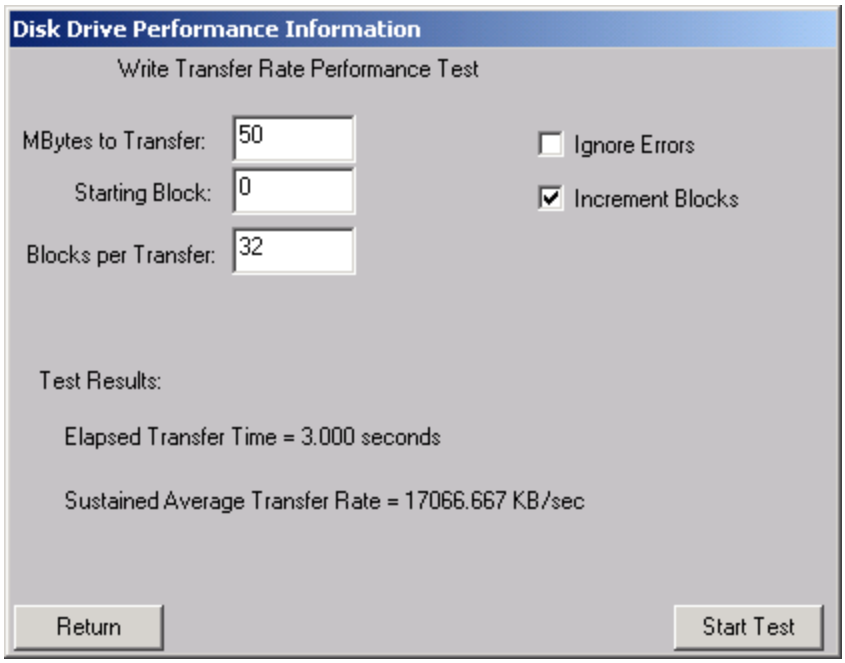

HP MO (Magneto Optical) Tests

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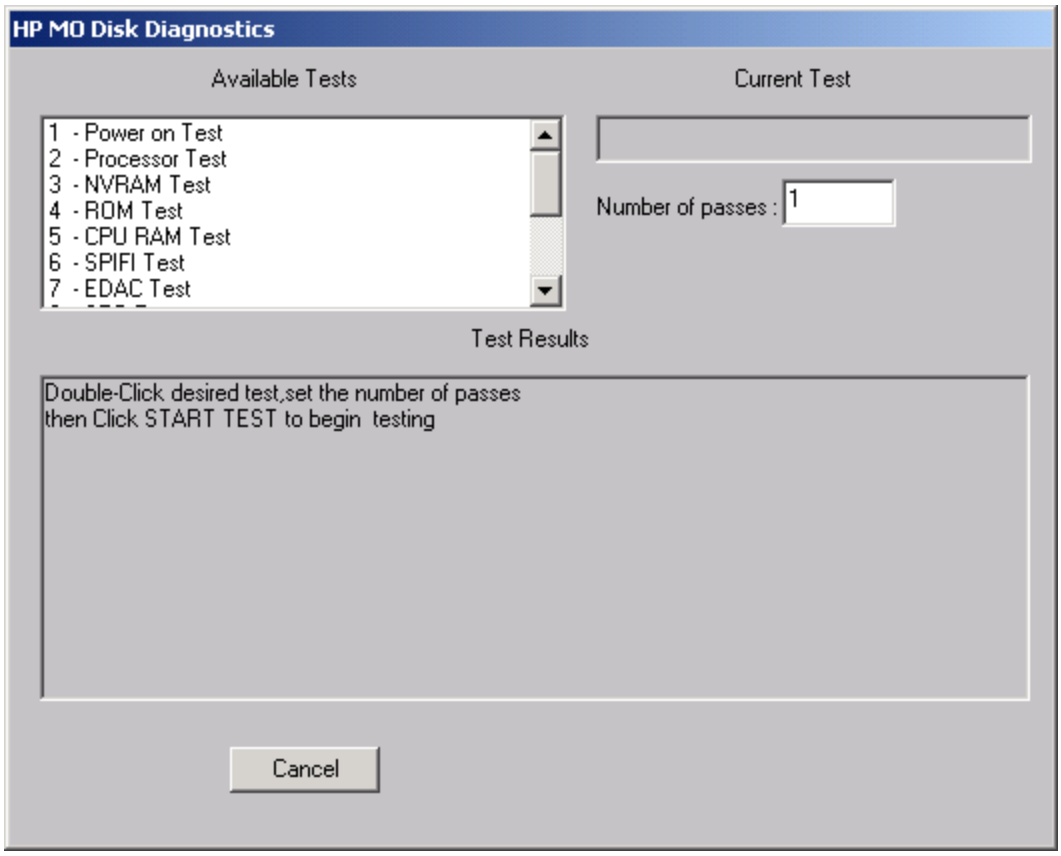

This selection is similar to the tests and utilities in the dosdass2 program.

Blocking Factor Tests

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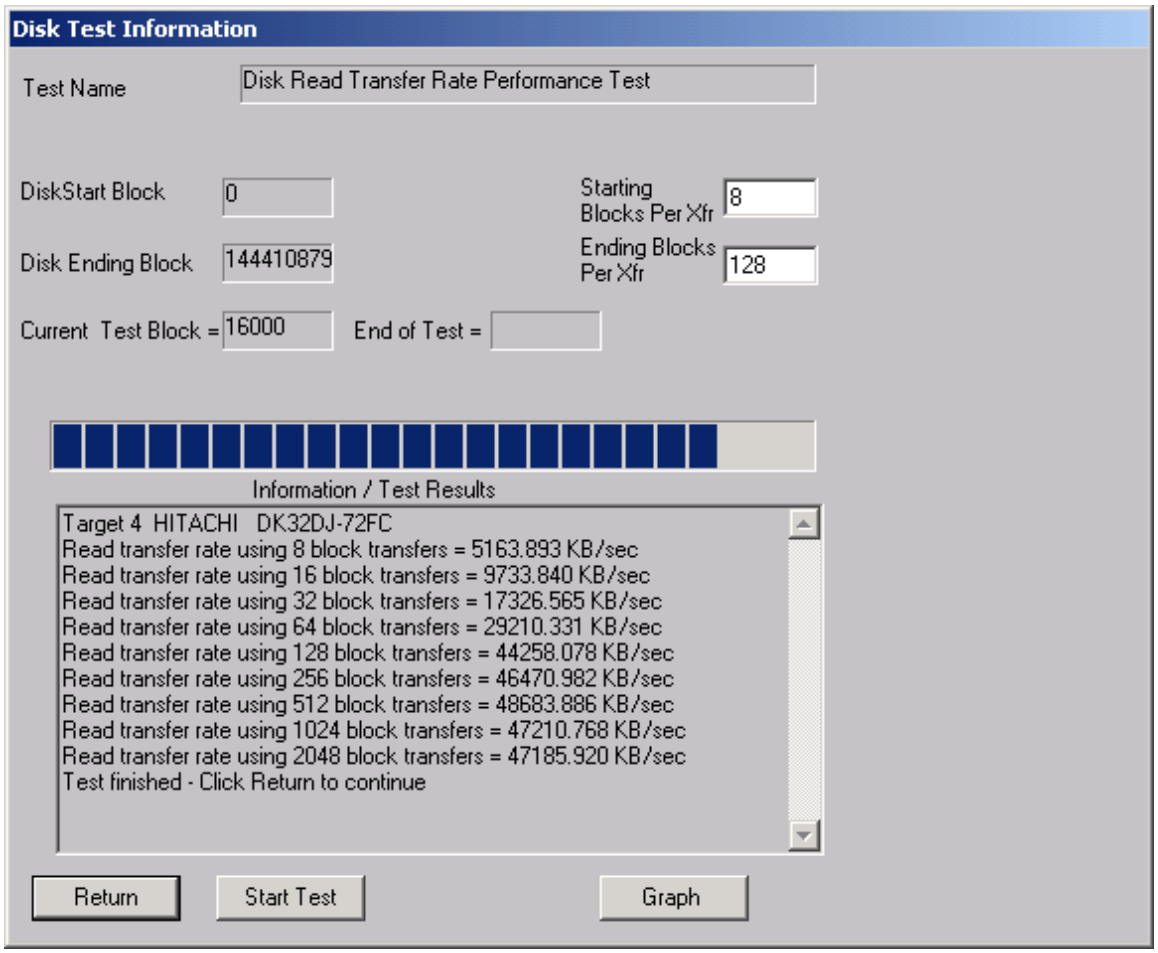

This test performs a series of 10MB reads with varying blocking factors to profile the I/O rates of the drive for various transfer sizes. The test starts with a transfer size of 1 block and increments that transfer rate through: 2, 4, 8,16,32,64,128,256, and 512 block transfers and times the 10MB I/O. The results are displayed in text form and as a bar graph.

Write Performance

This test is the same as the Read Performance except that write commands are issued.

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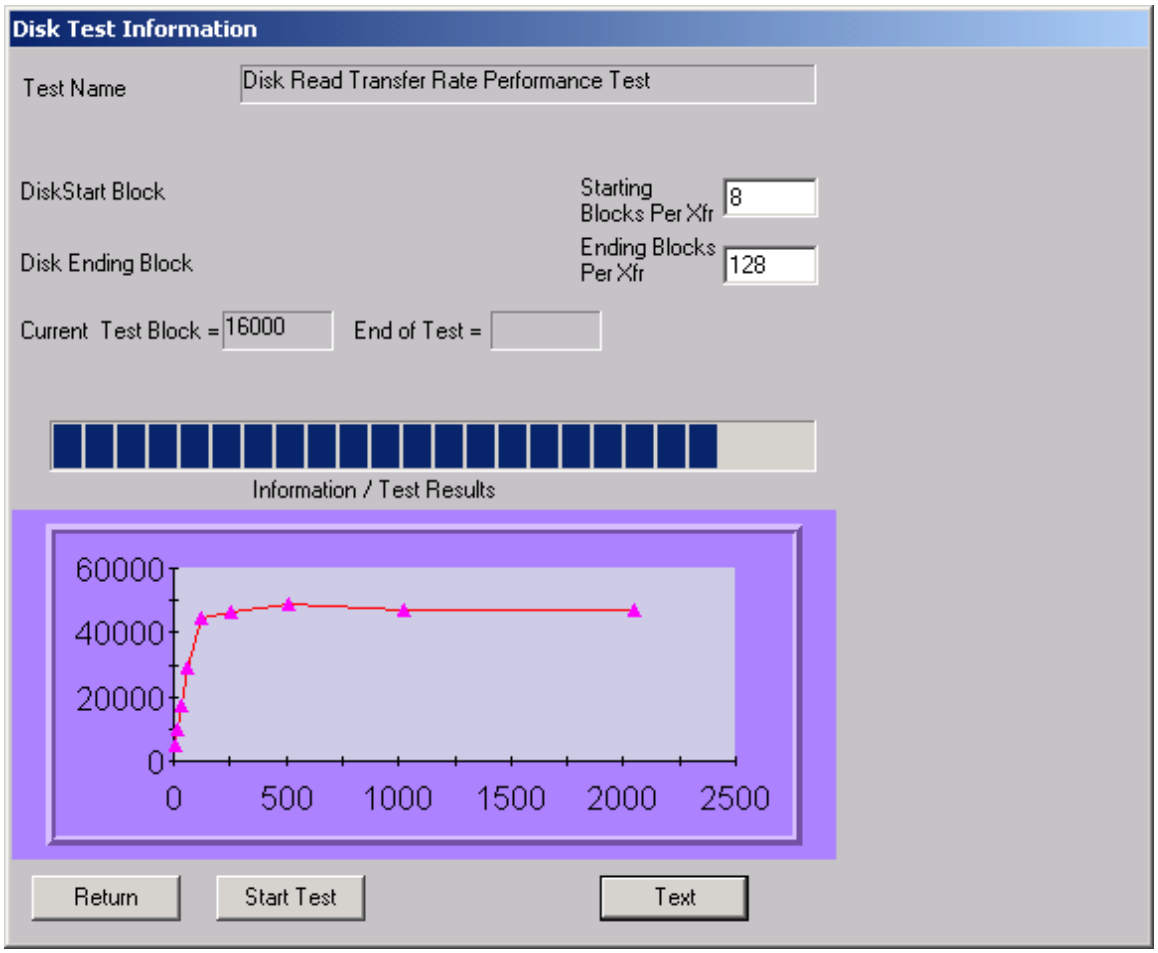

Bus Load Test

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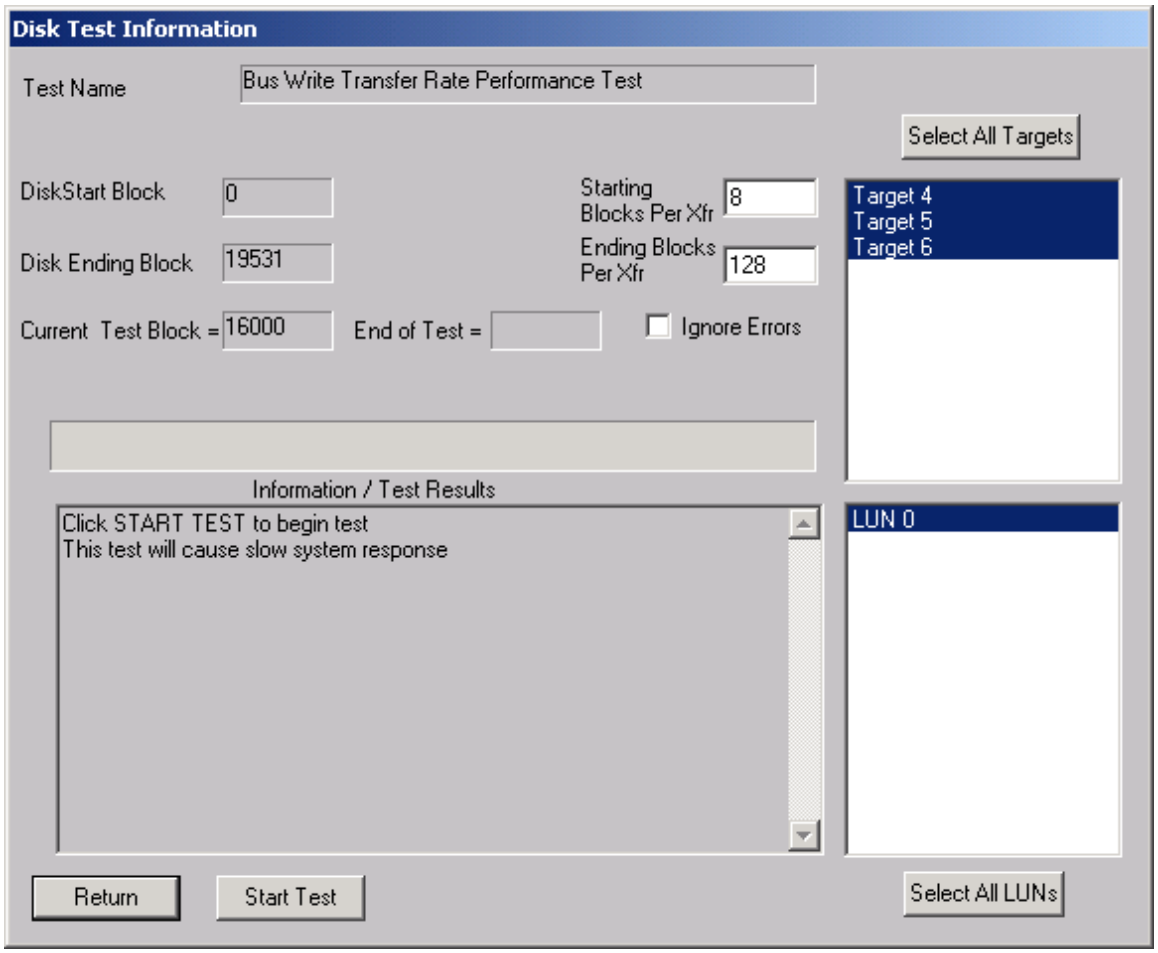

The bus load test will read or write data to one or more disk drives, graphing the transfer rates. With multiple disk drives, the test is performed on a single drive first, then on two drives, and so on, until all drives selected have been run. The average transfer rate to individual drives are graphed for each set of tests. Each drive tested will be run on its own worker thread, utilizing the multi-tasking ability of Win32. The starting and ending blocks per transfer, starting and ending block are all user-definable. When the test is first started a file box is displayed for logging the numerical results of the test. At this point it cancel is clicked no logs will be saved.

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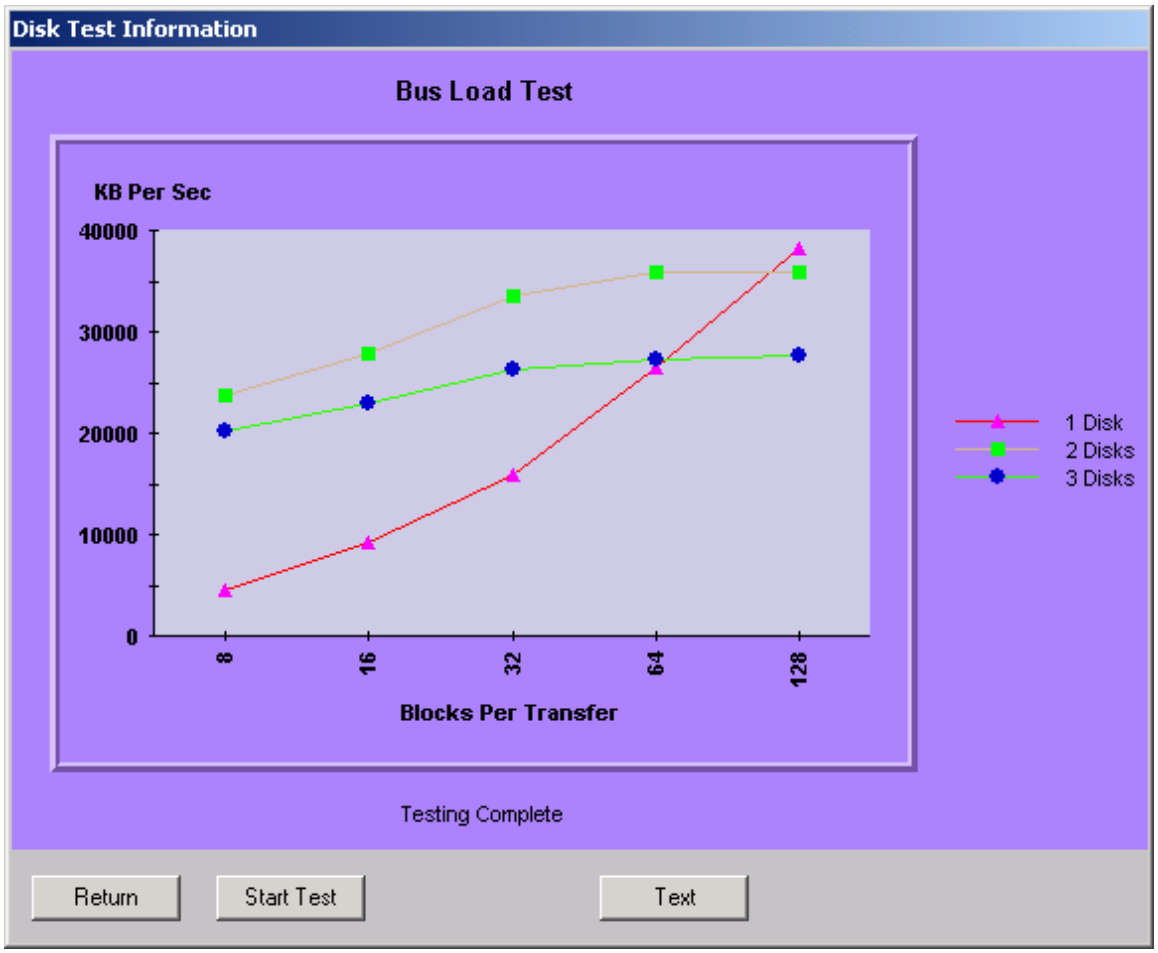

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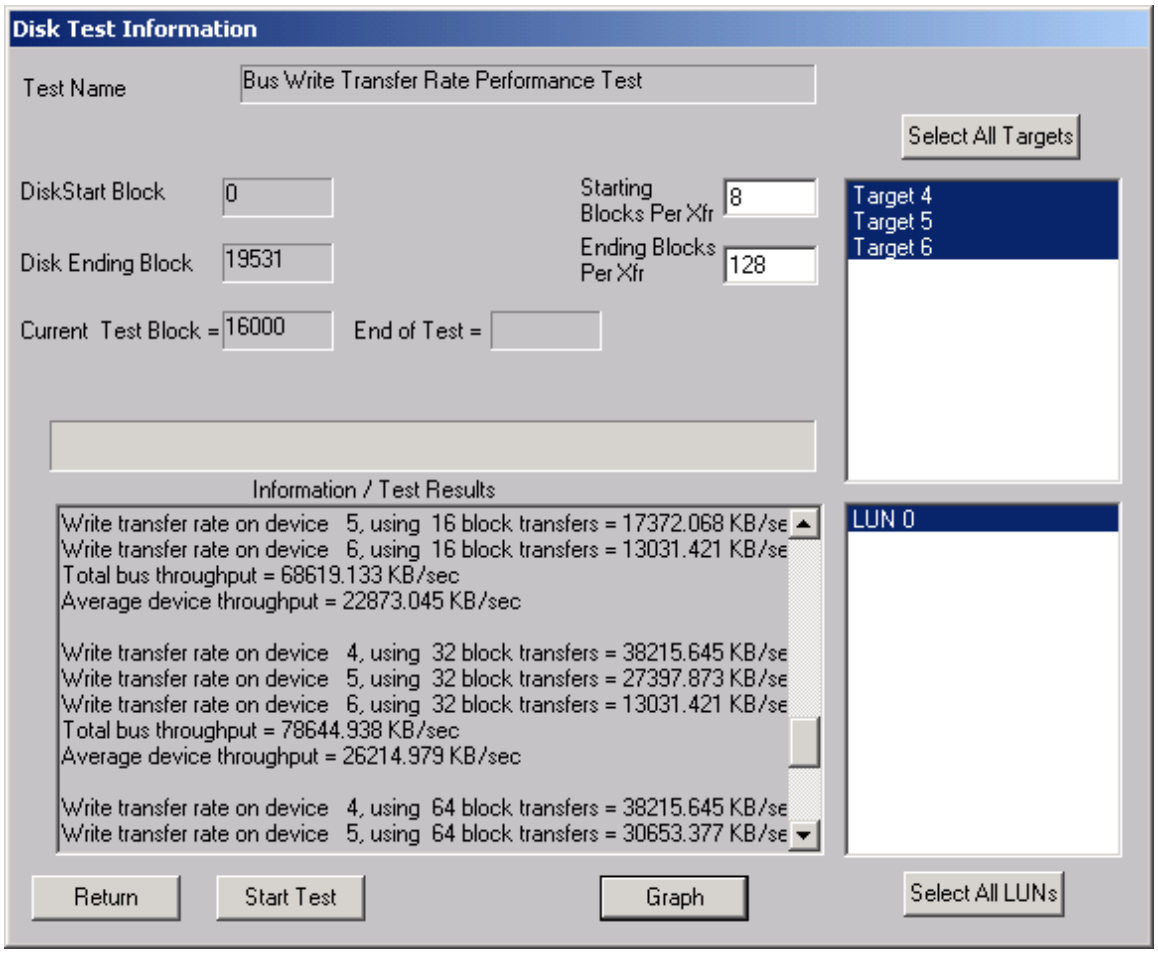

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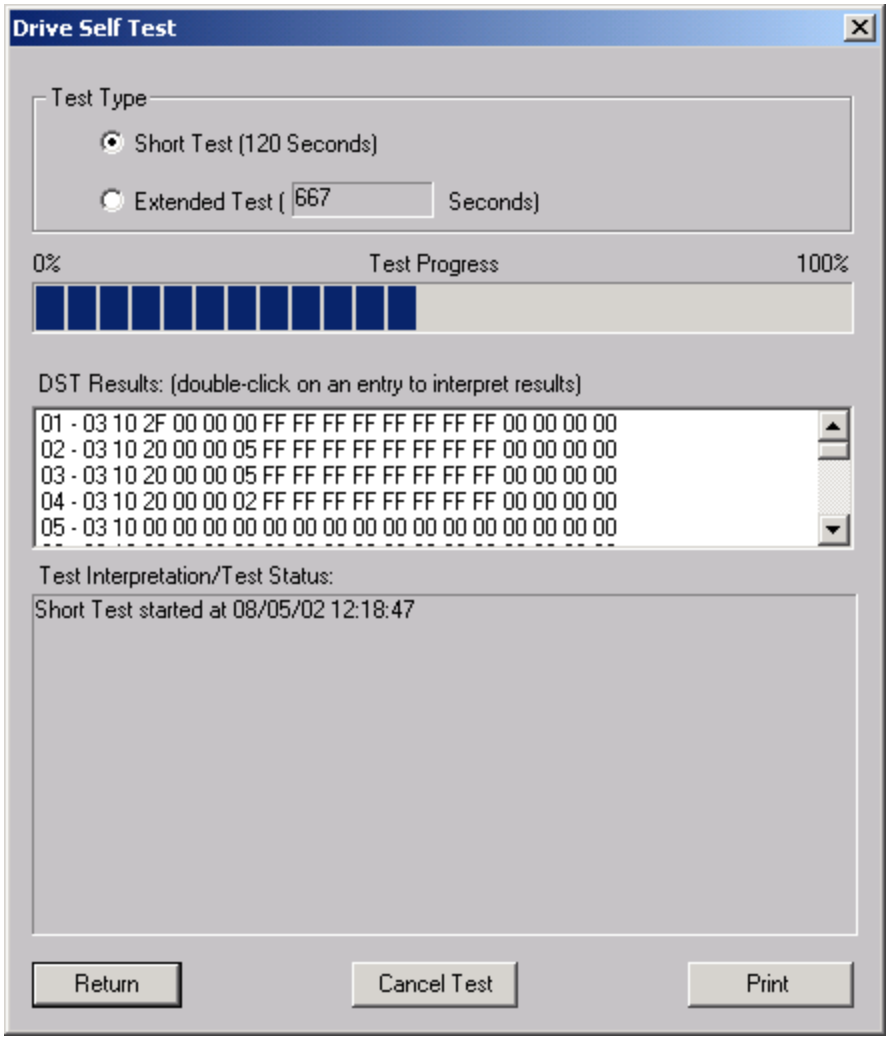
Drive Self Test



The Drive Self Test (DST) runs the drives built-in diagnostic tests in background mode. Once a self test is complete you can doulble-click on it's entry in the DST Results list box and the details of the results will be displayed in the Test Interpretation/Test Status window.

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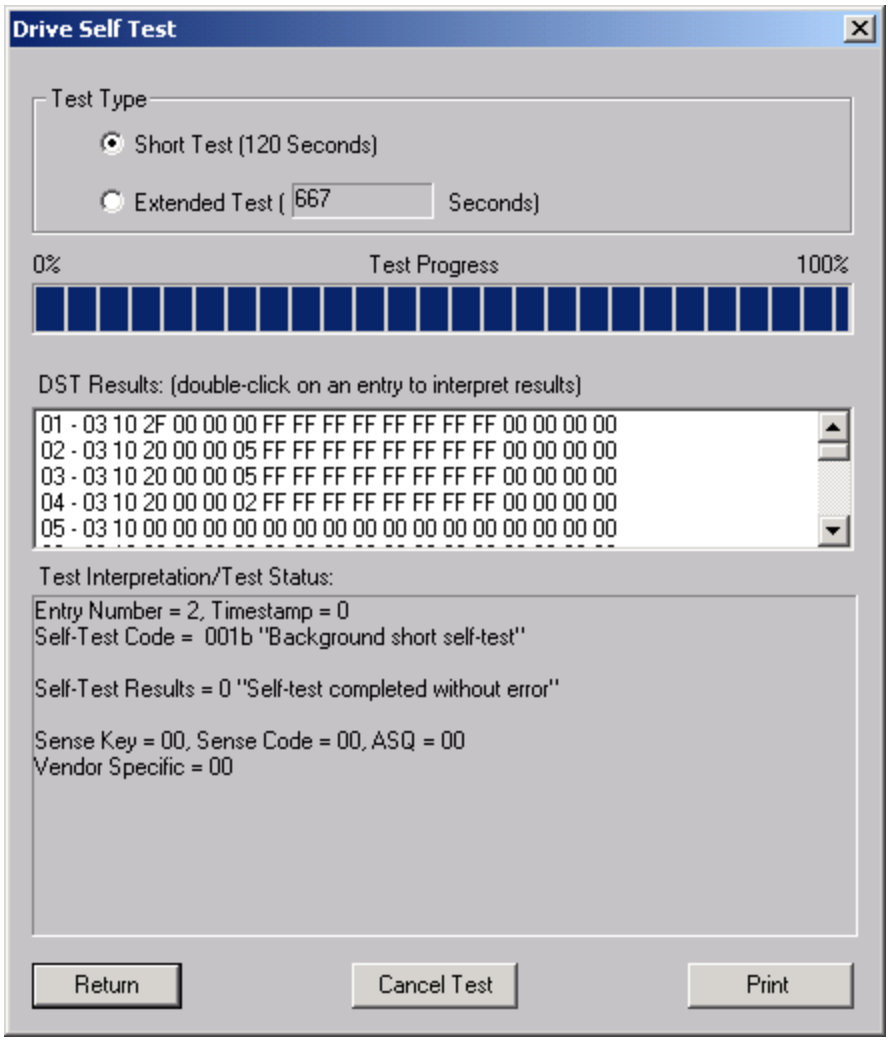

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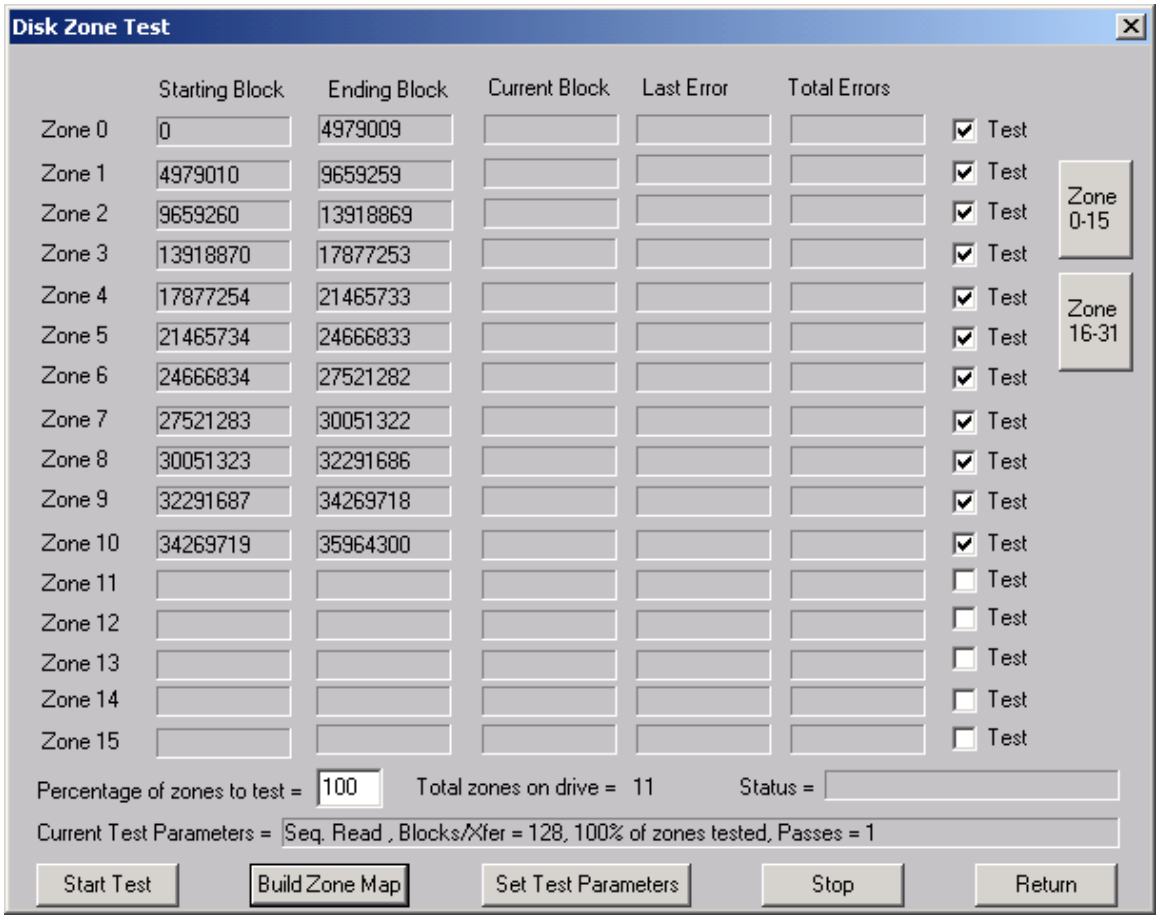
Disk Zone Test



The Zone Test determines the starting and ending blocks of each zone of a disk drive, and allows various types of tests to be run on any or all of the zones.

Click the Build Zone Map button to determine the zone bondaries of the drive. As each zone is processed the beginning and ending blocks of the zone are displayed. This process can take several minutes to complete.

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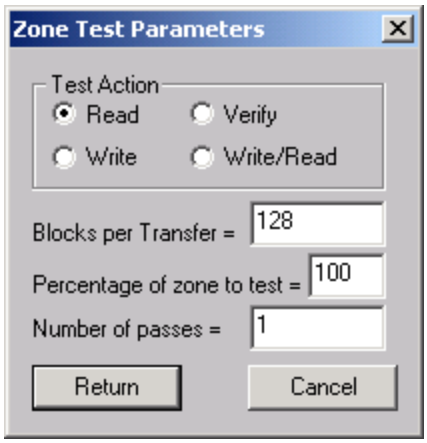

Set Zone Test Parameters – Clicking this button brings up the above dialog. You can select the following choices :

Test Action – Read Only, Write and Read, Write Only, or Verify

Blocks per Transfer – how many blocks are transferred for each SCSI command

Percentage of Zone to test – Specifies from 1 to 100% of each zone to test

Number of Passes – how many times the test is run

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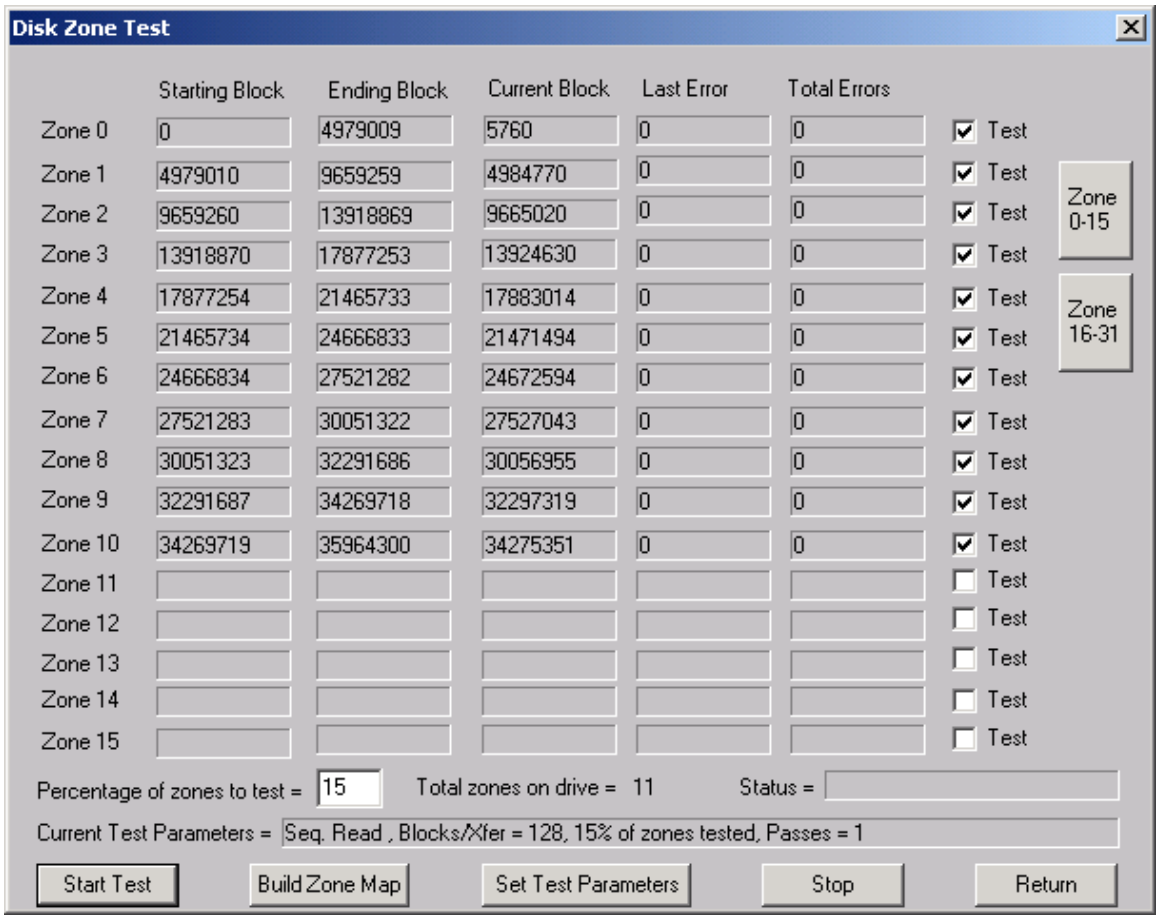

CD Performance Test

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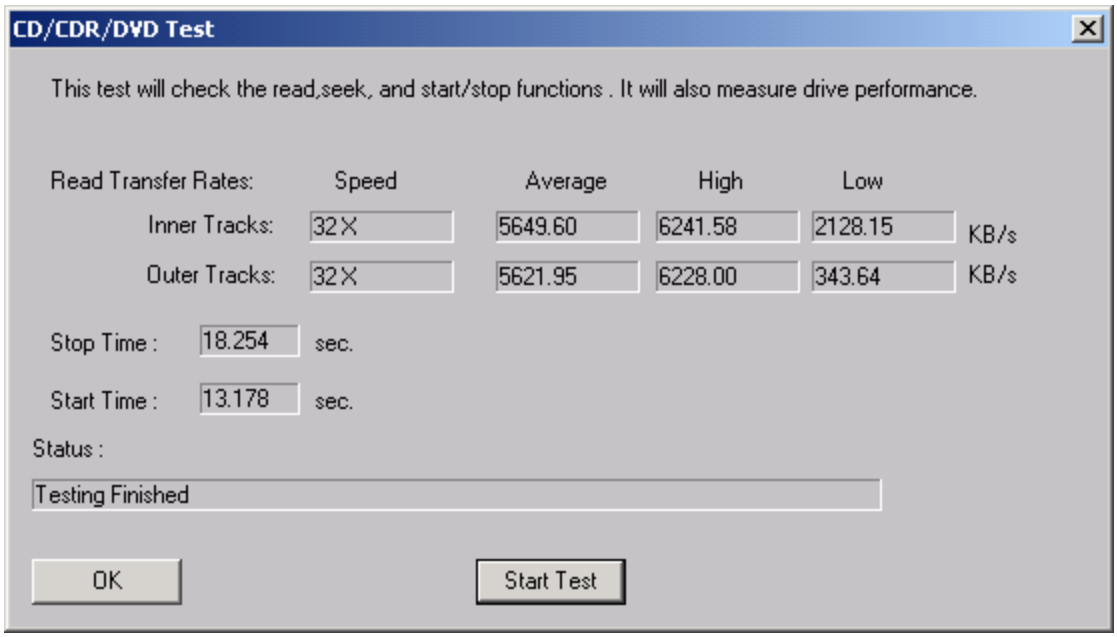

This test issues read commands to the inner and outer tracks of the device, and reports the time needed to start and stop the drive.

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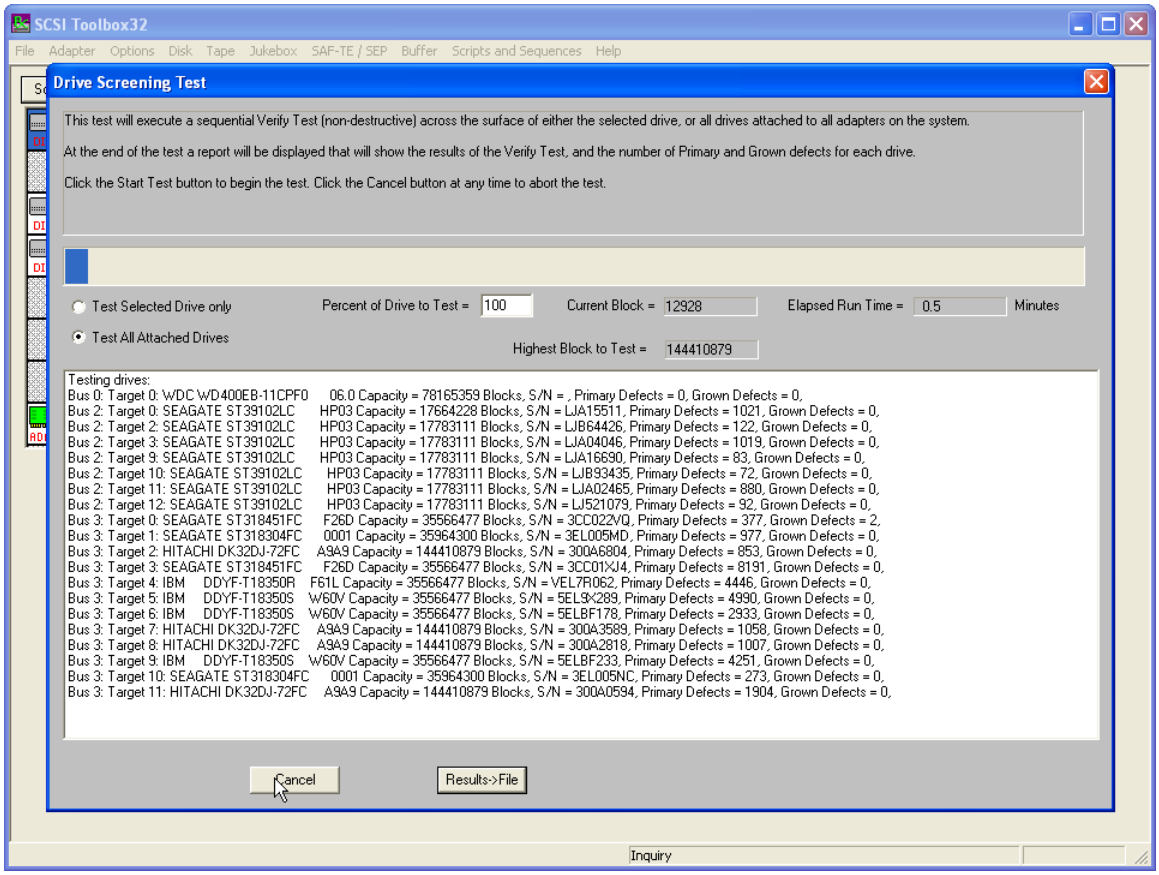
Drive Screen/Verify Test



NOTE: This test is no longer supported. Use the Disk Manufacturing Module (DMM) instead.

This test will verify any percentage of either the currently selected disk or all disks attached to all host bus adapters.

This test is not threaded, so you may want to use the Disk Screening Module which is documented in a separate chapter at the end of this manual.

High Speed Data Test

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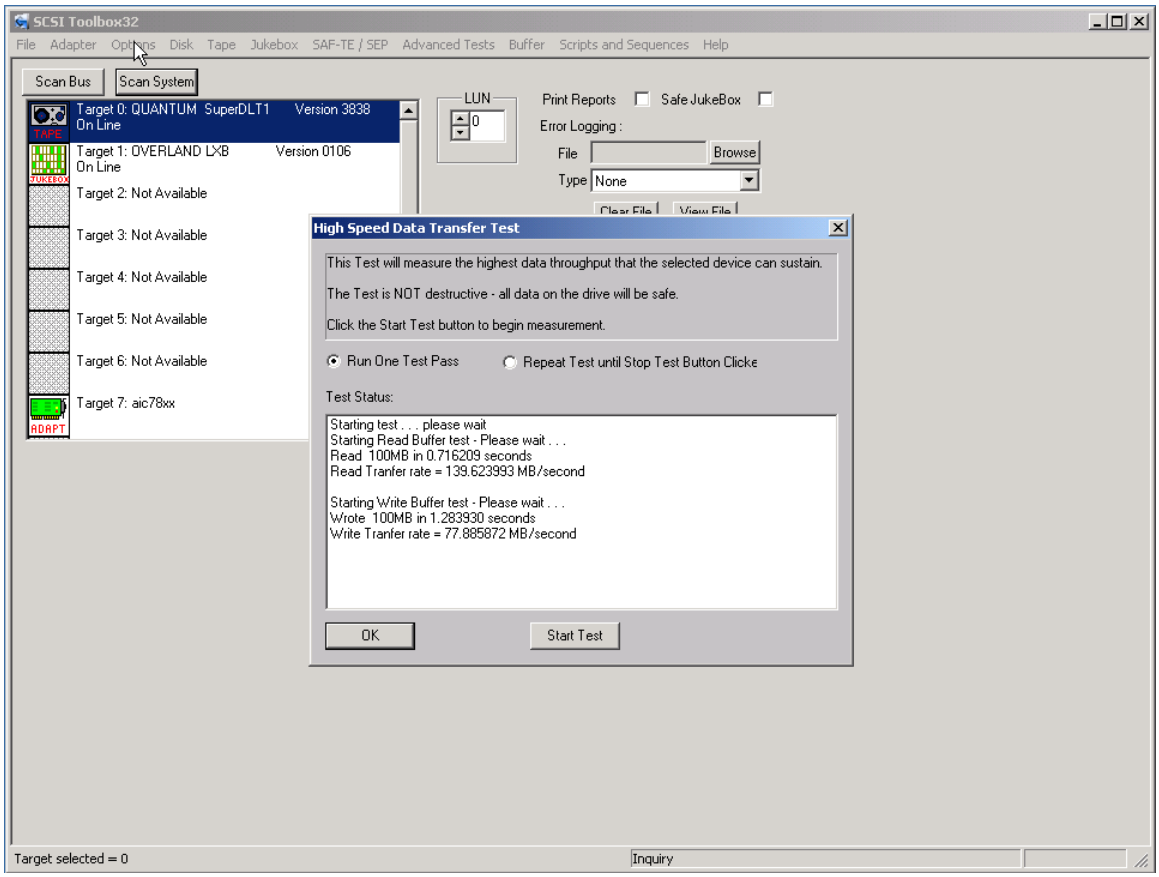

The High Speed Data test transfers data to and from the drive without transferring to the actual drive media. This allows the data transfer speed of the drive and host bus adapter to be determined.

This test uses WRITE BUFFER and READ BUFFER commands and may not be compatible with all drives.

Cable Integrity Test

For testing cable/termination/backplane integrity **for parallel SCSI drives only**

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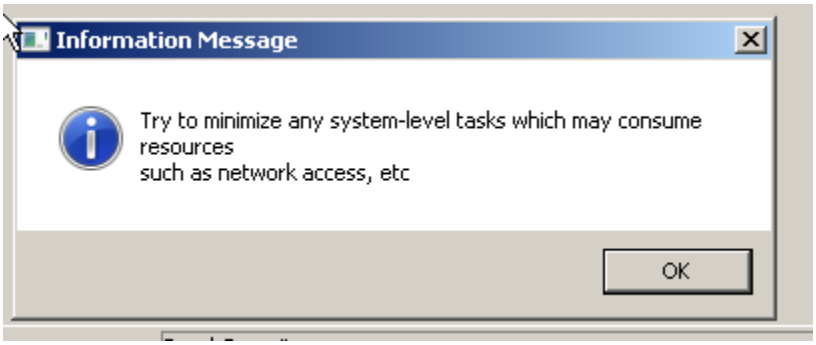
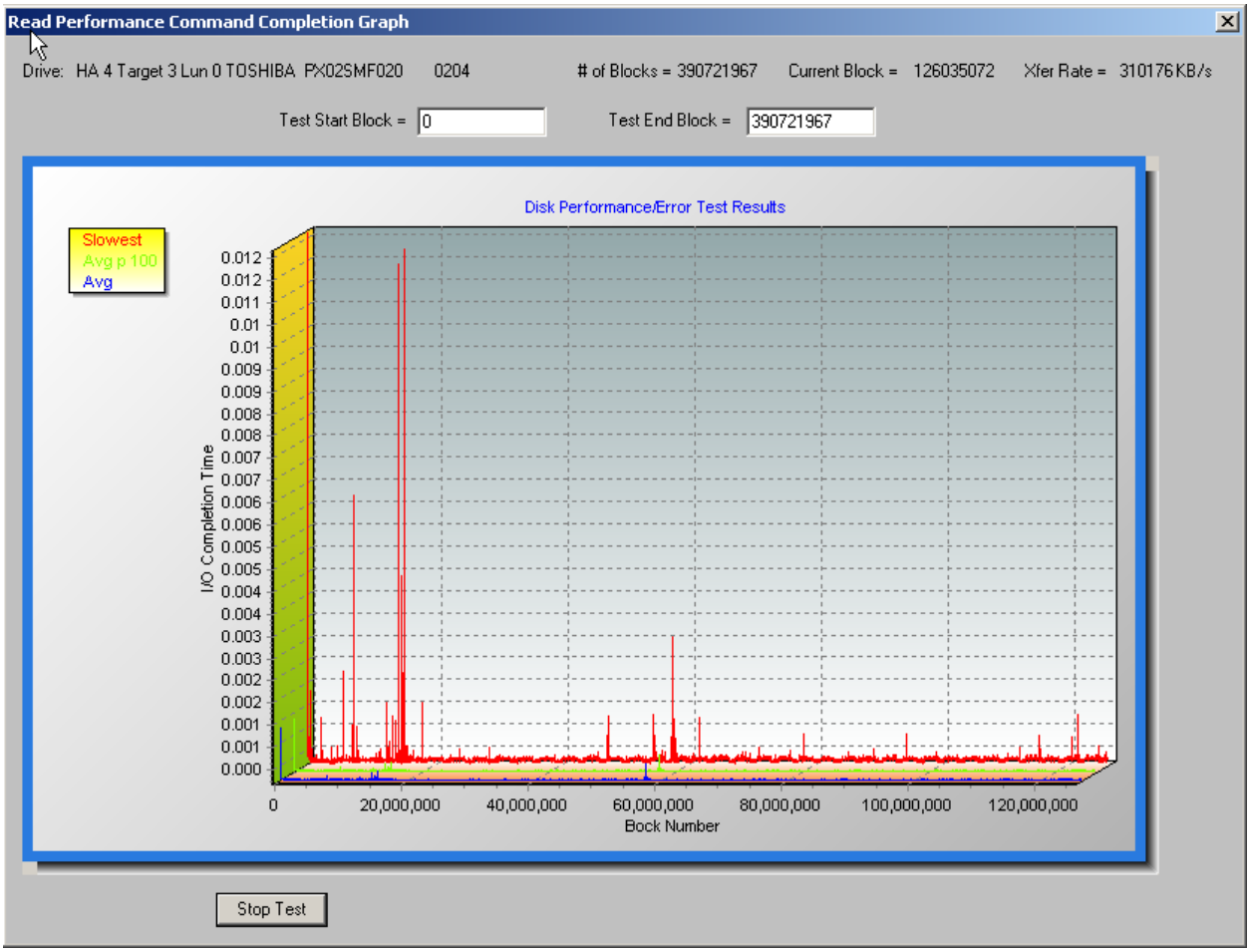
Performance/Error Graph Test

Issues READ or WRITE commands sequentially, graphs command completion time (inter-command latency).

It is important to eliminate as many processes consuming test system resources as possible -





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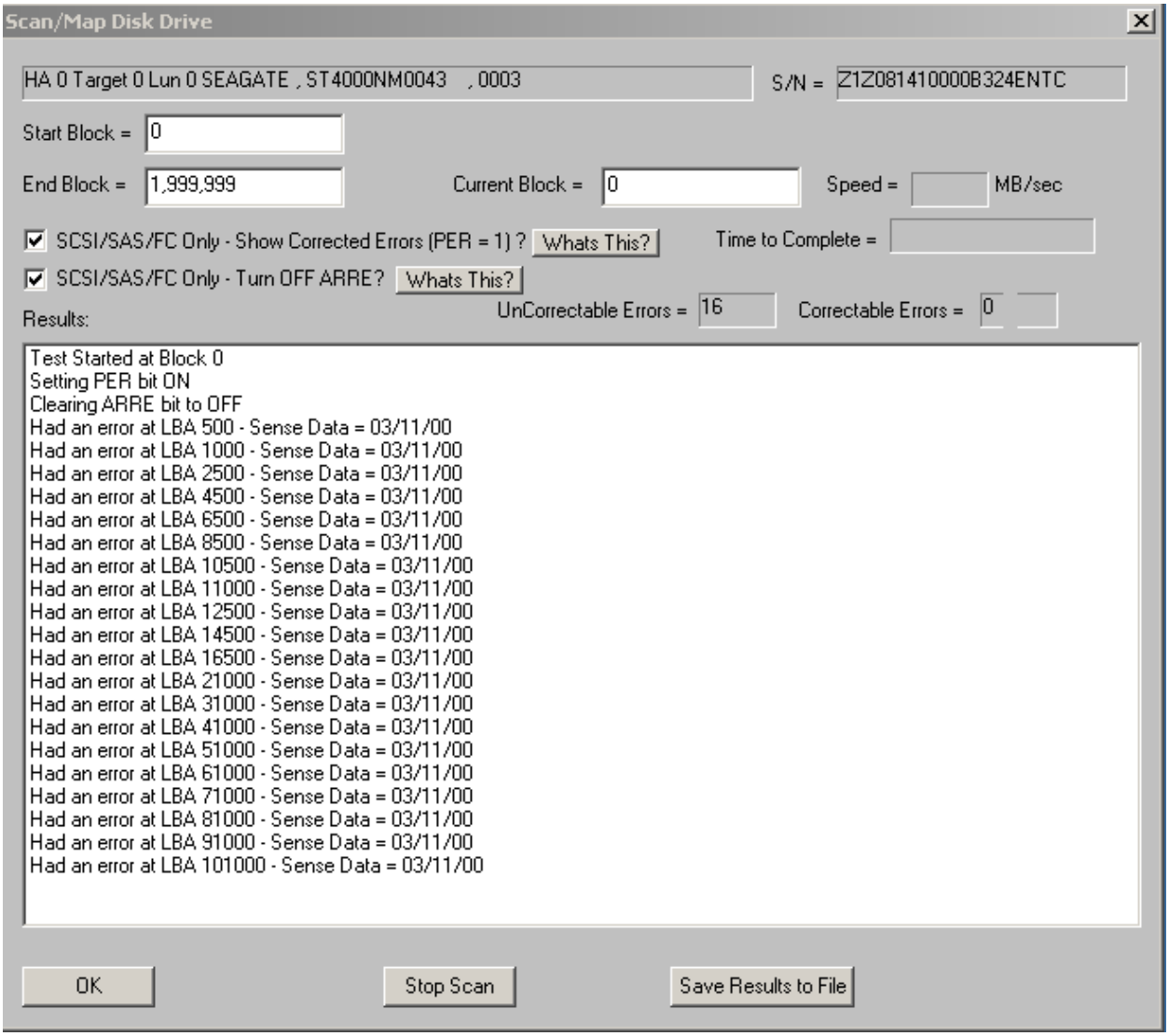
Scan/Map Disk Errors Test

Scans the disk looking for correctable and non-correctable errors/



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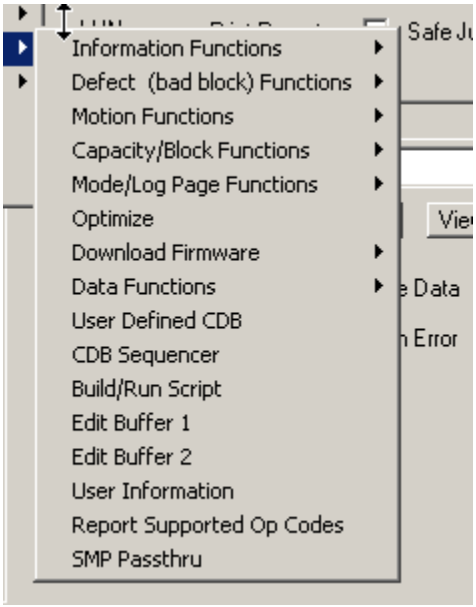
Disk Commands

The following commands may be accessed from the Disk Commands Menu



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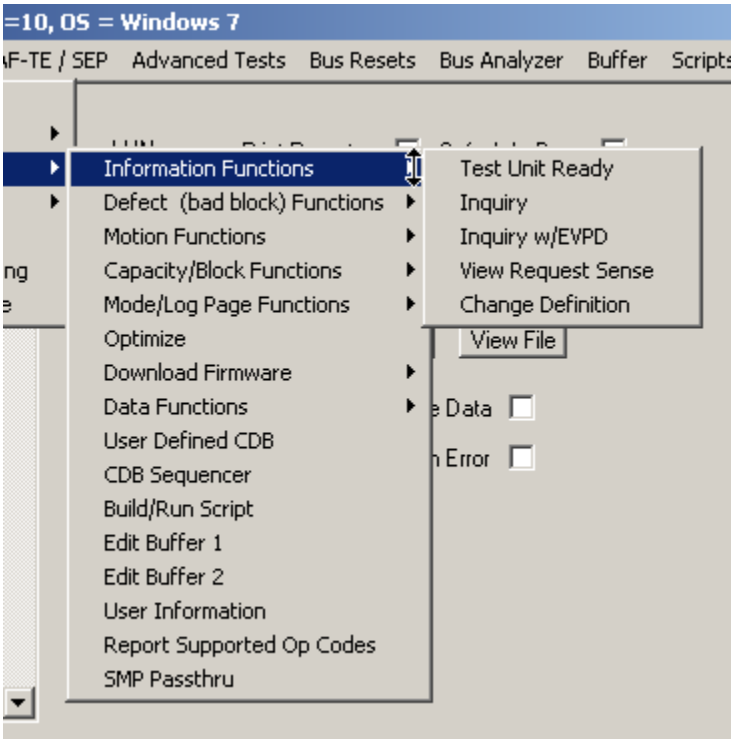
Information Functions



Test Unit Ready

This command tells you if the drive is spun up and ready or not

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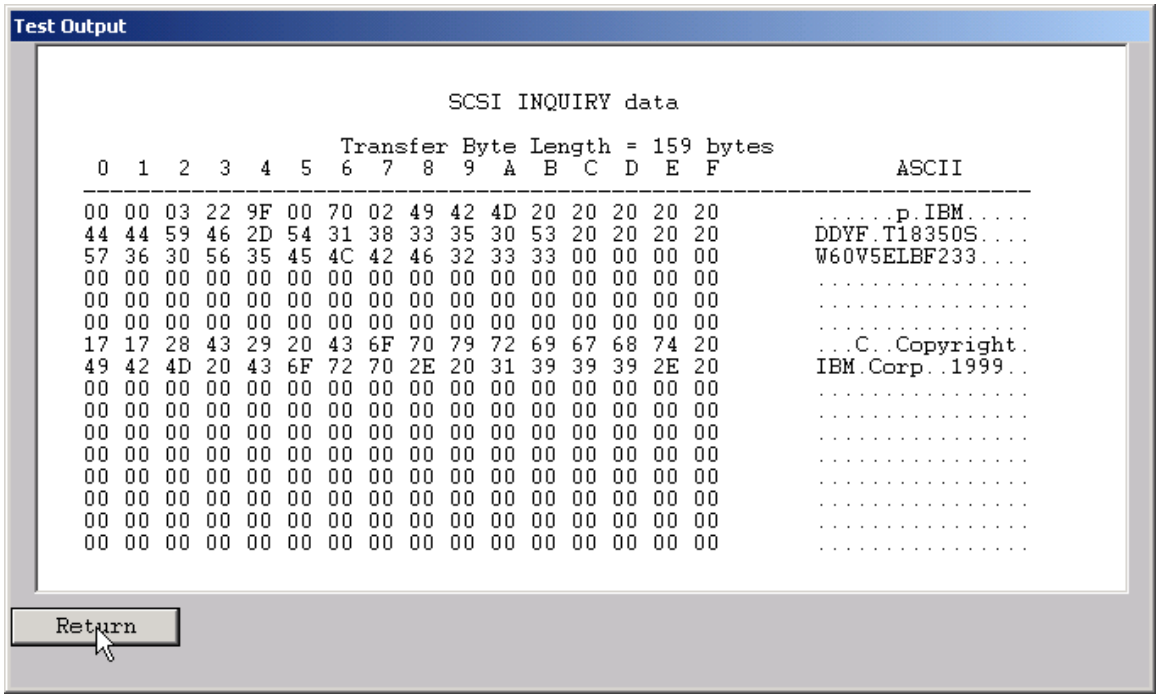
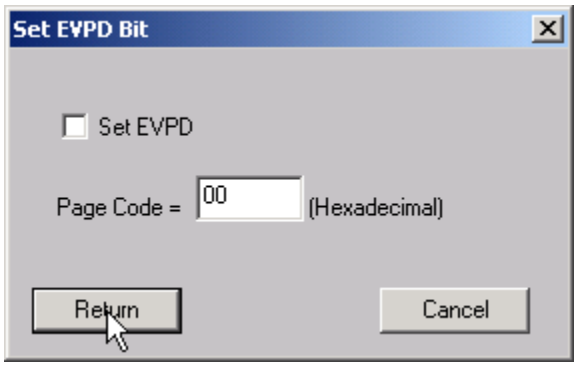
Inquiry



INQUIRY data is displayed in hexadecimal on the left side of the screen, and in ASCII on the right

Inquiry w/ EVPD



This option lets you specify whether to set the EVPD bit in the INQUIRY command, and which EVPD page you would like to display.

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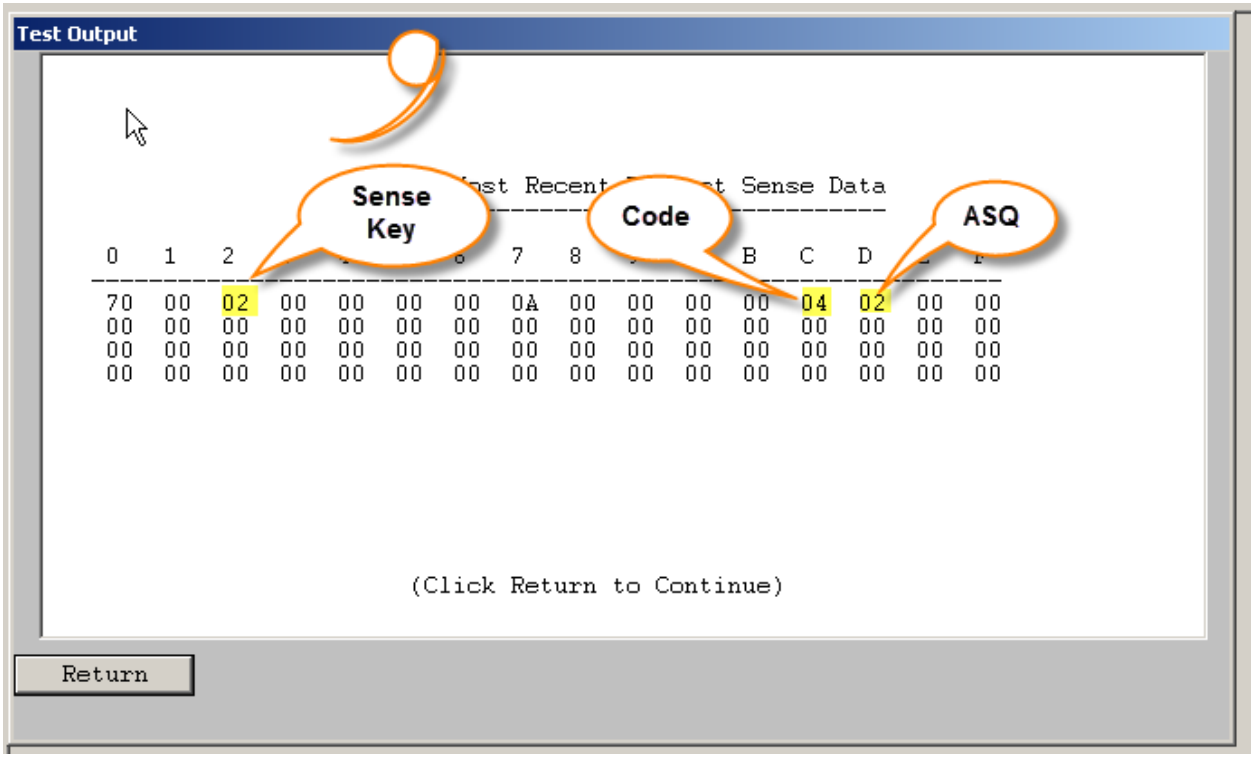
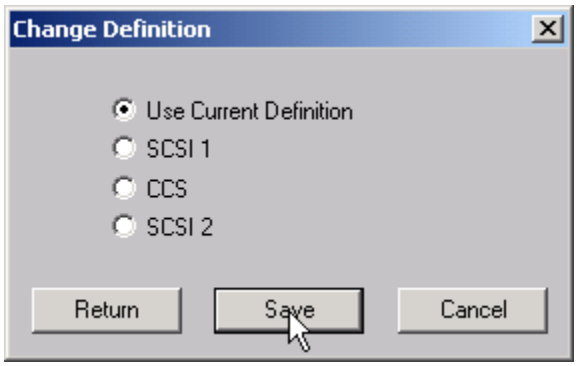
View Request Sense

The Sense Data returned by the last failed command (the CDB resulted in a CHECK CONDITION) may be viewed. Here is an example of Sense Data 02/04/02 – ***Logical Unit not Ready, Start Required***



Change Definition

Displays and allows change to the INQUIRY DEFINITION parameter



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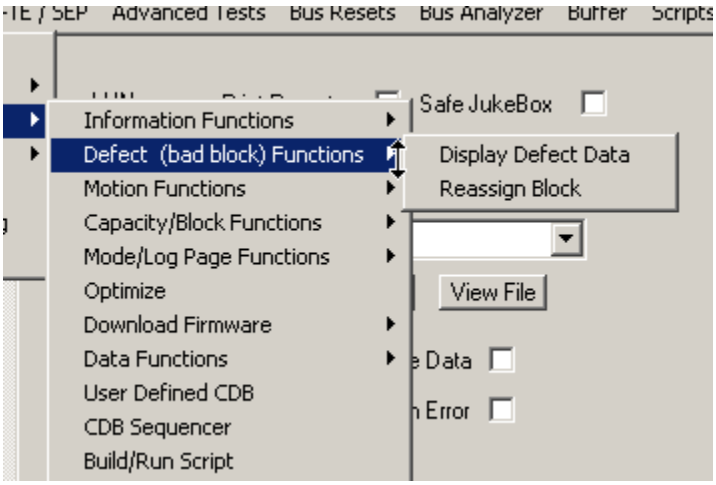
Defect Functions



Display Defect Data

This commands allows both the Primary and Grown defect data to be displayed, printed, or saved to a file. The number of defects is shown as well as each individual defect. A summary of defects per head is shown at the end of the defect data. The Defect List Format may be specified using the radio buttons. Click the Primary Defects button to display the primary (factory) defects, or the Grown Defects button to view the grown defect list.

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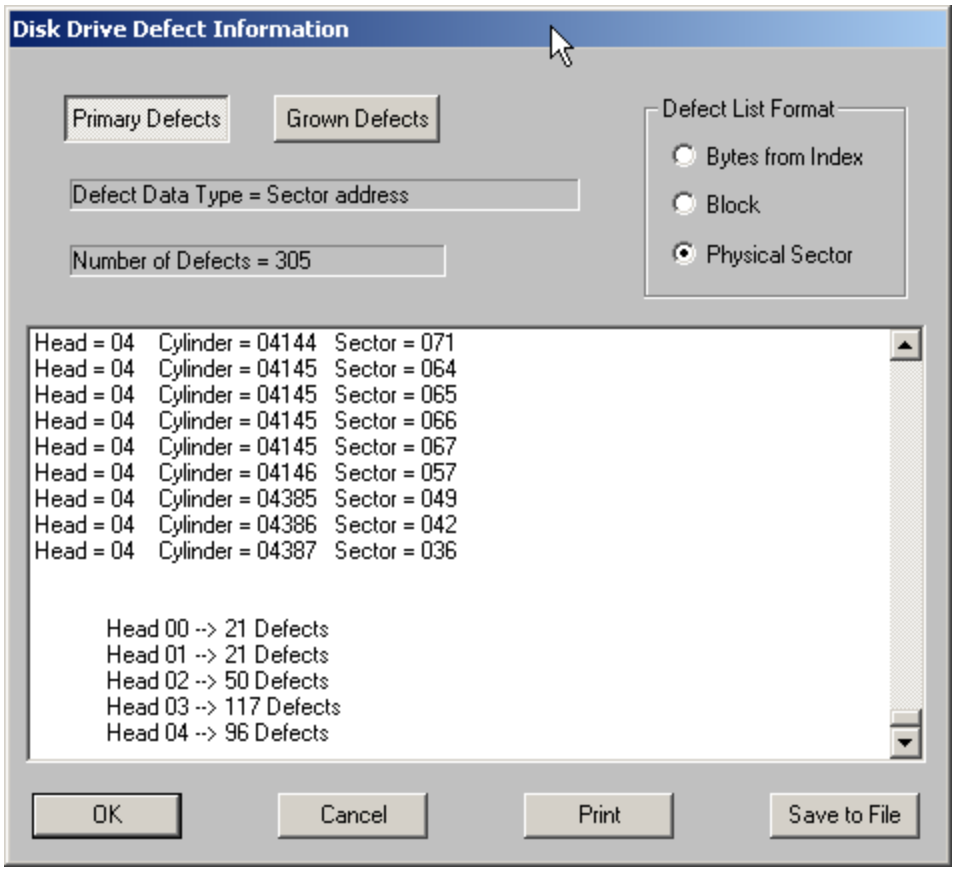

Reassign Block

Allows you to mark an LBA as bad and reassigned. Reassigned LBAs will increment the Grown Defect list count

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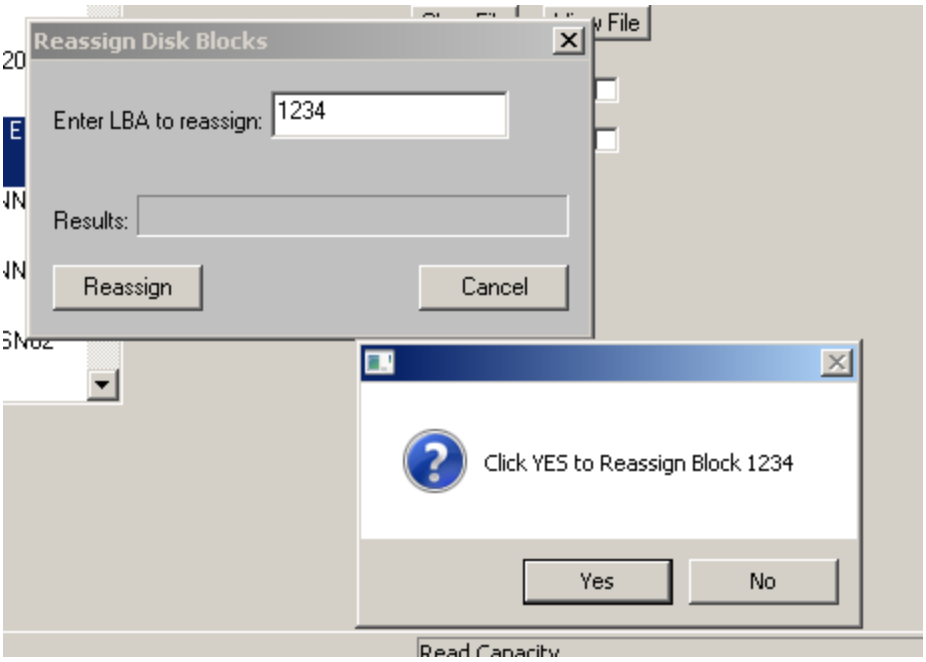
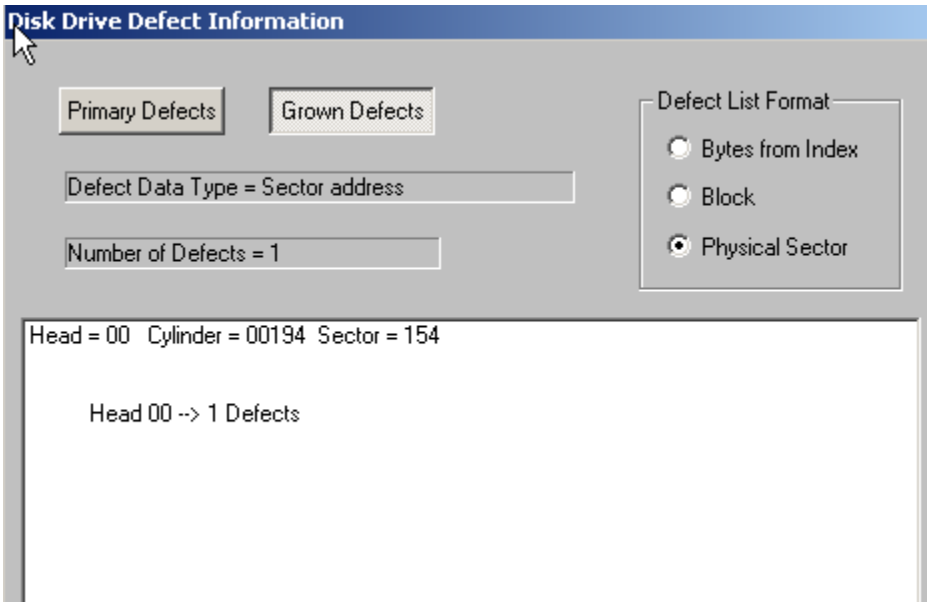


Here is the example drives G List after the reassign



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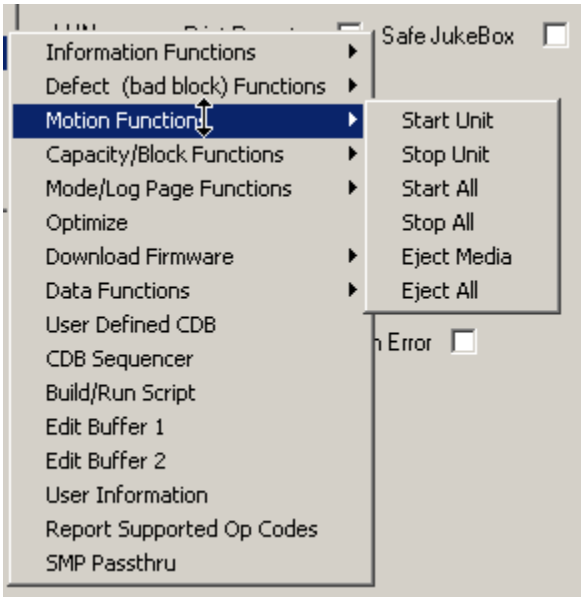
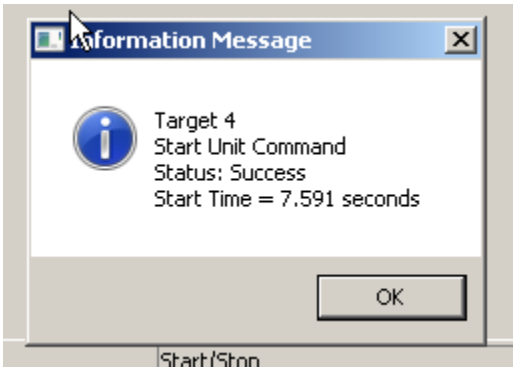
Motion Functions



Start Unit

Sends a START-STOP UNIT command to the drive to start or spin-up the drive.

Reports the time it takes for the Start to complete –



Stop Unit

Sends a START-STOP UNIT command to the drive to stop or spin-down the drive.

Reports the time it takes for the Stop to complete –

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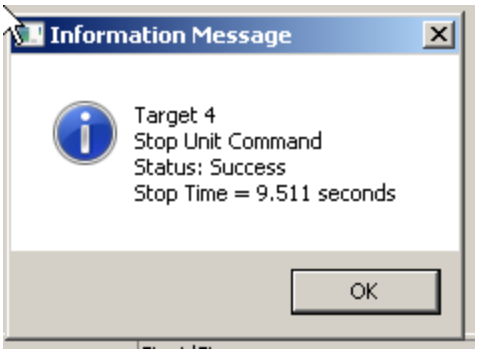


Start All

Starts or Spins up all drives on the selected HBA

Stop All

Stops or Spins down all drives on the selected HBA

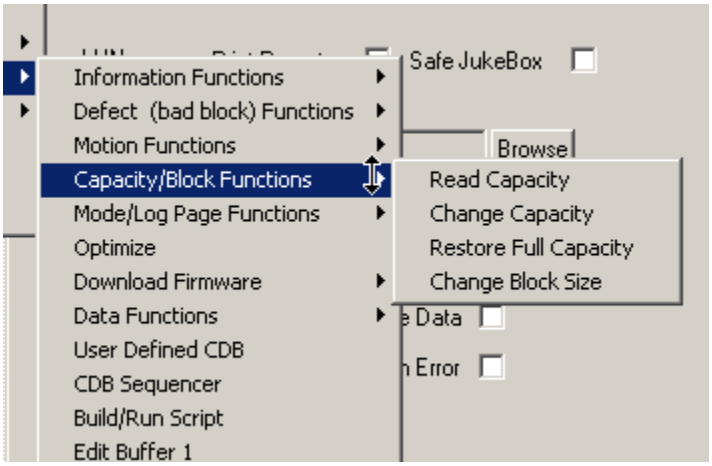
Eject Media

Ejects the media if the selected drive has removable media, such as an MO drive

Eject All

Ejects the media from all drives on the selected HBA

Capacity/Block Functions



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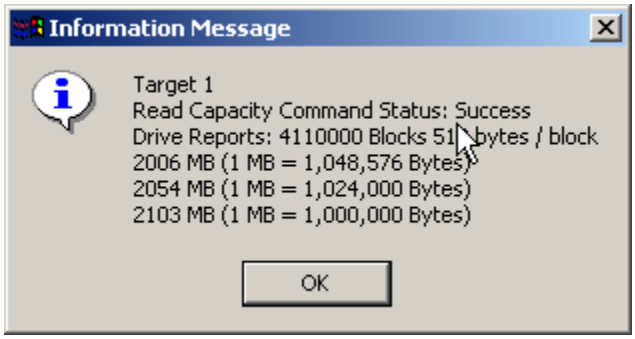
Read Capacity

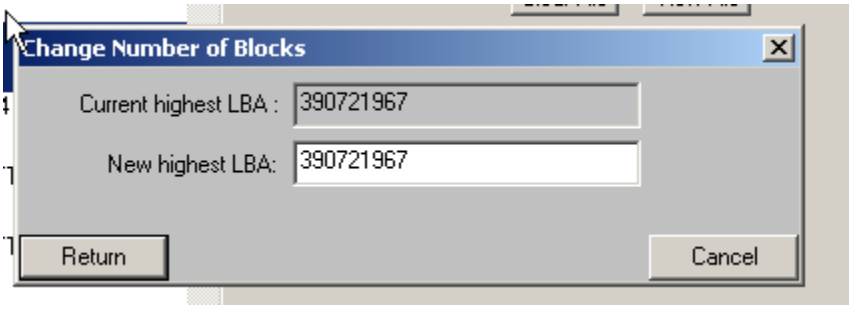
Displays the drive capacity and block size



Change Capacity

This command allows you to change the capacity (highest LBA) of the drive.
Note: since the drives LBAs are zero-based (starts at 0), after you specify a new **Highest LBA** the drive capacity will equal **Highest LBA** + 1.

Setting the drive to a smaller size is know as ***Short-stroking***



Restore Full Capacity

This command will restore the original full capacity of the drive. If you have short-stroked the drive this command will allow you to quickly set the drive back to its original size.

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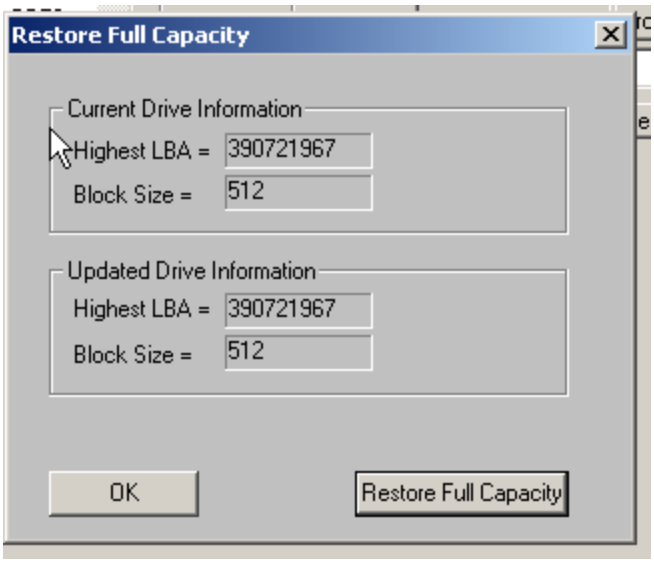

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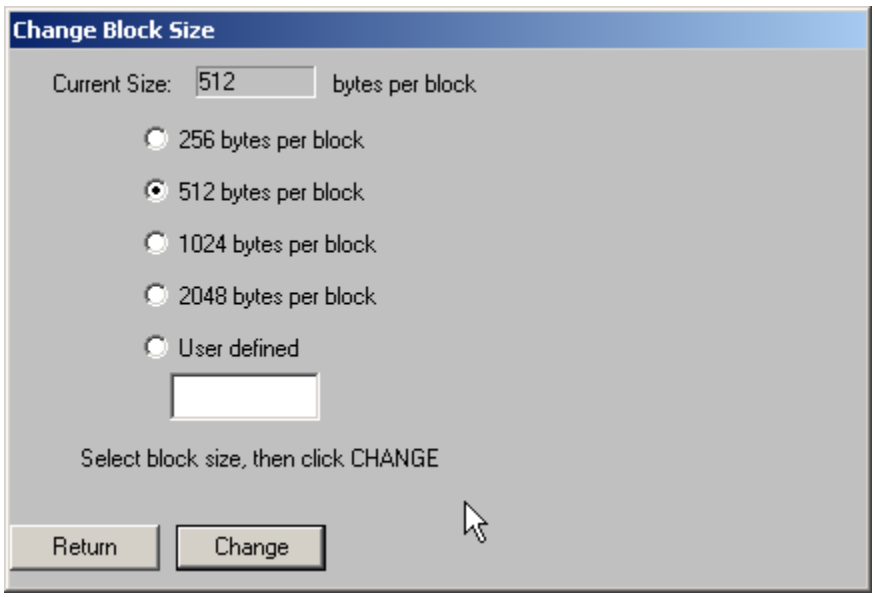
Change Block Size

This command allows the blocksize of the drive to be changed (assuming that the drive firmware supports changing block size). **THIS IS A DESTRUCTIVE OPERATION AND WILL REQUIRE REFORMATTING THE DRIVE!**



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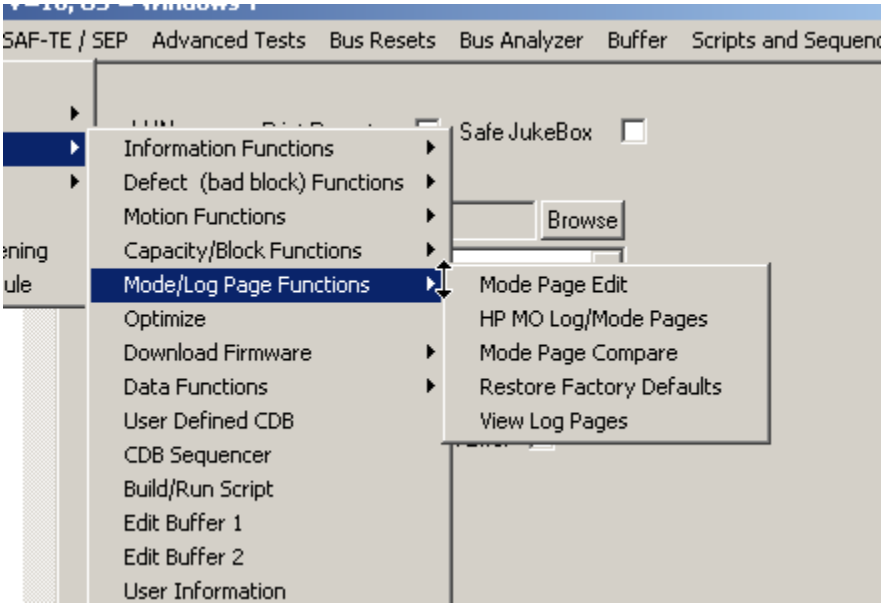
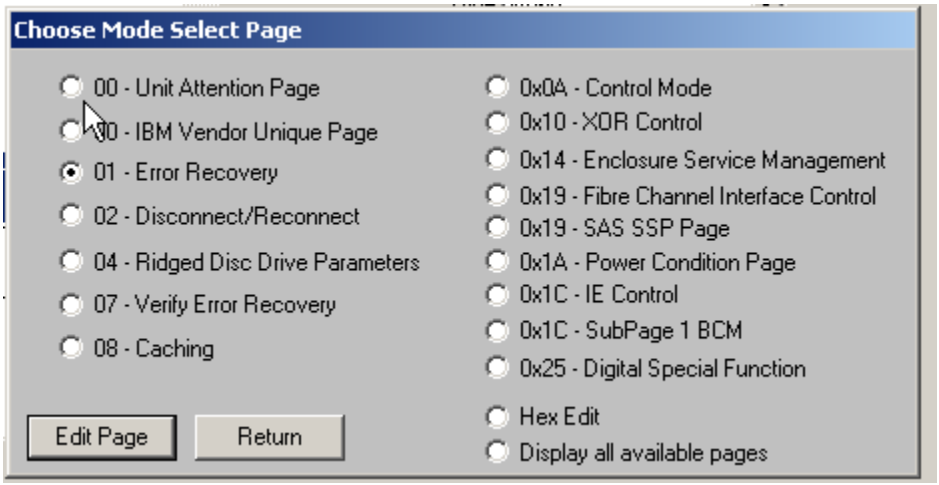
Mode/Log Page Functions



Mode Page Edit



Display all available Mode Pages

This function asks the drive to report all of its available Mode Pages and displays all of them in raw hex-

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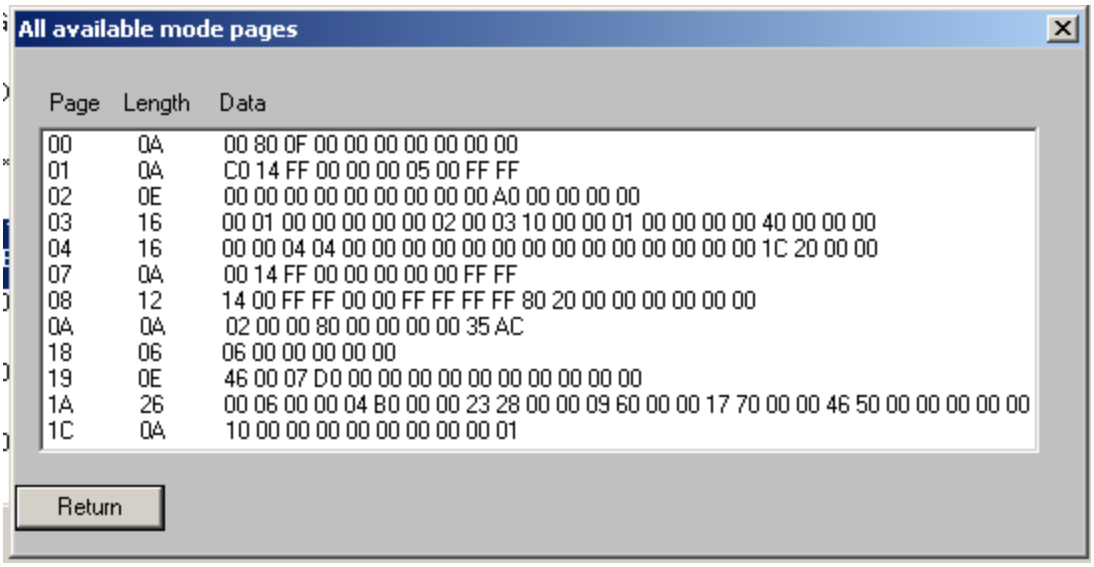
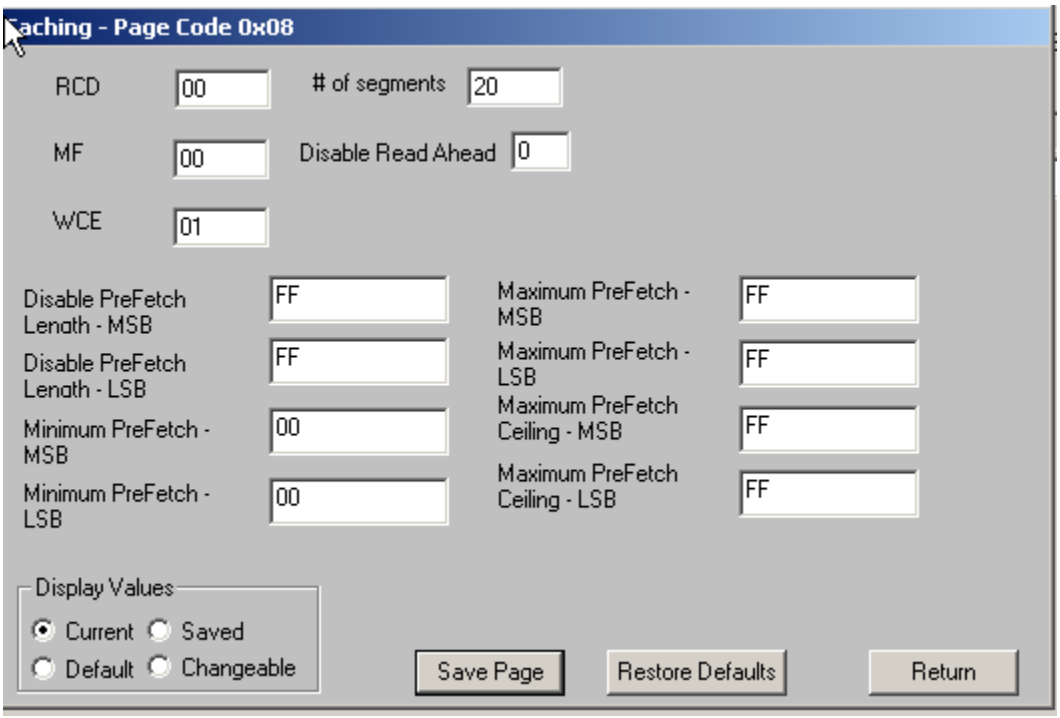


View/Edit a Mode Page

A list of common Mode Pages allows you to select a given page and view/change its common parameters. For example here is the Caching Page, where Write Caching (WCE) is controlled –



You can select the view to see Current, Default, Saved, and Changeable values.

You can **Save** your settings (MODE SELECT issued) to the drive and **Restore** all values to the factory Default settings.

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Hex Edit function

This function allows you to read & display (the ***Mode Sense*** button) any specified Mode Page.
It allows you to specify the value of any byte in the Mode Sense data and write your changes back to the drive (the ***Mode Select*** button).
You may also restore the specified page to its Default values (the ***Restore Defaults*** button)

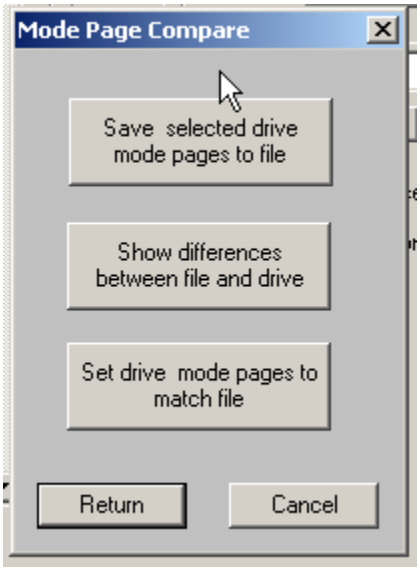
Note: changing any byte in the Block Descriptor data will change either the drives capacity or its block size. ***This is a destructive operation*** – make sure you are fully aware of how the Mode Select commands works before clicking the Mode Select button!

HP MO Log/Mode Pages

A very old function used to simplify working with HP (Sony) MO drives.

Mode Page Compare

This function is used to compare the Mode Page settings of either two drives or of one drive which you have changed a Mode Page setting.



Save drive to file

Use this choice to save the currently selected drives Mode Pages to a file for compare

Show differences

Specify the file created above – displays all differences between the drive and the file. In this example we set the WCE bit (WRITE CACHE ENABLE) to zero then did the compare –

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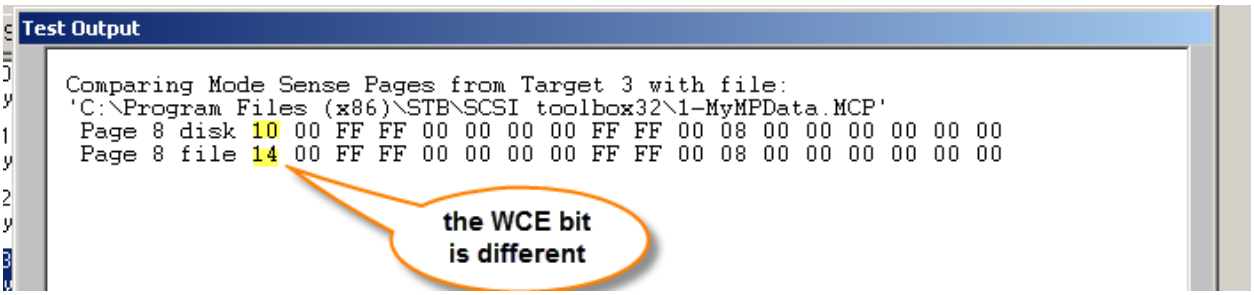
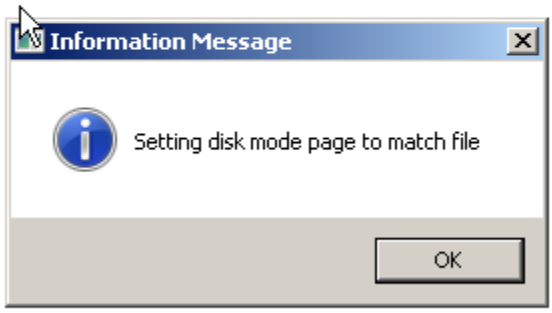


Set drive to file

This function checks for differences between the drive and the file and changes the drives setting to match the file –

```
                          Setting Mode Sense Pages
                          ------------------------
                          Setting Target 3
Page 8 disk 10 00 FF FF 00 00 00 00 FF FF 00 08 00 00 00 00 00 00
Page 8 file 14 00 FF FF 00 00 00 00 FF FF 00 08 00 00 00 00 00 00
```



Restore Factory Defaults

Restores all Mode Pages to their factory default settings

View Log Pages

Lets you view all of the drives Log Pages

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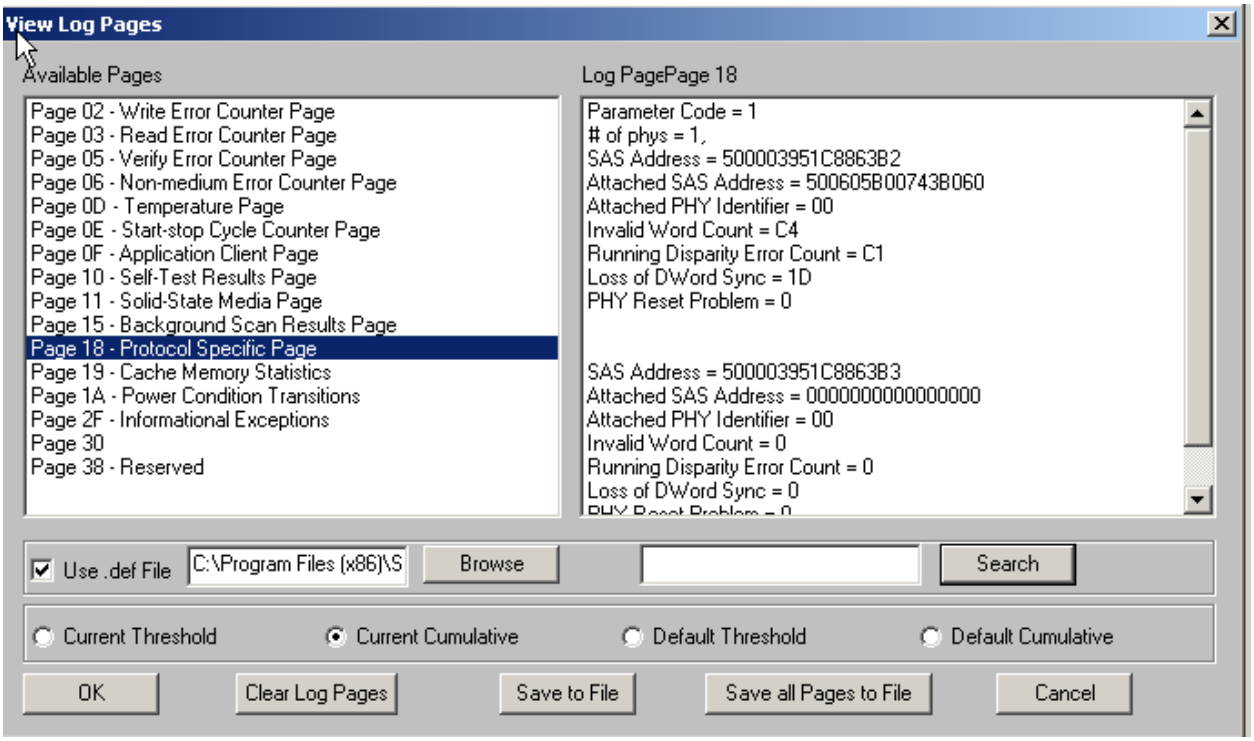
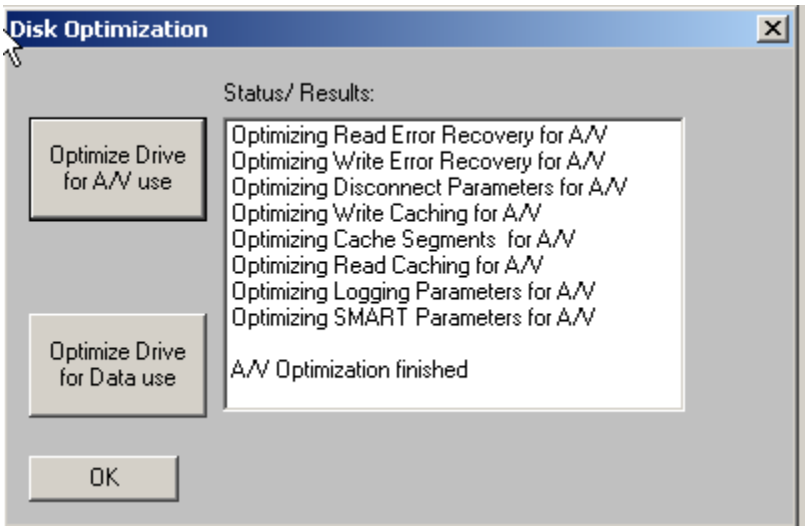


You may specify a .def (definition) file which is a text file which translates the raw hex LP data to English definitions.

You may Clear the LP values (those values which are allowed to be cleared) and may save the LP data to a file.

Optimize

Sets the drives Mode Pages for either A/V use (highest speed, lowest error correction settings) or for Data use (highest error correction, possibly lower speed)



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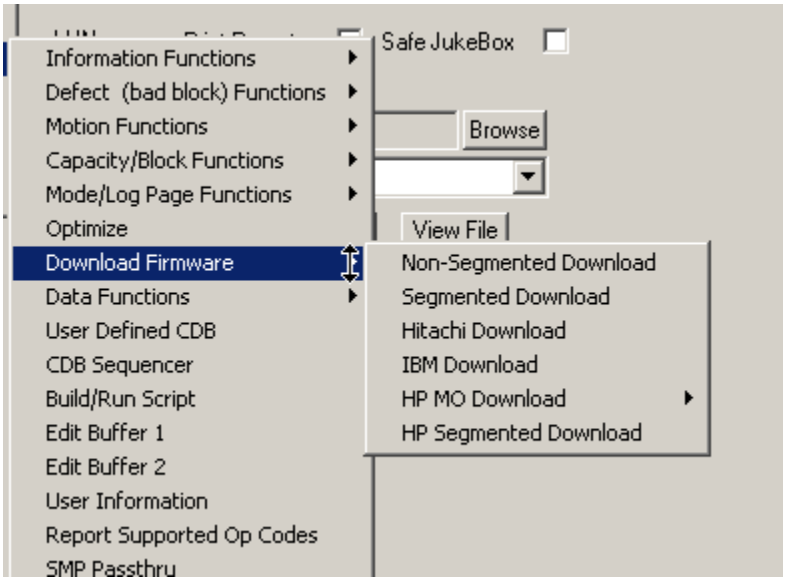
Download Firmware



Non-Segmented Download

An older type of firmware download. This type sends the entire firmware file to the drive in one chunck. Can lead to buffer problems if the firmware file is larger than 1MB

Segmented Download

The most universal type of firmware download. This type should always be tried first. This type of firmware download will break the firmware file into 32K chunks and send them individually to the drive.

Hitachi Download

A very old download type which used to be needed for Hitachi SCSI drives.

IBM Download

A very old download type which used to be needed for IBM SCSI drives.

HP MO Download

A very old download type which used to be needed for HP (Sony)iSCSI drives.

HP Segmented Download

A very old download type which used to be needed for HP SCSI drives.

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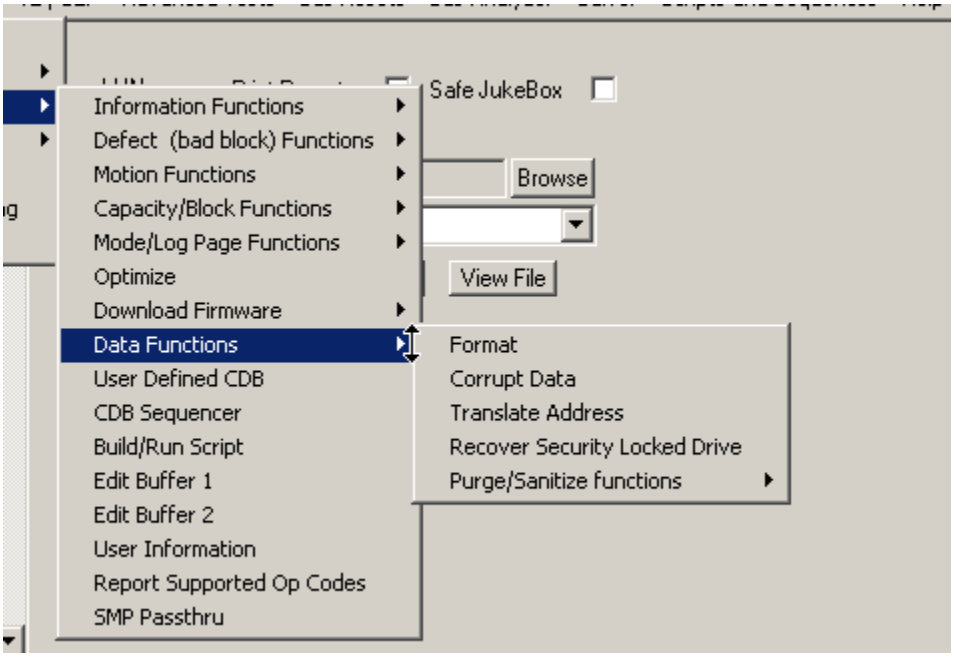
Data Functions



Format

Issues a FORMAT UNIT command to the drive.

Note: the SATA command definition does not define a FORMAT command for ATA/SATA drives. A given drive manufacturer may or may not implement some action when issued a FORMAT command.

Note: a Format is a destructive operation – all data on the drive will be lost.

Initially this function will be set to do a default FORMAT – no command options will be used. The default FORMAT is the most commonly implemented type of FORMAT.

Not all drives support all FORMAT options. Best case if an option is set which the drive does not support the FORMAT command will fail immediately.

Unclicking the Default box will display all possible FORMAT options –

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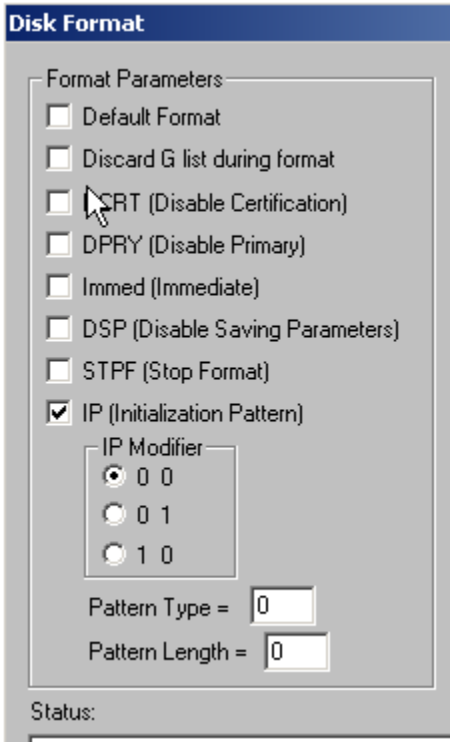

Default Format

The most basic FORMAT – should always work

Discard G List

Discard/remove all Grown Defects from the drives defect list before formatting

DCRT

Disable Certification – skips the certification (read) test after the format operation. Can cut the total time to complete the FORMAT in half. Does NOT check for an remap weak or bad blocks.

DPRY

DPRY (Disable Primary) bit
0 - A disable primary (DPRY) bit set to zero specifies that the device server shall not use parts of the medium identified as defective in the PLIST for application client accessible logical blocks. If the device server is not able to locate the PLIST or it is not able to determine whether a PLIST exists, it shall take the action specified by the STPF bit.
1 - A DPRY bit set to one specifies that the device server shall not use the PLIST to identify defective areas of the MEDIUM. The
PLIST shall not be deleted.

Immed

The drive will accept the FORMAT command and immediately return a completed status. This will allow your test system to be used for other functions while the FORMAT command executes.
Caution: you will have to determine on your own when the FORMAT has actually completed. Checking in the **Device display** until the drive no longer shows Unknown Capacity is one way to do this.

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DSP

Obsolete – do not use

STPF

The stop format (STPF) bit controls the behavior of the device server if one of the following events occurs:

a) The device server has been requested to use the PLIST (i.e., the DPRY bit is set to zero) or the GLIST (i.e., the CMPLST bit is set to zero) and the device server is not able to locate the list or determine whether the list exists; or

b) The device server has been requested to use the PLIST (i.e., the DPRY bit is set to zero) or the GLIST (i.e., the CMPLST bit is set to zero), and the device server encounters an error while accessing the defect list.

0 - A STPF bit set to zero specifies that, if one or both of these events occurs, the device server shall continue to process the FORMAT
UNIT command. The device server shall return CHECK CONDITION status at the completion of the FORMAT UNIT command with the sense key set to RECOVERED ERROR and the additional sense code set to either DEFECT LIST NOT FOUND if the condition described in item a) occurred, or DEFECT LIST ERROR if the condition described in item b) occurred.

1 - A STPF bit set to one specifies that, if one or both of these events occurs, the device server shall terminate the FORMAT UNIT command with CHECK CONDITION status and the sense key shall be set to MEDIUM ERROR with the additional sense code set to either DEFECT LIST NOT FOUND if the condition described in item a) occurred, or DEFECT LIST ERROR if the condition
described in item b) occurred.

IP

IP (initialization pattern) bit

0 - An initialization pattern (IP) bit set to zero specifies that an initialization pattern descriptor is not included and that the device server shall use its default initialization pattern.

1 - An IP bit set to one specifies that an initialization pattern descriptor (see 3.5.4) is included in the FORMAT UNIT parameter list following the parameter list header

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Corrupt Data

Allows Correctable or Uncorrectable errors to be created on the disk.

Disk ECC Correction Span Length

The longest error which the drive can correct.
Setting the **Corruption Span Length** value to less than this number will create a **Correctable Error**.
Setting the **Corruption Span Length** to greater than this number will create an **UnCorrectable Error**

Blocks to Corrupt: From Block

What LBA # you want to start corrupting at

Number of Blocks to Corrupt

How many LBAs you want to corrupt

Corrupt every

Space between corruptions

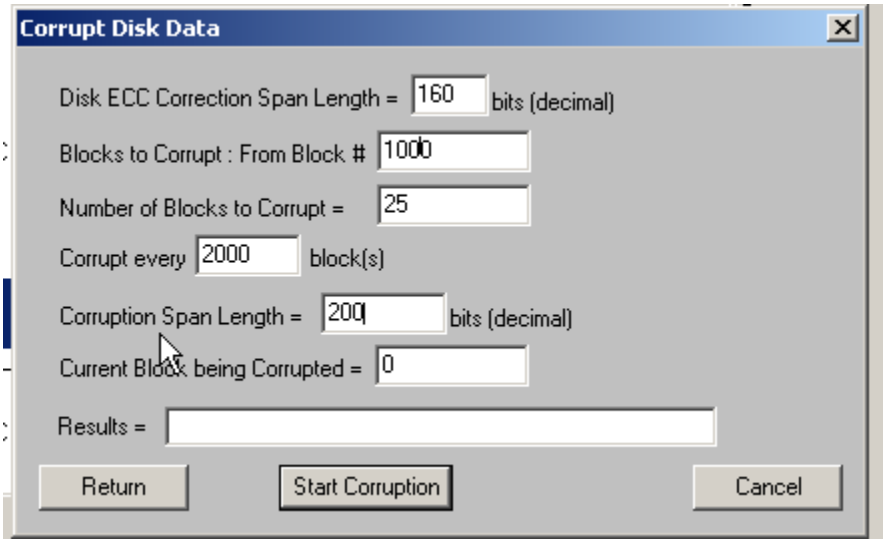
Corruption Span Length

How long of a corruption you want to create – see **Disk ECC Correction Span Length** above

Current Block being Corrupted

Once the Start Corruption button has been clicked this shows progress

In this example our drive has a Correction Span Length of 160 bits. We want to create 25 Non-Correctable errors, starting at LBA 1000, making a correctable error every 2000 LBAs. We set the Corruption Span Length to 200 (greater than 160) to create UnCorrectable errors –



Now when we Read the drive (Sequential Read Test) we will see the drive report these Uncorrectable errors –

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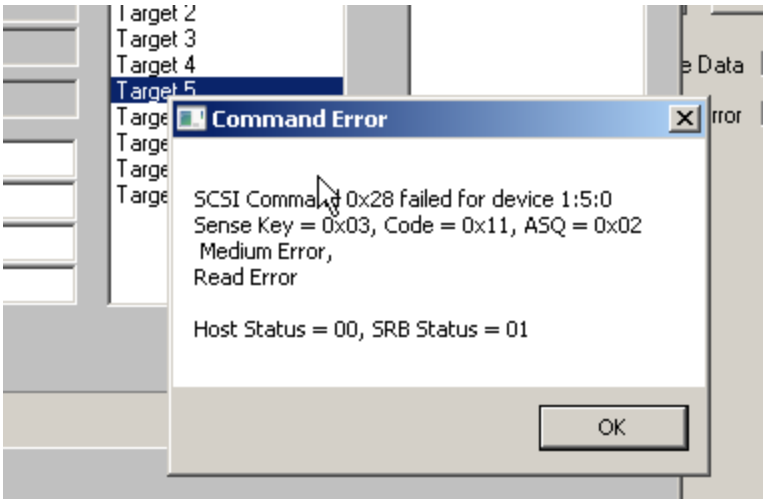
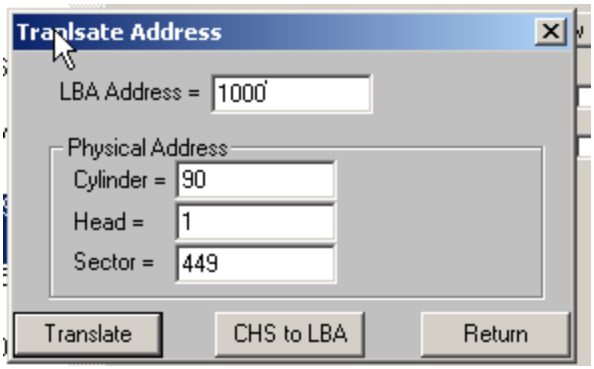


Translate Address

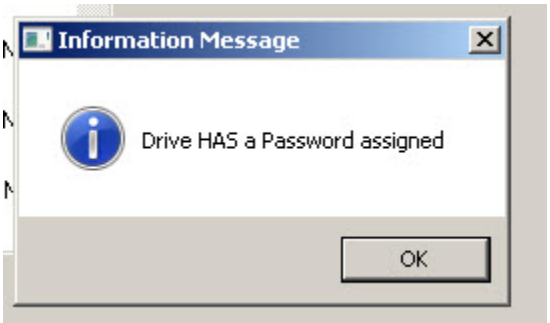
Enter an LBA and see where on the drive (physically) the LBA is located



Recover Security Locked Drive

Used to UnLock a SATA drive which has become locked or frozed due to a failed SECURITY ERASE command, or which has had a User or Master Password assigned.

Once you have selected this command you will see the status of the drive (Locked or not, has password or not)



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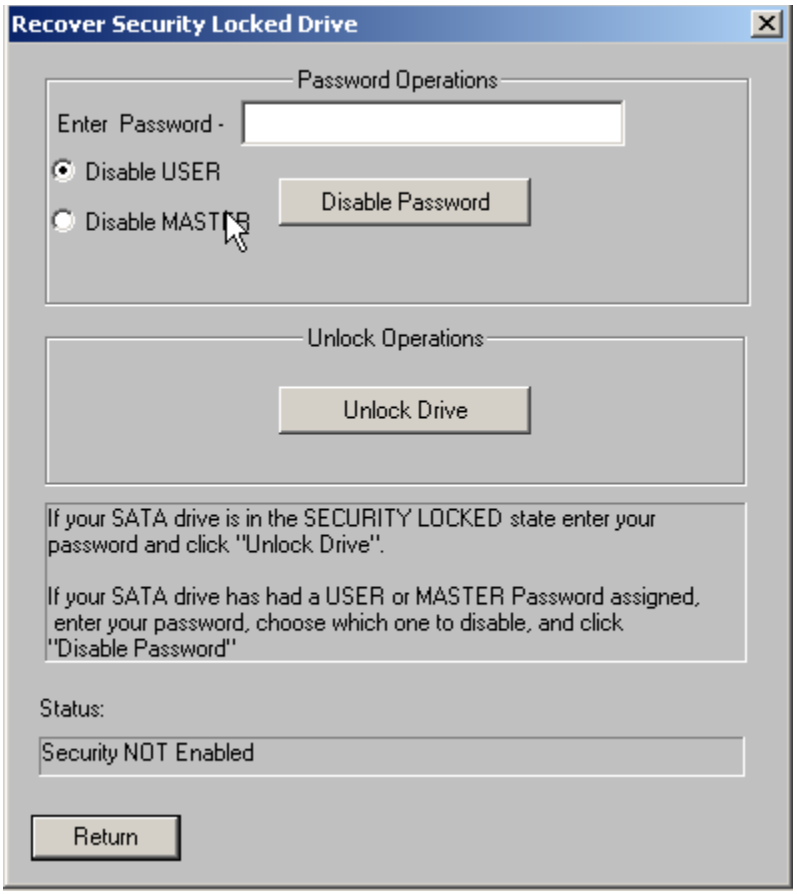

If the drive has a password assigned you can delete it by choosing either **User** or **Master**, entering the current password (yes, you must know the password that was assigned to the drive. No, there is no way to retrieve what that password was), and clicking **Disable Password**.

If the drive is Locked you can unlock it by clicking the **Unlock Drive** button.

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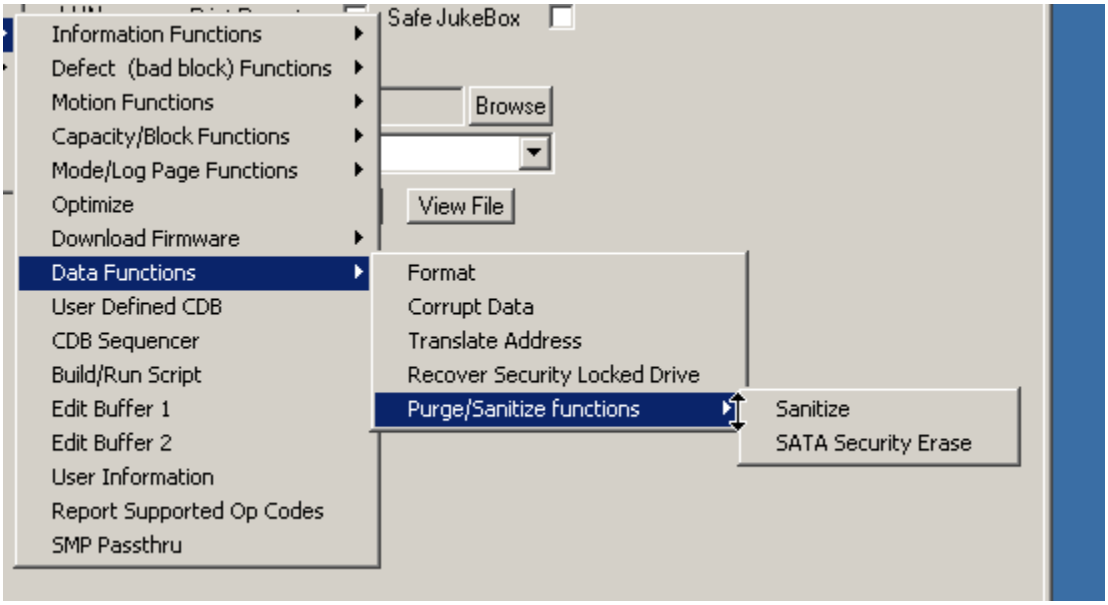
Purge/Sanitize Functions

The SATA SECURITY ERASE and SAS/SATA SANITIZE commands are used to remove all data from all blocks of a disk. These functions are approved by US Government standards for purging or wiping all data from the drive.



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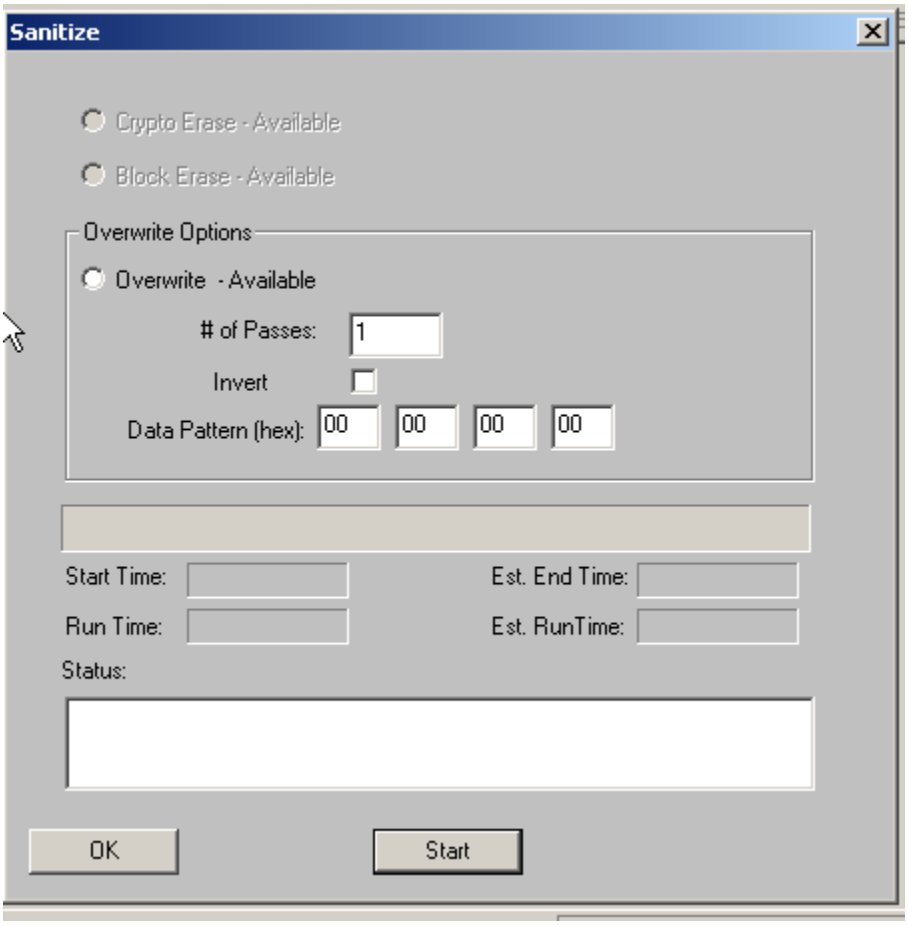
Sanitize



There are three types of SANITIZE functions –

1. Crypto Erase

Implemented in SED (Self Encrypting Drives). Using this SANITIZE option, if available, will change the drives internal cryptographic key, instantly scrambling all data on the drive with now random data. This SANITIZE operation will complete in a few seconds

2. Overwrite

You may specify the number of passes and the first four bytes of the data pattern to use. These four bytes will be duplicated out to fill the entire LBA with that repeating data pattern.
The Invert setting will invert (flip all bits) the data in the odd-numbered overwrite passes.
For example – setting # of Passes to 2 and the Data Pattern to 00 00 00 00 will write one full pass writing all zeros to all blocks of the drive. Then a second full write pass will occur, writing a pattern of 11 11 11 11 (all ones) to all blocks on the drive.

This operation will take several hours to complete.

3. Block Erase

If your drive permits this type of SANITIZE

Notes:

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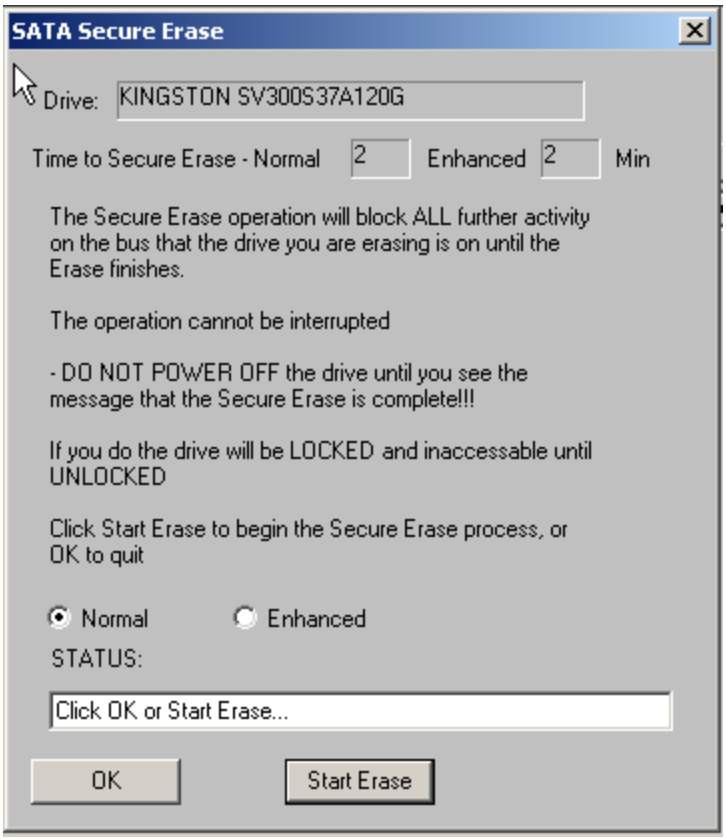
SANITIZE operations take many hours to complete. For example, a 4TB drive will take approximately 10 hours to complete one pass.
SANITIZE operations can NOT be interrupted or stopped. Even if you power down the drive, once it powered back up it will continue its SANITIZE operation until finished.

SATA Security Erase

SATA SECURITY ERASE is available for most ATA/SATA drives.



There are two modes –
1. Normal
2. Enhanced

A given drive may not support the Enhanced option

The time to complete the SE operation is shown.

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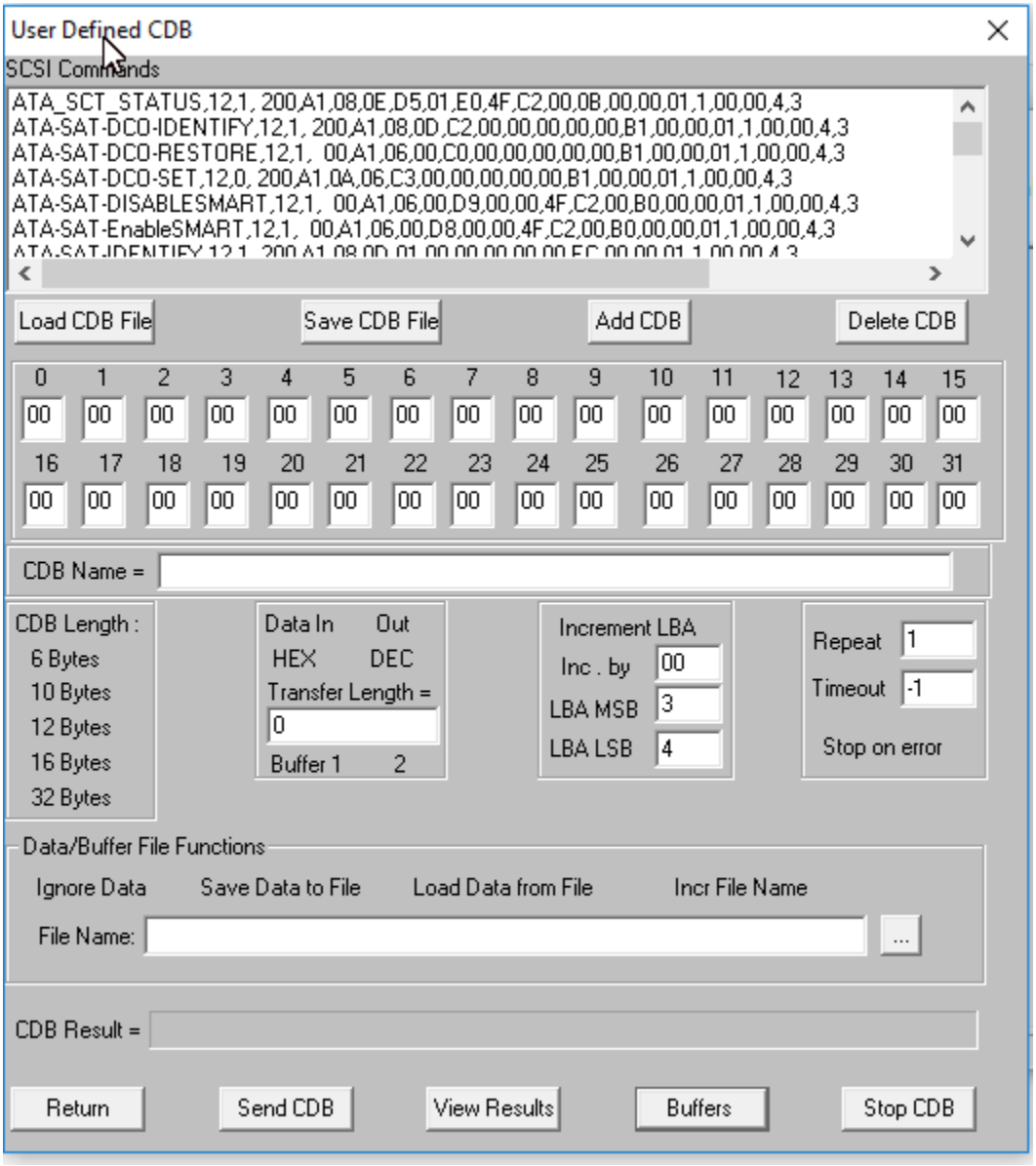
User Defined CDB



The User-Defined CDB functions of the SCSItoolbox allow the operator to construct an type of SCSI CDB and issue that CDB to the currently select SCSI TARGET. Any command created may also be added into a CDB file. Customized files of CDB's can be created and maintained.

Defining or Modifying a SCSI CDB

The following parameters define a SCSI CDB and are accessible/modifiable from the left side of the dialog box:

- Command name
- Individual bytes of the SCSI CDB
- Command length (6,10,12,16, or 32 bytes)

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- Data Direction
- Data transfer length
- Data buffer (buffer 1 or 2)
- Command timeout value
- Command repeat count
- Increment information

Once a SCSI CDB has been defined that command can be issued to the currently selected TARGET, stored to the current CDB list file, or added to the script window.

Important Issues

It is possible to create an incorrect SCSI CDB! If you are not intending to create an illegal CDB, some common mistakes to watch out for are:

- Data direction incorrect
- Data length specified in CDB does not match Data Transfer Length

Incrementing Issues

It is possible to increment a field within the CDB each time the CDB is issued. This is commonly used to increment the block number specified in the CDB. Set the Increment portion of the dialog as follows to use the feature:

- Check the Increment LBA box
- Specify which CDB byte is the LSB of the SCSI CDB
- Specify which CDB byte is the MSB
- Specify how much you want to increment by

For instance, if you define a 10 byte READ EXTENDED CDB, byte 2 is the LSB and byte 5 is MSB of the Logical Block Address. In this example we will start reading a block 0 by setting CDB bytes 2 through 5 to zero (0). If you define this CDB to read 128 blocks per command (0x80 hex in byte 8 of the CDB) you will set the “increment by” field to 128. By setting the “CDB Repeat Count” field to 100, then clicking the “Send CDB” button, the READ EXTENDED CDB will be issued 100 times, and each time it is issued, 128 blocks of data will be read and the LBA will be incremented by 128.

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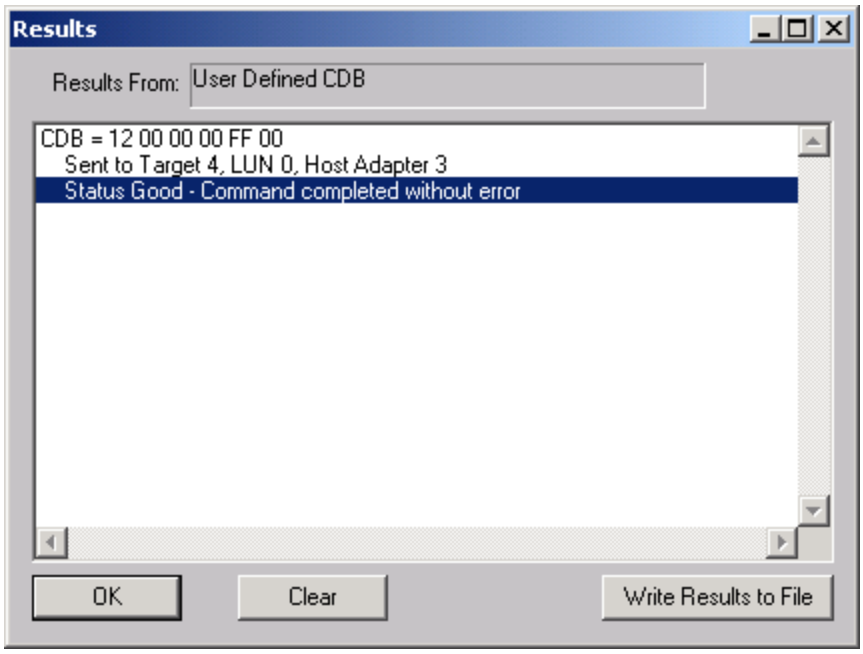

After issuing a User-defined CDB you can click on the Display Results button to view the status of each CDB that has been sent. You can clear this display with the Clear button, or you can save the contents of the display to a disk file.

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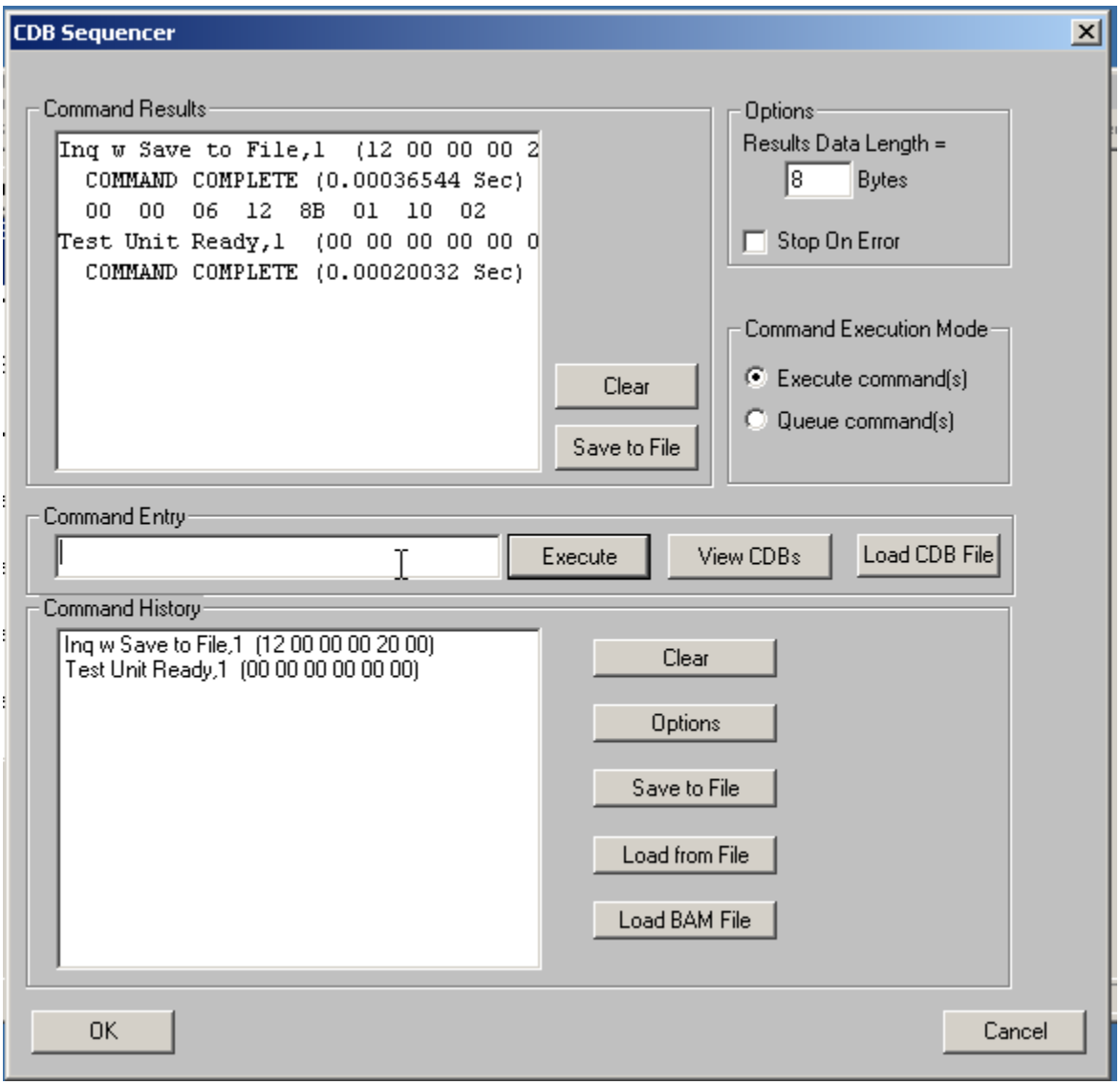
CDB Sequencer



The CDB Sequencer uses the same CDB list file as User Defined CDBs. This function lets you specify the CDB to issue by name in the Command Entry field, or you may use the View CDBs button to see a list of CDBs defined in your CDB list file.

List of commands available

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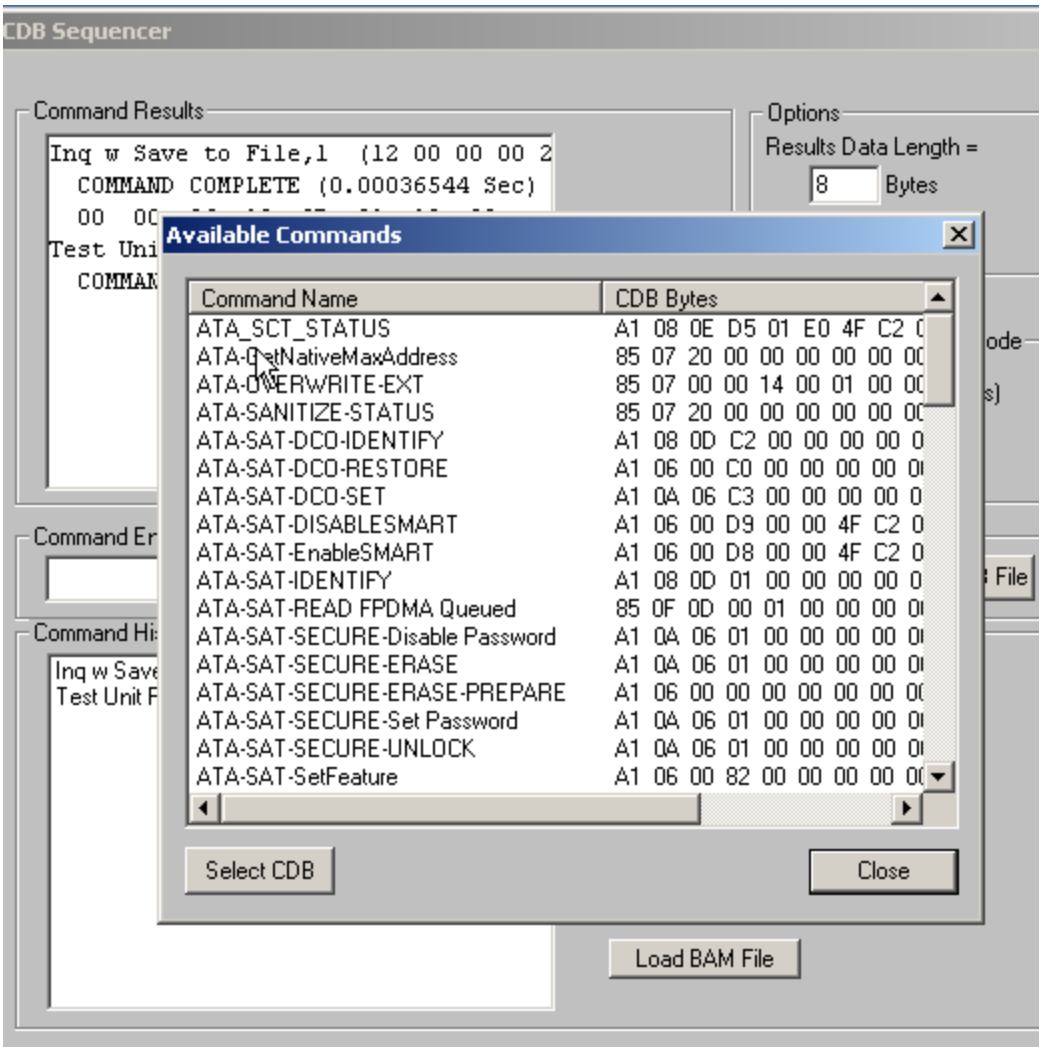

You may chose a CDB from the list to issue it.

You may specify how many BYTEs of data or sense data to save in the Results Data Length field.

When you issue the CDB the results (Time to complete, status, and data if any) will be displayed in the Command Results window.

The command will also be added to the Command History Window.

You may select any or all CDBs in the Command History window and click Execute, which will issue all of the CDBs in sequence.

In this example we issued an Inquiry CDB, then a Test Unit Ready CDB –

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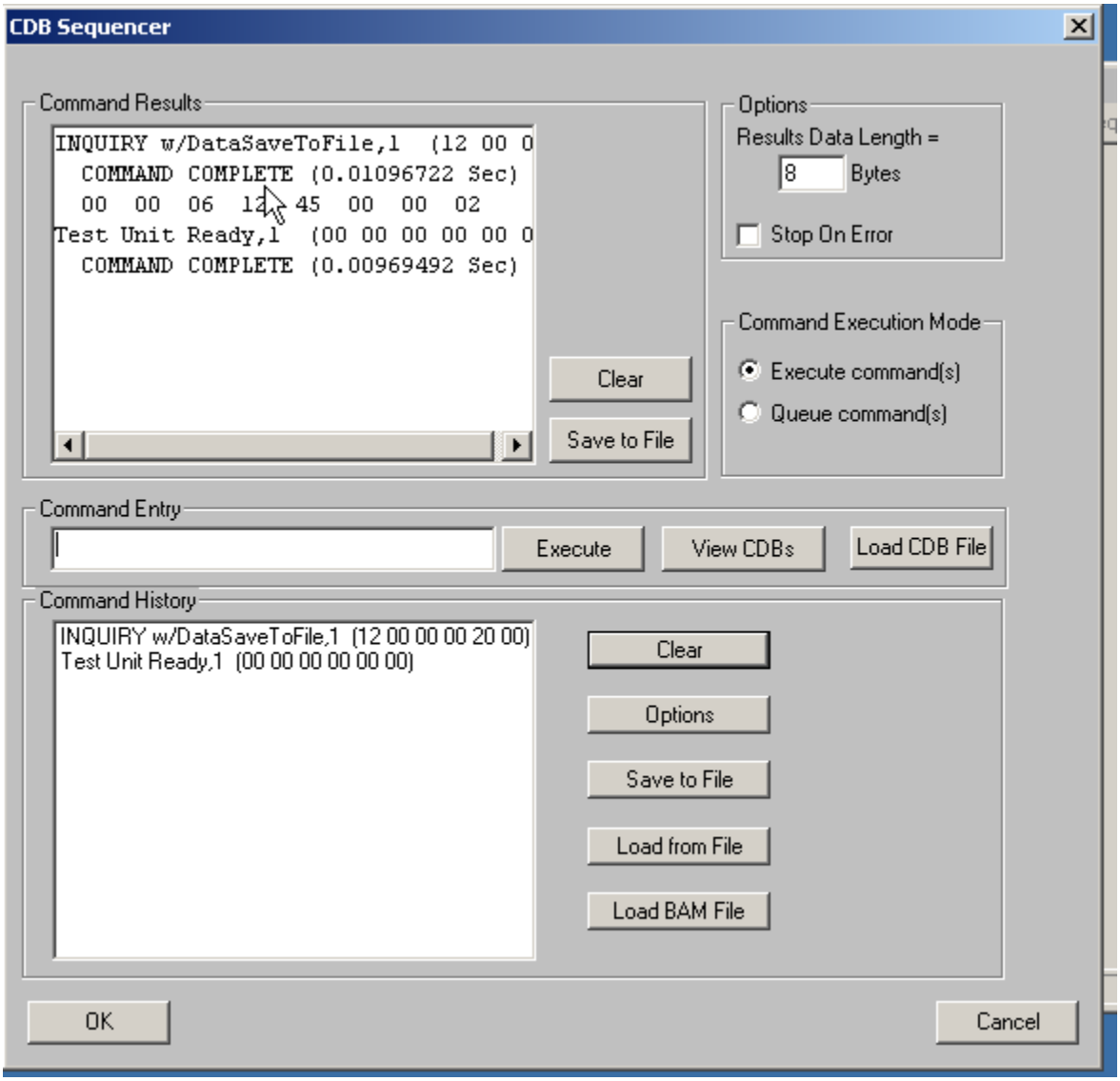

We then selected all CDBs in the Command History window and clicked Execute, causing both CDBs to be reissued.

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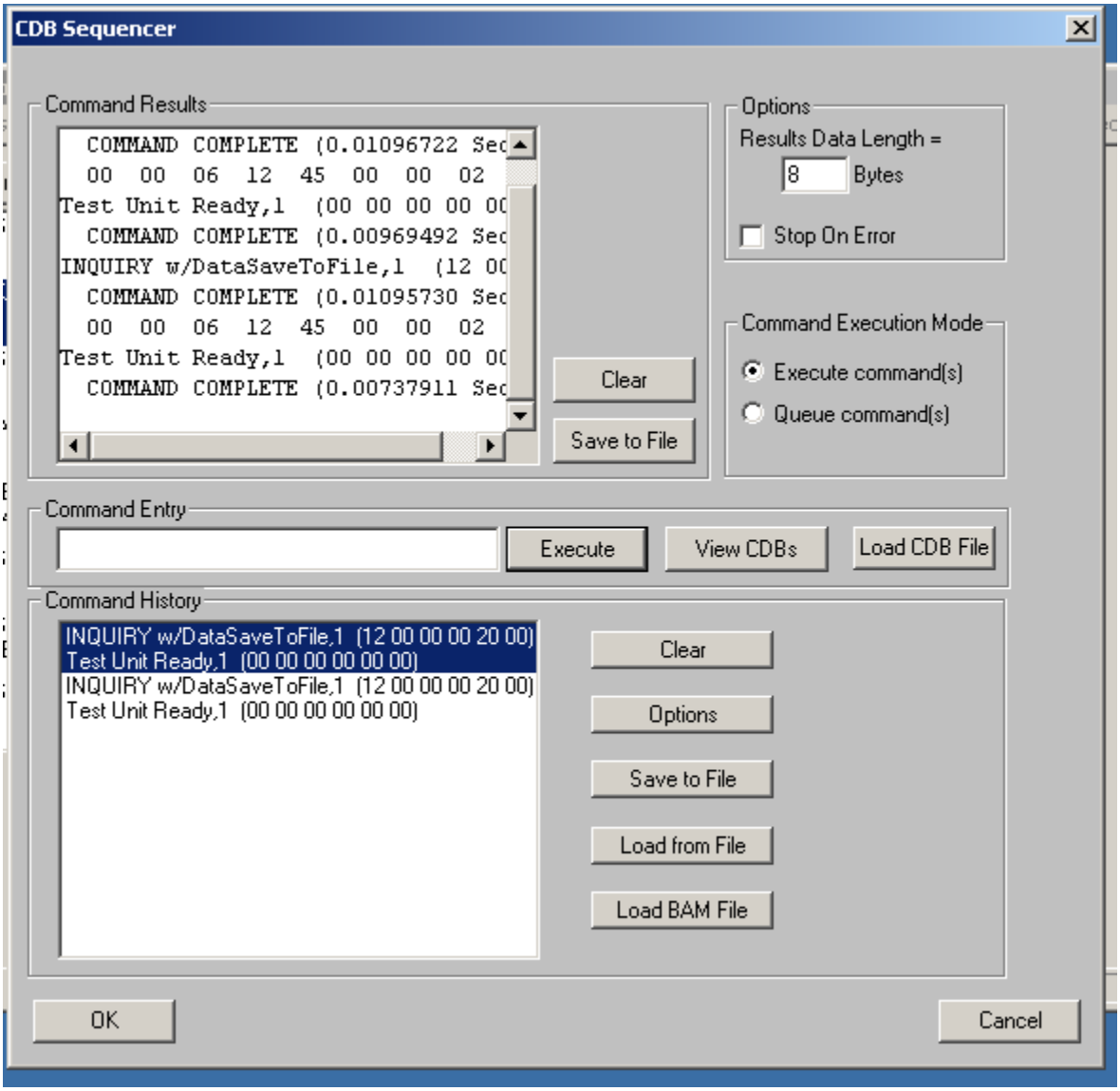

You may save the CDB sequence for reissue later by clicking the Save To File button in the Command History area. Use the Load from File button to load your CDB sequences.

This lets you build up command CDB sequences and easily use them later.

You may also save the results data to a file.

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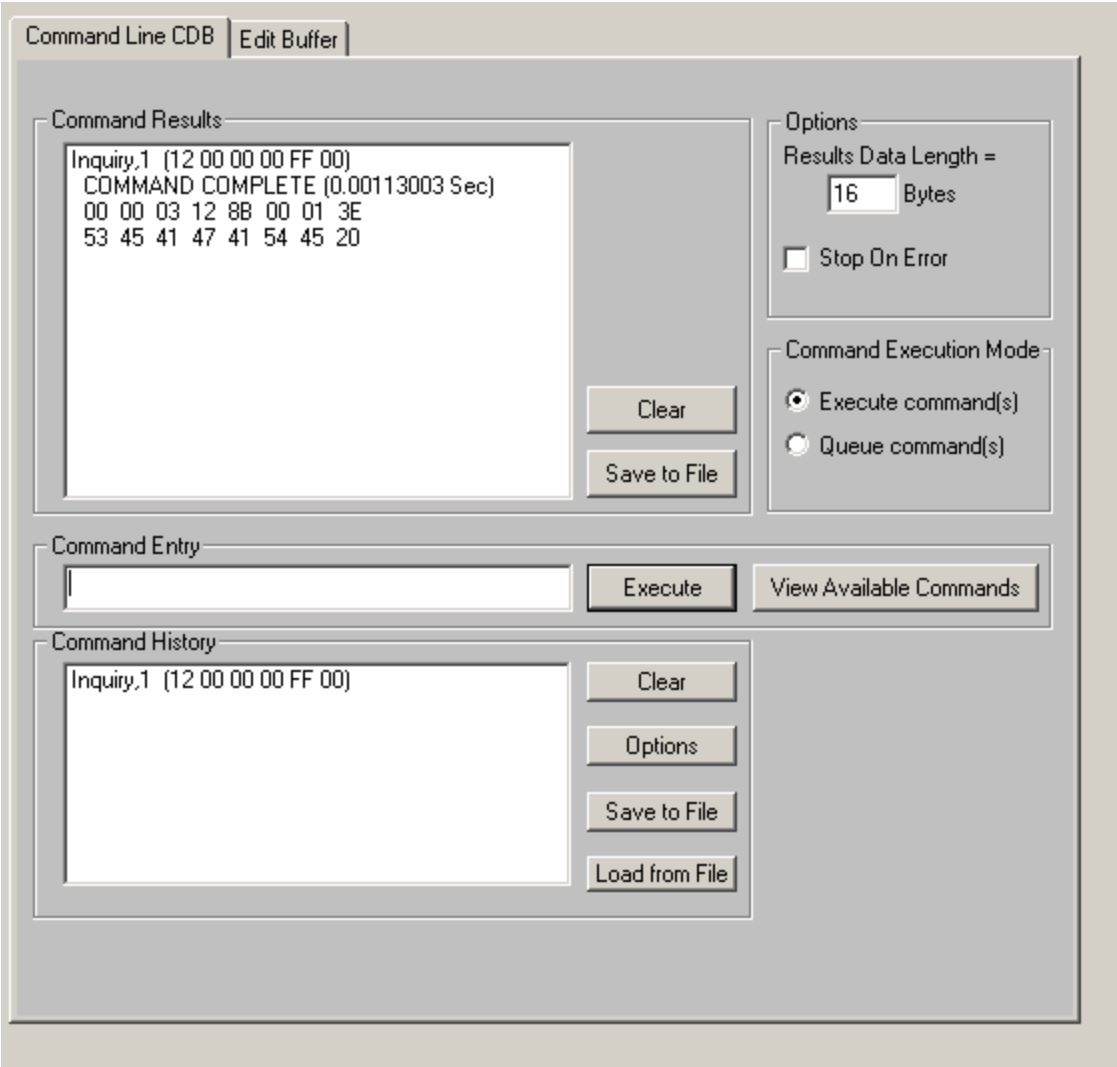
Build/Run Script



Note!!!!! This function is no longer supported in the STB Suite. Please use the Developers Toolbox (DTB) to create scripts and programs.

This function lets you type in the name of a CDB on the command line. When you press *Enter*, the function looks for a matching CDB name in the COMMANDS.DAT file, and issues the CDB to the selected target.

For example, typing "INQ", followed by pressing *Enter*, matches with the INQUIRY CDB in the sample COMMANDS.DAT file and issues that CDB. Note that the first match found will be issued. For example, if you had two read commands defined, Read6 and Read10, simply typing "read" will match Read10, since that CDB is first in the file. The file is sorted alphabetically.

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If a match is not found in the CDB file, an error message is returned. If you are using multiple CDB files, you must first rename (or copy) the desired file to COMMANDS.DAT.

You can use the "View Available Commands" button to display a list of all commands in the commands.dat file. This display can also be used to select a command from the list for execution.

Command Results Window

When the CDB is issued, the status of the command is shown in the top list box (Command Results).

This status shows:

- the bytes of the CDB that were sent
- the time spent executing the CDB,
- several bytes of data, depending on the Results Data Length setting
- whether the command completed successfully, or
- if the result is a check condition, the sense data is shown.

The contents of the Command results window can be erased or saved to a file.

Command History Window

The CDB issued is also recorded in the lower "Command History" window.

Commands in this window can be selected and re-issued using the "Execute" button.

Commands in this window can also be saved and/or reloaded from a file to facilitate reusing CDB sequences.

Options

The "Options" buttons allow choosing to execute commands upon pressing *Enter*, or Queuing the commands in the Command History window for batch execution.
This allows a series of CDB's to be set up, then sent sequentially with no delays.
The "Stop on Error" checkbox will stop a multi-pass CDB on error if checked. If not checked, a multi-pass CDB will execute all passes, regardless of any error conditions.

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Command line arguments

Command line arguments are available to specify the number of times to issue the cdb, and to change the values in bytes 1 and 2 of the cdb.
Multi-pass CDB's are issued by typing in the CDB name, a comma, then the number of passes. For example, "READ,1000" will issue 1000 reads.
To issue a READ EXTENDED cdb and set the FUA bit, you would enter READ_10,1, 80

These arguments tell the program to:

-issue the READ_10 cdb
-issue the cdb 1 time
-modify byte 1 to the hex value 0x80 (this sets the FUA bit in the cdb)

Continuous command execution

Entering a pass count of less than 0 will cause the cdb to be issued continuously, until the "Stop" button is clicked.

Results Data Length

The "Results Data Length" allows you to specify how many bytes of data are displayed in the "Command Results" window. If a command transfers data, this many bytes will be displayed along with the command results. If the command terminates in a check condition, this many bytes of sense data will be displayed.

The entire data buffer can be viewed, modified, and saved/loaded from a file in the ***Edit Buffer*** tab page.

Re-issuing commands

Any command or commands can be re-issued by selecting them (clicking on them) in the "Command History" window. Once the commands you want to reissue are highlighted, click the "Execute" button and they will be reissued.

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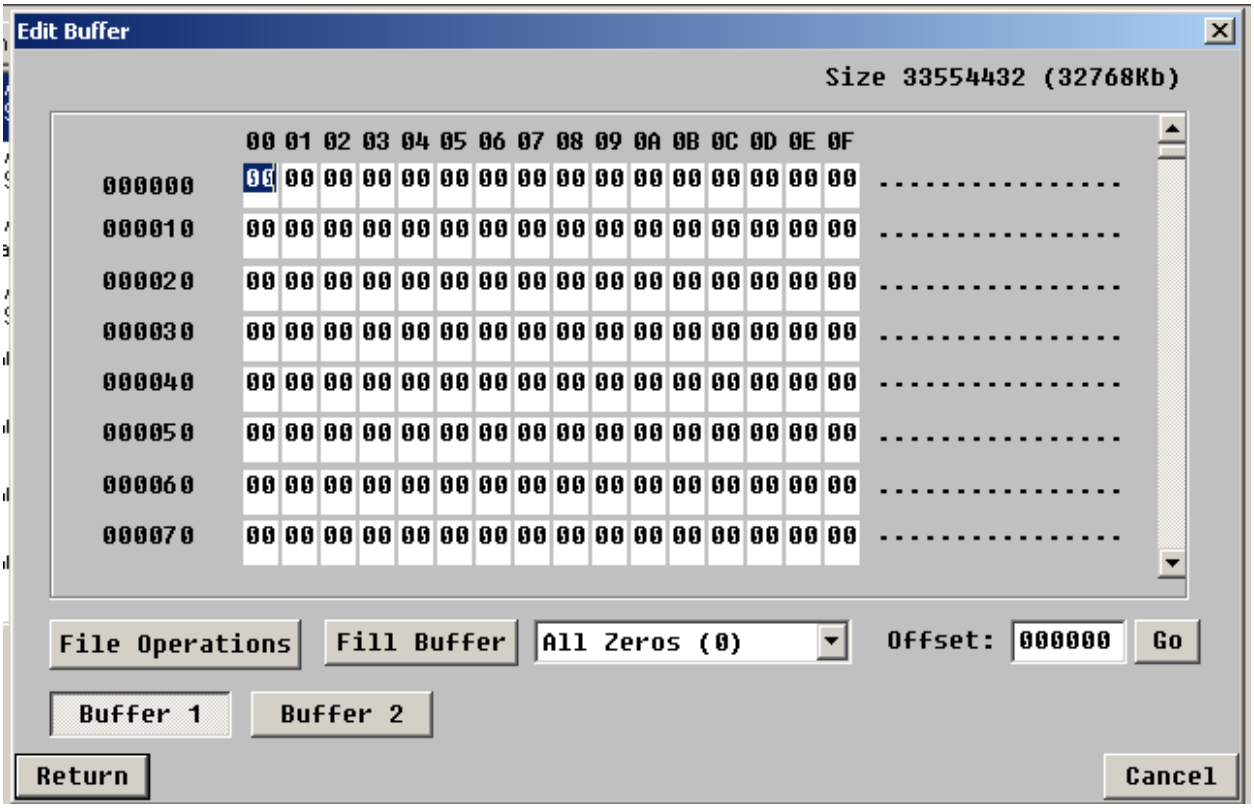
Buffer Functions



The main Buffer menu lets you view/edit data in the CDB buffers. There are two buffers available.

You may scroll through the buffer data, or enter a value to jump to in the Offset field.

If you edit or change any buffer byte values you will be asked to confirm the change when you exit the buffer function.

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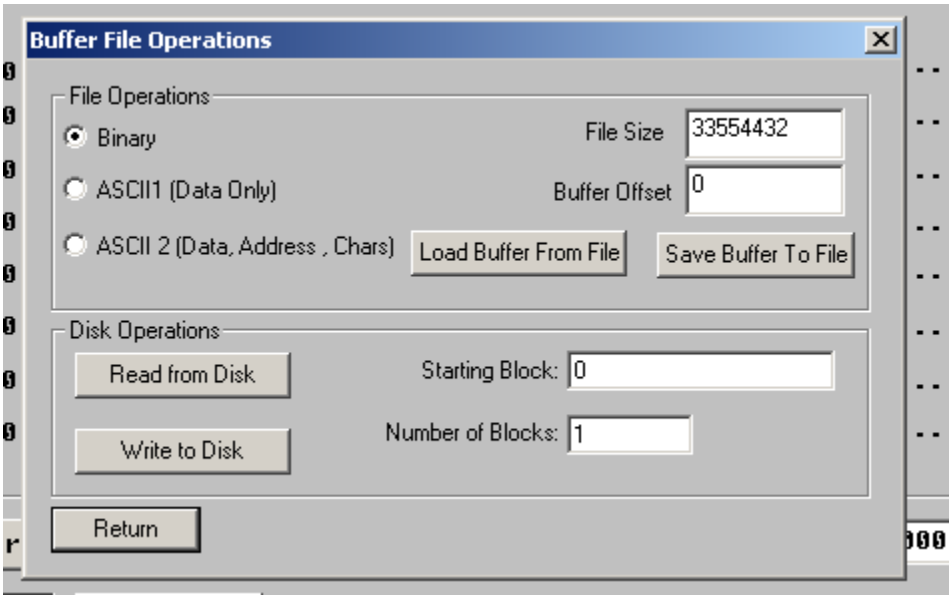
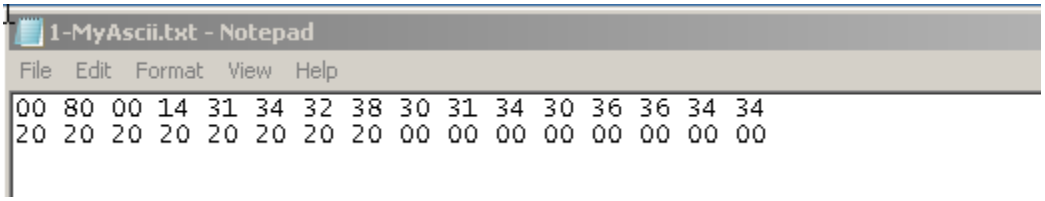
File Functions



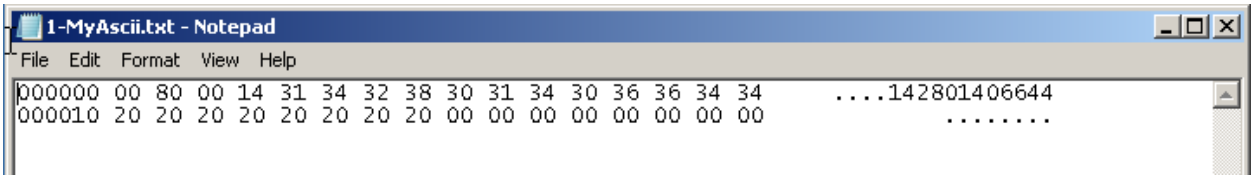
The Buffer File functions let you save the buffer contents to a file in one of three formats:

1. Binary data

2. ASCII (Data Only) creates a text file with the data represented in ASCII



3. ASCII 2 (Data, address,chars)



You may also load data from a file into the selected buffer.

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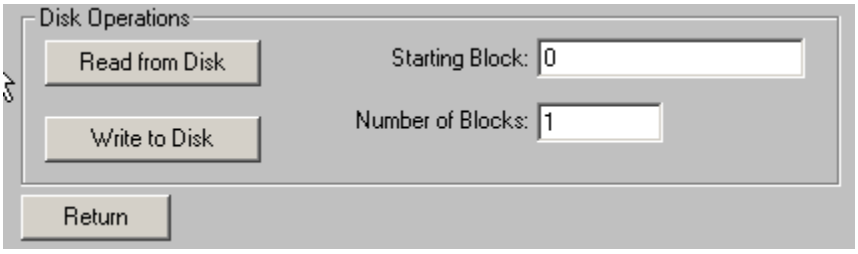
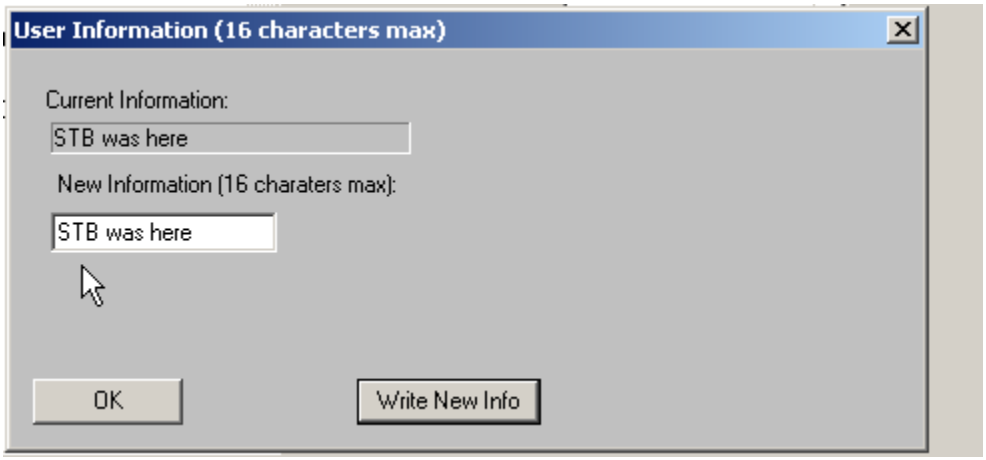
Disk Operations Functions



You may read data blocks from the selected disk into the buffer, and you may write the buffer contents to the drive.
The Buffer->File Operations->Disk Operations->Read from Disk is a quick way to read in one or more blocks of data, view it , edit it, etc.

User Information



All modern disk drives have one or more User Information areas where data can be stored. This area is separate from the normal data blocks of the drive.

This function lets you store up to 16 text characters to the User Information area.

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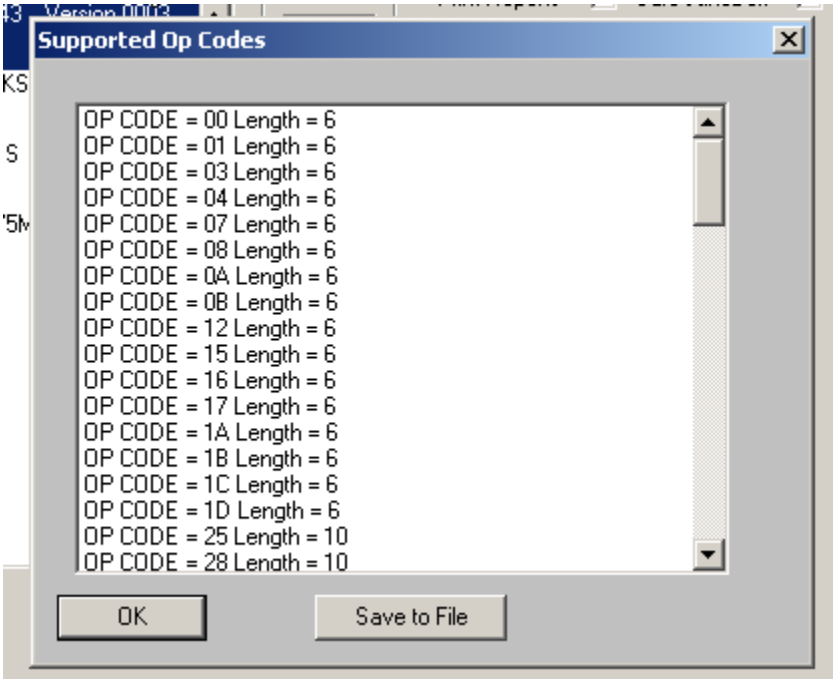
Report Supported Op Codes



This function (for SAS/SCSI/FC drives) displays all of the CDB Op Codes which the drive implements

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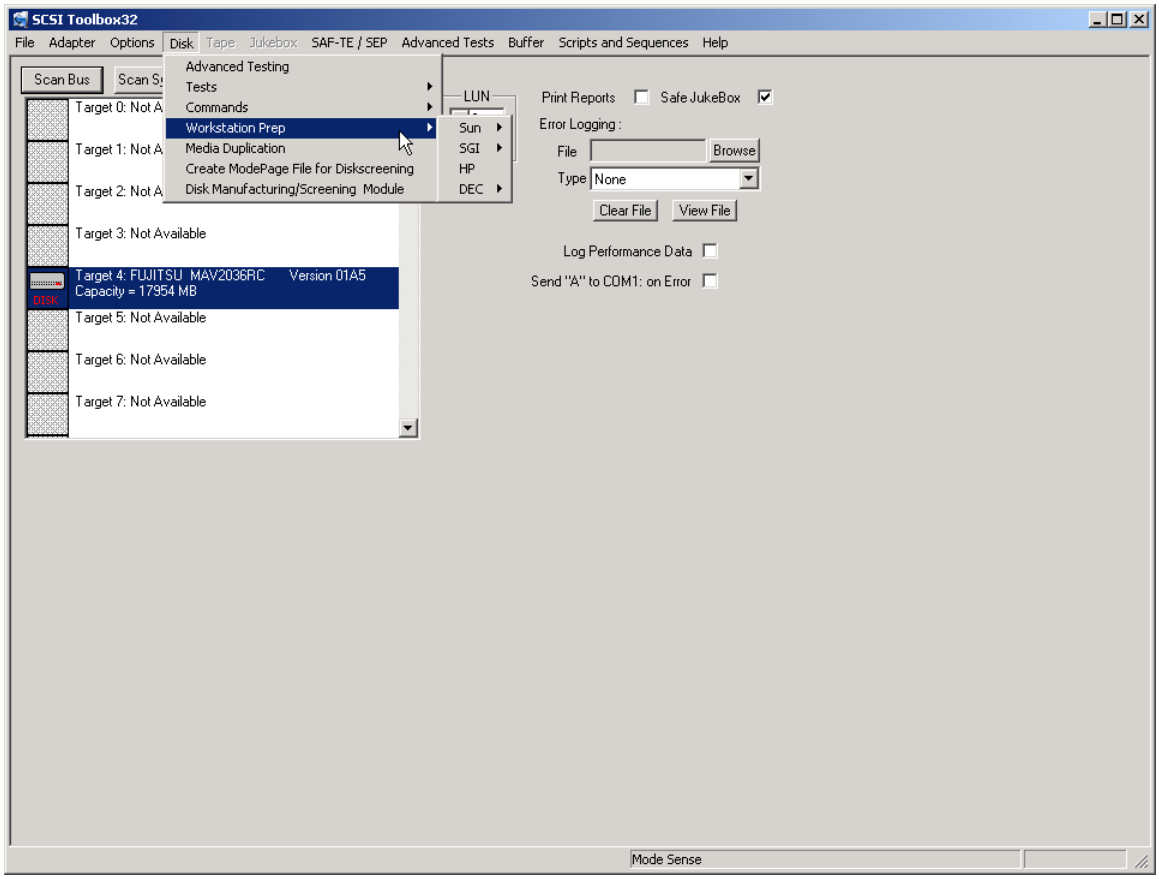
Workstation Prep



The Workstation Prep Module allows you to quickly prepare any disk device for use on many Unix-based workstations. The type of prep and what it entails depends on which type of workstation is being used, and ranges from supplying drive-specific information for entry into a disktab file, to rewriting defect information and calculating "magic numbers." Through whatever means, the results are the sam--drives can be quickly prepared to work on a number of different workstations.

One main advantage of using the SCSI *toolbox32* for preparing drives for workstations is the intelligence built into the SCSI *toolbox32*. As soon as you receive new disk devices from drive vendors, the SCSI *toolbox32* will show you how to optimally configure them for workstation use.

A good strategy for preparing disks is to first qualify the drive as functional. This can be quickly ascertained by running the Quick QC Test. If you are more comfortable completely reformatting the drive, you can do so using the Format Command. If you want to test the drive for an extended period of time, the Random Write/Read Test can be run for as long as you like. Of course, saving the screens from the above tests and functions,

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and sending the test results to a log file will allow you to print out all results and include them with your disk drives, so that the end user of the drive will know that the drive was indeed tested.

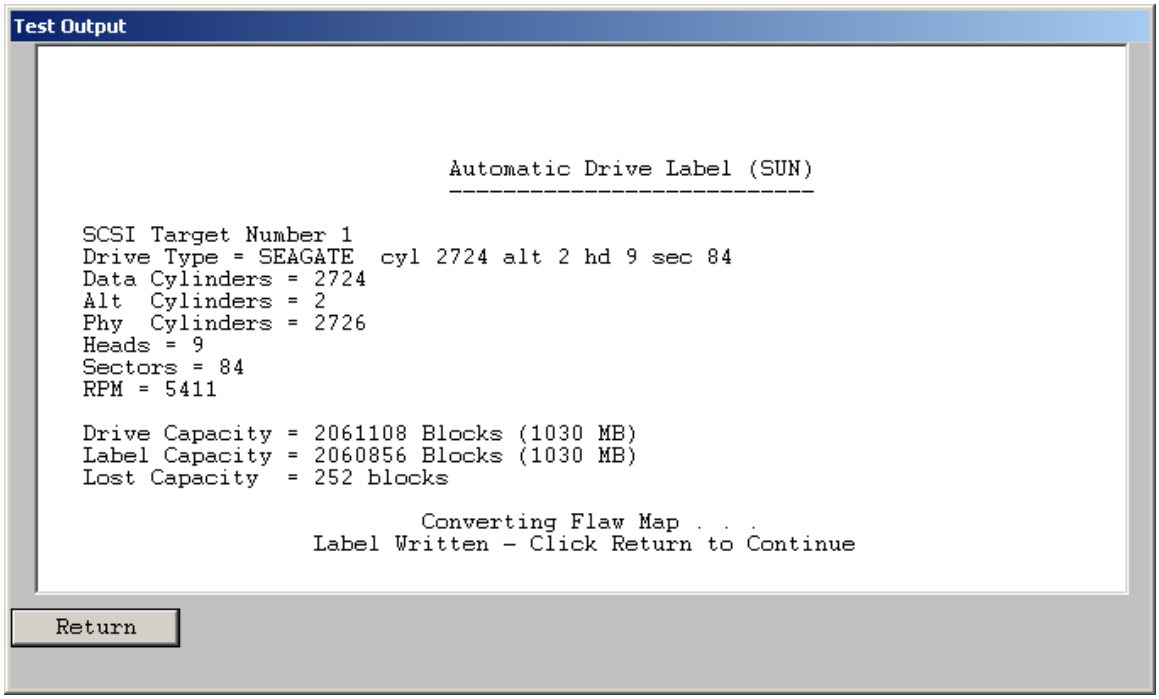
You might also want to take the time to print the drive's flaw list to a file, using the Read Defect Data command. The flaw list can be printed and included with the drive.

Workstation Preparation

The Sun Workstation Menu

Read Existing Label

This choice lets you confirm whether a drive has an existing, valid Sun label and partition table. If the selected and the drive already has a Sun label, the label information will be displayed.



Write New Label

Pick this choice and the SCSI *toolbox32* will analyze the drive, calculate the optimal geometry for a Sun, and then create a label based on this geometry. It will create eight partitions, with the C partition the size of the entire drive.

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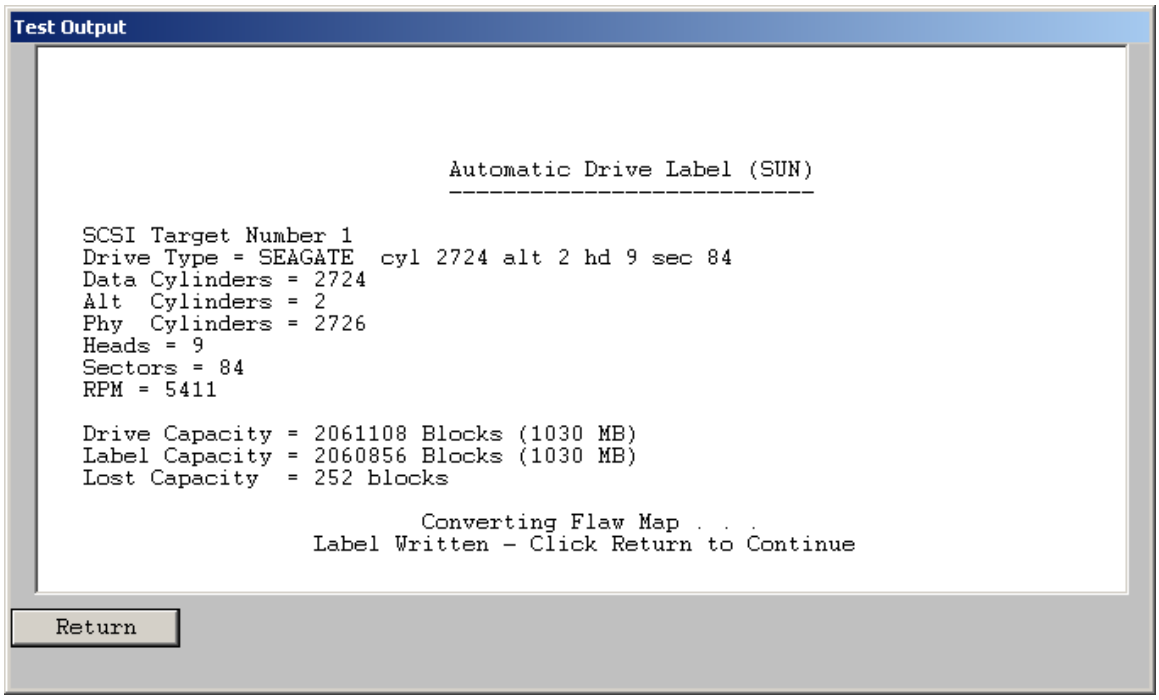

Calculate Format.dat Entry

This choice will calculate and display the lines which can be added to the format.dat file which will correspond to this drive.

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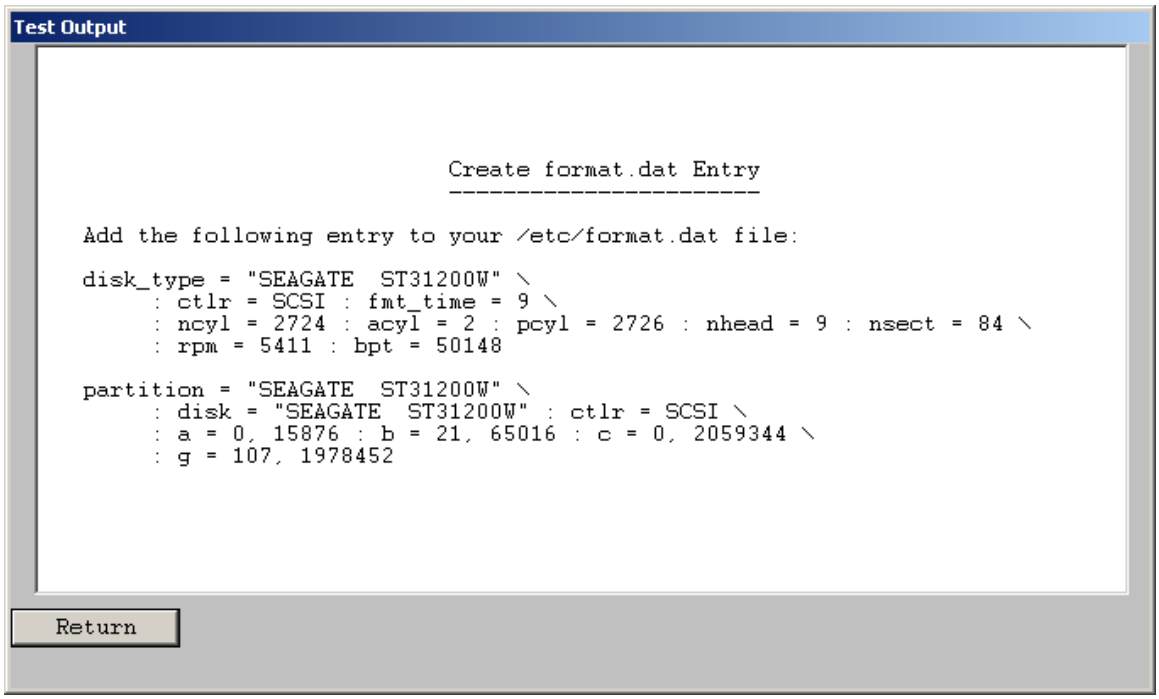
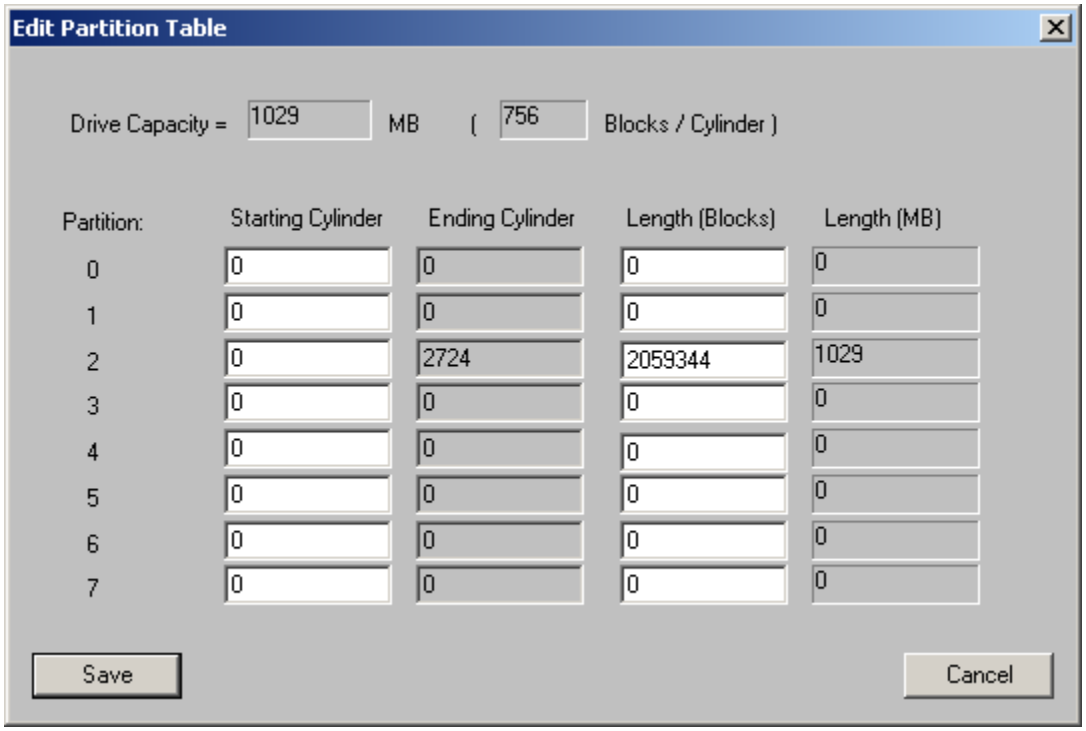


Edit Sun Partition Table



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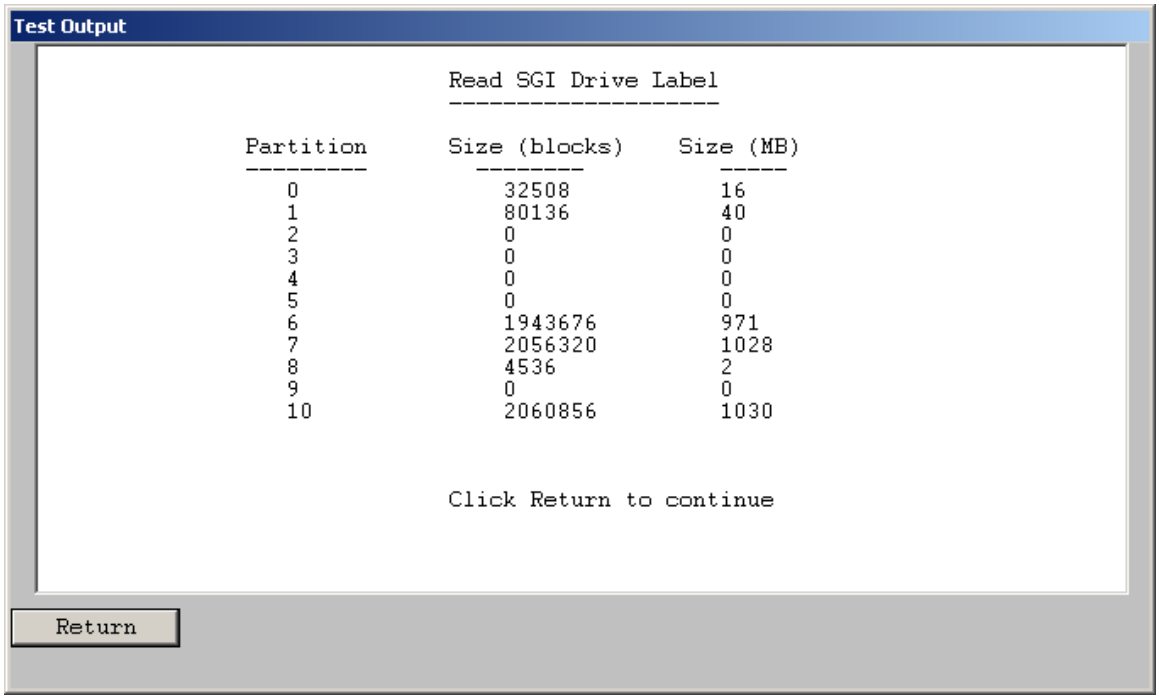
This function allows you to edit the partition table, creating new partitions or editing the size of existing partitions.

The SGI Workstation Menu

Read Current Label

This option will check a drive for the presence of a valid SGI label. If found the details of the label will be displayed.



Write Label

This option lets you write a Silicon Graphics label on the current disk drive. This process is entirely automatic, and will return a status showing whether the label was successfully written

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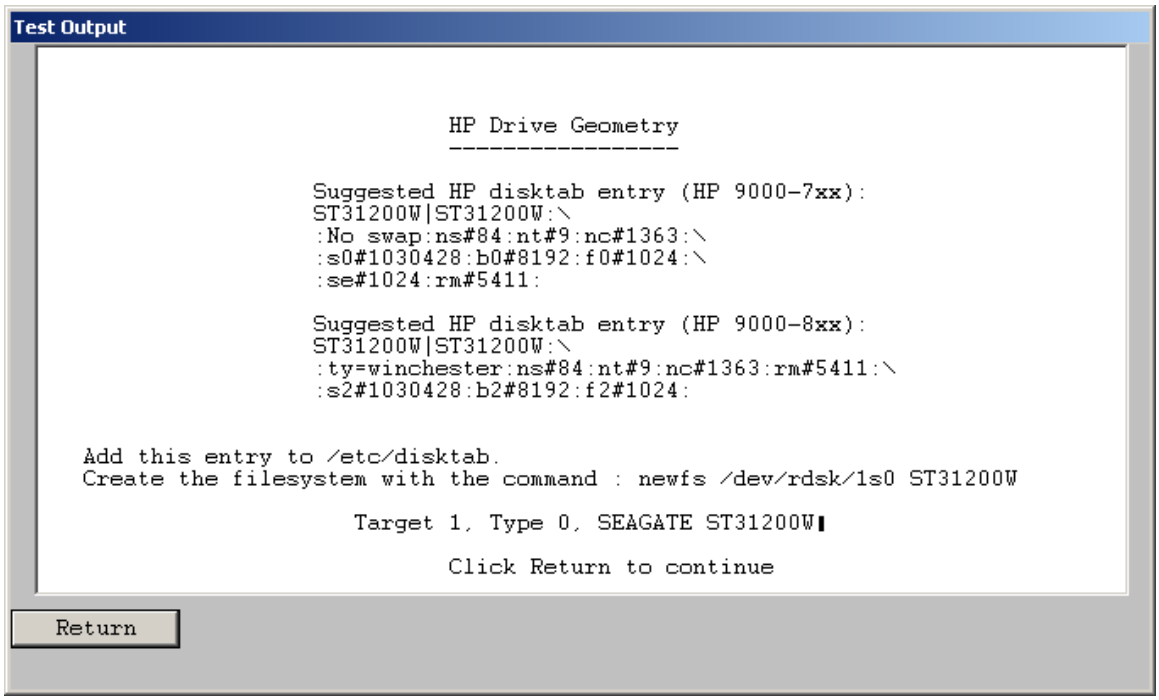
or not. The drive is analyzed and a geometry is calculated and written to the drive, along with SGI standard partitions.

The HP Workstation Menu



This choice will generate an entry to be added to the system's disktab file. This file is located in the /etc directory on the HP machine. The following figure shows an example of an HP entry.

HP Drive Geometry

Suggested HP disktab entry:

IBM_OEM_|IBM_OEM_:\
:No swap:ns#63:nt#15:nc#1038:\
s0#980910:b0#8192:f0#1024:\
se#1024:rm#3600:

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Add this entry to /etc/disktab.
Create the filesystem with the command : newfs /dev/rdsk/1s0 IBM_OEM

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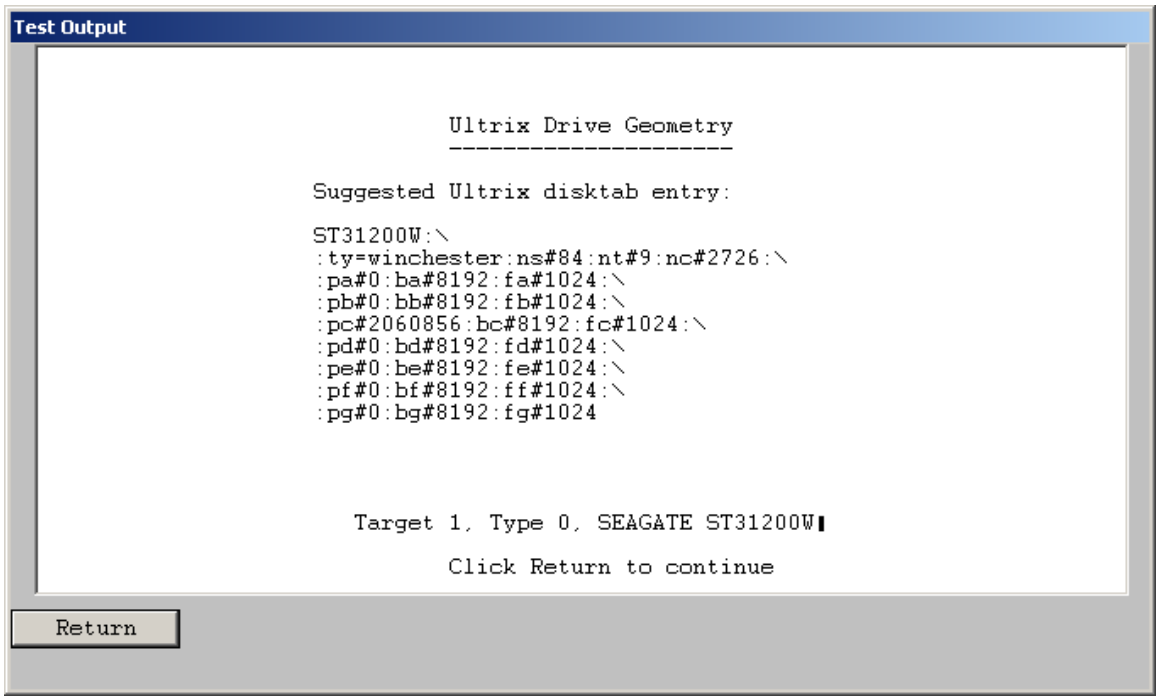
The DEC Workstation Menu

DEC Ultrix



This choice will generate an entry to be added to the system's disktab file.
This file is located in the /etc directory on the DEC machine. The following figure shows an example of a DEC entry.

Ultrix Drive Geometry
Suggested Ultrix disktab entry:

```
IBM_OEM_:\
:ty=winchester:ns#63:nt#15:nc#2076:\
:pa#0:ba#8192:fa#1024:\
:pb#0:bb#8192:fb#1024:\
:pc#1961820:bc#8192:fc#1024:\
:pd#0:bd#8192:fd#1024:\
:pe#0:be#8192:fe#1024:\
:pf#0:bf#8192:ff#1024:\
:pg#0:bg#8192:fg#1024
```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Add this entry to /etc/disktab. Then perform a newfs with the following command: newfs /dev/rrz1c IBM_OEM_

DEC OSF

This choice will generate an entry to be added to the system's disktab file.
This file is located in the /etc directory on the DEC machine. The following figure shows an example of a DEC entry.

```
            OSF Drive Geometry
 Suggested OSF disktab entry:
        IBM_OEM_:\
        :ty=winchester:ns#63:nt#15:nc#2076:\
        :pa#0:ba#8192:fa#1024:\
        :pb#0:bb#8192:fb#1024:\
        :pc#1961820:bc#8192:fc#1024:\
        :pd#0:bd#8192:fd#1024:\
        :pe#0:be#8192:fe#1024:\
        :pf#0:bf#8192:ff#1024:\
        :pg#0:bg#8192:fg#1024
```

Add this entry to /etc/disktab.
Then perform a newfs with the following command: newfs /dev/rrz1c IBM_OEM_

Media Duplication

The optional Media Module lets you copy or clone media from one source to up to six destinations. This copying is done on a byte-by-byte basis, so the copy will be an exact replica of the original. The Media Module will copy disks to disks, and tapes to tapes, and can be used to copy a marginal disk or transcribe tapes from one media type to another. In the case of a tape-to-tape copy, the destination tape will be written in the same format as the source tape, in regard to block size, etc. All filemarks will be copies as well. A tape copy will end when the End of Tape mark is encountered on the source tape.

Disk copies will proceed until the last block is encountered on either the source or the destination disk. This allows you to copy part of a large disk to a smaller one, or to copy all of a small disk to a larger one. The copy operation of the Media Module can be interrupted at any time by pressing the “Cancel” button.

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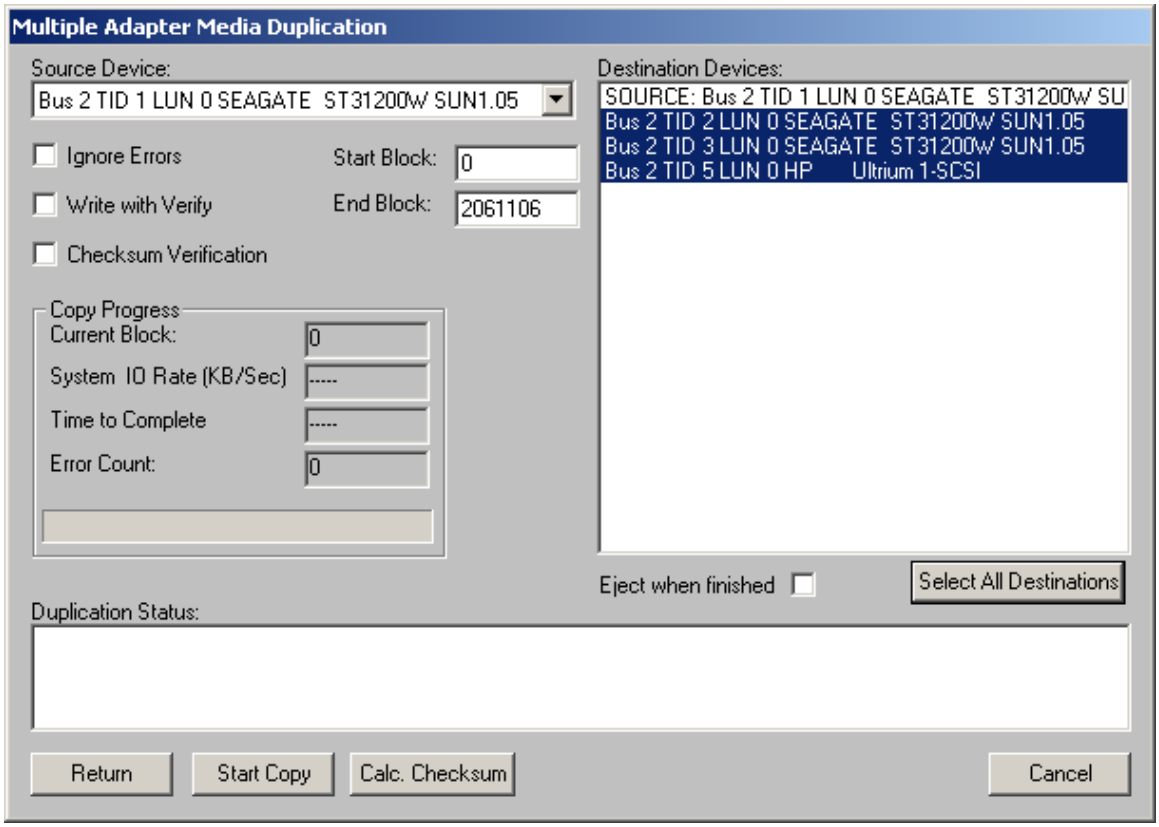

Choosing the Source Device

Use the Source Device pull-down list to pick which device to copy from. Click on the arrow in the selection box to display a list of possible source devices. Clicking on one of those devices will select it. If the device is a disk, it will default the start and end blocks to the full capacity of the disk.

Choosing the Destination Drive

Destination devices are chosen from the Destination Device List box. This list box supports the standard Windows method of selecting multiple items from a list. You may select 1 or more of the available devices displayed.

Copying Rules

You must be copying to and from the same type of device, i.e., disk-to-disk and tape-to-tape. The source and destination devices must be different SCSI targets. If an error is encountered

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during a copy operation, the copy will be aborted. In the case of multiple destinations, if the copy encounters an error to a particular device, the cop to that device will be aborted; all others will continue. Multiple-device copies are implemented by:

1. Reading a block (or blocks) of data from the source.
2. Writing that data to each destination device. (This eliminates reading the source device multiple times.)

Keep in mind that throughput is important. Faster bus adapters will provide the highest levels of performance.

Choosing the Copy Range

In the case of a disk-to-disk copy, you may specify the range of blocks that are copied. The starting block will be defaulted to block zero, and the ending block will default to the highest block number of the source disk. You may enter any other value into the starting and ending block in order to copy less than the whole source disk.

Write with Verify

Selecting this check box will cause all write commands to be written with verify commands. This will cause the destination drive to compare the CRC and ECC data for each block after it is written. ***Note: Selecting this option will significantly reduce the throughput of the copy operation.***

Ignore Errors

Selecting this check box will cause the copy operation to continue on a device after an error has occurred. You may want to use this to skip over bad blocks on a device.

SES Functions

SES Device Configuration display

Enclosure processor information on all elements is displayed – right-click on the SES device in the display window and choose SES Data:

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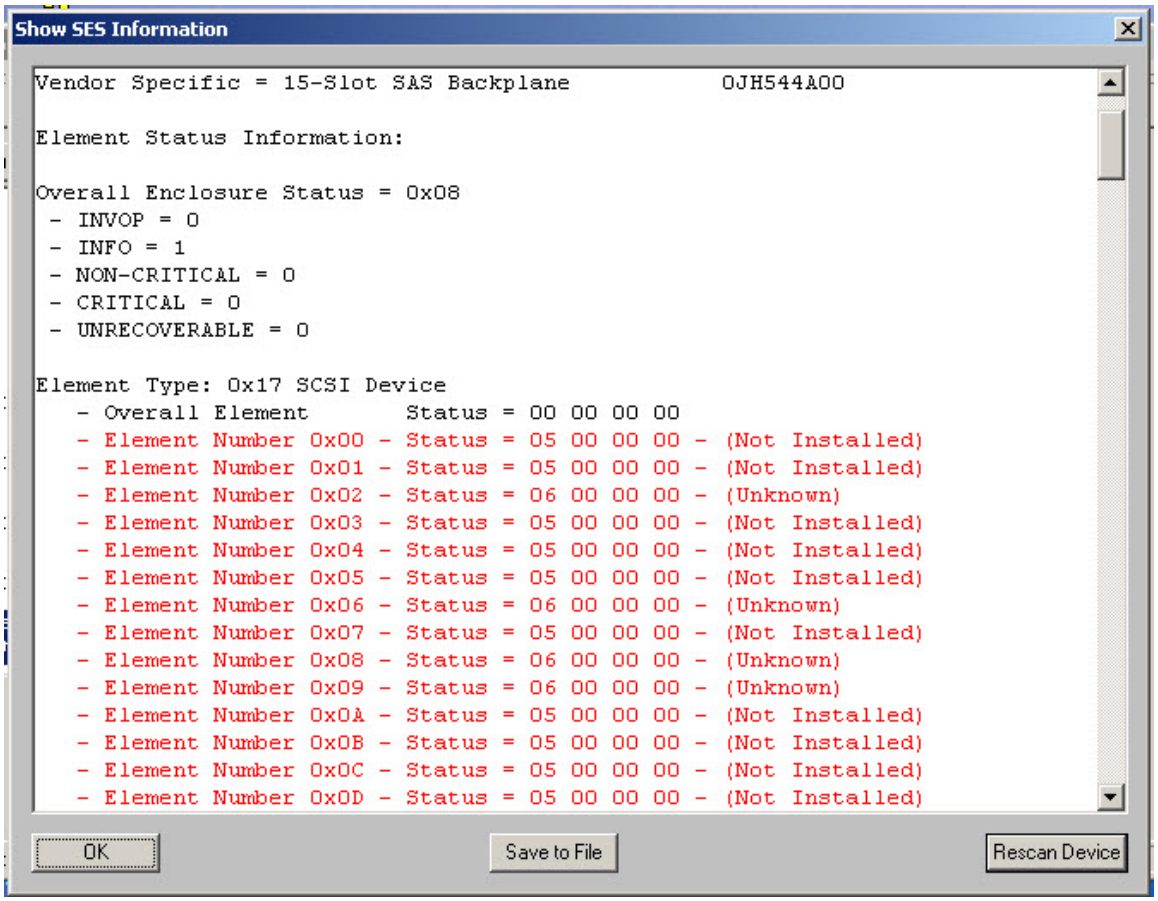

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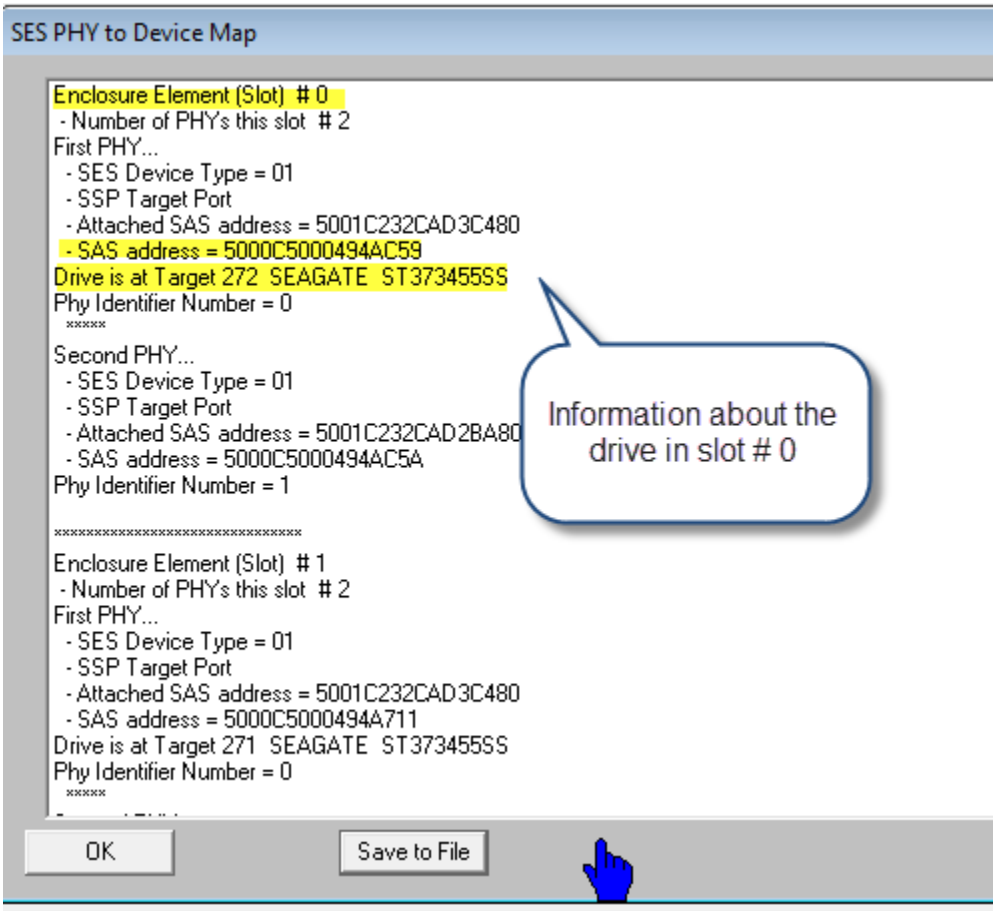
SES Element->PHY->WWN Map Display

This functions shows the correlation between a device enclosure drive slots and the drives plugged into a slot. For each enclosure slot the WWN of that slots PHY is displayed and if a drive is plugged into the slot that drives WWN is displayed along with the target number of the drive and the drives INQUIRY or IDENTIFY information (Vendor & Product) is displayed.



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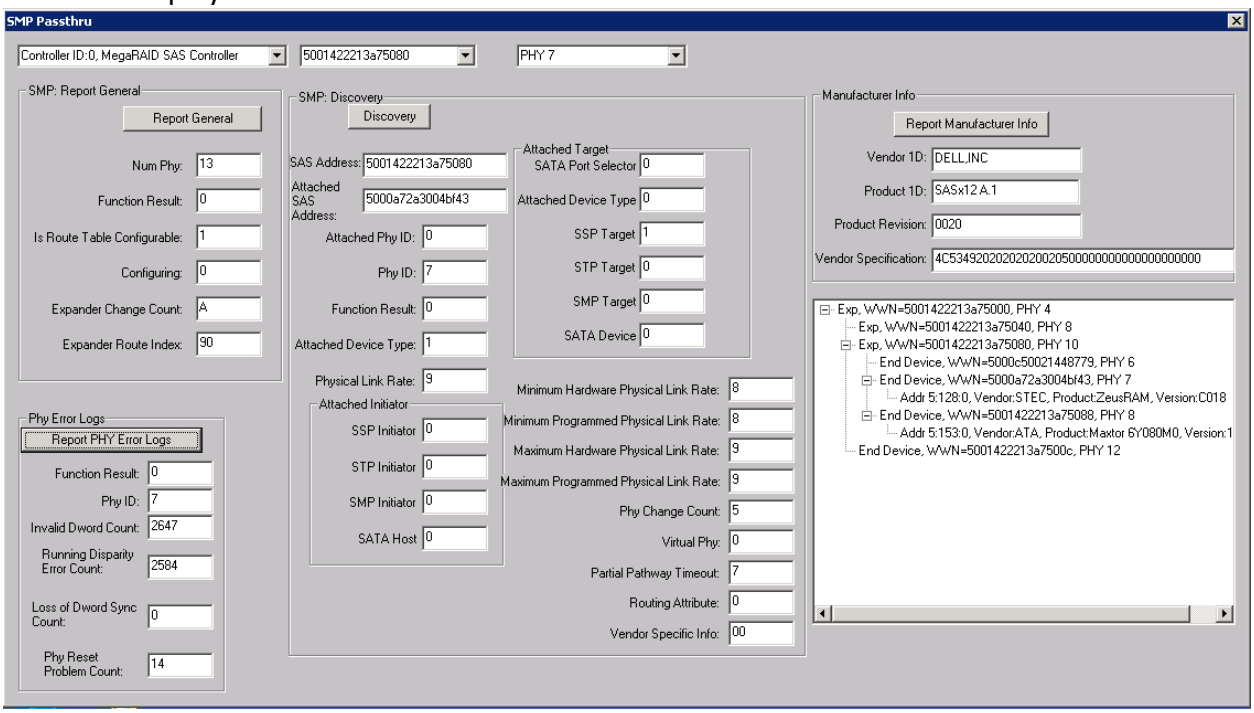
LSI RAID SMP Passthrough function

This function reports all of the SMP discovery information for enclosures and devices behind LSI RAID cards.

The main display is shown here



First a controller is selected from the pull-down list then the “Report General” button is clicked which fills in further information.

A SAS Address (WWN) may be selected in the second pull-down , and selecting a PHY from the third pull-down fills in all details about the selected PHY including individual PHY error reports and all PHY configuration information.

The SAS topology is displayed in the tree control which may be expanded or compressed.

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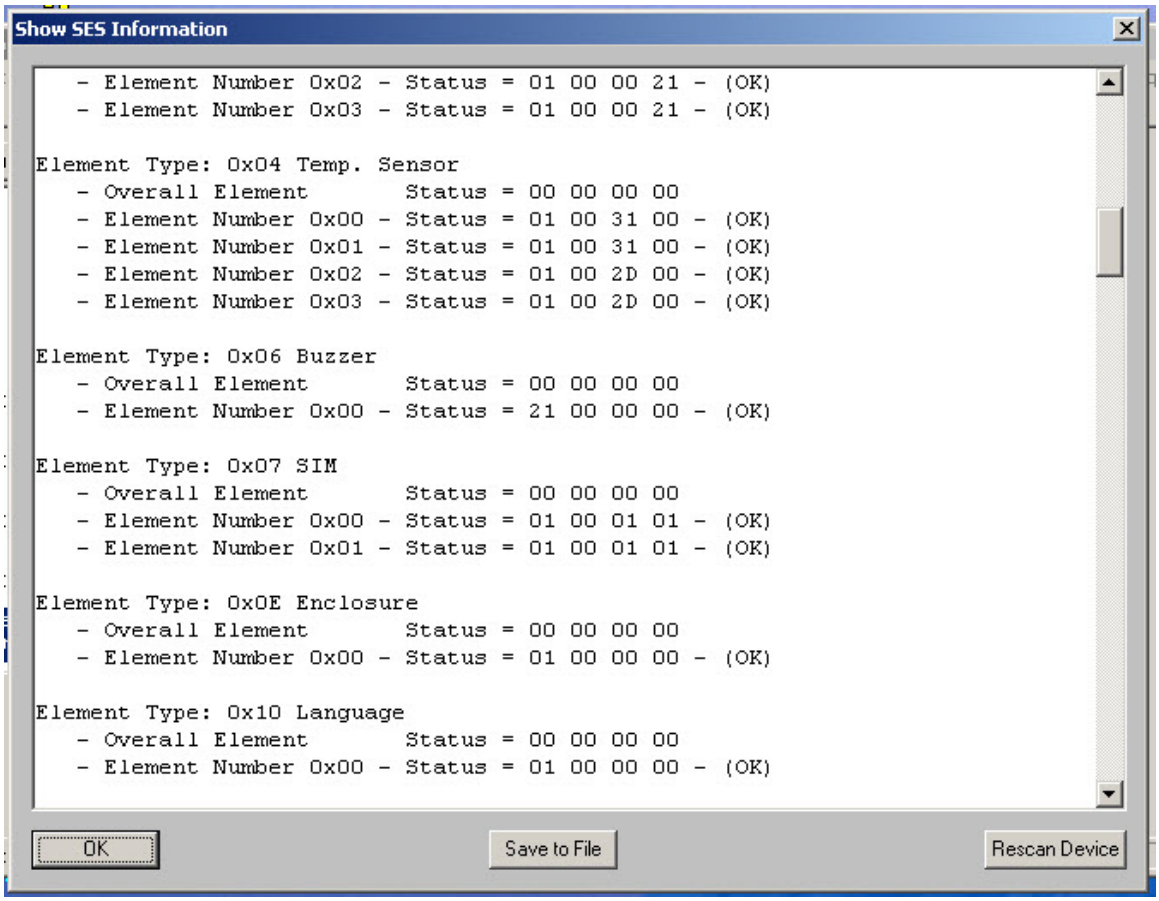

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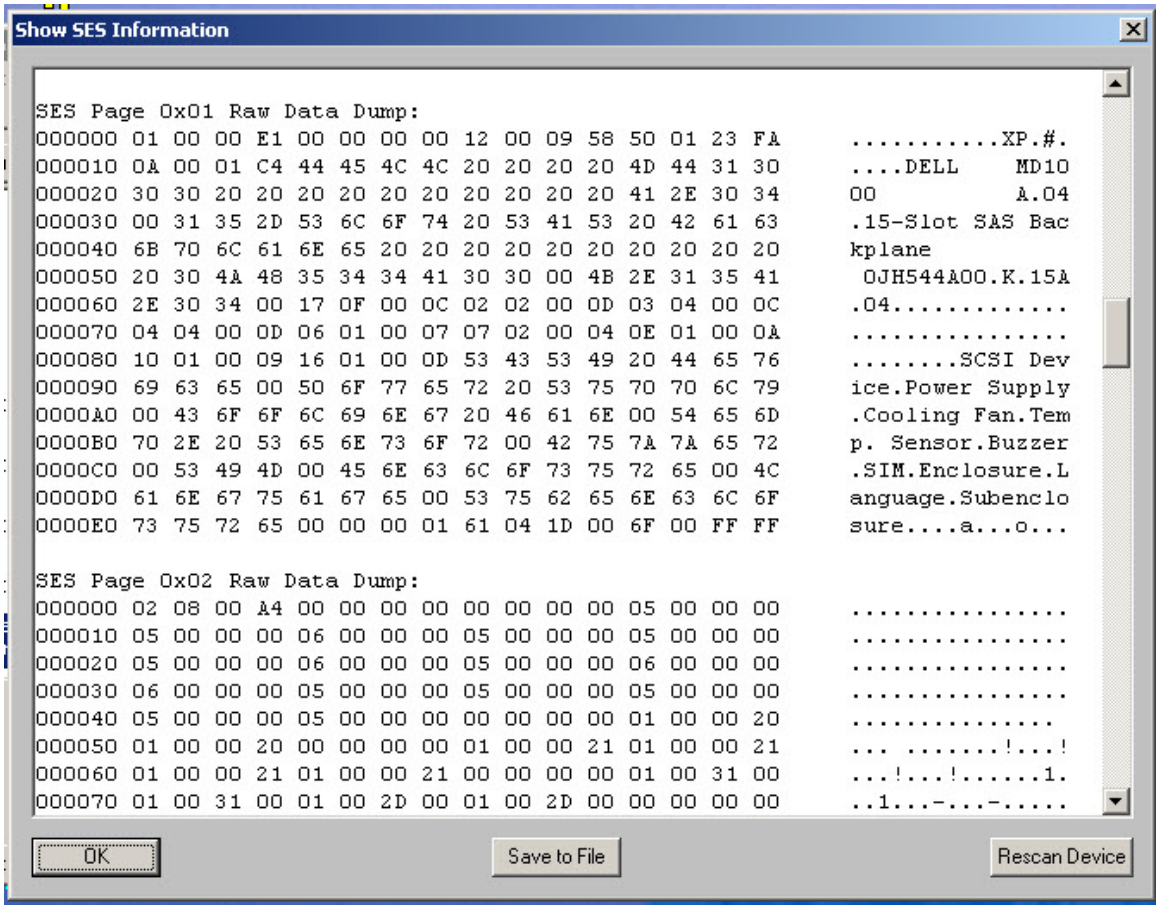
Raw data for all elements is also displayed:



Tape Tests

The following tests are available via the Tape Test menu

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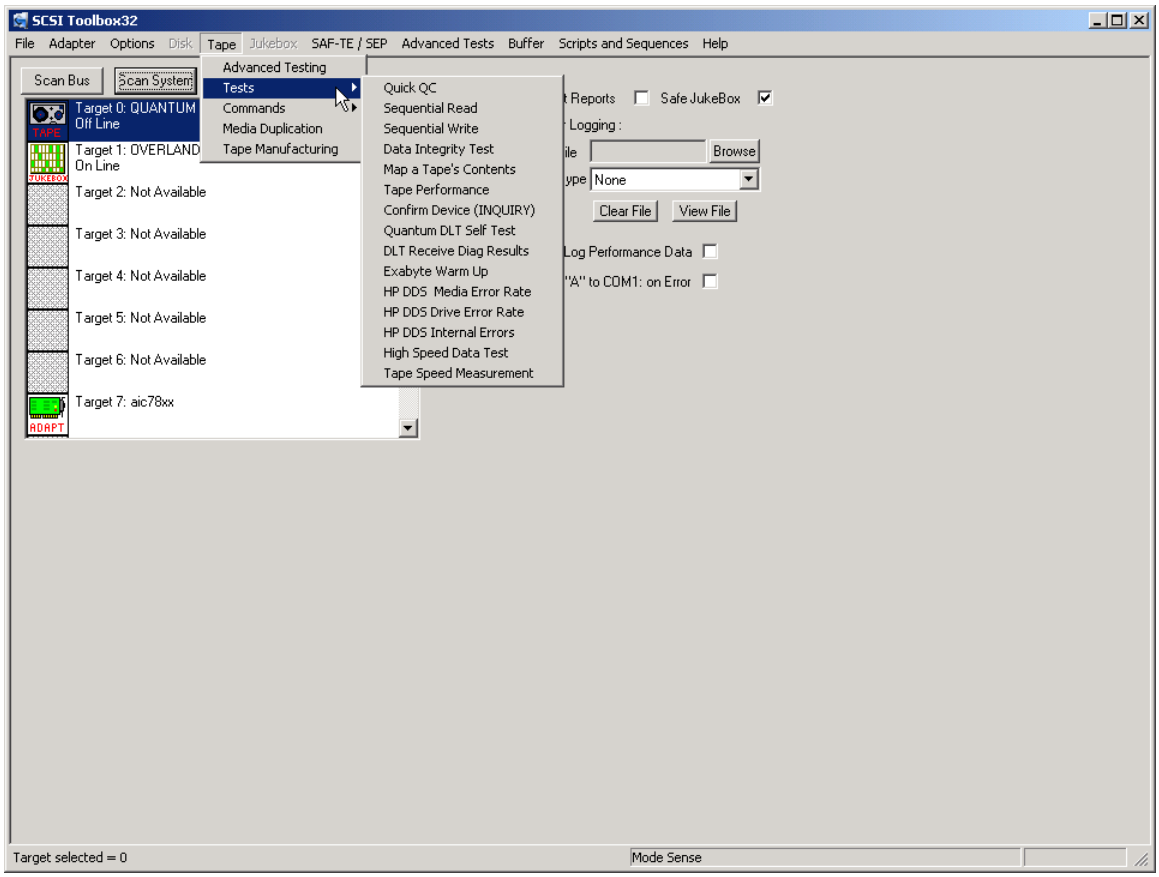

Quick QC Test

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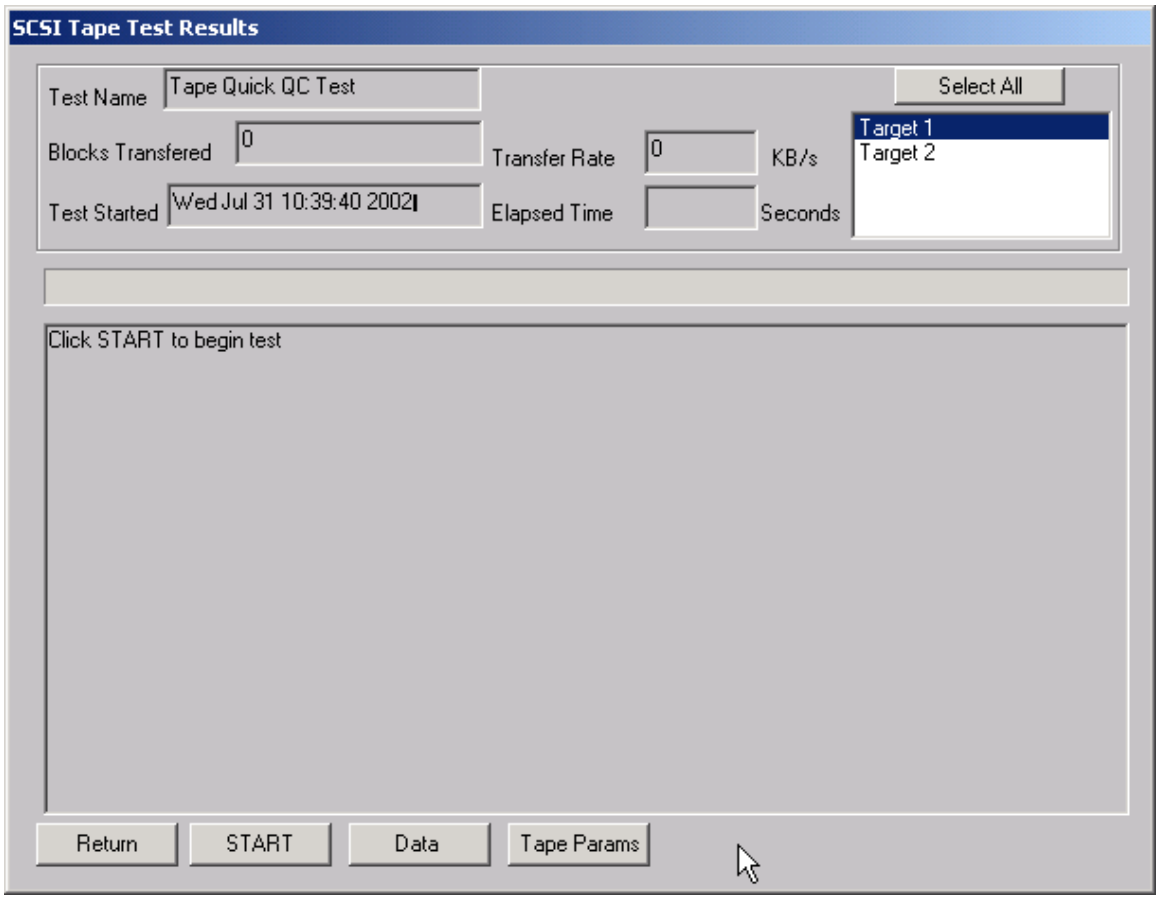

The Quick QC test exercises every function of the tape drive. The test Progresses in the following order:

-Rewind tape
-Write blocks of data to tape
-Write a File Mark
-Rewind tape
-Read blocks of data from tape
-Space Reverse to beginning of tape
-Space Forward to File Mark
-Rewind tape

Sequential Read Test

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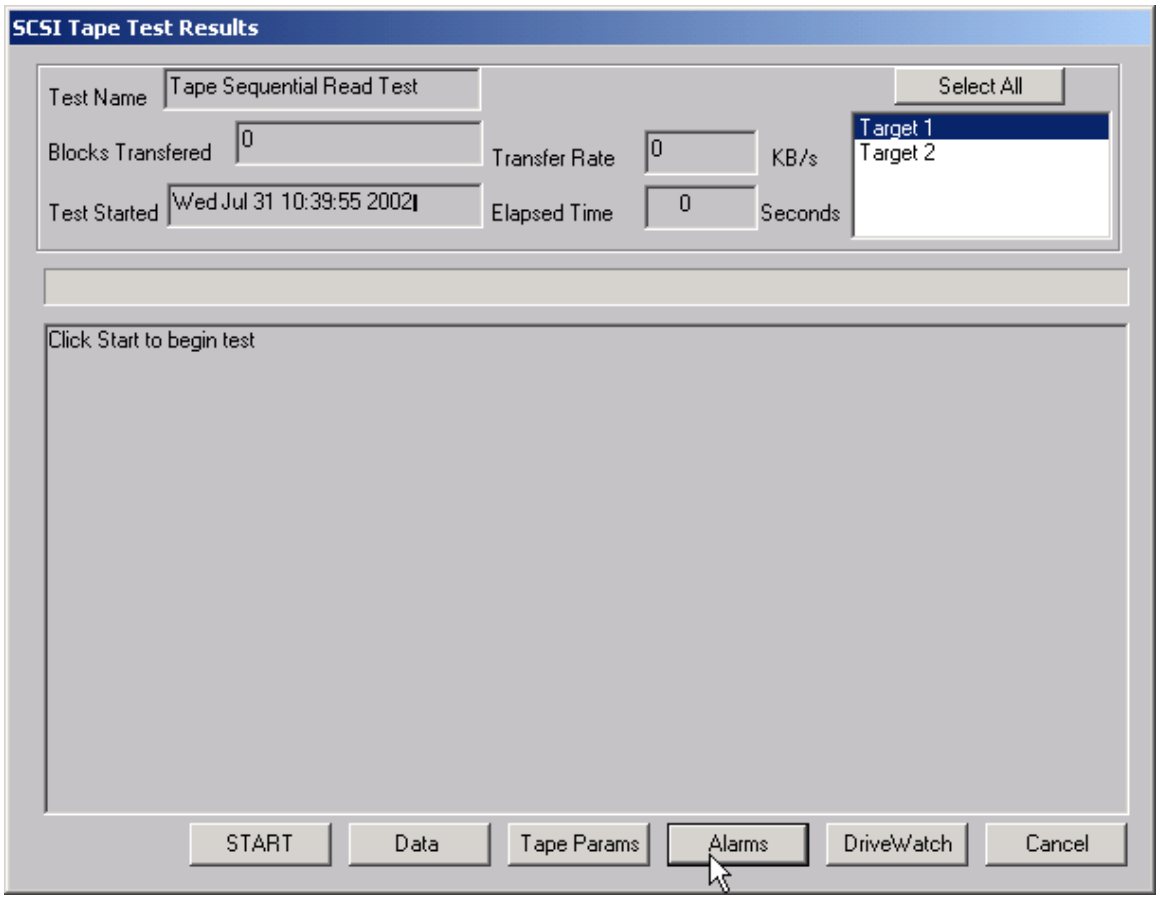

This test asks if you want to rewind the tape or not then sequentially reads every block on the tape, until either a Blank Check (End of Data) or End of Media is encountered. In the case of tape drives that can report remaining tape and error information, this information is displayed and updated every 1 MB of data. In this case, the Total Error Count, Errors since last Error, and Remaining Tape data is displayed.

Tape DriveWatch

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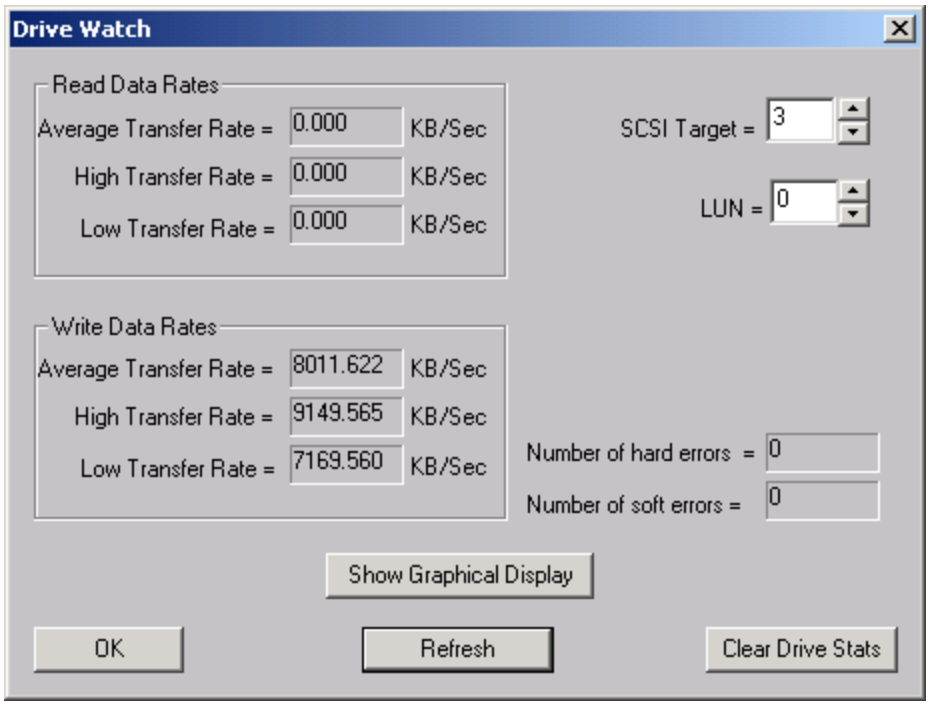

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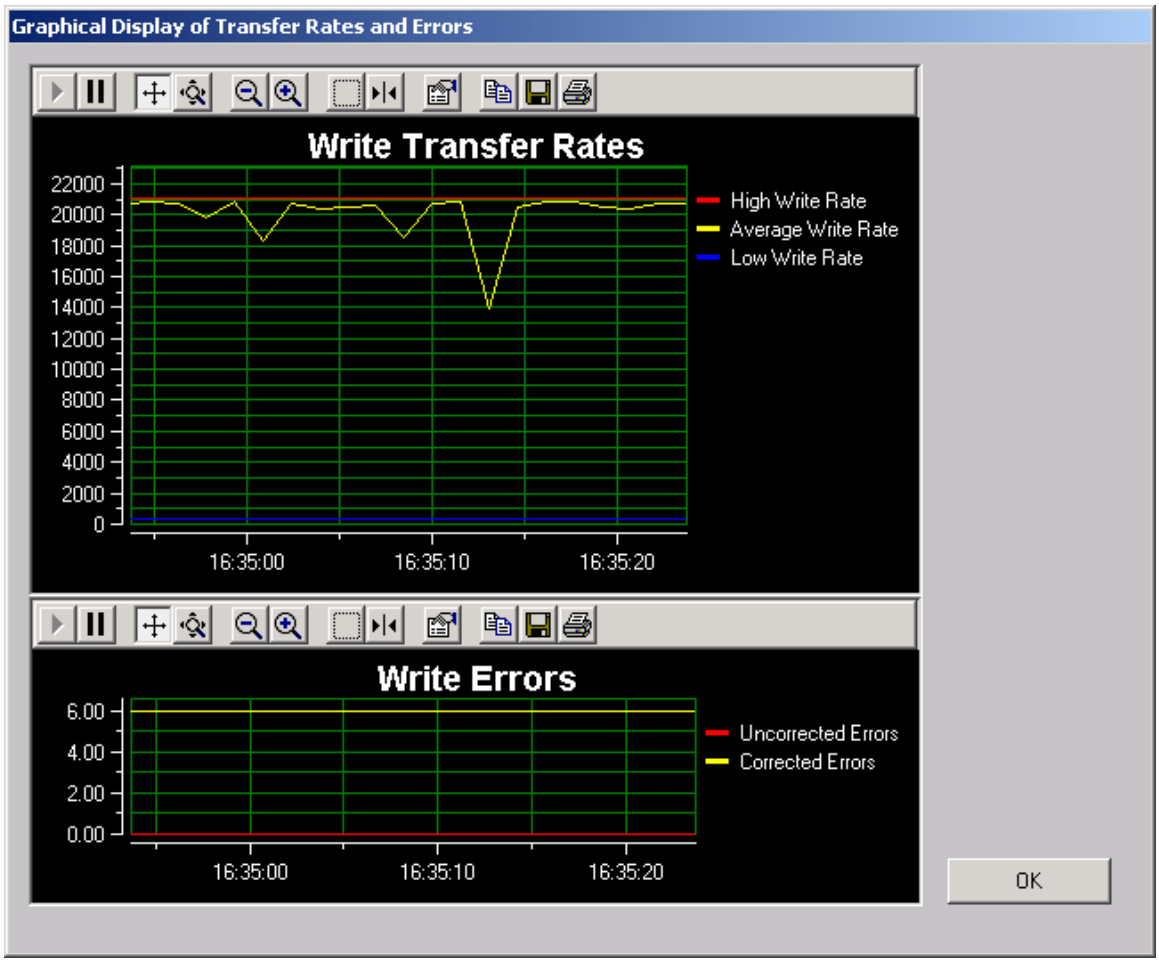
Tape Drive Watch allows real-time monitoring of tape drive performance data as any test is running. The Show Graphical Display button will show performance and error information graphically:



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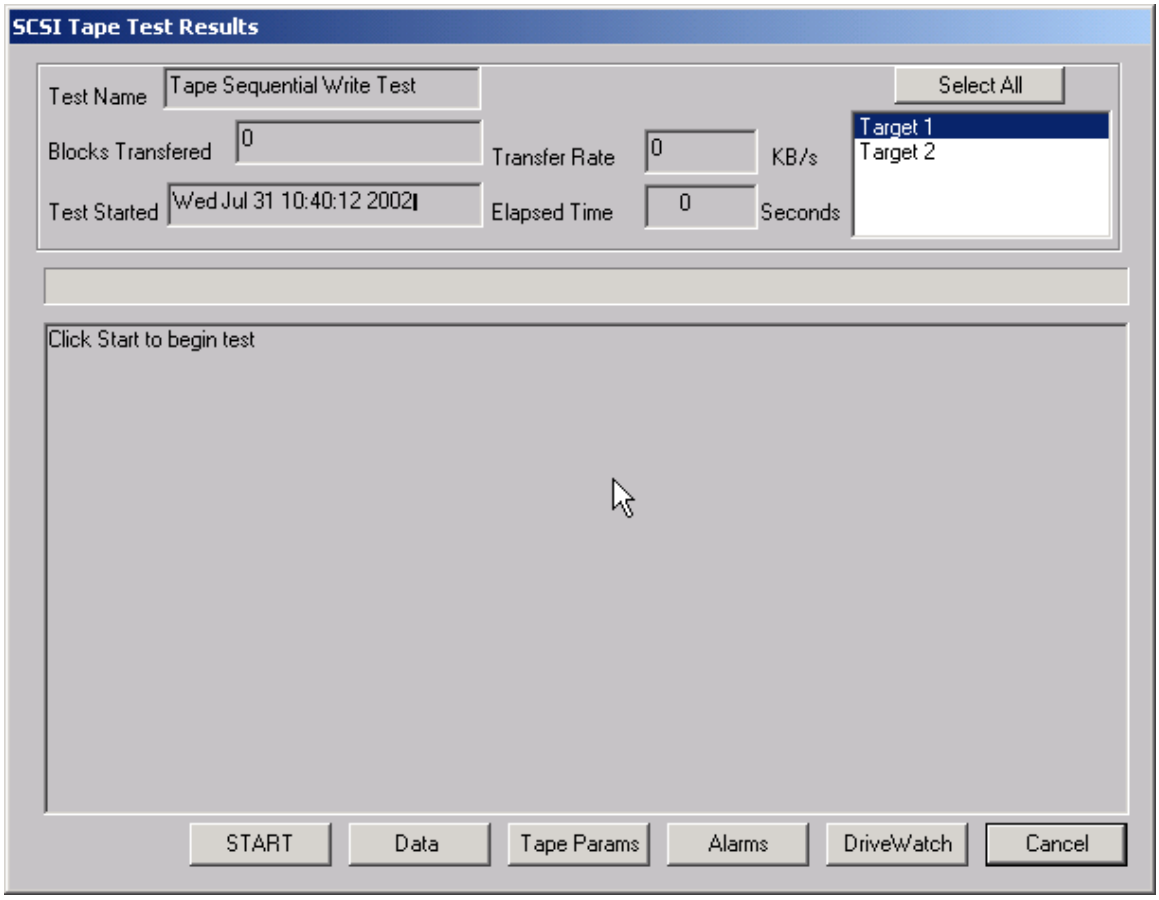
Sequential Write Test



The Sequential Write Test asks if you want to rewind the tape or not then writes to every block on the tape media until End of Media is encountered. In the case of Exabyte 8mm drives and most 4mm DAT drives, the remaining tape and error statistics are displayed on the screen after each one megabyte of testing is complete.

Data Integrity Test

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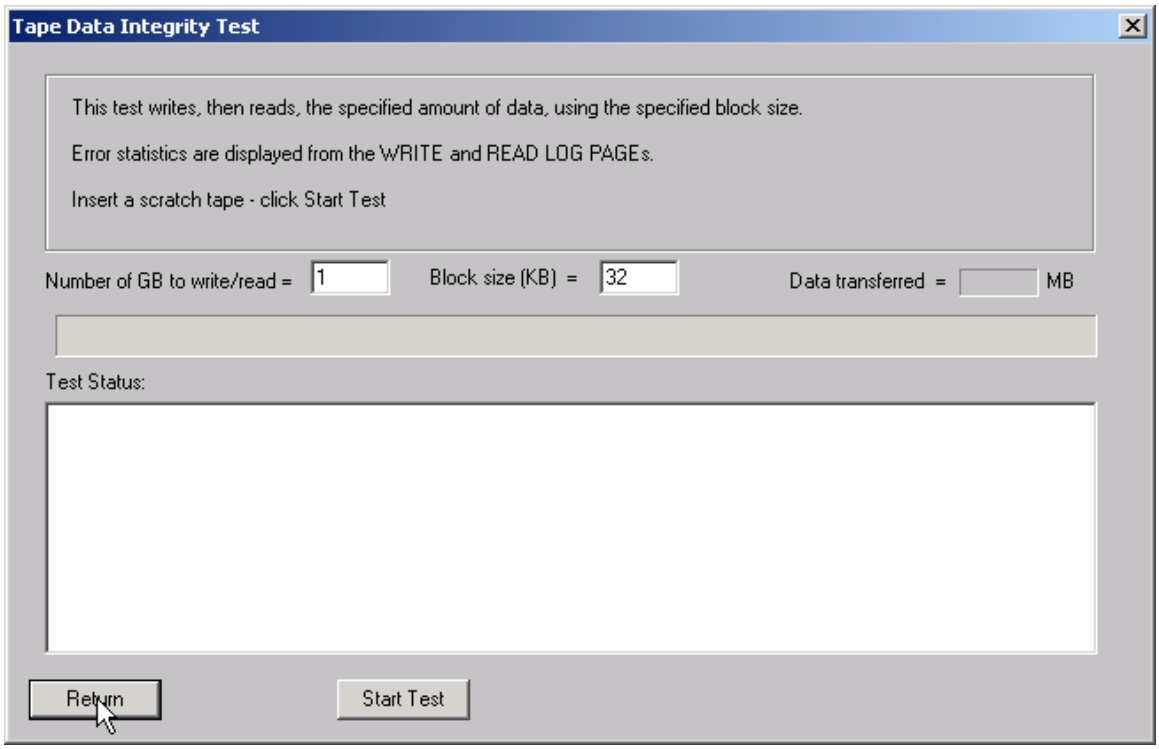

This test will rewind the tape, then write the specified amount of data to the selected drive. At the end of the write phase the error information collected from the drive's log pages will be displayed.

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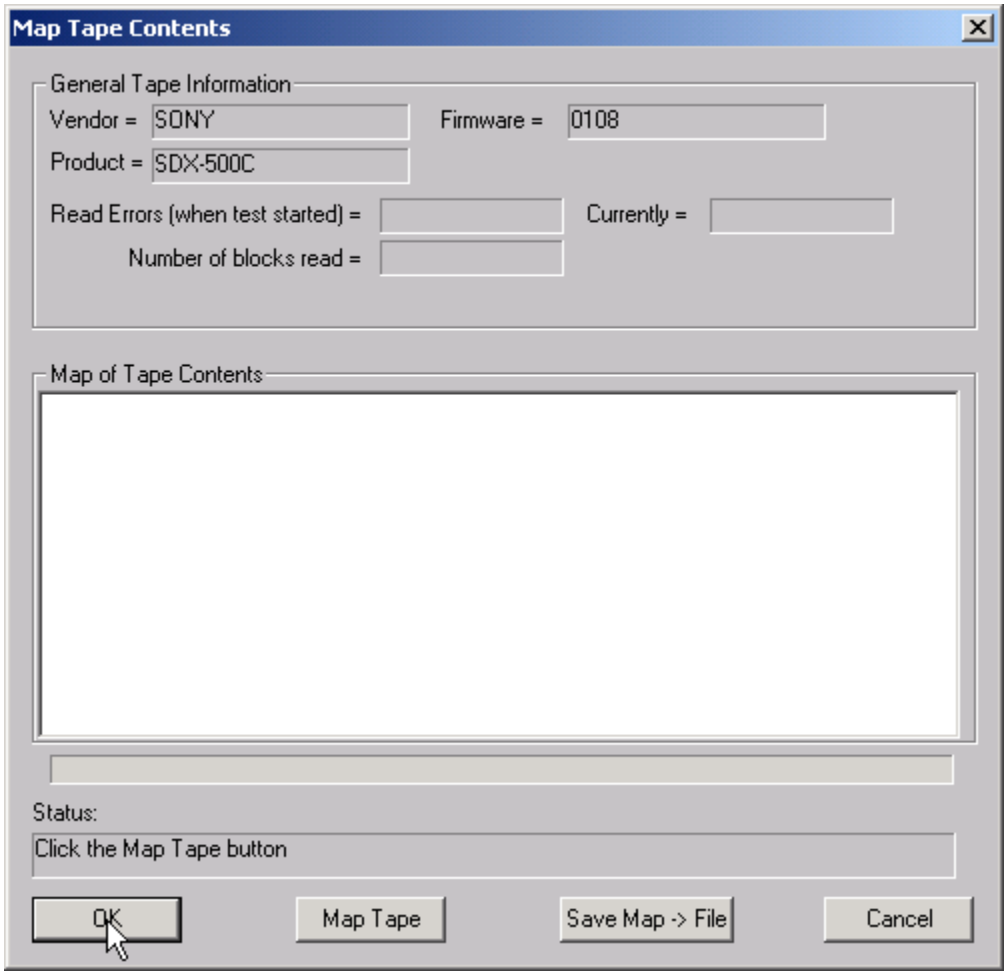
Map a Tape's Contents



Click the Map Tape button and the tape will be rewound, then read. The contents of the tape (data, filemark, etc) will be displayed in the Map of Tape Contents window. For each section of data the read error rates will be displayed from the drive's log pages.

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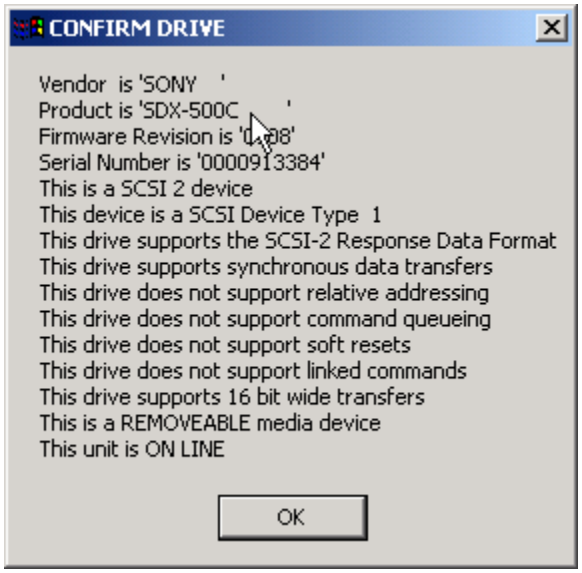
Confirm Device (Inquiry)



This test will report as much information as is available about the currently selected tape drive. In all cases, the VENDOR, PRODUCT,
and REVISION fields returned by a SCSI INQUIRY command will be displayed, along with the ANSI SCSI level of the device, and the device's ability to support any of the following:

- Synchronous data transfers
- Relative addressing
- Command queuing
- Soft resets
- Linked commands, and
- Whether the device is a removable media type or not

Some devices will report back with much more information than indicated above. In these cases the information is often in a vendor-unique format, which the SCSI *toolbox* will interpret for you. If additional data beyond that described above is available that data will displayed.

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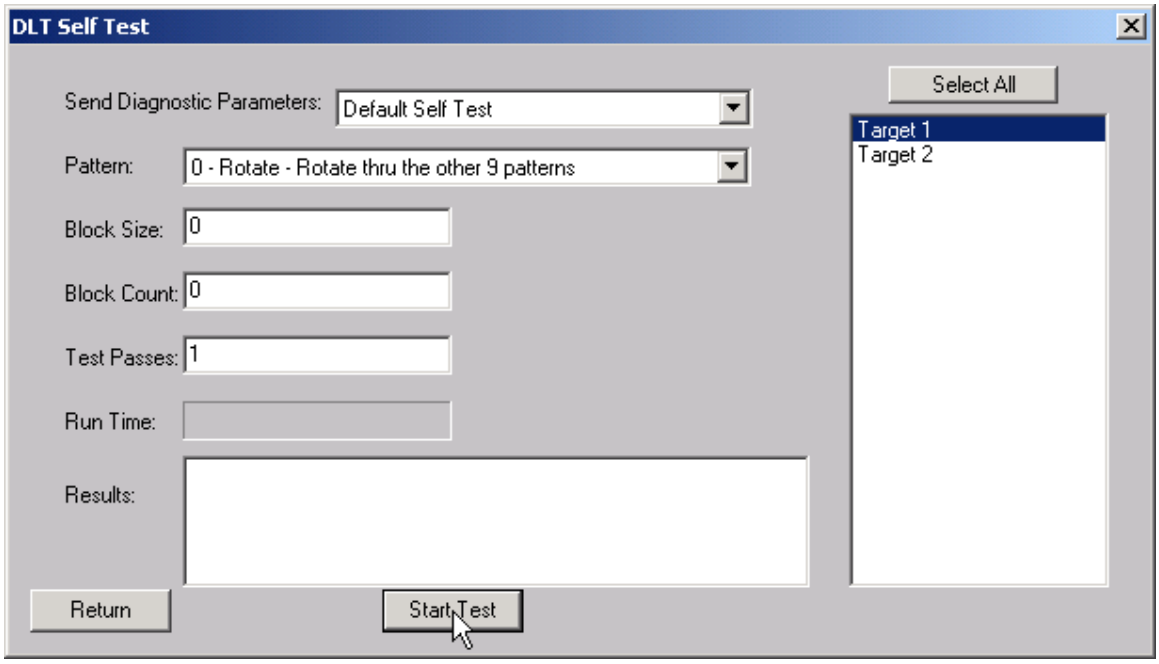
Quantum DLT Self Test



This test allows you to set all the user defined parameters, or use the default self test. This test supports disconnect-reconnect with Adaptec or Q-Logic SCSI adapters in the multi-drive mode.

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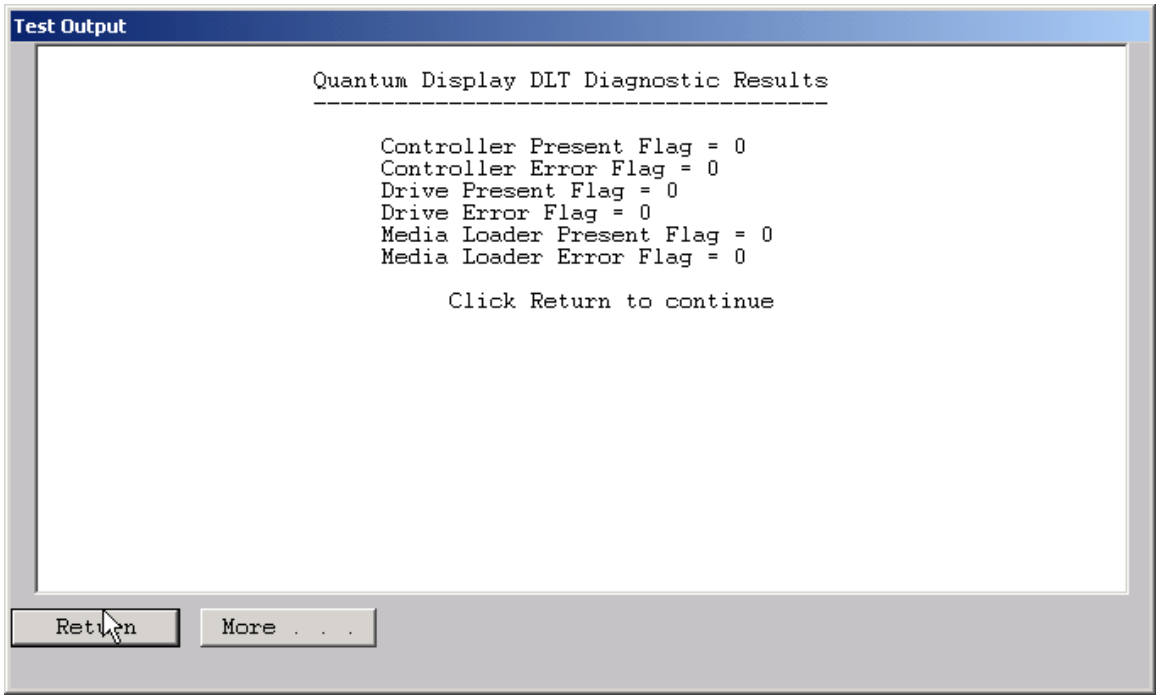
DLT Receive Diagnostic Results



DLT Receive Diagnostic Results

This function displays the results of a recv diagnostic command for the controller, drive and medium on any DLT-type device.

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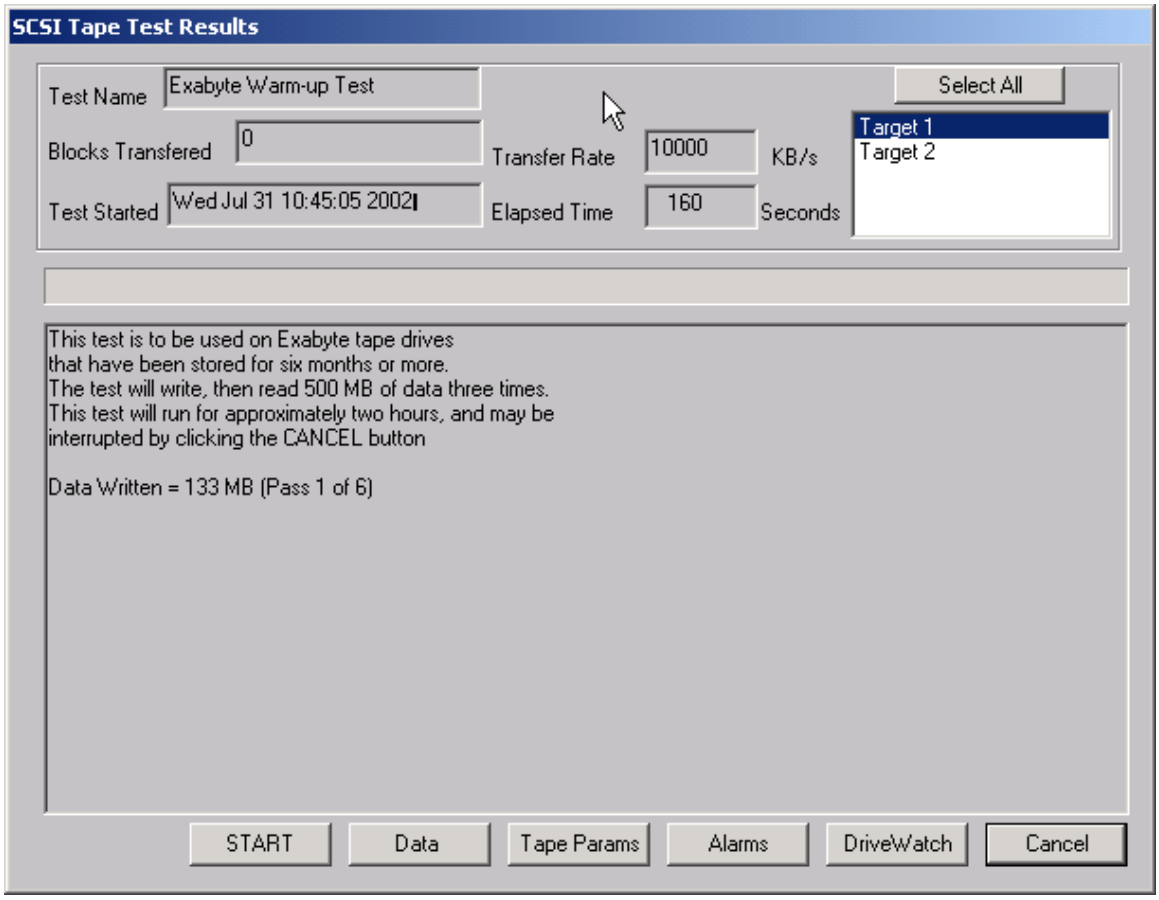
Exabyte Warm Up Test



This test is specific to Exabyte 8mm tape drives. If the drive is inactive for long periods of time then is used it may fail. This test simply moves the tape forward and back writes data etc to break in a drive that has been inactive. This helps get all the moving parts moving smoothly again and ready for normal use.

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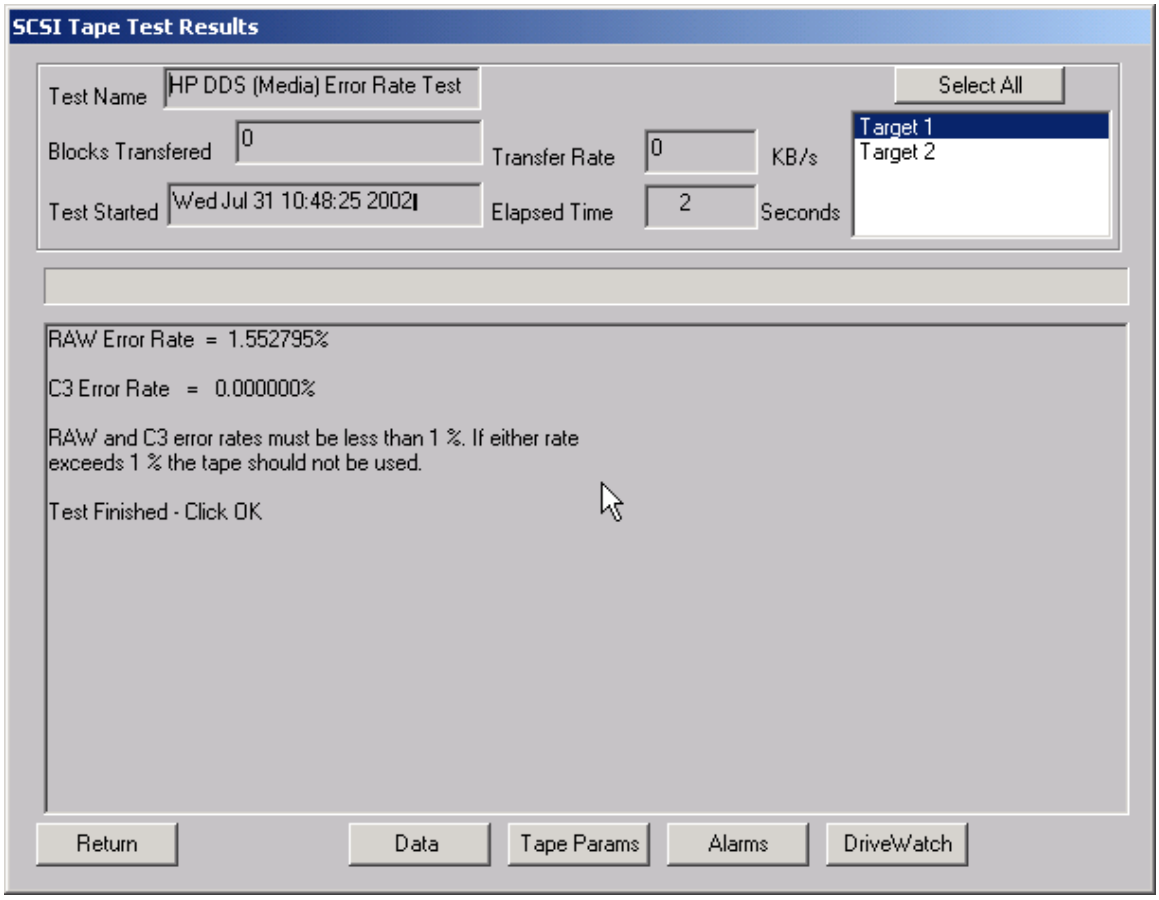
DDS (4mm) Media Error Rate Test



This test reads information from the header of a DDS (4mm) tape and interprets it into tape error statistics. This information is obtained by reading the TAPE LOG PAGE of the LOG SENSE command.

DDS (4mm) Drive Error Rate Test

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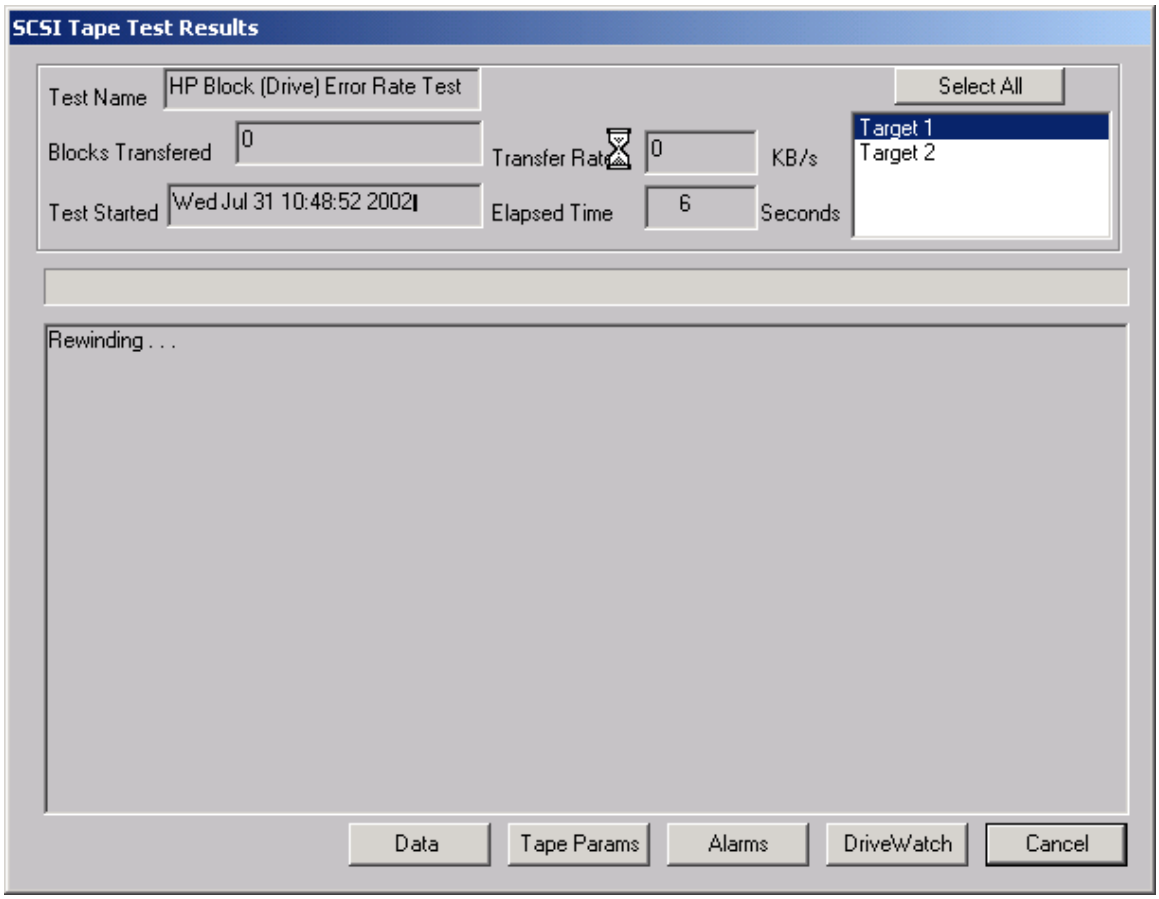

This test will space to the End of Data (EOD) on the tape, then will write 50 MB of data. The Block Error Rates from LOG SENSE PAGES 34 and 35 will then be read and interpreted. This test will show you the error rate of the tape drive itself, where the HP Media Error Rate test will show the error rate of the tape media.

High Speed Data Test

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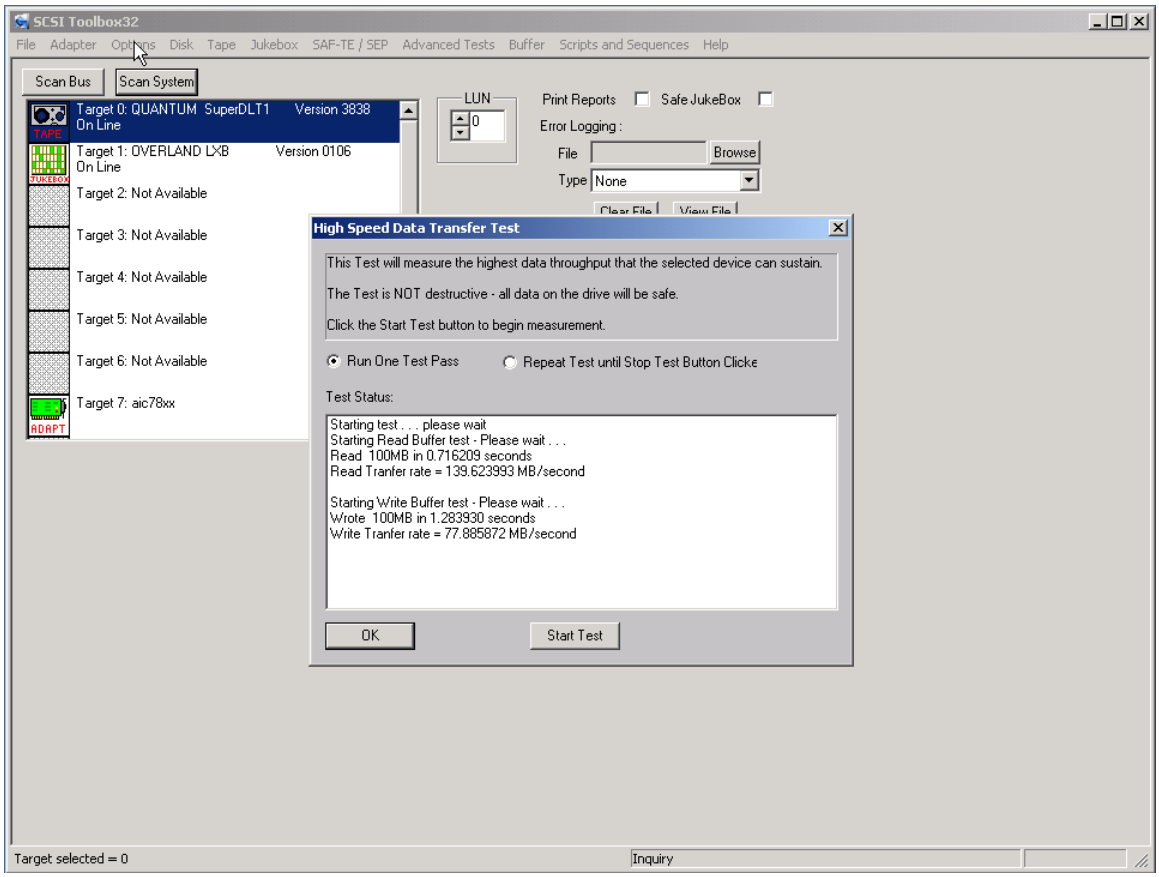

The High Speed Data test transfers data to and from the drive without transferring to the actual drive media. This allows the data transfer speed of the drive and host bus adapter to be determined.

High Performance Measurement Test

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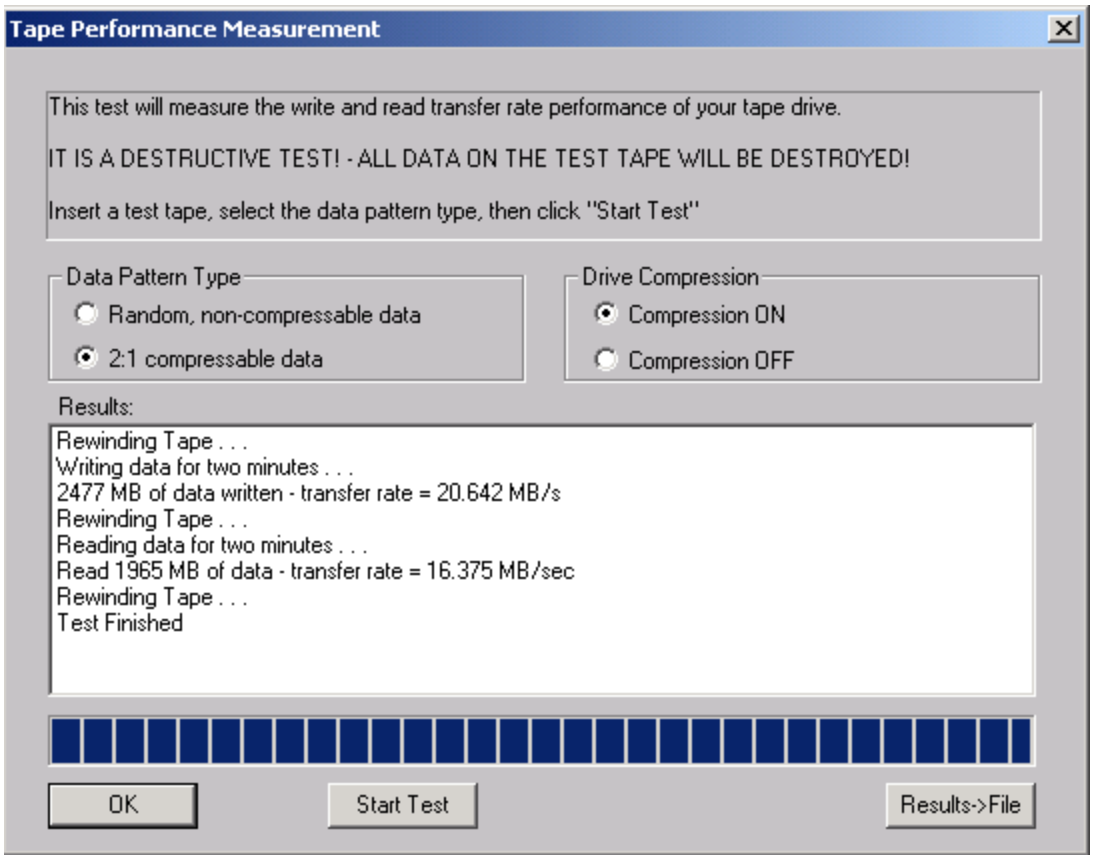

The Tape Performance Measurement test transfers data to and from the drive for two minutes, measuring the amount of data that can be transferred in that time to determine the "real –world" data throughput of the drive.

The data pattern can be selected to be a non-compressible format, or a format that will be able to be compressed to a 2:1 ratio.

The drive's compression can be turned on or off for this test.

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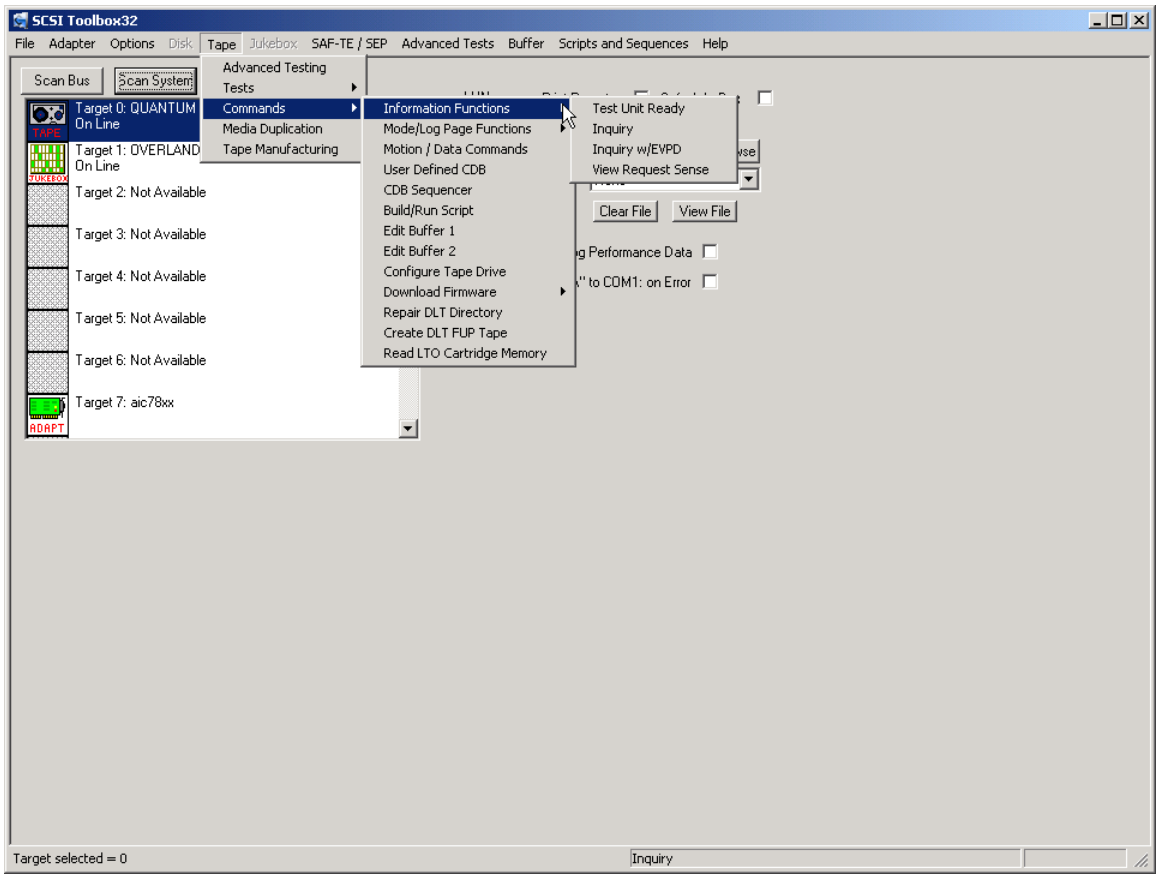
Tape Commands

The following commands are available via the Tape Commands menu:



Information Functions – Test Unit Ready

This command displays the return value from a SCSI Test Unit Ready command. A value of zero indicates a successful command completed.

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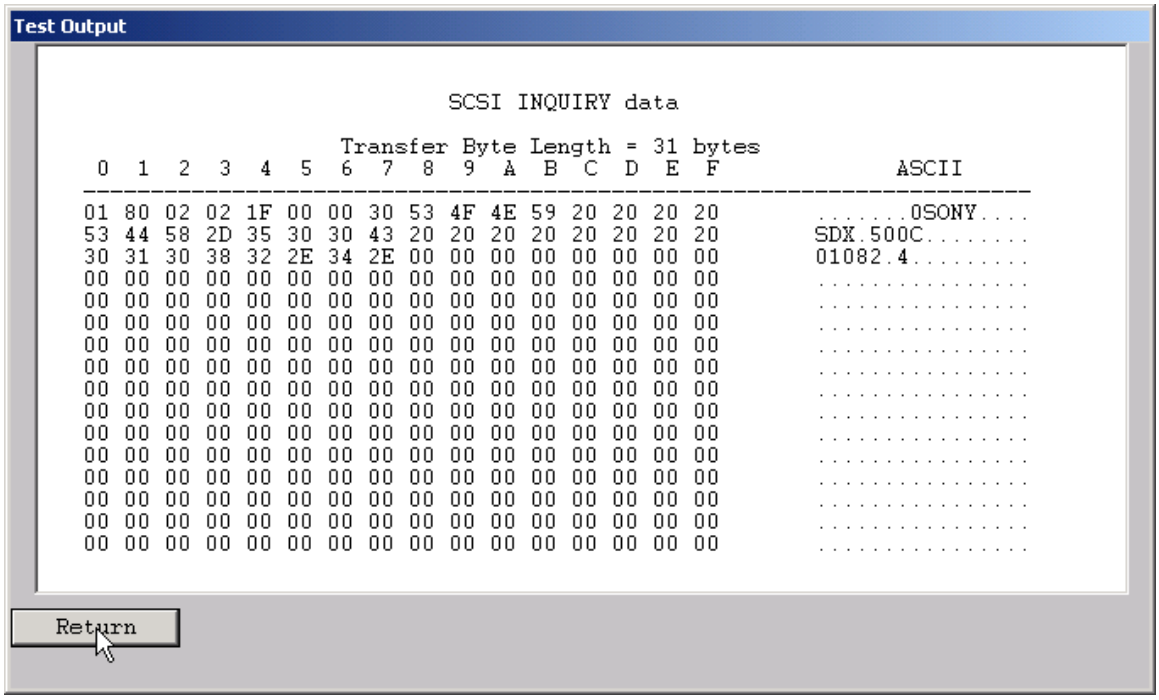
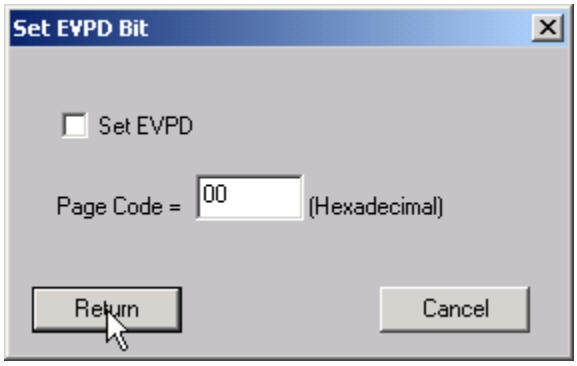
Inquiry



This command displays the data returned from the SCSI INQUIRY command. The data is shown in hexadecimal format on the left of the screen and in ASCII format on the right side of the screen.

Inquiry with EVPD



This option lets you specifiy whether to set the EVPD bit in the INQUIRY command, and which EVPD page you would like to display.

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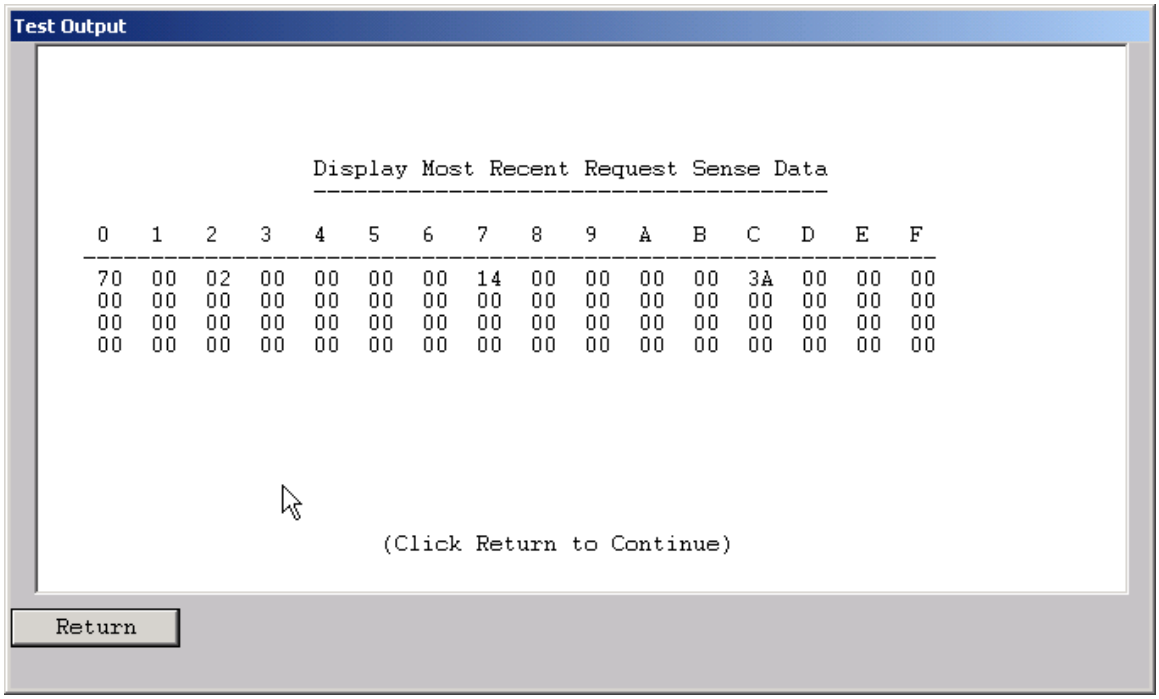
View most recent Sense Data



This command will display the most recent request sense data. This data will have been generated by the most recent check condition that occurred.

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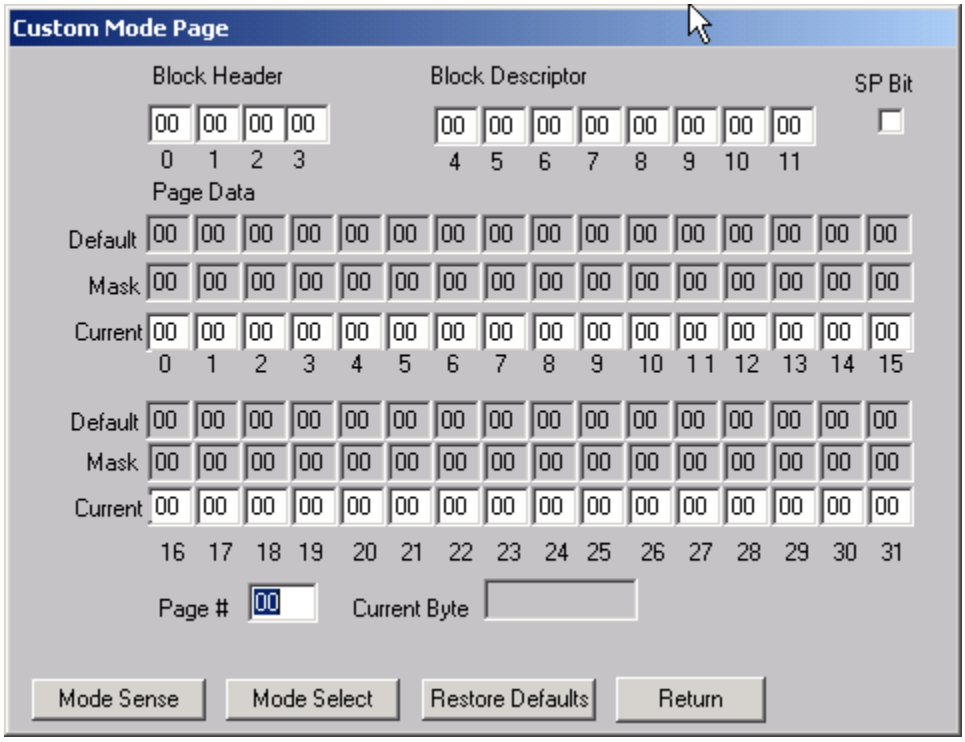
Mode Page Edit



This command allows you to select one of several standard mode pages and view and or change the values by their acromymns. For example selecting the Error Recovery page you can view the setting for the PER bit and change it.

This is a "Hex Edit" selection which displays a dialog box with which you can select the mode page number, and issue a mode sense for that page. The data is then displayed as a series of hexadecimal byte values with the changeable mask value for that byte. You may then edit any byte to specify a new value then issue a mode select to store the new values to the device.

DLT Log Pages

This command will read, format and display the log page data for DLT drives from the following log pages:

1. Write Error Counter Page
2. Read Error Counter Page
3. Tape Log Page
4. Tape Capacity Page
5. Write Frames Error Counter Page
6. Read Frames Error Counter Page
7. Data Compression Page

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DDS Log Pages

This command will read, format and display the log page data for DDS drives from the following log pages:

1. Write Error Counter Page
2. Read Error Counter Page
3. Tape Log Page
4. Tape Capacity Page
5. Write Frames Error Counter Page
6. Read Frames Error Counter Page
7. Data Compression Page

View Log Pages

Motion/Data Functions

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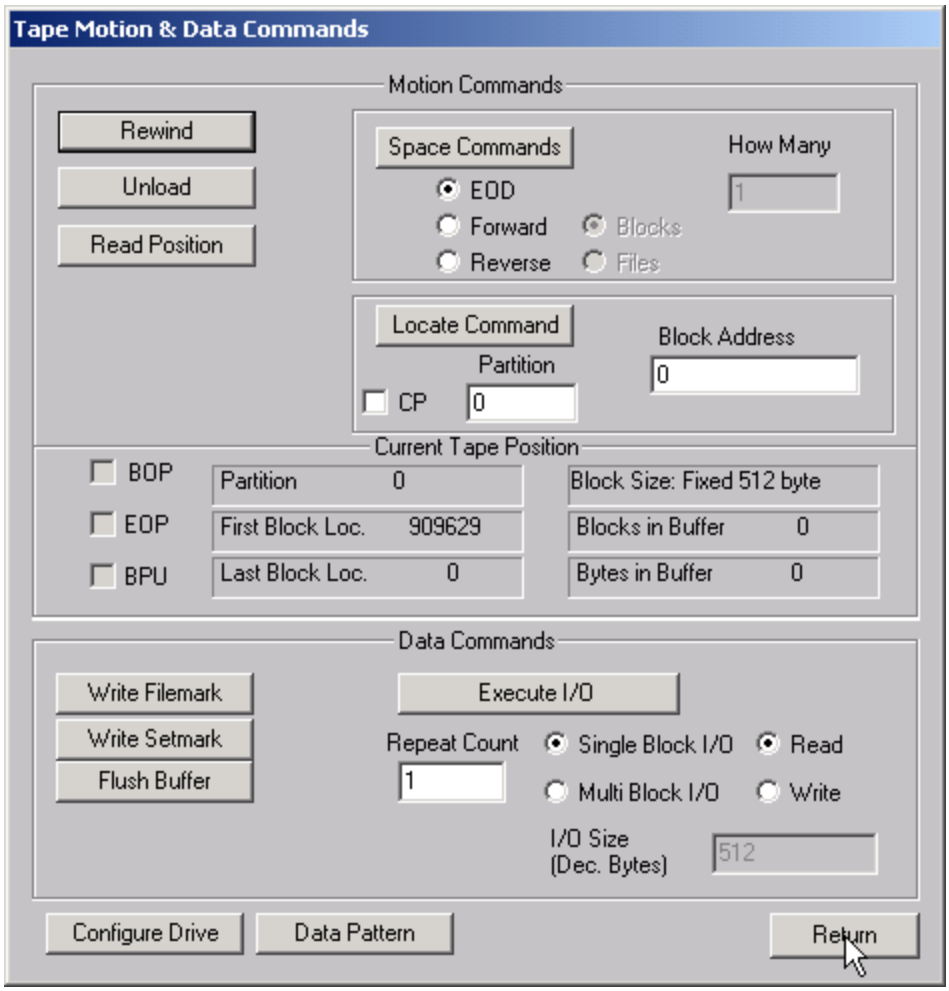

This dialog provides access to the basic motion and data commands normally used to diagnose tape devices.

Rewind

This command executes a SCSI REWIND command, rewinding the tape device under test to Beginning of Media. The time to complete the rewind operation is displayed.

Unload

Clicking this button issues an UNLOAD command to the selected drive. The time to complete the unload operation is displayed.

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Space

Clicking this button will issue the space command as specified by the radio buttons and edit field shown below the button. Each space type is described as follows:

EOD

- This command will space forward on the tape to the logical end of data mark which is written on the media. No other settings are valid with this type of space command.

Forward

- This command allows you to space forware through the tape media by file marks. If End of Media or Blank Check (End of Data) is encountered before a file mark has been spaced over, the command will be aborted and an error message will be displayed.

- Reverse
  - This command spaceds from the current position toward Beginning of Tape (BOT). The user can select either blocks or files, and indicate how many to sequentially space over.

Read Position

The Read Position command will read the current block number from the drive and display it in the Block Address window.

Locate

Enter the block number and position that you want to position the tape to in the Block Address and Partition windows. Then Click the Locate button and the tape will be positioned to this block number.

write filemark

Clicking this button will issue a WRITE FILEMARK command to the tape drive with the NUMBER OF FILEMARKS field set to 1.

write setmark

Clicking this button will issue a WRITE FILEMARK command to the tape drive with the NUMBER OF FILEMARKS field set to 1 and the Wsmk bit set to 1.

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Note: not all tape drives support this command

flush buffer

Clicking this button will issue a WRITE FILEMARK command to the tape drive wit the NUMBER OF FILEMARKS field set to 0. This command will cause the drive to flush any data that is in the buffer to the physical tape media.

read block(s)

Data blocks can be read from the tape drive by clicking the Read radio button, then clicking the Execute IO button. The number of blocks read specified in the Repeat Count window.

write block(s)

Data blocks can be written to the tape drive by clicking the Write radio button, then clicking the Execute IO button. The number of blocks written is specified in the Repeat Count window.

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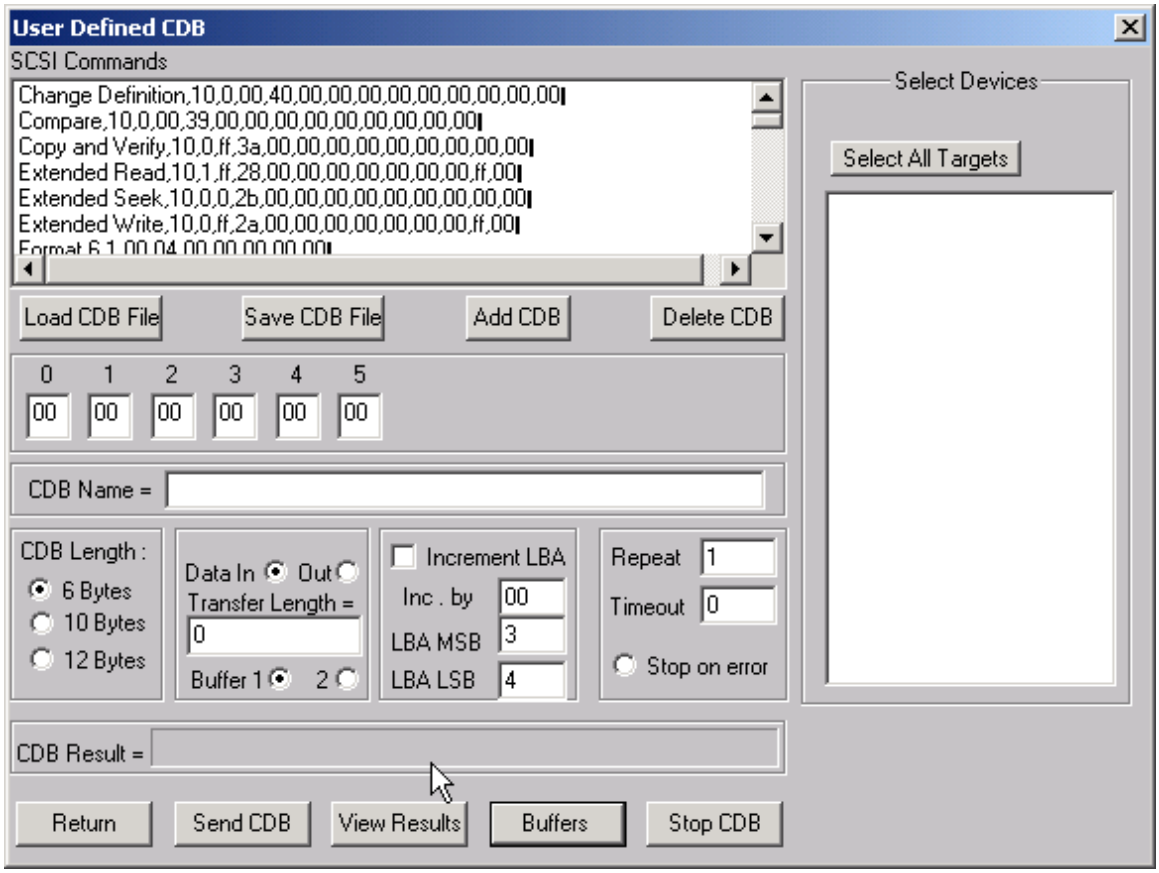
User Defined CDB



The User-Defined CDB functions of the SCSItoolbox allow the operator to construct an type of SCSI CDB and issue that CDB to the currently select SCSI TARGET. Any command created may also be added into a CDB file. Customized files of CDB's can be created and maintained.

Defining or Modifying a SCSI CDB

The following parameters define a SCSI CDB and are accessible/modifiable from the left side of the dialog box:

- Command name
- Individual bytes of the SCSI CDB
- Command length (6,10,12 bytes)
- Data Direction
- Data transfer length
- Data buffer (buffer 1 or 2)
- Command timeout value
- Command repeat count
- Increment information

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Once a SCSI CDB has been defined that command can be issued to the currently selected TARGET, stored to the current CDB list file, or added to the script window.

Important Issues

It is possible to create an incorrect SCSI CDB! If you are not intending to create an illegal CDB, some common mistakes to watch out for are:

- Data direction incorrect
- Data length specified in CDB does not match Data Transfer Length

Incrementing Issues

It is possible to increment a field within the CDB each time the CDB is issued. This is commonly used to increment the block number specified in the CDB. Set the Increment portion of the dialog as follows to use the feature:

- Check the Increment LBA box
- Specify which CDB byte is the LSB of the SCSI CDB
- Specify which CDB byte is the MSB
- Specify how much you want to increment by

For instance, if you define a 10 byte READ EXTENDED CDB, byte 2 is the LSB and byte 5 is MSB of the Logical Block Address. In this example we will start reading a block 0 by setting CDB bytes 2 through 5 to zero (0). If you define this CDB to read 128 blocks per command (0x80 hex in byte 8 of the CDB) you will set the “increment by” field to 128. By setting the “CDB Repeat Count” field to 100, then clicking the “Send CDB” button, the READ EXTENDED CDB will be issued 100 times, and each time it is issued, 128 blocks of data will be read and the LBA will be incremented by 128.

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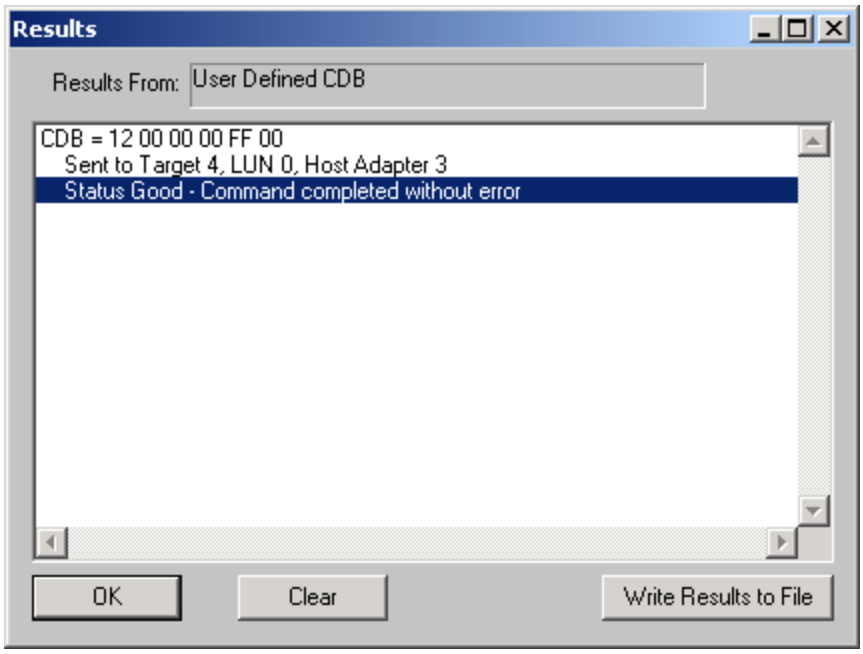
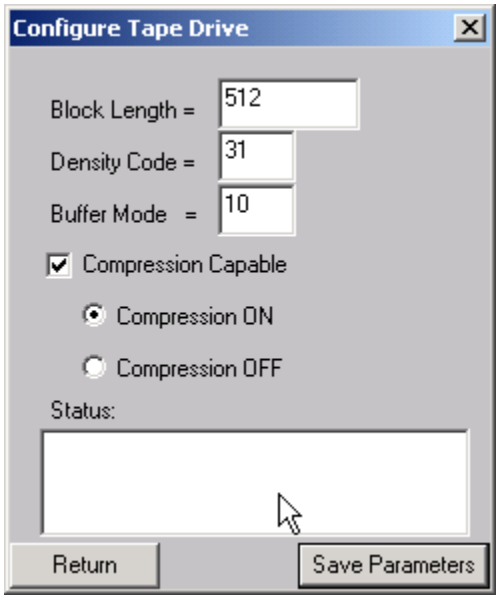


After issuing a User-defined CDB you can click on the Display Results button to view the status of each CDB that has been sent. You can clear this display with the Clear button, or you can save the contents of the display to a disk file.

Configure TapeDrive



This command allows the user to set the standard variable parameters in the MODE SELECT parameter list header and block descriptor. The fields that may be assigned values are:

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Block Length

- Sets the block length field in the block descriptor, used to set block length for fixed block I/O block descriptor bytes 5-7. Setting this value to zero 0 sets the drive to write variable length records.

Density Code

- Some tape drives will read and write different with different data densities and provide values in the block descriptor byte 0 for those different settings.

Buffer Mode

- Assigns the value to parameter list header byte 2 to set buffer mode on or off

If the drive supports compression, the Compression Capable check box will be check and the user can turn compression on or off with the radio button below it.

When the Save Parameters button is clicked the mode select command is issued to the tape drive and the results of that command are displayed in the box at the bottom of the window.

Note: Not all tape drives support all of these settings. The user must be familiar with the drive and have a SCSI manual available to determine support and valid values for these parameters.

Download Firmware

Several types of firmware download options are available as shown below:

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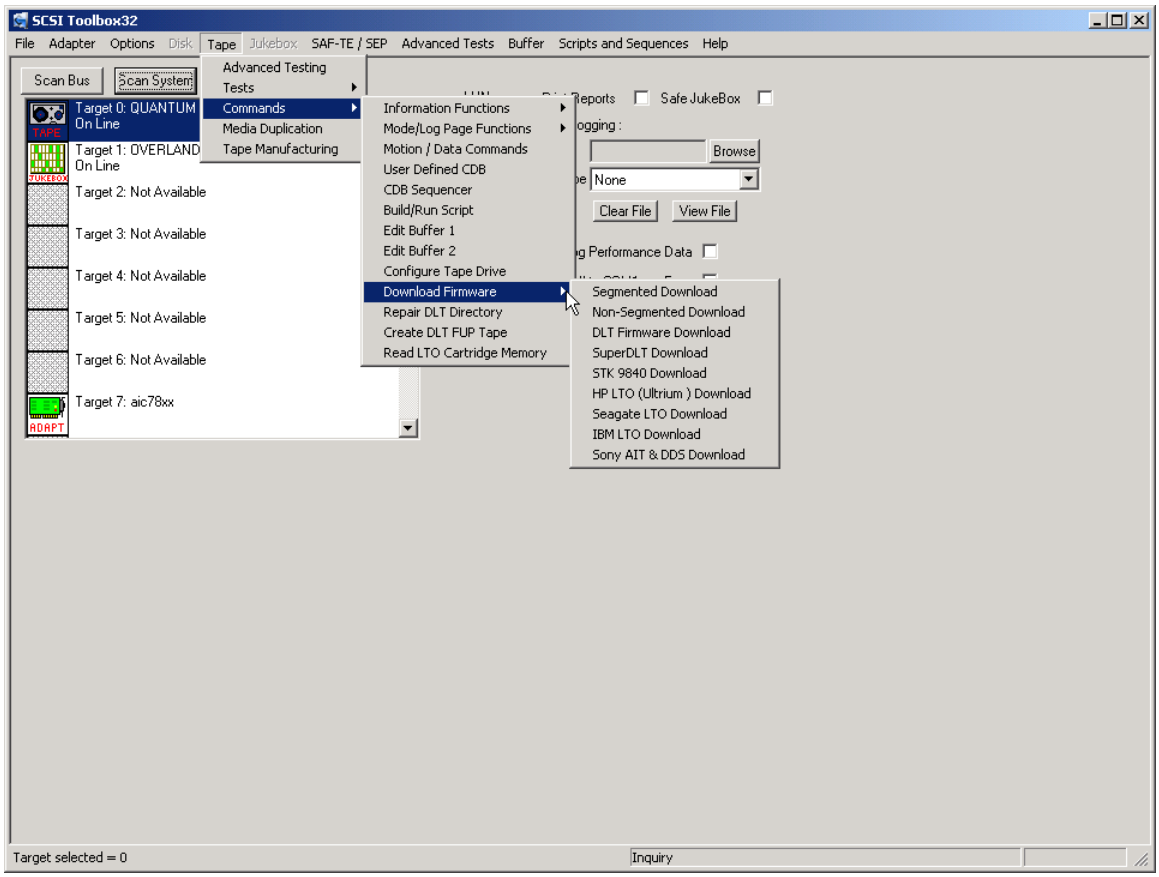

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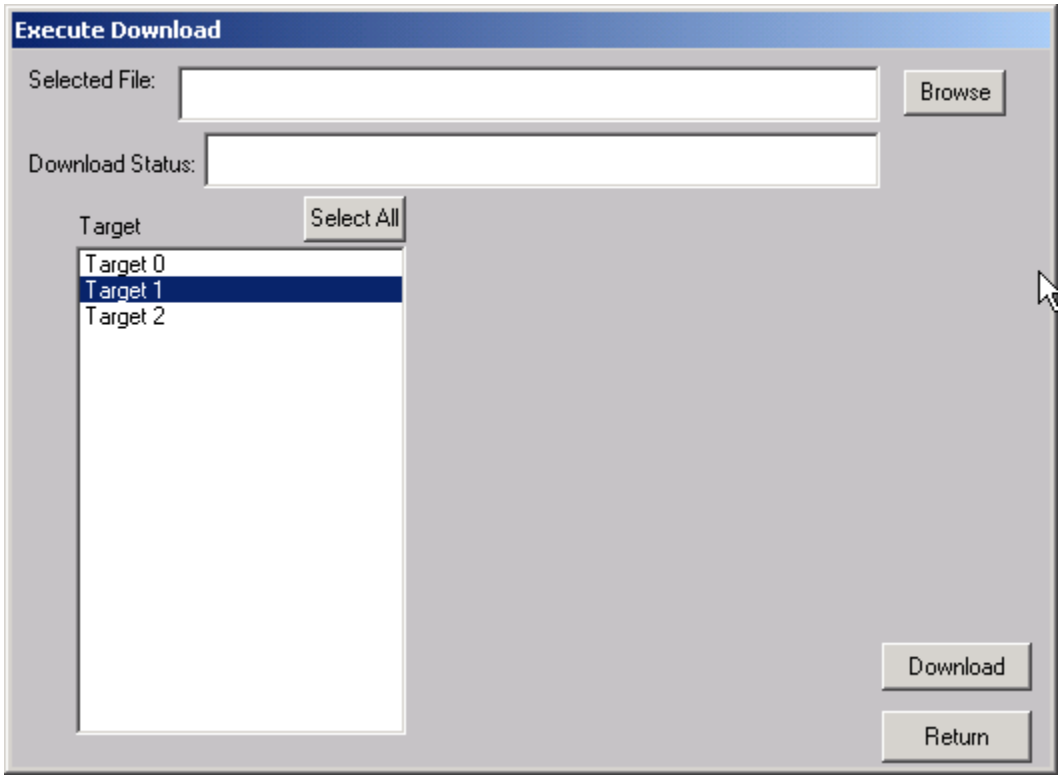
Segmented Download



The Segmented firmware download command will download new firmware into the tape drive using the SCSI WRITE BUFFER command. The firmware will be downloaded in 32K segments. Use the Browse button to select the download file name.

If your tape drive does not support segmented downloads, use the Non-Segmented download command.

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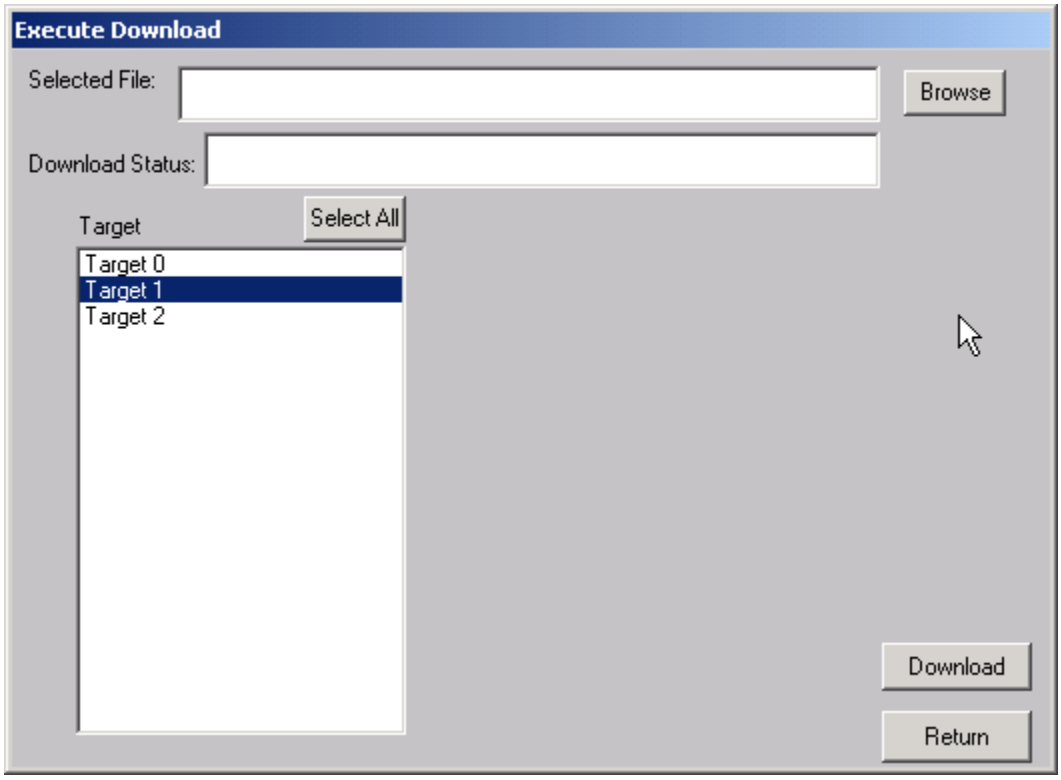
Non-Segmented Download



The Non-Segmented firmware download command will download new firmware into the tape drive using the SCSI WRITE BUFFER command. Use the Browse button to select the file to download into the drive.

If the available buffer space is not large enough to hold the file the download will fail. The "About SCSI toolbox" choice of the "Help" menu displays the available buffer space.

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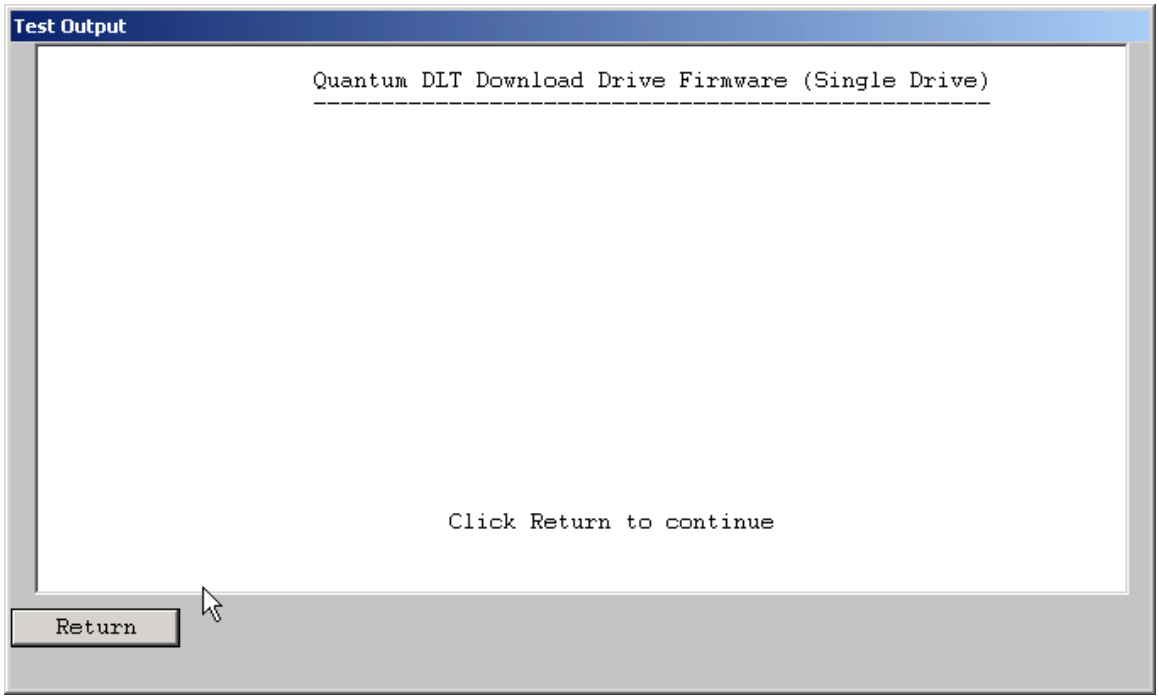
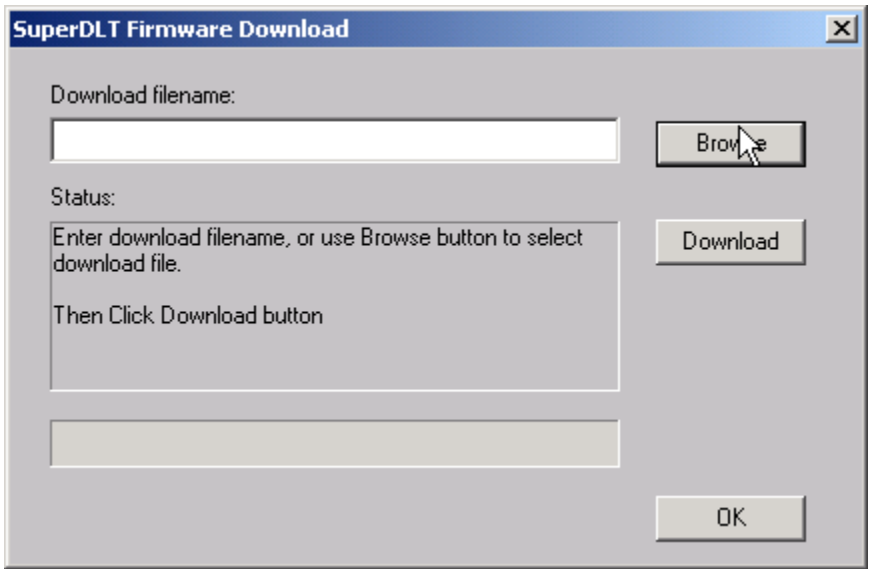
DLT Firmware Download



This command will download new firmware into a DLT or DLT-compatible tape drive.

SuperDLT Download



This command will download new firmware into a SuperDLT drive. Use the Browse button to select the download file, then click the Download button.

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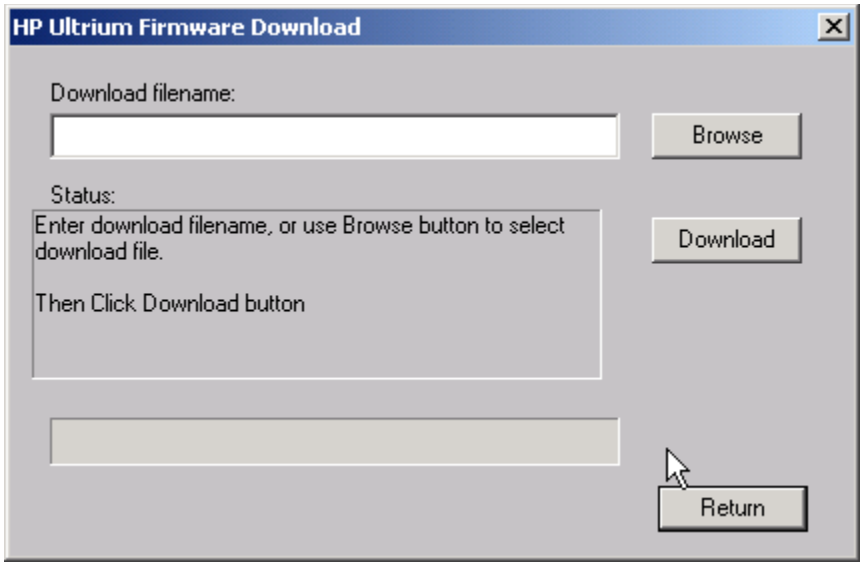
STK 9840 Download

This command will download new firmware into a STK 9840/9940 drive. Use the Browse button to select the download file, then click the Download button.

HP LTO Download



This command will download new firmware into a HP LTO (Ultrium) drive. Use the Browse button to select the download file, then click the Download button.

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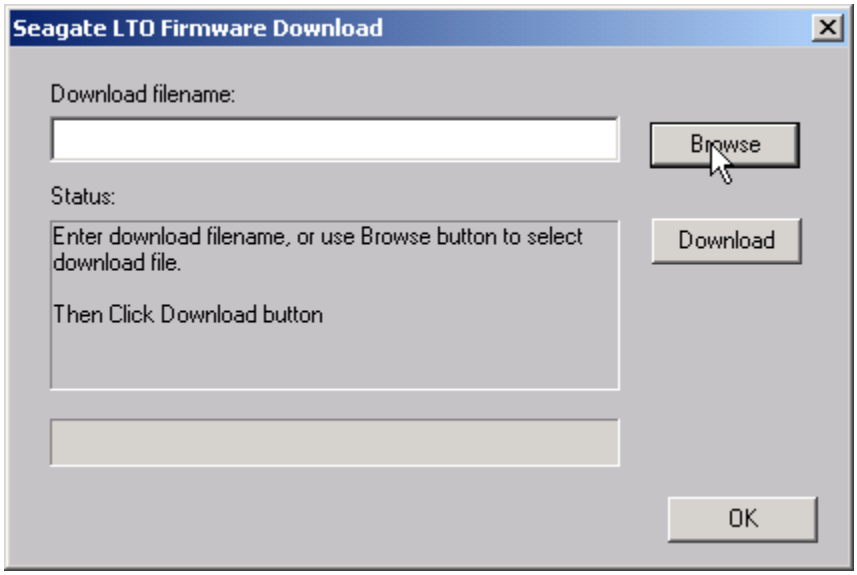
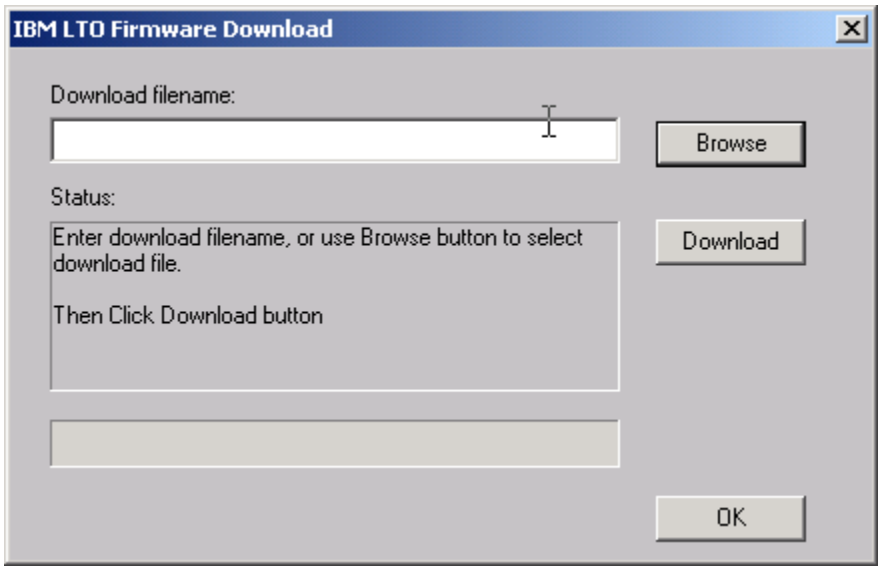
Seagate LTO Download



This command will download new firmware into a Seagate LTO drive. Use the Browse button to select the download file, then click the Download button.

IBM LTO Download



This command will download new firmware into a IBM LTO drive. Use the Browse button to select the download file, then click the Download button.

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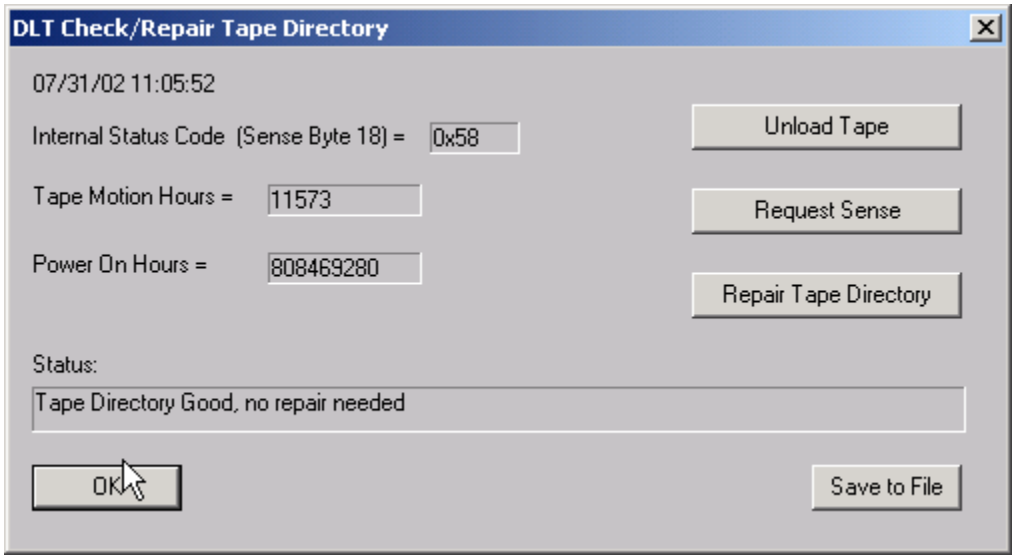
Sony AIT & DDS Download

This command will download new firmware into a Sony AIT and DDS drives. Use the Browse button to select the download file, then click the Download button.

Repair DLT Tape Directory



DLT tapes contain a directory at the beginning of the tape. This directory can become damaged if the tape drive is powered down before the tape has been unloaded. This command will determine the integrity of the DLT directory, and if it is damaged it can repair or re-write the directory.

Note: If the directory needs repair it can take up to several hours for the operation to complete.

Create DLT FUP (Firmware Update) Tape

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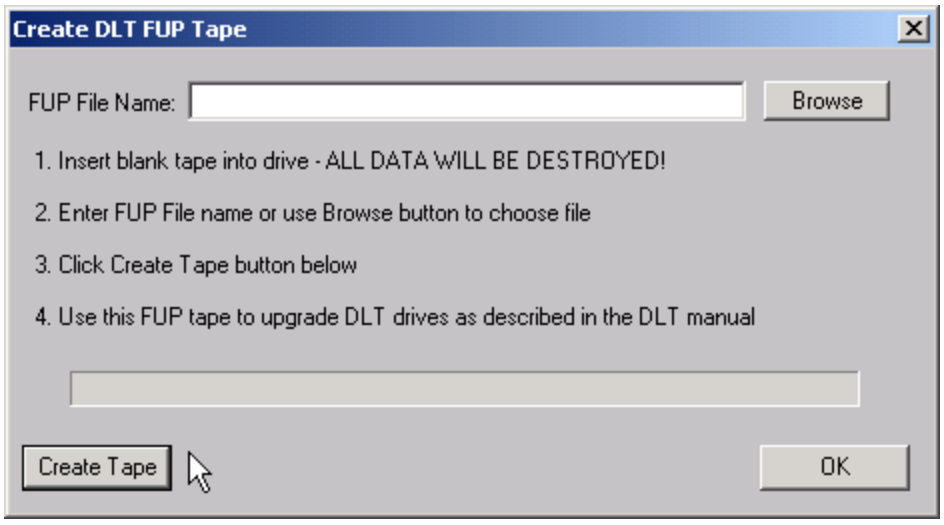
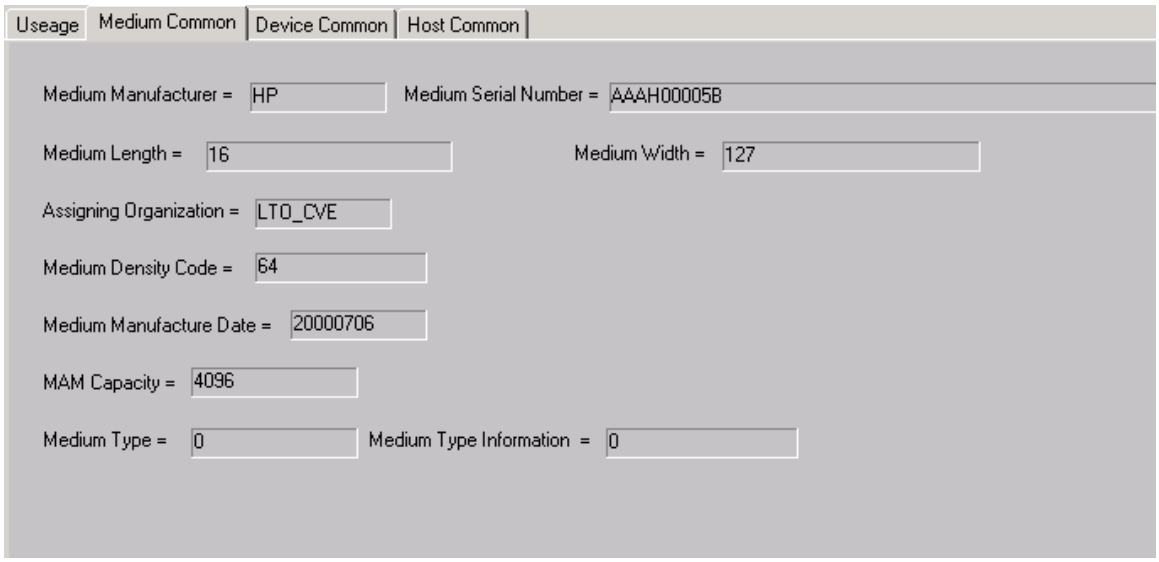


This command allows you to create an update tape from a firmware file. Use the Browse button to specify the firmware file name, then click the Create Tape button. You can then use this update tape to upgrade the firmware in other DLT tape drives.

LTO Cartridge Memory Display

This command allows you to display the cartridge memory stored within LTO tape cartridges.



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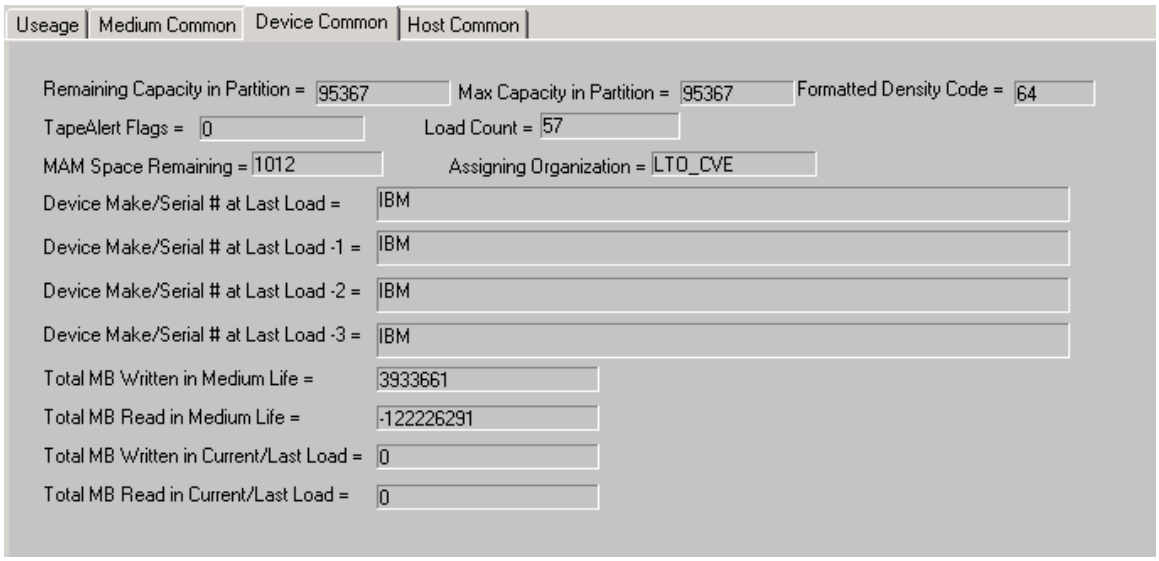
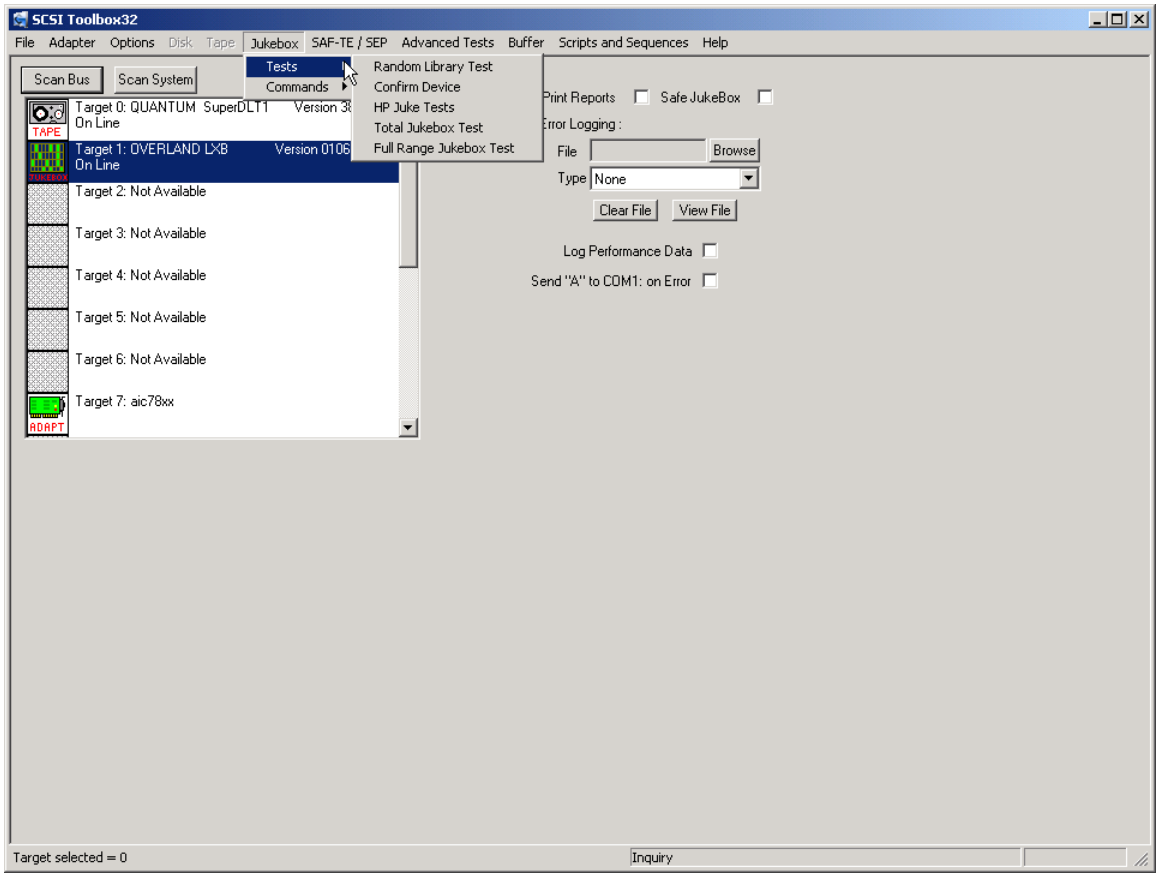


Jukebox Tests

The following tests are available via the Jukebox Test menu:



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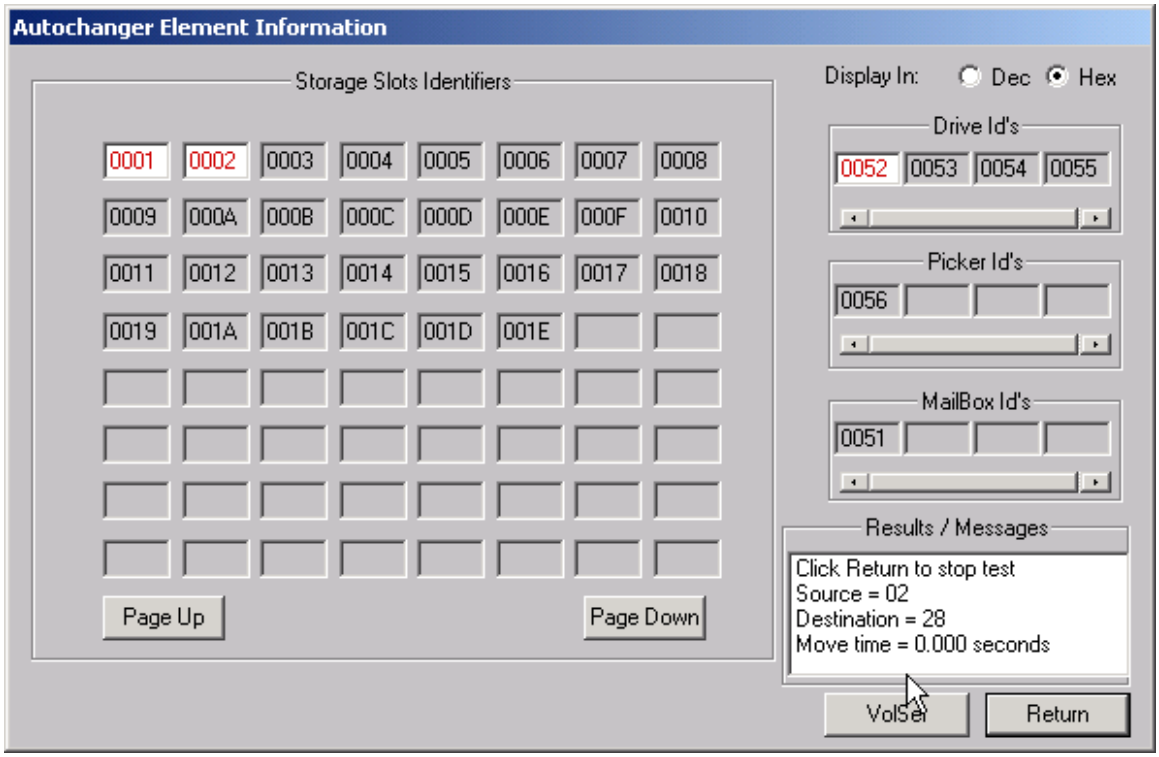
The jukebox module uses a display screen to show the configuration of the jukebox under test. The eight by eight matrix represents the storage elements of the jukebox, allowing the display of up to 64 storage elements at a time. If a storage element it present, it's storage element address is displayed. If a given storage element does not exist on the jukebox under test, that position will be blank. If there is media in a particular storage element, it's address will be displayed in a highlighted color. This allows you to see the addresses of each storage element and see if media is present in any of the storage elements. "PAGE UP" and "PAGE DOWN" buttons are provided to scroll the display across the valid storage element range.

This screen also displays the Media Transport Elements (the jukebox "picker"). The same display conventions are used here. Ther element address of the element will be displayed, and if there is media in the element the address will be displayed in highlighted color. Please note that it is possible to have a jukebox that does not have an Import/Export element. Horizontal scroll bars are provided for devices which have more elements than are displayed at one time.

Data Transfer Elements (the drives in the jukebox) are displayed in the same manner. Please note that the drive element address is not necessarily the same as the drive SCSI address.

This display is seen when using the Initialize Element Status, Read Element Status, Position to Element, and Move Media commands.

Random Library Test



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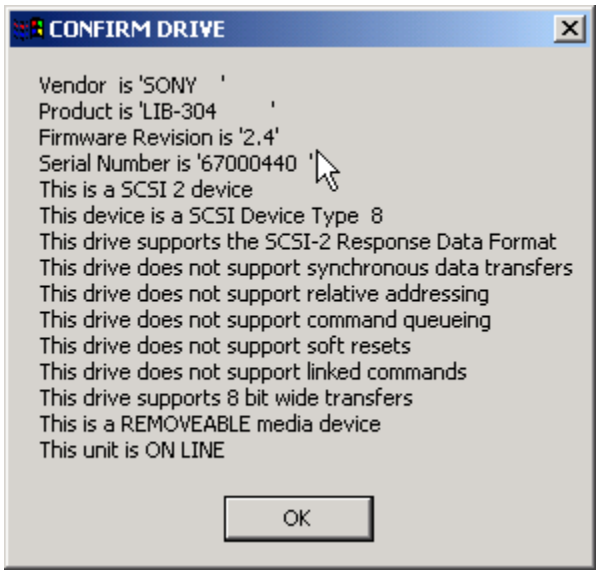
This test will move a piece of media randomly between the jukebox storage elements. It requires at least one empty storage element, and at least one storage element with media in it. As the test runs, it will randomly choose a full storage element and randomly choose an empty storage element. Then it will execute a MOVE MEDIUM command from the full element to the empty element. The Source and Destination storage elements will be displayed at the bottom of the screen. This test will run until interrupted.

Confirm Device



This choice will display pertinent SCSI information about the jukebox, such as firmware revisions, etc.

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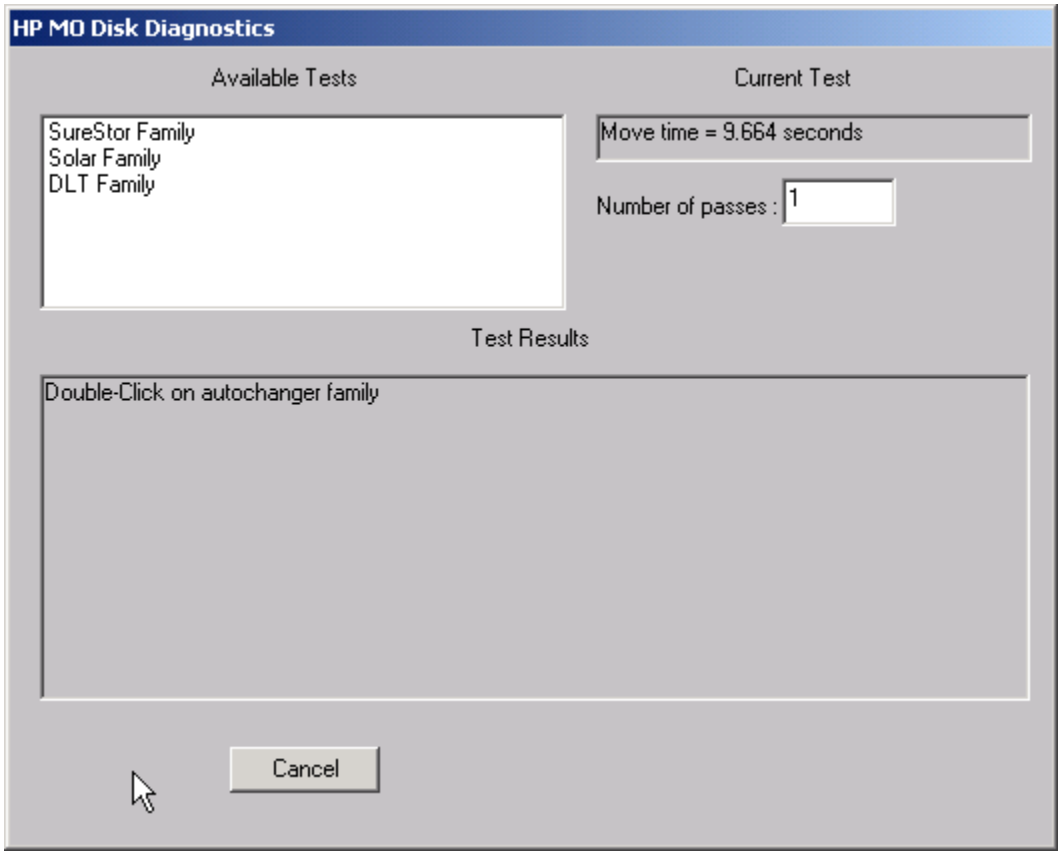
HP Juke Tests



SureStore Family Tests

Solar Family Tests

Choosing one of these selections will display a menu of choices similar to the dosdass2 diagnostic menu. Within this menu, a diagnostic may be specified and the number of test passes may be specified.

This menu will vary depending upon which HP autochanger is being tested. As the tests run, the current loop count is displayed and decrimented as each pass completes.

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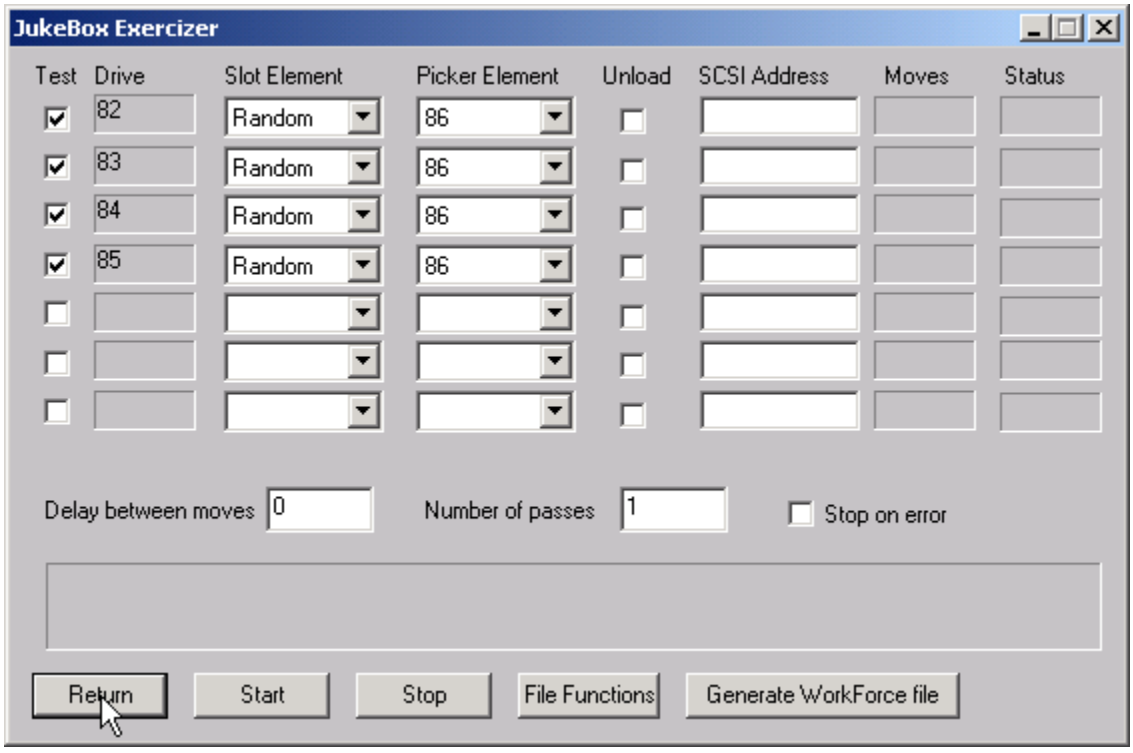
Total Jukebox Test



The Total Jukebox test is designed to stress moving media between storage elements and drives. This is the most common failure point in jukeboxes.

The element address of the drive is shown on the right. Click the “TEST” box to select each drive to test. Use the Slot Element and Picker Element choices to determine where the tape will be moved FROM.

Check the Unload box if the tape drive needs an implicit unload command sent to it before executing a move from the drive. In this case, specify the SCSI address of the tape drive in the SCSI address field. If your jukebox can execute a move from a loaded tape drive without needing an explicit unload leave the Unload box unchecked.

You may specify an amount of time to delay between moves with the Delay between moves field. Some jukeboxes require some “settling time” between moves.

Specify the number of moves in the Number of Passes field.

Click the Start box to begin the test.

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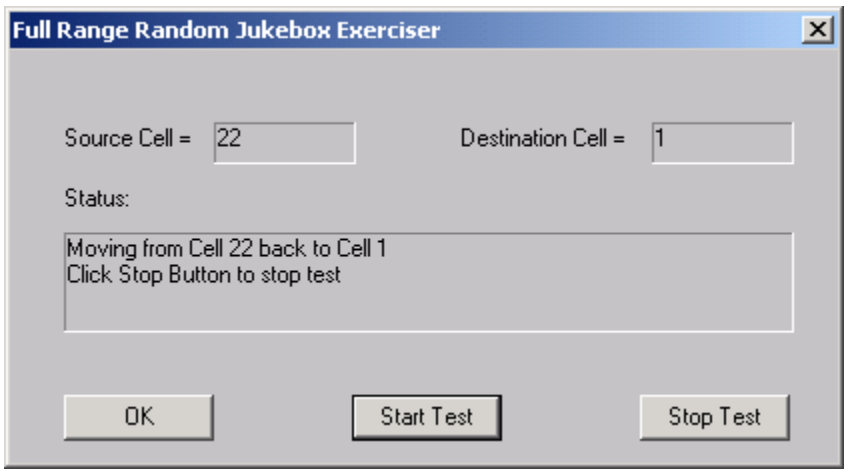
JukeBox Full Range Test

This test will include moves from any location within the jukebox



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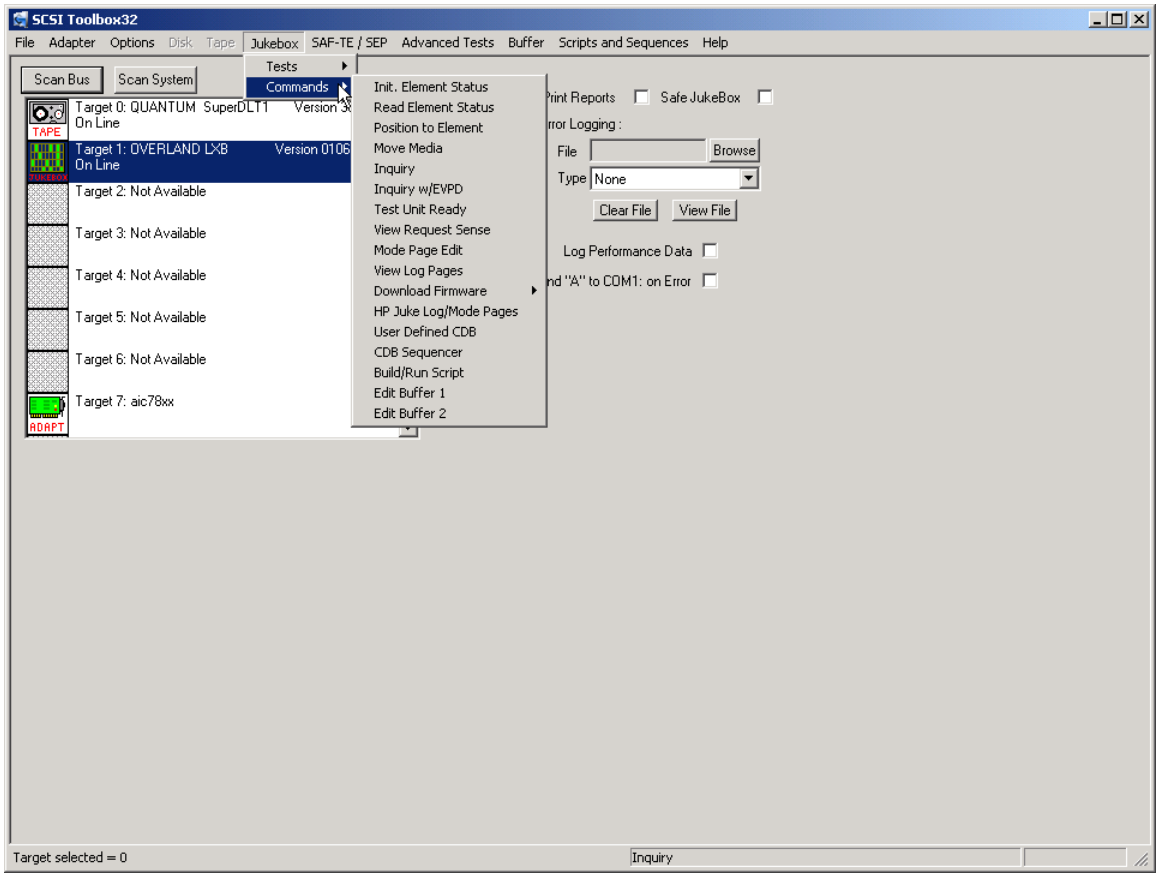
Jukebox Commands

The following commands are available via the Jukebox Commands menu:



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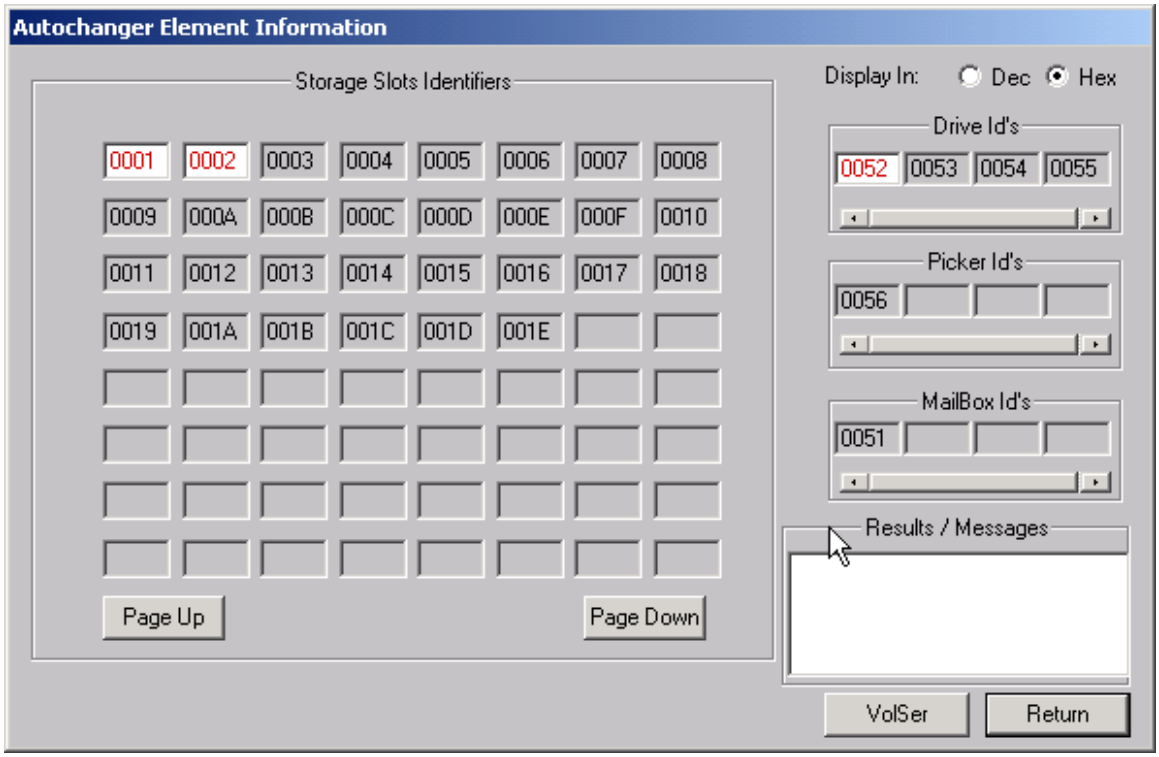
Initialize Element Status



This command issues a SCSI INITIALIZE ELEMENT STATUS command to the jukebox. This command causes the jukebox to check its configuration and determine the full or empty status of all of its elements. It is good practice to ALWAYS run this command before running any other commands or tests.

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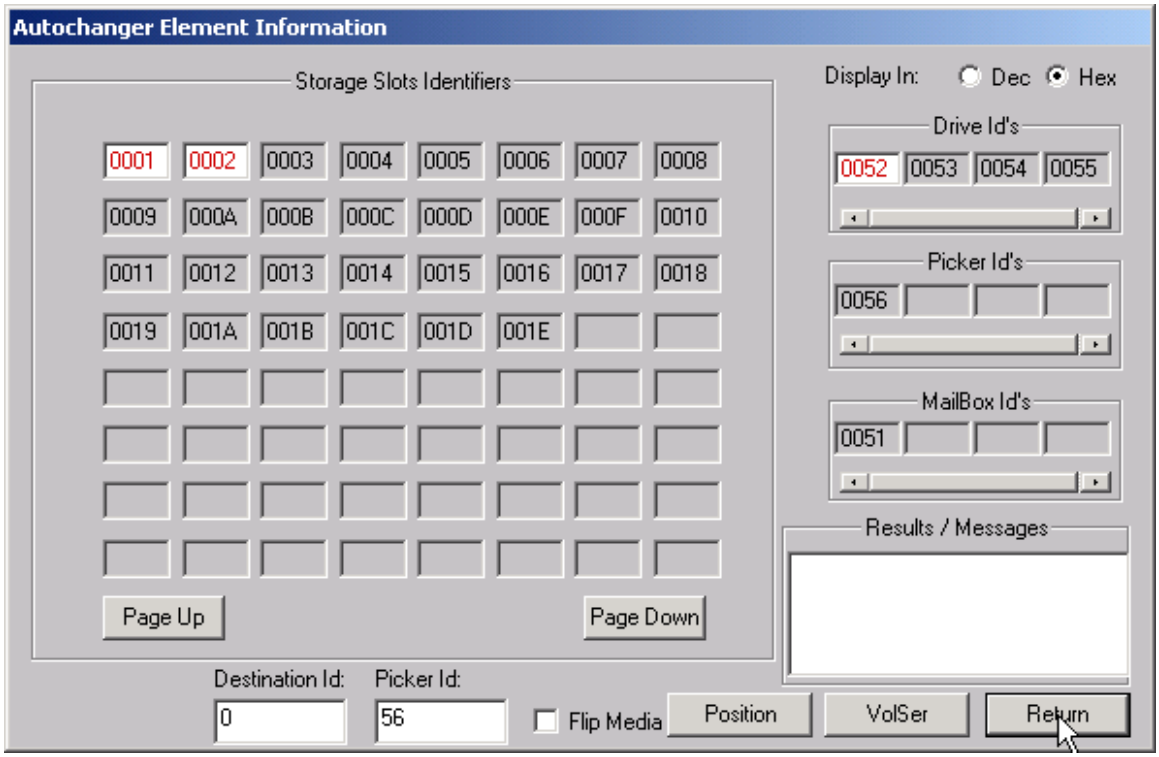
Read Element Status



This command will show the status of each of the jukebox elements, as described at the beginning of this chapter.

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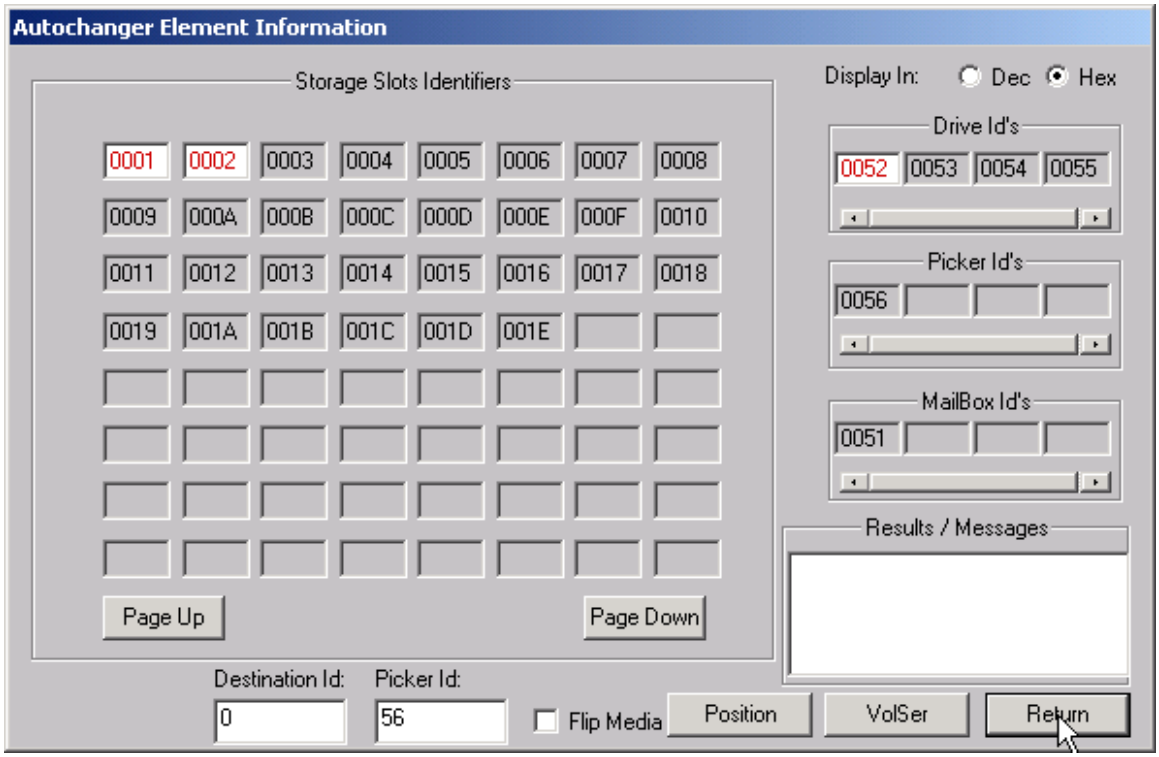
Position to Element



This command will allow you to position a transport element at a destination element. Assuming valid addresses, the transport element will be positioned to the destination element address.

Note: Not all jukeboxes support this command.

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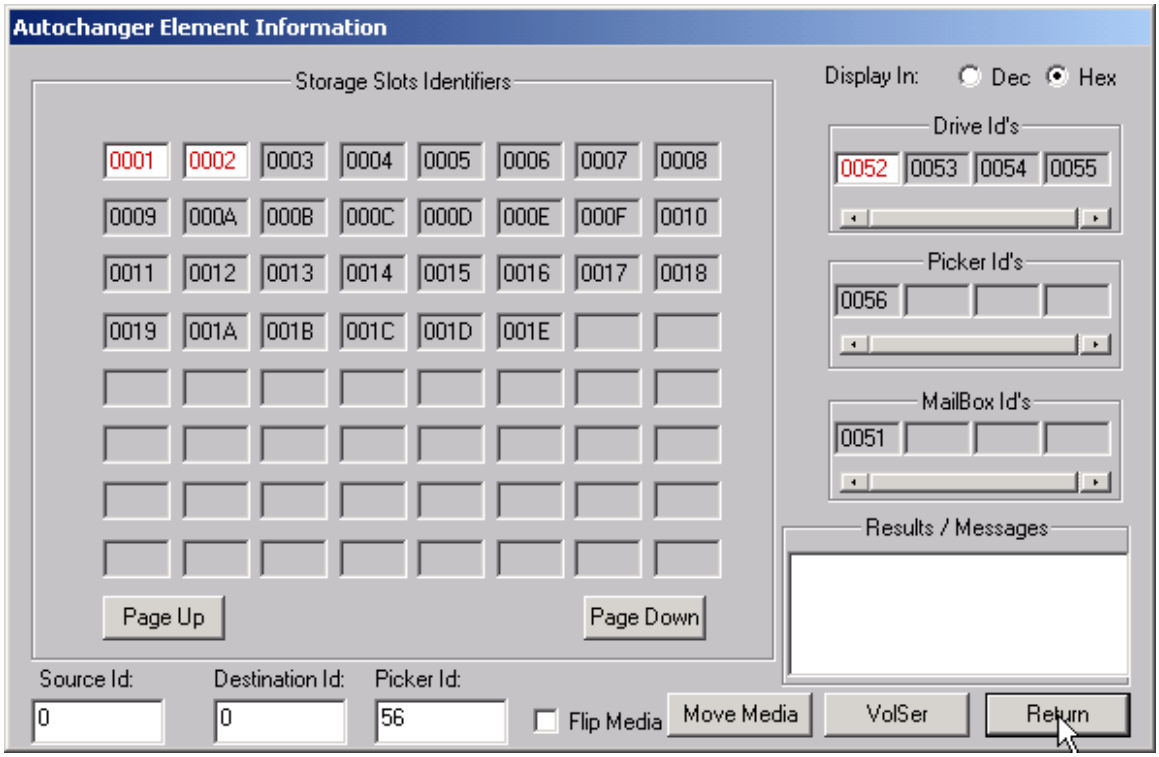
Move Media



This command will prompt you to enter the source, destination, and transport address, and then will attempt to move the piece of media from the source element address to the destination element address via the transport element address. This assumes the following:

1. You entered a valid source, destination, and transport address (in hexadecimal or decimal, depending on the “Display In” setting).
2. The source element you entered contains media.
3. The destination element you entered is empty.
4. The transport element is empty. If any of the above conditions are not met, the command will fail, probably with an ILLEGAL REQUEST error. You can use the View Most Recent Sense command in the Command MENU to examine the request sense data in case of an error.

You may also use the drag and drop method to pick up a source and drag to a destination. When you drop on the destination the values will be filled in on the edit boxes. Simply confirm that the desired transport address is selected and press the move button to execute the move.

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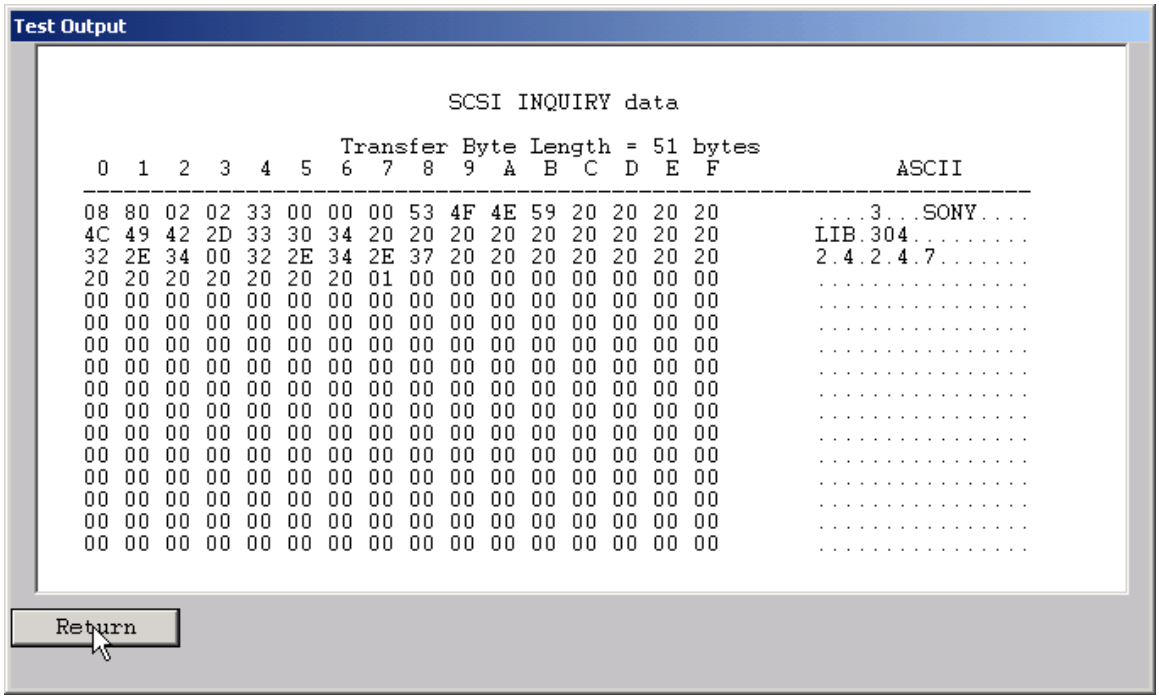
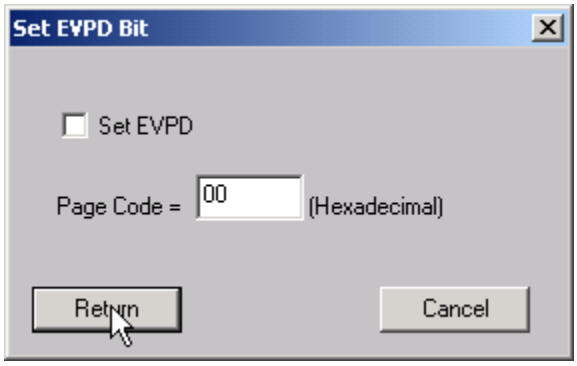
Inquiry



This command displays the data returned from the SCSI INQUIRY command. The data is shown in hexadecimal format on the left of the screen, and in ASCII format on the right side of the screen.

Inquiry with EVPD



This command allows you to specify setting the EVPD bit and Page Code for the INQUIRY command.

Test Unit Ready

This command displays the return value from a SCSI Test Unit Ready

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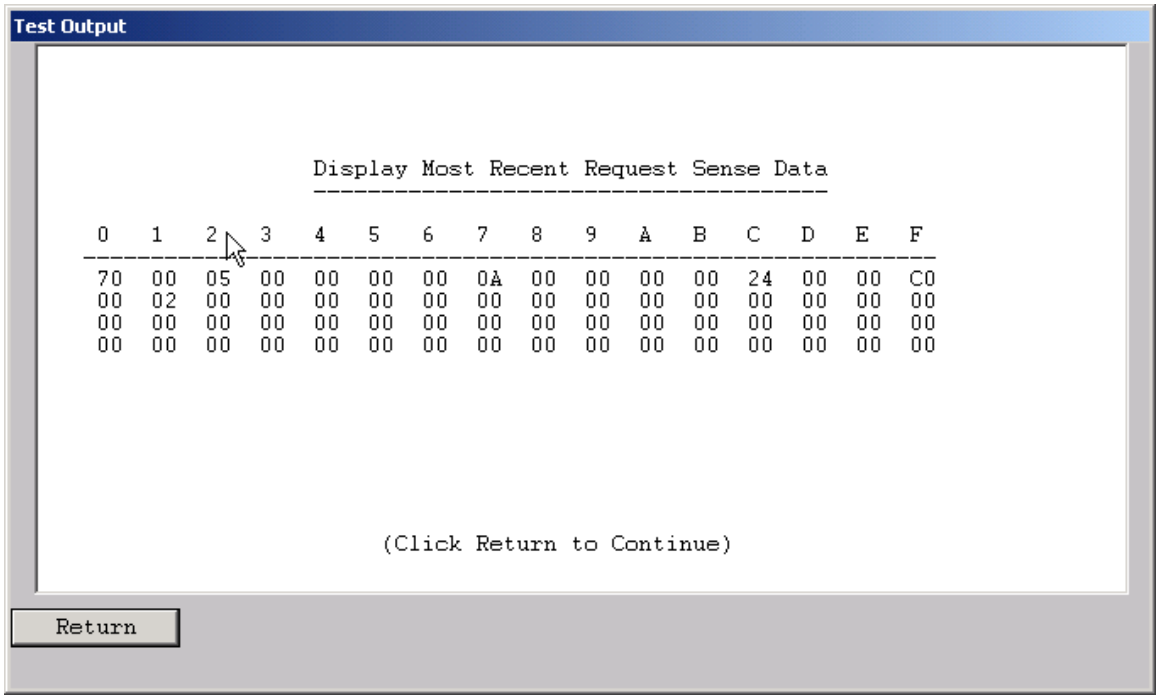
command. A value of zero indicates a successful Command Complete.

View Request Sense



This command will display the most recent request sense data.

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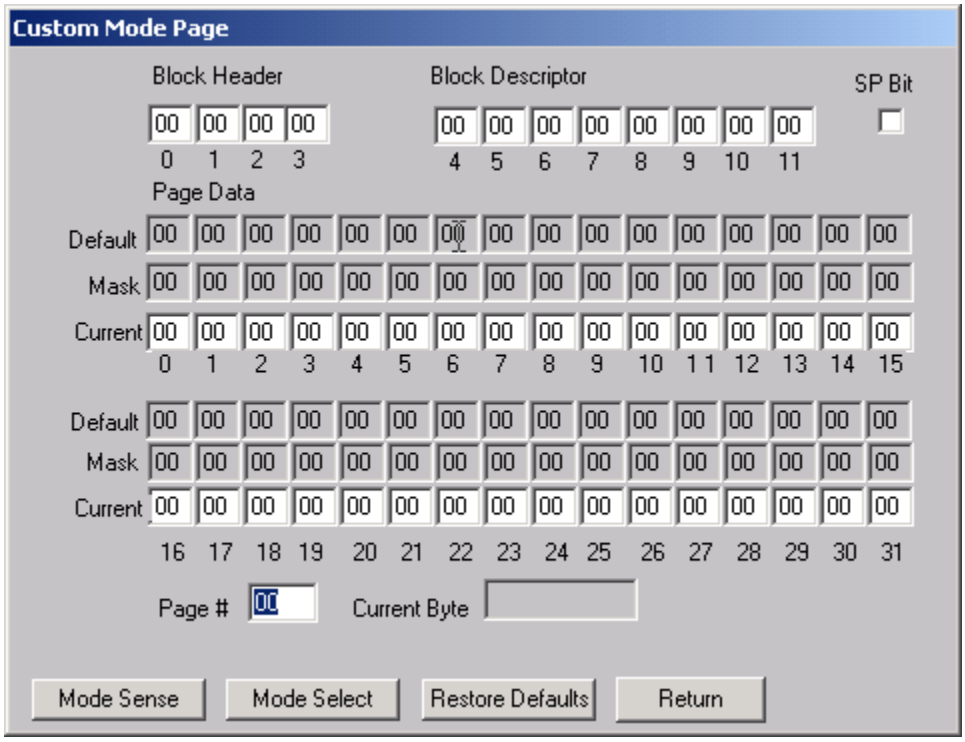
Mode Page Edit



This command allows you to select one of several standard mode pages and view and or change the values by their acromymns. For example selecting the Error Recovery page you can view the setting for the PER bit and change it.

This is a "Hex Edit" selection which displays a dialog box with which you can select the mode page number, and issue a mode sense for that page. The data is then displayed as a series of hexadecimal byte values with the changeable mask value for that byte. You may then edit any byte to specify a new value then issue a mode select to store the new values to the device.

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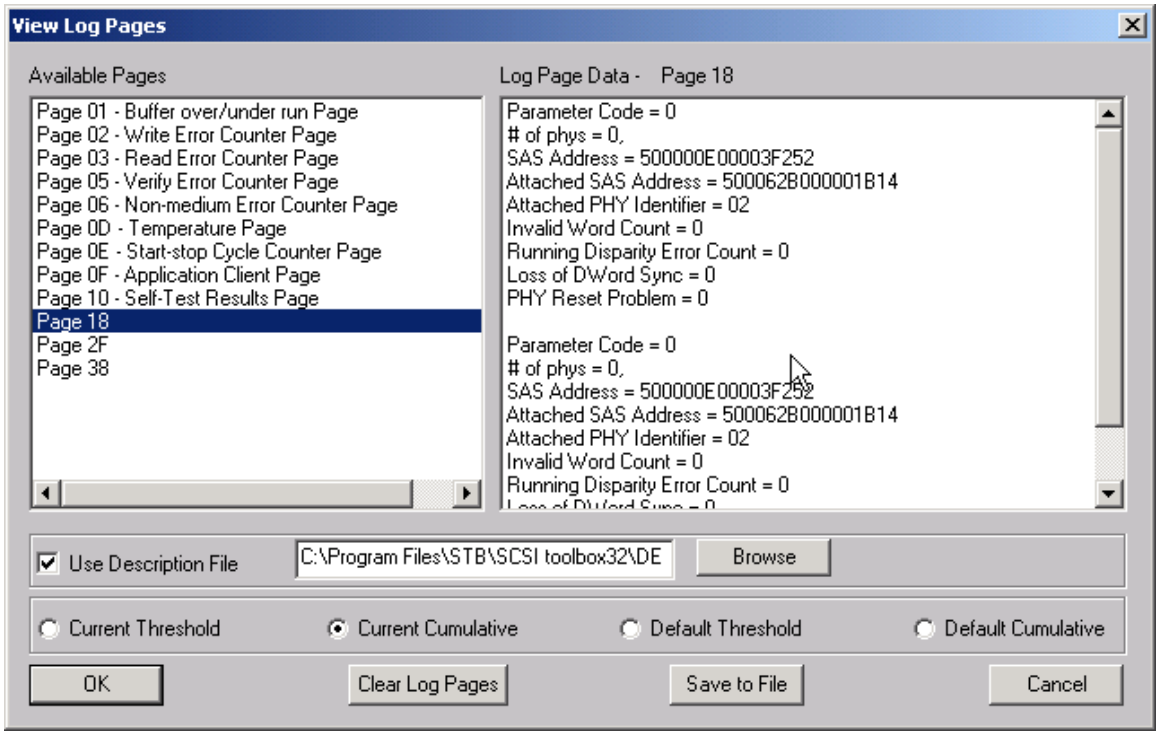
View Log Pages



This command allows you to select the display of either standard mode pages or standard log pages, you can then select from the list of pages and the data will be retrieved from the drive and interpreted into English.

Download Firmware

Several types of firmware download methods are available as shown below:

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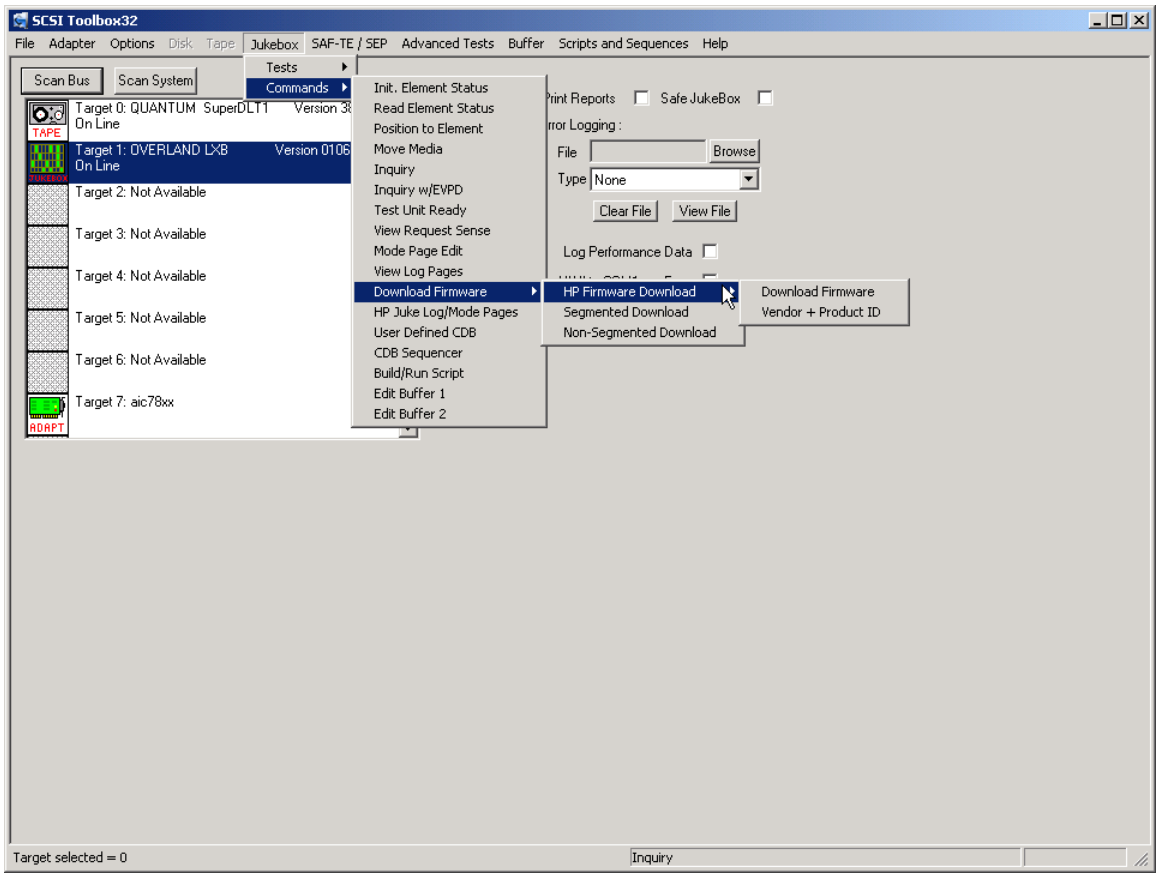

HP Firmware Download

Download Firmware

This command duplicates the functionality of hp-dload.exe. The user is prompted to specify the first download filename. The program then reads that file sends it to the drive then increments the extension by 1 and looks for a file which matches. If it finds a matching file it sends that file to the drive. This process will continue until the file is not found. This allows you to download a standard set of file with names like: File.001 File.002, ... File.008.

Download Vendor & Product ID

This selection is used to download both firmware and Vendor ID and Product ID data to the autochanger. The operator will be asked to specify the filename of the download file, then the

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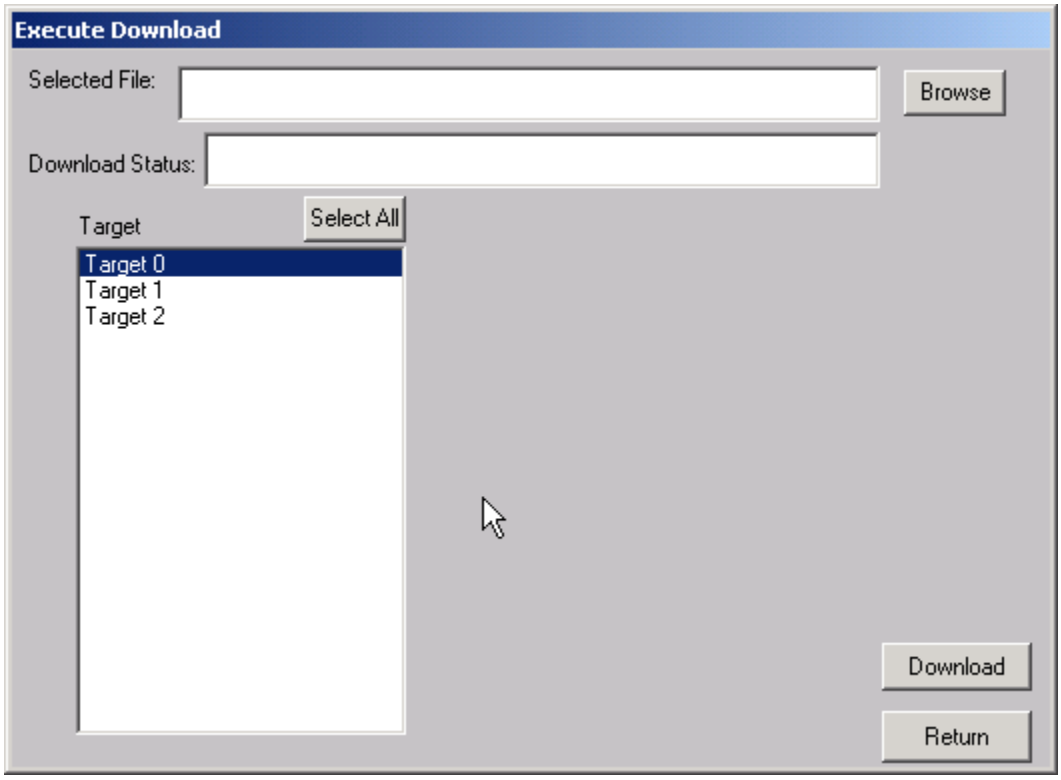
download will be executed. The file names conform to the HP standard (i.e., a:\ac_base\dnld_001).

Segmented Download



The Segmented firmware download command will download new firmware into the jukebox using the SCSI WRITE BUFFER command. The firmware will be downloaded in 32K segments. Use the Browse button to select the download file name.

If your jukebox does not support segmented downloads, use the Non-Segmented download command.

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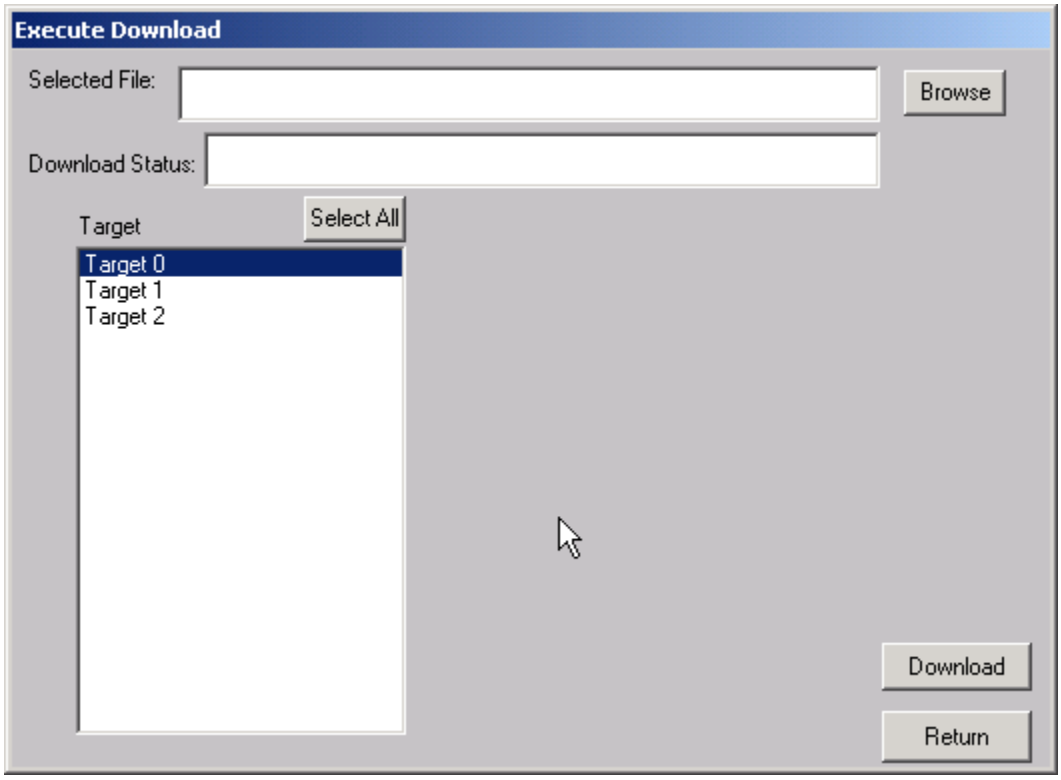
Non-Segmented Download



The Non-Segmented firmware download command will download new firmware into the jukebox using the SCSI WRITE BUFFER command. Use the Browse button to select the file to download into the drive.

If the available buffer space is not large enough to hold the file the download will fail. The "About SCSI toolbox" choice of the "Help" menu displays the available buffer space.

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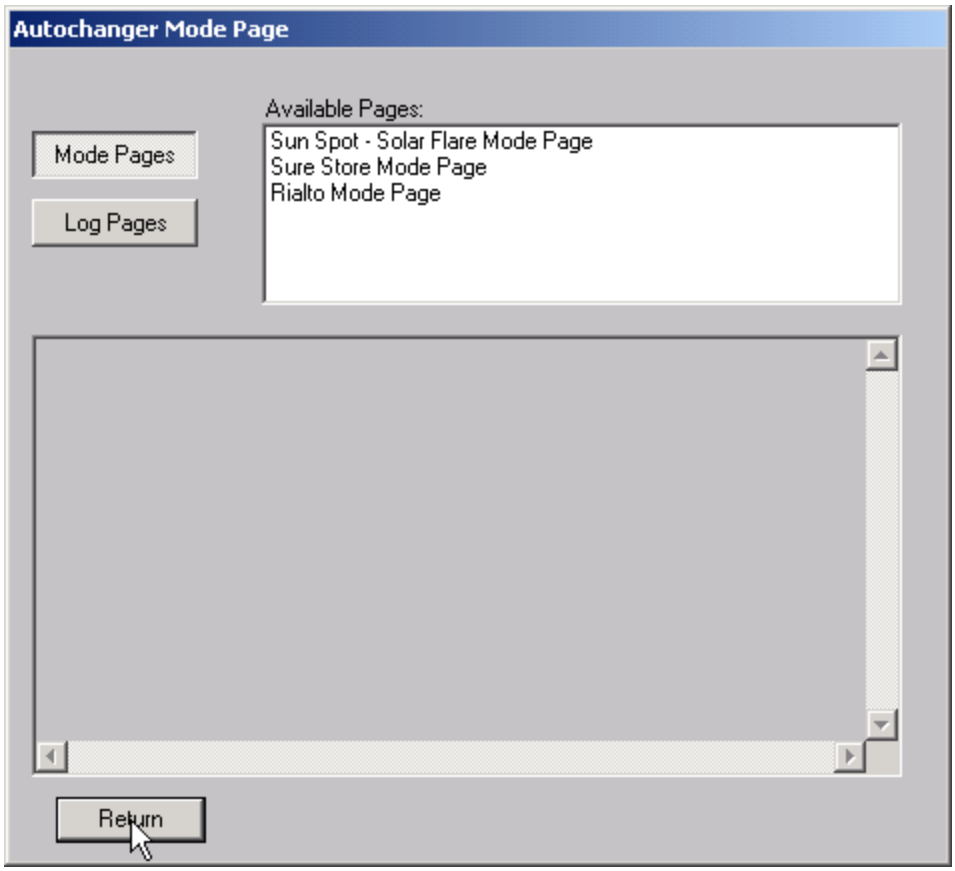
HP Jukebox Mode Pages



This command allows you to select the display of either standard mode pages or standard log pages, you can then select from the list of pages and the data will be retrieved from the drive and interpreted into English.

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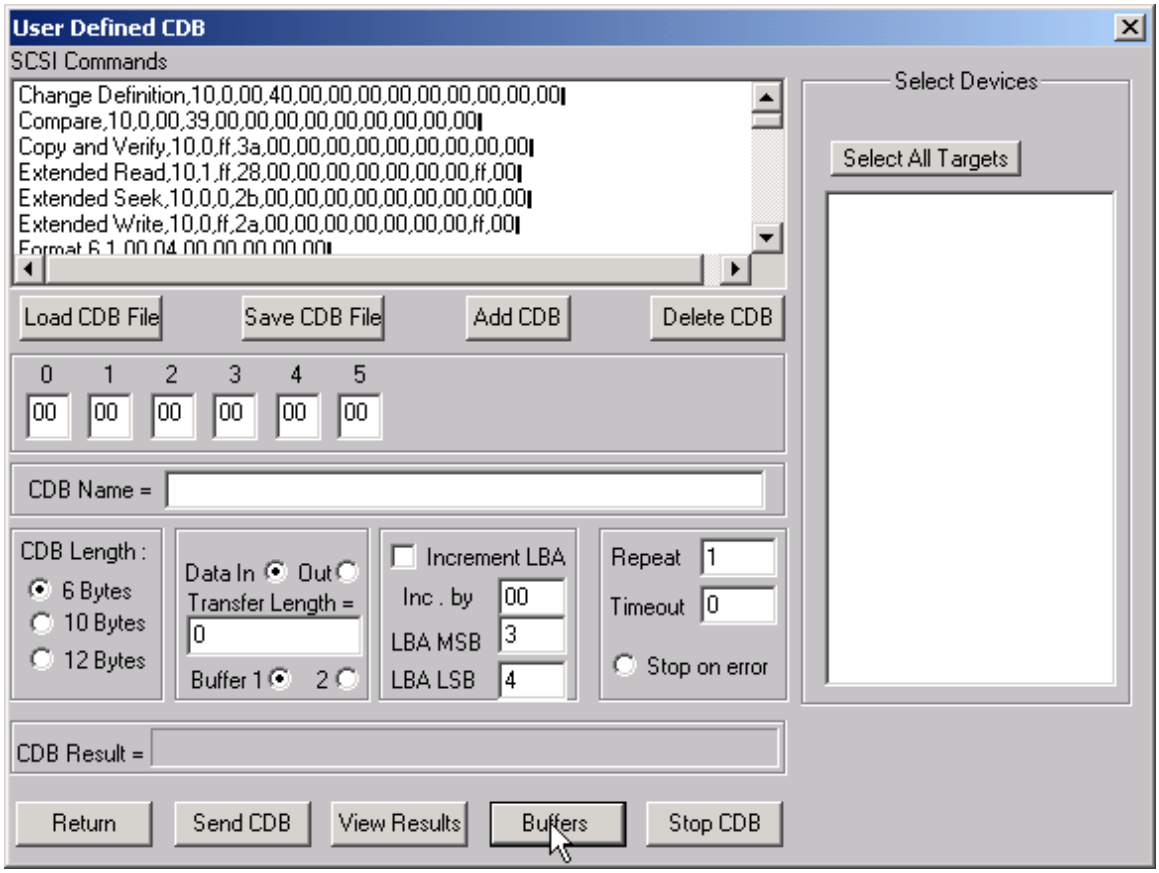
User Defined CDB



The User-Defined CDB functions of the SCSItoolbox allow the operator to construct an type of SCSI CDB and issue that CDB to the currently select SCSI TARGET. Any command created may also be added into a CDB file. Customized files of CDB's can be created and maintained.

Definining or Modifying a SCSI CDB

The following parameters define a SCSI CDB and are accessible/modifiable from the left side of the dialog box:

- Command name
- Individual bytes of the SCSI CDB
- Command length (6,10,12 bytes)
- Data Direction
- Data transfer length
- Data buffer (buffer 1 or 2)
- Command timeout value
- Command repeat count
- Increment information

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Once a SCSI CDB has been defined that command can be issued to the currently selected TARGET, stored to the current CDB list file, or added to the script window.

Important Issues

It is possible to create an incorrect SCSI CDB! If you are not intending to create an illegal CDB, some common mistakes to watch out for are:

- Data direction incorrect
- Data length specified in CDB does not match Data Transfer Length

Incrementing Issues

It is possible to increment a field within the CDB each time the CDB is issued. This is commonly used to increment the block number specified in the CDB. Set the Increment portion of the dialog as follows to use the feature:

- Check the Increment LBA box
- Specify which CDB byte is the LSB of the SCSI CDB
- Specify whick CDB byte is the MSB
- Specify how much you want to increment by

For instance, if you define a 10 byte READ EXTENDED CDB, byte 2 is the LSB and byte 5 is MSB of the Logical Block Address. In this example we will start reading a block 0 by setting CDB bytes 2 through 5 to zero (0). If you define this CDB to read 128 blocks per command (0x80 hex in byte 8 of the CDB) you will set the “increment by” field to 128. By setting the “CDB Repeat Count” field to 100, then clicking the “Send CDB” button, the READ EXTENDED CDB will be issued 100 times, and each time it is issued, 128 blocks of data will be read and the LBA will be incremented by 128.

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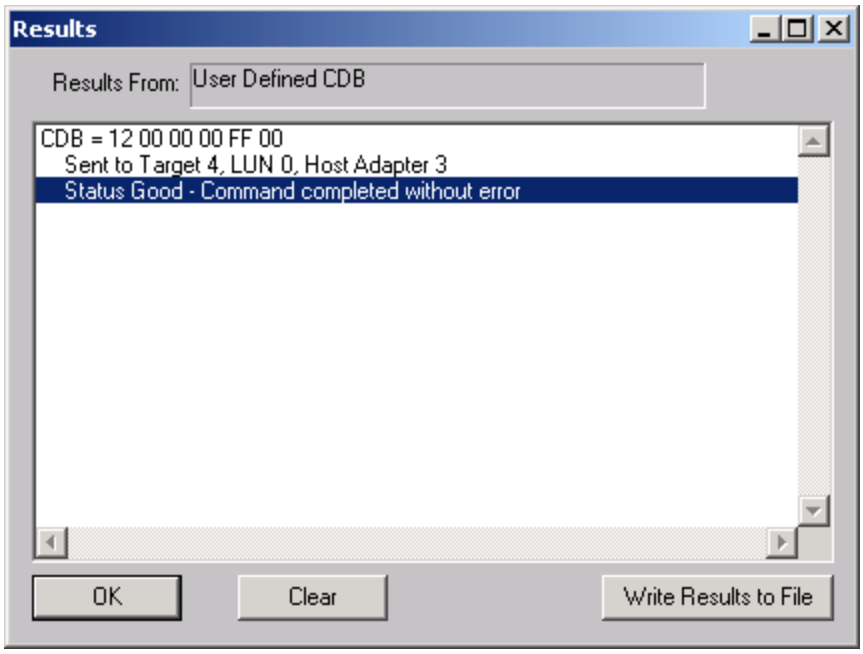

After issuing a User-defined CDB you can click on the Display Results button to view the status of each CDB that has been sent. You can clear this display with the Clear button, or you can save the contents of the display to a disk file.

Bus Reset Control

The Bus Reset control is accessed by the top menu “Bus Reset Choice” as shown here:

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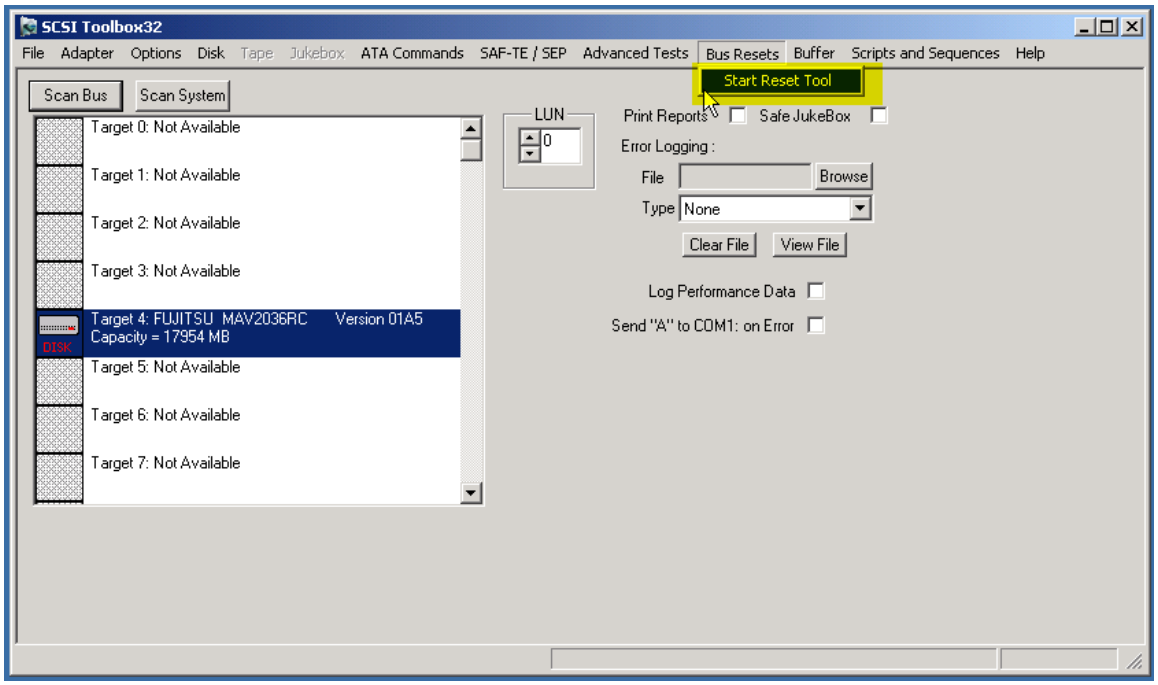

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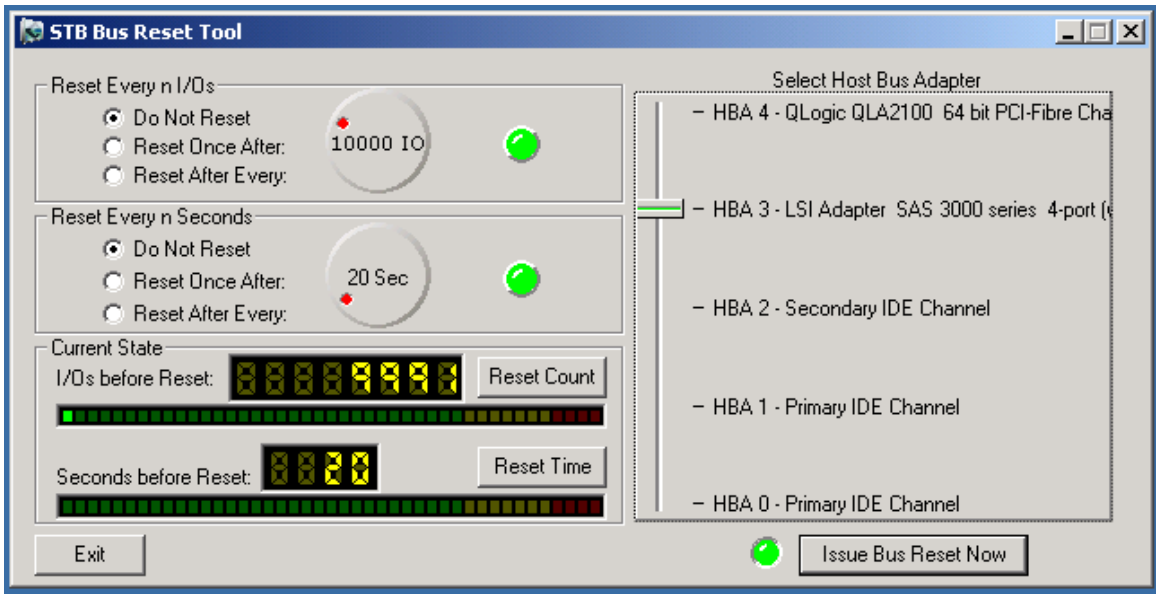
The Bus Reset Control:



As shown above, you may select any bus that is displayed in the right side "Select Host Bus Adapter" switch section. Simply drag the vertical switch control to the HBA that you wish to work with. The default switch setting will be the HBA that is currently selected in STB.

Manual Reset

Clicking on the "Issue Bus Reset Now" button immediately causes a hard bus reset on the selected HBA.

Reset by Time

Use the "Reset Every n IOs section of the tool to automatically issue bus resets after n IOs have been generated by STB. Change the number of seconds between resets by rotating the seconds knob control.

Use the radio buttons to the left of the rotary seconds control to select reset behavior.

The default setting "Do Not Reset" does nothing when the timer ends.

The "Reset Once After:" selection will issue one and only one reset when the timer expires.

The "Reset After Every:" selection will issue a reset each time the timer expires.

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Reset by I/Os

Use the “Reset Every n IOs section of the tool to automatically issue bus resets after n IOs have occurred. Change the number of IOs between resets by rotating the IO knob control.

Use the radio buttons to the left of the rotary IOs control to select reset behavior.

The default setting “Do Not Reset” does not issue a reset.

The “Reset Once After:” selection will issue one and only one reset after n IOs.

The “Reset After Every:” selection will issue a reset each time n IOs have occurred.

Bus Analyzer Module - BAM

Note: There is a separate manual for BAM in your Documentation folder.

Description of BAM

BAM is a software bus analyzer that can capture, display, and analyze trace data from any peripheral bus, including SCSI, Fibre Channel, IDE, ATA, SATA, and SAS.
BAM offers complete versatility as far as choice of phases that are captured and displayed, capture modes to minimize I/O impact, buffer size and capture size, and device(s) to capture trace data from.

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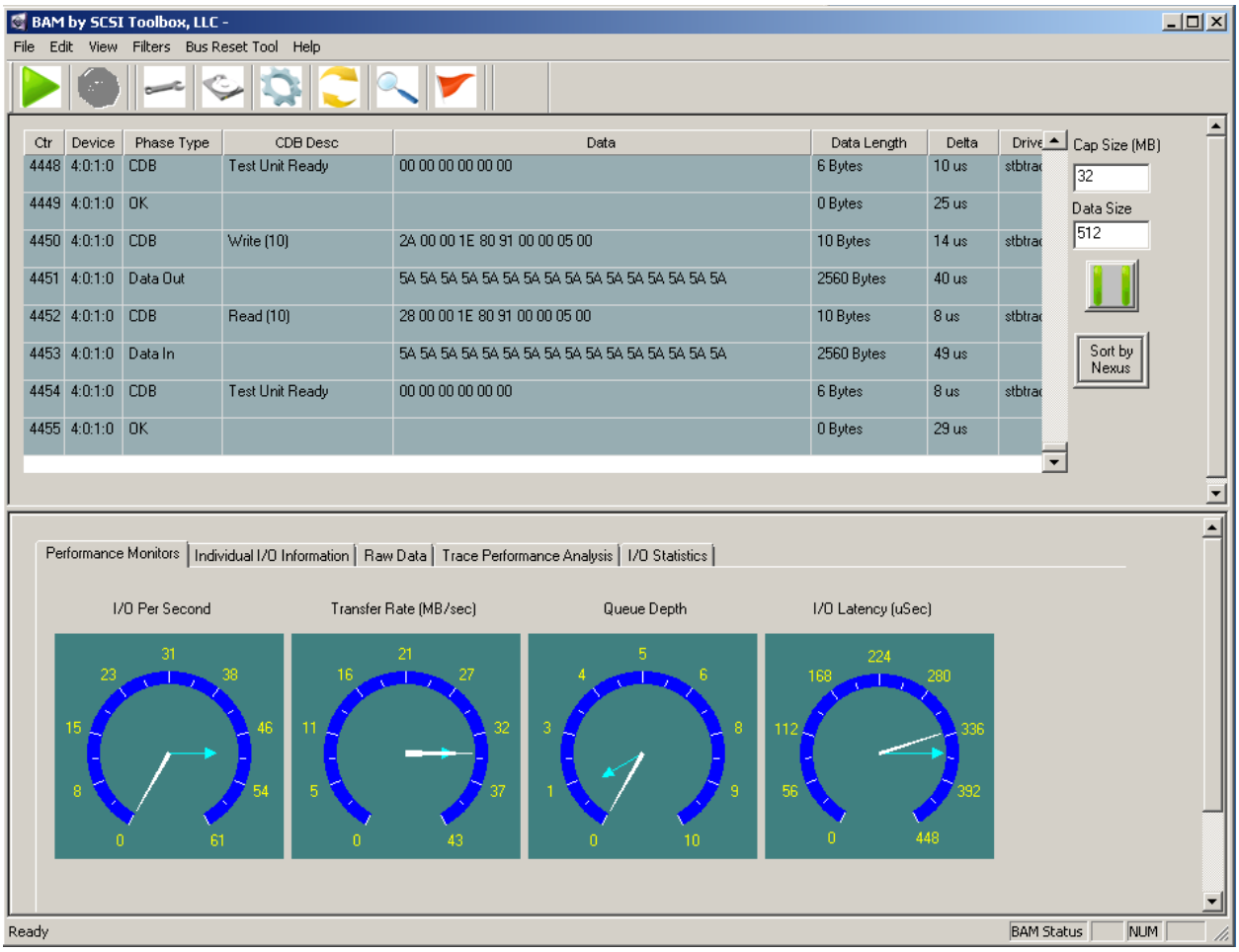

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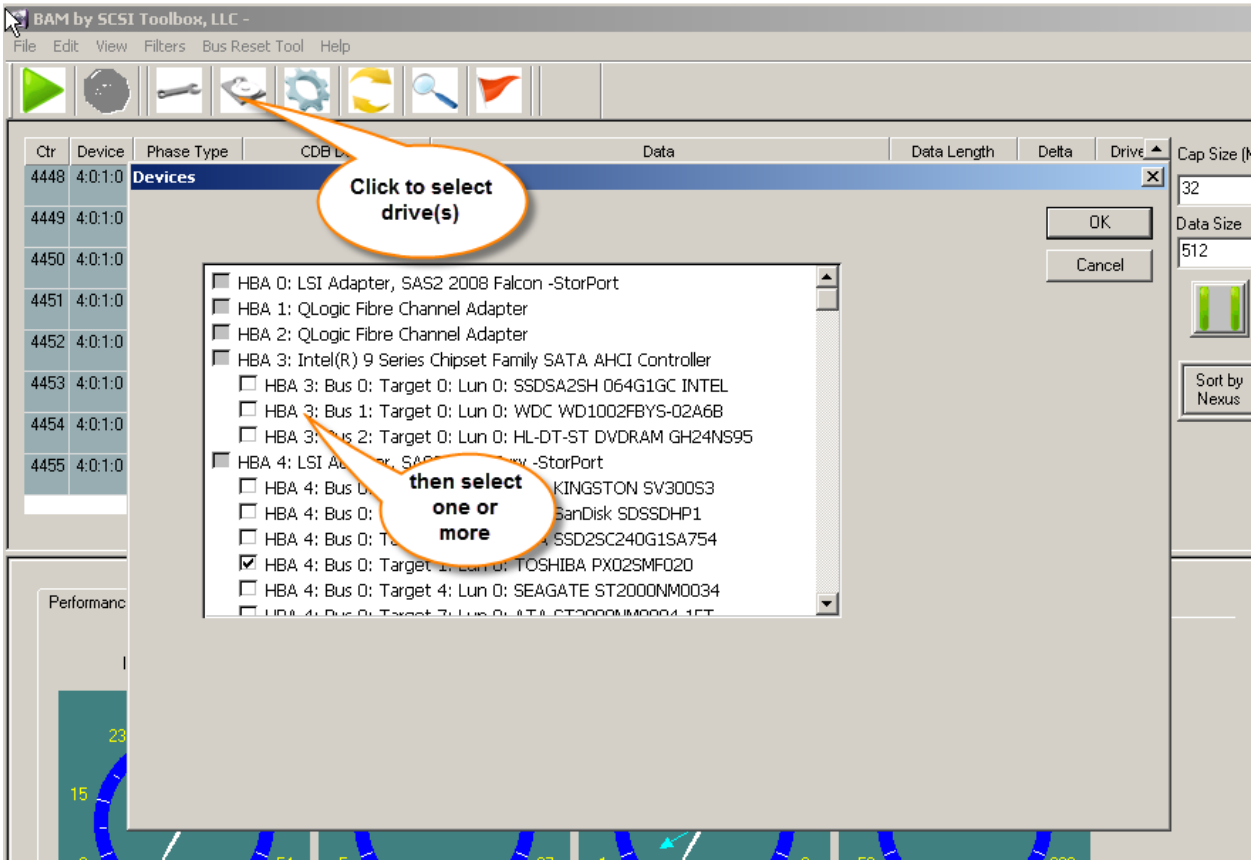
Pre-Capture Setup

Identifying devices to capture

The Device screen displays all devices attached to all adapters on the system. In performance mode you can select one device, in capture mode you can select as many devices as you wish.



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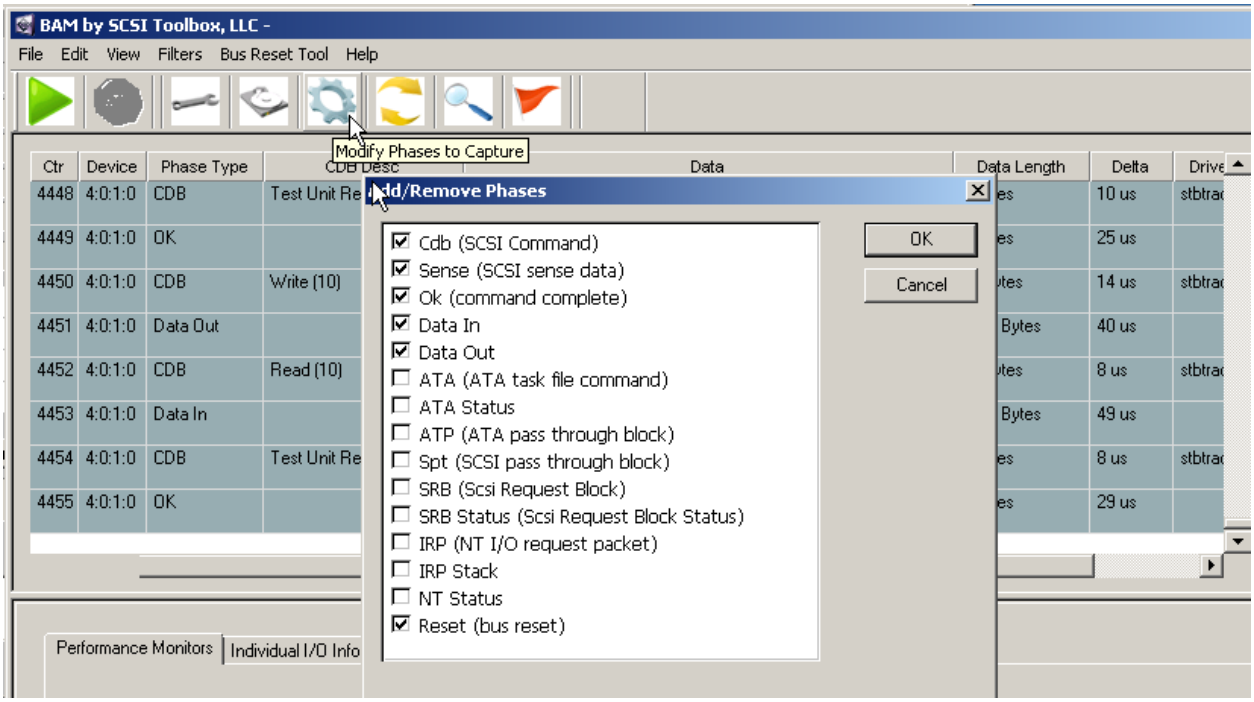
Identifying Phases to capture



Select the phases that you wish to record during capture by using the Phases screen.

Selecting Triggers

Use the Trigger Screen to select trigger conditions to stop trace capture. When a trigger condition occurs during data capture the capture will stop and a message box will inform you of which trigger condition caused the stop.

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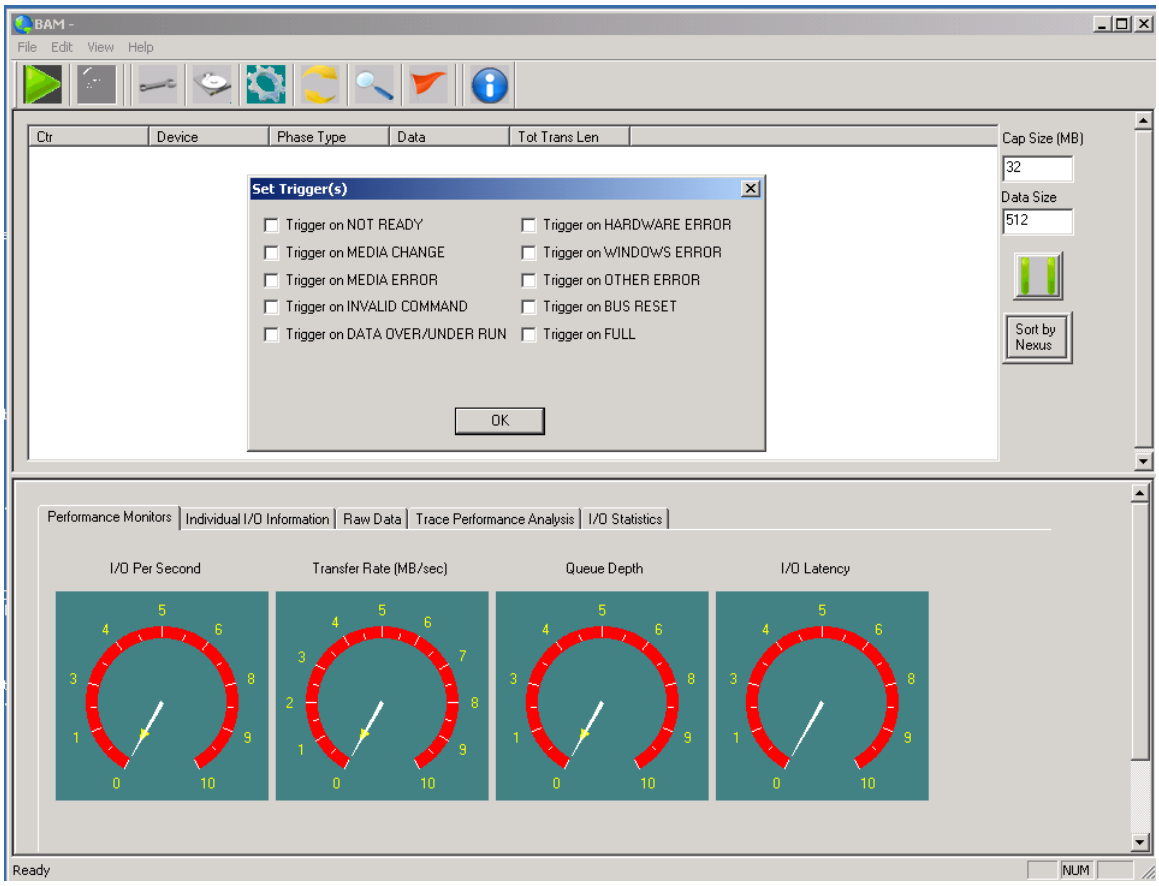

Setting Capture Buffer size and Phase Data Size

The amount of trace data you will be able to capture is determined by the size of the Capture Buffer. The Capture Buffer uses system memory – enter the amount of memory you can allocate to trace memory in the Cap Size field. Enter this number in Megabytes.

Enter the amount of data (in bytes) from each phase that you wish to capture in the Data Size field – up to 64K.

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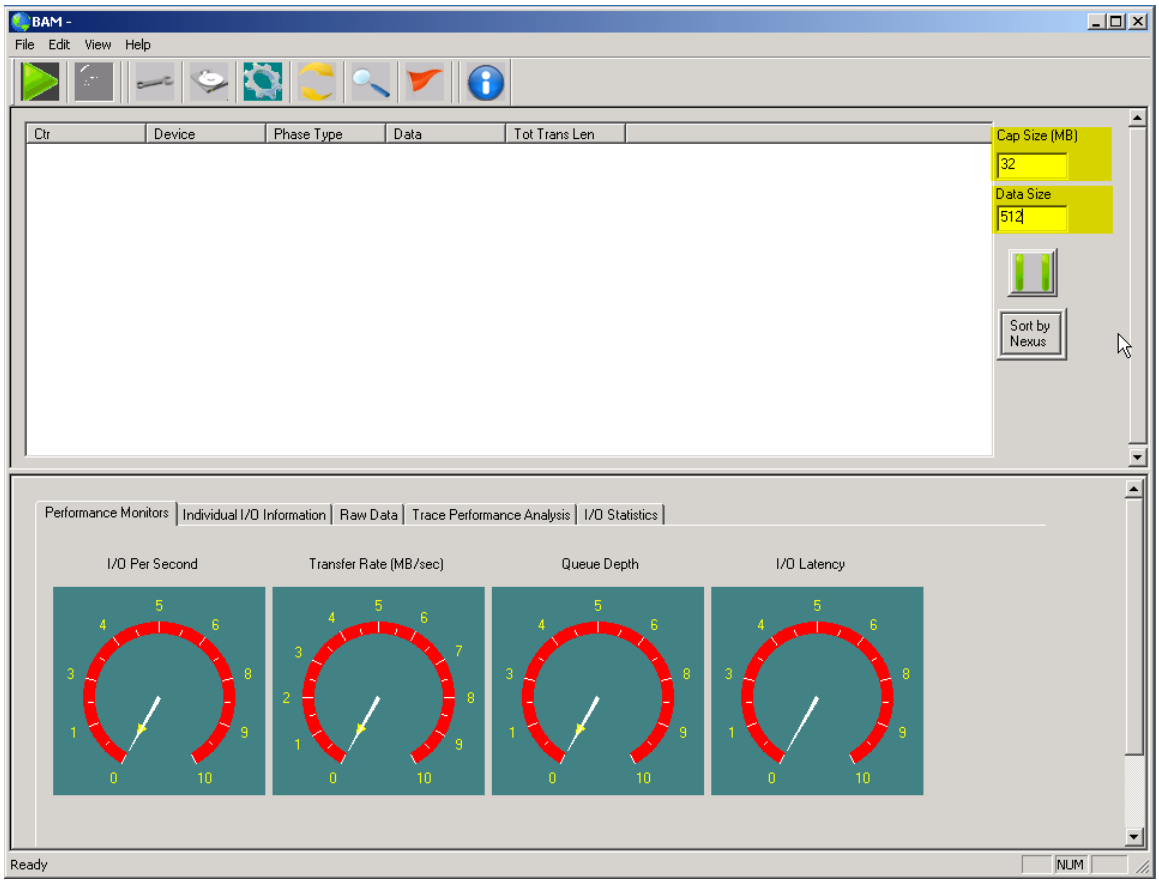

Identifying columns to display

Use the Columns screen to select the data you wish displayed on the screen, and the order you would like the data columns to be in. In our example we will show all data columns.

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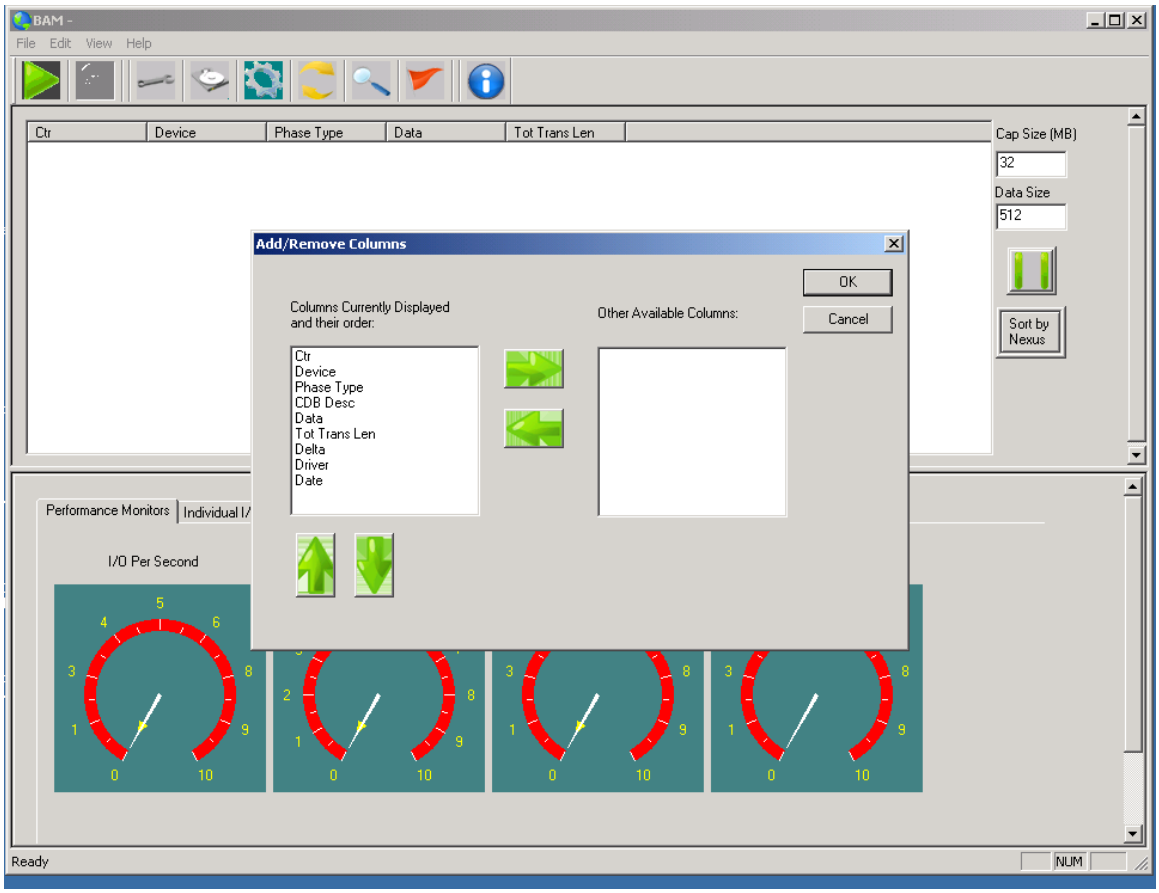

Selecting the mode

Use the Mode Selection screen to choose between Performance mode and Capture Mode.

Performance mode allows data from one device to be captured, and the phases displayed in real-time during capture will be limited to not impact system performance. Once a Performance Mode capture is stopped all phases will be displayed on the screen.

In Capture mode you may capture data from multiple devices, and all phases are displayed in real-time during capture.

Note: - during Capture Mode capture you may use the Pause/Continue button to the right of the phase display to momentarily pause phase data scrolling.

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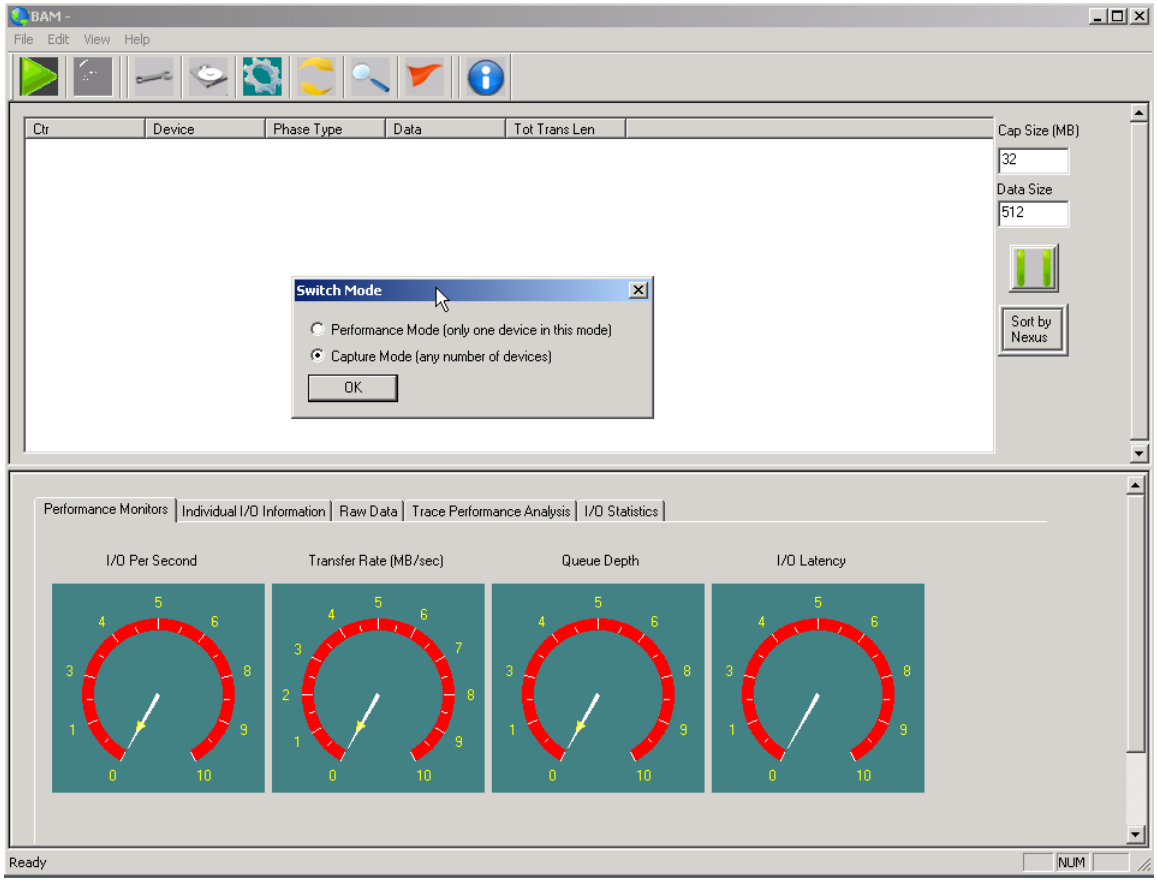

Starting and stopping capture

Click the Start Capture button (the green arrow) to start the capture

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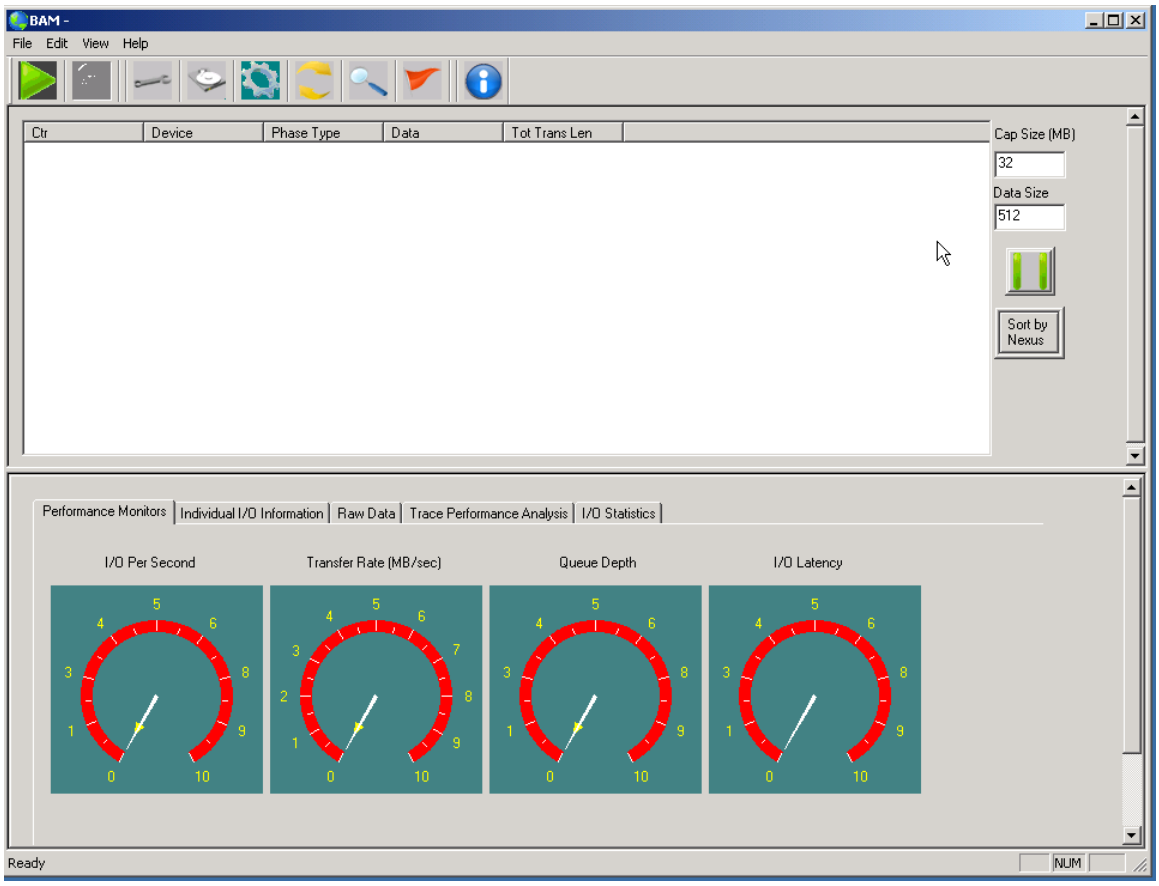

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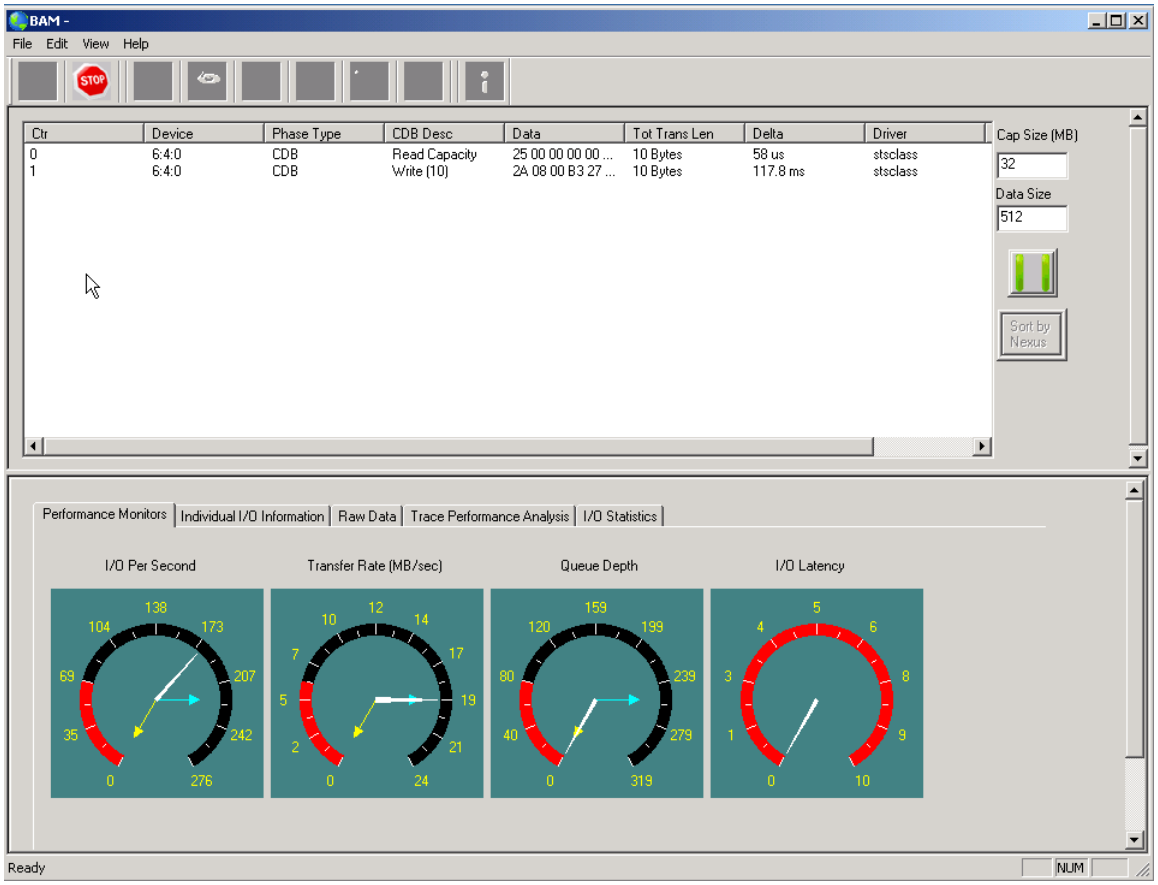
And click the Stop button (the red stop sign) to stop capture



Monitoring while tracing

During trace capture the Performance Monitor tab will show real-time performance data such as Number of I/Os per second, Transfer rate in MB/second, Maximum Queue Depth achieved, and I/O Latency. These displays show the maximum, average, and minimum values.

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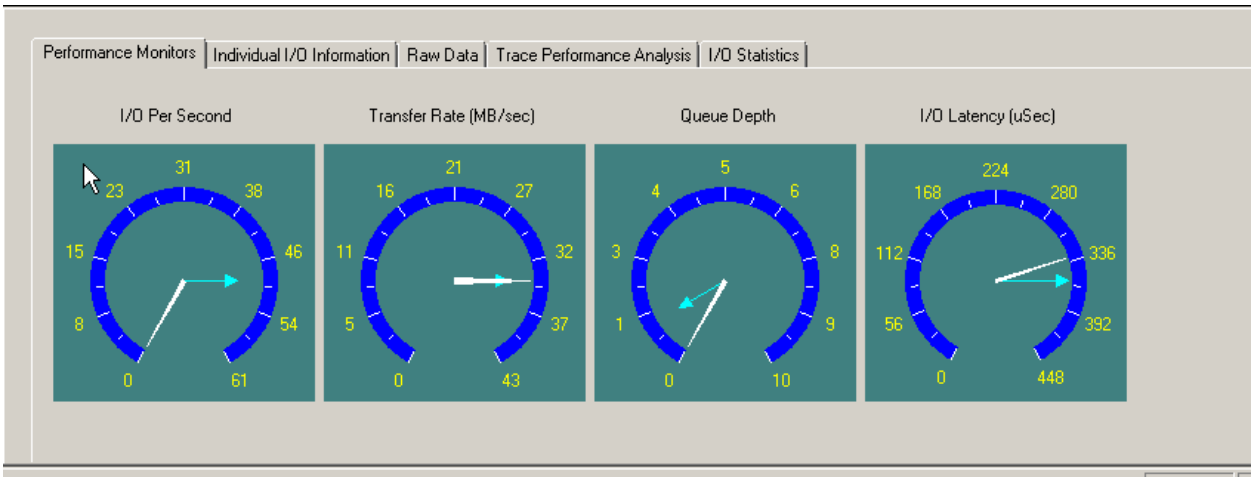

Post Capture Analysis

Trace Performance Analysis

The Trace Performance Analysis tab displays statistical information about the trace data

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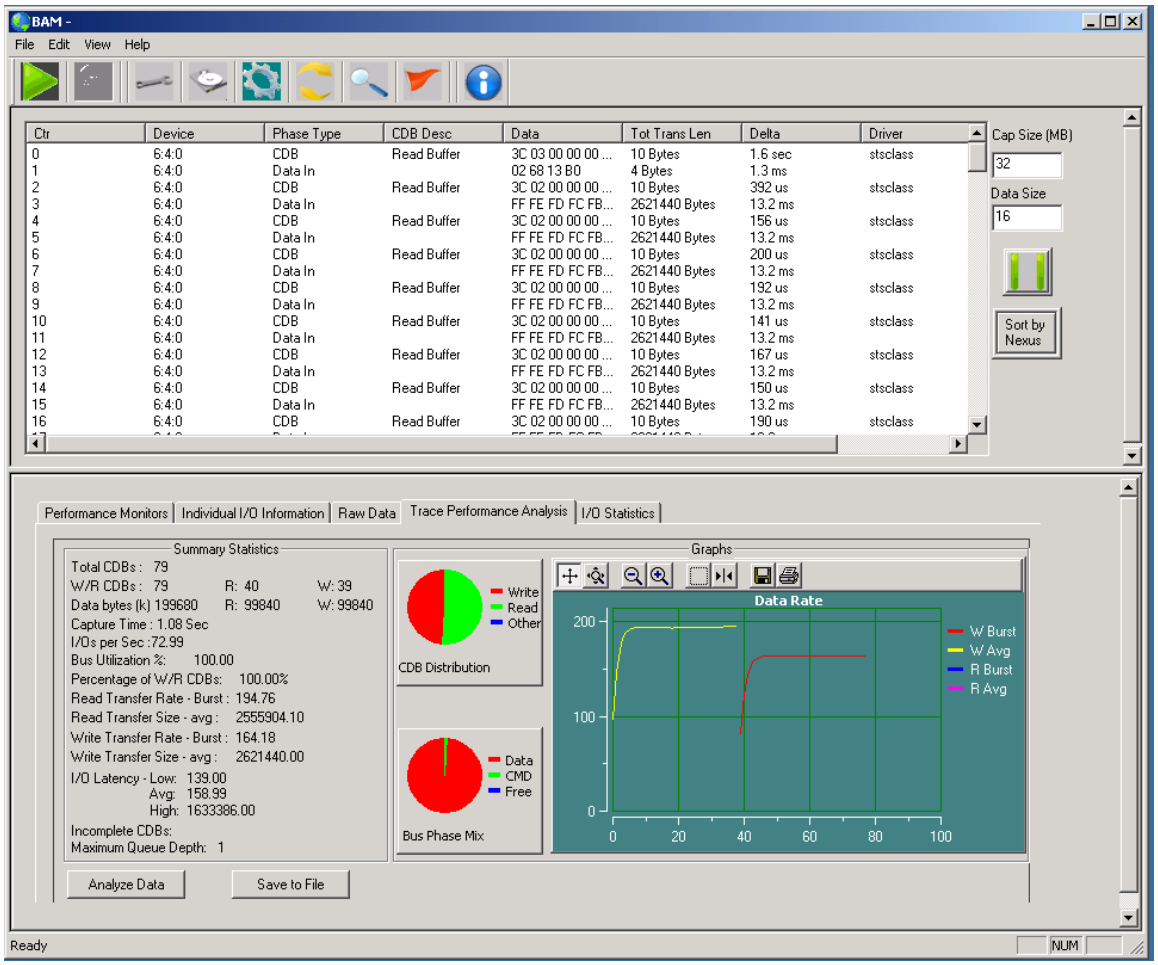

Information on type of I/O, data size, transfer rates, I/O rates, and inter-command I/O latency are displayed, as well as graphs of CDB type distribution, and Bus Phase mixture over the trace capture period. Read and Write Transfer rates are displayed in a scrollable graph.

If you start another trace capture be sure to click the ***Analyze Data*** button once the capture has been stopped in order to recalculate and display the current data.

The Data Rate graph can be scrolled by clicking on the axis that you wish to scroll, then using the keyboard arrow keys to scroll the graph.

You may zoom on any graph axis by clicking on the zoom control (the second tool from the left at the top of the graph) then using the + and/or – buttons to zoom.

Data Analysis

The top section of the tool displays trace data, including the device ID, the Phase Type, CDB Description, Data, Data Length, Delta Time, what OS driver issued the IO, and Date/Time.

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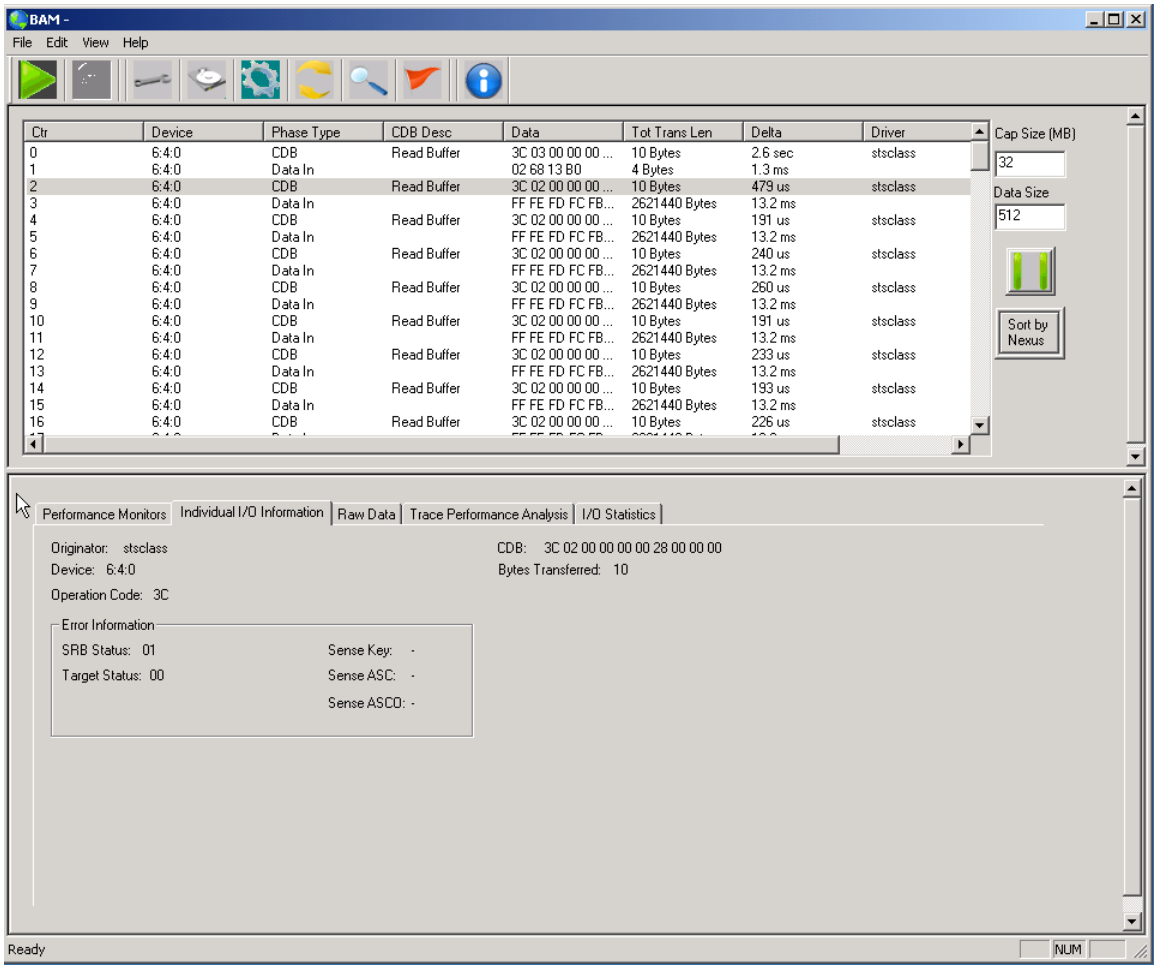
Note: - trace data can be displayed in two modes:

1. Sorted by time
2. Sorted by Nexus

Time sorting displays the trace data in the order it occurred on the bus.

Nexus sorting will group phase data for a given nexus together. For example, nexus mode will group commands and data together even if other commands had occurred between the command and data phase, such as would be the case with command tag queuing or with interleaved capture of multiple device data.

The default mode is Sorted by Time – change modes by clicking the “Sort by” button



Searching through Trace Data

The Search tool allows you to specify a data pattern to search for within the trace data

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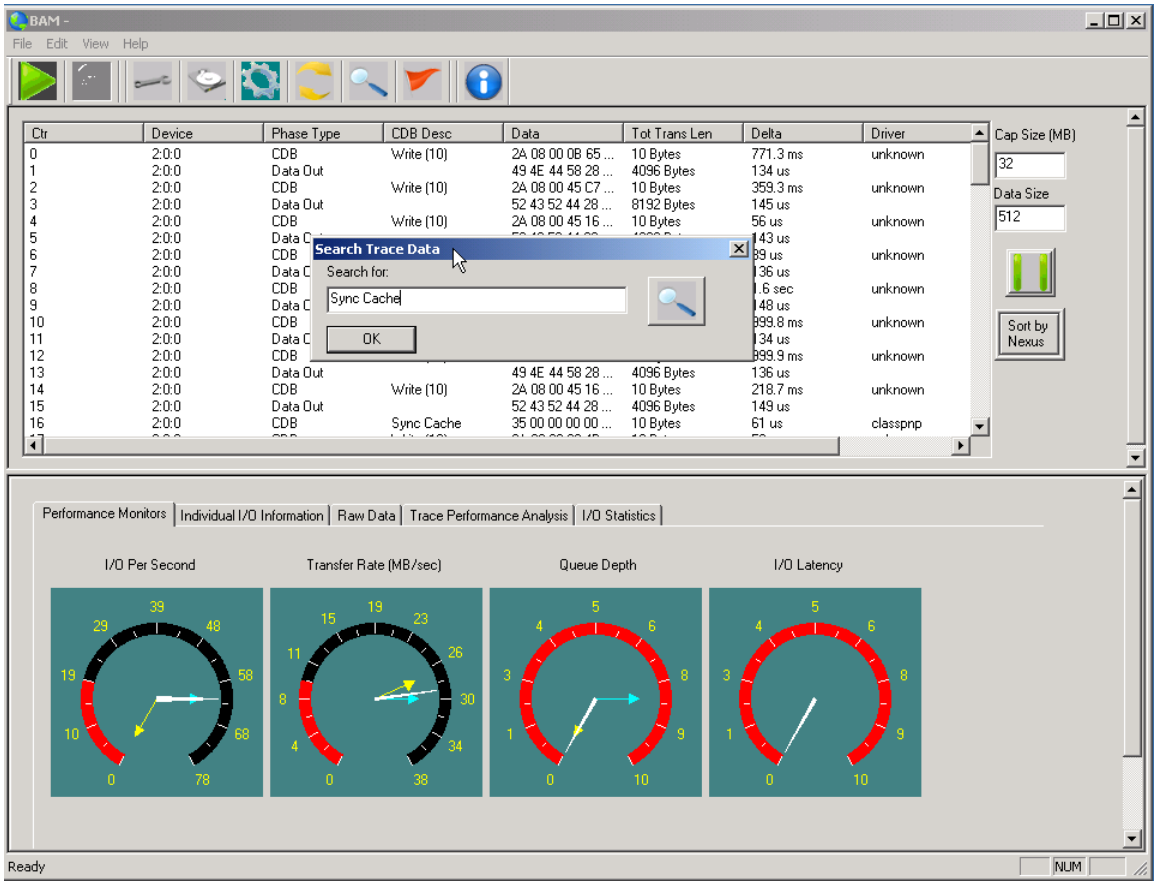

Individual IO information

Information on any Command may be viewed with the Individual I/O Information tab. This information will display the OS driver that originated the IO, the device address, the OpCode of the CDB, all CDB bytes, plus error information if the command had any type of error condition.

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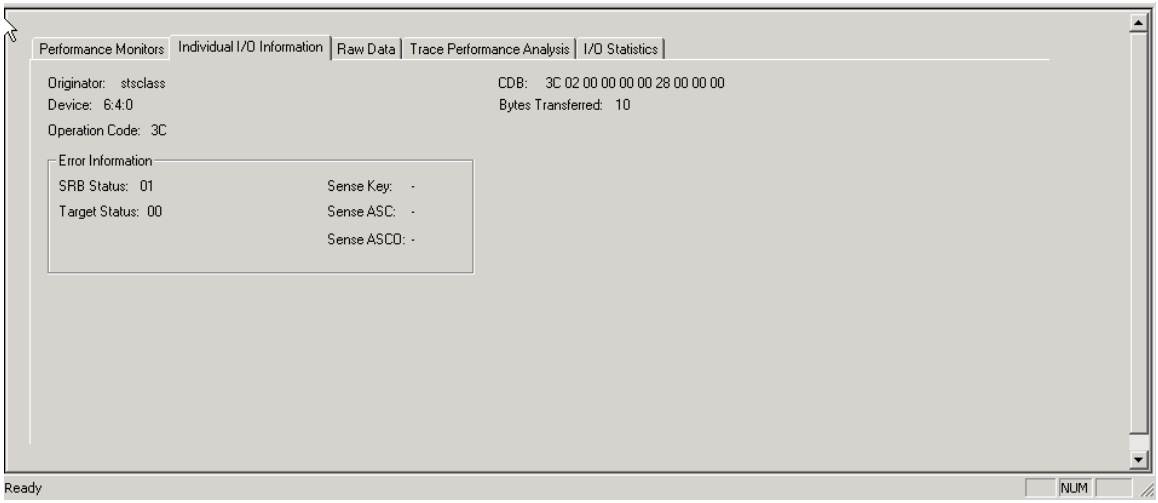
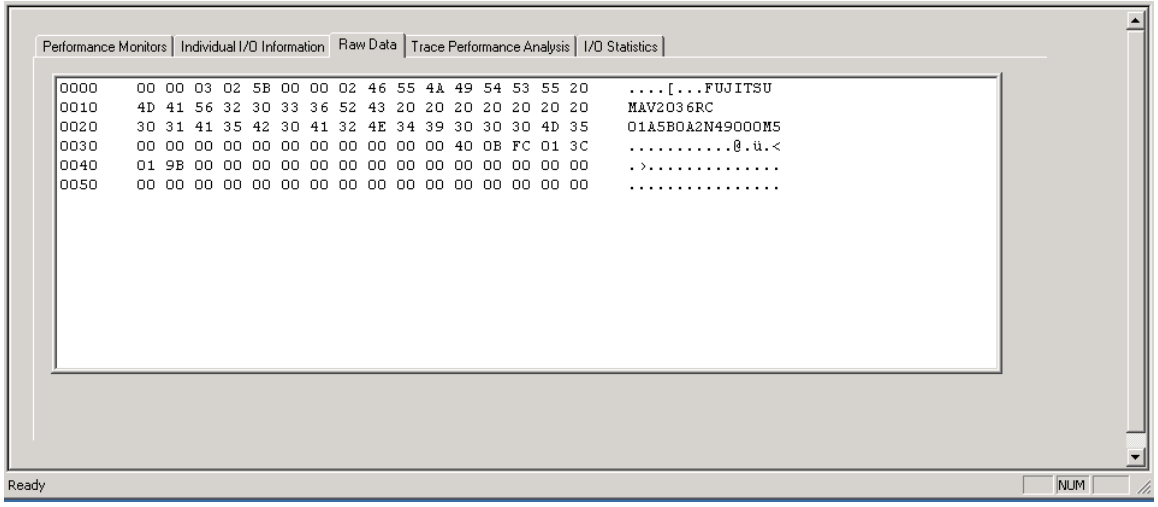


Raw Data View

Data captured may be viewed using the Raw Data tab



Advanced Buffer Functions

Added full buffer editing functionality to the BAM Raw Data tab.

This function allows you to easily export captured data into a file for further analysis. To use this function first capture some I/O with BAM, then select one of your traces DATA phases by clicking on the data phase. This brings up the previous raw data display along with a new button called “Buffer Edit Functions. Click this button to bring up the new Buffer Editor –

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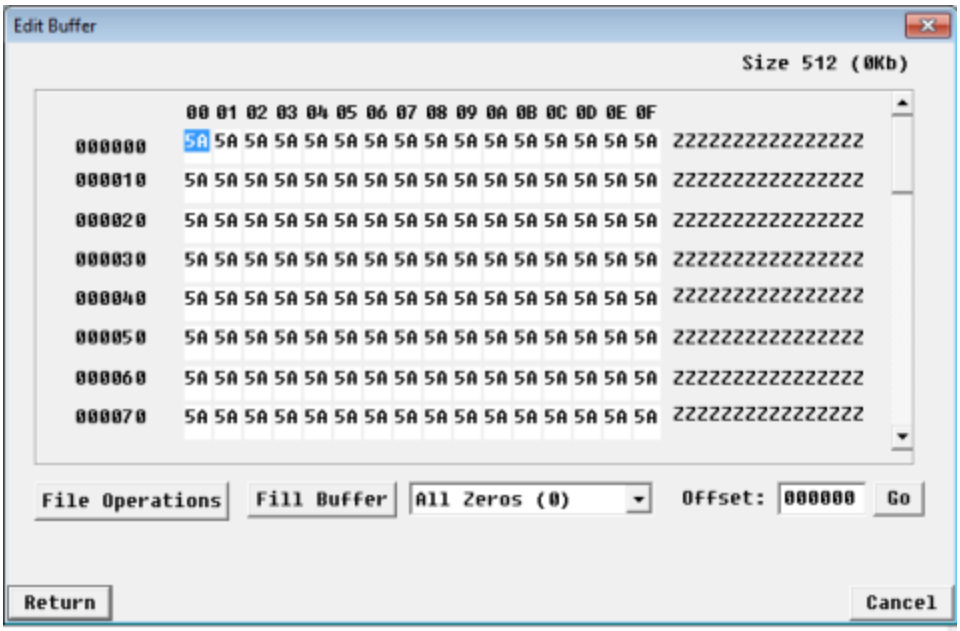

In addition to a duplicate of the previous raw data view you will see several new buttons. If you want to fill the buffer with a pattern you can choose the pattern from the data pattern pulldown and then click “Fill Buffer”. You can also enter data into the buffer by tabbing to each byte and entering the data you wish.

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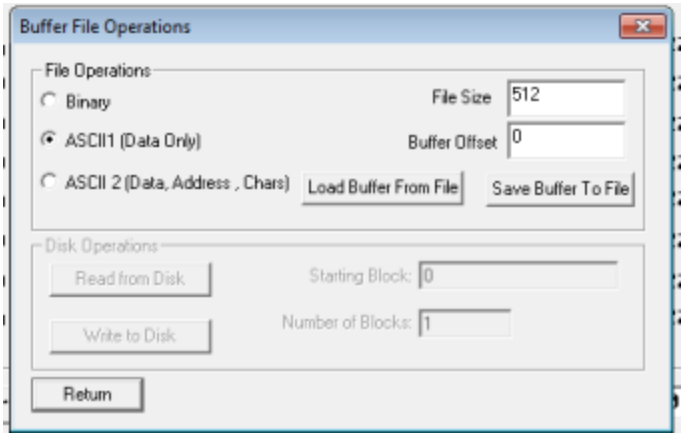
Probably the most useful feature here is found clicking the ***File Operations*** button:



From this screen you can specify the number of bytes you wise to write out to a file – using the File Size window. You can also specify three different methods to write your data to your file.

1. Binary – this will write the pure binary representation of your data, useful if you're going to feed this data back to your device, etc.
2. ASCII1 (Data Only) – this will write the data out in ASCII text formatted like this:

```
5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A
5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A
5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A
```

3. ASCII 2 (Data plus addresses plus printable chars) – looks like this:

```
000000 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A     ZZZZZZZZZZZZZZZZ
000010 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A     ZZZZZZZZZZZZZZZZ
000020 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A     ZZZZZZZZZZZZZZZZ
```

   Be sure to keep an eye on the file size – it will default to what your BAM Data Size setting is.
   Also, you can write data from your buffer starting at an offset by using the Buffer Offset field.

   In addition to all of these buffer write functions conversely you can use this function to read data from your files into the buffer.

IO Statistics

Statistics about the type and amount of commands captured may be viewed with the IO Statistics tab

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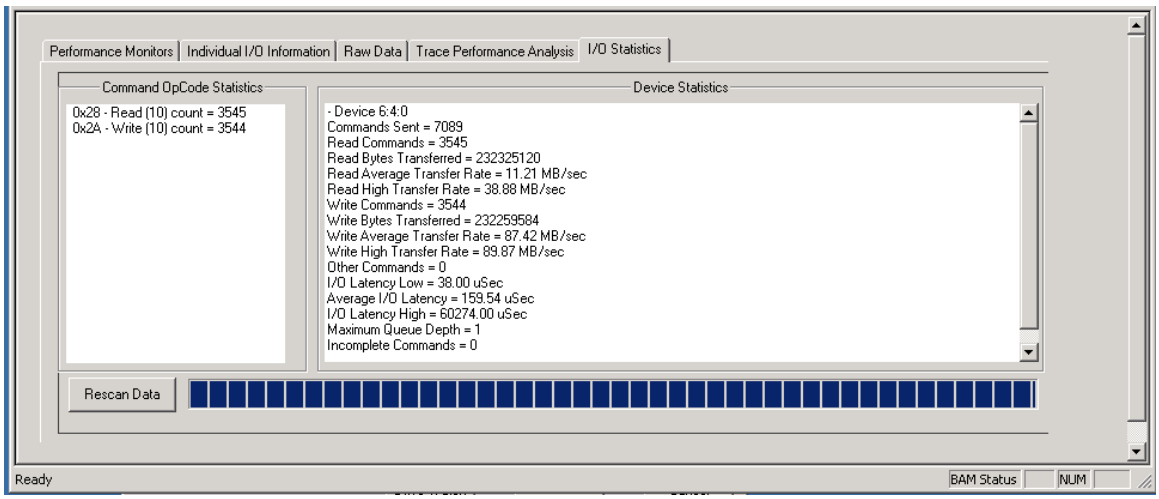
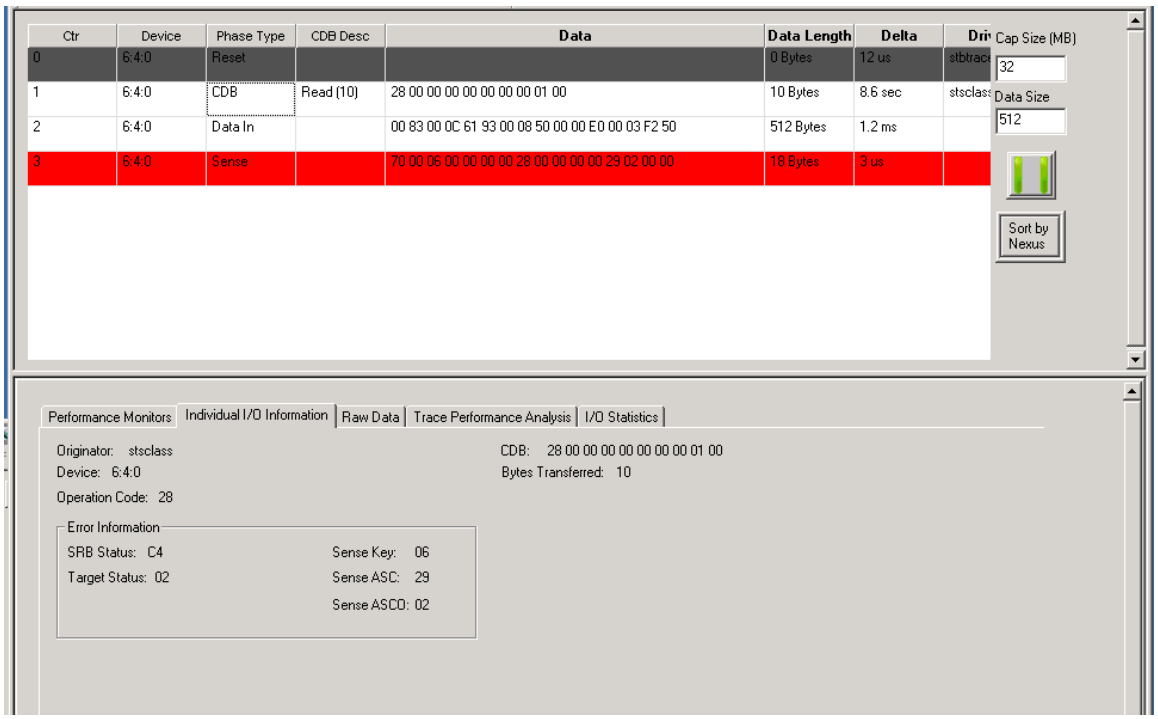


If you start another trace capture be sure to click the ***Rescan Data*** button once the capture has been stopped in order to recalculate and display the current data.

Check Conditions

If an IO fails resulting in a check condition the IO will be marked red in the phase display, as shown here:



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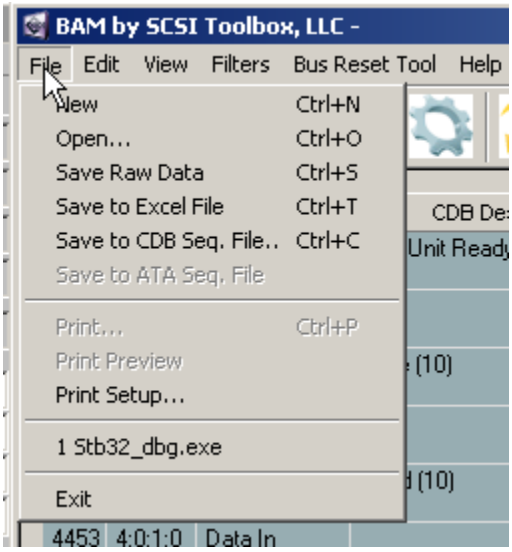
Saving your trace

The BAM File menu has these options:



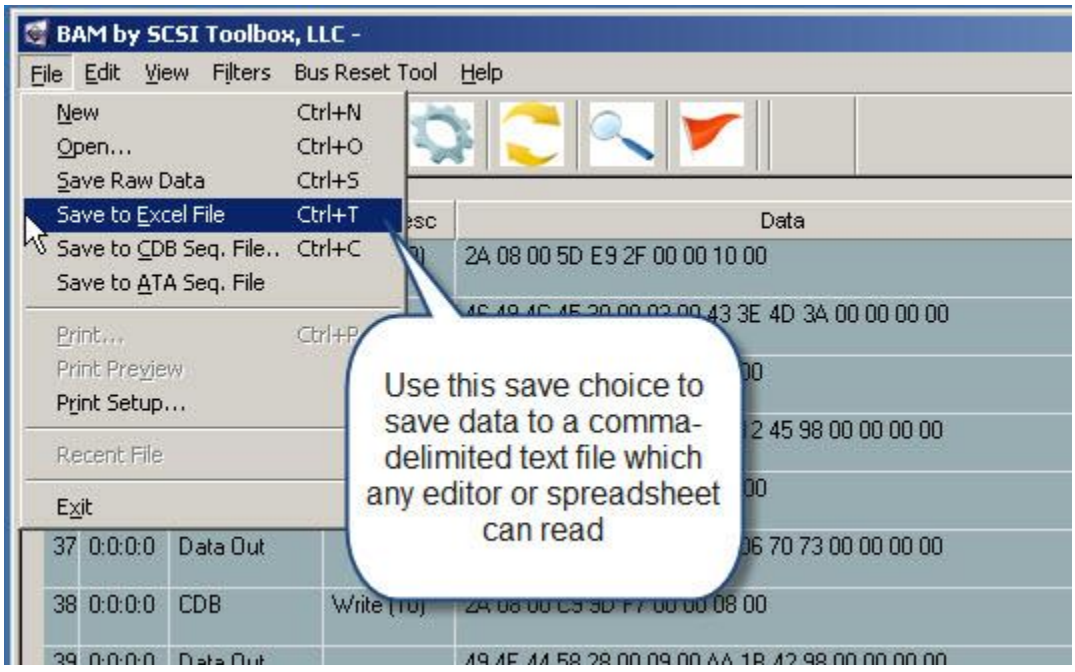
Save to Raw Data

Saves the trace data in BAMs internal data format. Allows saved traces to be reloaded and reanalyzed.

This option will save all captured data.

Save BAM capture data to a Spreadsheet file

This feature lets you send data to colleagues or coworkers who do not have their own copy of BAM.
Note: only the amount of data displayed will be saved. For example, if your Data Size is set to 512 and you have captured 512 bytes of data, only the 16 bytes displayed will be saved to the .csv file.



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This choice will write all of the BAM capture data to a comma-delimited (.csv) text file. This type of file can be opened by any spreadsheet program or you may also open these files with any text editor.

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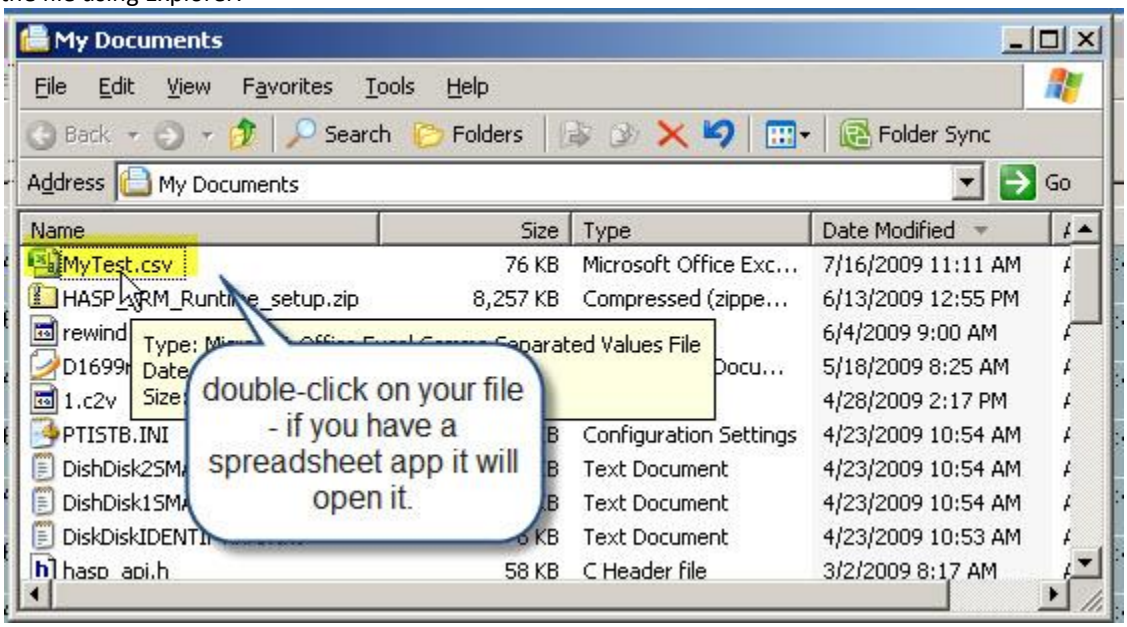
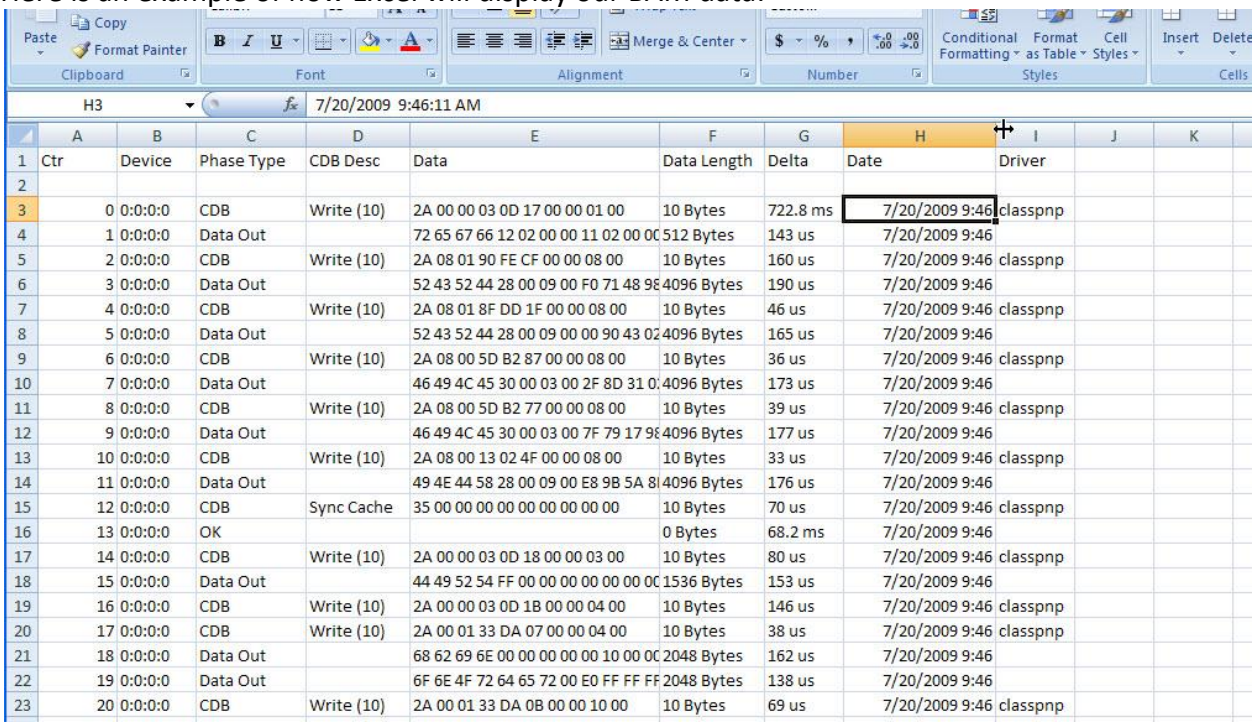
Reading the file is simple – to open it with a spreadsheet program such as Microsoft Excel simply double-click on the file using Explorer:



Here is an example of how Excel will display our BAM data:



	A	B	C	D	E	F	G	H	I	J	K
1	Ctr	Device	Phase Type	CDB Desc	Data	Data Length	Delta	Date	Driver		
2											
3	0	0:0:0:0	CDB	Write (10)	2A 00 00 03 0D 17 00 00 01 00	10 Bytes	722.8 ms	7/20/2009 9:46	classpnp		
4	1	0:0:0:0	Data Out		72 65 67 66 12 02 00 00 11 02 00 00	512 Bytes	143 us	7/20/2009 9:46			
5	2	0:0:0:0	CDB	Write (10)	2A 08 01 90 FE CF 00 00 08 00	10 Bytes	160 us	7/20/2009 9:46	classpnp		
6	3	0:0:0:0	Data Out		52 43 52 44 28 00 09 00 F0 71 48 98	4096 Bytes	190 us	7/20/2009 9:46			
7	4	0:0:0:0	CDB	Write (10)	2A 08 01 8F DD 1F 00 00 08 00	10 Bytes	46 us	7/20/2009 9:46	classpnp		
8	5	0:0:0:0	Data Out		52 43 52 44 28 00 09 00 00 90 43 02	4096 Bytes	165 us	7/20/2009 9:46			
9	6	0:0:0:0	CDB	Write (10)	2A 08 00 5D B2 87 00 00 08 00	10 Bytes	36 us	7/20/2009 9:46	classpnp		
10	7	0:0:0:0	Data Out		46 49 4C 45 30 00 03 00 2F 8D 31 0	4096 Bytes	173 us	7/20/2009 9:46			
11	8	0:0:0:0	CDB	Write (10)	2A 08 00 5D B2 77 00 00 08 00	10 Bytes	39 us	7/20/2009 9:46	classpnp		
12	9	0:0:0:0	Data Out		46 49 4C 45 30 00 03 00 7F 79 17 98	4096 Bytes	177 us	7/20/2009 9:46			
13	10	0:0:0:0	CDB	Write (10)	2A 08 00 13 02 4F 00 00 08 00	10 Bytes	33 us	7/20/2009 9:46	classpnp		
14	11	0:0:0:0	Data Out		49 4E 44 58 28 00 09 00 E8 9B 5A 8	4096 Bytes	176 us	7/20/2009 9:46			
15	12	0:0:0:0	CDB	Sync Cache	35 00 00 00 00 00 00 00 00 00	10 Bytes	70 us	7/20/2009 9:46	classpnp		
16	13	0:0:0:0	OK			0 Bytes	68.2 ms	7/20/2009 9:46			
17	14	0:0:0:0	CDB	Write (10)	2A 00 00 03 0D 18 00 00 03 00	10 Bytes	80 us	7/20/2009 9:46	classpnp		
18	15	0:0:0:0	Data Out		44 49 52 54 FF 00 00 00 00 00 00 00	1536 Bytes	153 us	7/20/2009 9:46			
19	16	0:0:0:0	CDB	Write (10)	2A 00 00 03 0D 1B 00 00 04 00	10 Bytes	146 us	7/20/2009 9:46	classpnp		
20	17	0:0:0:0	CDB	Write (10)	2A 00 01 33 DA 07 00 00 04 00	10 Bytes	38 us	7/20/2009 9:46	classpnp		
21	18	0:0:0:0	Data Out		68 62 69 6E 00 00 00 00 00 10 00 00	2048 Bytes	162 us	7/20/2009 9:46			
22	19	0:0:0:0	Data Out		6F 6E 4F 72 64 65 72 00 E0 FF FF FF	2048 Bytes	138 us	7/20/2009 9:46			
23	20	0:0:0:0	CDB	Write (10)	2A 00 01 33 DA 0B 00 00 10 00	10 Bytes	69 us	7/20/2009 9:46	classpnp		

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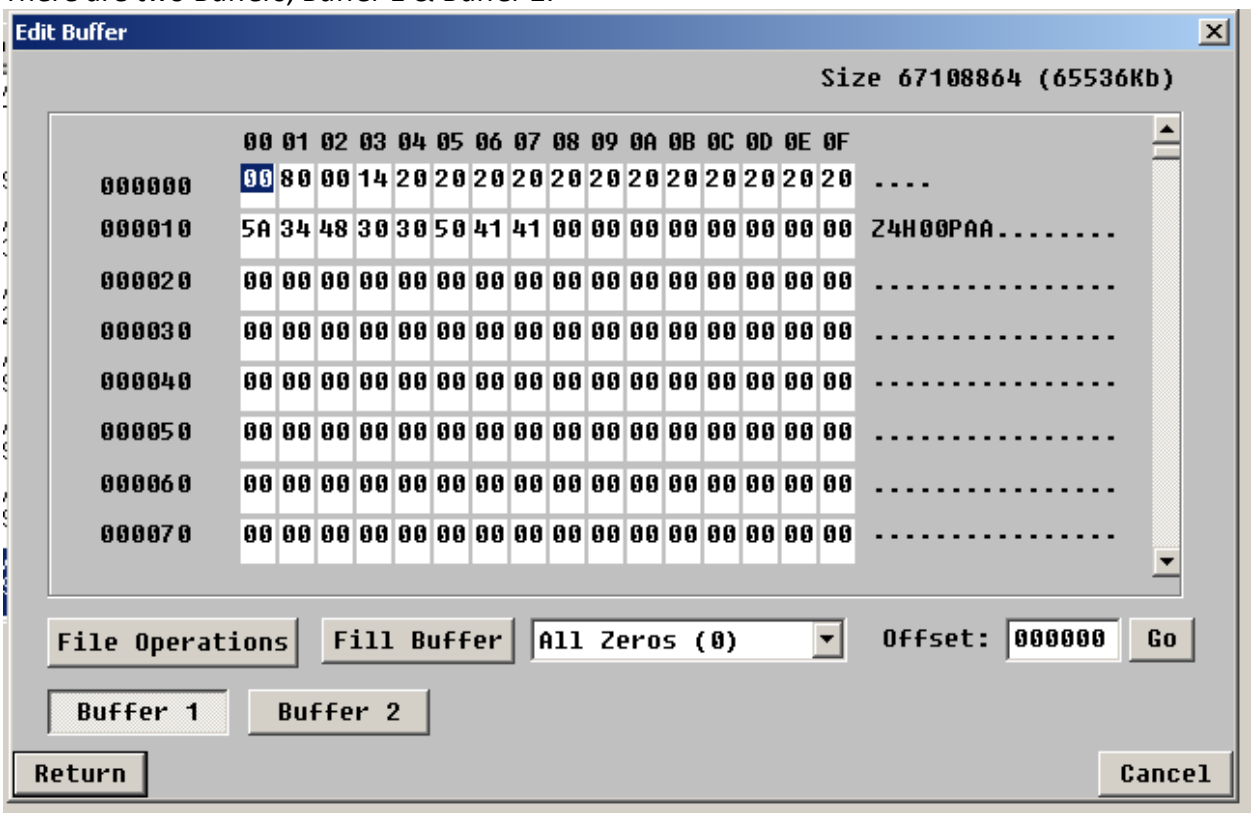
The Buffer Menu

Main Buffer Menu

The Buffer functions let you view, edit, and record the STB Suites internal data buffers.
There are two Buffers, Buffer 1 & Buffer 2.



The main Buffer screen displays a matrix of eight rows of sixteen bytes of buffer data. The outside left and upper areas mark the address of the bytes.
Within this matrix each buffer byte value is displayed in hexadecimal.
For each matrix row, to the right of the matrix, the ASCII charactor all 16 bytes will be displayed. If there is not a printable ASCII character for a given byte a **.** will be printed.

You can scroll through the buffer contents, and you may jump to any address by entering the address (in hex) in the **Offset:** field, then clicking **Go.**

You can fill the buffer with any of the data patterns listed in the data pattern pulldown. Select the data pattern, then click **Fill Buffer**.

File Operations Menu

The file Operations menu has two main functions –

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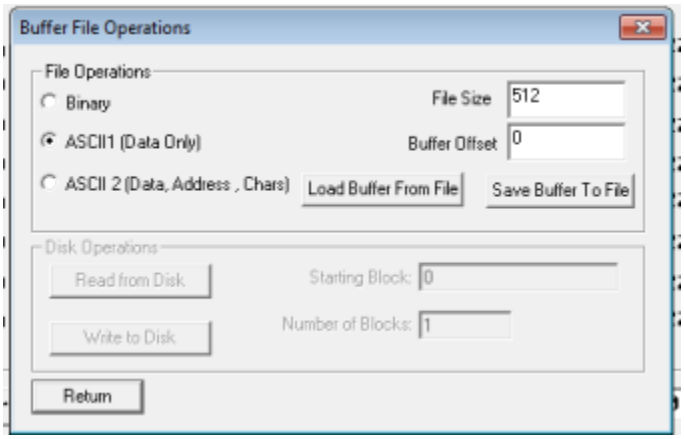
Save/Load Buffer to file



From this screen you can specify the number of bytes you wish to write out to a file – using the File Size window.

You can also specify three different methods to write your data to your file.

4. Binary – this will write the pure binary representation of your data, useful if you're going to feed this data back to your device, etc.
5. ASCII1 (Data Only) – this will write the data out in ASCII text formatted like this:

```
5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A
5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A
5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A
```

6. ASCII 2 (Data plus addresses plus printable chars) – looks like this:

```
000000 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A     ZZZZZZZZZZZZZZZZ
000010 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A     ZZZZZZZZZZZZZZZZ
000020 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A 5A     ZZZZZZZZZZZZZZZZ
```

Be sure to keep an eye on the file size – it will default to what your BAM Data Size setting is.

Also, you can write data from your buffer starting at an offset by using the Buffer Offset field.

In addition to all of these buffer write functions conversely you can use this function to read data from your files into the buffer.

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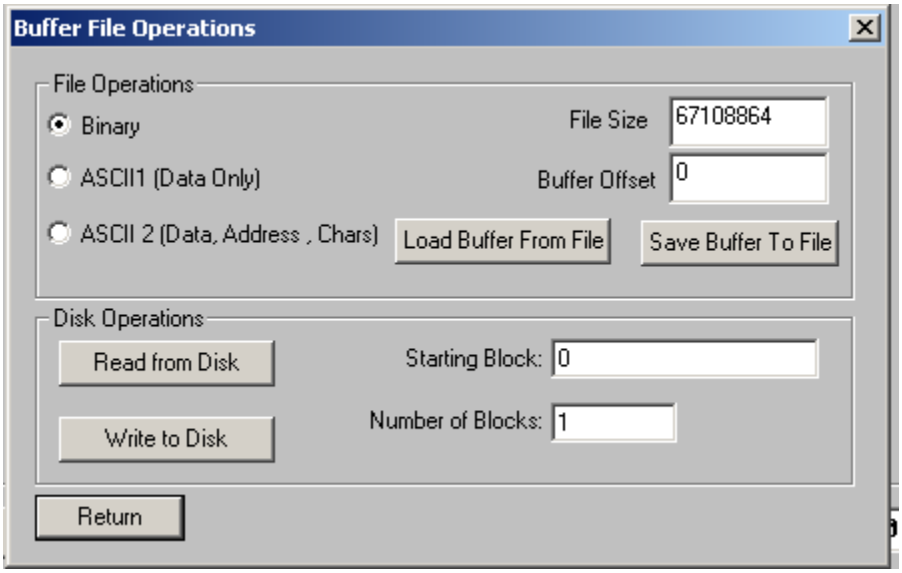
Disk Operations - Read/Write Disk



The Disk Operations choice will work using the currently selected disk.

Use the **Read from Disk** button to read the specified number of blocks into the buffer, starting at the LBA specified with the **Starting Block** field.

This is a quick way to view sectors from a disk drive.

Use the **Write to Disk** button and **Starting Block** – **Number of Blocks** to write the buffer contents to the specified LBAs.

Obviously the **Write to Disk** function is destructive!

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SCSI/SAS/FC Commands

Commands sorted by command name

Command name	OP code [1]	Command type		Length				
		All devices	Direct access devices	6 byte	10 byte	12 byte	16 byte	32 byte
CHANGE DEFINITION	40h	x [2]			x			
FORMAT UNIT	04h		x	x				
GET LBA STATUS	9Eh		x				x	
INQUIRY	12h	x		x				
LOG SELECT	4Ch	x			x			
LOG SENSE	4Dh	x			x			
MODE SELECT (6)	15h	x		x				
MODE SELECT (10)	55h	x			x			
MODE SENSE (6)	1Ah	x		x				
MODE SENSE (10)	5Ah	x			x			
PERSISTENT RESERVE IN	5Eh	x			x			
PERSISTENT RESERVE OUT	5Fh	x			x			
READ (6)	08h		x	x				
READ (10)	28h		x		x			
READ (12)	A8h		x			x		
READ (16)	88h		x				x	
READ (32)	7Fh/0009h		x					x
READ BUFFER	3Ch	x			x			
READ CAPACITY (10)	25h		x		x			
READ CAPACITY (16)	9Eh/10h		x				x	
READ DEFECT DATA (10)	37h		x		x			
READ DEFECT DATA (12)	B7h		x			x		
READ LONG (10)	3Eh		x		x			
READ LONG (16)	9Eh/11h		x				x	
REASSIGN BLOCKS	07h		x	x				
RECEIVE DIAGNOSTIC RESULTS	1Ch	x		x				
RELEASE (6)	17h	x [2]		x				
RELEASE (10)	57h	x [2]			x			
REPORT IDENTIFYING INFORMATION	A3h/05h	x				x		
REPORT LUNS	A0h	x				x		
REQUEST SENSE	03h	x		x				
RESERVE (6)	16h	x [2]		x				
RESERVE (10)	56h	x [2]			x			

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REZERO UNIT	01h		x [2]	x				
SANITIZE	48H		x		x			
SECURITY PROTOCOL IN	A2h	x				x		
SECURITY PROTOCOL OUT	B5h	x				x		
SEEK (6)	0Bh		x [2]	x				
SEEK EXTENDED (10)	2Bh		x		x			
SEND DIAGNOSTIC	1Dh	x		x				
SET IDENTIFYING INFORMATION	A4h/06h	x				x		
START/STOP UNIT	1Bh		x	x				
SYNCHRONIZE CACHE (10)	35h		x		x			
SYNCHRONIZE CACHE (16)	91h		x				x	
TEST UNIT READY	00h	x		x				
UNMAP	42h		x		x			
VERIFY(10)	2Fh		x		x			
VERIFY (12)	AFh		x			x		
VERIFY (16)	8Fh		x				x	
VERIFY (32)	7Fh/000Ah		x					x
WRITE (6)	0Ah		x	x				
WRITE (10)	2Ah		x		x			
WRITE (12)	AAh		x			x		
WRITE (16)	8Ah		x				x	
WRITE (32)	7Fh/000Bh		x					x
WRITE AND VERIFY (10)	2Eh		x		x			
WRITE AND VERIFY (12)	AEh		x			x		
WRITE AND VERIFY (16)	8Eh		x				x	
WRITE AND VERIFY (32)	7Fh/000Ch		x					x
WRITE BUFFER	3Bh	x			x			
WRITE LONG	3Fh		x		x			
WRITE LONG (16)	9Fh/11h		x				x	
WRITE SAME (10)	41h		x		x			
WRITE SAME (16)	93h		x				x	
WRITE SAME (32)	7Fh/000Dh		x					x

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Sense Data

Sense Key

Sense Key	Description
0h	**NO SENSE: Indicates that there is no specific sense key information to be reported. This may occur for a successful command or for a command that receives CHECK CONDITION status because one of the FILEMARK, EOM, or ILI bits is set to one.**
1h	**RECOVERED ERROR:** Indicates that the command completed successfully, with some recovery action performed by the device server. Details may be determined by examining the additional sense bytes and the INFORMATION field. When multiple recovered errors occur during one command, the choice of which error to report (e.g., first, last, most severe) is vendor specific.
2h	**NOT READY:** Indicates that the logical unit is not accessible. Operator intervention may be required to correct this condition.
3h	**MEDIUM ERROR:** Indicates that the command terminated with a non-recovered error condition that may have been caused by a flaw in the medium or an error in the recorded data. This sense key may also be returned if the device server is unable to distinguish between a flaw in the medium and a specific hardware failure (i.e., sense key 4h).
4h	**HARDWARE ERROR:** Indicates that the device server detected a non-recoverable hardware failure (e.g., controller failure, device failure, or parity error) while performing the command or during a self test.
5h	**ILLEGAL REQUEST:** Indicates that: a) The command was addressed to an incorrect logical unit number (see SAM-5); b) The command had an invalid task attribute (see SAM-5); c) The command was addressed to a logical unit whose current configuration prohibits processing the command; d) There was an illegal parameter in the CDB; or e) There was an illegal parameter in the additional parameters supplied as data for some commands (e.g., PERSISTENT RESERVE OUT). If the device server detects an invalid parameter in the CDB, it shall terminate the command without altering the medium. If the device server detects an invalid parameter in the additional parameters supplied as data, the device server may have already altered the medium.
6h	**UNIT ATTENTION:** Indicates that a unit attention condition has been established (e.g., the removable medium may have been changed, a logical unit reset occurred). See SAM-5.
7h	**DATA PROTECT:** Indicates that a command that reads or writes the medium was attempted on a block that is protected. The read or write operation is not performed.
8h	**BLANK CHECK:** Indicates that a write-once device or a sequential-access device encountered blank medium or format-defined end-of-data indication while reading or that a write-once device encountered a non-blank medium while writing.
9h	**VENDOR SPECIFIC:** This sense key is available for reporting vendor specific conditions.
Ah	**COPY ABORTED:** Indicates an EXTENDED COPY command was aborted due to an error condition on the source device, the destination device, or both.
Bh	**ABORTED COMMAND:** Indicates that the device server aborted the command. The application client may be able to recover by trying the command again.
Ch	Reserved
Dh	**VOLUME OVERFLOW:** Indicates that a buffered SCSI device has reached the end-of-partition and data may remain in the buffer that has not been written to the medium. One or more RECOVER BUFFERED DATA command(s) may be issued to read the unwritten data from the buffer. (See SSC-3.)
Eh	**MISCOMPARE:** Indicates that the source data did not match the data read from the medium.
Fh	**COMPLETED:** Indicates there is command completed sense data (see SAM-5) to be reported. This may occur for a successful command.

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Sense Code/ASQ

ASC (byte 12)	ASCQ (byte 13)	Description	Sense Key
00	00	No Additional Sense Information	0
01	00	No Index/Logical Block Signal	4
02	00	No SEEK Complete	4
03	00	Peripheral Device Write Fault	1, 3, 4
03	86	Write Fault Data Corruption	
04	00	Logical Unit Not Ready, Cause Not Reportable	2
04	01	Logical Unit Not Ready, Becoming Ready	2
04	02	Logical Unit Not Ready, START UNIT Required	2
04	03	Logical Unit Not Ready, Manual Intervention Required	2
04	04	Logical Unit Not Ready, Format in Progress	2
04	09	Logical Unit Not Ready, Self Test in Progress	2
04	0A	Logical Unit Not Ready, NVC recovery in progress after and exception event	2
04	11	Logical Unit Not Ready, Notify (Enable Spinup) required	2
04	F0	Logical unit not ready, super certify in progress	2
08	00	Logical Unit Communication Failure	9, B
08	01	Logical Unit Communication Time-Out	B
08	02	Logical Unit Communication Parity Error	
09	00	Track Following Error	1, 3, 4
09	01	Servo Fault	1, 4
09	04	Head Select Fault	3, 4
09	0D	Write to at least one copy of a redundant file failed	1
09	0E	Redundant files have < 50% good copies	1
09	F8	Calibration is needed but the QST is set without the Recal Only bit	1
09	FF	Servo Cal completed as part of self-test	1
0A	00	Error Log Overflow	
0A	01	Failed to write super certify log file	3
0A	02	Failed to read super certify log file	3
0B	00	Aborted Command	B
0B	01	Warning—Specified Temperature Exceeded	1, 6
0B	02	Warning, Enclosure Degraded	1

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ASC (byte 12)	ASCQ (byte 13)	Description	Sense Key
0C	00	Write Error	3
0C	01	Write Error Recovered With Auto-Reallocation	1
0C	02	Write Error—Auto Reallocation Failed	3
0C	03	Write Error—Recommend Reassignment	3
0C	FF	Write Error—Too many error recovery revs	3
0D	00	Volume Overflow Constants	D
0E	00	Data Miscompare	E
10	00	ID CRC Or ECC Error	
11	00	Unrecovered Read Error	1, 3
11	01	Read Retries Exhausted	
11	02	Error Too Long To Correct	
11	04	Unrecovered Read Error—Auto Reallocation Failed	3
11	FF	Unrecovered Read Error—Too many error recovery revs	3
12	00	Address Mark Not Found For ID Field	
12	01	Recovered Data Without ECC Using Previous Logical Block ID	
12	02	Recovered Data With ECC Using Previous Logical Block ID	
14	00	Logical Block Not Found	
14	01	Record Not Found	3
15	00	Random Positioning Error	
15	01	Mechanical Positioning Error	1, 3, 4
15	02	Positioning Error Detected By Read Of Medium	
16	00	Data Synchronization Mark Error	1, 3, 4
17	00	Recovered Data With No Error Correction Applied	
17	01	Recovered Data Using Retries	1
17	02	Recovered Data Using Positive Offset	1
17	03	Recovered Data Using Negative Offset	1
17	05	Recovered Data Using Previous Logical Block ID	
17	06	Recovered Data Without ECC—Data Auto Reallocated	
18	00	Recovered Data With ECC	1
18	01	Recovered Data With ECC And Retries Applied	1
18	02	Recovered Data With ECC And/Or Retries, Data Auto-Reallocated	1
18	05	Recovered Data—Recommand Reassignment	
18	06	Recovered Data Using ECC and Offsets	
18	07	Recovered Data With ECC—Data Rewritten	1
19	00	Defect List Error	1, 4

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ASC (byte 12)	ASCQ (byte 13)	Description	Sense Key
19	01	Defect List Not Available	
19	02	Defect List Error In Primary List	
19	03	Defect List Error in Grown List	
19	0E	Fewer than 50% Defect List Copies	
1A	00	Parameter List Length Error	5
1B	00	Synchronous Data Transfer Error	
1C	00	Defect List Not Found	1, 4
1C	01	Primary Defect List Not Found	
1C	02	Grown Defect List Not Found	
1C	83	Seagate Unique Diagnostic Code	
1D	00	Miscompare During Verify Operation	E
1F	00	Number of Defects Overflows the Allocated Space That The Read Defect Command Can Handle	1
20	00	Invalid Command Operation Code	5
20	F3	Invalid linked command operation code	5
21	00	Logical Block Address Out Of Range	D
24	00	Invalid Field In CDB	5
24	01	Illegal Queue Type for CDB (Low priority commands must be SIMPLE queue)	5
24	F0	Invalid LBA in linked command	5
24	F2	Invalid linked command operation code	5
24	F3	Illegal G->P operation request	5
25	00	Logical Unit Not Supported	5
26	00	Invalid Field In Parameter List	5
26	01	Parameter Not Supported	5
26	02	Parameter Value Invalid	5
26	03	Invalid Field Parameter—Threshold Parameter	5
26	04	Invalid Release of Active Persistent Reserve	5
26	05	Fail to read valid log dump data	5
26	97	Invalid Field Parameter—TMS Firmware Tag	
26	98	Invalid Field Parameter—Check Sum	
26	99	Invalid Field Parameter—Firmware Tag	
27	00	Write Protected	7
29	00	Flashing LED occurred	4
29	00	Power On, Reset, Or Bus Device Reset Occurred	6
29	01	Power-On Reset Occurred	6
29	02	SCSI Bus Reset Occurred	6

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ASC (byte 12)	ASCQ (byte 13)	Description	Sense Key
29	03	Bus Device Reset Function Occurred	6
29	04	Internal Reset Occurred	6
29	05	Transceiver Mode Changed To Single-Ended	6
29	06	Transceiver Mode Changed To LVD	6
29	07	Write Log Dump data to disk successful OR IT Nexus Loss	6
29	08	Write Log Dump data to disk fail	6
29	09	Write Log Dump Entry information fail	6
29	0A	Reserved disk space is full	6
29	0B	SDBP test service contained an error, examine status packet(s) for details	6
29	0C	SDBP incoming buffer overflow (incoming packet too big)	6
29	CD	Flashing LED occurred. (Cold reset)	6
29	CE	Flashing LED occurred. (Warm reset)	6
2A	01	Mode Parameters Changed	6
2A	02	Log Parameters Changed	6
2A	03	Reservations preempted	6
2A	04	Reservations Released	6
2A	05	Registrations Preempted	6
2C	00	Command Sequence Error	5
2F	00	Tagged Commands Cleared By Another Initiator	6
31	00	Medium Format Corrupted	3
31	01	Corruption in R/W format request	3
31	91	Corrupt World Wide Name (WWN) in drive information file	3
32	00	No Defect Spare Location Available	4
32	01	Defect List Update Error	3, 4, 5
32	02	No Spares Available—Too Many Defects On One Track	
32	03	Defect list longer than allocated memory	3
33	00	Flash not ready for access	3
35	00	Unspecified Enclosure Services Failure	4
35	01	Unsupported Enclosure Function	5
35	02	Enclosure Services Unavailable	2
35	03	Enclosure Transfer Failure	4
35	04	Enclosure Transfer Refused	4
37	00	Parameter Rounded	1
3D	00	Invalid Bits In Identify Message	
3E	03	Logical Unit Failed Self Test	4

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ASC (byte 12)	ASCQ (byte 13)	Description	Sense Key
3E	00	Logical Unit Has Not Self Configured Yet	
3F	00	Target Operating Conditions Have Changed	6
3F	01	Device internal reset occurred	6
3F	02	Changed Operating Definition	6
3F	05	Device Identifier Changed	6
3F	0F	Echo buffer overwritten	B
3F	80	Buffer contents have changed	1
3F	90	Invalid APM Parameters	
3F	91	World Wide Name (WWN) Mismatch	6
40	01	DRAM Parity Error	1, 4
40	02	Spinup Error recovered with retries	1
42	00	Power-On Or Self-Test Failure	4
42	0A	Port A failed loopback test	4
42	0B	Port B failed loopback test	4
43	00	Message Reject Error	B
44	00	Internal Target Failure	1, 3, 4
44	F2	Data Integrity Check Failed on verify	4
44	F6	Data Integrity Check Failed during write	4
44	FF	XOR CDB check error	4
45	00	Select/Reselection Failure	B
47	00	SCSI Parity Error	B
47	03	Information Unit CRC Error	B
47	80	Fibre Channel Sequence Error	B
48	00	Initiator Detected Error Message Received	B
49	00	Invalid Message Received	B
4B	00	Data Phase Error	B
4B	01	Invalid transfer tag	B
4B	02	Too many write data	B
4B	03	ACK NAK Timeout	B
4B	04	NAK received	B
4B	05	Data Offset error	B
4B	06	Initiator response timeout	B
4C	00	Logical Unit Failed Self-Configuration	
4E	00	Overlapped Commands Attempted	B
55	01	XOR Cache is Not Available	

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ASC (byte 12)	ASCQ (byte 13)	Description	Sense Key
55	04	PRKT table is full	5
5B1	00	Log Exception	
5B*	01	Threshold Condition Met	
5B*	02	Log Counter At Maximum	
5B*	03	Log List Codes Exhausted	
5C	00	RPL Status Change	6
5C	01	Spindles Synchronized	
5C	02	Spindles Not Synchronized	
5D	00	Failure Prediction Threshold Exceeded	1, 6
5D	FF	False Failure Prediction Threshold Exceeded	1, 6
65	00	Voltage Fault	4
80	00	General Firmware Error Qualifier	9
80	86	IOEDC Error on Read	9
80	87	IOEDC Error on Write	9
80	88	Host Parity Check Failed	9
80	89	IOEDC Error on Read Detected by Formatter	9
80	8A	Host FIFO Parity Error detected by Common Buffer	9
80	8B	Host FIFO Parity Error detected by frame buffer logic	9
80	8C	Host Data Frame Buffer Parity Error	9
81	00	Reassign Power—Fail Recovery Failed	
81	00	LA Check Error, LCM bit = 0	4
81	00	LA Check Error	B
B4	00	Unreported Deferred Errors have been logged on log page 34h	6

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The Disk Manufacturing & Screening Module Introduction

The Disk Manufacturing & Screening Toolbox is the easiest to use, most versatile, and fastest disk testing product on the market. A true multi-threaded, multiple host bus adapter, multi-drive screening and testing tool, the Disk Screening Toolbox allows you to:

- confirm that the proper drives are in the subsystem
- download new drive firmware if needed
- set all mode pages to your standard
- set block size and capacity
- format
- log and track all error information
- run any type of test, or sequence of tests at **full bus and device speeds**
- log all test process activities, drive information, and any errors to an Access database

All processes and test sequences are created from a graphical user interface – no programming or scripting is required! Time from installation to running a complete test process can be as little as 5 minutes!

The Disk Screening Toolbox will test SCSI, Fibre Channel, iSCSI, and ATAPI interface disk drives. It runs under Windows operating systems, and will work with any SCSI, FC, iSCSI, or ATAPI host bus adapters.

It can simultaneously test all disk drives connected to up to eight HBA's in a given system – up to a maximum of 250 disk drives at a time.

Testing throughput speed will be dependent upon the maximum throughput that the Host Bus Adapters and your system can sustain. The faster your storage subsystem is the better throughput you will obtain. All test speeds can be monitored at any time during testing.

Test Methodology

The Disk Screening Tool looks at the disk test process as three distinct sections or phases,

Pre-Test Actions

Testing

Post-Test Actions

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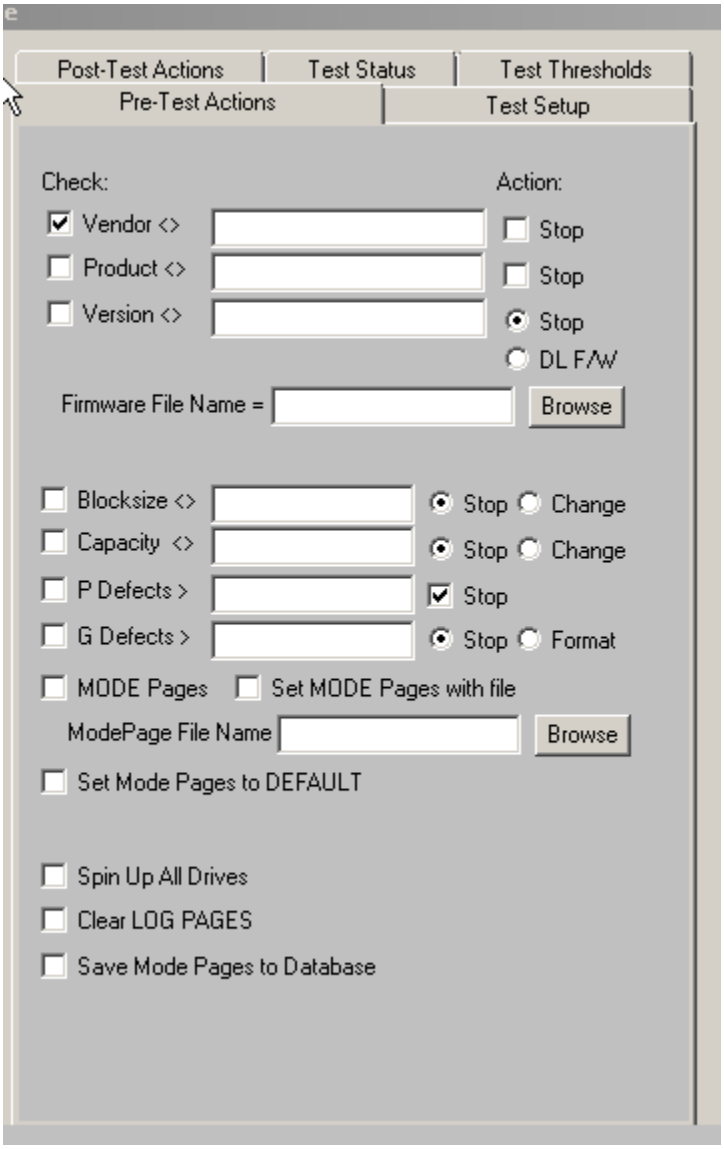
Pre-Test Actions



The pre-test process allows your test to screen the attached drives by the following qualifiers. Each Action consists of a ***Qualifier***, a ***User Input***, and an ***Action.*** Each Action is described below:

Drive Vendor – you can specify that a drive must match a certain vendor code, or the drive will be rejected from the test. Example = "SEAGATE"

Qualifier = INQUIRY VENDOR string
User Input = Enter the Vendor String to select on, for example "SEAGATE" or "IBM"

- please note that all string comparisons will be case sensitive, so if the Vendor string of the disk is SEAGATE you must enter your User Input in all capital letters

Action = Stop – if the User Input does not match the Qualifier the drive will be de-selected and not tested further

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Drive Product – you can specify that a drive must match a certain product code, or the drive will be rejected from the test. Example = “ST32123FC”

Qualifier = INQUIRY PRODUCT string
User Input = Enter the Product String to select on, for example “ST39102”.

- please note that all string comparisons will be case sensitive, so if the PRODUCT string of the disk is ST39102you must enter your User Input in all capital letters. Also note that sub-string matching is implemented, so that if your User Input = ST, this will “match” any Product string containing “ST”

Action = Stop– if the User Input does not match the Qualifier the drive will be de-selected and not tested further

Drive Firmware Version – you can specify that the firmware version of each drive must match a specified version. If the version does not match the drive under test the drive can either be rejected, or the proper firmware file can be downloaded into the drive.

Qualifier = INQUIRY VERSION string
User Input = Enter the Version String to select on, for example 1234.

- please note that all string comparisons will be case sensitive, and that sub-string matching is implemented

Action = Stop– if the User Input does not match the Qualifier the drive will be de-selected and not tested further
Action = Download Firmware – the firmware file specified in the Firmware File Name field will be downloading into the drive before testing. Use the Browse button to search for firmware files on your system. Firmware files must be obtained from your disk drive vendor. All drives that require a firmware download will be downloaded simultaneously.

Drive Block(“Sector”) Size – the current blocksize of the drive can be checked, and the drive can either be rejected if the blocksize is not correct, or the blocksize of the drive can be changed. Perfect for production runs of RAID systems.
Note: changing the drives block size requires a FORMAT – this will take a long time.

Qualifier = Block (“Sector”) size of the disk drive
User Input = Enter the desired blocksize
Action = Stop– if the User Input does not match the Qualifier the drive will be de-selected and not tested further

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Action = Change – the blocksize of the drive will be changed to the blocksize specified by User Input. A low-level format will be run after the block size is changed. All drives that require a format will be formatted simultaneously.

Drive Capacity – the number of blocks of the drive under test can be set to match a specified number, or the drive can be rejected if the capacity does not match a specified value.

Note: Entering "FULL" (without the quotes) will instruct DMM to restore the factory original full capacity to the drive before testing begins.

Qualifier = Capacity – number of blocks available on the disk drive
User Input = Enter the desired number of blocks – or enter FULL to set drive to it's factory capacity
Action = Stop– if the User Input does not match the Qualifier the drive will be de-selected and not tested further
Action = Change – the capacity of the drive will be changed to that specified by User Input.

Number of Primary Defects – a drive can be rejected if it has too many primary (factory) defects.

Qualifier = Capacity – number of Primary defects on the disk drive
User Input = Enter the maximum number of Primary Defects that you wish to allow
Action = Stop– disk has more Primary Defects than specified by User Input the drive will be de-selected and not tested further
Note: only SAS, SCSI, and FC drives have P & G lists

Number of Grown Defects – a drive can be rejected if it has too many grown defects, or alternatively a low-level format can be issued to try to clear the grown defects.

Qualifier = Capacity – number of Grown defects on the disk drive
User Input = Enter the maximum number of Grown Defects that you wish to allow
Action = Stop– disk has more Grown Defects than specified by User Input the drive will be de-selected and not tested further
Action = Format– a low-level format will be run discarding the current Grown Defect List
Note: only SAS, SCSI, and FC drives have P & G lists

Drive Mode Page Functions

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Set Mode Page with File

Checking MODE Pages plus Set Mode Pages with File allows you to set all MODE pages to the value of a "golden" drive. You must first create a Mode Page file using the top menu **Disk->Create MODE Page file for DMM** choice.

Enter or browse to the Mode Page file

Qualifier = Set the MODE PAGEs of the disk drive
User Input = The file name of the Mode Pages file recorded using the Menu Choice "Create ModePage File for DiskScreening"
Action = Each MODE PAGE will be set to the settings recorded from a "golden" drive.

To record a ModePage file for this use, do the following:

1. Select the disk drive to serve as the "golden" drive from the Main drive-selection menu
2. If the MODE PAGE settings of this drive are not set the way you want them, use the SCSItoolbox Mode Page functions to set them the way you want.
3. Choose the "***Create ModePage File for DMM***" choice from the Disk Menu
4. Specify the file name to save the Mode Page info to, then click the "Save to File" button
5. Use the browse button to select this file for your User Input

Set Mode Pages to Default

This choice will set all Mode Pages to factory default values

Spin Up all Drives

Spins up or starts all drives before testing begins
Action = A START command will be sent to each selected disk drive, and the program will wait for the drive to be ready before starting the test sequence

Clear Log Pages – all Log Page (error and performance) data can be cleared at the beginning of the test process.

Action = All drive LOG PAGES will be cleared before the test sequence is started. Log Pages contain run-time counters such as read and write error counters, etc. Clearing these pages before testing allows everything to be started "at zero"

Save Mode Pages to Database – all Mode Pages data can be logged at the beginning of the test process.

Action = All drive MODE PAGE values will be recorded in the database

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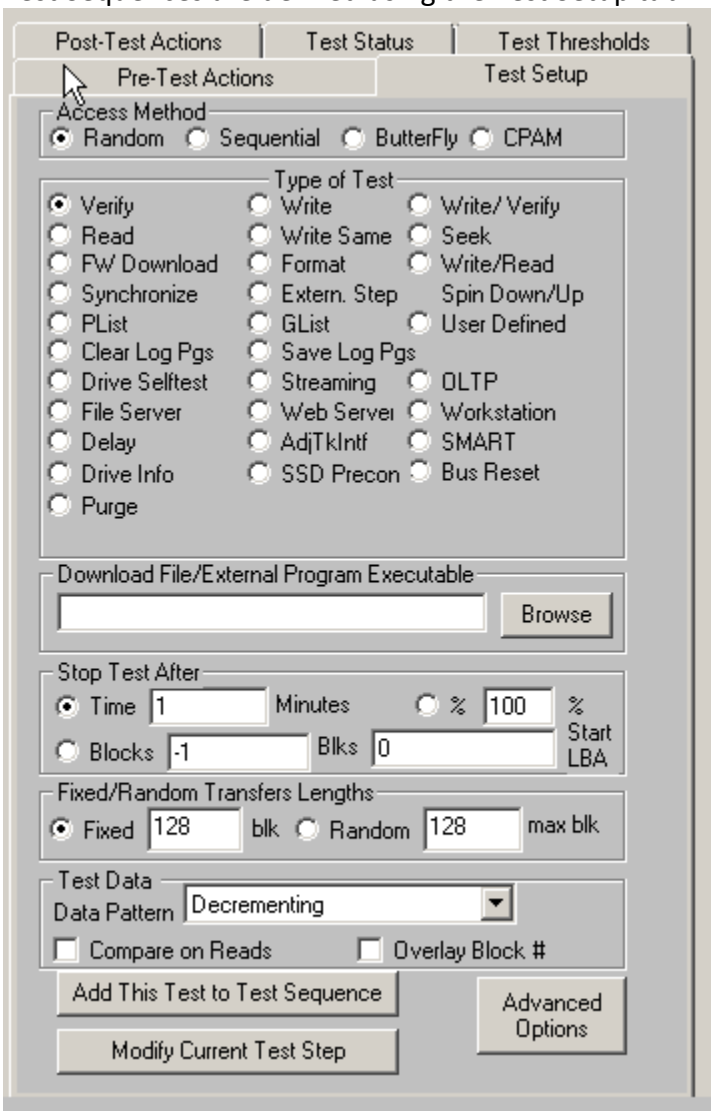
The Test Setup Tab

The test process will be made up of one or more tests assembled into test sequences. Each test sequence is defined by selecting test definition parameters from the Test Configuration Menu. Once a test is defined the test is added to the test sequence list.

Test Sequences are defined using the Test Setup tab



The following test parameters can be chosen for each test:

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Access Type

– choose whether each drive block is accessed in a **random manner**, **sequentially** through the test block range, in a **Butterfly** pattern (high-LBA, Start of drive, High LBA-1, Start +1, etc), or using STB's **CPAM** (Cyclical Permutation Access Method).

Random

Random Access testing will use a random number generator to choose the starting block of each data transfer. This will create a more strenuous test situation with more acceleration and deceleration and associated head settling time for each data transfer. There is no guarantee that random access testing will test every block on the disk.

Sequential

Sequential Access testing will process the data blocks of the disk drive in a sequential manner, and will insure that every block on the disk will be tested.

Butterfly

Butterfly access seeks between the highest LBA and LBA zero, then from Highest – 1 to 1, etc. This pattern works from the highest LBA down alternating with from zero up, with the seek span getting smaller each iteration.

CPAM is a better random access method.
The standard random access method may:
1. repeat LBAs
2. not cover the entire LBA range of the drive
3. Not ever access some LBAs

CPAM on the other hand will:
1. Never access an LBA more than once
2. Cover the entire LBA range of the drive
3. Access every LBA on the drive

Note: The CPAM access method allows random access, never repeats a block, and guarantees to hit every block.
Due to CPAMs true random nature it will result in a very low transfer rate.

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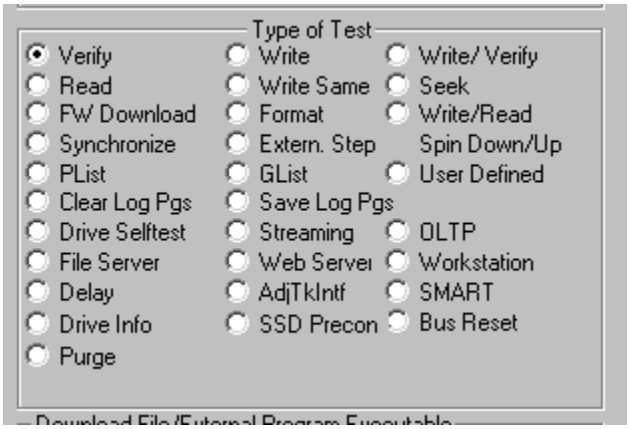
Test Type

The following test types or steps are available



Verify

Uses the SCSI VERIFY command. This command is just like a READ command, with the difference being that no data is actually transferred from the disk to the system. The data is read from the drive platters, and is ECC checked to see if data correction was necessary to accomplish the READ operation.

It can be very efficient to test using the VERIFY command rather than the READ command if you have a large number of drives attached to a bus with a total bus bandwidth of less than then total aggregate bandwidth needed to actually transfer data from all drives. For instance, if you have a 1Gb Fibre Channel bus with 100 drives attached, and each drive can sustain a average read transfer rate of 30MB/sec, using READ commands the Fibre Channel bus will saturate with three drives testing. But using the VERIFY test you can actually have all 100 drives effectively doing read testing at full speed, since no data is being transferred over the FC bus.

Write

The WRITE test will write data to the drive. It is a destructive test – any data previously written on the drive will be lost.

Write with Verify

The Write with Verify issues a write command, then a Verify operation is done to insure that the data is actually readable from the drive. The verify part of the operation does not transfer data across the bus to the host system.

Note: Due to the nature of this type of test (Write, then Verify the same LBA) it will be **VERY SLOW!** It is much better to run a separate Write Test, then a separate Verify Test.

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Read

The Read test reads data from the drive and transfers that data back to the host system. This data can be verified by checking the “Compare on Reads” check button.

Write/Read

This test writes data from the host system, then immediately reads the data back to the host. The read data can be compared with the data written using the “Compare on Reads” check button.

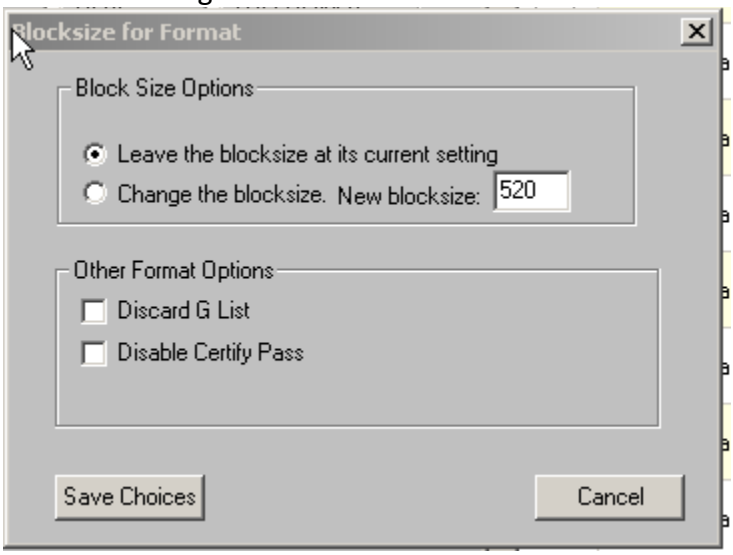
Note: Due to the nature of this type of test (Write, then Read the same LBA) it will be **VERY SLOW!** It is much better to run a separate Write Test, then a separate Read Test.

FW Download

This test is used to download firmware to the drive during a test sequence.
Use the Browse button to specify the file name of the firmware file.

Format

This test is used to format drive(s) during a test sequence. A dialog box allows you to specify a block size change before the format and to discard the drives Glist, and to not do a certify pass



Synchronize

This test is used to pause or stop testing until all drives under test have finished all their tests up to this point. For instance, if you want to test all drives to a certain point, then when all drives have reached that point run an external program to change a temperature chamber, you use the Synchronize test to sync the test steps of all drives.

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External Program

This test is used to run any external program as a test step. This could be used to control an environmental chamber, programmable power supplies, etc. Or this could be used to run an external program to extract factory logs or other vendor unique data at a certain point in the test sequence.

Spin Up/Down

This test type will spin the drive up or down

Plist

This test type will record the number of Primary defects to the .log file

Note: - only valid for SAS/SCSI/FC drives – SATA drives do not have accessible defect lists

Glist

This test type will record the number of Grown defects to the .log file.

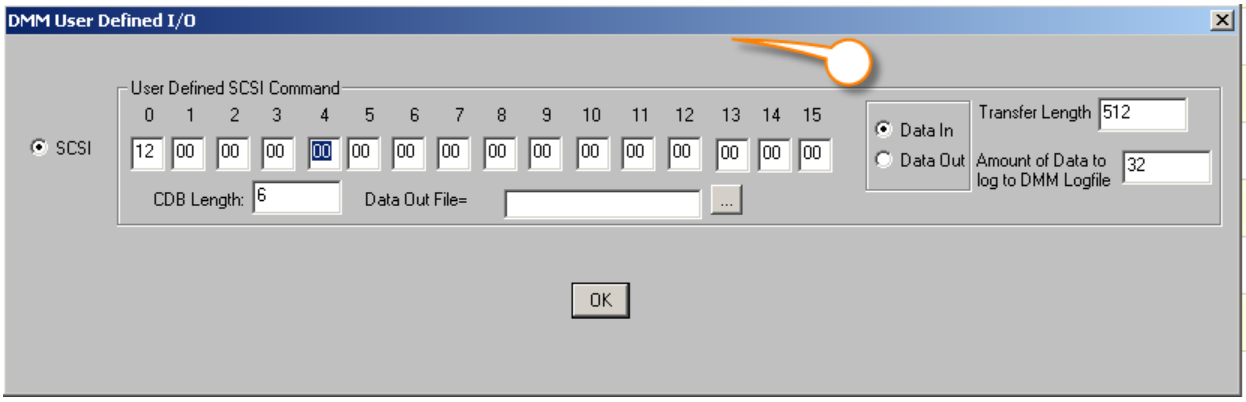
Note: - only valid for SAS/SCSI/FC drives – SATA drives do not have accessible defect lists

User Defined CDB

Lets you construct a CDB to issue to the drive.

The CDB can be 6,10,12, or 16 bytes.

You specify the data direction, data transfer size, and optionally how many data bytes to write to the .log file



Clear Log Pages

Clears (zeroes) all clearable Log Pages.

Useful if you want to only record Log Pages for a particular section of your test sequence.

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For example

-clear all log pages

-run some tests generating I/O

-record the log page data to the .log files

-repeat…

Save Log Pages

Records all Log Page/Parameters to the .log file. Log Page data is recorded in the same interpreted format as STB Original Mode View Log Pages.

Drive Selftest

Issues a DST to the drive and records the DST results

Streaming

The Streaming test simulates the functions of a video or audio streaming computer application. It consists of :
- transfer size = ***large random between 64 and 128 blocks***
- access method = ***sequential***
- each transfer step = ***write or read***

The Write/Read ratios are set using the Advanced Options tab Write/Read I/O Ratio setting

OLTP

The OLTP test simulates the functions of an Online Transaction Processing computer application. It consists of:

- transfer size = ***random*** between 4 and 32 blocks
- access method = ***random***
  - each transfer step = (***read, write***)

The Write/Read ratios are set using the Advanced Options tab Write/Read I/O Ratio setting

File Server

The File Server Test is a great test for mixing writes and reads, for mixing transfer lengths, and mixing where the I/O accesses are.

Let's go over each of these three attributes of the File Server Test.

Mixing of Writes and Reads: The default for the File Server Test is to issue 20% Writes to the drive, and 80% Reads to the drive. But you can modify this ratio by going to the Advanced Options dialog and inputting the desired Write/Read I/O Ratio. In the picture below, we have entered "75" – this means we want 75% of the I/O to be Writes (and 25% to be Reads).

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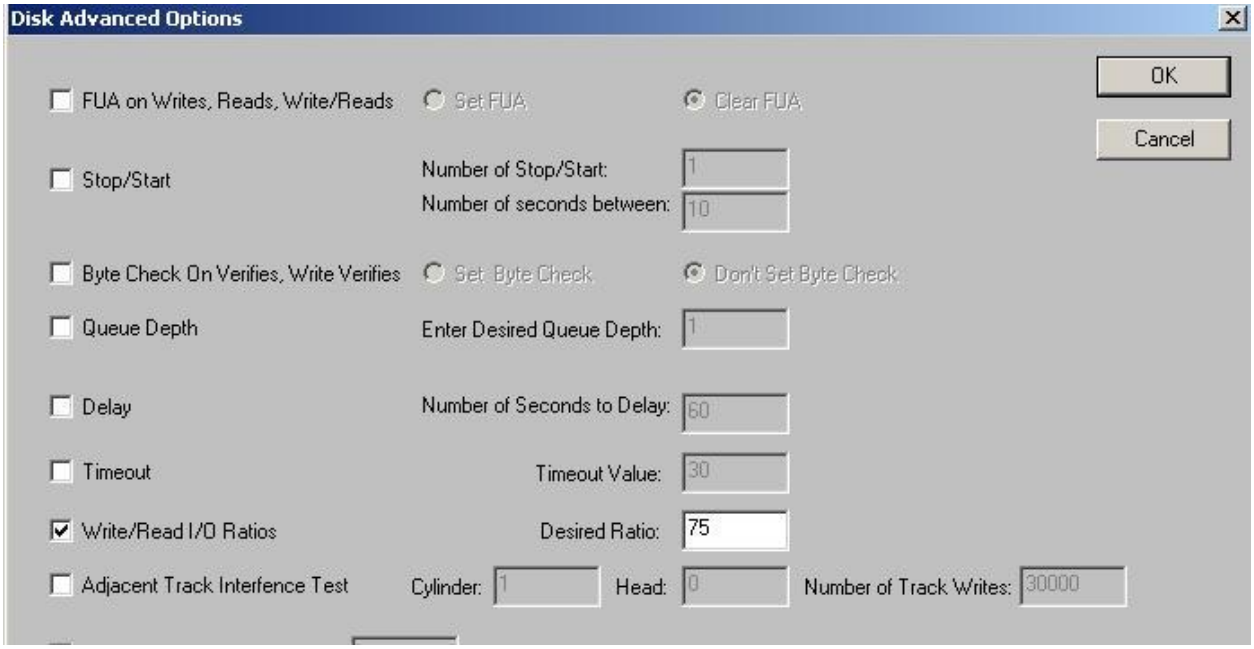

Mixing of Transfer Lengths: The File Server test will randomly pick transfer lengths between 8 and 128. You can modify this behavior by going to the “Fixed/Random Transfer Length” section, selecting the “Random” radio button, and inputting any value larger than 8. In the picture below, we have entered the number 32. This means this File Server Test will randomly pick transfer lengths between 8 and 32.

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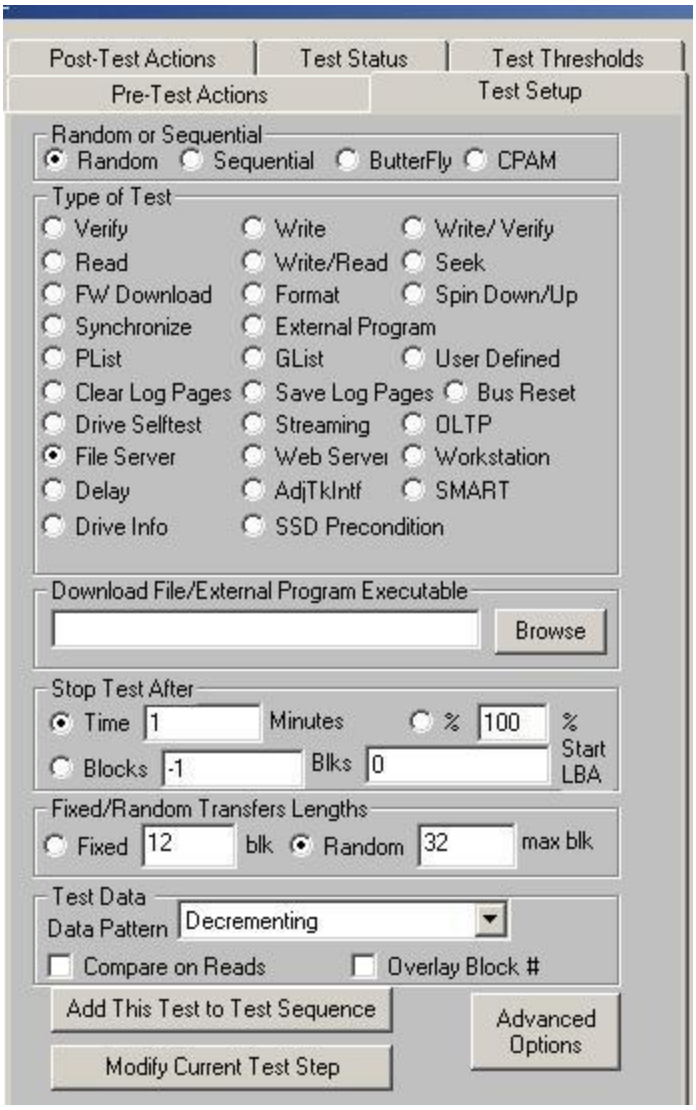

Mixing of Accesses to the Drive: The File Server Test accesses the drive in a random fashion (so, in particular, it is NOT a sequential access test).

In summary, the File Server Test is the perfect test for mixing up all the normal parameters like Writes & Reads, transfer lengths, and accesses to the drive.

Web Server

The Web Server test simulates the functions of a typical web server computer application.

It consists of:

- transfer size = random between 1 blk and 1024 blks
- access method = random
- each transfer = read

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Workstation

The Workstation test simulates the functions of a typical workstation computer application.

It consists of:

- transfer size = random between 1 and 32 blocks per transfer
- access method =
    - 8 out of 10 random
    - 2 out of 10 sequential from previous
- Each transfer =
    - 4 out of 5 = read
    - 1 out of 5 = write

The Write/Read ratios are set using the **Advanced Options** tab **Write/Read I/O** setting

Delay

Pauses for the number of seconds specified in the Advanced Options Delay field. Default is 60 seconds

Adjacent Track Interference

The AdjTkIntf (Adjacent Track Interference Test) test step tests for data integrity between physical tracks on the Disk Under Test.

Adjacent tracks are considered to be adjacent tracks on the same platter (NOT adjacent tracks on the same cylinder).
So given a track uniquely characterized by its Cyl:Hd values, the track “to the left” is (Cyl – 1):Hd, while the track to the right is (Cyl + 1):Hd.
Call these 3 tracks Tr_L, Tr_M, Tr_R.
We write “All Zeroes” to all 3 tracks.
Then we write a different pattern to Tr_M (the number of times we write to Tr_M is what you input on the Advanced Options edit box “Number of Writes to Middle Track”).
After writing track Tr_M say 100,000 times, we then look to track Tr_L, and Tr_R and see if “All Zeroes” is still there.
If there is all zeroes, the test succeeds.
If any bit is different, the test fails.

The test parameters are defined on the Advanced Options page -

SMART functions

Lets you screen (fail a drive) on either:

1. If any SMART Attribute Current value is within *n* of its Threshold value

2. If any SMART Attribute raw value is >= or <= to a specified value (up to 5 Attribute checks)

If none of the Fail settings are checked this test step will simply record all SMART data to the .log files.

If a FAIL setting is checked all FAIL checks and check settings will be recorded in the .log file

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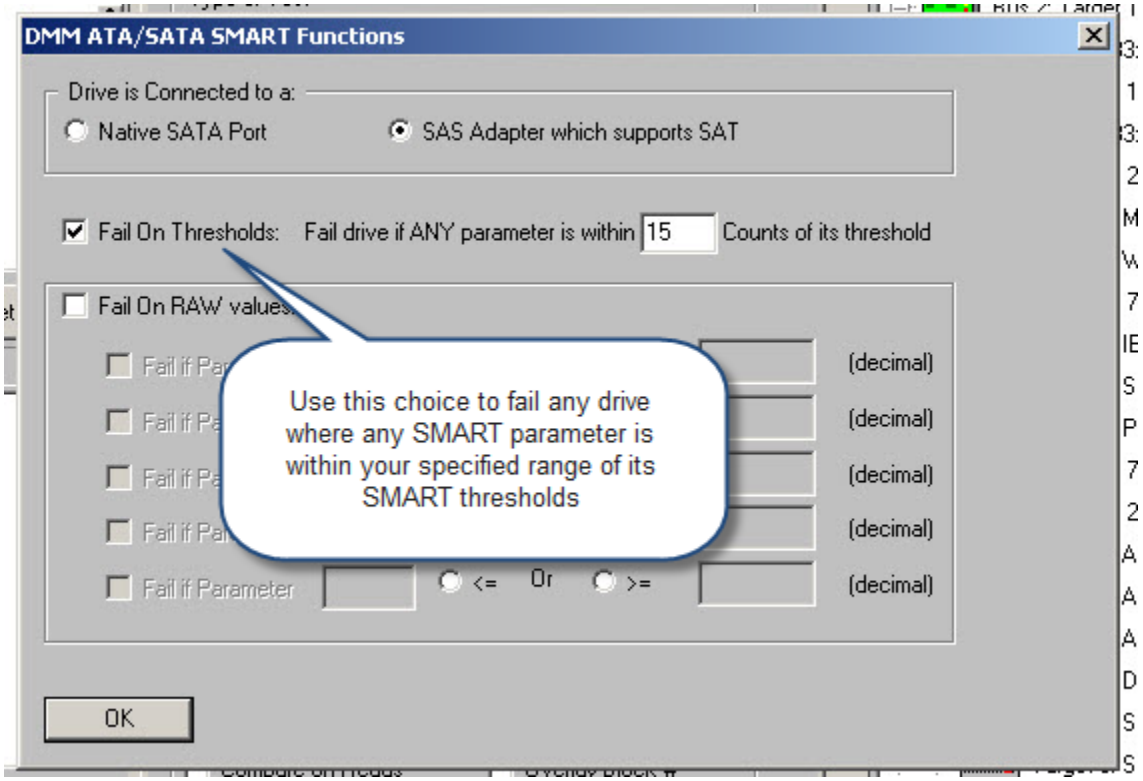
Screening on SATA SMART Thresholds for DMM

Select the SMART DMM test type, the following screen will be displayed where you may specify how you want to screen SATA drives using their SMART data.

Note: You may also use this test type to simply log the drive SMART data and not to fail a drive on any thresholds.

1. Screening on Current approaching Threshold



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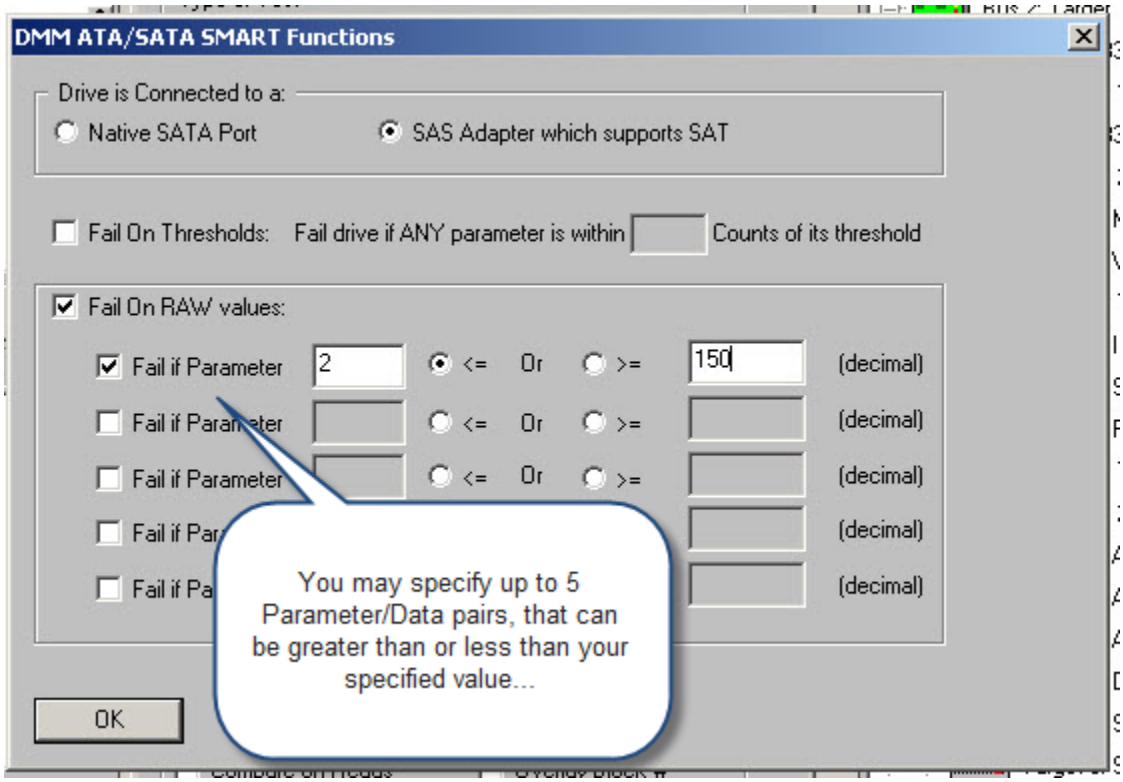
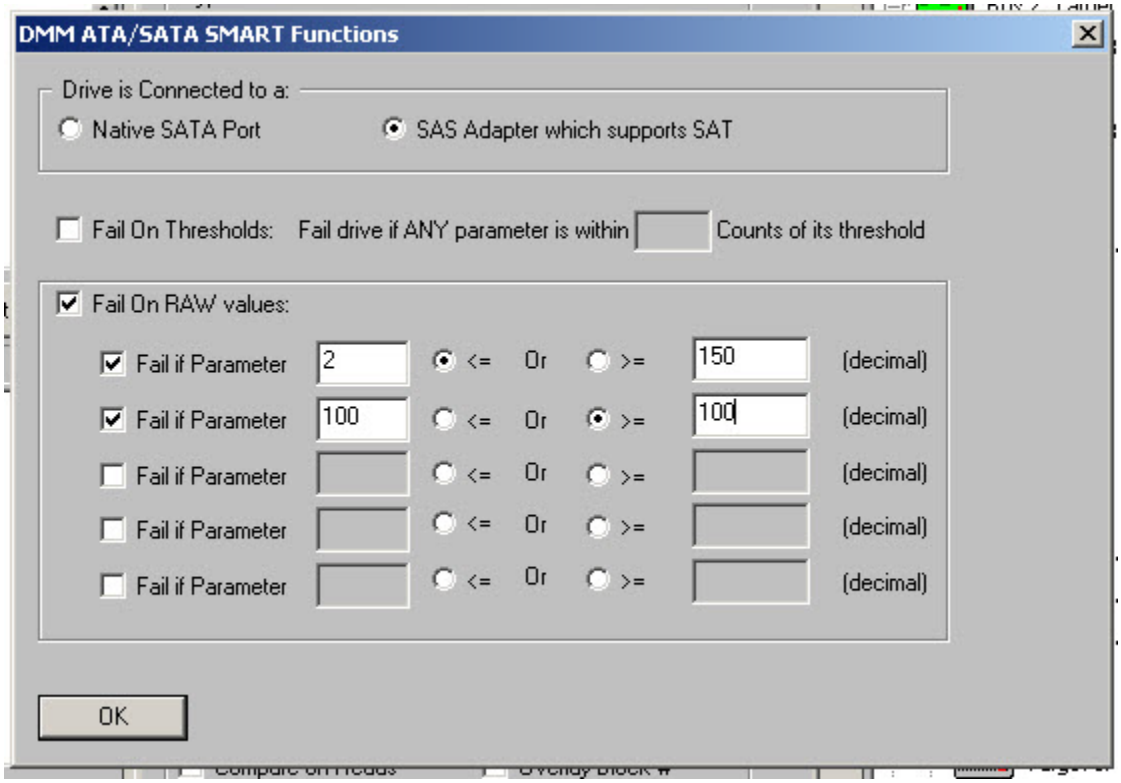
2. Screening on specific SMART parameter/data values3





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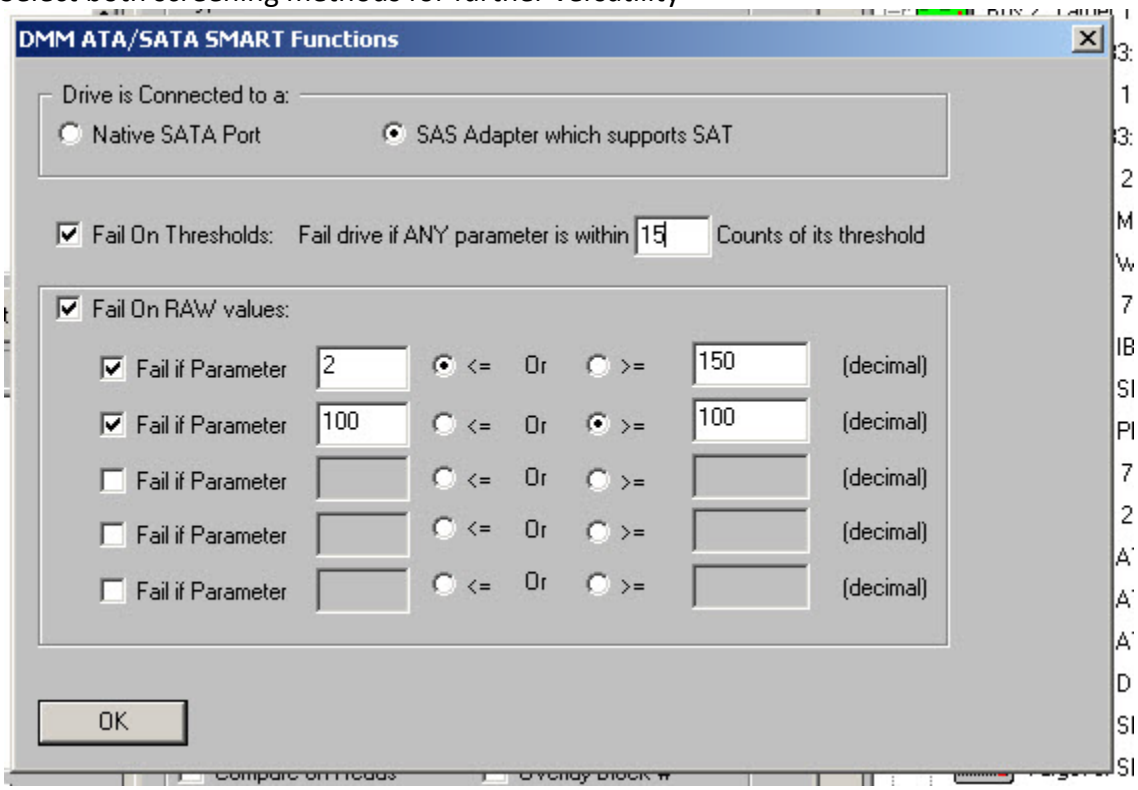
3. Screening using both methods

Select both screening methods for further versatility



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Log Results

The results of the screening (if any screening method is selected) will be reflected in both the DMM display (drive will be failed if any of your screening parameters is met) and in the drive log file.
The drive log file will show the raw SMART data, the raw SMART threshold data, and the interpreted SMART data, as shown below:

- a Drive with no SMART Errors:

```
================================================================================
>> SCSI Toolbox32, Version 8. 0. 1 (build)  9012, running on \\STB-DH       <<
================================================================================

Test Date:  02/02/2009  11:19:50
Test Pass:  1

  Device:  7:0:0   ATA      WDC WD5000AAJS-2   Serial:      WD-WCAS81978613

Results:
  02/02/2009  11:19:50  TEST 1 of 1:
                        SMART Data Test

SMART data follows:
10 00 01 0F 00 C8 C8 00 00 00 00 00 00 00 03 03
00 F3 B5 11 0B 00 00 00 00 00 04 32 00 64 64 DF
00 00 00 00 00 00 05 33 00 C8 C8 00 00 00 00 00
00 00 07 0E 00 C8 C8 00 00 00 00 00 00 00 09 32
00 5A 5A 9F 1D 00 00 00 00 00 0A 12 00 64 64 00
00 00 00 00 00 00 0B 12 00 64 64 00 00 00 00 00
00 00 0C 32 00 64 64 BB 00 00 00 00 00 00 C0 32
00 C8 C8 B5 00 00 00 00 00 00 C1 32 00 C8 C8 DF
00 00 00 00 00 00 C2 22 00 7C 55 1A 00 00 00 00
00 00 C4 32 00 C8 C8 00 00 00 00 00 00 00 C5 12
00 C8 C8 00 00 00 00 00 00 00 C6 10 00 C8 C8 00
00 00 00 00 00 00 C7 3E 00 C8 C8 00 00 00 00 00
00 00 C8 08 00 C8 C8 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 84 00 38 31 01 7B
03 00 01 00 02 93 05 00 00 00 00 00 00 00 00 00
00 00 01 06 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 49
```


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SMART Threshold data follows:
10 00 01 33 C8 C8 C8 C8 C8 C8 00 00 00 00 03 15
00 00 00 00 00 00 00 00 00 00 04 00 00 00 00 00
00 00 00 00 00 00 05 8C 00 00 00 00 00 00 00 00
00 00 07 33 C8 C8 C8 C8 C8 C8 00 00 00 00 09 00
00 00 00 00 00 00 00 00 00 00 0A 33 00 00 00 00
00 00 00 00 00 00 0B 33 00 00 00 00 00 00 00 00
00 00 0C 00 00 00 00 00 00 00 00 00 00 00 C0 00
00 00 00 00 00 00 00 00 00 00 C1 00 00 00 00 00
00 00 00 00 00 00 C2 00 00 00 00 00 00 00 00 00
00 00 C4 00 00 00 00 00 00 00 00 00 00 00 C5 00
00 00 00 00 00 00 00 00 00 00 C6 00 00 00 00 00
00 00 00 00 00 00 C7 00 00 00 00 00 00 00 00 00
00 00 C8 33 C8 C8 C8 C8 C8 C8 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 E1

Attribute 1 (** Raw Read Error Rate) - Flags = 0F, Current Value = 200, Threshold = 51, Worst = 200 Raw = (00 00 00 00 00 00)
Attribute 3 (Spin Up Time) - Flags = 03, Current Value = 243, Threshold = 21, Worst = 181 Raw = (11 0B 00 00 00 00)
Attribute 4 (Start/Stop Count) - Flags = 32, Current Value = 100, Threshold = 0, Worst = 100 Raw = (DF 00 00 00 00 00)
Attribute 5 (** Reallocated Sector Count) - Flags = 33, Current Value = 200, Threshold = 140, Worst = 200 Raw = (00 00 00 00 00 00)
Attribute 7 (Seek Error Rate) - Flags = 0E, Current Value = 200, Threshold = 51, Worst = 200 Raw = (00 00 00 00 00 00)
Attribute 9 (Power-On Hours Count) - Flags = 32, Current Value = 90, Threshold = 0, Worst = 90 Raw = (9F 1D 00 00 00 00)
Attribute 10 (Spin Retry Count) - Flags = 12, Current Value = 100, Threshold = 51, Worst = 100 Raw = (00 00 00 00 00 00)
Attribute 11 (Recalibration Retries) - Flags = 12, Current Value = 100, Threshold = 51, Worst = 100 Raw = (00 00 00 00 00 00)
Attribute 12 (Device Power-Cycle Count) - Flags = 32, Current Value = 100, Threshold = 0, Worst = 100 Raw = (BB 00 00 00 00 00)
Attribute 192 (Power Off Retract Count) - Flags = 32, Current Value = 200, Threshold = 0, Worst = 200 Raw = (B5 00 00 00 00 00)
Attribute 193 (Load Cycle Count) - Flags = 32, Current Value = 200, Threshold = 0, Worst = 200 Raw = (DF 00 00 00 00 00)
Attribute 194 (Device Temperature) - Flags = 22, Current Value = 124, Threshold = 0, Worst = 85 Raw = (1A 00 00 00 00 00)
Attribute 196 (** Reallocation Event Count) - Flags = 32, Current Value = 200, Threshold = 0, Worst = 200 Raw = (00 00 00 00 00 00)
Attribute 197 (** Current Pending Sector Count) - Flags = 12, Current Value = 200, Threshold = 0, Worst = 200 Raw = (00 00 00 00 00 00)
Attribute 198 (*Off-Line Scan Uncorrectable Sector Count) - Flags = 10, Current Value = 200, Threshold = 0, Worst = 200 Raw = (00 00 00 00 00 00)
Attribute 199 (Ultra DMA CRC Error Count) - Flags = 3E, Current Value = 200, Threshold = 0, Worst = 200 Raw = (00 00 00 00 00 00)
Attribute 200 (Write Error Rate/Multi-zone Error Rate) - Flags = 08, Current Value = 200, Threshold = 51, Worst = 200 Raw = (00 00 00 00 00 00)

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02/02/2009 11:19:51 PASSED

- a Drive *with* SMART Errors:

```
================================================================================
>> SCSI Toolbox32, Version 8. 0. 1 (build)  9012, running on \\STB-DH       <<
================================================================================

Test Date:  02/02/2009  11:19:50
Test Pass:  1

  Device:  7:12:0   ATA      ST31000340NS      Serial:          9QJ280T5

Results:
 02/02/2009  11:19:50  TEST 1 of 1:
                  SMART Data Test

SMART data follows:
0A 00 01 0F 00 4E 44 4E CD 9F 03 00 00 00 03 03
00 62 5B 00 00 00 00 00 00 00 04 32 00 64 64 31
01 00 00 00 00 00 05 33 00 64 64 00 00 00 00 00
00 00 07 0F 00 48 3C 77 A5 E1 00 00 00 00 09 32
00 64 64 B1 02 00 00 00 00 00 0A 13 00 64 64 02
00 00 00 00 00 00 0C 32 00 64 25 C8 00 00 00 00
00 00 B8 32 00 64 64 00 00 00 00 00 00 00 BB 32
00 64 64 00 00 00 00 00 00 00 BC 32 00 64 4B 70
00 68 00 68 00 00 BD 3A 00 64 64 00 00 00 00 00
00 00 BE 22 00 49 38 1B 00 19 1B 00 00 00 C2 22
00 1B 2C 1B 00 00 00 14 00 00 C3 1A 00 27 24 4E
CD 9F 03 00 00 00 C5 12 00 64 64 00 00 00 00 00
00 00 C6 10 00 64 64 00 00 00 00 00 00 00 C7 3E
00 C8 C8 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 82 00 82 02 00 7B
03 00 01 00 01 E6 02 00 00 00 00 00 00 00 00 00
00 00 05 00 05 00 00 00 01 01 09 01 01 01 01 01
01 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00
00 00 00 00 00 00 00 00 1A 04 88 35 42 02 00 00
00 00 00 00 01 00 36 05 58 3D B4 9B 08 00 00 00
74 38 13 96 02 00 00 00 00 00 00 13 F0 F6 01
00 00 00 00 00 00 00 00 40 00 00 00 00 00 00 00
0E 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 AB
```


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SMART Threshold data follows:
01 00 01 2C 00 00 00 00 00 00 00 00 00 00 03 00
00 00 00 00 00 00 00 00 00 00 04 14 00 00 00 00
00 00 00 00 00 00 05 24 00 00 00 00 00 00 00 00
00 00 07 1E 00 00 00 00 00 00 00 00 00 00 09 00
00 00 00 00 00 00 00 00 00 00 0A 61 00 00 00 00
00 00 00 00 00 00 0C 14 00 00 00 00 00 00 00 00
00 00 B8 63 00 00 00 00 00 00 00 00 00 00 BB 00
00 00 00 00 00 00 00 00 00 00 BC 00 00 00 00 00
00 00 00 00 00 00 BD 00 00 00 00 00 00 00 00 00
00 00 BE 2D 00 00 00 00 00 00 00 00 00 00 C2 00
00 00 00 00 00 00 00 00 00 00 C3 00 00 00 00 00
00 00 00 00 00 00 C5 00 00 00 00 00 00 00 00 00
00 00 C6 00 00 00 00 00 00 00 00 00 00 00 C7 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 C4

Attribute 1 (** Raw Read Error Rate) - Flags = 0F, Current Value = 78, Threshold = 44, Worst = 68 Raw = (4E CD 9F 03 00 00)
Attribute 7 (Seek Error Rate) - Flags = 0E, Current Value = 200, Threshold = 51, Worst = 200 Raw = (00 00 00 00)
Attribute 4 (Start/Stop Count) - Flags = 32, Current Value = 100, Threshold = 20, Worst = 100 Raw = (31 01 00 00 00 00)
Attribute 5 (** Reallocated Sector Count) - Flags = 33, Current Value = 100, Threshold = 36, Worst = 100 Raw = (00 00 00 00 00 00)
Attribute 7 (Seek Error Rate) - Flags = 0F, Current Value = 72, Threshold = 30, Worst = 60 Raw = (77 A5 E1 00 00 00)
Attribute 9 (Power-On Hours Count) - Flags = 32, Current Value = 100, Threshold = 0, Worst = 100 Raw = (B1 02 00 00 00 00)
Attribute 10 (Spin Retry Count) - Flags = 13, Current Value = 100, Threshold = 97, Worst = 100 Raw = (02 00 00 00 00 00)
!!! WARNING !!! attribute Spin Retry Count value 100 is approaching threshold 97
Attribute 12 (Device Power-Cycle Count) - Flags = 32, Current Value = 100, Threshold = 20, Worst = 37 Raw = (C8 00 00 00 00 00)
Attribute 184 () - Flags = 32, Current Value = 100, Threshold = 99, Worst = 100 Raw = (00 00 00 00 00 00)
!!! WARNING !!! attribute value 100 is approaching threshold 99
Attribute 187 () - Flags = 32, Current Value = 100, Threshold = 0, Worst = 100 Raw = (00 00 00 00 00 00)
Attribute 188 () - Flags = 32, Current Value = 100, Threshold = 0, Worst = 75 Raw = (70 00 68 00 68 00)
Attribute 189 () - Flags = 3A, Current Value = 100, Threshold = 0, Worst = 100 Raw = (00 00 00 00 00 00)
Attribute 190 (Airflow Temperature) - Flags = 22, Current Value = 73, Threshold = 45, Worst = 56 Raw = (1B 00 19 1B 00 00)
Attribute 194 (Device Temperature) - Flags = 22, Current Value = 27, Threshold = 0, Worst = 44 Raw = (1B 00 00 00 14 00)
Attribute 195 (Hardware ECC Recovered) - Flags = 1A, Current Value = 39, Threshold = 0, Worst = 36 Raw = (4E CD 9F 03 00 00)
Attribute 197 (** Current Pending Sector Count) - Flags = 12, Current Value = 100, Threshold = 0, Worst = 100 Raw = (00 00 00 00 00 00)
Attribute 198 (Off-Line Scan Uncorrectable Sector Count) - Flags = 10, Current Value = 100, Threshold = 0, Worst = 100 Raw = (00 00 00 00 000)
Attribute 199 (Ultra DMA CRC Error Count) - Flags = 3E, Current Value = 200, Threshold = 0, Worst = 200 Raw = (00 00 00 00 00 00)

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!!!Error!!!- Drive failed - SMART Value 10 (Spin Retry Count) is within 5 0f Threshold

02/02/2009 11:19:51 *** FAIL ***

Drive Info

Records all possible drive information to the .log file.

In the case of SCSI/SAS/FC drives INQUIRY data and drive temperature will be recorded –

****

Drive INQUIRY information:

Vendor = SEAGATE

Product = ST4000NM0043

Revision = 0003

Device Type = Direct Access

Removeable Media = No

Dual Port

Width = 8 bit

Queuing Supported

SCSI Level = 6

Serial Number = Z1Z081410000B324ENTC

WWN = 5000C50055E8E051

Drive Temperature = 35

For SATA drives all drive IDENTIFY and SMART data and SMART Self-test results will be recorded.

SSD Precondition

To “precondition a drive” is a fairly complex process, a process whose goal is to determine if the drive is in a stable state. This process involves writing the SSD drive twice, and then taking performance measurements, and then mathematically analyzing these measurements to determine if the drive is in a stable state. The new SSD Preconditioning Test incorporates all of this mathematical analysis, alleviating the user from having to digest all the complex criteria for this preconditioning process.

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After the SSD Preconditioning Test has completed, the logfile will contain a summary of all the technical details for how we determined the drive is in a stable state. Here is a sample logfile output:

```
 ---------------------------------------------------------------------------
10/11/2012  08:17:10  TEST 2 of 2:
                      SSD Precondition (Performance) Test
                      Stop-on-Error Type: Stop Current Test

Measurement Window Values:228.90 MB/s, 240.21 MB/s, 240.60 MB/s, 240.71 MB/s, 240.71 MB/s

The above 5 values forms a "Measurement Window" because of the following information

Average of Measurement Window Values: 238.23,
Maximum Difference of Measurement Window Values:11.82

Max Difference of Values is 5.0% of Average Values, which is <= 20%

Least Squares Slope: 2.41,
Least Squares Y-Intercept: 238.23,
Maximum Difference on Least Squares Line:9.66

Max Diff of Least Square Line Values is 4.1% of Average Values, which is <= 10%

  Total number of Measurements Taken: 10

  10/11/2012  09:26:40  Test Completed Successfully

  10/11/2012  09:26:40                                    PASSED
  ---------------------------------------------------------------------------
```

Here we explain some of the technical details in the logfile. After writing the drive twice with a workload which is independent of the measurement values, we run a 1 minute test and get the transfer rate for this 1 minute interval. We then build up 5 measurement values, each value being the transfer rate from a 1 minute interval. We then “feed” these 5 values into our mathematical cruncher to determine if the drive has a stable transfer rate. If it does NOT, we then continue with another interval. As you can see from the logfile, we had to take 10 measurement values. The final 5 values are printed in the logfile (these are the values 228.90 MB/s, 240.21 MB/s, 240.60 MB/s, 240.71 MB/s, and 240.71 MB/s). Our mathematical cruncher determined two criteria were satisfied:

#1: That the maximum difference of the measurement values was less than 20% of the average of the 5 measurement values (in fact, the logfile indicates the maximum difference was only 5.0% of the average).

#2: If you take the Method of Least Squares line going thru these 5 measurement values, the maximum difference on this line must be less than 10% of the average of the measurement values (in fact, the logfile indicates the maximum difference on the least squares line was only 4.1% of the average).

That criteria #1 and #2 were satisfied, the drive is considered preconditioned (i.e. is in a stable state in relationship to performance).

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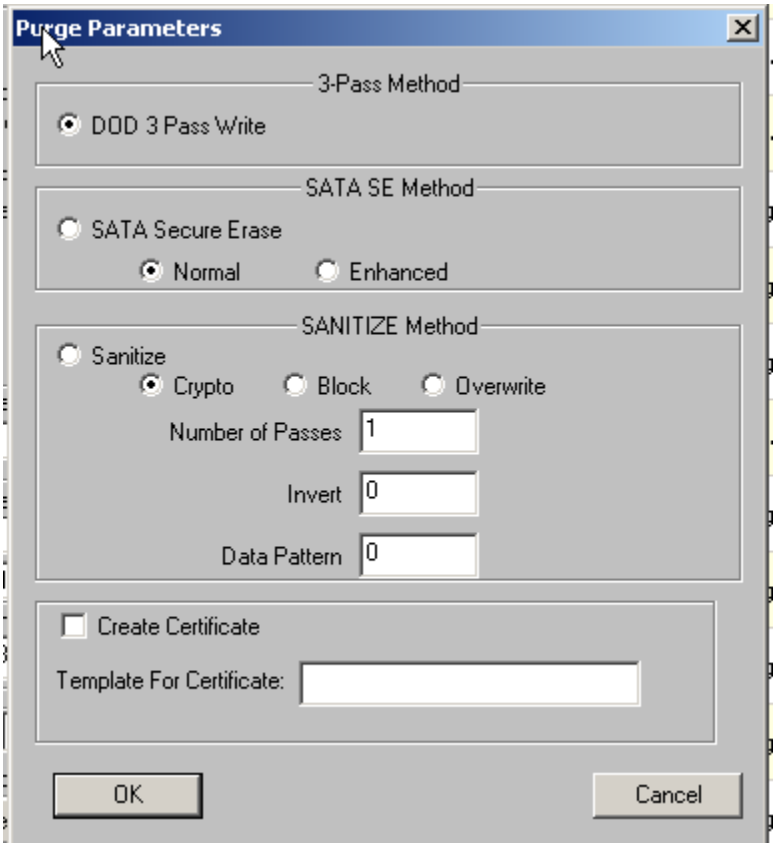
Bus Reset

Will attempt to issue a hard bus reset to the HBA the drive is connected to

Purge

Allows several type of purge/wipe/declassify operations



DoD 5220 3-Pass Write Purge

This choice will do :
1. write all zeros to all blocks
2. write all ones to all blocks
3. write random data to all blocks
4. verity the last random data pass

SATA Security Erase Purge

This choice will issue a SATA SECURITY ERASE command to the drive

Sanitize Purge

There are three possible types of SANITIZE operations
Note: some drives may not implement any, if a drive does support SANITIZE it will probably only support one of the three types.

Crypto Purge

For Self-Encrypting Drives (SED). Changes the drives internal crypto key resulting in all previous data being scrambled. Completes in seconds.

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OverWrite Purge

Runs one or more write passes to all blocks on the drive.

Number of Passes = how many full write passes

Invert – if checked and if multiple passes are specified the data pattern will be inverted on odd-number write passes

Data Pattern – four bytes which will be repeated to fill the block

Note: each pass can take several hours to complete.

This operation can not be stopped! If you power the drive off it will resume the full purge when powered back up. There is no way to interrupt this operation and it can take a LONG time to compete.

Block Purge

For Block aware drives.

Create Purge Certificate

This option uses a text template file, allowing you to specify fields to be filled in such as the Drive type, model, manufacturer, serial number, the time and date, etc along with any text desired.

These files are template files that you create with and editor. You can embed the following tokens into these files and the report generator will fill the values in at print time:

%d	prints time and date
%v	prints SCSI VENDOR data
%p	prints SCSI PRODUCT data
%r	prints SCSI VERSION data
%s	prints SCSI serial number
%a	prints SCSI target address
%c	prints capacity
%n	prints name of last test run
%f	prints a form feed
%e	prints test error count
%k	prints SCSI Sense information

For example :

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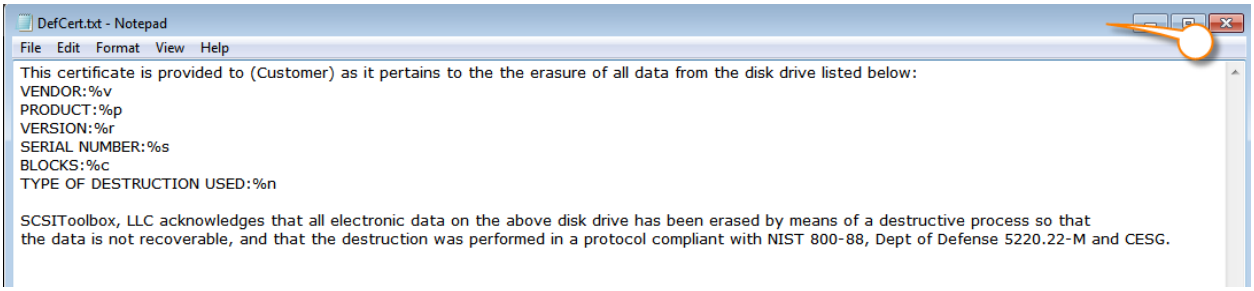
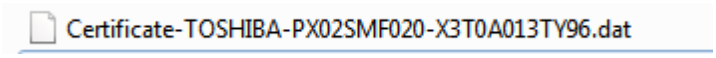
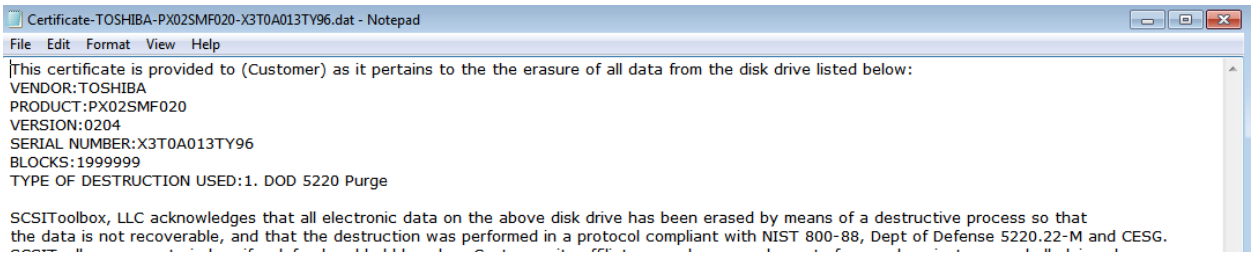


The results of the purge will create a file named with the drive name and s/n –



Here are the contents of that file –



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When to stop testing

Below the list of test types is the area to specify when to stop the test step.

Run test by
Number of Blocks or by
Time
– the test can be defined to run for a time duration, such as 30 minutes, or by a number of blocks. If specifying a number of blocks, the entire drive may be specified by entering '-1' for the number of blocks to test.

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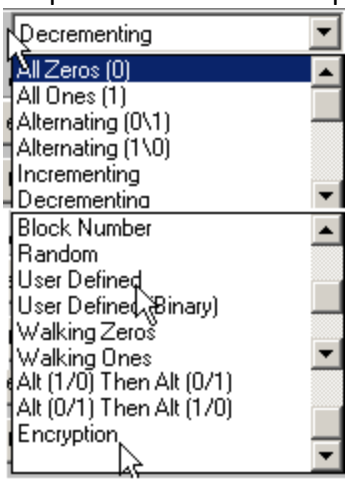
Data Pattern

– a pull-down list of data patterns is available to choose from.



13 different data patterns are available for testing – and each pattern can optionally have the data block overlaid, making a total of 26 data patterns

All Zeros

A repeating pattern of 00000000

All Ones

A repeating pattern of 11111111

Alternating (0/1)

A repeating pattern of 01010101

Alternating (1/0)

A repeating pattern of 10101010

Incrementing

Each block is filled with pattern 00010203040506...

Decrementing

Each block is filled with pattern FFFEFDFCFBFAF9F8…

Block Number

The block number is repeated throughout each block-size buffer

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Random

Totally random data using a random number generator with period 16GBytes

User Defined

When the user selects this pattern, the user is prompted to enter a file with the desired pattern. It is recommended this file be created with NotePad. This file can be of any length and the pattern on the file is written to each block. The file must only contain hex digits, namely 0 thru 9, and characters ‘a’, ‘b’, ‘c’, ‘d’, ‘e’, ‘f’.

Walking Ones

An 8-byte repeating pattern – 00000001 00000010 00000100 00001000 00010000 00100000 01000000 10000000

Walking Zeros

An 8-byte repeating pattern – 11111110 11111101 11111011 11110111 11101111 11011111 10111111 01111111

Alt (0/1) then Alt (1/0)

A two-byte repeating pattern 01010101 10101010

Alt (1/0) then (0/1)

A two-byte repeating pattern 10101010 01010101

Overlay Block option

– the block number can be overlaid on top of any data pattern. This will overlay the first four bytes of each blocks data with the LBA being written.

Data Compare on Read

– this option can be chosen to confirm that the expected data was read from the disk by doing a data compare.

Checking this box will cause all data read to be checked that it compares with the expected data. If a miscompare is found the test will be aborted and the miscompare data will be recorded in the database and will be viewable in the Test Status tab page.

You must take care to specify the same data pattern for your read test as you used when you wrote the data. Also, be careful to use the same **Overlay Block** setting as used when writing.

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Transfer Lengths

Specifies how many blocks per command are transferred. Most HBAs will support transfer sizes up to 1MB per transfer. Some will support 2 and even 8MB per transfer.
You can choose between fixed (always transfer the same amount of data) or Random (transfer size between one and the specified **Max Block** value

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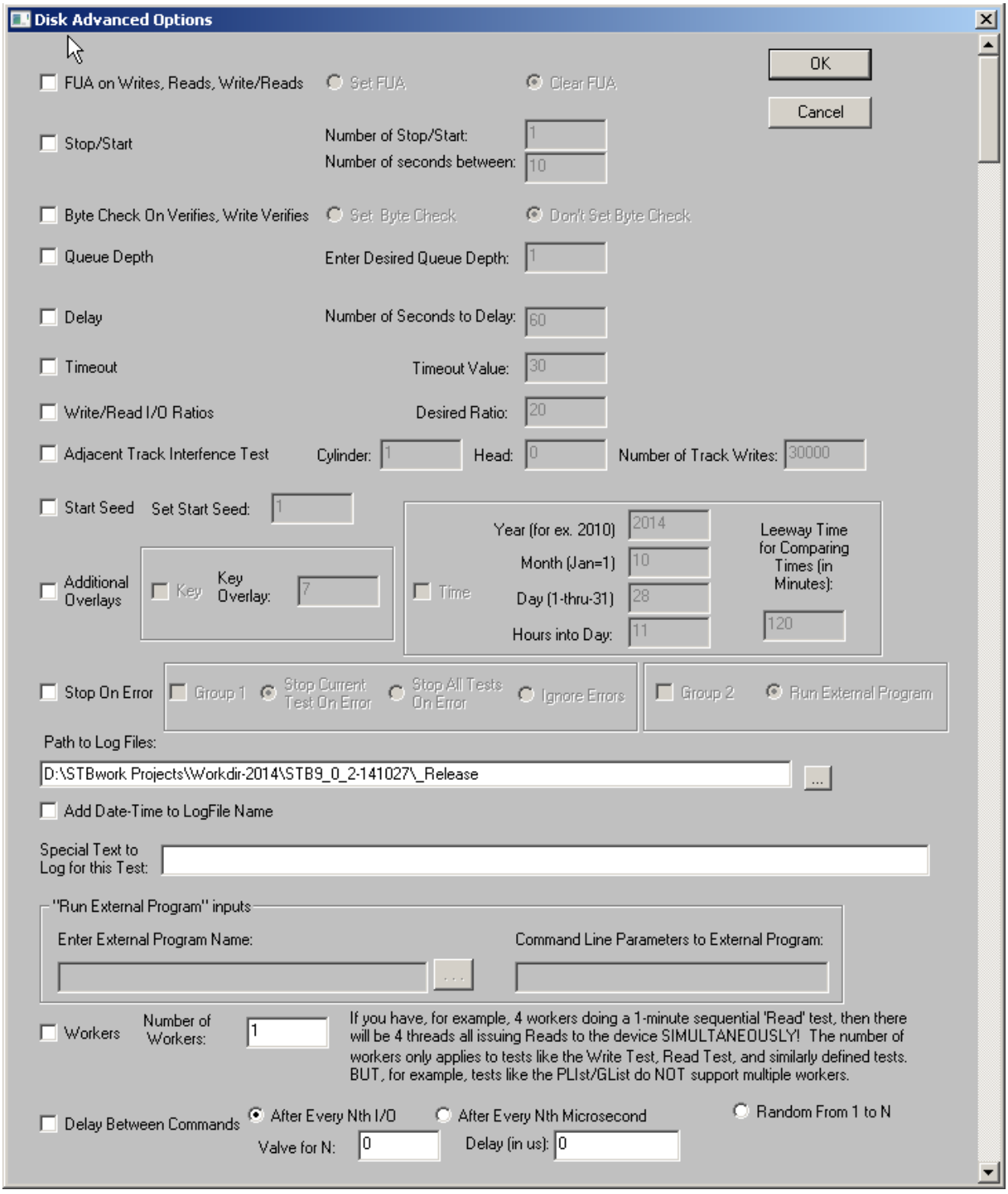
Advanced Options

Note: All Advanced Options settings are per-test-step and will be saved/loaded when a sequence file is save or loaded.



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FUA on Writes, Reads, Write/Reads

Will set the FUA (Force Unit Access) bit in all WRITE, READ, and WRTE/READ commands.

FUA tells the drive not to complete the command until all data has been written to non-volatile media

Stop/Start

Specify the Number of Stop/Start cycles and number of seconds delay between cycles for the Stop-Start Test Step.

Byte Check On Verifies, Write Verify

If set then data will be transferred and used to compare on the Verify test step

Queue Depth

Allow you to set the maximum queue depth to try to obtain during WRITE and READ tests.

Delay

Lets you specify how many seconds to delay when the Delay test step is run

Timeout

Lets you specify the command timeout value after which an outstanding command will be aborted. The default timeout in the STB Suite is 30 seconds with the exception of long duration commands such as FORMAT, SANITIZE, etc.

Write/Read I/O ratios

The Disk Manufacturing Module (DMM) has the capability to issue writes and reads at a user defined percentage. So if you want to have a test that issues 17% writes (and 83% reads), this can be done using one of following tests: Streaming, OLTP, FileServer, and Workstation.

You specify which test by selecting the appropriate test (see the picture below, where we have selected the Workstation Test):

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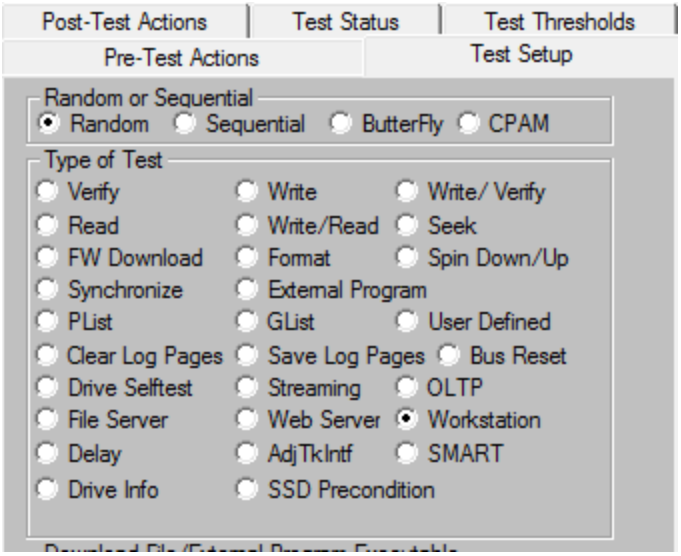
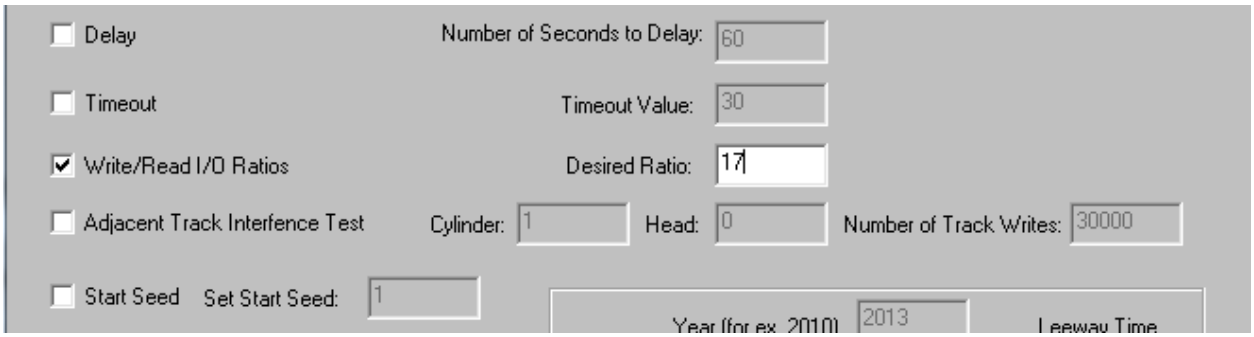


To specify the Write/Read I/O ratio, click on the **Advanced Options** button, and input the percentage of writes you want (see the picture below, where we have entered 17, which means we want 17% writes):



If you run the Workstation Test with the Write/Read I/O ratio set to 17, you will get 17% writes and 83% reads.
The Workstation Test is unique in that it randomly accesses the drive 80% of the time, while 20% of the time it is sequential.

If you would like a 100% sequential access test that supports the Write/Read I/O ratios parameter, use our Streaming Test. If you would like a 100% random access test, use our OLTP or FileServer Test (these both support the Write/Read I/O ratio parameter).

Note that our Write/Read Test does NOT support the Write/Read I/O ratio parameter.
In the Write/Read test, there is no concept of write percentage (or write ratio) – the Write/Read test always Writes to a block and then immediately Reads that exact same block (so necessarily the Write percentage MUST be 50%).

Adjacent Track Interference Test

The AdjTkIntf (Adjacent Track Interference Test) test step tests for data integrity between physical tracks on the Disk Under Test.

Adjacent tracks are considered to be adjacent tracks on the same platter (NOT adjacent tracks on the same cylinder).

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So given a track uniquely characterized by its Cyl:Hd values, the track “to the left” is (Cyl – 1):Hd, while the track to the right is (Cyl + 1):Hd.
Call these 3 tracks Tr_L, Tr_M, Tr_R.
We write “All Zeroes” to all 3 tracks.
Then we write a different pattern to Tr_M (the number of times we write to Tr_M is what you input on the Advanced Options edit box “Number of Writes to Middle Track”).
After writing track Tr_M say 100,000 times, we then look to track Tr_L, and Tr_R and see if “All Zeroes” is still there.
If there is all zeroes, the test succeeds.
If any bit is different, the test fails.

The test parameters are defined on the Advanced Options page -

Start Seed

Lets you specify the seed number to be used to seed the random number generate to generate random data patterns.

Additional Overlays

In addition to the standard LBA overlay you can specify:

Key Overlay

a Key value – a number which will be overlayed in each block of data pattern

Time Overlay

a Time value and Time Leeway value

The Timestamp overlay writes the time and date into each block of data pattern.

The Time Leeway value is used to specify how long written data is considered to be valid.

This is used to detect “stale” data

Stop On Error (SOE) Options

Specify what to do when an error occurs. These SOE options are per-drive-under-test.

Choices are

Group 1 Stop Current Test On Error

End the currently running test step, go on to the next step if there is one

Group 1 Stop All Tests On Error

End all further testing on this drive

Group 1 Ignore Errors

Ignore the error and keep running the current test step

Group 2 Run an external program

Run an external program on error.
Example – turn off a programmable power supply if a drive fails
The program to run and command line parameters are specified in the **Run External Program** inputs fields defined below

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SOE Further Details –

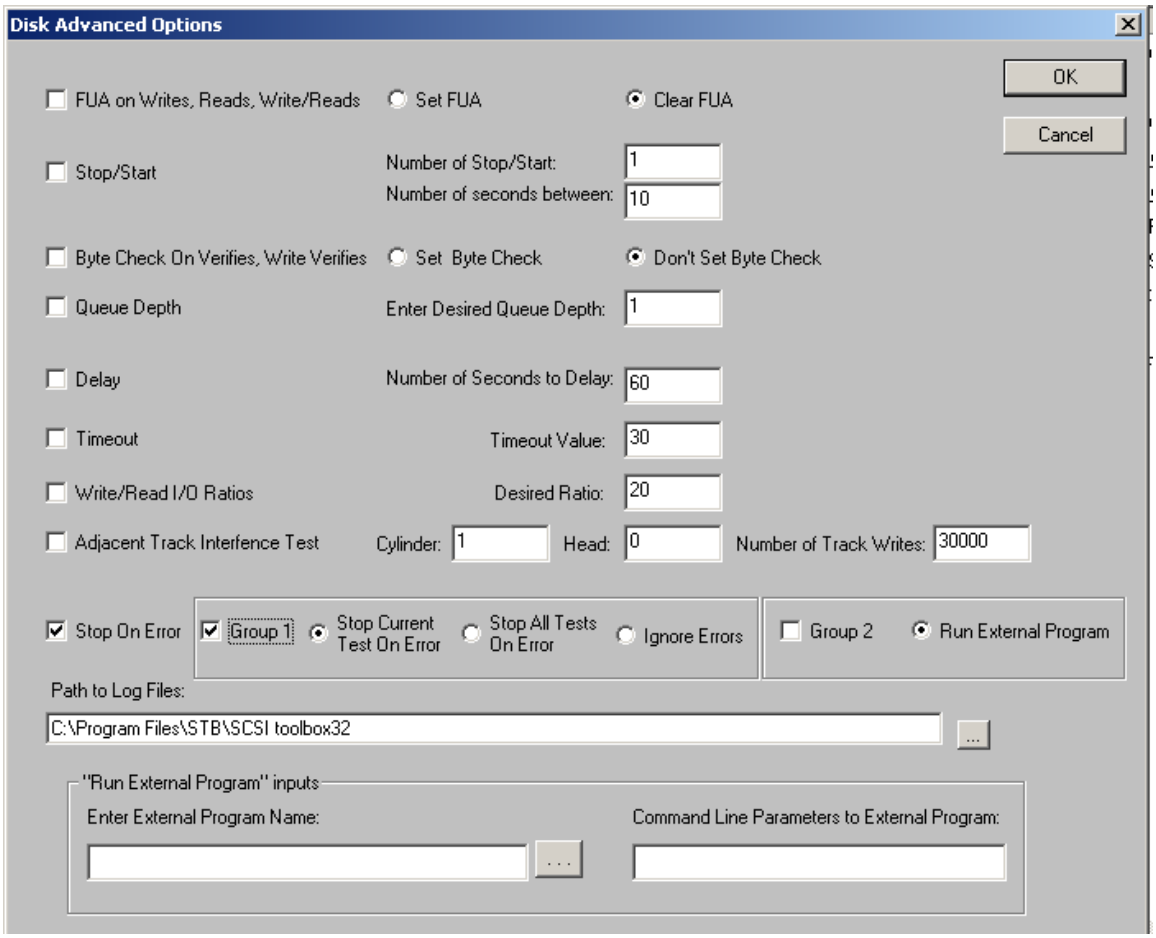
The “Stop On Error” options, which can be set on the “Advanced Options” dialog inside of DMM, were designed to allow you to accomplish the following six tasks:

A) If an error occurs to stop the current test in the test sequence
B) If an error occurs to stop all tests in the test sequence
C) If an error occurs to simply ignore the error
D) If an error occurs to run an “External Program”
E) If an error occurs to run an “External Program” and if the “External Program” fails to stop the current test
F) If an error occurs to run an “External Program” and if the “External Program” fails to stop all tests
G) If an error occurs to run an “External Program” and continue executing the current test

Let’s take a closer look at each of the above options.

Option A) If an error occurs to stop the current test in the test sequence

On the “Advanced Options” dialog in DMM, you set this option as seen in the following picture:



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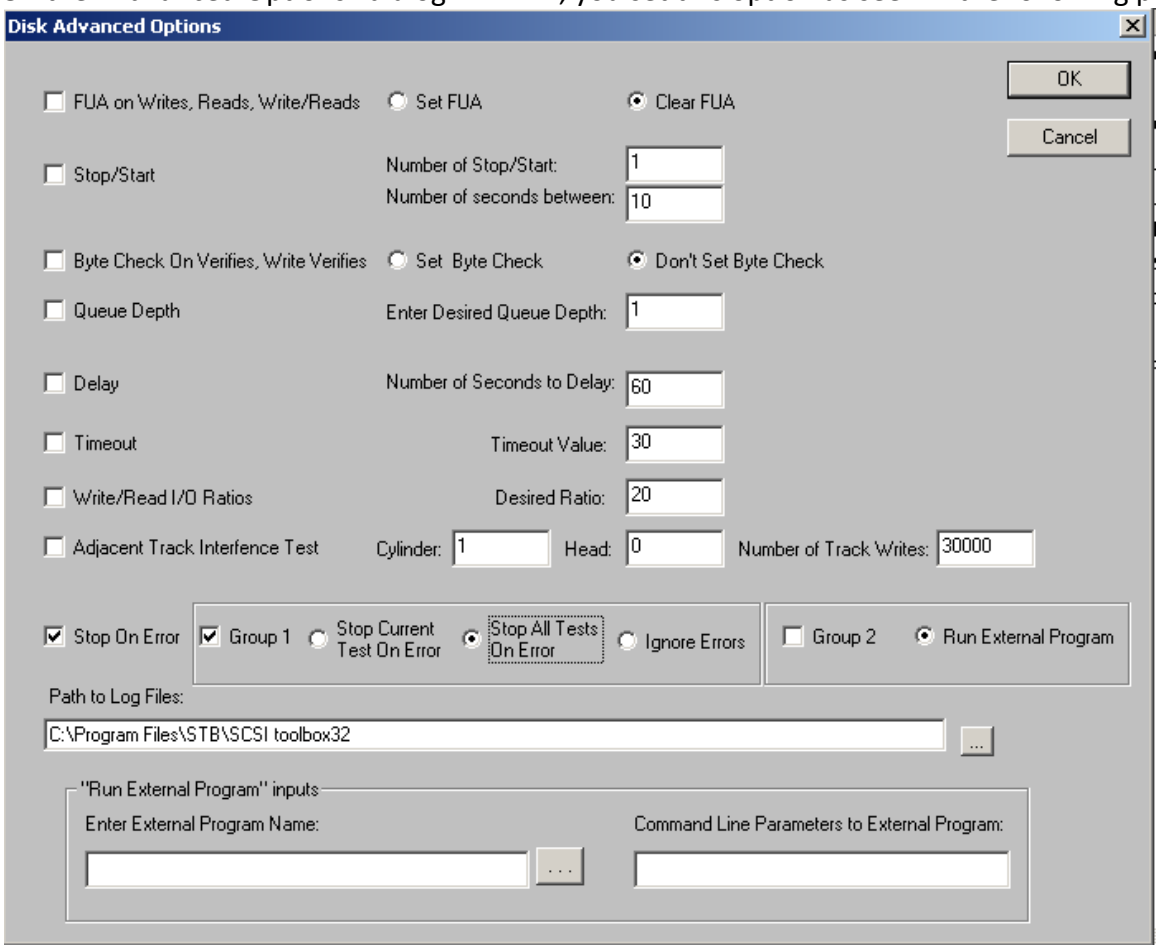
Notice that the checkbox “Stop On Error” is checked, “Group 1” is checked, and “Group 2” is unchecked

As an example, let’s say you have a 7-step test sequence, and step 3 is a sequential write test for 10 minutes, and that step 3 is currently executing when an error occurs at say the 5 minute mark of the test. What this option will do is stop the current test (i.e. step 3 of 7 steps, will NOT continue the remaining 5 minutes of the sequential write test, and proceed to step 4 of your 7 step test sequence).

Option B) If an error occurs to stop all tests in the test sequence

On the “Advanced Options” dialog in DMM, you set this option as seen in the following picture:



Notice that the checkbox “Stop On Error” is checked, “Group 1” is checked, and “Group 2” is unchecked

As an example, let’s say you have a 7-step test sequence, and step 3 is a sequential write test for 10 minutes, and that step 3 is currently executing when an error occurs at say the 5 minute mark of the test. What this option will do is stop all tests (i.e. it will stop step 3 and will NOT continue the remaining 5 minutes of the sequential write test, and will NOT execute steps 4-thru-7).

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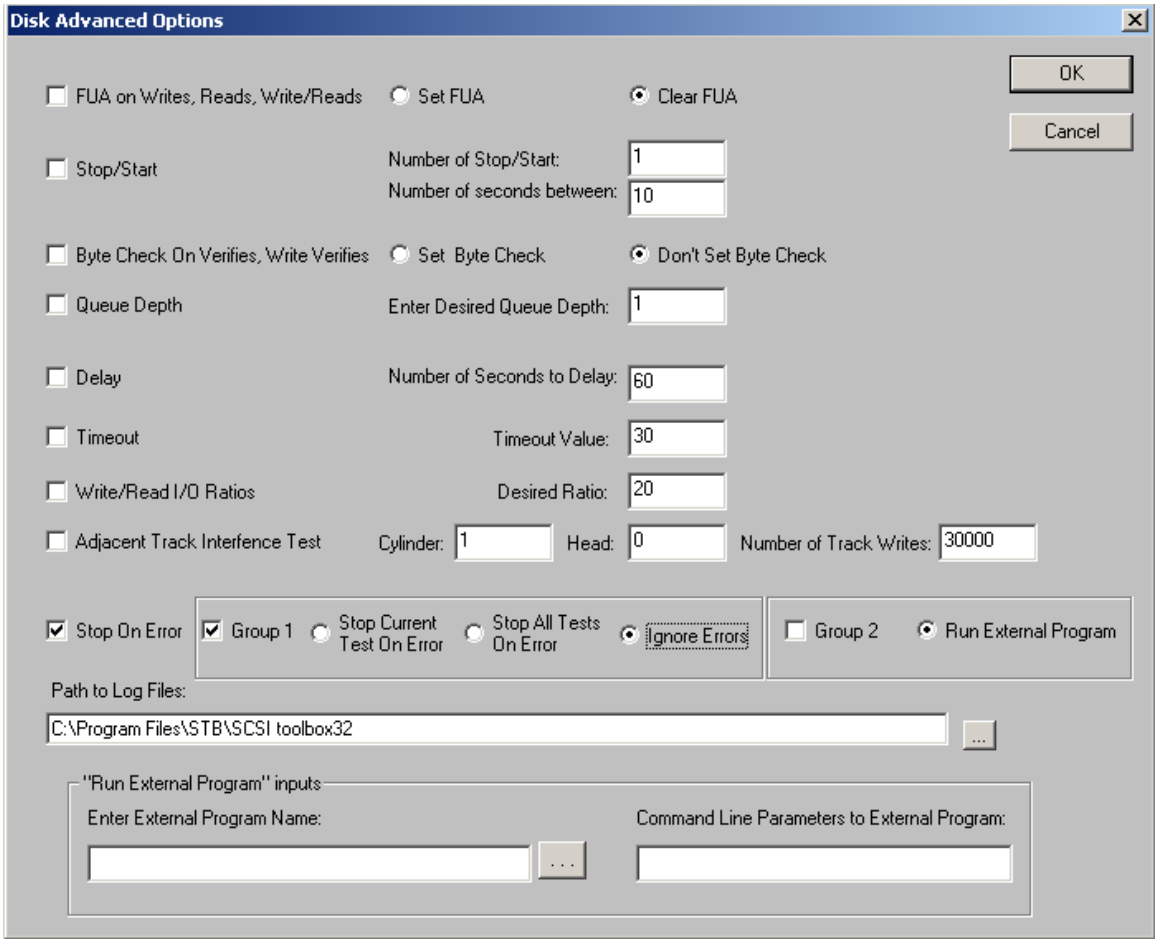
***Option C*)** If an error occurs to simply ignore the error

On the "Advanced Options" dialog in DMM, you set this option as seen in the following picture:



Notice that the checkbox "Stop On Error" is checked, "Group 1" is checked, and "Group 2" is unchecked

As an example, let's say you have a 7-step test sequence, and step 3 is a sequential write test for 10 minutes, and that step 3 is currently executing when an error occurs at say the 5 minute mark of the test. What this option will do is simply ignore the error (i.e. it will continue step 3 and will continue with the remaining 5 minutes of the sequential write test, and after this step 3 has completed proceed to step 4 of your 7 step test sequence).

Option D) If an error occurs to run an "External Program"

On the "Advanced Options" dialog in DMM, you set this option as seen in the following picture:

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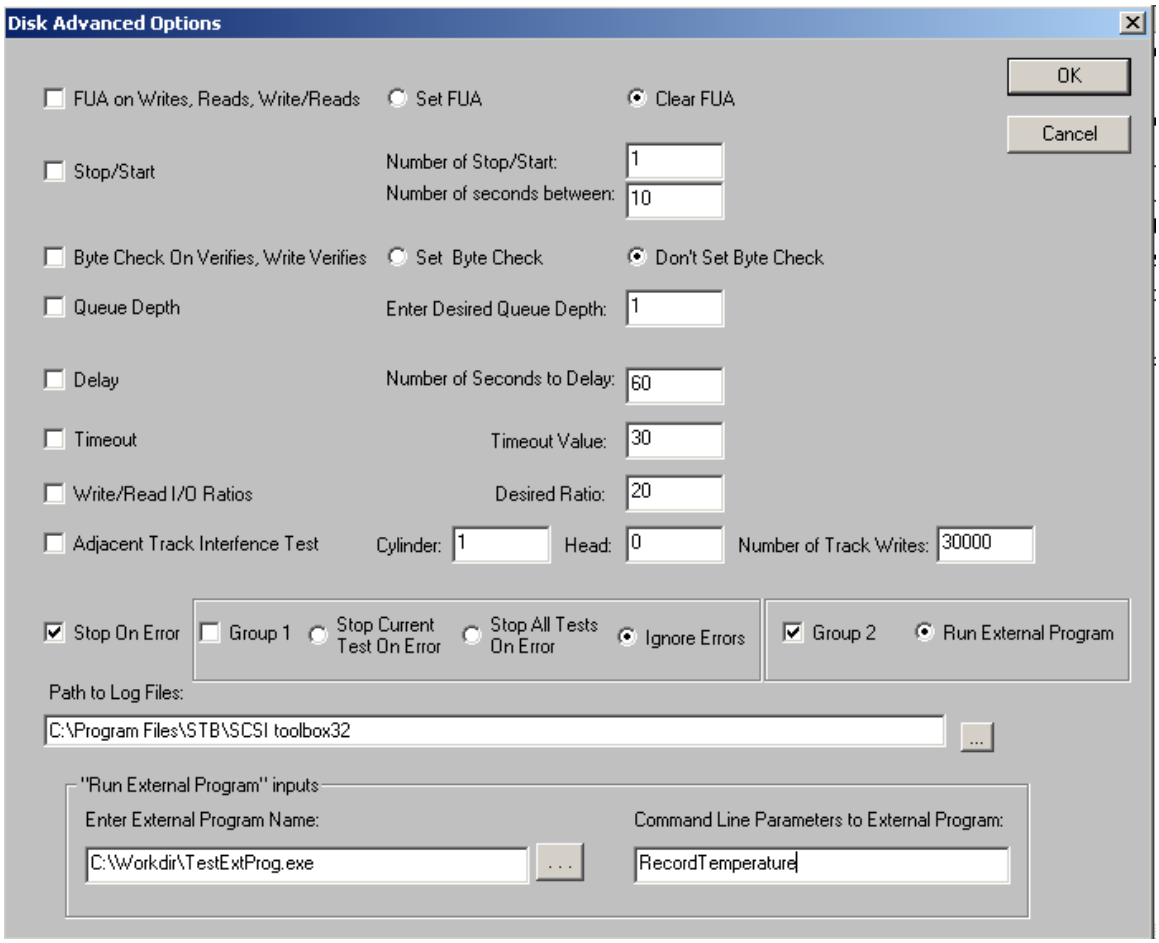

Notice that the checkbox “Stop On Error” is checked, “Group 1” is unchecked, and “Group 2” is checked

As an example, let’s say you have a 7-step test sequence, and step 3 is a sequential write test for 10 minutes, and that step 3 is currently executing when an error occurs at say the 5 minute mark of the test. What this option will do is run the “External Program” that you inputted on the “Advanced Options” dialog, and pass, as a command line argument, the following information:

HBA=n,TID=m,LUN=x,SLOT=255,RecordTemperature.

IMPORTANT: Notice that preceding the command line parameters you inputted on the “Advanced Options” dialog are the device address of the device that had the error. After the device address information, we append the string “RecordTemperature” at the end of the command line argument to the “External Program”.

After the “External Program” completes, the return code from the External Program logged to the devices logfile and step 3 is stopped (so the remaining 5 minutes of the sequential write test is not performed). Then we proceed to step 4 of your 7 step test sequence.

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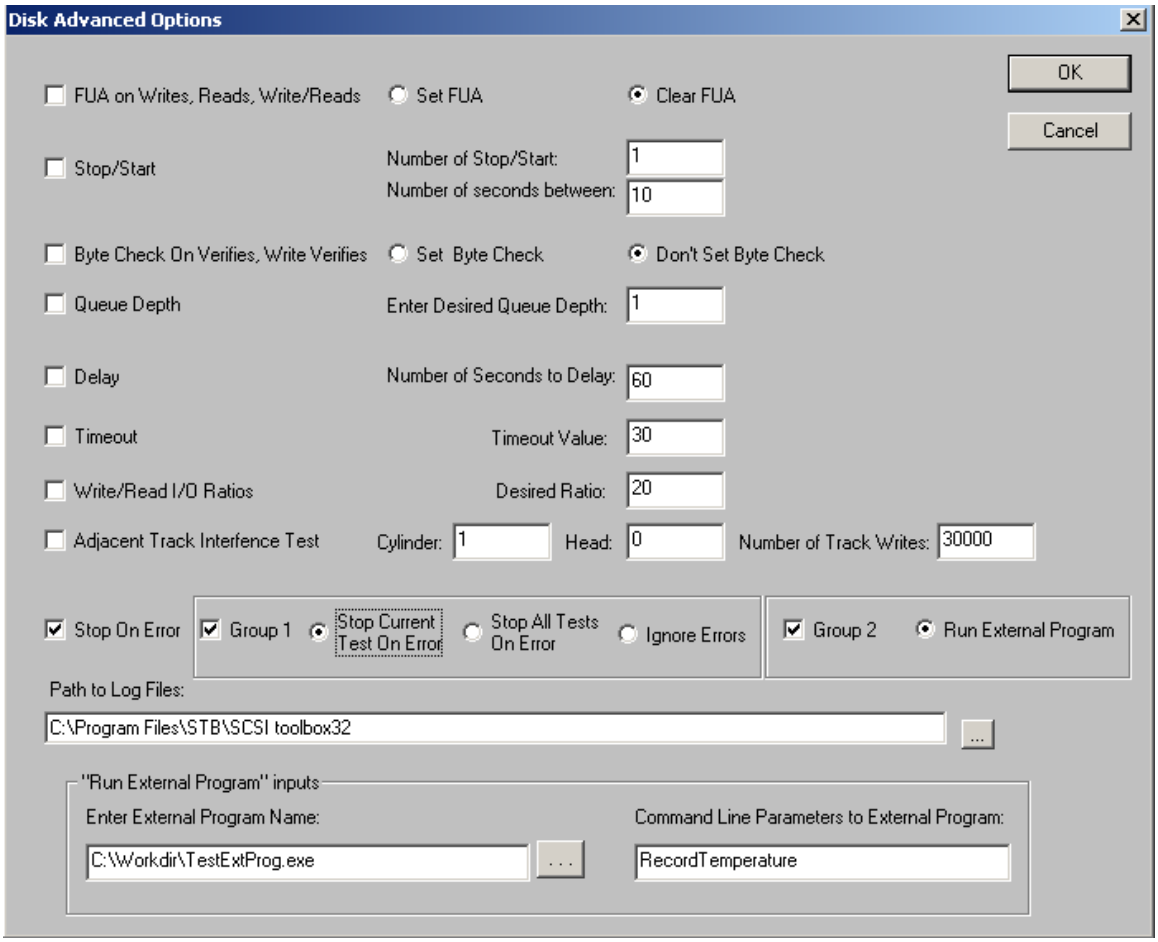
Option E) If an error occurs to run an "External Program" and if the "External Program" fails to stop the current test

On the "Advanced Options" dialog in DMM, you set this option as seen in the following picture:



Notice that the checkbox "Stop On Error" is checked, "Group 1" is checked, and "Group 2" is checked. Also note that the "Enter External Program Name" edit box is filled in, and so is the "Command Line Parameters to External Program" edit box is filled in.

As an example, let's say you have a 7-step test sequence, and step 3 is a sequential write test for 10 minutes, and that step 3 is currently executing when an error occurs at say the 5 minute mark of the test. What this option will do is run the "External Program" that you inputted on the "Advanced Options" dialog, and pass, as a command line argument, the following information:

HBA=n,TID=m,LUN=x,SLOT=255,RecordTemperature.

IMPORTANT: Notice that preceding the command line parameters you inputted on the "Advanced Options" dialog are the device address of the device that had the error. After the device address

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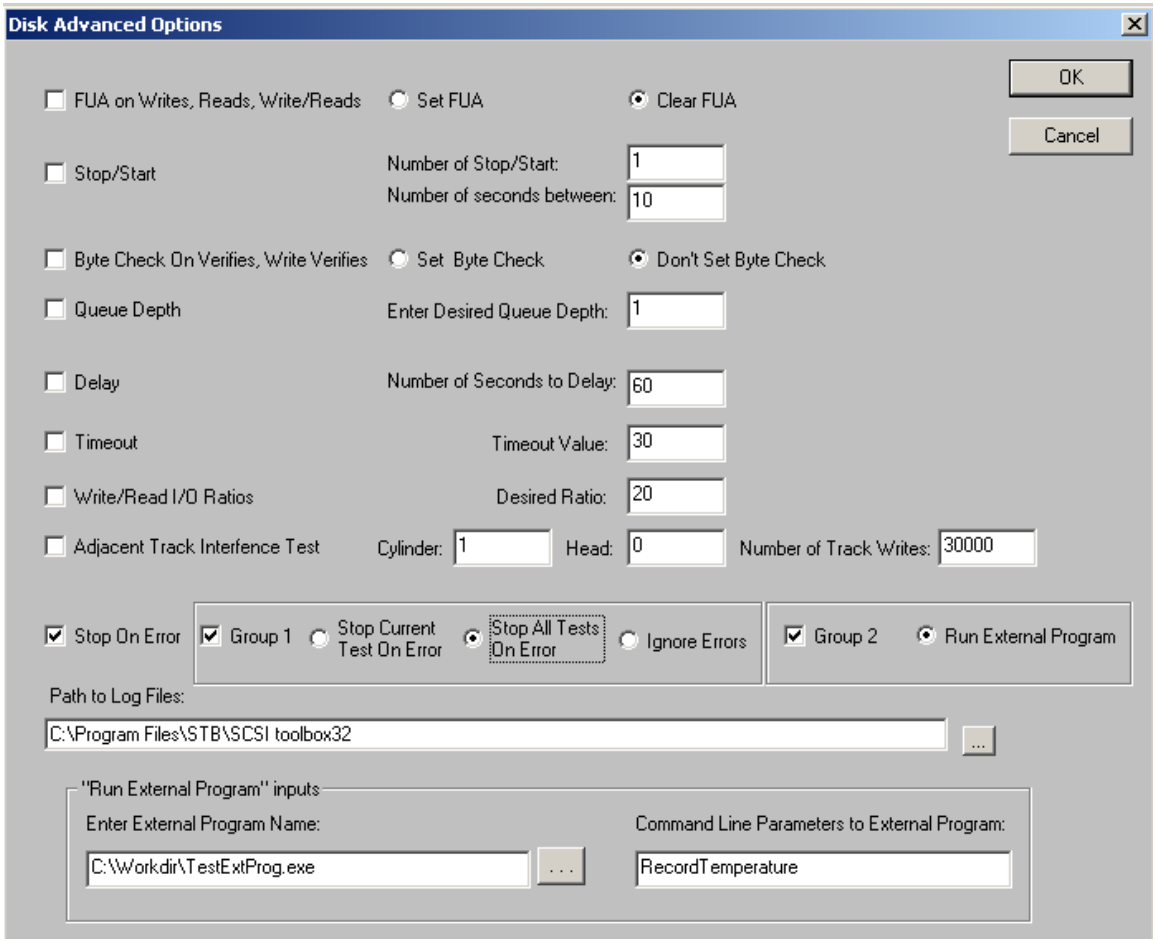
information, we append the string “RecordTemperature” at the end of the command line argument to the “External Program”.

After the “External Program” completes, the return code from the External Program logged to the devices logfile. **THEN** the return code from the “External Program” is analyzed for SUCCESS (return code of 0) or FAILURE (return code of anything other than 0). **IF** the return code from the “External Program” is 0 (SUCCESS) then step 3 is continued. **IF** the return code from the “External Program” is non-zero (FAILURE), step 3 is stopped (so the remaining 5 minutes of the sequential write test is not performed). Then we proceed to step 4 of your 7 step test sequence.

Option F) If an error occurs to run an “External Program” and if the “External Program” fails to stop all tests

On the “Advanced Options” dialog in DMM, you set this option as seen in the following picture:



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Notice that the checkbox “Stop On Error” is checked, “Group 1” is checked, and “Group 2” is checked. Also note that the “Enter External Program Name” edit box is filled in, and so is the “Command Line Parameters to External Program” edit box is filled in.

As an example, let’s say you have a 7-step test sequence, and step 3 is a sequential write test for 10 minutes, and that step 3 is currently executing when an error occurs at say the 5 minute mark of the test. What this option will do is run the “External Program” that you inputted on the “Advanced Options” dialog, and pass, as a command line argument, the following information:

HBA=n,TID=m,LUN=x,SLOT=255,RecordTemperature.

IMPORTANT: Notice that preceding the command line parameters you inputted on the “Advanced Options” dialog are the device address of the device that had the error. After the device address information, we append the string “RecordTemperature” at the end of the command line argument to the “External Program”.

After the “External Program” completes, the return code from the External Program is logged to the device’s logfile. **THEN** the return code from the “External Program” is analyzed for SUCCESS (return code of 0) or FAILURE (return code of anything other than 0). **IF** the return code from the “External Program” is 0 (SUCCESS) then step 3 is continued. **IF** the return code from the “External Program” is non-zero (FAILURE), step 3 is stopped (so the remaining 5 minutes of the sequential write test is not performed). No other tests are executed on this device.

Option G) If an error occurs to run an “External Program” and continue executing the current test

On the “Advanced Options” dialog in DMM, you set this option as seen in the following picture:

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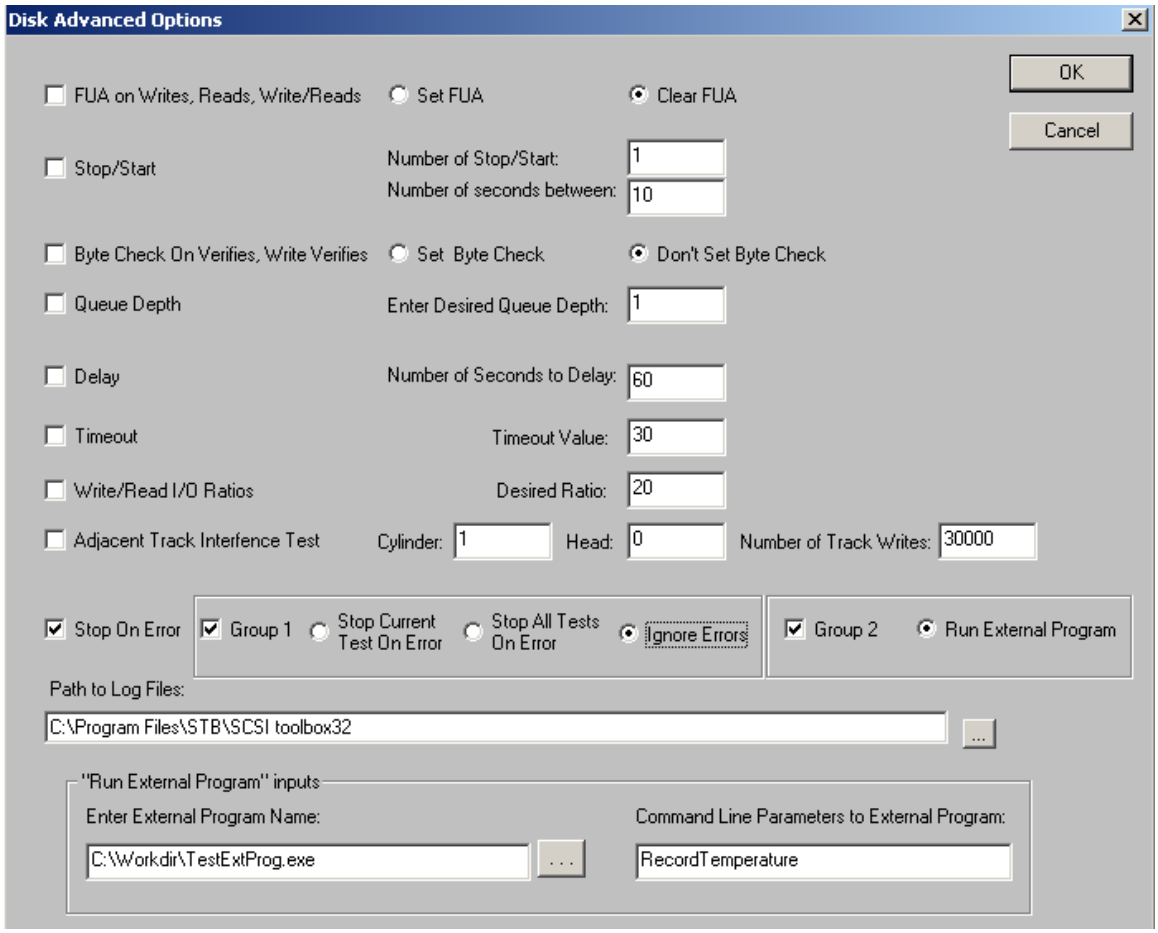

Notice that the checkbox “Stop On Error” is checked, “Group 1” is checked, and “Group 2” is checked. Also note that the “Enter External Program Name” edit box is filled in, and so is the “Command Line Parameters to External Program” edit box is filled in.

As an example, let’s say you have a 7-step test sequence, and step 3 is a sequential write test for 10 minutes, and that step 3 is currently executing when an error occurs at say the 5 minute mark of the test. What this option will do is run the “External Program” that you inputted on the “Advanced Options” dialog, and pass, as a command line argument, the following information:

HBA=n,TID=m,LUN=x,SLOT=255,RecordTemperature.

IMPORTANT: Notice that preceding the command line parameters you inputted on the “Advanced Options” dialog are the device address of the device that had the error. After the device address information, we append the string “RecordTemperature” at the end of the command line argument to the “External Program”.

After the “External Program” completes, the return code from the External Program is logged to the device’s logfile. Step 3 is continued.

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ASYNCHRONOUS NOTIFICATIONS OPTIONS IN DMM

The user can asynchronously notify DMM of the following actions:

1) Run an “External Program”
2) Log information to a device’s DMM logfile
3) Stop testing on a drive

We’ll take a closer look at these three options:

Option 1) Run an “External Program”

Here the goal is to run an “external program” on a device asynchronously. This is different from having an “external program” as a test step (which is predefined in the test sequence). For example, suppose you have a sequential write test currently running on a drive and you want to run an external program. You can “on-the-spur-of-a-moment” notify DMM to execute an external program. The following code snippet shows you how to accomplish this:

```
char * pBuf = new char[256];
sprintf(pBuf,"CODE=2,ExtProg=%s,CmdLine=%s,HBA=%02d,TID=%03d,LUN=%02d",
        m_strExternalProgram,m_strCommandLine,m_nHBA,m_nTid,m_nLun);

COPYDATASTRUCT * pCDS = new COPYDATASTRUCT;
pCDS->dwData = 4;
pCDS->cbData = 256;
pCDS->lpData = pBuf;

CWnd * pWnd = CWnd::FindWindow(NULL,"Disk Manufacturing & Screening Module");
if (pWnd != NULL && ::IsWindow(pWnd->m_hWnd))
{
  pWnd->SendMessage(WM_COPYDATA,(WPARAM)NULL,(LPARAM)pCDS);
}
```

When DMM receives this asynchronous notification, it will parse the device address and then execute the external program name passed in, passing to the external program as a command line argument the device’s address plus the command line you pass DMM.

Option 2) Log information to a device’s DMM logfile

Here the goal is to asynchronously log information to a device’s DMM logfile. The following code snippet shows you how to accomplish this:

```
char * pBuf = new char[256];
```


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```
sprintf(pBuf,"CODE=2,LogToFile=%s,HBA=%02d,TID=%03d,LUN=%02d",
        m_strDMMText,m_nHBA,m_nTid,m_nLun);

COPYDATASTRUCT * pCDS = new COPYDATASTRUCT;
pCDS->dwData = 5;
pCDS->cbData = strlen(pBuf)+1;
pCDS->lpData = pBuf;

CWnd * pWnd = CWnd::FindWindow(NULL,"Disk Manufacturing & Screening Module");
if (pWnd != NULL && ::IsWindow(pWnd->m_hWnd))
{
  pWnd->SendMessage(WM_COPYDATA,(WPARAM)NULL,(LPARAM)pCDS);
}
```

Option 3) Stop testing on a drive

Here the goal is to asynchronously stop all testing on a drive. The following code snippet shows you how to accomplish this:

```
char * pBuf = new char[256];
sprintf(pBuf,"CODE=2,HBA=%02d,TID=%03d,LUN=%02d",
        m_nHBA,m_nTid,m_nLun);

COPYDATASTRUCT * pCDS = new COPYDATASTRUCT;
pCDS->dwData = 6;
pCDS->cbData = strlen(pBuf)+1;
pCDS->lpData = pBuf;

CWnd * pWnd = CWnd::FindWindow(NULL,"Disk Manufacturing & Screening Module");
if (pWnd != NULL && ::IsWindow(pWnd->m_hWnd))
{
  pWnd->SendMessage(WM_COPYDATA,(WPARAM)NULL,(LPARAM)pCDS);
}
```


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Path to .Log files

The path name where the .log files will be created

Add Date-Time to .Log file names

Time-Stamps each log file.

Without this option if you run tests on the same drive each test runs log data will be appended to the first log file for that drive.

With this option set a new .log file will be created for each drive for each test run

Special Text for this test step

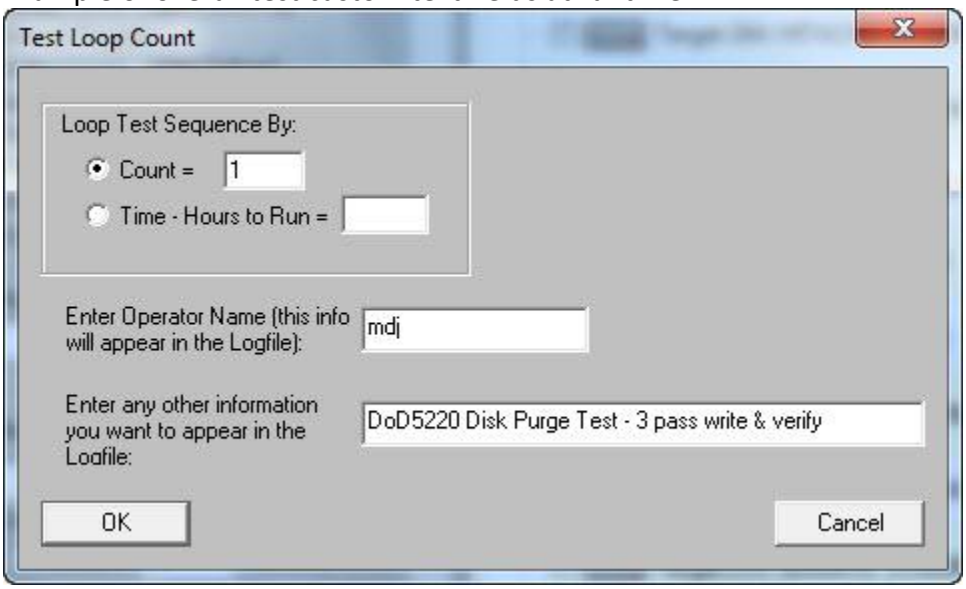
Per-test-step special text.

Example – for a 3-pass purge test, write the data pattern used for each test step into the .log files

Each test step can have a user-defined text field.

Example of the "Per-Test Step" custom text field in Advanced Options –

Example of overall test custom text fields at runtime –



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Run External Program inputs

Specify the program to run and any command-line arguments you want to pass to it if you've set the Group 2 SOE option.

Workers

Let's you specify multiple test streams. For each test step this will thread as many I/O streams as you specified to each drive under test. Simulates multiple users

Delay between Commands

Lets you inject occasional delays into the command stream while testing. You can specify the delay time in microseconds, and can inject either every *n* commands, every *nth* microsecond, or randomly

Test Thresholds for Screening

Drives may be screened (failed) based on

Performance

Fail the drive if it's average data transfer rate falls below the specified value

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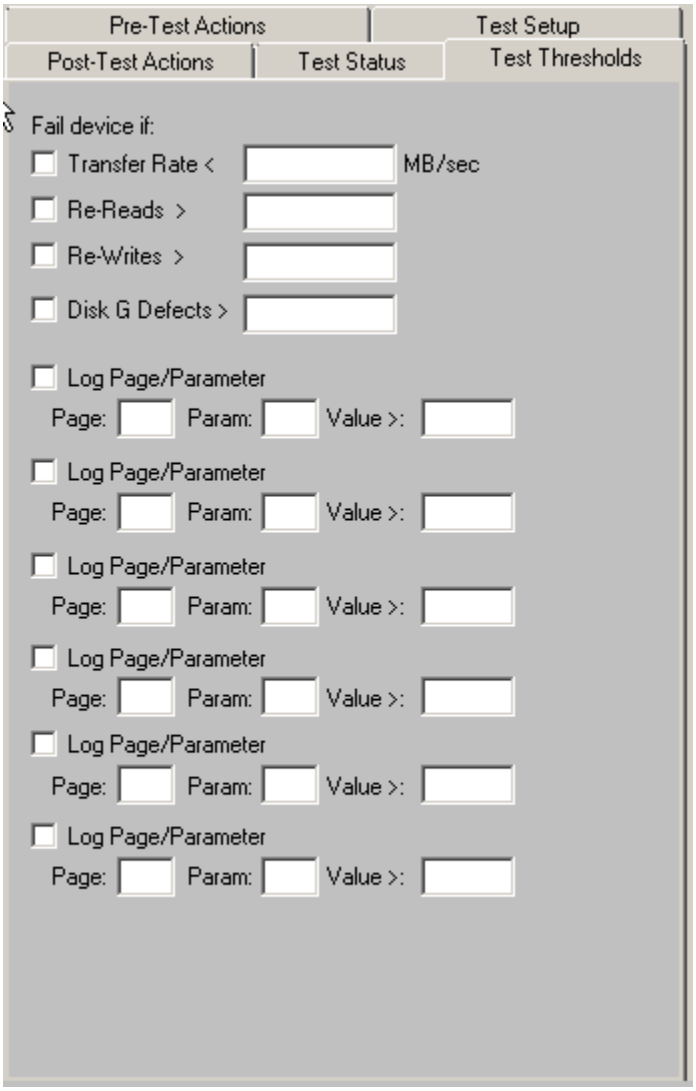
Number of re-read or re-writes (SAS/SCSI/FC only)

Log Page/Parameter values



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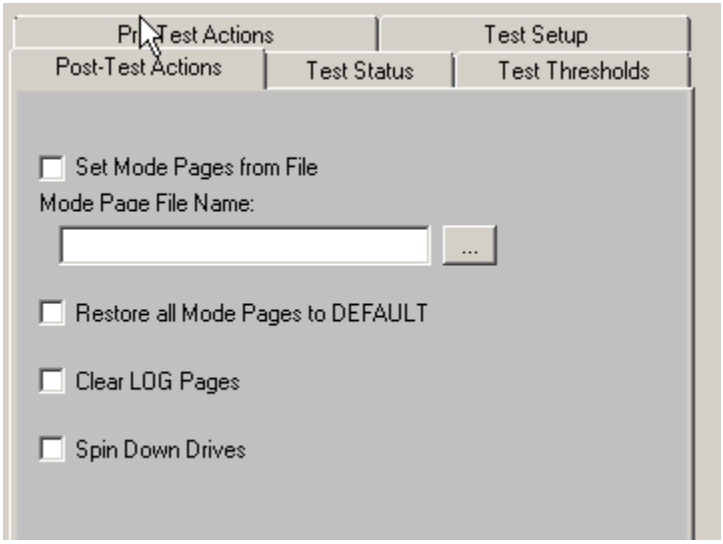
The Post Test Actions Tab



Once a test sequence is finished you may want to perform certain post-test actions. These include :

Spinning all of the disks down

Recording each disks MODE PAGE information to the database,

Setting Mode Pages to a File

Setting all Mode Pages back to Default,

Clearing each drives LOG PAGE information.

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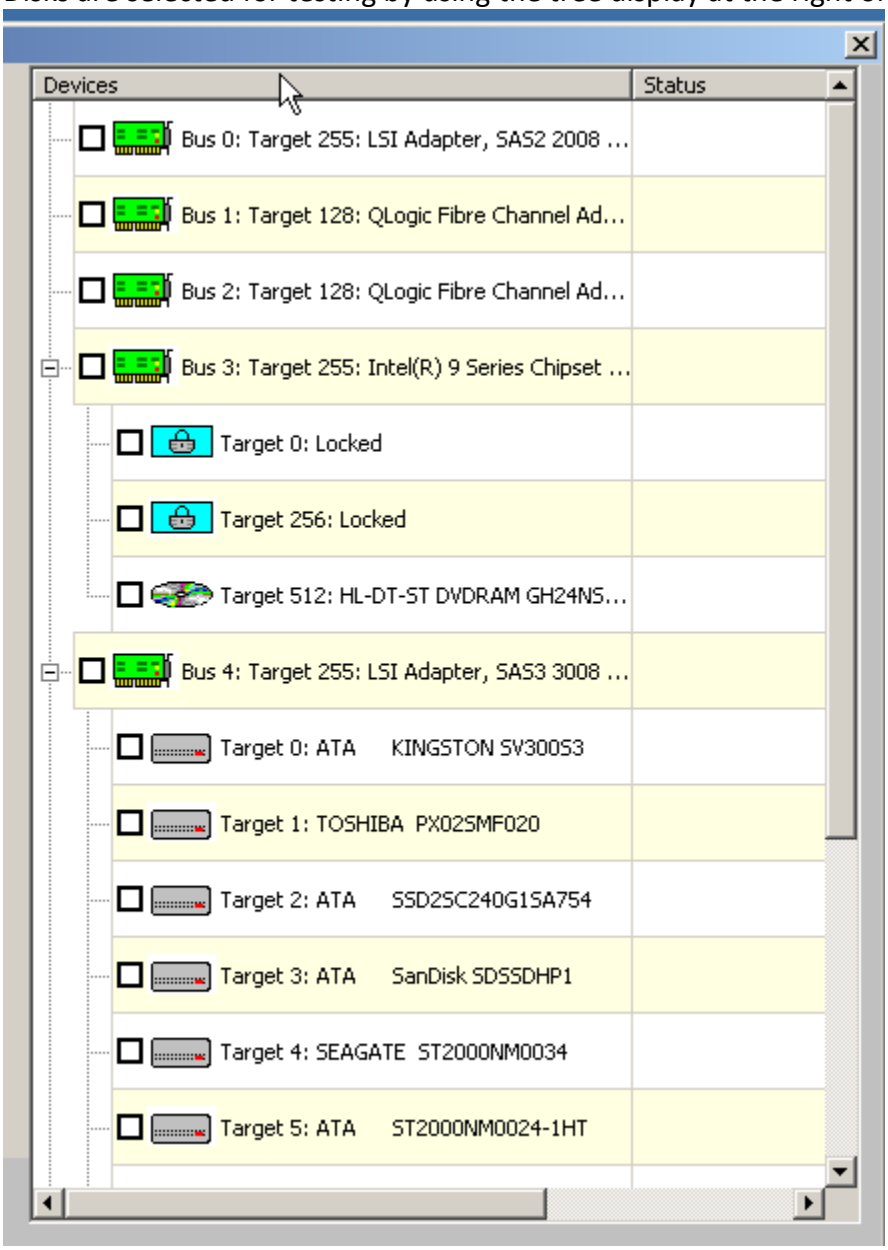
Selecting the Disks to Test

Disks are selected for testing by using the tree display at the right of the DMM screen –



You may click on the checkbox next to any Target to select that drive, or you may click on the checkbox next to the Host Bus Adapter to select all drives connected to that HBA.
You may also Control-Click to select multiple drives.

Clicking on a drive selects the drive for testing.
Multiple drives may be selected by holding down the Control key while clicking on drives, or a whole series of disks may be selected by clicking on the first drive, then holding down the Shift key while clicking on the last drive.
When a test sequence is started the drives that you have selected will be validated.

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Any device that is selected, but that is not a disk drive, will be de-selected.
If you have specified Pre-Test qualifiers, such as selecting only Seagate drives, all non-qualifying devices will be de-selected.

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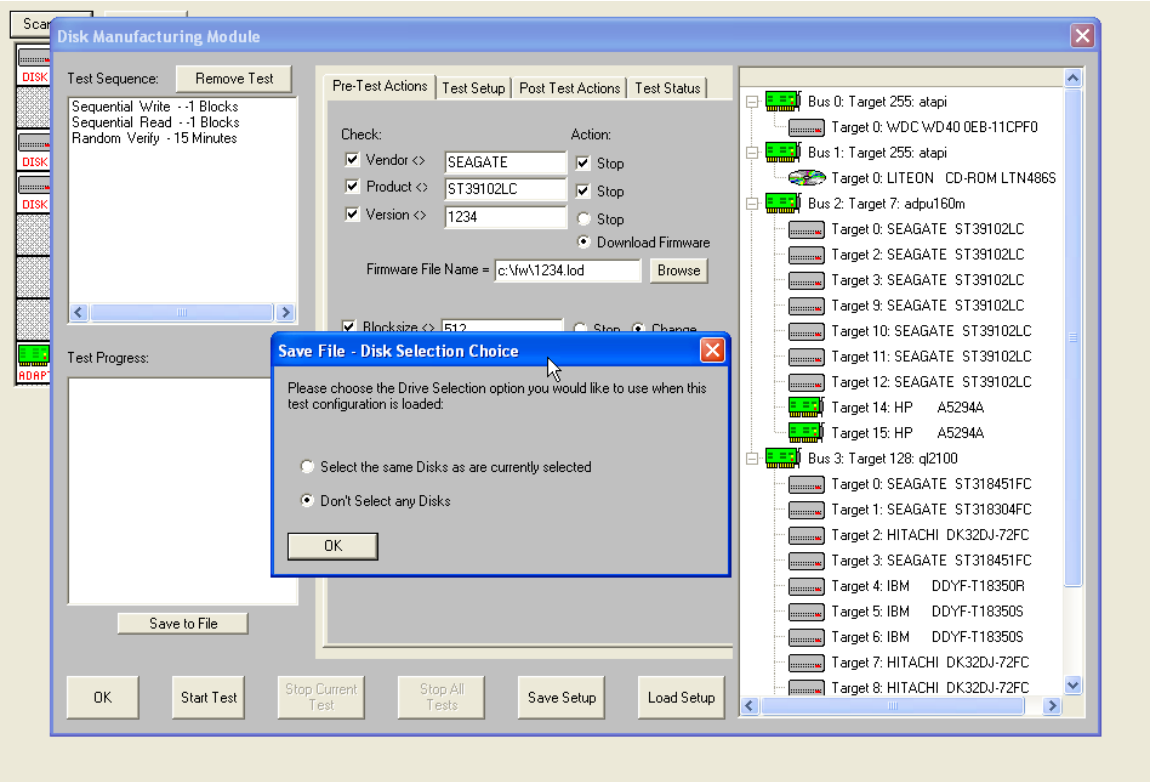
Saving and Load Test Configurations

Another power feature of the Disk Screening Toolbox is that once a test process has been defined, it can be saved for later recall and use. This is done using the Save Setup and Load Setup buttons.

Saving a Test Configuration

Once you have defined a test process (Pre-Test Actions, Tests, Post-Test Actions, and optionally disk selection) you can save this entire test process by clicking on the Save Setup button.

Once you have specified the file name to save your test definition to, you will be asked if you want to save the disk selection as well – as below:



You choose to not save the disk selection, or you can save the same disks that are currently selected.

If you choose to save the currently selected disks, when you load this test definition later it will look for disks at the same addresses. If there was a disk at HA2 Target 3, and there is a disk there now, it will be tested. If it is not there now, that will not cause a problem.

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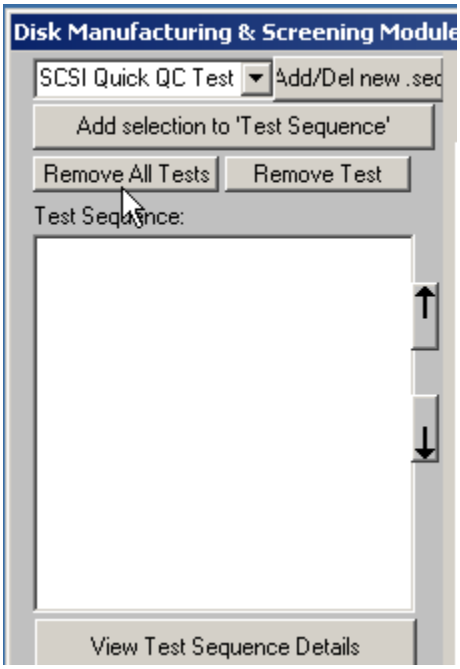
If you choose to not save the disk selection, then when you reload the test definition later you will have to manually select the drives to test again.

Loading a Test Configuration

Just click on the Load Setup button to reload a previously defined test configuration.

Quick Test Selector

The Quick Test Selector controls are located in the upper left of the DMM screen, directly above the Test Sequence window –



Select a Quick Test by clicking on the Drop-Down arrow to display the tests in your list. Click on your test choice then click **Add selection to 'Test Sequence'**

You will then see the test steps populate the Test Sequence display.

Hard-Coded Tests

There are five hard coded quick tests

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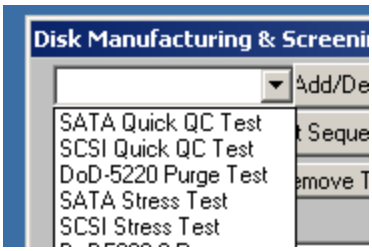

SATA Quick QC Test

Pre-Test Configuration:
==========
<none>

Test Summaries. 2 Tests Defined:
==========
TEST 1 of 2:
Write/Read Test; Random Access; for 5 Minutes
Fixed-Length Transfers of 128 (0x0080) Blocks
Start Block: 0 (0x0)
Data Pattern: Incrementing w/ LBA Overlay; Data Compare ON
Queue Depth = 1
FUA = OFF
Number of Workers = 1
Timeout Value = 30
Action on Error: Stop Current Test

TEST 2 of 2:
IDENTIFY Drive
Timeout Value = 30
Action on Error: Stop Current Test

Post-Test Configuration:
==========
<none>

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```
Pre-Test Configuration:
=======================
  <none>

Test Summaries.  5 Tests Defined:
=================================
  TEST 1 of 5:
    Grown Defect List Count
    Timeout Value = 30
    Action on Error: Stop Current Test

  TEST 2 of 5:
    Clear Log Pages
    Timeout Value = 30
    Action on Error: Stop Current Test

  TEST 3 of 5:
    Write/Read Test; Random Access; for 5 Minutes
    Fixed-Length Transfers of 128 (0x0080) Blocks
    Start Block: 0 (0x0)
    Data Pattern: Incrementing w/ LBA Overlay; Data Compare ON
    Queue Depth = 1
    FUA = OFF
    Number of Workers = 1
    Timeout Value = 30
    Action on Error: Stop Current Test

  TEST 4 of 5:
    Grown Defect List Count
    Timeout Value = 30
    Action on Error: Stop Current Test

  TEST 5 of 5:
    Save Log Pages
    Timeout Value = 30
    Action on Error: Stop Current Test

Post-Test Configuration:
========================
  <none>
```


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DoD-5220 Purge Test

```
Pre-Test Configuration:
=======================
 <none>

Test Summaries.  1 Test Defined:
================================
 TEST 1 of 1:
  Purge Test
  Timeout Value = 30
  Action on Error: Stop Current Test
  DOD 5220 Purge

Post-Test Configuration:
========================
 <none>
```

SATA Stress Test

```
Pre-Test Configuration:
=======================
 <none>

Test Summaries.  4 Tests Defined:
=================================
 TEST 1 of 4:
  Write Test; Sequential; for ALL Blocks
  Fixed-Length Transfers of 64 (0x0040) Blocks
  Start Block: 0 (0x0)
  Data Pattern: Incrementing w/ LBA Overlay
  Queue Depth = 1
  FUA = OFF
  Number of Workers = 1
  Timeout Value = 30
  Action on Error: Stop Current Test

 TEST 2 of 4:
  Read Test; Sequential; for ALL Blocks
  Fixed-Length Transfers of 64 (0x0040) Blocks
  Start Block: 0 (0x0)
  Data Pattern: Incrementing w/ LBA Overlay; Data Compare ON
  Queue Depth = 1
  FUA = OFF
  Number of Workers = 1
  Timeout Value = 30
  Action on Error: Stop Current Test

 TEST 3 of 4:
  Write/Read Test; Random Access; for 15 Minutes
  Fixed-Length Transfers of 128 (0x0080) Blocks
  Start Block: 0 (0x0)
  Data Pattern: Incrementing w/ LBA Overlay; Data Compare ON
  Queue Depth = 1
  FUA = OFF
  Number of Workers = 1
  Timeout Value = 30
```


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```
   Action on Error: Stop Current Test

  TEST 4 of 4:
   IDENTIFY Drive
   Timeout Value = 30
   Action on Error: Stop Current Test

Post-Test Configuration:
========================
  <none>
```

SCSI Stress Test

```
Pre-Test Configuration:
=======================
  <none>

Test Summaries.  6 Tests Defined:
=================================
  TEST 1 of 6:
   Grown Defect List Count
   Timeout Value = 30
   Action on Error: Stop Current Test

  TEST 2 of 6:
   Clear Log Pages
   Timeout Value = 30
   Action on Error: Stop Current Test

  TEST 3 of 6:
   Write Test; Sequential; for ALL Blocks
   Fixed-Length Transfers of 64 (0x0040) Blocks
   Start Block: 0 (0x0)
   Data Pattern: Incrementing w/ LBA Overlay
   Queue Depth = 1
   FUA = OFF
   Number of Workers = 1
   Timeout Value = 30
   Action on Error: Stop Current Test

  TEST 4 of 6:
   Read Test; Sequential; for ALL Blocks
   Fixed-Length Transfers of 64 (0x0040) Blocks
   Start Block: 0 (0x0)
   Data Pattern: Incrementing w/ LBA Overlay; Data Compare ON
   Queue Depth = 1
```


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```
   FUA = OFF
   Number of Workers = 1
   Timeout Value = 30
   Action on Error: Stop Current Test

  TEST 5 of 6:
   Grown Defect List Count
   Timeout Value = 30
   Action on Error: Stop Current Test

  TEST 6 of 6:
   Save Log Pages
   Timeout Value = 30
   Action on Error: Stop Current Test

Post-Test Configuration:
========================
  <none>
```


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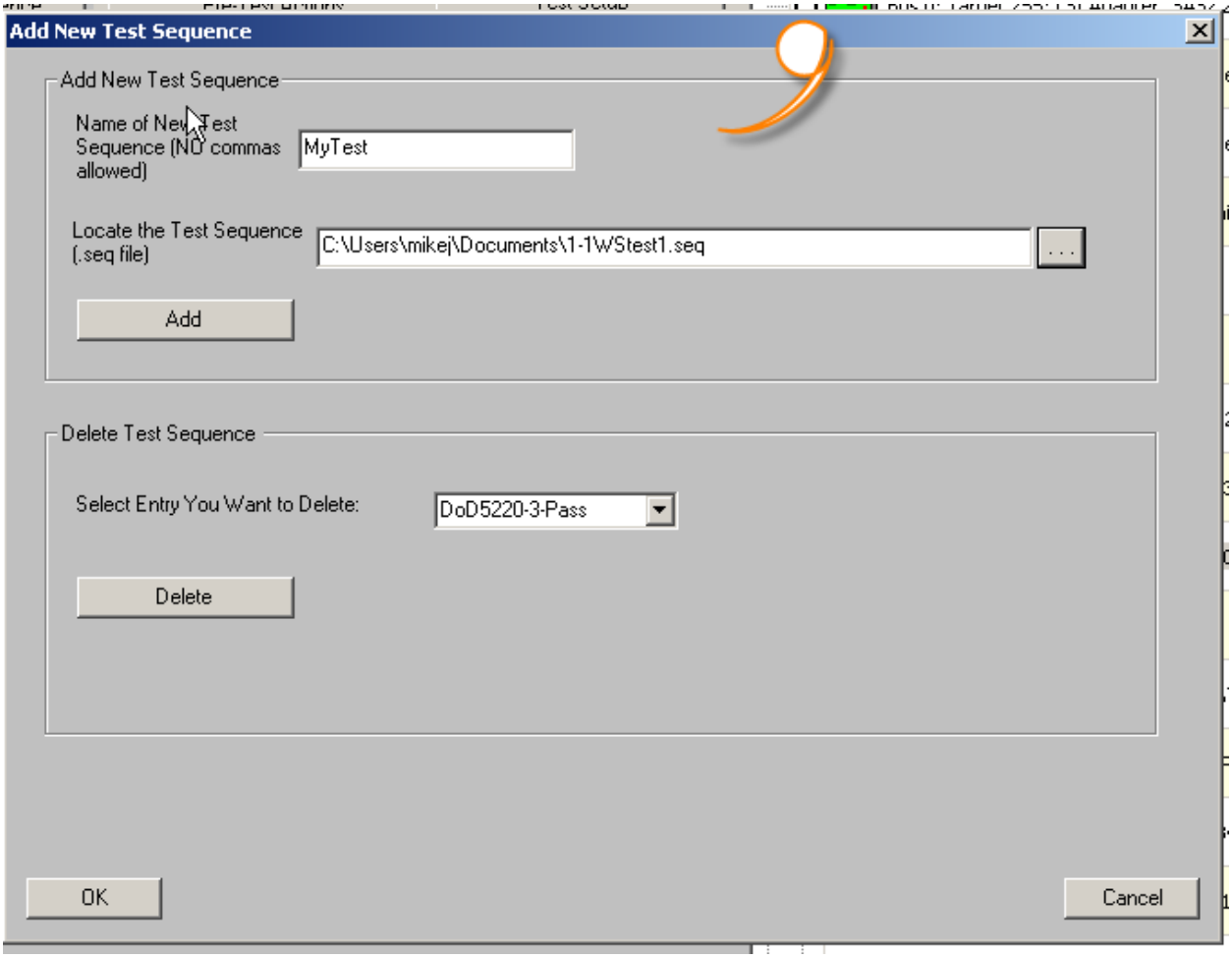
Adding your own Tests

You may add any of your favorite Test Sequences to the Quick Test list by clicking on the **Add/Del New .Seq** button and filling in the Name of Test and location of the test sequence file –



Enter your new Test name (no commas allowed in the test name), then use the browse button to navigate to and select your DMM test sequence file.

Then click the **Add** button to complete adding your test to the Quick Test list.

Deleting Tests

You may delete any User Added tests from the Quick Test list by clicking the **Add/Del New .Seq** button, selecting the test to remove from the Delete Test Sequence drop-down box, then clicking the **Delete** button.

As with any Test Sequence, just click on the View Test Sequence button to view and save the test sequence details.

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Monitoring Test Progress

During Testing – individual drive

As a disk is being tested it will be displayed with a Blue highlight in the tree display.

During testing each disk drive can have:

The current test Paused
Testing resumed
The current test stopped
All testing for this drive stopped
The status of the current test displayed

Pausing a Test

Move the cursor over the disk of interest, then click the Right mouse button. Clicking the Pause choice will pause the current test on that drive. The drive will now be displayed with a Magenta highlight in the tree display.

Resuming a Test

Right click on the paused drive, then click the Resume Test choice to resume testing. The drive is displayed in Blue highlight again

Stopping a Test

Right click on a drive, then choose either the Stop Current Test, or Stop All Tests choice

Viewing Test Status

Right clicking on a drive and choosing the Get Status choice will display the following screen:

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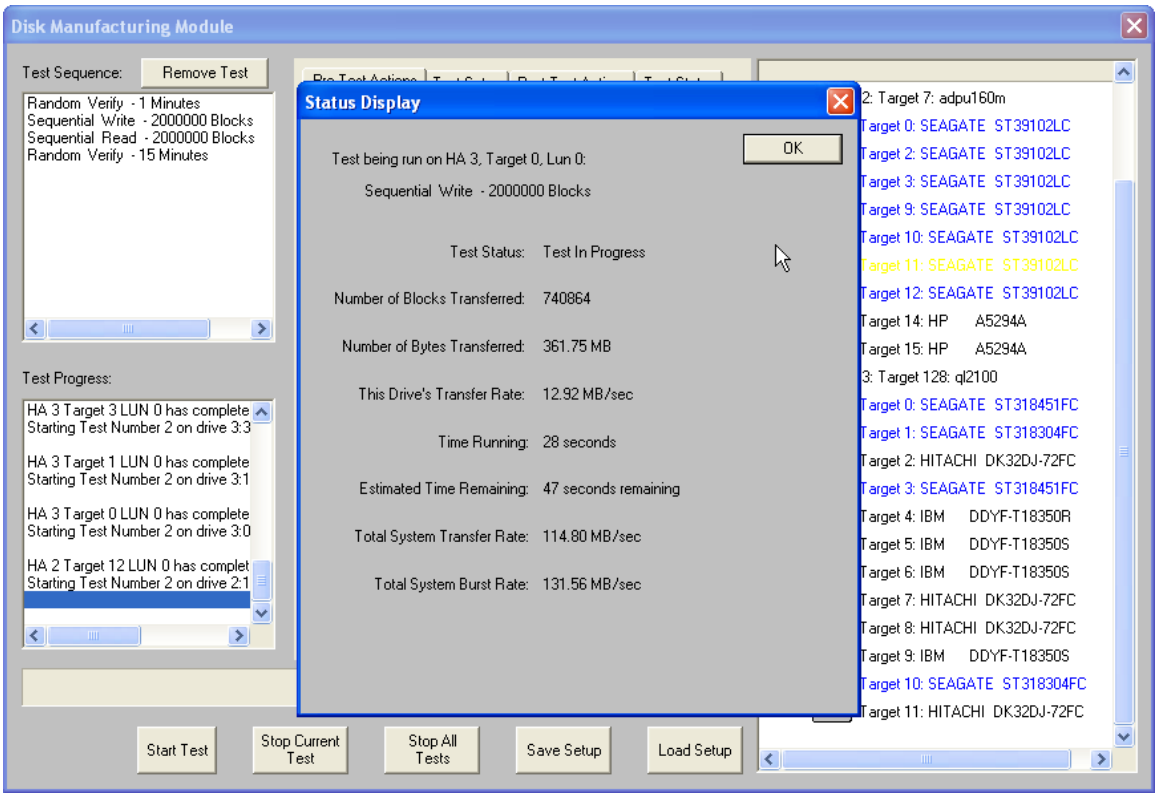

Data that is shown is:

The name of the test that is currently running,
Test Status
Number of Blocks Transferred
Number of Bytes Transferred
The average transfer rate (over time) achieved
Time running
Estimated time remaining
Total System Transfer Rate
Total System Burst Rate

All data is updated every few seconds

During Testing – All Drives

As the test sequence progresses it is possible to view status on each drive for each test of the sequence. This is done at the Test Status tab page

All performance and error data for each test of each drive is viewable here.

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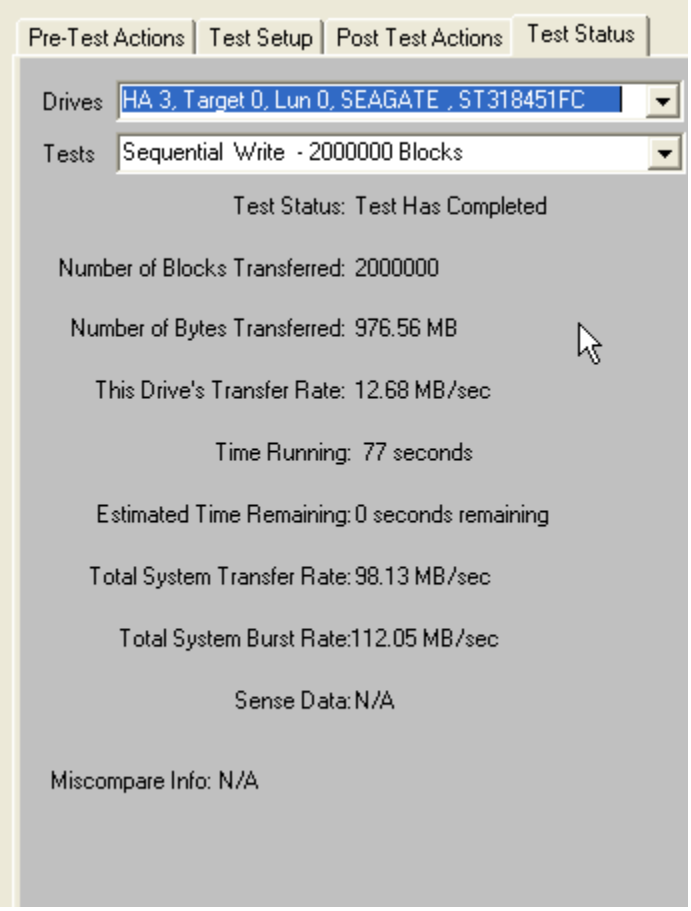
The Test Status Page

The test status pages appears as below:



The Drives Pulldown

Use the Drives Pulldown box to choose which disk

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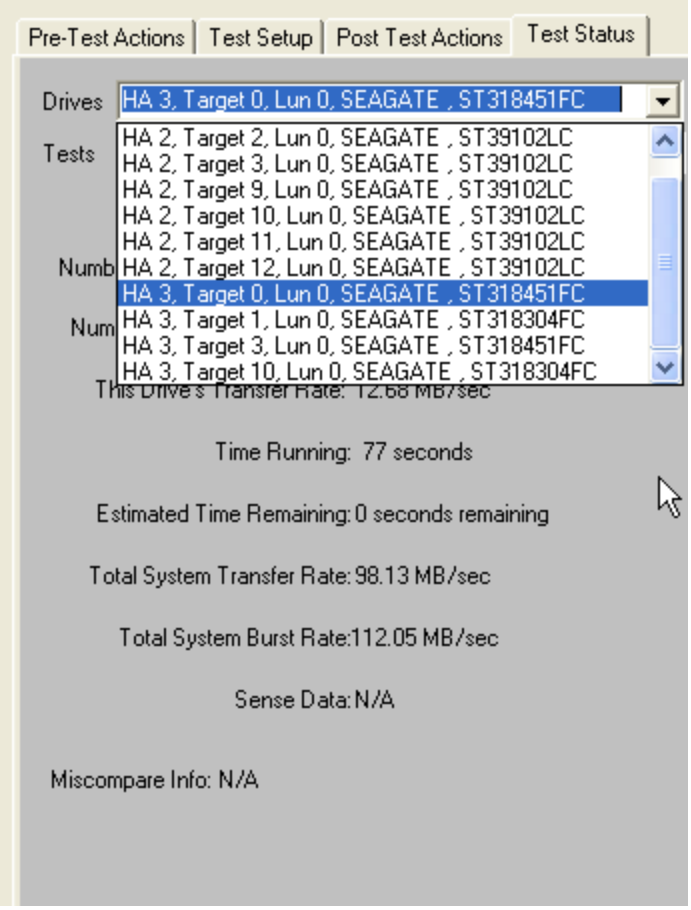

Just highlight the disk of interest

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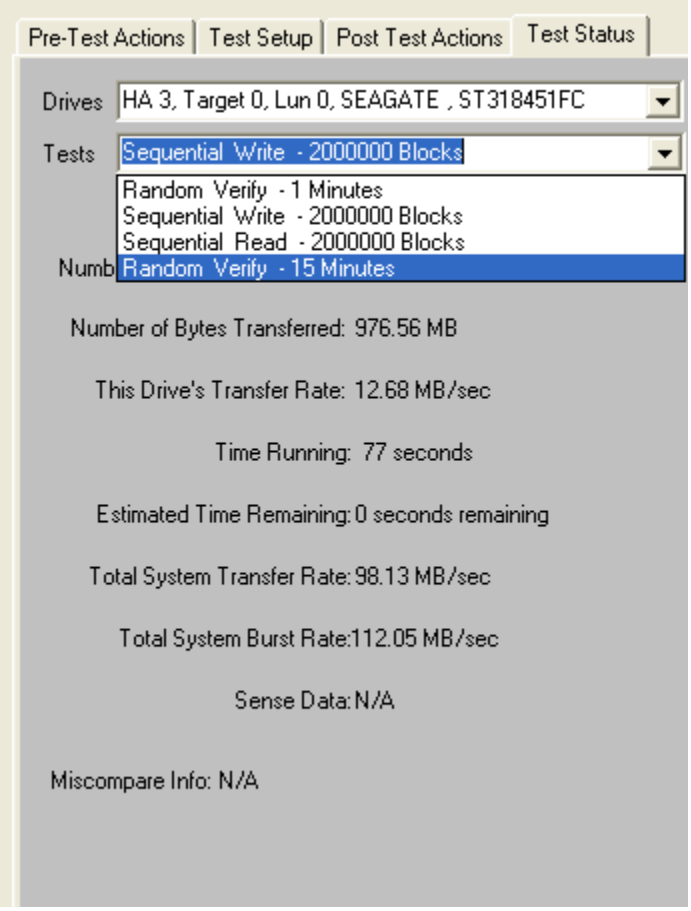
The Tests Pulldown

Use the Tests Pulldown to choose which test to view



Stopping Tests

Use the ***Stop Current Test*** or ***Stop All Tests*** buttons at the bottom of the Disk Screening Toolbox page to stop testing.

Choosing the ***Stop Current Test*** button will stop the current test running on all drives – if there are more tests in the test sequence each drive will go on to what is the next test for it.

Choosing the ***Stop All Tests*** button will stop all testing on all drives

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Test Results – Log Files

Database data

Test results are written to an Access database – the database file name is DiskScreenDatabase.mdb, and it is located in the folder where SCSItoolbox or the Stand Alone Disk Screening Toolbox is installed.

If you have Access installed on your system you can double-click on this file to view it's contents.

This data is also written as a comma-delimited text file called DiskScreenDatabase.txt

There are two tables – Test and Information.

The Test table stores the following information for each test or test event:

ComputerName
DateTimeStamp
HBA
TARGET
Lun
Vendor
Product
SerialNum
Version
BlkSz
Capacity
Adapter
Comment
TestName
Pattern
TestResult
TestStartTime
TestEndTime
TimeToDoTest
NumMBToDev
NumMBFromDev
TotMBTrans
TransRateTo
TransRateFrom
TotTransRate
SenseOnFailure

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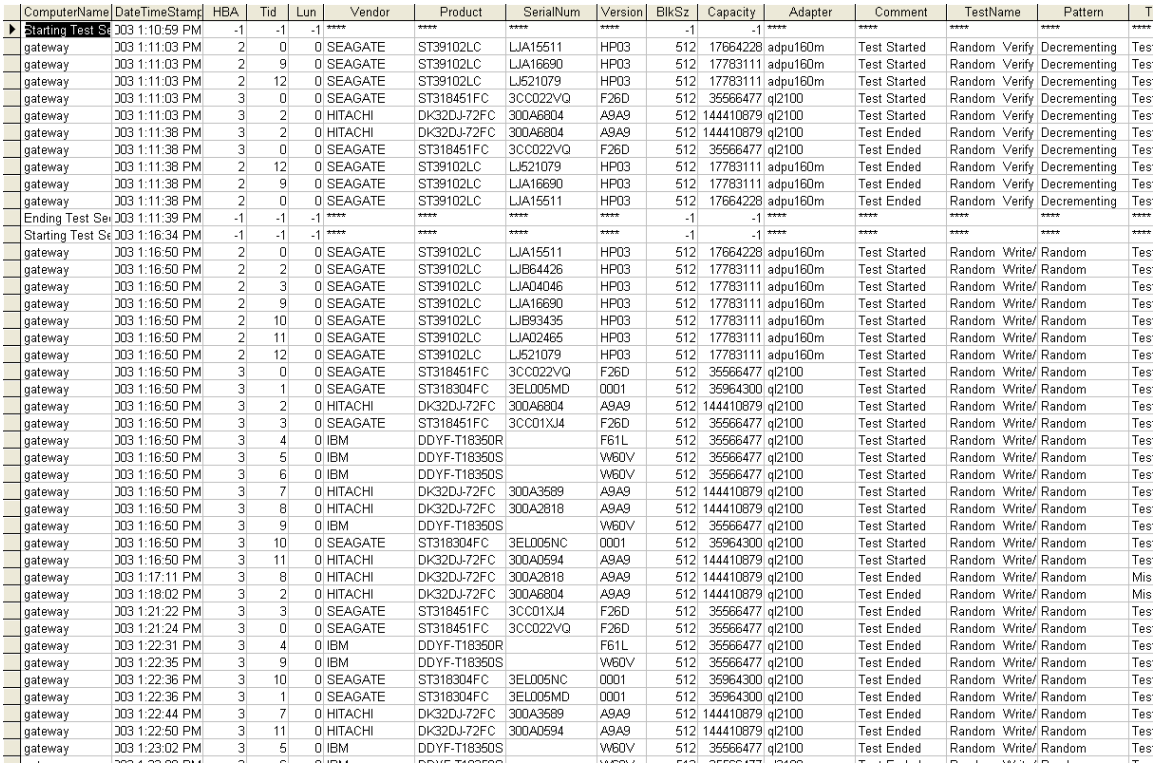
MiscompareLBA
MiscompareOffset
MiscompareExpected
MiscompareActual

Here is a (partial!) screen shot of the test table:



ComputerName	DateTimeStamp	HBA	Tid	Lun	Vendor	Product	SerialNum	Version	BlkSz	Capacity	Adapter	Comment	TestName	Pattern	T
Starting Test Se	03 1:10:59 PM	-1	-1	-1	****	****	****	****	-1	-1	****	****	****	****	****
gateway	03 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	17664228	adpu160m	Test Started	Random Verify	Decrementing	Tes
gateway	03 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	17783111	adpu160m	Test Started	Random Verify	Decrementing	Tes
gateway	03 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	17783111	adpu160m	Test Started	Random Verify	Decrementing	Tes
gateway	03 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Started	Random Verify	Decrementing	Tes
gateway	03 1:11:03 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Started	Random Verify	Decrementing	Tes
gateway	03 1:11:38 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Ended	Random Verify	Decrementing	Tes
gateway	03 1:11:38 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Ended	Random Verify	Decrementing	Tes
gateway	03 1:11:38 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	17783111	adpu160m	Test Ended	Random Verify	Decrementing	Tes
gateway	03 1:11:38 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	17783111	adpu160m	Test Ended	Random Verify	Decrementing	Tes
gateway	03 1:11:38 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	17664228	adpu160m	Test Ended	Random Verify	Decrementing	Tes
Ending Test Se	03 1:11:39 PM	-1	-1	-1	****	****	****	****	-1	-1	****	****	****	****	****
Starting Test Se	03 1:16:34 PM	-1	-1	-1	****	****	****	****	-1	-1	****	****	****	****	****
gateway	03 1:16:50 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	17664228	adpu160m	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	2	2	0	SEAGATE	ST39102LC	LJB64426	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	2	3	0	SEAGATE	ST39102LC	LJA04046	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	2	10	0	SEAGATE	ST39102LC	LJB93435	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	2	11	0	SEAGATE	ST39102LC	LJA02465	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	3	1	0	SEAGATE	ST318304FC	3EL005MD	0001	512	35964300	ql2100	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	3	3	0	SEAGATE	ST318451FC	3CC01XJ4	F26D	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	3	4	0	IBM	DDYF-T18350R		F61L	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	3	5	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	3	6	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	3	7	0	HITACHI	DK32DJ-72FC	300A3589	A9A9	512	144410879	ql2100	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	3	8	0	HITACHI	DK32DJ-72FC	300A2818	A9A9	512	144410879	ql2100	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	3	9	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	3	10	0	SEAGATE	ST318304FC	3EL005NC	0001	512	35964300	ql2100	Test Started	Random Write/	Random	Tes
gateway	03 1:16:50 PM	3	11	0	HITACHI	DK32DJ-72FC	300A0594	A9A9	512	144410879	ql2100	Test Started	Random Write/	Random	Tes
gateway	03 1:17:11 PM	3	8	0	HITACHI	DK32DJ-72FC	300A2818	A9A9	512	144410879	ql2100	Test Ended	Random Write/	Random	Mis
gateway	03 1:18:02 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Ended	Random Write/	Random	Mis
gateway	03 1:21:22 PM	3	3	0	SEAGATE	ST318451FC	3CC01XJ4	F26D	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes
gateway	03 1:21:24 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes
gateway	03 1:22:31 PM	3	4	0	IBM	DDYF-T18350R		F61L	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes
gateway	03 1:22:35 PM	3	9	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes
gateway	03 1:22:36 PM	3	10	0	SEAGATE	ST318304FC	3EL005NC	0001	512	35964300	ql2100	Test Ended	Random Write/	Random	Tes
gateway	03 1:22:36 PM	3	1	0	SEAGATE	ST318304FC	3EL005MD	0001	512	35964300	ql2100	Test Ended	Random Write/	Random	Tes
gateway	03 1:22:44 PM	3	7	0	HITACHI	DK32DJ-72FC	300A3589	A9A9	512	144410879	ql2100	Test Ended	Random Write/	Random	Tes
gateway	03 1:22:50 PM	3	11	0	HITACHI	DK32DJ-72FC	300A0594	A9A9	512	144410879	ql2100	Test Ended	Random Write/	Random	Tes
gateway	03 1:23:02 PM	3	5	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes

Here is the rest of the test table:

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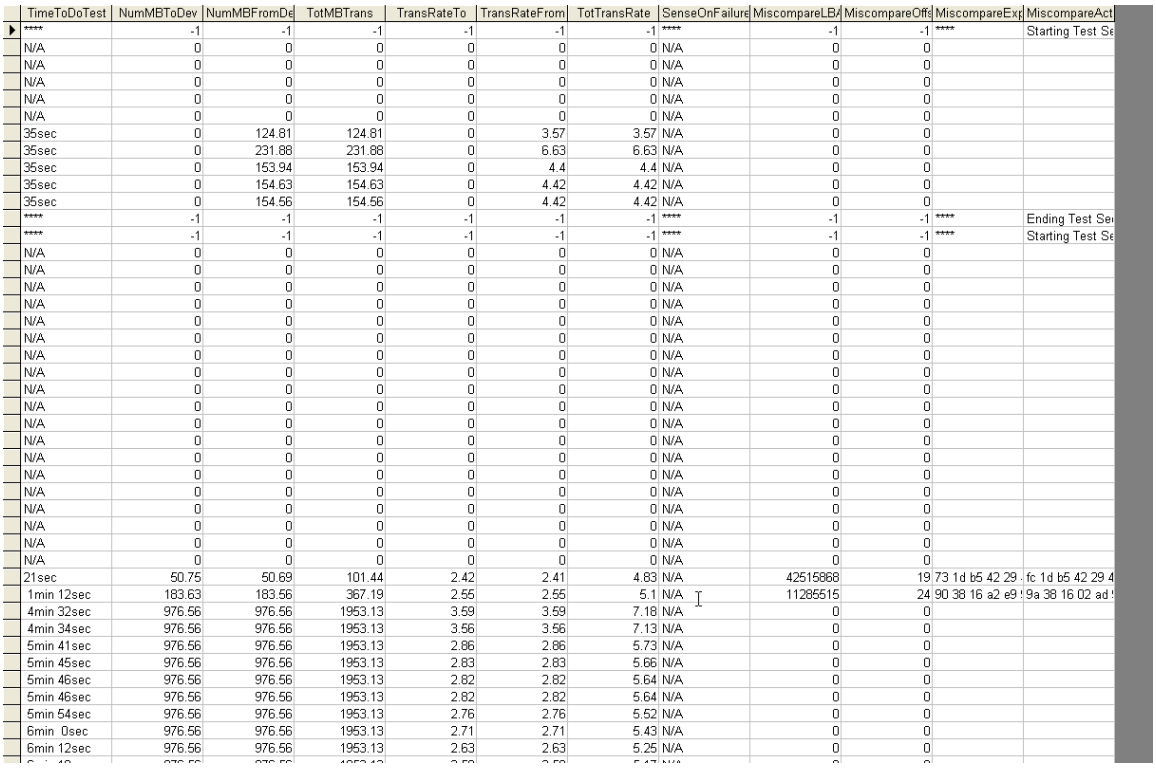
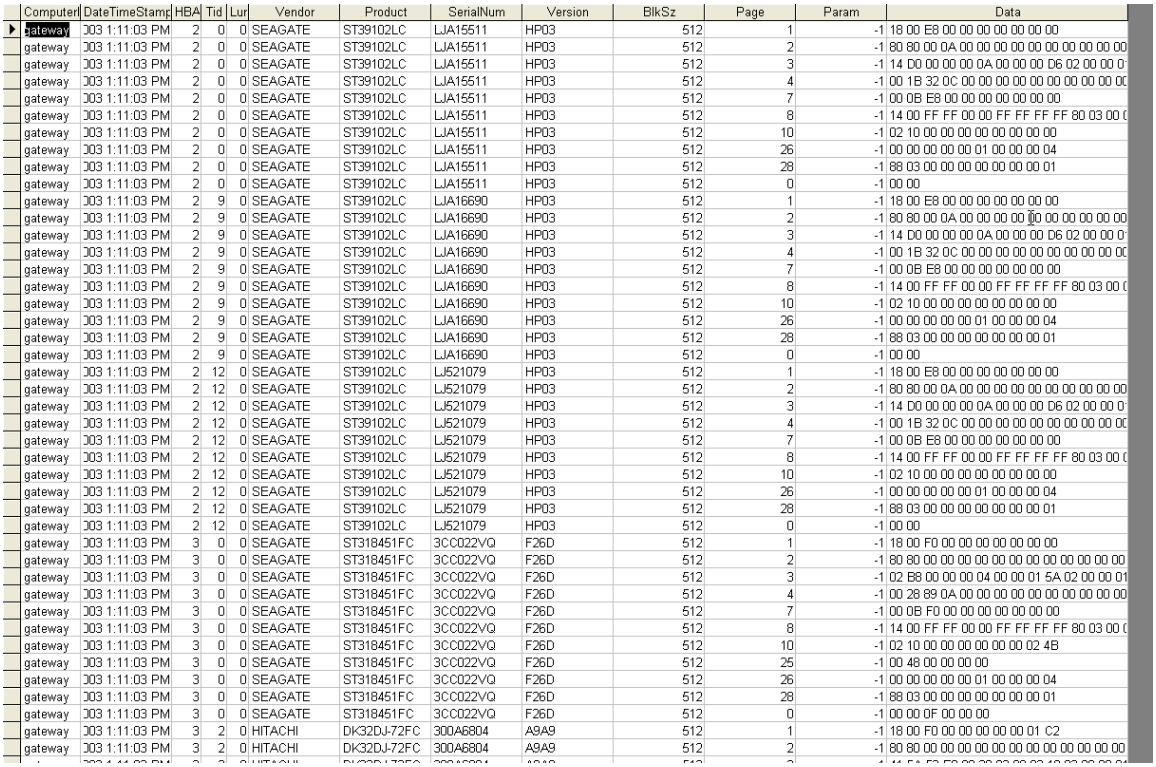


TimeToDoTest	NumMBToDev	NumMBFromDe	TotMBTrans	TransRateTo	TransRateFrom	TotTransRate	SenseOnFailure	MiscompareLBA	MiscompareOffs	MiscompareExp	MiscompareAct
****	-1	-1	-1	-1	-1	-1	****	-1	-1	****	Starting Test Se
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
35sec	0	124.81	124.81	0	3.57	3.57	N/A	0	0		
35sec	0	231.88	231.88	0	6.63	6.63	N/A	0	0		
35sec	0	153.94	153.94	0	4.4	4.4	N/A	0	0		
35sec	0	154.63	154.63	0	4.42	4.42	N/A	0	0		
35sec	0	154.56	154.56	0	4.42	4.42	N/A	0	0		
****	-1	-1	-1	-1	-1	-1	****	-1	-1	****	Ending Test Se
****	-1	-1	-1	-1	-1	-1	****	-1	-1	****	Starting Test Se
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
21sec	50.75	50.69	101.44	2.42	2.41	4.83	N/A	42515868	19	73 1d b5 42 29	fc 1d b5 42 29 4
1min 12sec	183.63	183.56	367.19	2.55	2.55	5.1	N/A	11285515	24	90 38 16 a2 e9	9a 38 16 02 ad
4min 32sec	976.56	976.56	1953.13	3.59	3.59	7.18	N/A	0	0		
4min 34sec	976.56	976.56	1953.13	3.56	3.56	7.13	N/A	0	0		
5min 41sec	976.56	976.56	1953.13	2.86	2.86	5.73	N/A	0	0		
5min 45sec	976.56	976.56	1953.13	2.83	2.83	5.66	N/A	0	0		
5min 46sec	976.56	976.56	1953.13	2.82	2.82	5.64	N/A	0	0		
5min 46sec	976.56	976.56	1953.13	2.82	2.82	5.64	N/A	0	0		
5min 54sec	976.56	976.56	1953.13	2.76	2.76	5.52	N/A	0	0		
6min 0sec	976.56	976.56	1953.13	2.71	2.71	5.43	N/A	0	0		
6min 12sec	976.56	976.56	1953.13	2.63	2.63	5.25	N/A	0	0		

The Information table stores Mode and Log page information – again a screen shot:



Computer	DateTimeStamp	HBA	Tid	Lur	Vendor	Product	SerialNum	Version	BlkSz	Page	Param	Data
gateway	303 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	1	-1	18 00 E8 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	2	-1	80 80 00 0A 00 00 00 00 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	3	-1	14 D0 00 00 00 0A 00 00 00 D6 02 00 00 0
gateway	303 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	4	-1	00 1B 32 0C 00 00 00 00 00 00 00 00 00 00 0
gateway	303 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	7	-1	00 0B E8 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	8	-1	14 00 FF FF 00 00 FF FF FF FF 80 03 00
gateway	303 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	10	-1	02 10 00 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	26	-1	00 00 00 00 00 01 00 00 00 04
gateway	303 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	28	-1	88 03 00 00 00 00 00 00 00 01
gateway	303 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	0	-1	00 00
gateway	303 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	1	-1	18 00 E8 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	2	-1	80 80 00 0A 00 00 00 00 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	3	-1	14 D0 00 00 00 0A 00 00 00 D6 02 00 00 0
gateway	303 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	4	-1	00 1B 32 0C 00 00 00 00 00 00 00 00 00 00 0
gateway	303 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	7	-1	00 0B E8 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	8	-1	14 00 FF FF 00 00 FF FF FF FF 80 03 00
gateway	303 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	10	-1	02 10 00 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	26	-1	00 00 00 00 00 01 00 00 00 04
gateway	303 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	28	-1	88 03 00 00 00 00 00 00 00 01
gateway	303 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	0	-1	00 00
gateway	303 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	1	-1	18 00 E8 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	2	-1	80 80 00 0A 00 00 00 00 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	3	-1	14 D0 00 00 00 0A 00 00 00 D6 02 00 00 0
gateway	303 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	4	-1	00 1B 32 0C 00 00 00 00 00 00 00 00 00 00 0
gateway	303 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	7	-1	00 0B E8 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	8	-1	14 00 FF FF 00 00 FF FF FF FF 80 03 00
gateway	303 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	10	-1	02 10 00 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	26	-1	00 00 00 00 00 01 00 00 00 04
gateway	303 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	28	-1	88 03 00 00 00 00 00 00 00 01
gateway	303 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	0	-1	00 00
gateway	303 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	1	-1	18 00 F0 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	2	-1	80 80 00 00 00 00 00 00 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	3	-1	02 B8 00 00 00 04 00 00 01 5A 02 00 00 01
gateway	303 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	4	-1	00 28 89 0A 00 00 00 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	7	-1	00 0B F0 00 00 00 00 00 00 00
gateway	303 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	8	-1	14 00 FF FF 00 00 FF FF FF FF 80 03 00
gateway	303 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	10	-1	02 10 00 00 00 00 00 00 02 4B
gateway	303 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	25	-1	00 48 00 00 00 00
gateway	303 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	26	-1	00 00 00 00 00 01 00 00 00 04
gateway	303 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	28	-1	88 03 00 00 00 00 00 00 00 01
gateway	303 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	0	-1	00 00 0F 00 00 00
gateway	303 1:11:03 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	1	-1	18 00 F0 00 00 00 00 00 01 C2
gateway	303 1:11:03 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	2	-1	80 80 00 00 00 00 00 00 00 00 00 00 00 00 00

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Text File Output Data

A separate text output file will be created for each device that is tested by the Manufacturing Module. The name of these files is a combination of the device address (bus-target-lun) and the device serial number if available. For instance the example file here is named "**00-264-00-3SK00EMN.Log**".

This file contains all information about the drive, and about the tests that were run. The results of the Manufacturing test run, as shown below:

```
================================================================================
>> SCSI Toolbox32, Version 9. 0. 2 (build) 141024, running on \\W7TEST       <<
>> Default Driver: 10, Operating System: Windows 7<<
>> Number of Drives Under Test: 1 <<
>> Available Memory (in GB): 11.60 <<
================================================================================

Test Date:  10/30/2014  10:26:40
Test Pass:  1

  Device:  0:264:0   Vendor: SEAGATE, Product: ST3450857SS   Serial: 3SK00EMN, Version: ES62

  Capacity: 1.02 GB, BlockSize: 512 (0x200)

Results:


-- OPERATOR NAME: mdj

-- SPECIAL TEXT: Example Test Sequence for manual
 10/30/2014  10:26:40  TEST 1 of 4:
                  Write Test; Sequential; for 2,000,000 Blocks
                  Fixed-Length Transfers of 128 (0x0080) Blocks
                  Start Block: 0
                  Data Pattern: Decrementing w/ LBA Overlay
                  Queue Depth = 1
                  FUA = OFF
                  Number of Workers = 1
                  Stop-on-Error Type: Stop Current Test


 10/30/2014  10:27:47  Worker ID: 1
 10/30/2014  10:27:47  Test Completed Successfully

                Transfer Rate: 14.58 MB/sec
                I/O Per Second: 233.21 IO/sec
                Number of Blocks Transferred: 2,000,000
                Fastest Command Completion Time: 0.572 ms
                Slowest Command Completion Time: 30.912 ms
                Average Command Completion Time: 4.300 ms
```


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Standard Deviation of Command Completion Times: 0.273 ms

10/30/2014 10:27:47 PASSED

10/30/2014 10:27:47 TEST 2 of 4:
Read Test; Sequential; for 2,000,000 Blocks
Fixed-Length Transfers of 128 (0x0080) Blocks
Start Block: 0
Data Pattern: Decrementing w/ LBA Overlay; Data Compare ON
Queue Depth = 1
FUA = OFF
Number of Workers = 1
Stop-on-Error Type: Stop Current Test

10/30/2014 10:27:53 Worker ID: 1
10/30/2014 10:27:53 Test Completed Successfully

Transfer Rate: 162.76 MB/sec
I/O Per Second: 2604.17 IO/sec
Number of Blocks Transferred: 2,000,000
Fastest Command Completion Time: 0.319 ms
Slowest Command Completion Time: 5.121 ms
Average Command Completion Time: 0.335 ms
Standard Deviation of Command Completion Times: 0.047 ms

10/30/2014 10:27:53 PASSED

10/30/2014 10:27:53 TEST 3 of 4:
Grown Defect List Count Test
Stop-on-Error Type: Stop Current Test

10/30/2014 10:27:53 Number of Grown Defects = 0

10/30/2014 10:27:53 Worker ID: 1
10/30/2014 10:27:53 Test Completed Successfully

10/30/2014 10:27:53 PASSED

10/30/2014 10:27:53 TEST 4 of 4:
IDENTIFY Drive Test
Stop-on-Error Type: Stop Current Test

****
Drive INQUIRY information:
Vendor = SEAGATE
Product = ST3450857SS
Revision = ES62
Device Type = Direct Access
Removeable Media = No
Dual Port
Width = 8 bit
Queuing Supported
SCSI Level = 5
Serial Number = 3SK00EMN
WWN = 5000C50000798065
Drive Temperature = 25

****

10/30/2014 10:27:53 PASSED

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Other output data

Clicking on the “Save to File” button under the Test Progress window will save the contents of the Test Sequence and Test Progress windows to a file – in text mode.

Here is a sample of this type of output:

Output from Disk Screening Toolbox

The time is Fri Oct 31 11:32:27 2014

Test Sequence:

1. SCSI Stress Test - Step 1, GList

2. SCSI Stress Test - Step 2, Clear Log Pages

3. SCSI Stress Test - Step 3, Write Test

4. SCSI Stress Test - Step 4, Read Test

5. SCSI Stress Test - Step 5, GList

6. SCSI Stress Tes - Step 6, Save Log Pages

Test Progress:

Pass # 1

Verifying selected devices

Starting Pre-Test Actions

Done Pre-Test Actions

Test 1 Started on :

HA 4 Target 1 Lun 0 TOSHIBA PX02SMF020

HA 4 Target 1 LUN 0 has completed test 1 successfully

Starting Test Number 2 on drive 4:1:0

HA 4 Target 1 LUN 0 has completed test 2 successfully

Starting Test Number 3 on drive 4:1:0

HA 4 Target 1 LUN 0 has completed test 3 successfully

Starting Test Number 4 on drive 4:1:0

HA 4 Target 1 LUN 0 has completed test 4 successfully

Starting Test Number 5 on drive 4:1:0

HA 4 Target 1 LUN 0 has completed test 5 successfully

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Starting Test Number 6 on drive 4:1:0

HA 4 Target 1 LUN 0 has completed test 6 successfully
ALL TESTS HAVE BEEN COMPLETED

Starting Post-Test Actions
Done Post-Test Actions

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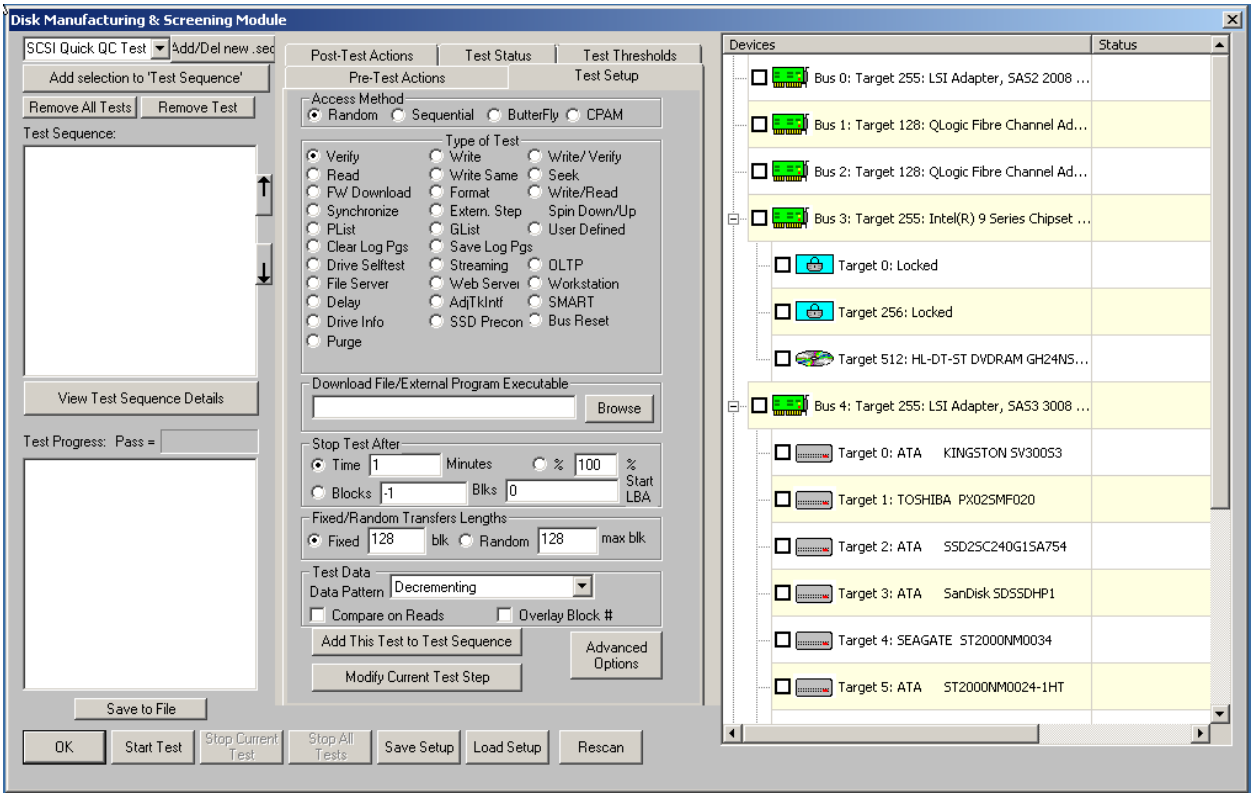
Getting Started – DMM Quick Users Guide

Choosing the Disk Screening Module from the Disk Menu of the SCSItoolbox will present you with this screen:



The left side of the screen has Test Sequence and Test Progress list boxes, the center part of the screen has several tabbed pages for configuring the test process, and the right side of the screen shows a tree display of all of the adapters and devices attached to the system.

There are several buttons at the bottom of the screen to control the testing process.

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Since a test process is made up of ***Pre-Test Actions, Tests, and Post-Test actions***, let's go through each of these sections and see how to configure each.

This Users Guide will walk you through the process of defining, running, and evaluating a typical test scenario.

For more details on all DMM features see the DMM Reference section above.

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In this example we will define a test sequence which will:
1. Pretest Actions
-Set all Mode Pages to default
-Spin up all drives

2. Test Setup
-do a Sequential Access Write
-do a Sequential Access Read with data compare
-record the drives G List
-Screen the drive – fail if there are more than 1 G defects
-log all of the drives information

3. Post Test Actions
-Spin down all drives

Here is a quick step through the process of creating and running a DMM Test Sequence

Pre-Test Action Setup

We want to set all Mode Pages to DEFAULT and spin all drives up before testing, so we set our PreTest Actions tab page like this:

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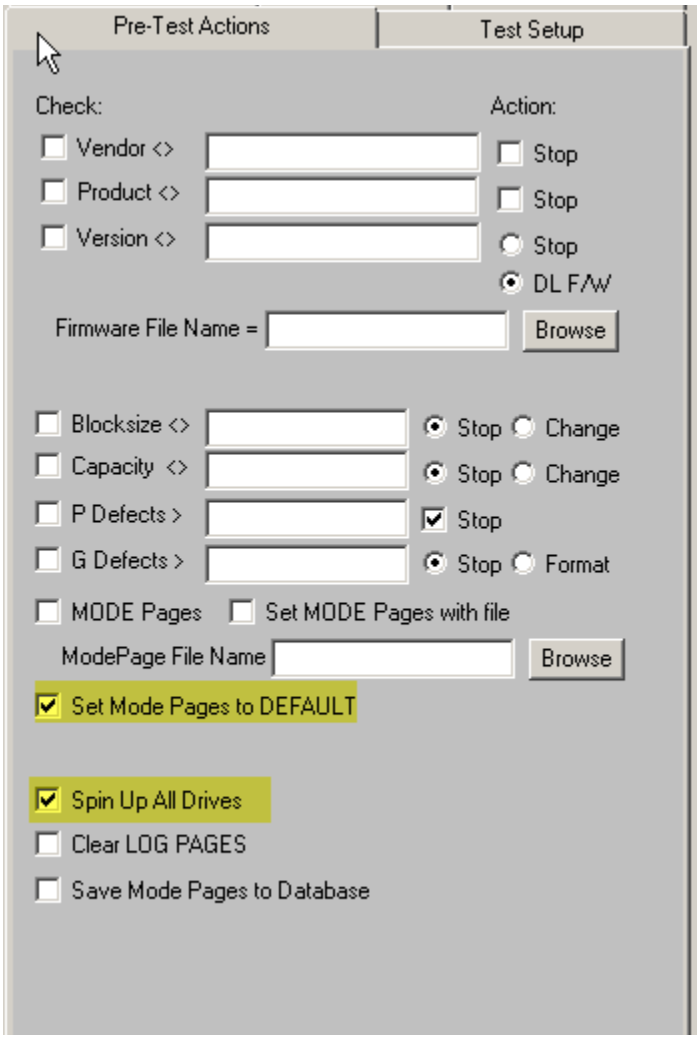

Remember that your Pre-Test Actions can be made up of any, all, or none of these choices – it is up to you!

Test Setup

We want our test to do:
-do a **Sequential Access Write**
-do a **Sequential Access Read** with **data compare**
-record the drives **G List**
-Screen the drive – **fail if there are more than 1 G defects**
-**log all of the drives information**

Remember that DMM uses Test Sequences to define what actions your test will take.
Test Sequences are simply made up of one or more Test Steps.

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Test Steps are defined by selecting choices from the Test Setup tab which will define each Test Steps testing parameters. Going from top to bottom on the Test Setup tab, generally to define a Test Step you will:

1. define the access method
2. choose the test type
3. define when you want the test step to stop
4. define what size data transfers you want while doing I/O
5. define what data pattern and options you want to use
6. define options such as what to do if an error occurs, where to save your log files, etc
7. when everything for the Test Step is defined – add the Test Step to the Test Sequence

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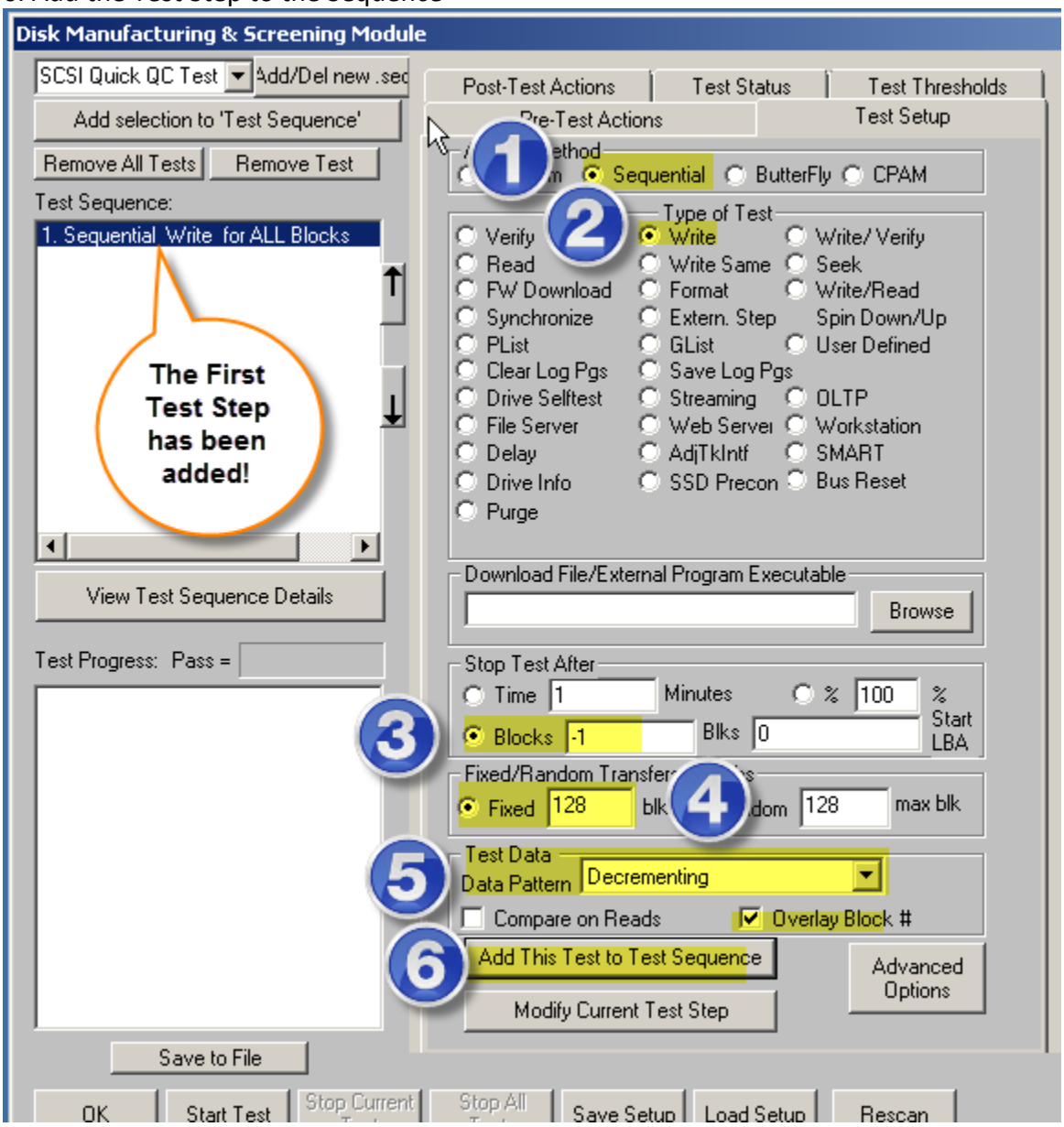
Here is the detail on defining the first test step – the Sequential Write test.

1. Choose the Sequential Access Type
2. Choose the Write test
3. Choose to write the entire drive
4. Choose the size of data transfers you want
5. Choose the data pattern and options you want
6. Add the Test Step to the Sequence



Notes: Entering -1 in the Stop Test After Blocks field instructs DMM to hit every block on the drive.

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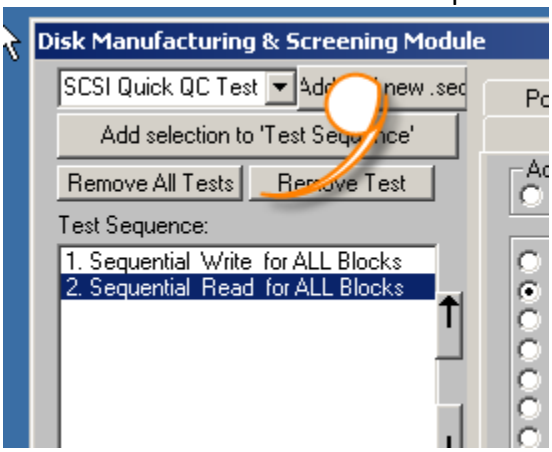
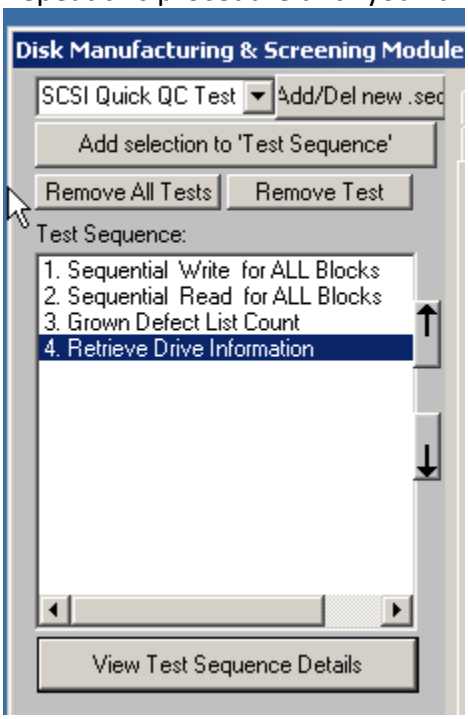
Now, to add our second Test Step (the Sequential Read w/ Data Compare) simple click on the Read test type, leave all other settings the same – and check the Compare on Reads option, then click Add This Test to Test Sequence and you will see Step 2 added to the Test Sequence



Repeat this procedure until you have defined all of your Test Steps –



You may notice that we described 5 test steps but there are only 4 steps shown. That is because the Screening by Glist threshold is slightly different than a normal Test Step. Screening is done using the **Thresholds Tab**, and any screening Thresholds that have been defined will be tested for after *each test step runs*.

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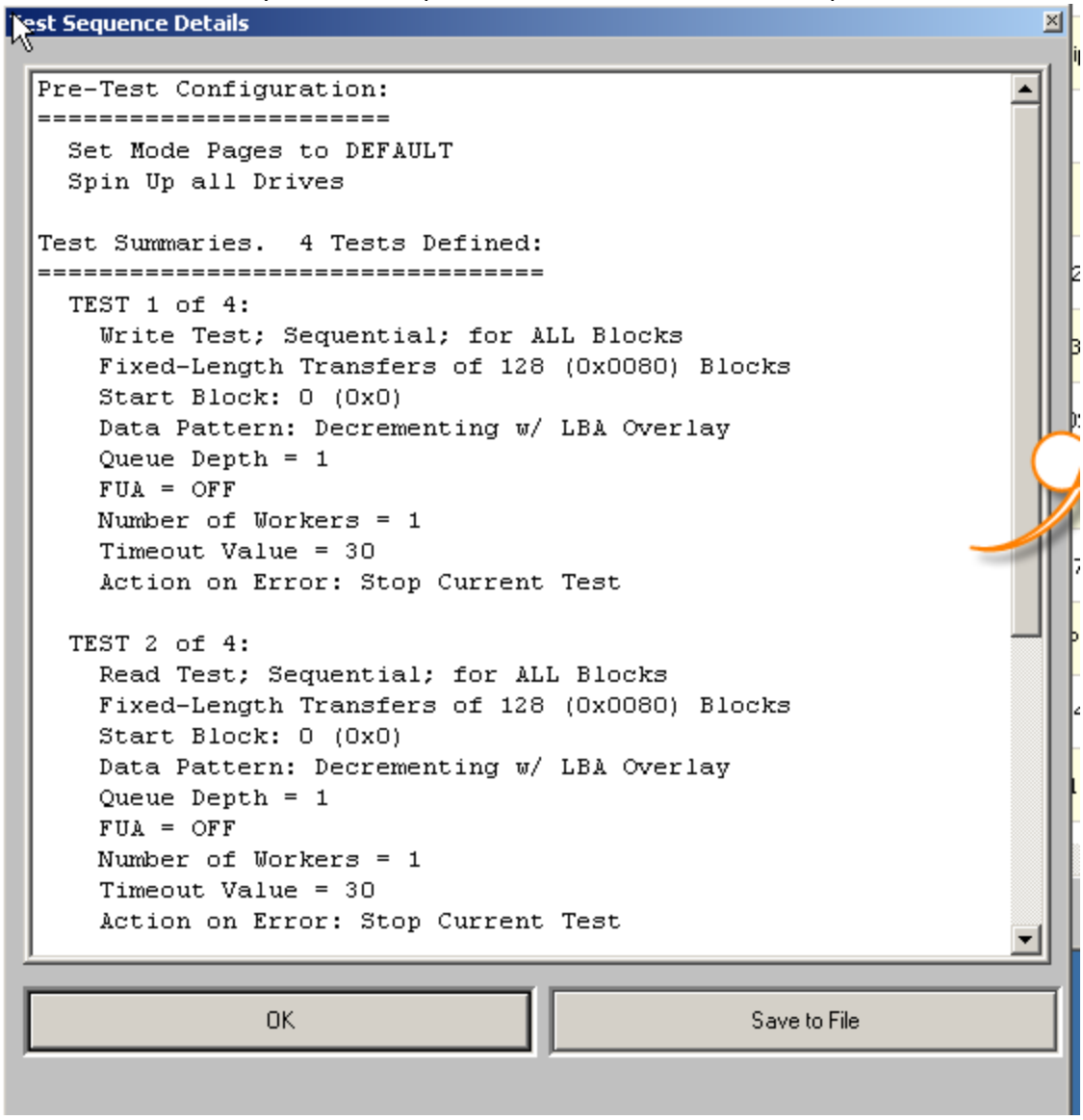
To see the details of your Test Sequence click on the View Test Sequence Details button –



Now, you may want to save your Test Sequence so that you can run it again any time without having to enter the entire Test Sequence again and again.
Simply use the Save Setup button to save the Sequence to a file, and use Load Setup to reload any of your saved Test Sequences.

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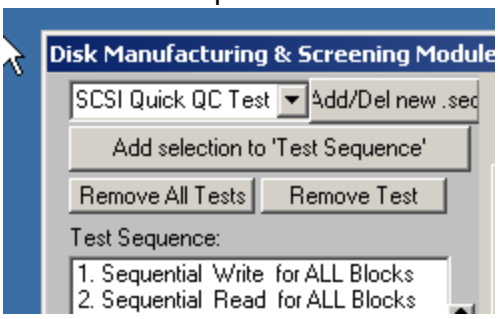
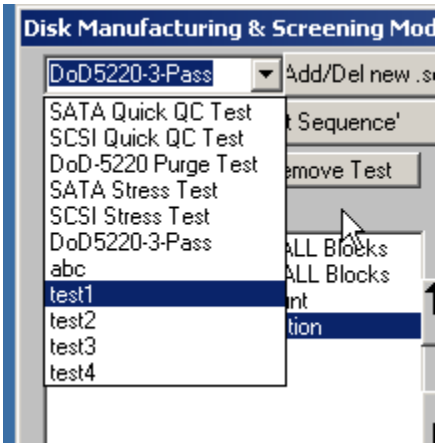
Note: in the Upper left of the main DMM screen you will see options for quickly recalling your favorite Test Sequences –



There are 5 examples stored, and you may use the Add/Del New .seq button to add more to the list



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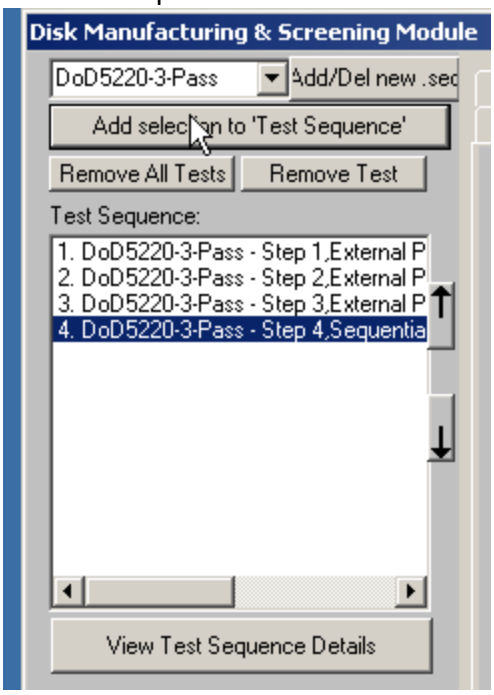
Click on any choice from the pull-down list, then click Add selection to Test Sequence to fill in the Test Sequence-



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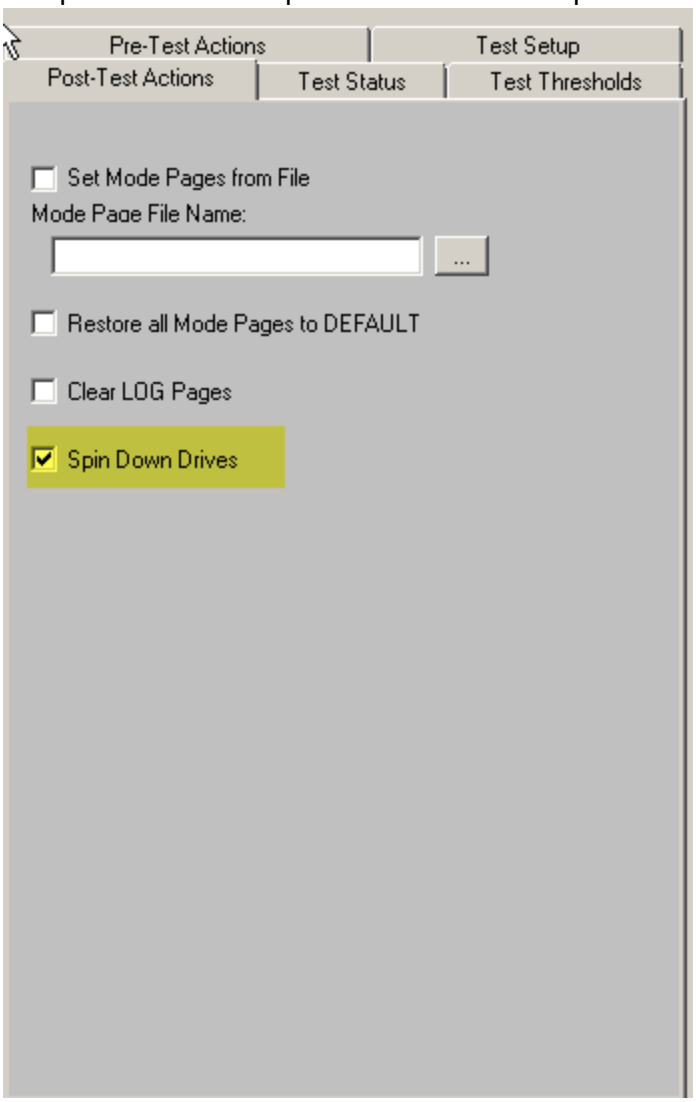
Post Test Actions Setup

Click on the Post Test Actions tab to define what actions you want taken after all tests have completed. Our example wanted all drives spun down, so simply check that choice



Select the Drive(s) to Test

Scroll through the Drive List display on the right to select which drives to test.

DMM will run your test step in a separate thread against all drives you select. Each drive can run at its own maximum speed – slow drives will not slow down faster drives.

Click on the check box next to each drive, or click the check box next to a HBA to select all drives on that HBA

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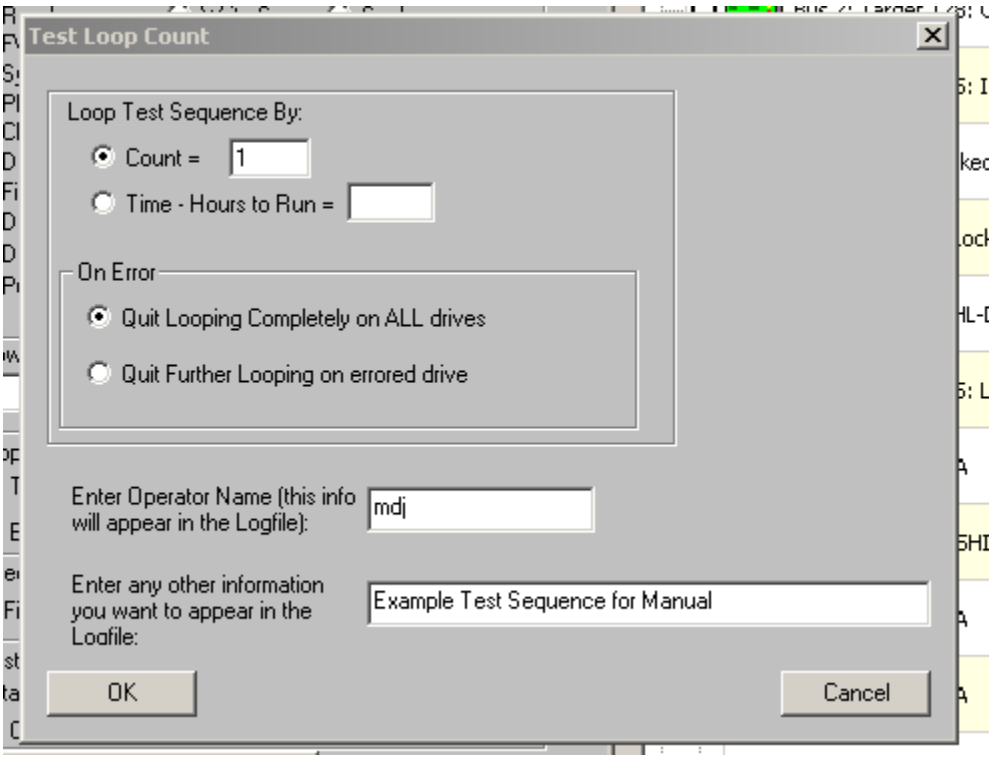
Start the Test

Click Start Test to begin the test –



You can choose to loop your test by count – for instance run the test sequence 10 times in a row. Or you may loop the test sequence by time – run the test sequence over and over for 12 hours.

You can also choose what to do if you are looping your tests and a drive fails. The choices here are

Quit looping completely on ALL drives – in other words stop the looped testing if a drive fails, or

Quit Further Looping on errored drive – drop the failed drive but keep looping/test all others

You may also enter an operator ID and a short note which will be recorded into the .log files.

Once you click the OK button here the test sequence will start on all selected drives.

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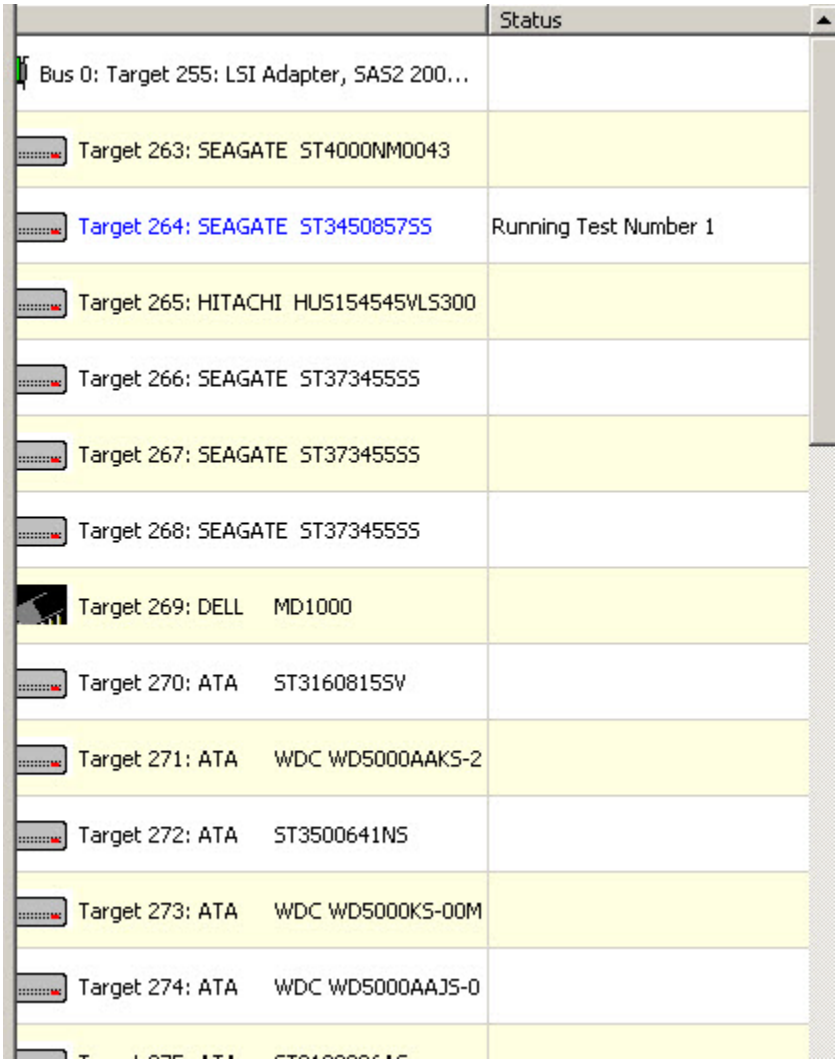
Watch the Test Progress

As the Test Sequence runs the progress of each drive under test will be seen in the Disk display.

Drives testing will be shown in Blue, drives that had an error will be shown in Red, and drives that completed with no errors will be shown in Green. In addition as the test sequence progresses you can see which test step is currently being run.



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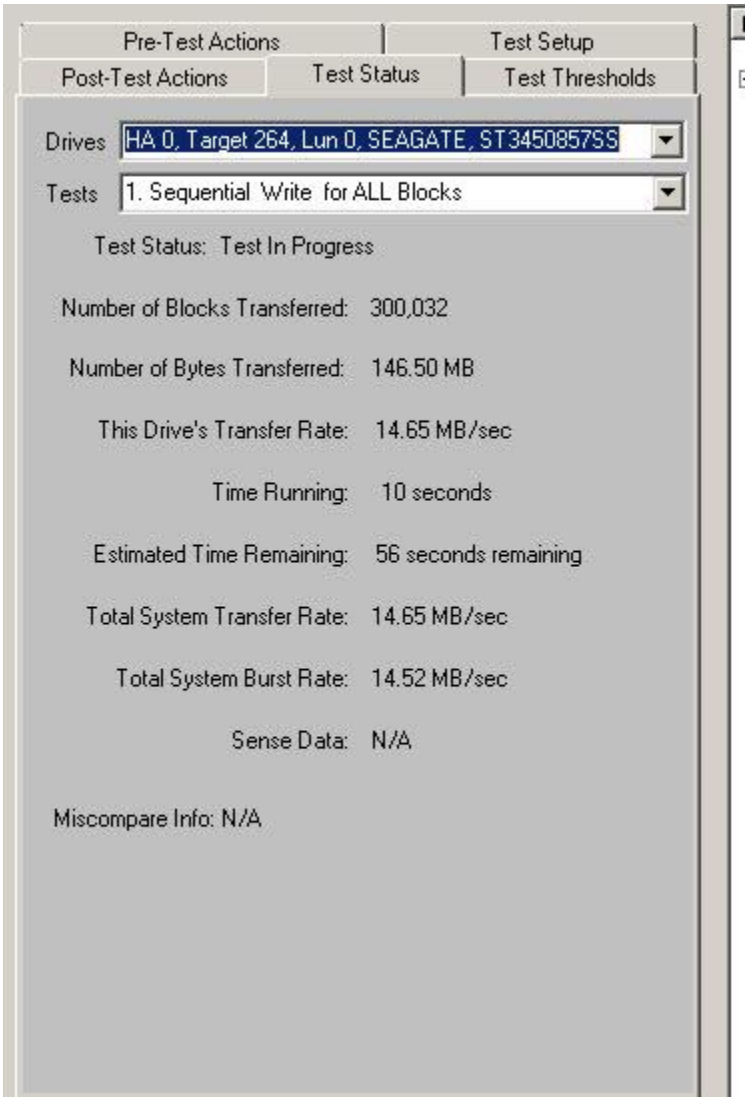
Clicking on the Test Status tab will show performance details and estimated time to complete the currently running step –



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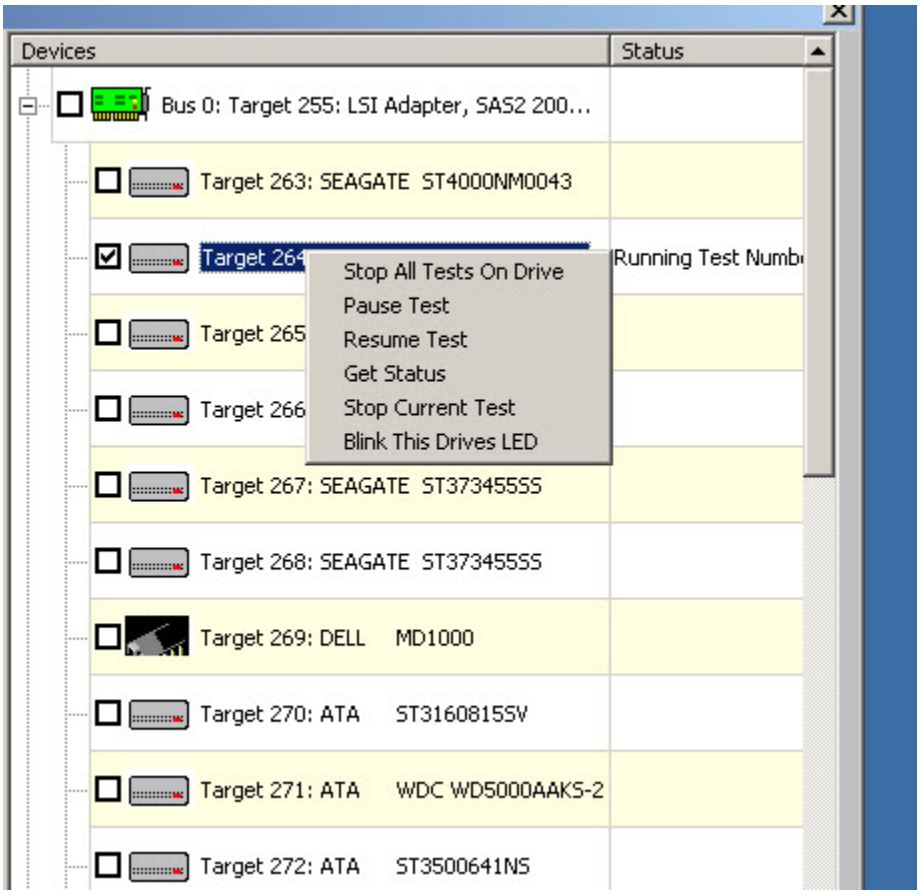
And Right-Clicking on any drive will show you options available for pausing, stopping, resuming, and checking status –



Examine the Results

Test results are stored in several places

Access Database

The file ***DiskScreenDatabase.mdb*** is a Microsoft Access database file. All test step details and results for all drives are recorded here. This could allow you to track the history of a drive by its serial number for instance.

Text (cxv) Database

The same information as is stored in the Access database is also stored in a comma-delimited .csv file named ***DiskScreenDatabase.txt***

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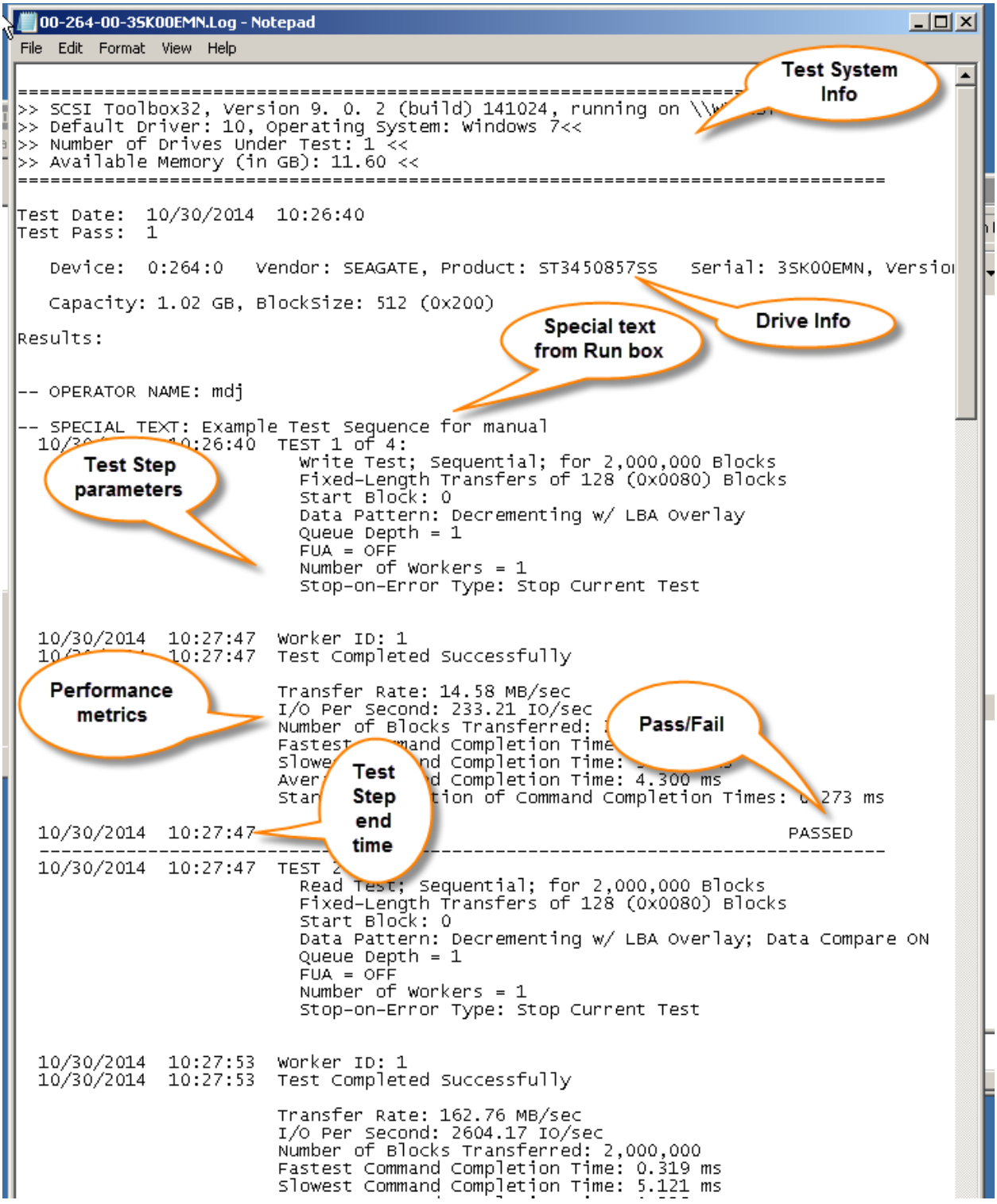
Individual Drive text logs

An individual text log file is produced for each drive tested. The file name is made up of the drives address on the test system (*HBA-Target-LUN-SerialNumber.Log*). Here is an example of the .log file showing the results of our example test run –



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The Test Progress box will display a message that the selected drives are being verified, then any Pre-Test Actions will be performed and shown in the Test Progress box.

Once all Pre-Test Actions are finished the Test Sequence will be executed.

Each disk under test has it's own execution thread, and will run the tests in the test sequence as fast as it can. This can lead to faster drives processing through the test sequence faster than others. To check individual drive status, and to pause or stop a test on an individual drive, just right-click on that drive in the tree display

During Testing – individual drive

As a disk is being tested it will be displayed with a Blue highlight in the tree display.

During testing each disk drive can have:

The current test Paused
Testing resumed
The current test stopped
All testing for this drive stopped
The status of the current test displayed

Pausing a Test

Move the cursor over the disk of interest, then click the Right mouse button. Clicking the Pause choice will pause the current test on that drive. The drive will now be displayed with a Magenta highlight in the tree display.

Resuming a Test

Right click on the paused drive, then click the Resume Test choice to resume testing. The drive is displayed in Blue highlight again

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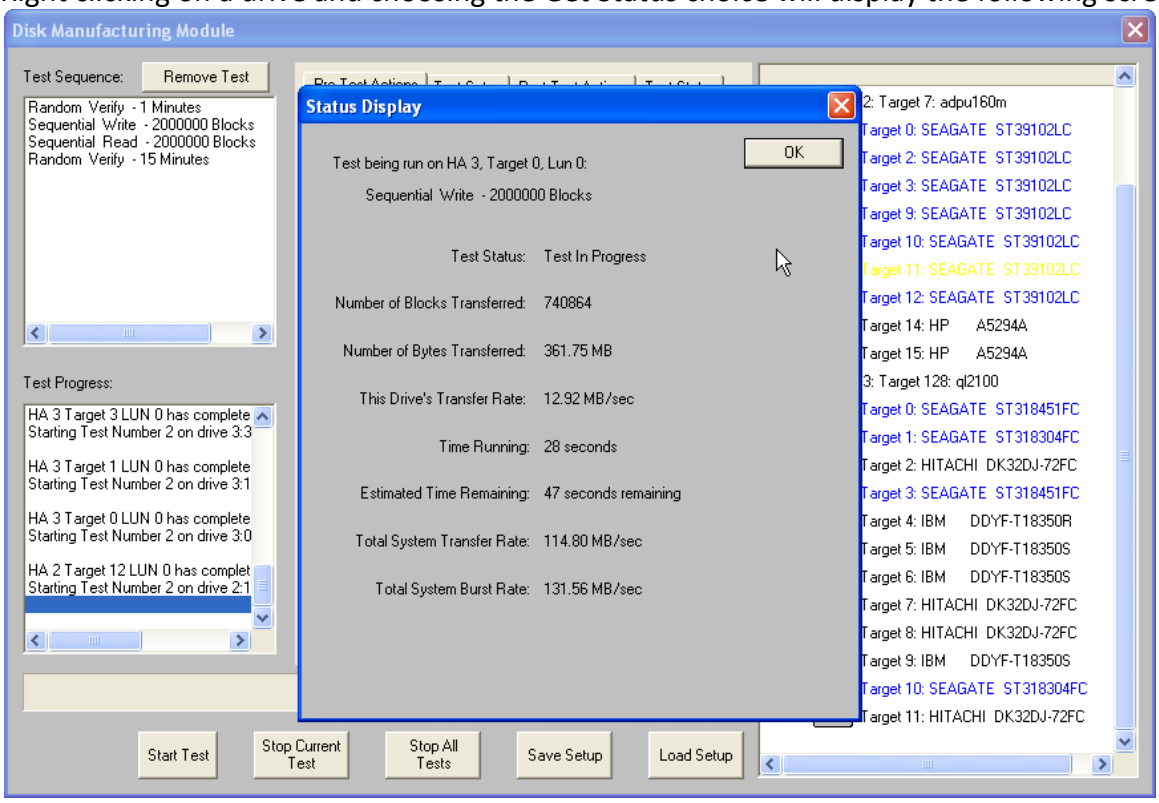
Stopping a Test

Right click on a drive, then choose either the Stop Current Test, or Stop All Tests choice

Viewing Test Status

Right clicking on a drive and choosing the Get Status choice will display the following screen:



Data that is shown is:

The name of the test that is currently running,
Test Status
Number of Blocks Transferred
Number of Bytes Transferred
The average transfer rate (over time) achieved
Time running
Estimated time remaining
Total System Transfer Rate
Total System Burst Rate

All data is updated every few seconds

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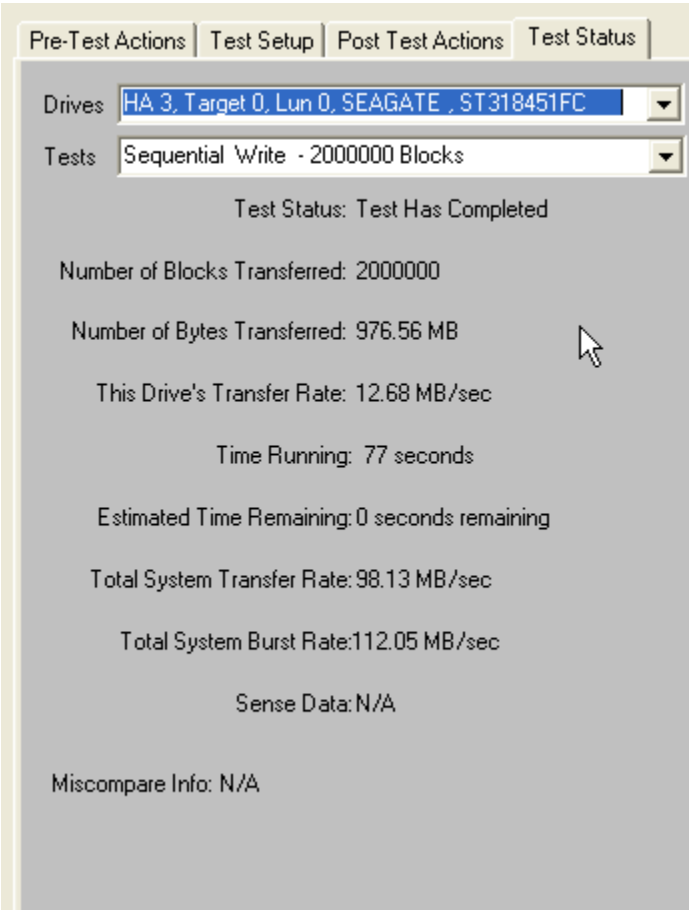
During Testing – All Drives

As the test sequence progresses it is possible to view status on each drive for each test of the sequence. This is done at the Test Status tab page

All performance and error data for each test of each drive is viewable here.

The Test Status Page

The test status pages appears as below:



The Drives Pulldown

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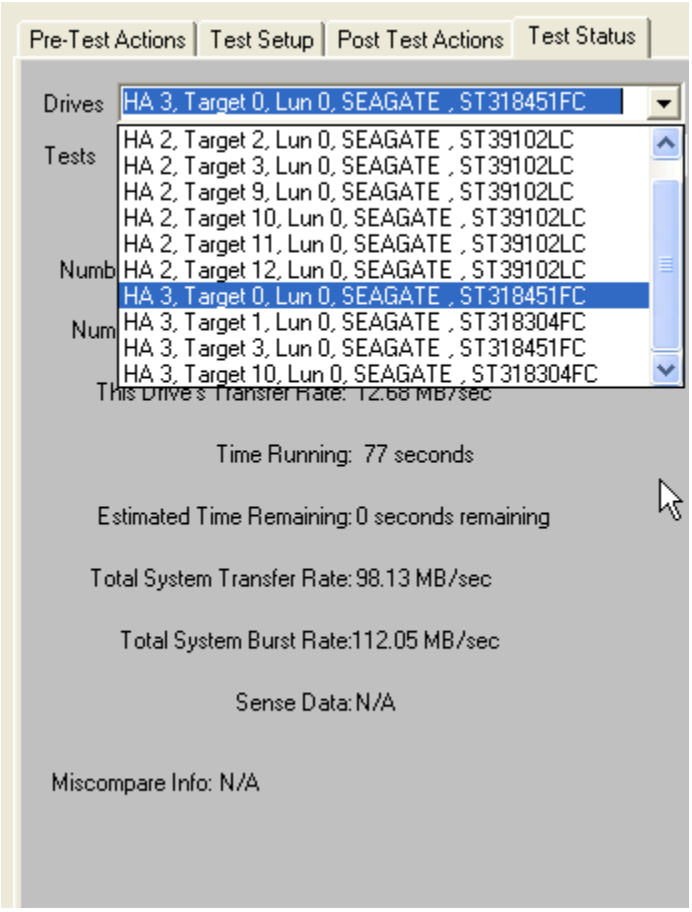
Use the Drives Pulldown box to choose which disk



Just highlight the disk of interest

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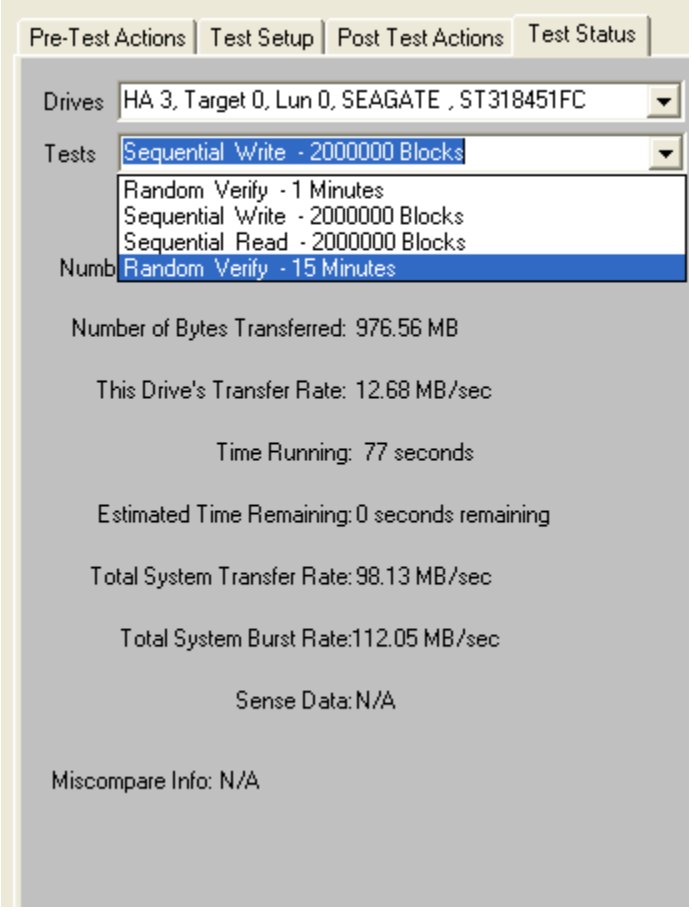
The Tests Pulldown

Use the Tests Pulldown to choose which test to view



Stopping Tests

Use the ***Stop Current Test*** or ***Stop All Tests*** buttons at the bottom of the Disk Screening Toolbox page to stop testing.

Choosing the ***Stop Current Test*** button will stop the current test running on all drives – if there are more tests in the test sequence each drive will go on to what is the next test for it.

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Choosing the ***Stop All Tests*** button will stop all testing on all drives

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Test Results and Output Data

Database data

Test results are written to an Access database – the database file name is DiskScreenDatabase.mdb, and it is located in the folder where SCSItoolbox or the Stand Alone Disk Screening Toolbox is installed.

If you have Access installed on your system you can double-click on this file to view it's contents.

This data is also written as a comma-delimited text file called DiskScreenDatabase.txt

There are two tables – Test and Information.

The Test table stores the following information for each test or test event:

ComputerNam e
DateTimeStamp
HBA
TARGET
Lun
Vendor
Product
SerialNum
Version
BlkSz
Capacity
Adapter
Comment
TestName
Pattern
TestResult
TestStartTime
TestEndTime
TimeToDoTest
NumMBToDev
NumMBFromDev
TotMBTrans

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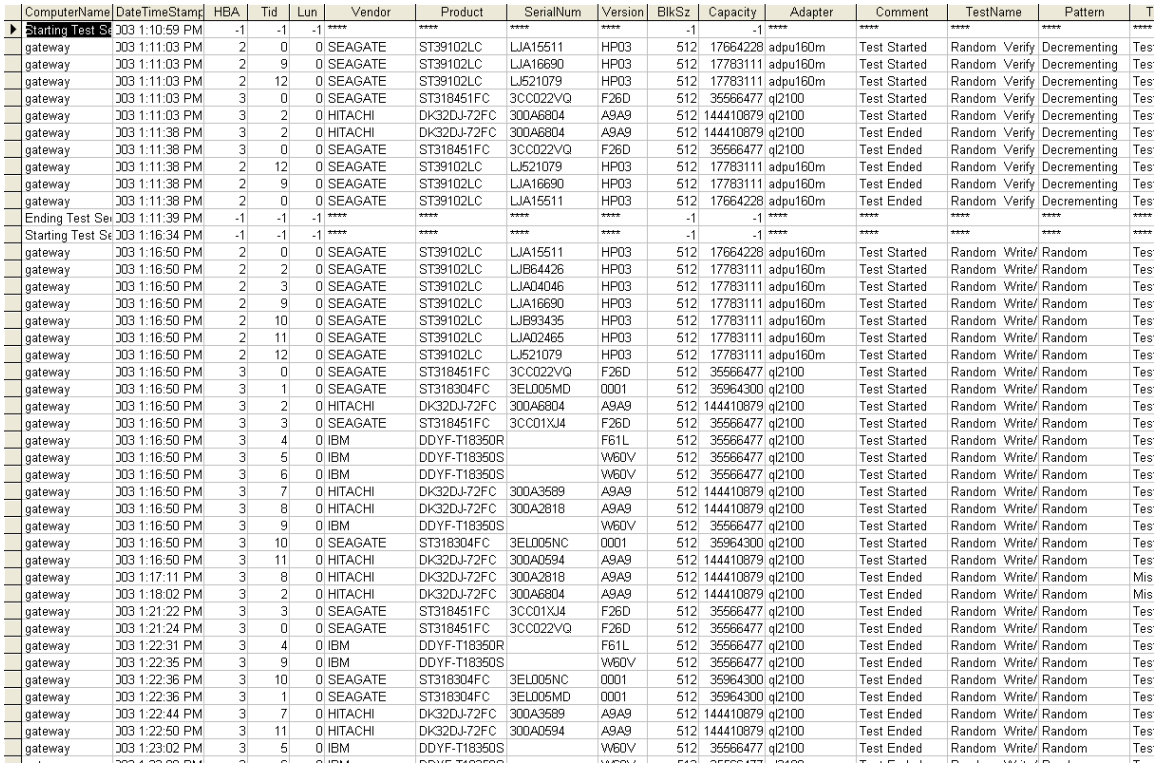
TransRateTo
TransRateFrom
TotTransRate
SenseOnFailure
MiscompareLBA
MiscompareOffset
MiscompareExpected
MiscompareActual

Here is a (partial!) screen shot of the test table:



ComputerName	DateTimeStamp	HBA	Tid	Lun	Vendor	Product	SerialNum	Version	BlkSz	Capacity	Adapter	Comment	TestName	Pattern	T
Starting Test Se	3/3 1:10:59 PM	-1	-1	-1	****	****	****	****	-1	-1	****	****	****	****	****
gateway	3/3 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	17664228	adpu160m	Test Started	Random Verify	Decrementing	Tes
gateway	3/3 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	17783111	adpu160m	Test Started	Random Verify	Decrementing	Tes
gateway	3/3 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	17783111	adpu160m	Test Started	Random Verify	Decrementing	Tes
gateway	3/3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Started	Random Verify	Decrementing	Tes
gateway	3/3 1:11:03 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Started	Random Verify	Decrementing	Tes
gateway	3/3 1:11:38 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Ended	Random Verify	Decrementing	Tes
gateway	3/3 1:11:38 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Ended	Random Verify	Decrementing	Tes
gateway	3/3 1:11:38 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	17783111	adpu160m	Test Ended	Random Verify	Decrementing	Tes
gateway	3/3 1:11:38 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	17783111	adpu160m	Test Ended	Random Verify	Decrementing	Tes
gateway	3/3 1:11:38 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	17664228	adpu160m	Test Ended	Random Verify	Decrementing	Tes
Ending Test Se	3/3 1:11:39 PM	-1	-1	-1	****	****	****	****	-1	-1	****	****	****	****	****
Starting Test Se	3/3 1:16:34 PM	-1	-1	-1	****	****	****	****	-1	-1	****	****	****	****	****
gateway	3/3 1:16:50 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	17664228	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	2	2	0	SEAGATE	ST39102LC	LJB64426	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	2	3	0	SEAGATE	ST39102LC	LJA04046	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	2	10	0	SEAGATE	ST39102LC	LJB93435	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	2	11	0	SEAGATE	ST39102LC	LJA02465	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	1	0	SEAGATE	ST318304FC	3EL005MD	0001	512	35964300	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	3	0	SEAGATE	ST318451FC	3CC01XJ4	F26D	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	4	0	IBM	DDYF-T18350R		F61L	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	5	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	6	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	7	0	HITACHI	DK32DJ-72FC	300A3589	A9A9	512	144410879	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	8	0	HITACHI	DK32DJ-72FC	300A2818	A9A9	512	144410879	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	9	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	10	0	SEAGATE	ST318304FC	3EL005NC	0001	512	35964300	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	11	0	HITACHI	DK32DJ-72FC	300A0594	A9A9	512	144410879	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:17:11 PM	3	8	0	HITACHI	DK32DJ-72FC	300A2818	A9A9	512	144410879	ql2100	Test Ended	Random Write/	Random	Mis
gateway	3/3 1:18:02 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Ended	Random Write/	Random	Mis
gateway	3/3 1:21:22 PM	3	3	0	SEAGATE	ST318451FC	3CC01XJ4	F26D	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:21:24 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:22:31 PM	3	4	0	IBM	DDYF-T18350R		F61L	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:22:35 PM	3	9	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:22:36 PM	3	10	0	SEAGATE	ST318304FC	3EL005NC	0001	512	35964300	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:22:36 PM	3	1	0	SEAGATE	ST318304FC	3EL005MD	0001	512	35964300	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:22:44 PM	3	7	0	HITACHI	DK32DJ-72FC	300A3589	A9A9	512	144410879	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:22:50 PM	3	11	0	HITACHI	DK32DJ-72FC	300A0594	A9A9	512	144410879	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:23:02 PM	3	5	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes

Here is the rest of the test table:

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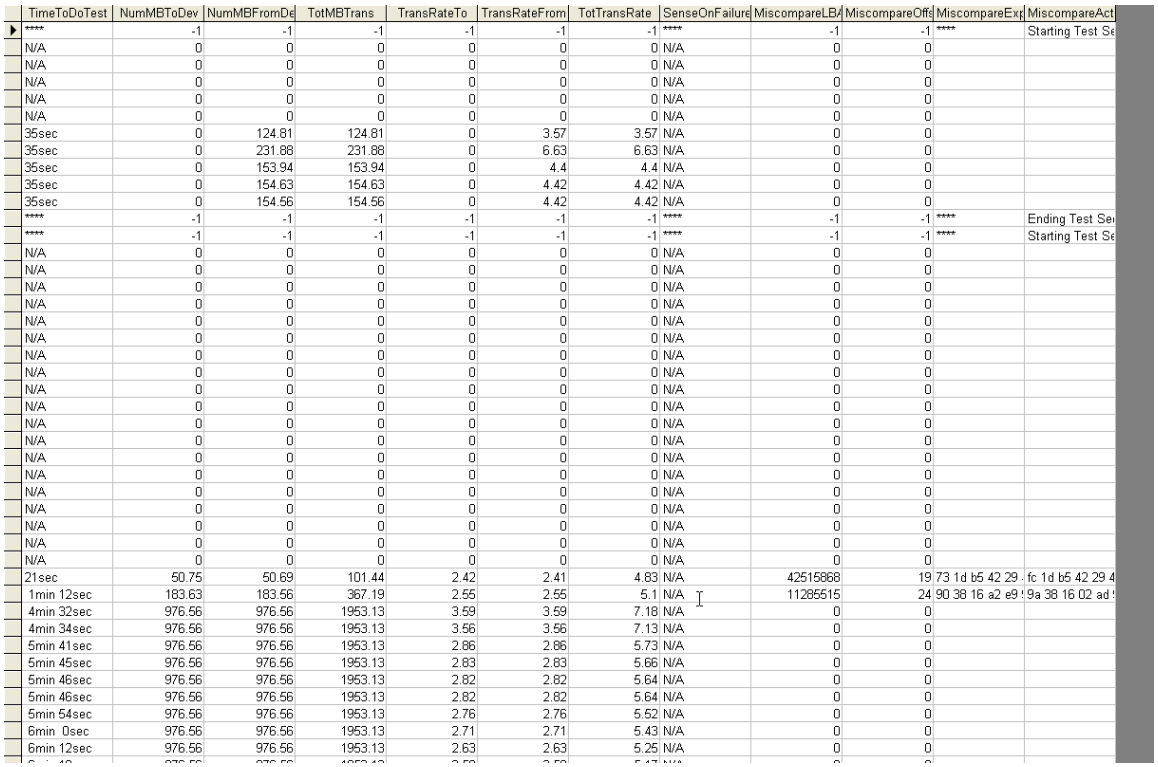
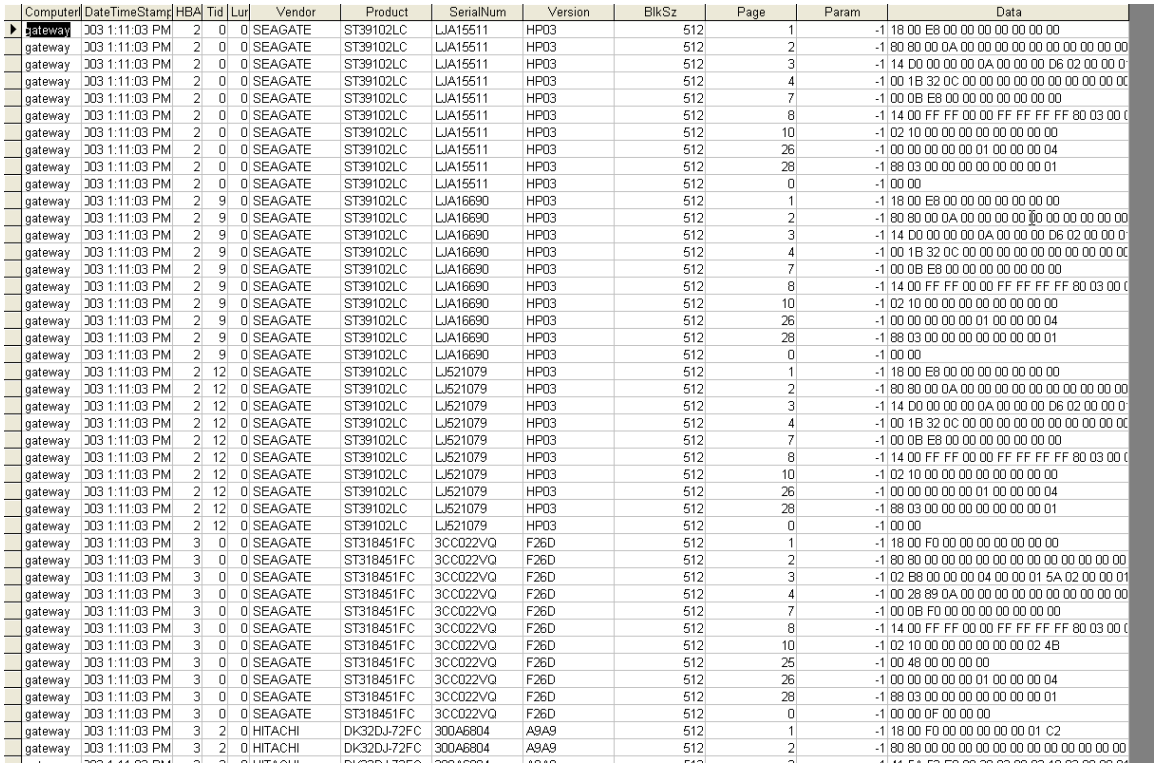


TimeToDoTest	NumMBToDev	NumMBFromDe	TotMBTrans	TransRateTo	TransRateFrom	TotTransRate	SenseOnFailure	MiscompareLBA	MiscompareOffs	MiscompareExp	MiscompareAct
****	-1	-1	-1	-1	-1	-1	****	-1	-1	****	Starting Test Se
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
35sec	0	124.81	124.81	0	3.57	3.57	N/A	0	0		
35sec	0	231.88	231.88	0	6.63	6.63	N/A	0	0		
35sec	0	153.94	153.94	0	4.4	4.4	N/A	0	0		
35sec	0	154.63	154.63	0	4.42	4.42	N/A	0	0		
35sec	0	154.56	154.56	0	4.42	4.42	N/A	0	0		
****	-1	-1	-1	-1	-1	-1	****	-1	-1	****	Ending Test Se
****	-1	-1	-1	-1	-1	-1	****	-1	-1	****	Starting Test Se
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
21sec	50.75	50.69	101.44	2.42	2.41	4.83	N/A	42515868	19	73 1d b5 42 29 .	fc 1d b5 42 29 4
1min 12sec	183.63	183.56	367.19	2.55	2.55	5.1	N/A	11285515	24	90 38 16 a2 e9	9a 38 16 02 ad
4min 32sec	976.56	976.56	1953.13	3.59	3.59	7.18	N/A	0	0		
4min 34sec	976.56	976.56	1953.13	3.56	3.56	7.13	N/A	0	0		
5min 41sec	976.56	976.56	1953.13	2.86	2.86	5.73	N/A	0	0		
5min 45sec	976.56	976.56	1953.13	2.83	2.83	5.66	N/A	0	0		
5min 46sec	976.56	976.56	1953.13	2.82	2.82	5.64	N/A	0	0		
5min 46sec	976.56	976.56	1953.13	2.82	2.82	5.64	N/A	0	0		
5min 54sec	976.56	976.56	1953.13	2.76	2.76	5.52	N/A	0	0		
6min 0sec	976.56	976.56	1953.13	2.71	2.71	5.43	N/A	0	0		
6min 12sec	976.56	976.56	1953.13	2.63	2.63	5.25	N/A	0	0		

The Information table stores Mode and Log page information – again a screen shot:



Computer	DateTimeStamp	HBA	Tid	Lur	Vendor	Product	SerialNum	Version	BlkSz	Page	Param	Data
gateway	03 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	1	-1	18 00 E8 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	2	-1	80 80 00 0A 00 00 00 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	3	-1	14 D0 00 00 00 0A 00 00 00 D6 02 00 00 0
gateway	03 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	4	-1	00 1B 32 0C 00 00 00 00 00 00 00 00 00 0
gateway	03 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	7	-1	00 0B E8 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	8	-1	14 00 FF FF 00 00 FF FF FF FF 80 03 00
gateway	03 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	10	-1	02 10 00 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	26	-1	00 00 00 00 00 01 00 00 00 04
gateway	03 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	28	-1	88 03 00 00 00 00 00 00 00 01
gateway	03 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	0	-1	00 00
gateway	03 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	1	-1	18 00 E8 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	2	-1	80 80 00 0A 00 00 00 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	3	-1	14 D0 00 00 00 0A 00 00 00 D6 02 00 00 0
gateway	03 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	4	-1	00 1B 32 0C 00 00 00 00 00 00 00 00 00 0
gateway	03 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	7	-1	00 0B E8 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	8	-1	14 00 FF FF 00 00 FF FF FF FF 80 03 00
gateway	03 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	10	-1	02 10 00 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	26	-1	00 00 00 00 00 01 00 00 00 04
gateway	03 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	28	-1	88 03 00 00 00 00 00 00 00 01
gateway	03 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	0	-1	00 00
gateway	03 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	1	-1	18 00 E8 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	2	-1	80 80 00 0A 00 00 00 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	3	-1	14 D0 00 00 00 0A 00 00 00 D6 02 00 00 0
gateway	03 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	4	-1	00 1B 32 0C 00 00 00 00 00 00 00 00 00 0
gateway	03 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	7	-1	00 0B E8 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	8	-1	14 00 FF FF 00 00 FF FF FF FF 80 03 00
gateway	03 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	10	-1	02 10 00 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	26	-1	00 00 00 00 00 01 00 00 00 04
gateway	03 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	28	-1	88 03 00 00 00 00 00 00 00 01
gateway	03 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	0	-1	00 00
gateway	03 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	1	-1	18 00 F0 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	2	-1	80 80 00 00 00 00 00 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	3	-1	02 B8 00 00 00 04 00 00 01 5A 02 00 00 01
gateway	03 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	4	-1	00 28 89 0A 00 00 00 00 00 00 00 00 00 0
gateway	03 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	7	-1	00 0B F0 00 00 00 00 00 00 00
gateway	03 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	8	-1	14 00 FF FF 00 00 FF FF FF FF 80 03 00
gateway	03 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	10	-1	02 10 00 00 00 00 00 00 02 4B
gateway	03 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	25	-1	00 48 00 00 00 00
gateway	03 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	26	-1	00 00 00 00 00 01 00 00 00 04
gateway	03 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	28	-1	88 03 00 00 00 00 00 00 00 01
gateway	03 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	0	-1	00 00 0F 00 00 00
gateway	03 1:11:03 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	1	-1	18 00 F0 00 00 00 00 00 01 C2
gateway	03 1:11:03 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	2	-1	80 80 00 00 00 00 00 00 00 00 00 00 00 00

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Text File Output Data

A separate text output file will be created for each device that is tested by the Manufacturing Module. The name of these files is a combination of the device address (bus-target-lun) and the device serial number if available. For instance the example file here is named “4-006-00-3ET06GK5.Log”.

This file contains all information about the drive, and about the tests that were run. The results of the Manufacturing test run, as shown below:

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```
================================================================================
==
>> SCSI Toolbox32, Version 5. 0. 0 (build)  40216, running on \\G64-XP       <<
================================================================================
==

Test Date:  02/23/2004  11:56:44
  Device:  4:9:0   SEAGATE  ST336732LC       Serial: 3ET06GK5

Results:
 02/23/2004  11:56:44  TEST 1 of 2:
                Write Test; Random Access; for 500000 Blocks
                Fixed-Length Transfers of 128 (0x0080) Blocks
                Start Block: 0 (0x0)
                Data Pattern: Random w/ LBA Overlay

 02/23/2004  11:57:04  Test Completed Successfully


 02/23/2004  11:57:04                                  PASSED
 ---------------------------------------------------------------------------
 02/23/2004  11:57:04  TEST 2 of 2:
                Read Test; Random Access; for 500000 Blocks
                Fixed-Length Transfers of 128 (0x0080) Blocks
                Start Block: 0 (0x0)
                Data Pattern: Random w/ LBA Overlay; Data Compare ON

 02/23/2004  11:57:35  Test Completed Successfully


 02/23/2004  11:57:35                                  PASSED
 ---------------------------------------------------------------------------


================================================================================
==
>> SCSI Toolbox32, Version 5. 0. 0 (build)  40216, running on \\G64-XP       <<
================================================================================
==

Test Date:  02/23/2004  11:58:13
  Device:  4:9:0   SEAGATE  ST336732LC       Serial: 3ET06GK5
```


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Results:
02/23/2004 11:58:13 TEST 1 of 1:
Read Test; Random Access; for 500000 Blocks
Fixed-Length Transfers of 128 (0x0080) Blocks
Start Block: 0 (0x0)
Data Pattern: Walking Zeros w/ LBA Overlay; Data Compare ON

02/23/2004 11:58:13 CDB = 28 00 03 61 30 3C 00 00 80 00
Miscompare: LBA 0x0361303C at 0x00000000
Exp: 03 61 30 3C EF DF BF 7F FE FD FB F7 EF DF BF 7F
Act: 3C 30 61 03 86 57 E0 06 91 6E 23 2E 0C CC 99 E1
>>> Current Test Aborted <<<

02/23/2004 11:58:13 *** FAIL ***

Other output data

Clicking on the “Save to File” button under the Test Progress window will save the contents of the Test Sequence and Test Progress windows to a file – in text mode.

Here is a sample of this type of output:

Output from Disk Screening Toolbox
The time is Fri Mar 14 10:21:47 2003

Test Sequence:
Random Write/Read - 15 Minutes
Sequential Write - -1 Blocks
Random Read - 60 Minutes

Test Progress:
Verifying selected devices
Device 2:14:0 deselected - not a disk
Device 2:15:0 deselected - not a disk

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Device 3:128:0 deselected - not a disk

Starting Pre-Test Actions
Spinning Up drive 2 - 0 - 0
Spinning Up drive 2 - 2 - 0
Spinning Up drive 2 - 3 - 0
Spinning Up drive 2 - 9 - 0
Spinning Up drive 2 - 10 - 0
Spinning Up drive 2 - 11 - 0
Spinning Up drive 2 - 12 - 0
Spinning Up drive 3 - 0 - 0
Spinning Up drive 3 - 1 - 0
Spinning Up drive 3 - 3 - 0
Spinning Up drive 3 - 4 - 0
Spinning Up drive 3 - 5 - 0
Spinning Up drive 3 - 6 - 0
Spinning Up drive 3 - 7 - 0
Spinning Up drive 3 - 8 - 0
Spinning Up drive 3 - 9 - 0
Spinning Up drive 3 - 10 - 0
Spinning Up drive 3 - 11 - 0
Done Pre-Test Actions
Test 1 Started on :
  HA 2 Target 0 Lun 0 SEAGATE ST39102LC
  HA 2 Target 2 Lun 0 SEAGATE ST39102LC
  HA 2 Target 3 Lun 0 SEAGATE ST39102LC
  HA 2 Target 9 Lun 0 SEAGATE ST39102LC
  HA 2 Target 10 Lun 0 SEAGATE ST39102LC
  HA 2 Target 11 Lun 0 SEAGATE ST39102LC
  HA 2 Target 12 Lun 0 SEAGATE ST39102LC
  HA 3 Target 0 Lun 0 SEAGATE ST318451FC
  HA 3 Target 1 Lun 0 SEAGATE ST318304FC
  HA 3 Target 3 Lun 0 SEAGATE ST318451FC
  HA 3 Target 4 Lun 0 IBM   DDYF-T18350R
  HA 3 Target 5 Lun 0 IBM   DDYF-T18350S
  HA 3 Target 6 Lun 0 IBM   DDYF-T18350S
  HA 3 Target 7 Lun 0 HITACHI DK32DJ-72FC
  HA 3 Target 8 Lun 0 HITACHI DK32DJ-72FC
  HA 3 Target 9 Lun 0 IBM   DDYF-T18350S
  HA 3 Target 10 Lun 0 SEAGATE ST318304FC
  HA 3 Target 11 Lun 0 HITACHI DK32DJ-72FC

HA 3 Target 8 LUN 0 FAILED test 1 - miscompare on a READ at LBA = 06471482
Starting Test Number 2 on drive 3:8:0

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HA 3 Target 11 LUN 0 FAILED test 1 - miscompare on a READ at LBA = 07e426e8
Starting Test Number 2 on drive 3:11:0

HA 2 Target 11 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:11:0

HA 2 Target 10 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:10:0

HA 2 Target 9 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:9:0

HA 2 Target 3 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:3:0

HA 2 Target 2 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:2:0

HA 2 Target 0 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:0:0

HA 3 Target 10 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:10:0

HA 3 Target 9 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:9:0

HA 3 Target 7 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:7:0

HA 3 Target 6 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:6:0

HA 3 Target 5 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:5:0

HA 3 Target 4 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:4:0

HA 3 Target 3 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:3:0

HA 3 Target 1 LUN 0 has completed test 1 successfully

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Starting Test Number 2 on drive 3:1:0

HA 3 Target 0 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:0:0

HA 2 Target 12 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:12:0

HA 2 Target 0 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:0:0

HA 2 Target 11 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:11:0

HA 2 Target 3 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:3:0

HA 2 Target 10 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:10:0

HA 2 Target 9 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:9:0

HA 2 Target 12 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:12:0

HA 2 Target 2 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:2:0

HA 3 Target 0 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:0:0

HA 3 Target 3 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:3:0

HA 3 Target 1 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:1:0

HA 3 Target 10 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:10:0

HA 3 Target 9 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:9:0

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HA 3 Target 4 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:4:0

HA 3 Target 6 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:6:0

HA 3 Target 5 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:5:0

HA 2 Target 0 LUN 0 has completed test 3 successfully
HA 2 Target 11 LUN 0 has completed test 3 successfully
HA 2 Target 10 LUN 0 has completed test 3 successfully
HA 2 Target 3 LUN 0 has completed test 3 successfully
HA 2 Target 9 LUN 0 has completed test 3 successfully
HA 2 Target 2 LUN 0 has completed test 3 successfully
HA 2 Target 12 LUN 0 has completed test 3 successfully
HA 3 Target 5 LUN 0 was Stopped on test 3
HA 3 Target 6 LUN 0 was Stopped on test 3
HA 3 Target 4 LUN 0 was Stopped on test 3
HA 3 Target 9 LUN 0 was Stopped on test 3
HA 3 Target 10 LUN 0 was Stopped on test 3
HA 3 Target 1 LUN 0 was Stopped on test 3
HA 3 Target 3 LUN 0 was Stopped on test 3
HA 3 Target 0 LUN 0 was Stopped on test 3
HA 3 Target 7 LUN 0 was Stopped on test 2
HA 3 Target 11 LUN 0 was Stopped on test 2
HA 3 Target 8 LUN 0 was Stopped on test 2
ALL TESTS HAVE BEEN COMPLETED

Starting Post-Test Actions
Done Post-Test Actions

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The Tape Manufacturing & Screening Module Introduction

The Tape Manufacturing & Screening Toolbox is the easiest to use, most versatile, and fastest tape testing product on the market. A true multi-threaded, multiple host bus adapter, multi-drive screening and testing tool, the Tape Screening Toolbox allows you to:

- confirm that the proper drives are in the subsystem
- download new drive firmware if needed
- set compression on or off
- create an individual text log file for each device tested
- run ***ANY*** external program as a part of the test sequence
- log and track all error information
- run any type of test, or sequence of tests at **full bus and device speeds**
- log all test process activities, drive information, and any errors to an Access database

All processes and test sequences are created from a graphical user interface – no programming or scripting is required! Time from installation to running a complete test process can be as little as 5 minutes!

The Tape Screening Toolbox will test SCSI, Fibre Channel, iSCSI, and ATAPI interface tape drives. It runs under Windows operating systems, and will work with any SCSI, FC, iSCSI, or ATAPI host bus adapters.

It can simultaneously test all tape drives connected to up to eight HBA's in a given system – up to a maximum of 250 tape drives at a time.

Testing throughput speed will be dependant upon the maximum throughput that the Host Bus Adapters and your system can sustain. The faster your storage subsystem is the better throughput you will obtain. All test speeds can be monitored at any time during testing.

Test Methodology

The Tape Screening Tool looks at the tape test process as three distinct sections or phases,

1. **Pre-Test Actions**
2. **Testing**
3. **Post-Test Actions**

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Pre-Test Actions

The pre-test process allows your test to screen the attached drives by the following qualifiers:

Drive Vendor – you can specify that a drive must match a certain vendor code, or the drive will be rejected from the test. Example = “QUANTUM”

Drive Product – you can specify that a drive must match a certain product code, or the drive will be rejected from the test. Example = “SDLT600”

Drive Firmware Version – you can specify that the firmware version of each drive must match a specified version. If the version does not match the drive under test the drive can either be rejected, or the proper firmware file can be downloaded into the drive.

Rewind All Drives – all drives can be rewound before the test sequence is started.

Set Compression On or Off – test with or without data compression enabled.

Clear Log Pages – all Log Page (error and performance) data can be cleared at the beginning of the test process.

Record Mode or Log Page data – all Mode and/or Log page data can be logged at the beginning of the test process.

During the test process, each drive will be individually checked against any or all of the above parameters.

The entire pre-test process definition is accomplished by using the simple GUI choices as show below:

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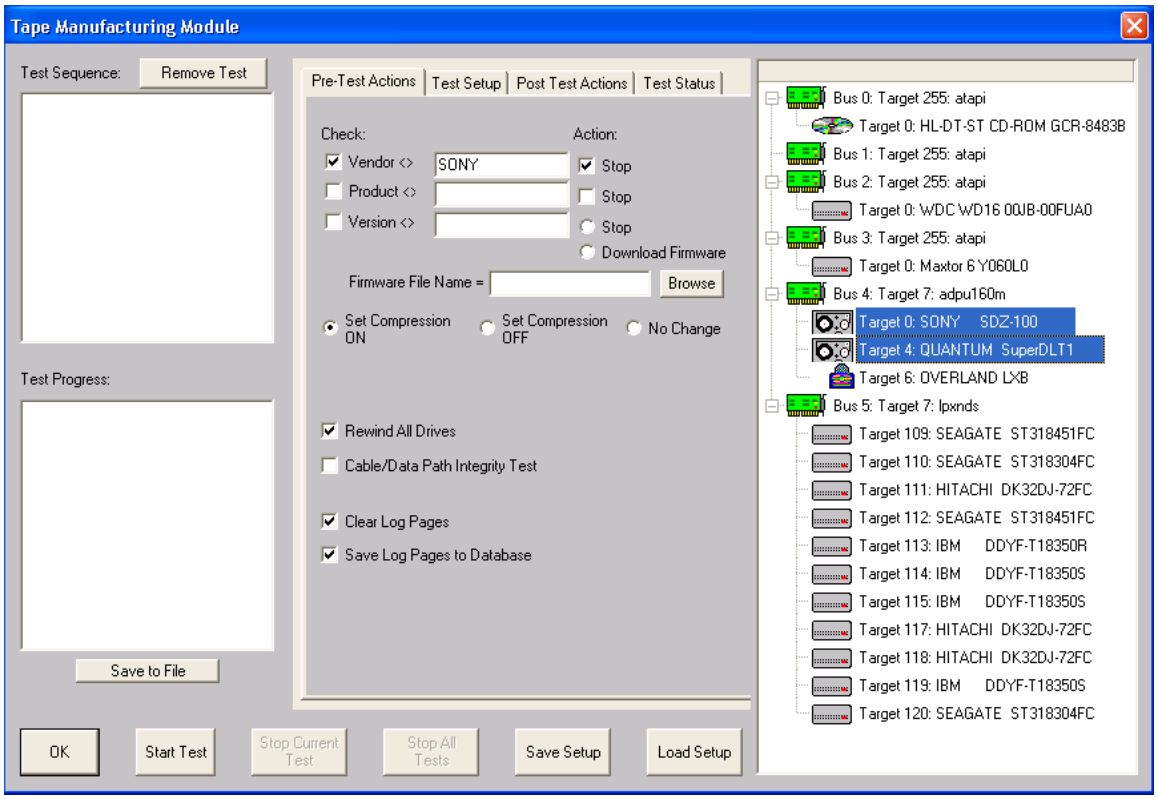

Testing

The test process will be made up of one or more tests assembled into test sequences. Each test sequence is defined by selecting test definition parameters from the Test Configuration Menu. Once a test is defined the test is added to the test sequence list.

The following tests can be used in a test sequence:

Type of Test

- Write
- Read
- Write FileMark
- Read FileMark
- Rewind
- Space Forward by Block
- Space Forward by FileMark
- Space Reverse by Block
- Space Reverse by FileMark

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- Space to End Of Data
- Turn Compression On
- Turn Compression Off
- Clear Log Pages
- Save Log Pages
- Synchronize
- Run External Program

Data Patterns

- 13 data patterns are available
- Data compare on read can be turned on or off

Test Duration

- Read and Write tests can be selected to run for a specified time, or run until a specified amount of data has been transferred.

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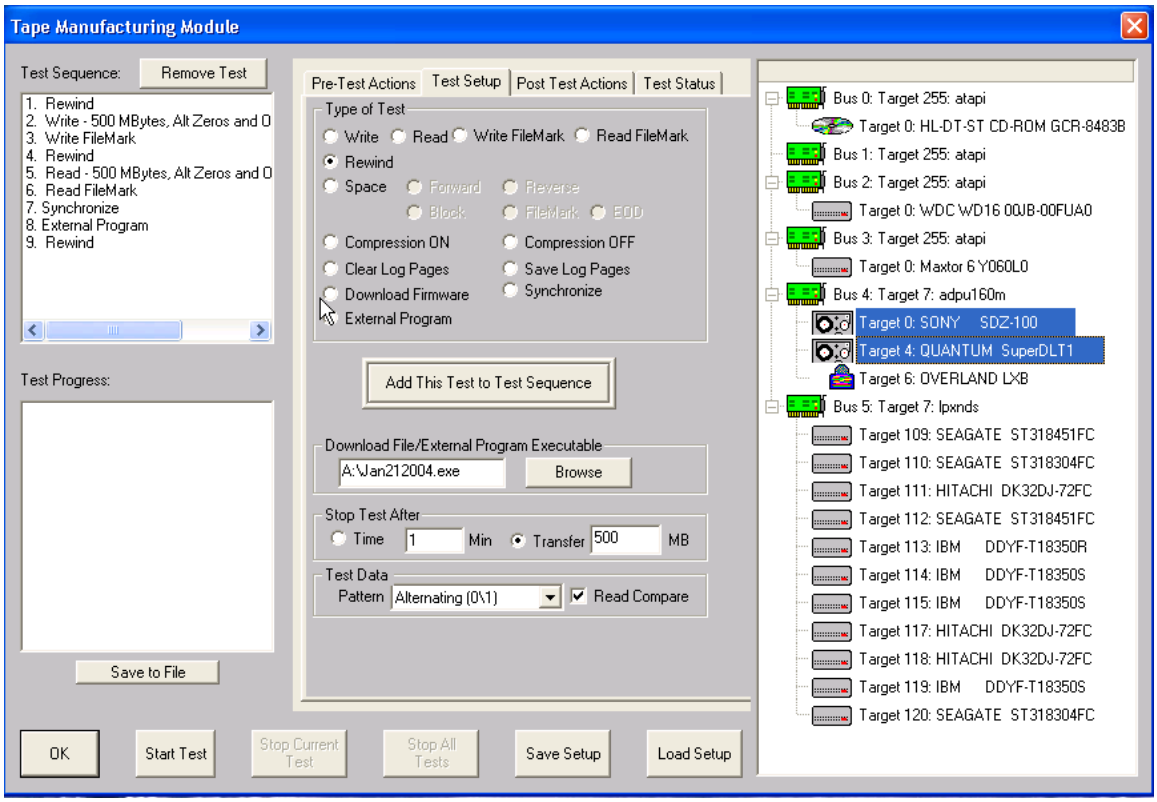
In the same manner as the pre-test conditions, tests are easily and quickly defined with the GUI as shown below – no editing, no syntax or language to learn, ***no way to make a mistake!***



Post-Test Actions

Once a test sequence is finished you may want to perform certain post-test actions. These include rewinding or unloading all of the tapes down, recording each tapes LOG PAGE information to the database, and clearing each drives LOG PAGE information.

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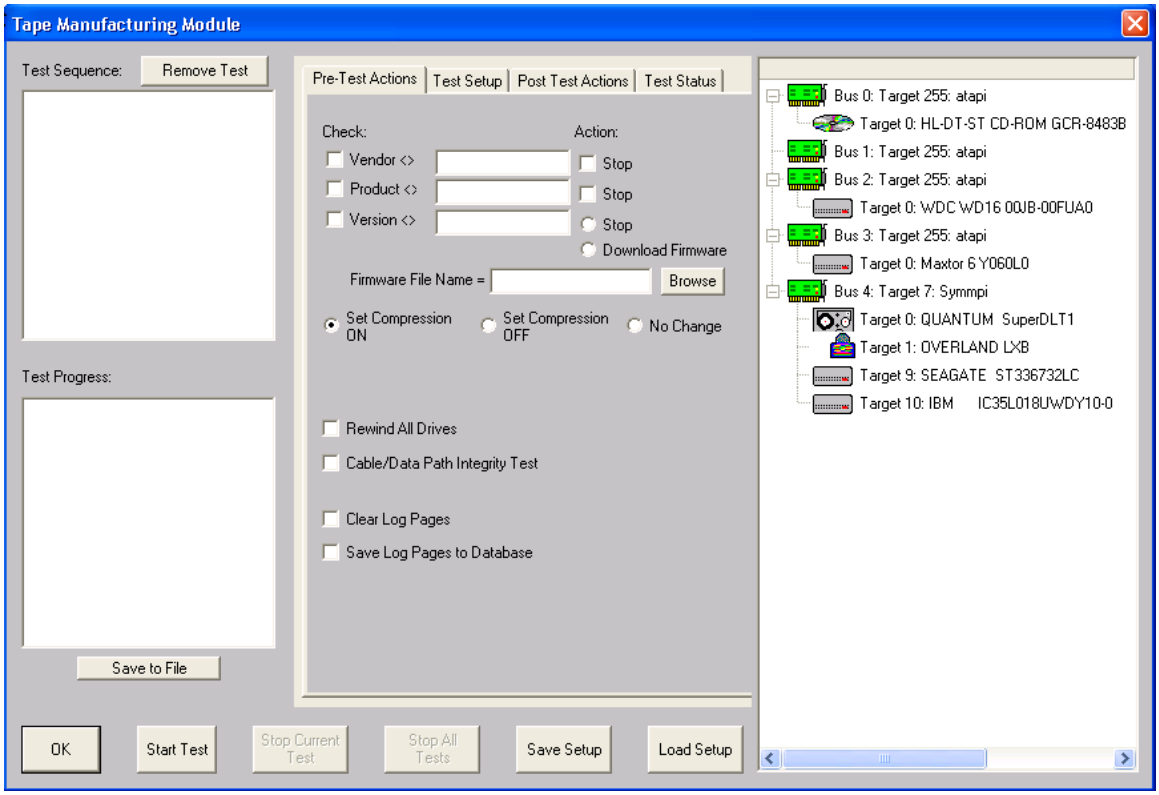
Getting Started

Choosing the Tape Screening Module from the Tape Menu of the SCSItoolbox will present you with this screen:



The left side of the screen has Test Sequence and Test Progress list boxes, the center part of the screen has several tabbed pages for configuring the test process, and the right side of the screen shows a tree display of all of the adapters and devices attached to the system.

There are several buttons at the bottom of the screen to control the testing process.

Since a test process is made up of ***Pre-Test Actions, Tests, and Post-Test actions***, let's go through each of these sections and see how to configure each.

Pre-Test Action Configuration

All Pre-Test Actions are defined with the following tab page:

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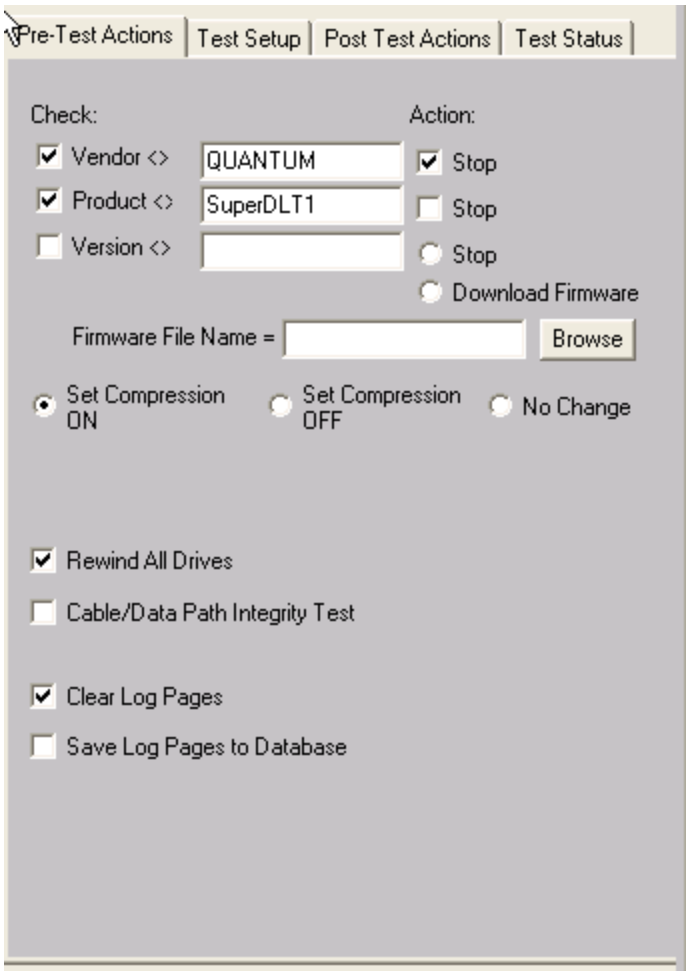

Remember that your Pre-Test Actions can be made up of any, all, or none of these choices – it is up to you!

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Each Action consists of a ***Qualifier***, a ***User Input***, and an ***Action.*** Each Action is described below:

Vendor

Qualifier = INQUIRY VENDOR string
User Input = Enter the Vendor String to select on, for example “SEAGATE” or “IBM”

- please note that all string comparisons will be case sensitive, so if the Vendor string of the tape is SEAGATE you must enter your User Input in all capital letters

Action = Stop – if the User Input does not match the Qualifier the drive will be de-selected and not tested further

Product

Qualifier = INQUIRY PRODUCT string
User Input = Enter the Product String to select on, for example “ST39102”.

- please note that all string comparisons will be case sensitive, so if the PRODUCT string of the tape is ST39102you must enter your User Input in all capital letters. Also note that sub-string matching is implemented, so that if your User Input = ST, this will “match” any Product string containing “ST”

Action = Stop– if the User Input does not match the Qualifier the drive will be de-selected and not tested further

Version

Qualifier = INQUIRY VERSION string
User Input = Enter the Version String to select on, for example 1234.

- please note that all string comparisons will be case sensitive, and that sub-string matching is implemented

Action = Stop– if the User Input does not match the Qualifier the drive will be de-selected and not tested further
Action = Download Firmware – the firmware file specified in the Firmware File Name field will be downloading into the drive before testing. Use the Browse button to seach for firmware files on your system. Firmware files must be obtained from your tape drive vendor. All drives that require a firmware download will be downloaded simultaneously.

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Compression

Compression can be explicitly set on, off, or can be left in whatever state the drive is currently in.

Rewind All Drives

Setting this option will rewind all drives before testing begins

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Clear Log Pages

Action = All drive LOG PAGES will be cleared before the test sequence is started. Log Pages contain run-time counters such as read and write error counters, etc. Clearing these pages before testing allows everything to be started “at zero”

Save LOG PAGES to database

Action = All drive LOG PAGE values will be recorded in the database

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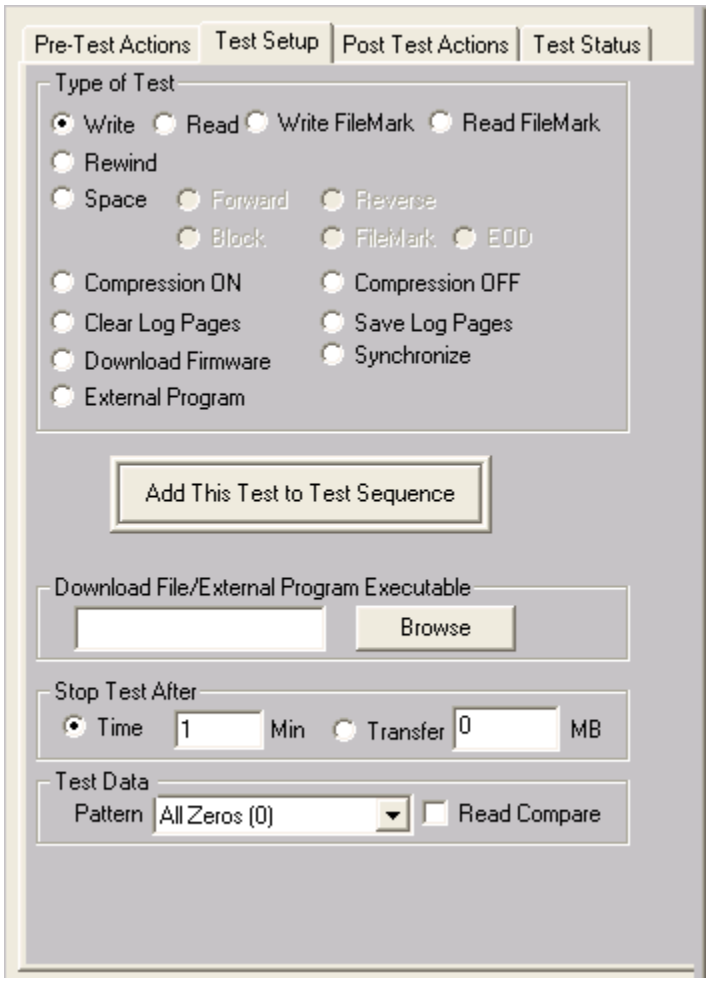
Test Setup

All Tests are defined with the following tab page:



This page lets you define test types, and then add the test into the Test Sequence. Simply pick from the various check boxes, then click the “Add this Test to Test Sequence” to quickly define any type of test.

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All test definition choices are explained in detail below

Type of Test

Write

The WRITE test will write data to the drive. It is a destructive test – any data previously written on the drive will be lost.

Read

The Read test reads data from the drive and transfers those data blocks back to the host system. This data can be verified by checking the “Compare on Reads” check button.

Write Filemark

Writes a file mark to the tape at the current position

Read Filemark

Reads a file mark from the tape at the current position

Space Forward Block

Spaces forward by one block

Space Forward FileMark

Spaces forward by one filemark

Space Forward to EOD

Spaces forward to End Of Data

Space Reverse Block

Spaces reverse by one block

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Space Reverse FileMark

Spaces reverse by one filemark

Rewind

Rewinds to Beginning Of Tape

FW Download

This test is used to download firmware to the drive during a test sequence. Use the Browse button to specify the file name of the firmware file.

Synchronize

This test is used to pause or stop testing until all drives under test have finished all their tests up to this point. For instance, if you want to test all drives to a certain point, then when all drives have reached that point run an external program to change a temperature chamber, you use the Synchronize test to sync the test steps of all drives.

External Program

This test is used to run any external program as a test step. As in the above example, this could be used to control an environmental chamber, programmable power supplies, etc. Or this could be used to run an external program to extract factory logs or other vendor unique data at a certain point in the test sequence.

Stop Test After

Tests can be run for either an amount of time, or until a number of blocks has been transferred.

Time

This choice allows you to specify the number of minutes to run a test. At the end of this time the actual number of bytes and blocks of data that has been transferred can be seen in the database entry for the test, or can be directly viewed in the Test Status tab page. All drives will test for the same amount of time, but faster drives will have moved more data during the test time.

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MB – Megabytes transferred

This choice allows you to specify the number of mega bytes to transfer during the test. Faster drives will complete this type of test and move on to the next test in the test sequence while slower drives go at their own pace. All drives will test the specified number of data, faster drives will finish sooner.

Data Patterns

13 different data patterns are available for testing – and each pattern can optionally have the data block overlaid, making a total of 26 data patterns ! All Zeros

A repeating pattern of 00000000

All Ones

A repeating pattern of 11111111

Alternating (0/1)

A repeating pattern of 01010101

Alternating (1/0)

A repeating pattern of 10101010

Incrementing

Each block is filled with pattern 00010203040506...

Decrementing

Each block is filled with pattern FFFEFDFCFBFAF9F8…

Block Number

The block number is repeated throughout each block-size buffer

Random

Totally random data using a random number generator with period 16GBytes

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User Defined

When the user selects this pattern, the user is prompted to enter a file with the desired pattern. It is recommended this file be created with NotePad. This file can be of any length and the pattern on the file is written to each block. The file must only contain hex digits, namely 0 thru 9, and characters ‘a’, ‘b’, ‘c’, ‘d’, ‘e’, ‘f’.

Walking Ones

An 8-byte repeating pattern – 00000001 00000010 00000100 00001000 00010000 00100000 01000000 10000000

Walking Zeros

An 8-byte repeating pattern – 11111110 11111101 11111011 11110111 11101111 11011111 10111111 01111111

Alt (0/1) then Alt (1/0)

A two-byte repeating pattern 01010101 10101010

Alt (1/0) then (0/1)

A two-byte repeating pattern 10101010 01010101

Compare on Reads

Checking this box will cause all data read to be checked that it compares with the expected data. If a miscompare is found the test will be aborted and the miscompare data will be recorded in the database and will be viewable in the Test Status tab page.

Post-Test Actions

There are currently four choice, as shown below

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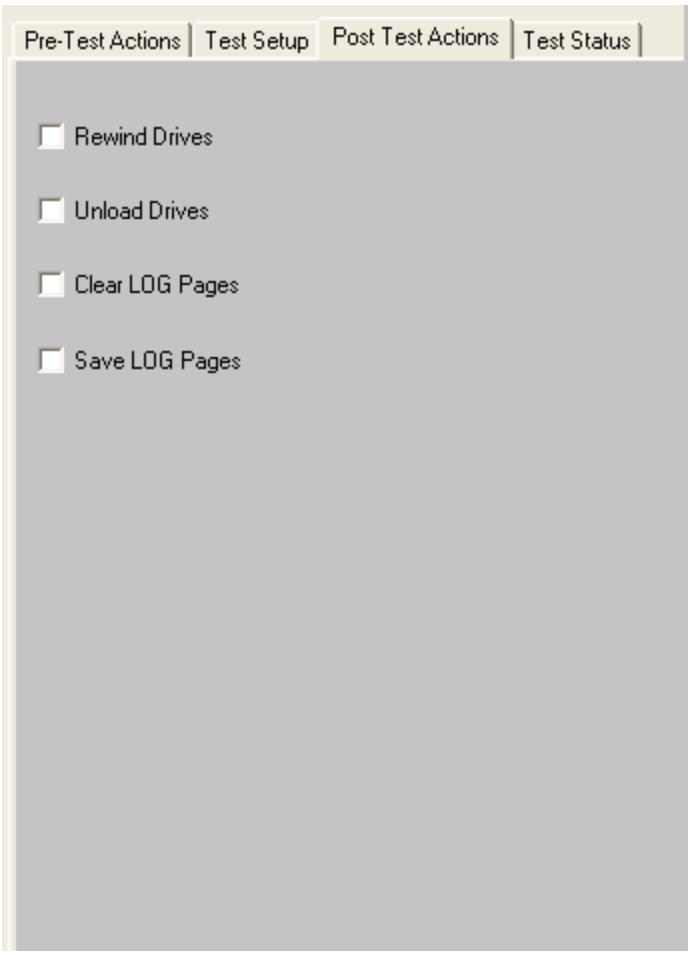

You can choose to rewind or unload all tapes down after testing, and to clear or save all Log Page data.

Selecting Tapes to Test

Tapes are selected for testing by using the tree display at the right of the Tape Screening Toolbox screen, as shown below

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Clicking on a drive selects the drive for testing. Multiple drives may be selected by holding down the Control key while clicking on drives, or a whole series of tapes may be selected by clicking on the first drive, then holding down the Shift key while clicking on the last drive. When a test sequence is started the drives that you have selected will be validated. Any device that is selected, but that is not a tape drive, will be de-selected. If you have specified Pre-Test qualifiers, such as selecting only Seagate drives, all non-qualifying devices will be de-selected.

Saving and Loading Test Configurations

Another power feature of the Tape Screening Toolbox is that once a test process has been defined, it can be saved for later recall and use. This is done using the Save Setup and Load Setup buttons.

Saving a Test Configuration

Once you have defined a test process (Pre-Test Actions, Tests, Post-Test Actions, and optionally tape selection) you can save this entire test process by clicking on the Save Setup button.

Once you have specified the file name to save your test definition to, you will be asked if you want to save the tape selection as well .

You choose to not save the tape selection, or you can save the same tapes are are currently selected.

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If you choose to save the currently selected tapes, when you load this test definition later it will look for tapes at the same addresses. If there was a tape at HA2 Target 3, and there is a tape there now, it will be tested. If it is not there now, that will not cause a problem.

If you choose to not save the tape selection, then when you reload the test definition later you will have to manually select the drives to test again.

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Loading a Test Configuration

Just click on the Load Setup button to reload a previously defined test configuration.

Starting the Test Process

Once at least one test has been defined and added to the Test Sequence, and once at least one tape drive has been selected, you can start the test process.

Just click on the Start Test button!

The Test Progress box will display a message that the selected drives are being verified, then any Pre-Test Actions will be performed and shown in the Test Progress box.

Once all Pre-Test Actions are finished the Test Sequence will be executed.

Each tape under test has it's own execution thread, and will run the tests in the test sequence as fast as it can. This can lead to faster drives processing through the test sequence faster than others. To check individual drive status, and to pause or stop a test on an individual drive, just right-click on that drive in the tree display

During Testing – individual drive

As a tape is being tested it will be displayed with a Blue highlight in the tree display.

During testing each tape drive can have:

The current test Paused
Testing resumed
The current test stopped
All testing for this drive stopped
The status of the current test displayed

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Pausing a Test

Move the cursor over the tape of interest, then click the Right mouse button. Clicking the Pause choice will pause the current test on that drive. The drive will now be displayed with a Magenta highlight in the tree display.

Resuming a Test

Right click on the paused drive, then click the Resume Test choice to resume testing. The drive is displayed in Blue highlight again

Stopping a Test

Right click on a drive, then choose either the Stop Current Test, or Stop All Tests choice

Viewing Test Status

Right clicking on a drive and choosing the Get Status choice will display the following screen:

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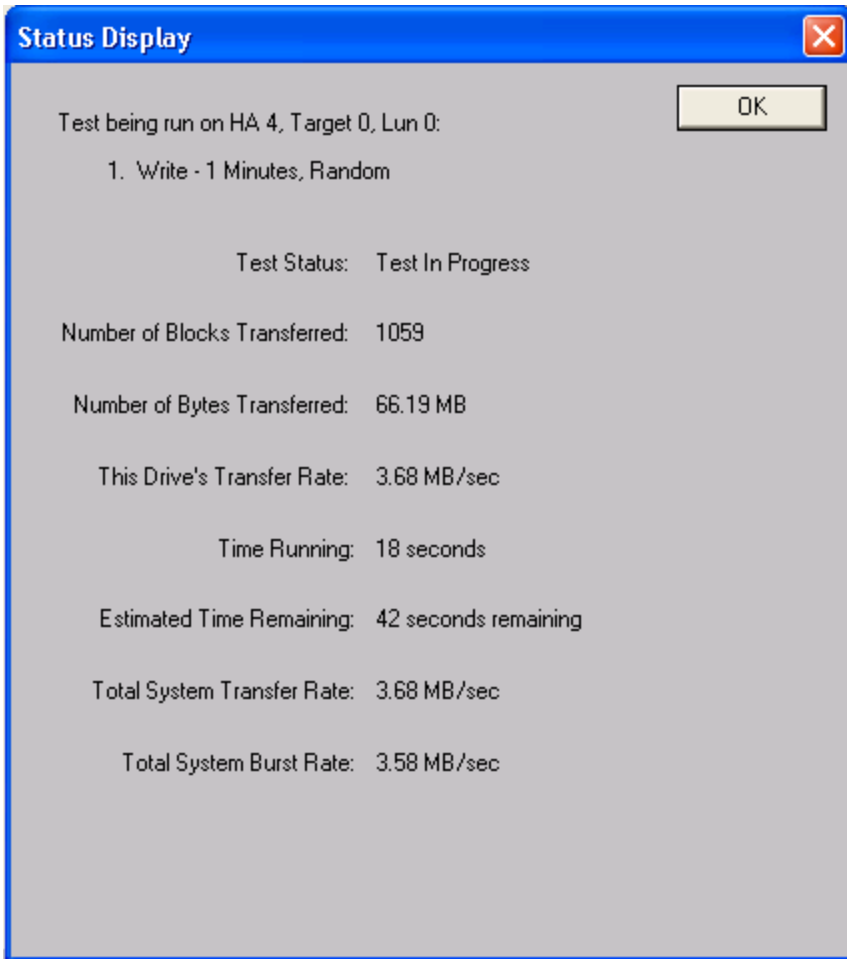

Data that is shown is:

The name of the test that is currently running,
Test Status
Number of Blocks Transferred
Number of Bytes Transferred
The average transfer rate (over time) achieved
Time running
Estimated time remaining
Total System Transfer Rate
Total System Burst Rate

All data is updated every few seconds

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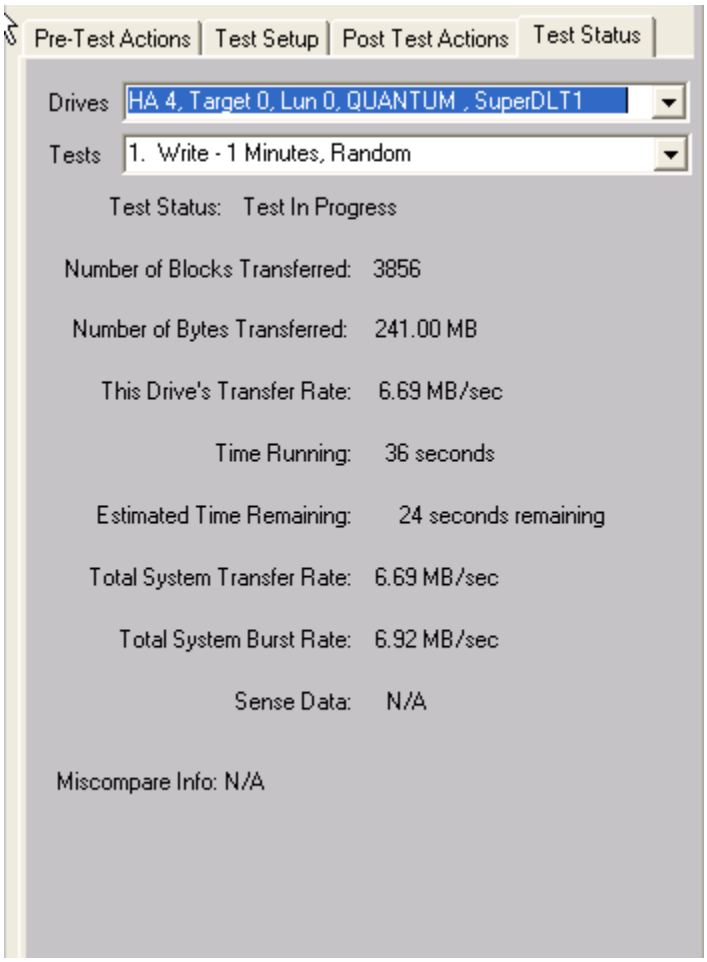
During Testing – All Drives

As the test sequence progresses it is possible to view status on each drive for each test of the sequence. This is done at the Test Status tab page

All performance and error data for each test of each drive is viewable here.

The Test Status Page

The test status pages appears as below:



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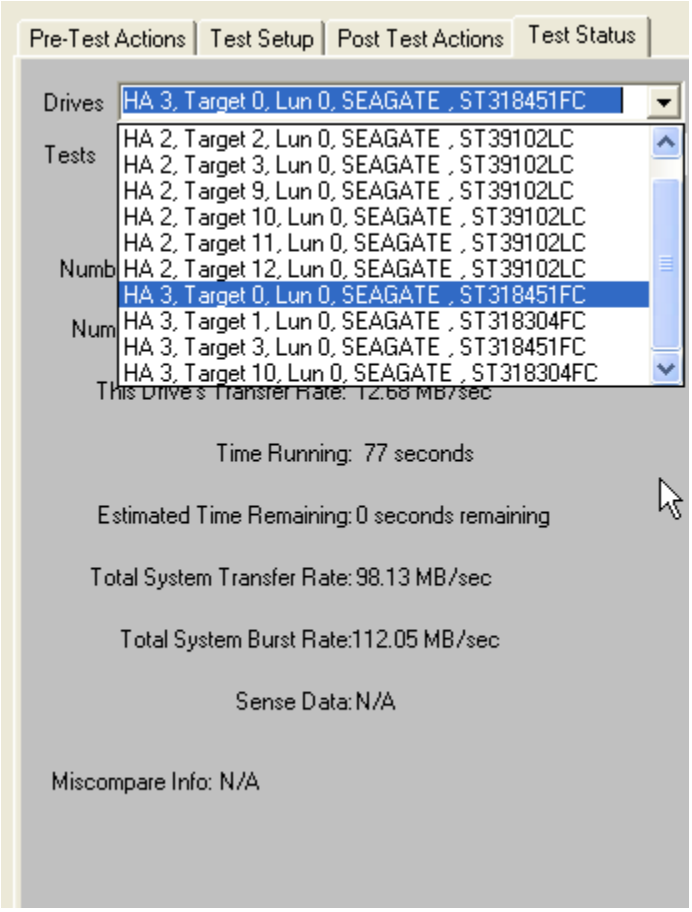
The Drives Pulldown

Use the Drives Pulldown box to choose which tape



Just highlight the tape of interest

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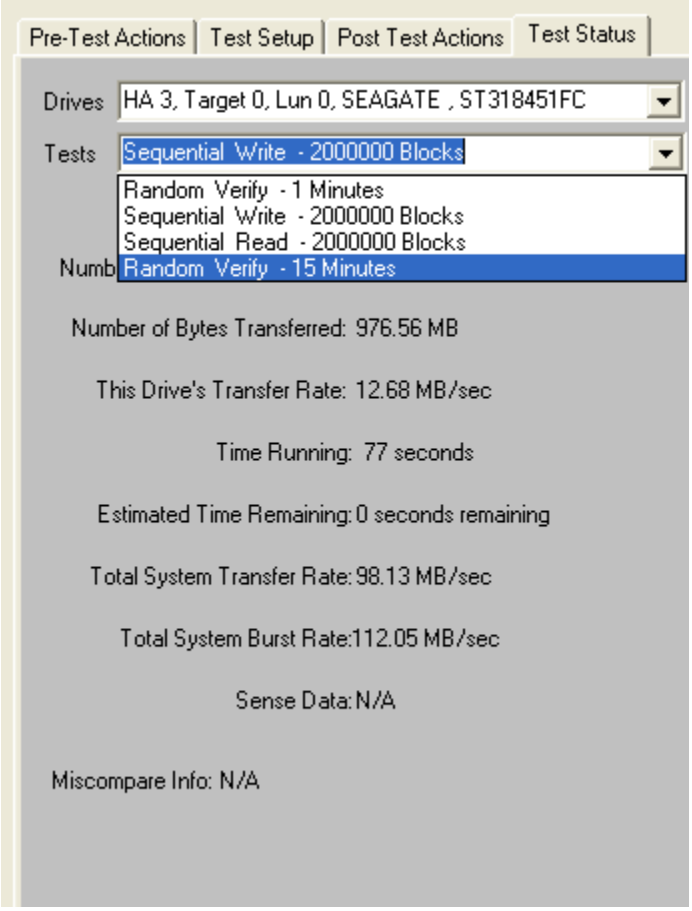
The Tests Pulldown

Use the Tests Pulldown to choose which test to view



Stopping Tests

Use the ***Stop Current Test*** or ***Stop All Tests*** buttons at the bottom of the Tape Screening Toolbox page to stop testing.

Choosing the ***Stop Current Test*** button will stop the current test running on all drives – if there are more tests in the test sequence each drive will go on to what is the next test for it.

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Choosing the ***Stop All Tests*** button will stop all testing on all drives

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Test Results and Output Data

Database data

Test results are written to an Access database – the database file name is TapeScreenDatabase.mdb, and it is located in the folder where SCSItoolbox or the Stand Alone Tape Screening Toolbox is installed.

If you have Access installed on your system you can double-click on this file to view it's contents.

This data is also written as a comma-delimited text file called TapeScreenDatabase.txt

There are two tables – Test and Information.

The Test table stores the following information for each test or test event:

ComputerNam e
DateTimeStamp
HBA
TARGET
Lun
Vendor
Product
SerialNum
Version
BlkSz
Capacity
Adapter
Comment
TestName
Pattern
TestResult
TestStartTime
TestEndTime
TimeToDoTest
NumMBToDev
NumMBFromDev
TotMBTrans

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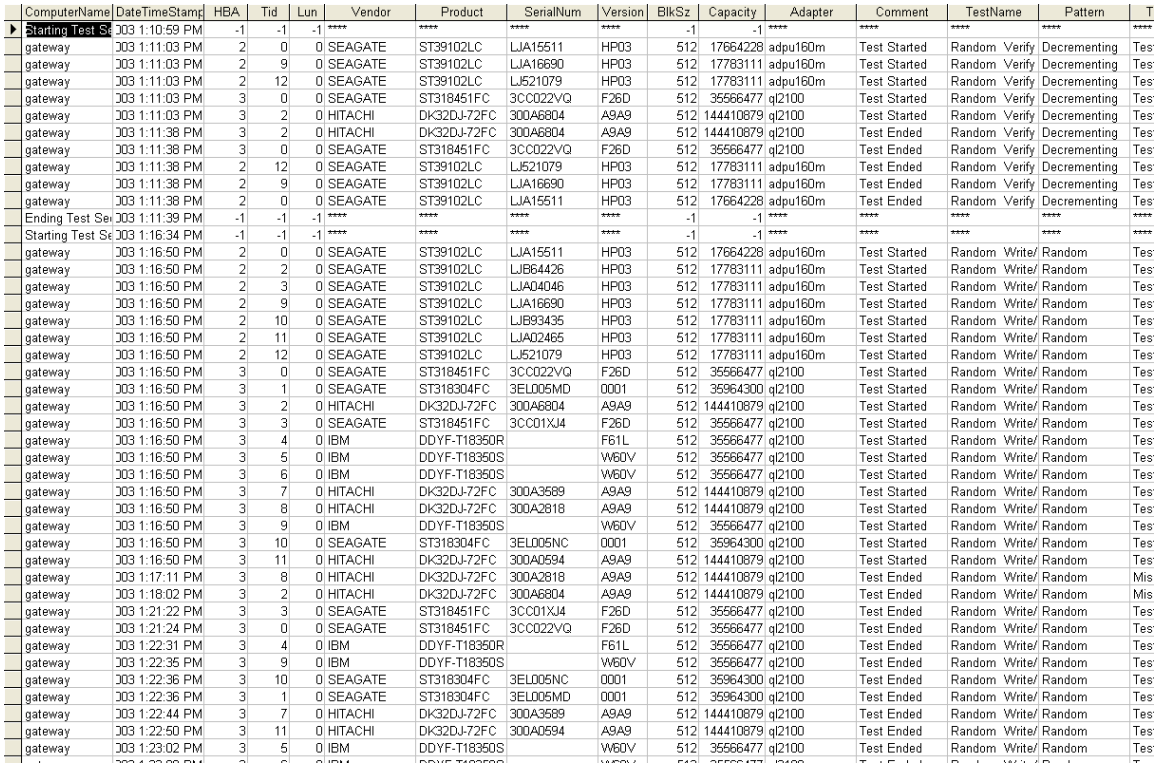
TransRateTo
TransRateFrom
TotTransRate
SenseOnFailure
MiscompareLBA
MiscompareOffset
MiscompareExpected
MiscompareActual

Here is a (partial!) screen shot of the test table:



ComputerName	DateTimeStamp	HBA	Tid	Lun	Vendor	Product	SerialNum	Version	BlkSz	Capacity	Adapter	Comment	TestName	Pattern	T
Starting Test Se	3/3 1:10:59 PM	-1	-1	-1	****	****	****	****	-1	-1	****	****	****	****	****
gateway	3/3 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	17664228	adpu160m	Test Started	Random Verify	Decrementing	Tes
gateway	3/3 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	17783111	adpu160m	Test Started	Random Verify	Decrementing	Tes
gateway	3/3 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	17783111	adpu160m	Test Started	Random Verify	Decrementing	Tes
gateway	3/3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Started	Random Verify	Decrementing	Tes
gateway	3/3 1:11:03 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Started	Random Verify	Decrementing	Tes
gateway	3/3 1:11:38 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Ended	Random Verify	Decrementing	Tes
gateway	3/3 1:11:38 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Ended	Random Verify	Decrementing	Tes
gateway	3/3 1:11:38 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	17783111	adpu160m	Test Ended	Random Verify	Decrementing	Tes
gateway	3/3 1:11:38 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	17783111	adpu160m	Test Ended	Random Verify	Decrementing	Tes
gateway	3/3 1:11:38 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	17664228	adpu160m	Test Ended	Random Verify	Decrementing	Tes
Ending Test Se	3/3 1:11:39 PM	-1	-1	-1	****	****	****	****	-1	-1	****	****	****	****	****
Starting Test Se	3/3 1:16:34 PM	-1	-1	-1	****	****	****	****	-1	-1	****	****	****	****	****
gateway	3/3 1:16:50 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	17664228	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	2	2	0	SEAGATE	ST39102LC	LJB64426	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	2	3	0	SEAGATE	ST39102LC	LJA04046	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	2	10	0	SEAGATE	ST39102LC	LJB93435	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	2	11	0	SEAGATE	ST39102LC	LJA02465	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	17783111	adpu160m	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	1	0	SEAGATE	ST318304FC	3EL005MD	0001	512	35964300	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	3	0	SEAGATE	ST318451FC	3CC01XJ4	F26D	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	4	0	IBM	DDYF-T18350R		F61L	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	5	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	6	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	7	0	HITACHI	DK32DJ-72FC	300A3589	A9A9	512	144410879	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	8	0	HITACHI	DK32DJ-72FC	300A2818	A9A9	512	144410879	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	9	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	10	0	SEAGATE	ST318304FC	3EL005NC	0001	512	35964300	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:16:50 PM	3	11	0	HITACHI	DK32DJ-72FC	300A0594	A9A9	512	144410879	ql2100	Test Started	Random Write/	Random	Tes
gateway	3/3 1:17:11 PM	3	8	0	HITACHI	DK32DJ-72FC	300A2818	A9A9	512	144410879	ql2100	Test Ended	Random Write/	Random	Mis
gateway	3/3 1:18:02 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Ended	Random Write/	Random	Mis
gateway	3/3 1:21:22 PM	3	3	0	SEAGATE	ST318451FC	3CC01XJ4	F26D	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:21:24 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:22:31 PM	3	4	0	IBM	DDYF-T18350R		F61L	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:22:35 PM	3	9	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:22:36 PM	3	10	0	SEAGATE	ST318304FC	3EL005NC	0001	512	35964300	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:22:36 PM	3	1	0	SEAGATE	ST318304FC	3EL005MD	0001	512	35964300	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:22:44 PM	3	7	0	HITACHI	DK32DJ-72FC	300A3589	A9A9	512	144410879	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:22:50 PM	3	11	0	HITACHI	DK32DJ-72FC	300A0594	A9A9	512	144410879	ql2100	Test Ended	Random Write/	Random	Tes
gateway	3/3 1:23:02 PM	3	5	0	IBM	DDYF-T18350S		W60V	512	35566477	ql2100	Test Ended	Random Write/	Random	Tes

Here is the rest of the test table:

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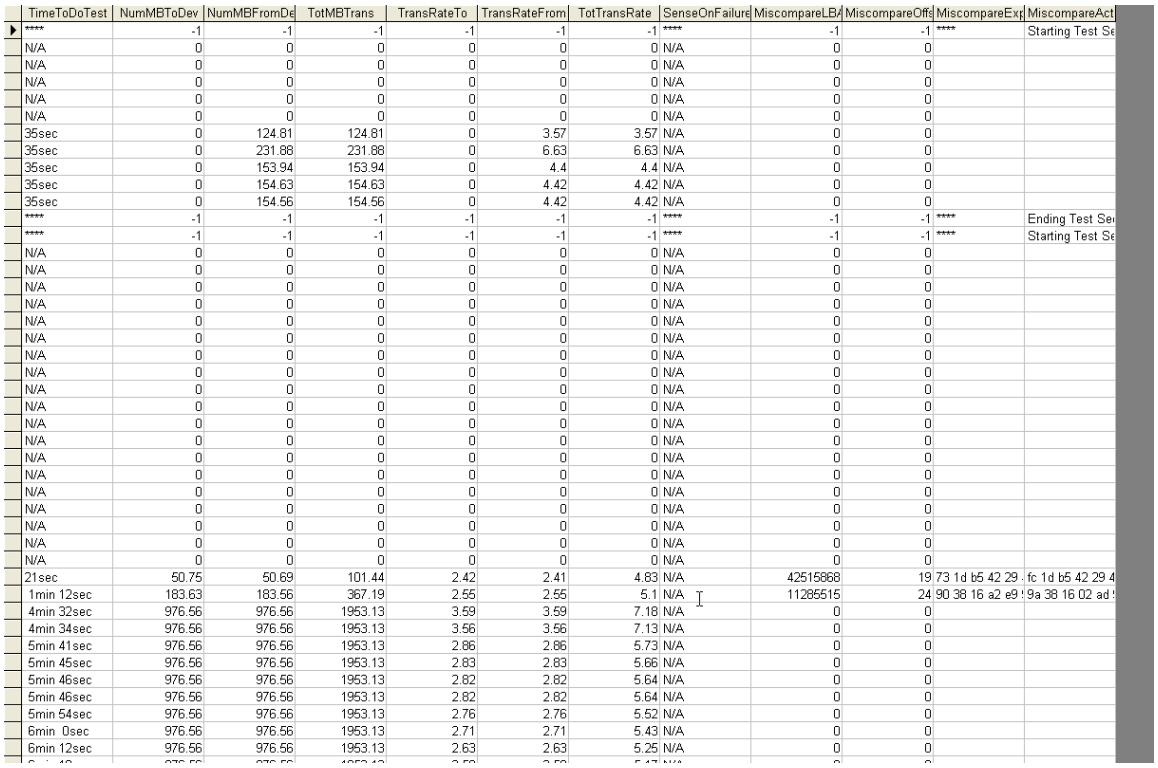
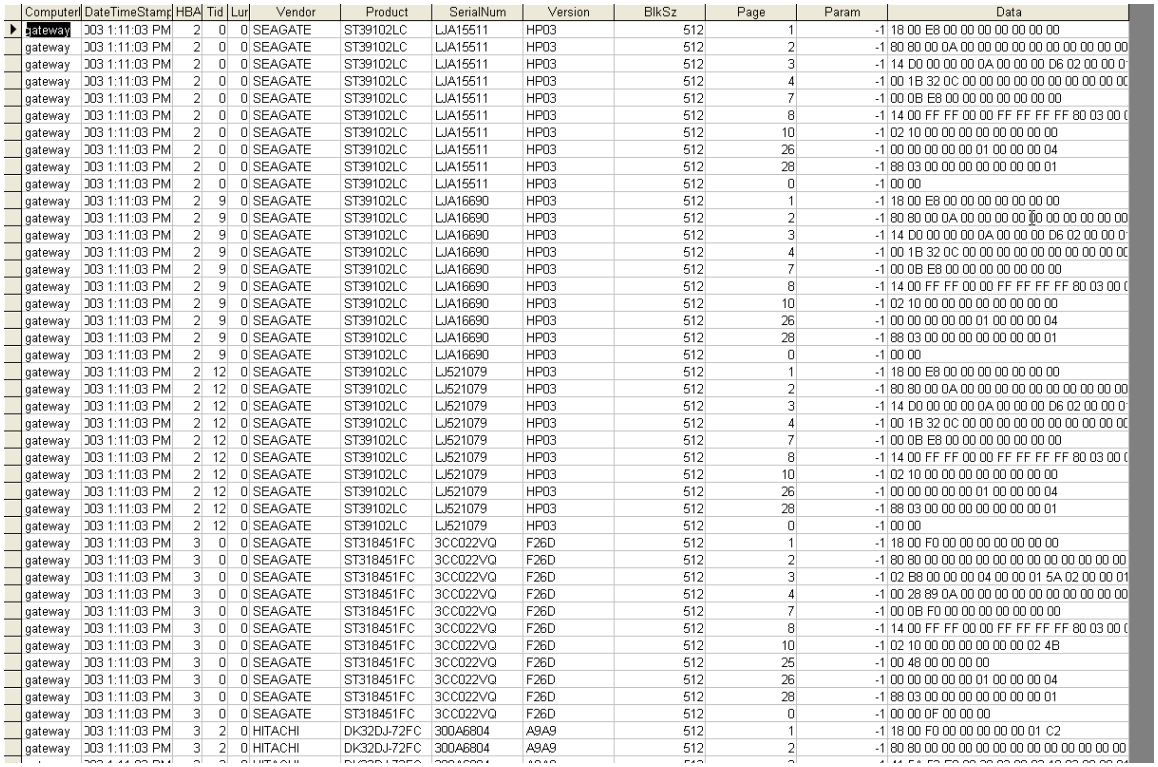


TimeToDoTest	NumMBToDev	NumMBFromDe	TotMBTrans	TransRateTo	TransRateFrom	TotTransRate	SenseOnFailure	MiscompareLBA	MiscompareOffs	MiscompareExp	MiscompareAct
****	-1	-1	-1	-1	-1	-1	****	-1	-1	****	Starting Test Se
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
35sec	0	124.81	124.81	0	3.57	3.57	N/A	0	0		
35sec	0	231.88	231.88	0	6.63	6.63	N/A	0	0		
35sec	0	153.94	153.94	0	4.4	4.4	N/A	0	0		
35sec	0	154.63	154.63	0	4.42	4.42	N/A	0	0		
35sec	0	154.56	154.56	0	4.42	4.42	N/A	0	0		
****	-1	-1	-1	-1	-1	-1	****	-1	-1	****	Ending Test Se
****	-1	-1	-1	-1	-1	-1	****	-1	-1	****	Starting Test Se
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
N/A	0	0	0	0	0	0	N/A	0	0		
21sec	50.75	50.69	101.44	2.42	2.41	4.83	N/A	42515868	19	73 1d b5 42 29 .	fc 1d b5 42 29 4
1min 12sec	183.63	183.56	367.19	2.55	2.55	5.1	N/A	11285515	24	90 38 16 a2 e9	9a 38 16 02 ad
4min 32sec	976.56	976.56	1953.13	3.59	3.59	7.18	N/A	0	0		
4min 34sec	976.56	976.56	1953.13	3.56	3.56	7.13	N/A	0	0		
5min 41sec	976.56	976.56	1953.13	2.86	2.86	5.73	N/A	0	0		
5min 45sec	976.56	976.56	1953.13	2.83	2.83	5.66	N/A	0	0		
5min 46sec	976.56	976.56	1953.13	2.82	2.82	5.64	N/A	0	0		
5min 46sec	976.56	976.56	1953.13	2.82	2.82	5.64	N/A	0	0		
5min 54sec	976.56	976.56	1953.13	2.76	2.76	5.52	N/A	0	0		
6min 0sec	976.56	976.56	1953.13	2.71	2.71	5.43	N/A	0	0		
6min 12sec	976.56	976.56	1953.13	2.63	2.63	5.25	N/A	0	0		

The Information table stores Mode and Log page information – again a screen shot:



ComputerN	DateTimeStamp	HBA	Tid	Lun	Vendor	Product	SerialNum	Version	BlkSz	Page	Param	Data
gateway	3 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	1	-1	18 00 E8 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	2	-1	80 80 00 0A 00 00 00 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	3	-1	14 D0 00 00 00 0A 00 00 00 D6 02 00 00 0
gateway	3 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	4	-1	00 1B 32 0C 00 00 00 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	7	-1	00 0B E8 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	8	-1	14 00 FF FF 00 00 FF FF FF FF 80 03 00 0
gateway	3 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	10	-1	02 10 00 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	26	-1	00 00 00 00 00 01 00 00 00 04
gateway	3 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	28	-1	88 03 00 00 00 00 00 00 00 01
gateway	3 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	0	-1	00 00
gateway	3 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	1	-1	18 00 E8 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	2	-1	80 80 00 0A 00 00 00 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	3	-1	14 D0 00 00 00 0A 00 00 00 D6 02 00 00 0
gateway	3 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	4	-1	00 1B 32 0C 00 00 00 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	7	-1	00 0B E8 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	8	-1	14 00 FF FF 00 00 FF FF FF FF 80 03 00 0
gateway	3 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	10	-1	02 10 00 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	26	-1	00 00 00 00 00 01 00 00 00 04
gateway	3 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	28	-1	88 03 00 00 00 00 00 00 00 01
gateway	3 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	0	-1	00 00
gateway	3 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	1	-1	18 00 E8 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	2	-1	80 80 00 0A 00 00 00 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	3	-1	14 D0 00 00 00 0A 00 00 00 D6 02 00 00 0
gateway	3 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	4	-1	00 1B 32 0C 00 00 00 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	7	-1	00 0B E8 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	8	-1	14 00 FF FF 00 00 FF FF FF FF 80 03 00 0
gateway	3 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	10	-1	02 10 00 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	26	-1	00 00 00 00 00 01 00 00 00 04
gateway	3 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	28	-1	88 03 00 00 00 00 00 00 00 01
gateway	3 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	0	-1	00 00
gateway	3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	1	-1	18 00 F0 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	2	-1	80 80 00 00 00 00 00 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	3	-1	02 B8 00 00 00 04 00 00 01 5A 02 00 00 01
gateway	3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	4	-1	00 28 89 0A 00 00 00 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	7	-1	00 0B F0 00 00 00 00 00 00 00
gateway	3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	8	-1	14 00 FF FF 00 00 FF FF FF FF 80 03 00 0
gateway	3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	10	-1	02 10 00 00 00 00 00 00 02 4B
gateway	3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	25	-1	00 48 00 00 00 00
gateway	3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	26	-1	00 00 00 00 00 01 00 00 00 04
gateway	3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	28	-1	88 03 00 00 00 00 00 00 00 01
gateway	3 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	0	-1	00 00 0F 00 00 00
gateway	3 1:11:03 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	1	-1	18 00 F0 00 00 00 00 00 00 01 C2
gateway	3 1:11:03 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	2	-1	80 80 00 00 00 00 00 00 00 00 00 00 00 00

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Text File Output Data

A separate text output file will be created for each device that is tested by the Manufacturing Module. The name of these files is a combination of the device address (bus-target-lun) and the device serial number if available. For instance the example file here is named “5-002-00-0001000125.Log”

This file contains all information about the drive, and about the tests that were run. The results of the Manufacturing test run, as shown below:

```
================================================================================
>> SCSI Toolbox32, Version 5. 0. 0 (build)  40211, running on \\G64-XP       <<
================================================================================

Test Date:  02/12/2004  14:55:43
  Device:  5:2:0   SONY     SDZ-100          Serial: 0001000125

Results:
 02/12/2004  14:55:43  TEST 1 of 12:
                Rewind

 02/12/2004  14:55:43  Test Completed Successfully


 02/12/2004  14:55:43                                  PASSED
 ---------------------------------------------------------------------------
 02/12/2004  14:55:43  TEST 2 of 12:
                Write Test; Sequential; for 2000.00 MBytes
                Fixed-Length Transfers of 1 (0x0001) Blocks
                Data Pattern: Alt Zeros and Ones

 02/12/2004  14:56:25  Test Completed Successfully


 02/12/2004  14:56:25                                  PASSED
 ---------------------------------------------------------------------------
 02/12/2004  14:56:26  TEST 3 of 12:
                Write FileMark

 02/12/2004  14:56:27  Test Completed Successfully
```


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02/12/2004 14:56:27 PASSED

02/12/2004 14:56:27 TEST 4 of 12:
Write Test; Sequential; for 1000.00 MBytes
Fixed-Length Transfers of 1 (0x0001) Blocks
Data Pattern: Random

02/12/2004 14:57:06 Test Completed Successfully

02/12/2004 14:57:06 PASSED

02/12/2004 14:57:06 TEST 5 of 12:
Write FileMark

02/12/2004 14:57:08 Test Completed Successfully

02/12/2004 14:57:08 PASSED

02/12/2004 14:57:08 TEST 6 of 12:
Rewind

02/12/2004 14:57:21 Test Completed Successfully

02/12/2004 14:57:21 PASSED

02/12/2004 14:57:21 TEST 7 of 12:
Read Test; Sequential; for 2000.00 MBytes
Fixed-Length Transfers of 1 (0x0001) Blocks
Data Pattern: Alt Zeros and Ones

02/12/2004 14:58:07 Test Completed Successfully

02/12/2004 14:58:07 PASSED

02/12/2004 14:58:07 TEST 8 of 12:
Read FileMark

02/12/2004 14:58:07 Test Completed Successfully

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02/12/2004 14:58:07 PASSED

02/12/2004 14:58:07 TEST 9 of 12:
Read Test; Sequential; for 1000.00 MBytes
Fixed-Length Transfers of 1 (0x0001) Blocks
Data Pattern: Random

02/12/2004 14:58:47 Test Completed Successfully

02/12/2004 14:58:47 PASSED

02/12/2004 14:58:47 TEST 10 of 12:
Rewind

02/12/2004 14:58:53 Test Completed Successfully

02/12/2004 14:58:53 PASSED

02/12/2004 14:58:53 TEST 11 of 12:
Space Tape Test; Forward to EOD

02/12/2004 14:59:02 Test Completed Successfully

02/12/2004 14:59:02 PASSED

02/12/2004 14:59:02 TEST 12 of 12:
Rewind

02/12/2004 14:59:09 Test Completed Successfully

02/12/2004 14:59:09 PASSED

Other output data

Clicking on the “Save to File” button under the Test Progress window will save the contents of the Test Sequence and Test Progress windows to a file – in text mode.

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Here is a sample of this type of output:

Output from Tape Screening Toolbox
The time is Fri Mar 14 10:21:47 2003

Test Sequence:
Random Write/Read - 15 Minutes
Sequential Write - -1 Blocks
Random Read - 60 Minutes

Test Progress:
Verifying selected devices
Device 2:14:0 deselected - not a tape
Device 2:15:0 deselected - not a tape
Device 3:128:0 deselected - not a tape

Starting Pre-Test Actions
Spinning Up drive 2 - 0 - 0
Spinning Up drive 2 - 2 - 0
Spinning Up drive 2 - 3 - 0
Spinning Up drive 2 - 9 - 0
Spinning Up drive 2 - 10 - 0
Spinning Up drive 2 - 11 - 0
Spinning Up drive 2 - 12 - 0
Spinning Up drive 3 - 0 - 0
Spinning Up drive 3 - 1 - 0
Spinning Up drive 3 - 3 - 0
Spinning Up drive 3 - 4 - 0
Spinning Up drive 3 - 5 - 0
Spinning Up drive 3 - 6 - 0
Spinning Up drive 3 - 7 - 0
Spinning Up drive 3 - 8 - 0
Spinning Up drive 3 - 9 - 0
Spinning Up drive 3 - 10 - 0
Spinning Up drive 3 - 11 - 0
Done Pre-Test Actions
Test 1 Started on :
HA 2 Target 0 Lun 0 SEAGATE ST39102LC
HA 2 Target 2 Lun 0 SEAGATE ST39102LC
HA 2 Target 3 Lun 0 SEAGATE ST39102LC

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HA 2 Target 9 Lun 0 SEAGATE ST39102LC
HA 2 Target 10 Lun 0 SEAGATE ST39102LC
HA 2 Target 11 Lun 0 SEAGATE ST39102LC
HA 2 Target 12 Lun 0 SEAGATE ST39102LC
HA 3 Target 0 Lun 0 SEAGATE ST318451FC
HA 3 Target 1 Lun 0 SEAGATE ST318304FC
HA 3 Target 3 Lun 0 SEAGATE ST318451FC
HA 3 Target 4 Lun 0 IBM DDYF-T18350R
HA 3 Target 5 Lun 0 IBM DDYF-T18350S
HA 3 Target 6 Lun 0 IBM DDYF-T18350S
HA 3 Target 7 Lun 0 HITACHI DK32DJ-72FC
HA 3 Target 8 Lun 0 HITACHI DK32DJ-72FC
HA 3 Target 9 Lun 0 IBM DDYF-T18350S
HA 3 Target 10 Lun 0 SEAGATE ST318304FC
HA 3 Target 11 Lun 0 HITACHI DK32DJ-72FC

HA 3 Target 8 LUN 0 FAILED test 1 - miscompare on a READ at LBA = 06471482
Starting Test Number 2 on drive 3:8:0

HA 3 Target 11 LUN 0 FAILED test 1 - miscompare on a READ at LBA = 07e426e8
Starting Test Number 2 on drive 3:11:0

HA 2 Target 11 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:11:0

HA 2 Target 10 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:10:0

HA 2 Target 9 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:9:0

HA 2 Target 3 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:3:0

HA 2 Target 2 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:2:0

HA 2 Target 0 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:0:0

HA 3 Target 10 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:10:0

HA 3 Target 9 LUN 0 has completed test 1 successfully

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Starting Test Number 2 on drive 3:9:0

HA 3 Target 7 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:7:0

HA 3 Target 6 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:6:0

HA 3 Target 5 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:5:0

HA 3 Target 4 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:4:0

HA 3 Target 3 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:3:0

HA 3 Target 1 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:1:0

HA 3 Target 0 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 3:0:0

HA 2 Target 12 LUN 0 has completed test 1 successfully
Starting Test Number 2 on drive 2:12:0

HA 2 Target 0 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:0:0

HA 2 Target 11 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:11:0

HA 2 Target 3 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:3:0

HA 2 Target 10 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:10:0

HA 2 Target 9 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:9:0

HA 2 Target 12 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:12:0

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HA 2 Target 2 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 2:2:0

HA 3 Target 0 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:0:0

HA 3 Target 3 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:3:0

HA 3 Target 1 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:1:0

HA 3 Target 10 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:10:0

HA 3 Target 9 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:9:0

HA 3 Target 4 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:4:0

HA 3 Target 6 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:6:0

HA 3 Target 5 LUN 0 has completed test 2 successfully
Starting Test Number 3 on drive 3:5:0

HA 2 Target 0 LUN 0 has completed test 3 successfully
HA 2 Target 11 LUN 0 has completed test 3 successfully
HA 2 Target 10 LUN 0 has completed test 3 successfully
HA 2 Target 3 LUN 0 has completed test 3 successfully
HA 2 Target 9 LUN 0 has completed test 3 successfully
HA 2 Target 2 LUN 0 has completed test 3 successfully
HA 2 Target 12 LUN 0 has completed test 3 successfully
HA 3 Target 5 LUN 0 was Stopped on test 3
HA 3 Target 6 LUN 0 was Stopped on test 3
HA 3 Target 4 LUN 0 was Stopped on test 3
HA 3 Target 9 LUN 0 was Stopped on test 3
HA 3 Target 10 LUN 0 was Stopped on test 3
HA 3 Target 1 LUN 0 was Stopped on test 3
HA 3 Target 3 LUN 0 was Stopped on test 3
HA 3 Target 0 LUN 0 was Stopped on test 3
HA 3 Target 7 LUN 0 was Stopped on test 2
HA 3 Target 11 LUN 0 was Stopped on test 2

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HA 3 Target 8 LUN 0 was Stopped on test 2
ALL TESTS HAVE BEEN COMPLETED

Starting Post-Test Actions
Done Post-Test Actions

End of DMM Section

The SCSI Command Compliance Test

This article will describe the details of the latest SCSI Command Compliance Utility tool version 2.0 – an important piece of the STB Suite.

The Purpose of the tool

The purpose of the SCSI Command Compliance Utility is to **issue CDB's** to a target device and to **record the results** of sending the CDB.

The CDB's which are sent can be **"legal"** or completely valid CDBs according to the SCSI specification or according to the device manufacturers documentation.

Or the CDB's issued may be **"illegal"** or invalid an a number of ways.

A "legal" CDB example is an INQUIRY CDB, which is a 6-byte CDB with a DATA OUT phase with a number of bytes of data returned from the device – in this case 16 bytes.
This CDB would look like this:
0x12,00,00,00,0x20,00

An "Illegal" version of this CDB could have a byte with bits set which are specified as reserved bits –
0x12,0xF0,00,00,0x20,00

In addition, a CDB can be defined with a number of **"reserved"** bits defined in any byte.
The Compliance Utility will automatically insert a 1 bit into each reserved bit which has been defined.

This lets you with one CDB definition cause a number of CDB's to be issued, walking the 1 bits through the defined reserved bits.

The Command Compliance utility will issue CDB's which are defined in a text CDB definition file.
If the CDB fails with a CHECK CONDITION the Sense Data will be returned and optionally checked against an expected value.

The results will be written to an output log file.

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The User Interface

The user interface has input fields to specify the target address of the device, and fields to specify the CDB definition file to use and the file name of the output report.

Enter the drives ***HBA***, ***Target***, and ***LUN*** address, then click the Scan button.
If the device is found it's INQUIRY information will be displayed in the Drive Info field.

The CDB file to be used in the test run is named in the ***CDB File*** field, and the name of the output report file is named in the ***Results*** field.

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The CDB Definition File

You can create as many CDB definition files as you need.
As an example, you could have one CDB file which only issues “non-destructive” CDB’s – Reads but no Writes or Formats for instance.

Or you could have one CDB file of legal disk commands and another with illegal disk commands, others for tape commands, others for vendor unique commands.

Each CDB file can contain definitions of up to 200 CDBs.

Each line of the CDB file consists of the same pattern of fields:
“CDB length, Data Direction, Transfer length, CDB fields, [Command Title], Expected Sense Key, Expected Sense Code, Expected ASQ “

The CDB length is the number of bytes in the CDB, and must be 6, 10, or 12.

The Data Direction is 00 for Data Out or 01 for Data In.

The Transfer length is the bytes in hex to transfer. This field is limited to 3 digits.

The CDB fields consist of the standard CDB as specified in SCSI CDB layouts

However, the byte(s) corresponding to reserved bits of the CDB have a special format in the fields of the CDB file to allow masking of the reserved bits to test compliance.

The mask is specified with the pattern “|hh” where hh represents two hex digits that specify the reserved bits.
For example, if bits 1 through 4 are reserved in a particular CDB then the mask is |1E.

The location of the mask is specified immediately after the standard CDB byte that contains the reserved bits that need to be examined.

For example, the Inquiry command has reserved bits 1 through 4 in byte 1 of the CDB.

The total mask assuming logical unit zero, looks like “00|1E”.

If a mask is specified, each bit in the mask is “OR”- ed with the bits in the standard CDB byte during the compliance test.

The Command Title is the name you wanted printed for this CDB in the report file. It must be surrounded by “[ ]” – for example [10-Byte Read]

The Expected Sense Key, Code, and ASQ
fields are optional.
If you do include expected sense data it should be entered as hexadecimal numbers, such as 05,24,00.

Here is an example of a CDB file with three entries:
"## DISK ##"
"06,01,200,08,00,00,00,01,00,[READ],05,24,00"
"10,01,200,28,00,00,00,00,00,00,01,00,[EXTENDED READ],05,20,00"
"06,01,00,00,00|1F,00|FF,00|FF,00|FF,00,[ILLEGAL-REZERO],05,26,00"

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The first line “## DISK ##” is the title and will be printed at the top of the output report.

The next line defines a 6-byte READ CDB. It defines that there will be 0x200 bytes of DATA IN and that the expected Sense data in case of a CHECK CONDITION is 05/24/00

The last CDB entry defines a CDB with reserved bits.

*"06,01,00,00,**00|1F**,00|FF,00|FF,00|FF,00,[ILLEGAL-REZERO],05,26,00"*

The bold section in the above CDB says to walk a 1 through all bit positions between 00 and 0x1f of that CDB byte. The next byte is the same but defines to walk the 1 from 00 through 0xff, in other words through all bit positions of that byte.

To help make this action clearer here is a section of the output file that is generated with this CDB definition:

"CDB[ILLEGAL-REZERO]= 00,00,00,00,00,00 passed"
"CDB[ILLEGAL-REZERO]= 00,**01**,00,00,00,00 failed Sense = 05/24/00 Expected 5/26/0 MISMATCH"
"CDB[ILLEGAL-REZERO]= 00,**02**,00,00,00,00 failed Sense = 05/24/00 Expected 5/26/0 MISMATCH"
"CDB[ILLEGAL-REZERO]= 00,**04**,00,00,00,00 failed Sense = 05/24/00 Expected 5/26/0 MISMATCH"
"CDB[ILLEGAL-REZERO]= 00,**08**,00,00,00,00 failed Sense = 05/24/00 Expected 5/26/0 MISMATCH"
"CDB[ILLEGAL-REZERO]= 00,**10**,00,00,00,00 failed Sense = 05/24/00 Expected 5/26/0 MISMATCH"
"CDB[ILLEGAL-REZERO]= 00,00,**01**,00,00,00 failed Sense = 05/24/00 Expected 5/26/0 MISMATCH"
"CDB[ILLEGAL-REZERO]= 00,00,**02**,00,00,00 failed Sense = 05/24/00 Expected 5/26/0 MISMATCH"
.
.
.
As the bold red numbers show, a 1 bit is walked through each reserved bit position of CDB byte 1, then byte 2, etc.

The Output Report

A standard text file is generated for each run of the utility.
Here is an example of a disk test output:

"SCSI Command Compliance Test Version 2.0 120620"
"SCSI device tested = Adapter = 7 , Target = 0 ,LUN = 0"
"Vendor = SEAGATE , Product = ST3450857SS , Revision = ES62"
" "
"## DISK ##"
"CDB[READ]= 08,00,00,00,01,00 passed"
""
"CDB[EXTENDED READ]= 28,00,00,00,00,00,00,00,01,00 passed"
""
"CDB[WRITE]= 0A,00,00,00,01,00 passed"
""
"CDB[EXTENDED WRITE]= 2A,00,00,00,00,00,00,00,00,00 passed"
"CDB[CHANGE DEFINITION]= 40,00,00,00,00,00,00,00,00,00 failed Sense = 05/20/00 Expected 5/20/0 OK"
""
"CDB[COMPARE]= 39,00,00,00,00,00,00,00,00,00 failed Sense = 05/20/00 Expected 5/20/0 OK"
"
"CDB[SEND DIAGNOSTIC]= 1D,00,00,00,00,00 failed Sense = 05/24/00 Expected 5/20/0 MISMATCH"

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Note: if the CDB definition file entry has Expected Sense Key, Expected Sense Code, and Expected ASQ defined, and a CHECK CONDITION occurs, the actual sense data and the expected sense data will be logged, along with either “MISMATCH” or “OK” depending on if the expected sense data is what was generated.

Summary

The CDB Compliance Utility is extremely versatile, allowing any CDBs to be issued and results collected from any type of SCSI, SAS, or Fibre Channel device. Since the utility uses simple text files to define the CDB’s to be executed the utility will never become out of date as CDB definition files containing any number of CDBs (up to 200 per file) can be defined.
Another advantage of having text files to define the CDB’s to test is that like types of CDBs can be grouped together. Disk oriented CDBs, tape oriented CDBs, etc. Also, separate CDB files can be created for CDBs which are “destructive” (write to the drive, format, etc) versus files with only non-destructive commands.

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ATA Command Compliance Testing

Introduction

Command compliance testing is needed in order to verify proper or expected operation of ATA and SATA storage peripherals. This paper will discuss in particular ATA/SATA disk drive command testing. Testing for packet devices such as CD or DVD drives can be accomplished in the same manner by simply replacing the list of commands used in the test

Requirements

Hardware Requirements

To run the example STB ATA and SATA command you will need a computer system running Windows operating system. If you need to test 48-bit ATA or SATA commands you need to be sure that the operating system drivers support these operations. The drivers in Windows Server 2003 do support 48-bit operations, other OS's will need testing to see if they support these commands.

You will also need an ATA or SATA controller which the operating system recognizes as a true ATA Task Register type of controller. Most add-in PCI SATA controllers are seen by Windows as if they are a SCSI host bus adapter rather than an ATA controller.

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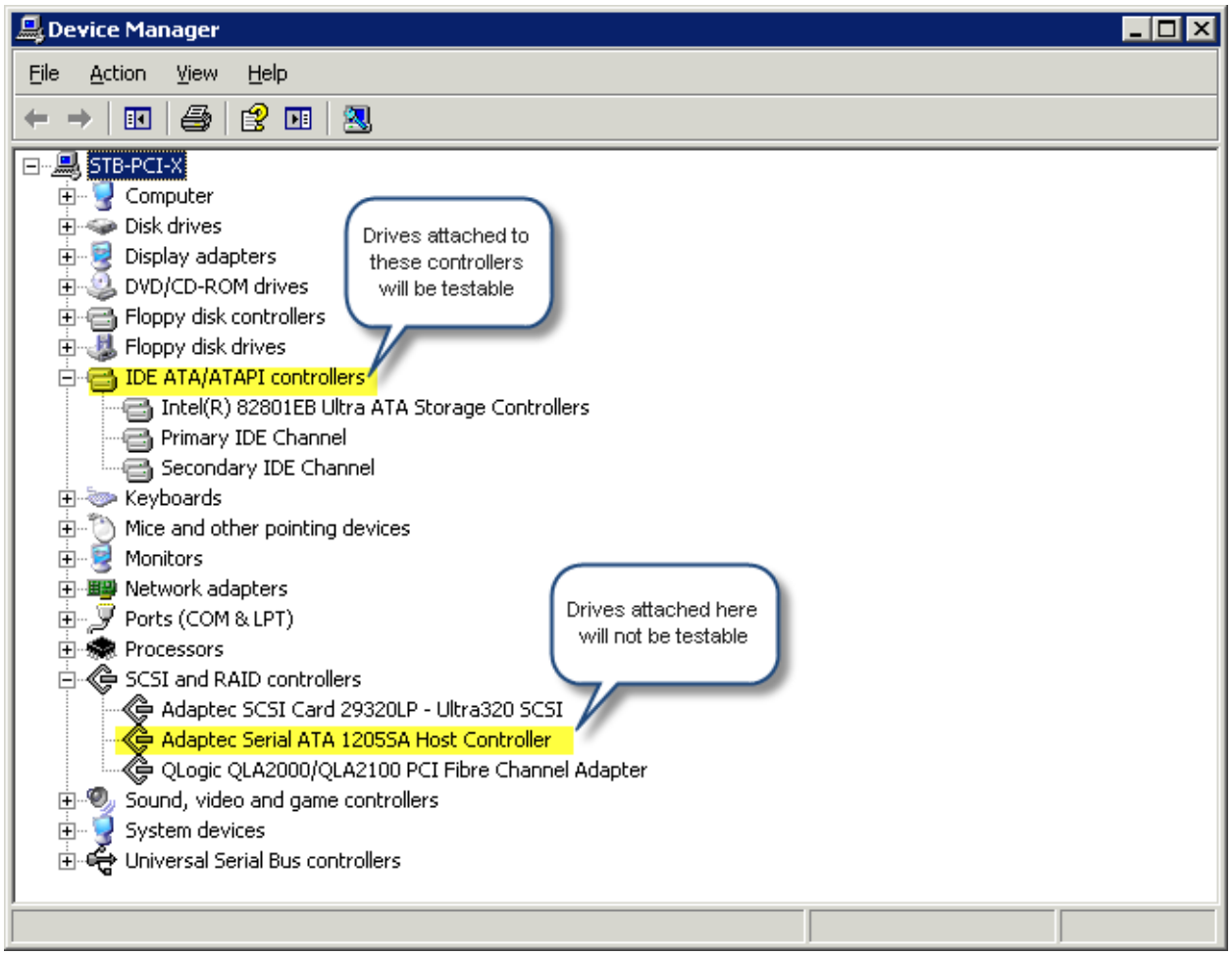
You can confirm how your operating system views your controller scheme by using Device Manager as shown below – note that the only drives that will be able to be tested for ATA or SATA command compliance ***must*** be attached to a controller that Windows sees as an *IDE ATA/ATAPI controller*



Note regarding 48-bit commands:

Also, be aware that at this time the Windows operating systems that do support 48-bit operations have a bug in ATA PASS THROUGH. After a 48-bit command completes, only the FIRST task file is returned (HOB=0), but not the second one (HOB=1). Thus, READ NATIVE MAX ADDRESS EXT can get the low LBA bits 0..23, but not the high LBA bits 24..47.

Once you have disk drives attached to the proper controller you can run the example STB ATA/SATA Command Compliance Test

Note regarding AHCI

The ATA Command Compliance test is not compatible with ATA/SATA drives configured as AHCI.

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User Requirements

It is essential that the user of this test be familiar with the ATA and SATA specifications. Documentation can be found at www.t13.org

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Test Methodology

A command compliance test must be able to issue any type of ATA or SATA command – including illegal commands. It should give an option to issue data-safe or non-destructive commands or data-destructive commands at the users choice. In order to minimize system hangs it is important that all commands that are issued are able to abort if they have not completed within an expected time.

The test should allow sending any number of commands in sequence. All aspects of these commands must be definable by the user, such as the actual command byte values, the data direction and length (if any), the command length (28-bit or 48-bit commands), and the number of seconds to wait for completion before aborting the command via a timeout.

The test should issue any commands that the user defines, and should gather and display if the command completed normally or with an error. If an error is returned the ATA Task Registers should be displayed and logged for interpretation.

Normal and error status

The results of all commands are returned via the ATA Task Registers. By interpreting the values contained in these registers the test can decide whether a command completed successfully or whether and error occurred. In particular the ERROR and STATUS registers will show error or normal completion. A status value of 0x50 indicates successful completion, a value of 0x51 indicates an error.

Note:

The NOP command always returns an ERROR status. Other commands may as well – be sure to study the ATA and SATA command documentation.

Exceptions

Certain commands will cause the drive to become idle or non-responsive. When a command is issued that results in the drive being left in an IDLE , STANDBY,or SLEEP state other command sequences may be needed to bring the drive back into an ACTIVE state.

Idle and Standby

A drive can be brought back to ACTIVE state from IDLE or STANDBY state by issuing a **READ SECTOR** command. The **CHECK POWER MODE** command can be issued to ascertain the current state of the drive.

Sleep

Once a SLEEP command has been executed by a disk drive it will no longer respond to any commands. In this case either a Bus Reset must be issued, or power to the drive must be cycled.

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Security Freeze

A drive which has been placed in a SECURITY FREEZE state must be power cycled to un-freeze the drive. Until this has happened the drive will not respond to any SECURITY FEATURE commands.

Determining the drive's capabilities and state

The IDENTIFY command can be issued to a drive in order to ascertain it's capabilities. The data returned by this command will show all information about the drive, such as Model and Serial Number, what version of ATA commands are supported, SATA interface level and speed, whether 48-bit and Security and Power Management features are supported and enabled. The STB Command Compliance will retrieve and interpret all drive IDENTIFY information. The current Power State of the drive can be determined at any point in the test process by issuing the CHECK POWER MODE command and interpreting the results.

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This test is supplied as a stand-alone executable program which may simply be run. In addition the complete Microsoft Studio vs 6 C++ project is supplied so the user can fully customize the test to their unique requirements. As delivered, the Destructive Testing mode will attempt to preserve data integrity by always issuing a READ command before any WRITE commands, and subsequently using the read data to write back out to the same block. But take care not to run destructive testing on any drive containing important data.
Also – it is ***highly recommended*** that you do ***not*** run the compliance test on your system boot drive, or any drives with important data or system files.

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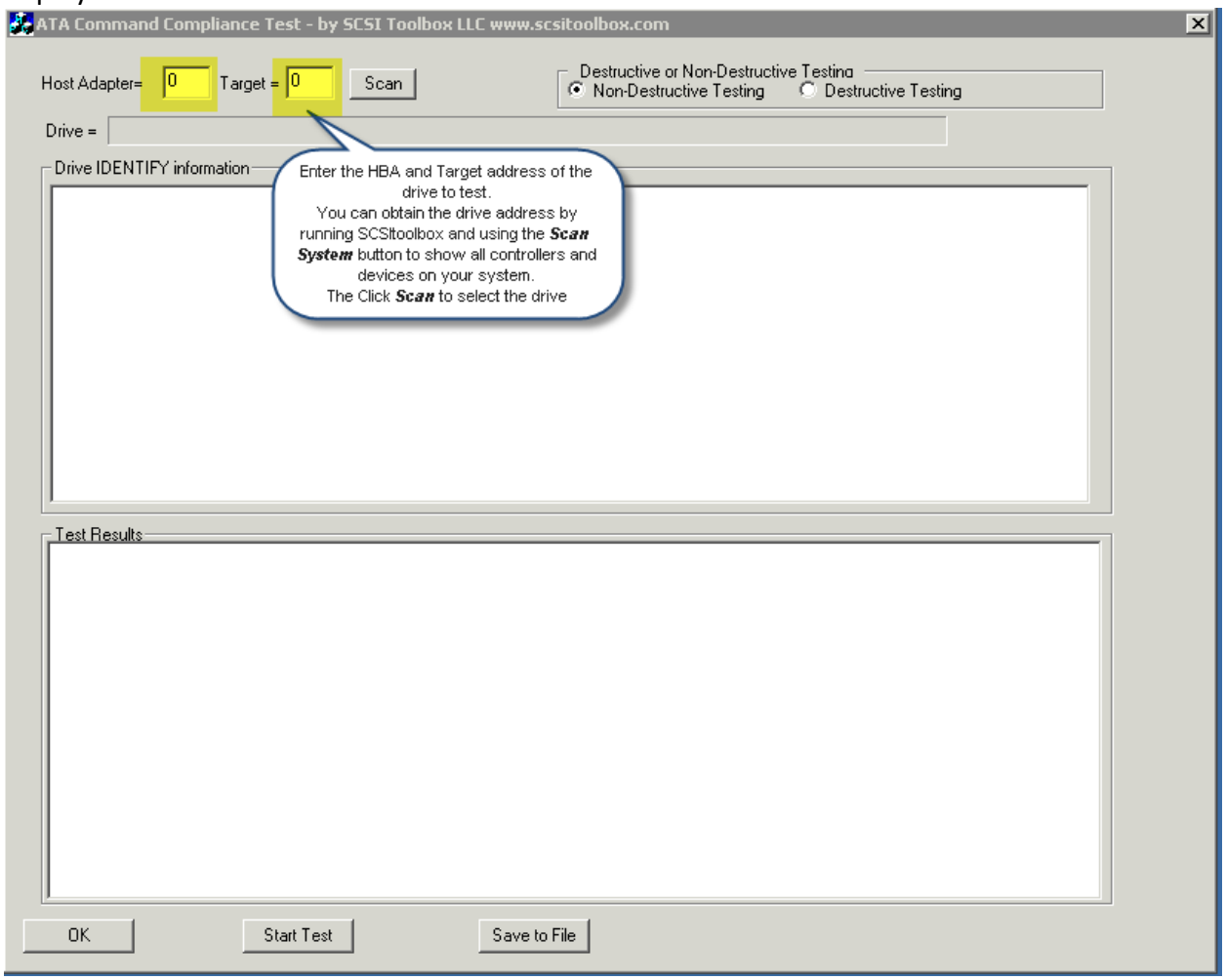
Test Execution

The test application requires that the installed STB Developers Toolbox be version 80428 or above. To start the test simply double-click on the application. The main test dialog will be displayed as below:



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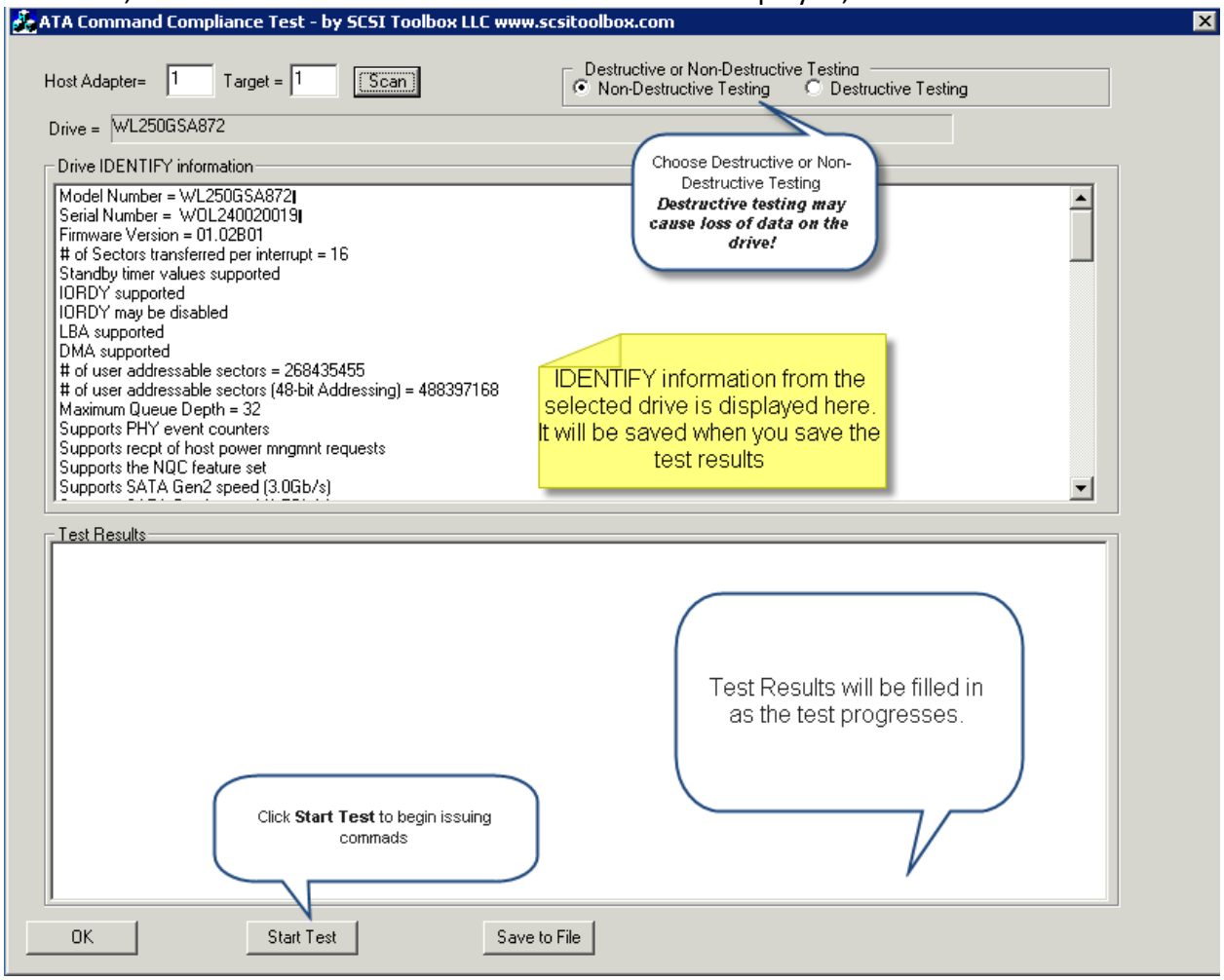
Once you have selected a drive and clicked Scan the test will attempt to issue an IDENTIFY command to the drive. If the drive is an ATA or SATA drive, connected to the proper type of controller, the IDENTIFY information for the drive will be displayed, as below:



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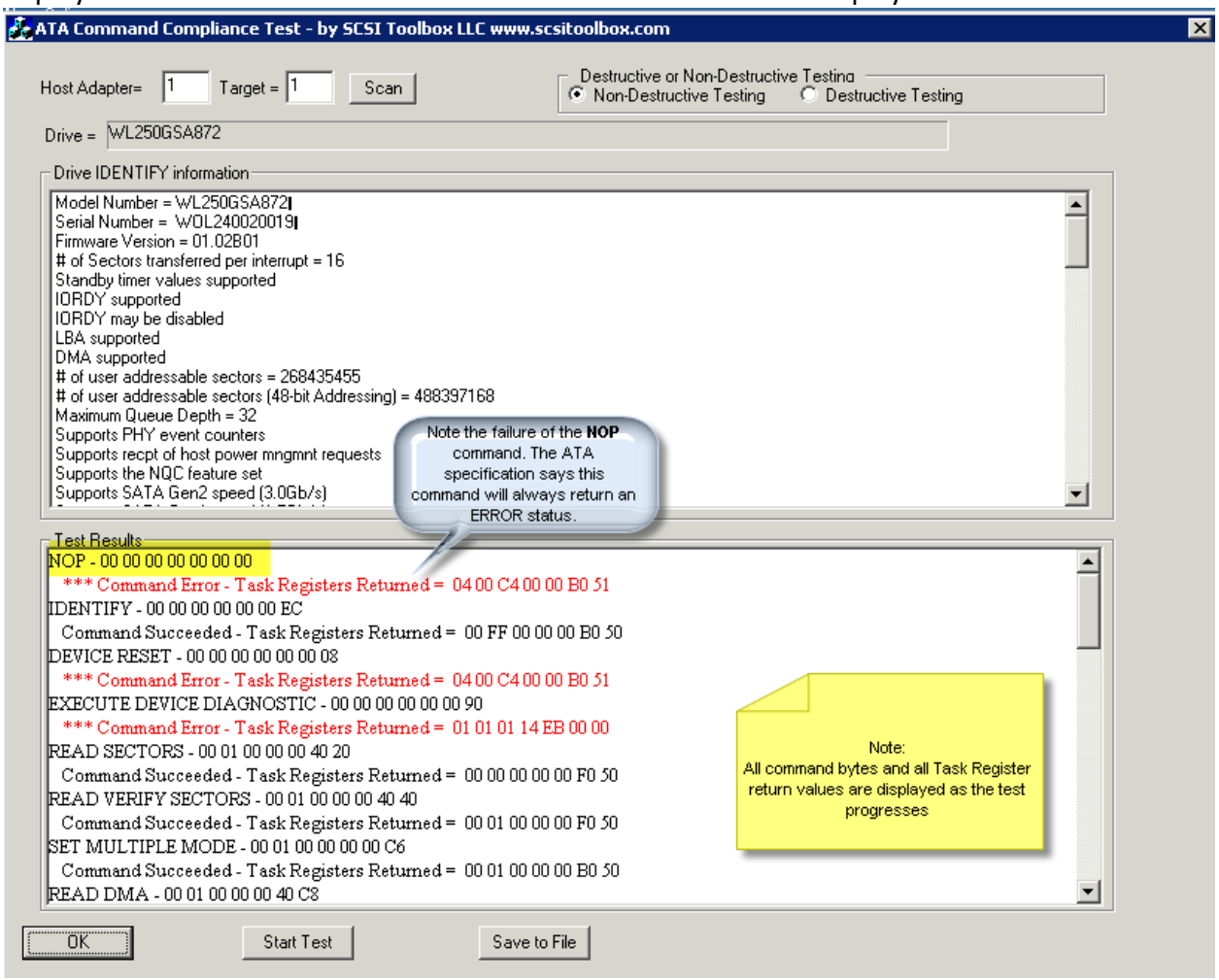
As the test progresses each command that is issued, and the results of the command are displayed in the Test Results window. If an error occurs it will be displayed in red



Click the Save to File button to store all drive IDENTIFY and test results information to an ascii text file.

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Customizing the test source code

Opening the project

The STB ATA/SATA Command Compliance test is written in C++, using Microsoft Visual Studio vs 6.
It uses calls to the STB Developers Toolbox Library dll to communicate with the drive.
Open the project by double-clicking on the project file ***ATACompliance.dsw***
The main body of the test code is located in the file ***ATAComplianceDlg.cpp***

Adding your own commands

Go to the functions ***NonDestructiveCommands()*** and ***DestructiveCommands()*** to customize the commands that are issued during the test.

Defining ATA/SATA commands

The function ***BuildCommand()*** is used to define commands. The parameters passed to this function are:

int CATAComplianceDlg::BuildCommand(

int **number** // the index into the array of commands issued by the test

unsigned char **b0 – b12** // the bytes that make up the ATA command, in order as defined in the ATA documentation – b0 = function, b1 = sector count…b6 = command, b7-b12 the 48-bit command bytes

int **cdblength** // either 7 for a 28-bit command or 13 for a 48-bit command

int **datalength** // if the command has a data phase – if no data phase this ***must*** be set to zero (0) to avoid driver hangs.

int **datadirection** // 1 = data *in* from drive, 0 = data *out* to drive

int **timeout** // number of seconds after which the command will be aborted if not complete

)

See the pre-defined command descriptions, and modify them to issue whatever command you need to test.
Upon clicking the Start Test button the function **OnStart()** will be called, and will in turn call either **NonDestructiveCommands()** or **DestructiveCommands()** to initialize the array of commands to be sent in the test.
Once the command arrays are filled in the program loops, issuing each command in turn.

Special command sequence issues

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As described previously, there are certain sequences of commands which must be issued in order to bring a drive back to active state once it has been put into **STANDBY** or **IDLE** state. You will note as the command sequence is defined there will be a **CHECK POWER MODE** command and a **READ SECTOR(s)** command issued after each type of **IDLE** or **STANDBY** command.
After a **SLEEP** command has put the drive into **SLEEP** state a bus reset must be issued. This is handled as a special exception as the test loops through the command list. If the command name == “BUSRESET” DTB will be called to issue a bus reset to the selected drive/bus.

Commands issued during Non-Destructive test

Here is the command sequence issued for the Non-Destructive test

```
BuildCommand(commandcount++,"NOP",0,0,0,0,0,0,0,0,0,0,0,0,0,7,0,0,5);
// nop will always fail according to spec
BuildCommand(commandcount++,"IDENTIFY",0,0,0,0,0,0,0xEC,0,0,0,0,0,0,7,512,1,5);
BuildCommand(commandcount++,"DEVICE RESET",0,0,0,0,0,0,0x08,0,0,0,0,0,0,7,0,0,5);
// devicereset usually fails
BuildCommand(commandcount++,"EXECUTE DEVICE
DIAGNOSTIC",0,0,0,0,0,0,0x90,0,0,0,0,0,0,7,0,1,5);
// read commands
// read dma commands will fail on SATA drives

BuildCommand(commandcount++,"READ
SECTORS",0,0x1,0,0,0,0x40,0x20,0,0,0,0,0,0,7,512,1,5);
BuildCommand(commandcount++,"READ VERIFY
SECTORS",0,0x1,0,0,0,0x40,0x40,0,0,0,0,0,0,7,512,1,5);
BuildCommand(commandcount++,"SET MULTIPLE
MODE",0,0x1,0,0,0,0x0,0xC6,0,0,0,0,0,0,7,0,1,5);
BuildCommand(commandcount++,"READ DMA",0,0x1,0,0,0,0x40,0xC8,0,0,0,0,0,0,7,512,1,5);
BuildCommand(commandcount++,"READ DMA
QUEUED",0x01,0,0,0,0,0x40,0xC7,0,0,0,0,0,0,7,512,1,5);
BuildCommand(commandcount++,"READ
MULTIPLE",0,0x1,0,0,0,0x40,0xC4,0,0,0,0,0,0,7,512,1,5);
BuildCommand(commandcount++,"READ SECTORS EXT
",0,0x1,0,0,0,0x40,0x24,0,0,0,0,0,0,13,512,1,5);
BuildCommand(commandcount++,"READ VERIFY SECTORS
EXT",0,0x1,0,0,0,0x40,0x42,0,0,0,0,0,0,13,512,1,5);
BuildCommand(commandcount++,"READ DMA
EXT",0,0x1,0,0,0,0x40,0x25,0,0,0,0,0,0,13,512,1,5);
BuildCommand(commandcount++,"READ MULTIPLE
EXT",0,0x1,0,0,0,0x40,0x29,0,0,0,0,0,0,13,512,1,5);
BuildCommand(commandcount++,"READ DMA QUEUED
EXT",0x01,0,0,0,0,0x40,0x26,0,0,0,0,0,0,13,512,1,5);
```


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```
//idle,standby, and sleep commands –
// with additional commands needed to wake drive back up to active state
BuildCommand(commandcount++,"CHECK POWER MODE",0,0,0,0,0,0,0xE5,0,0,0,0,0,0,7,0,1,5);
// sector count == 0xff means drive is active,ready. Sector count == 0x0 means drive is
idle,standby, offline

BuildCommand(commandcount++,"IDLE IMMEDIATE",0,0,0,0,0,0,0xE1,0,0,0,0,0,0,7,0,1,20);
BuildCommand(commandcount++,"READ
SECTORS",0,0x1,0,0,0,0x40,0x20,0,0,0,0,0,0,7,512,1,20);
BuildCommand(commandcount++,"CHECK POWER MODE",0,0,0,0,0,0,0xE5,0,0,0,0,0,0,7,0,1,5);

BuildCommand(commandcount++,"IDLE ",0,0,0,0,0,0,0xE3,0,0,0,0,0,0,7,0,1,20);
BuildCommand(commandcount++,"READ
SECTORS",0,0x1,0,0,0,0x40,0x20,0,0,0,0,0,0,7,512,1,20);
BuildCommand(commandcount++,"CHECK POWER MODE",0,0,0,0,0,0,0xE5,0,0,0,0,0,0,7,0,1,5);

BuildCommand(commandcount++,"STANDBY IMMEDIATE
",0,0,0,0,0,0,0xE0,0,0,0,0,0,0,7,0,1,20);
BuildCommand(commandcount++,"READ
SECTORS",0,0x1,0,0,0,0x40,0x20,0,0,0,0,0,0,7,512,1,20);
BuildCommand(commandcount++,"CHECK POWER MODE",0,0,0,0,0,0,0xE5,0,0,0,0,0,0,7,0,1,5);

BuildCommand(commandcount++,"STANDBY ",0,0,0,0,0,0,0xE2,0,0,0,0,0,0,7,0,1,20);
BuildCommand(commandcount++,"READ
SECTORS",0,0x1,0,0,0,0x40,0x20,0,0,0,0,0,0,7,512,1,20);
BuildCommand(commandcount++,"CHECK POWER MODE",0,0,0,0,0,0,0xE5,0,0,0,0,0,0,7,0,1,5);

BuildCommand(commandcount++,"SLEEP",0,0x1,0,0,0,0x40,0xE6,0,0,0,0,0,0,7,0,1,5);
BuildCommand(commandcount++,"BUSRESET",0,0,0,0,0,0,0,0,0,0,0,0,0,7,0,0,5);
BuildCommand(commandcount++,"READ
SECTORS",0,0x1,0,0,0,0x40,0x20,0,0,0,0,0,0,7,512,1,20);
BuildCommand(commandcount++,"CHECK POWER MODE",0,0,0,0,0,0,0xE5,0,0,0,0,0,0,7,0,1,5);
```


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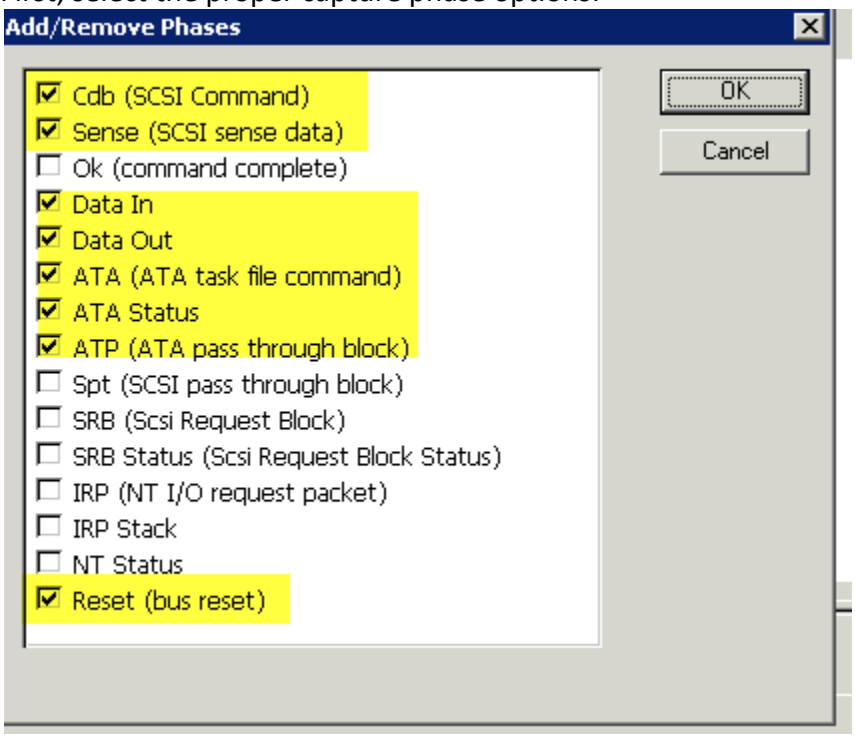
Using BAM to confirm testing

The STB Suite Bus Analyzer Module (BAM) is the perfect tool to confirm the results of the STB ATA/SATA Command Compliance Test.

Simply start BAM, insure that all ATA phase capture options are set, select the drive under test, and start the trace capture.
Here is an example BAM trace showing the Non-Destructive test commands:
First, select the proper capture phase options:



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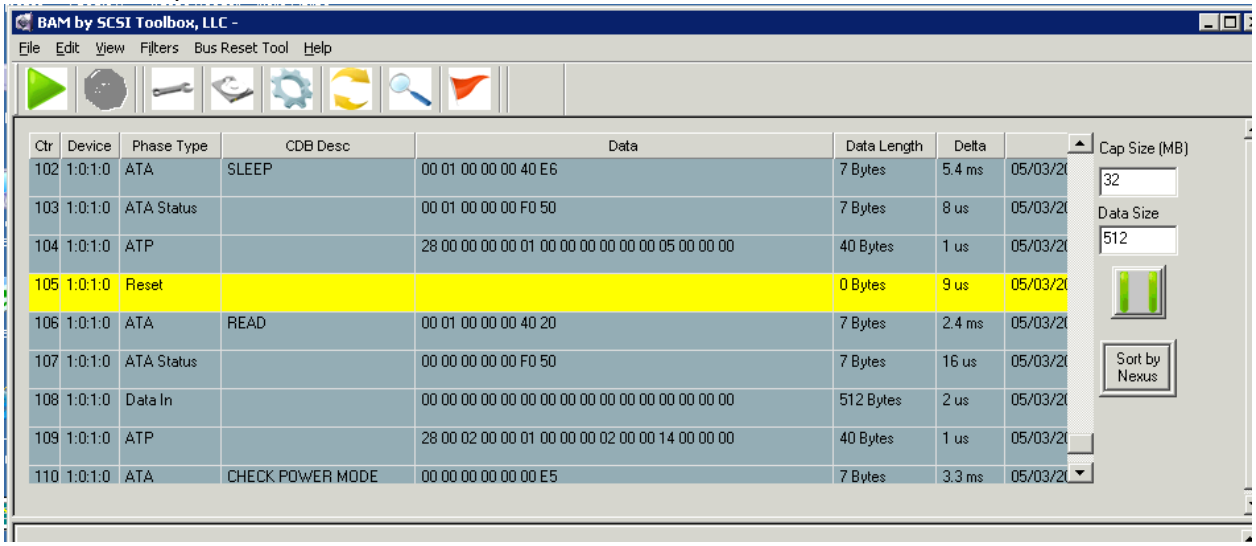
BAM trace capture:



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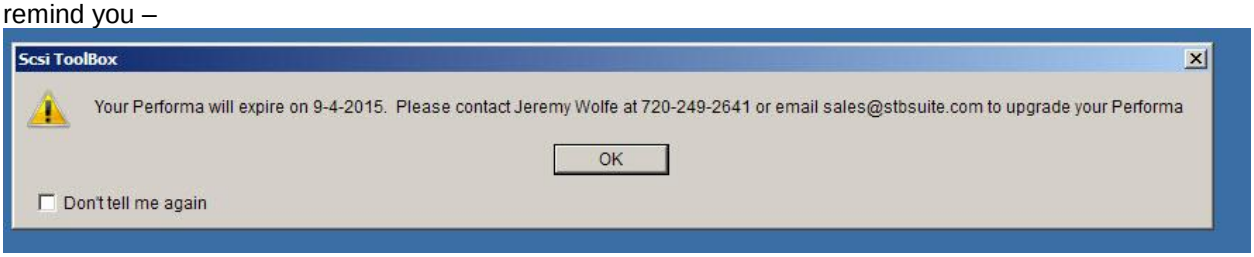
Appendix A – STB Suite Version 9.2 Release Notes

Installation Changes/Fixes

Removed possibly confusing messages about DEP settings.
All current Windows OS's default to the correct DEP settings and so these messages are no longer necessary

Performa Expiration Warning

When your Performa coverage is due to expire (within 14 days) you will receive an on-screen warning to remind you –



You may check the ***Don't tell me again*** box to stop the warning from subsequently appearing

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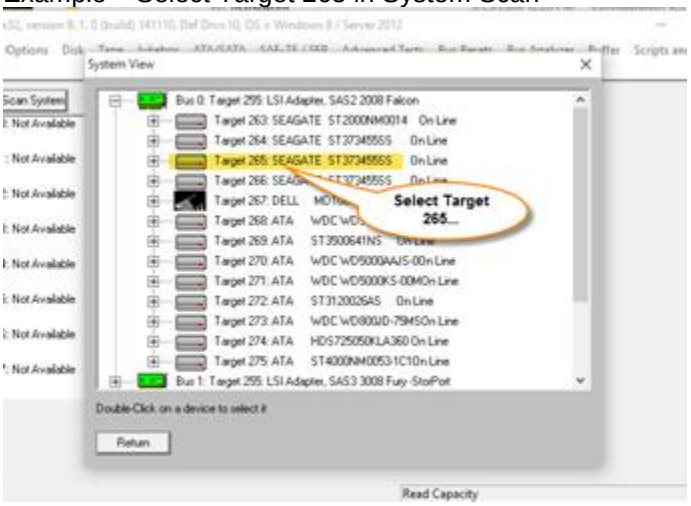
STB (Original Mode) Changes/Fixes

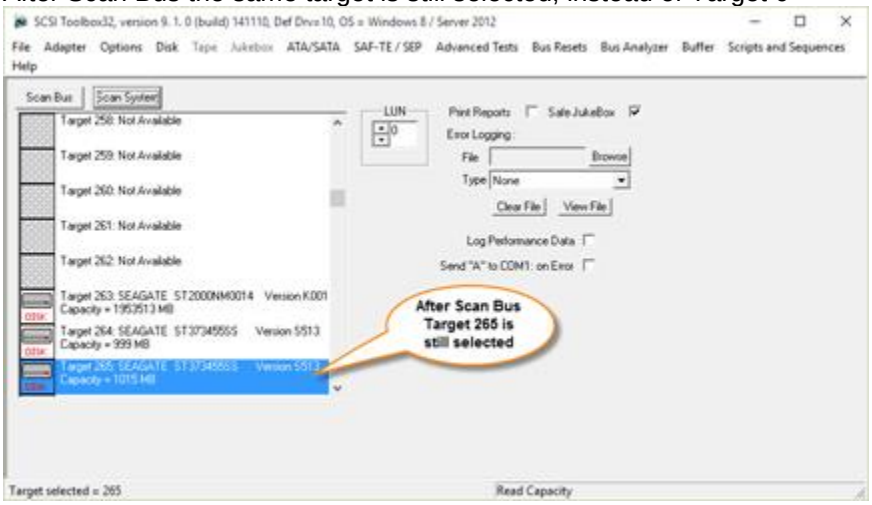
1. Main Screen Device Display/ Selection fixed

Whatever target device which was previously selected will be returned to after a bus rescan. Previously a bus rescan would set the device display to Target 0.

Example – Select Target 265 in System Scan



After Scan Bus the same target is still selected, instead of Target 0



2. Retrieving EVPD data no long can read data beyond the buffer size

3. Data Functions->Recover Security Locked Drive fixed –

Password was being placed at the wrong offset within the SATA command data buffer

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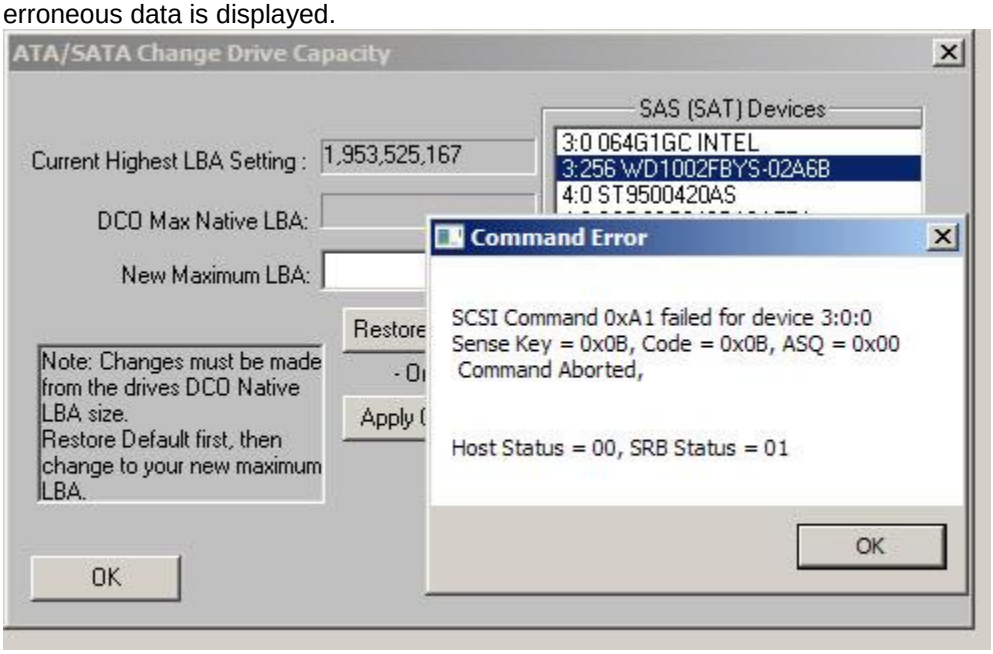
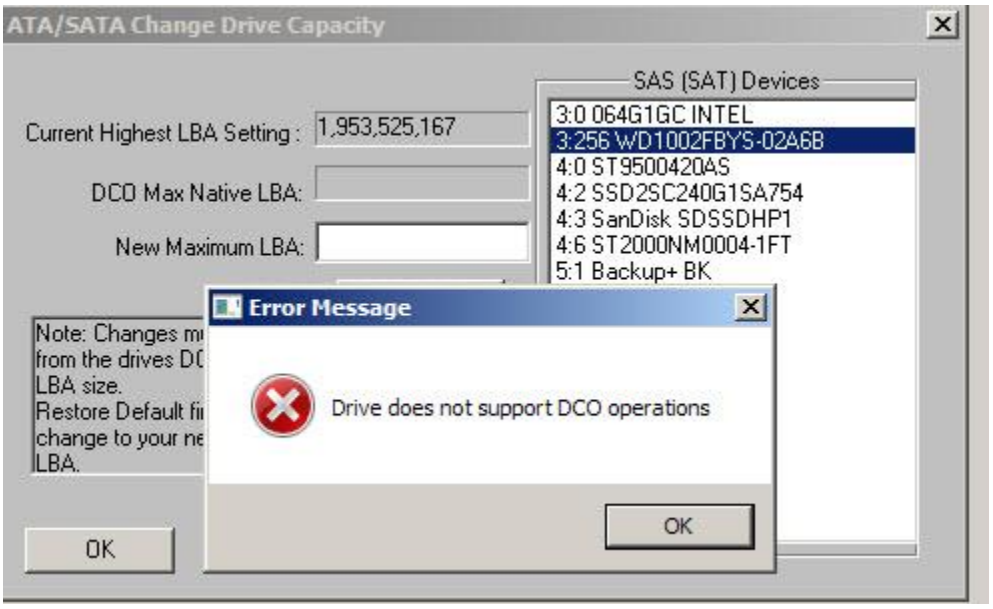
4. ATA/SATA Commands->Change Capacity

If the selected drive does not support DCO function then a message is displayed that it doesn't and no erroneous data is displayed.



Then



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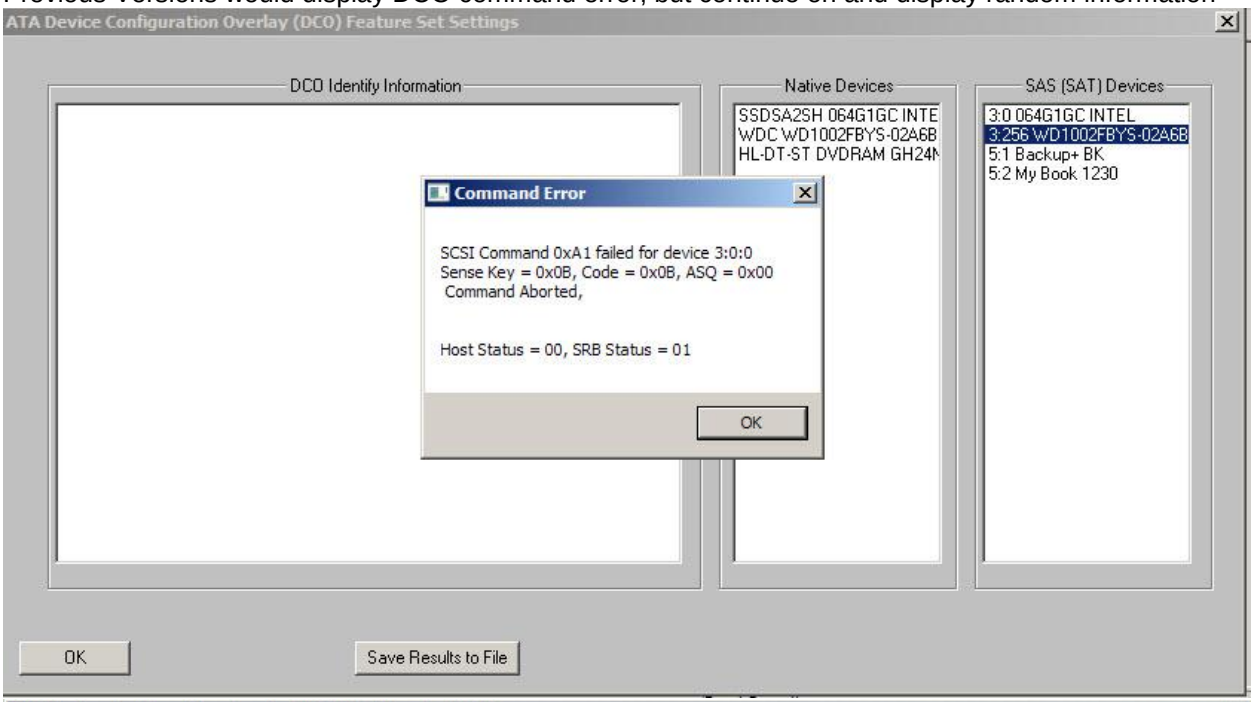
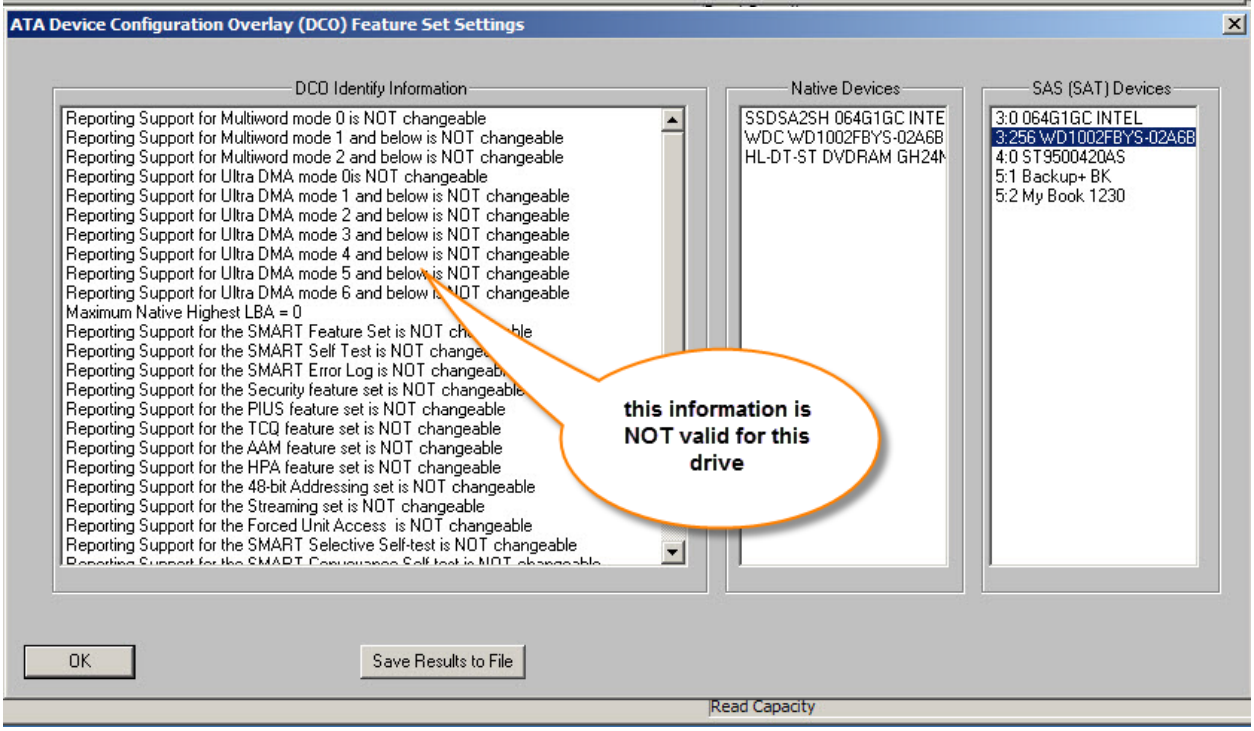
5. ATA/SATA Commands->View DCO Settings

If the selected drive does not support DCO function then a message is displayed that it doesn't and no erroneous data is displayed.
Previous Versions would display DCO command error, but continue on and display random information –





Version 9.2 will state that DCO is not supported and will not display any data

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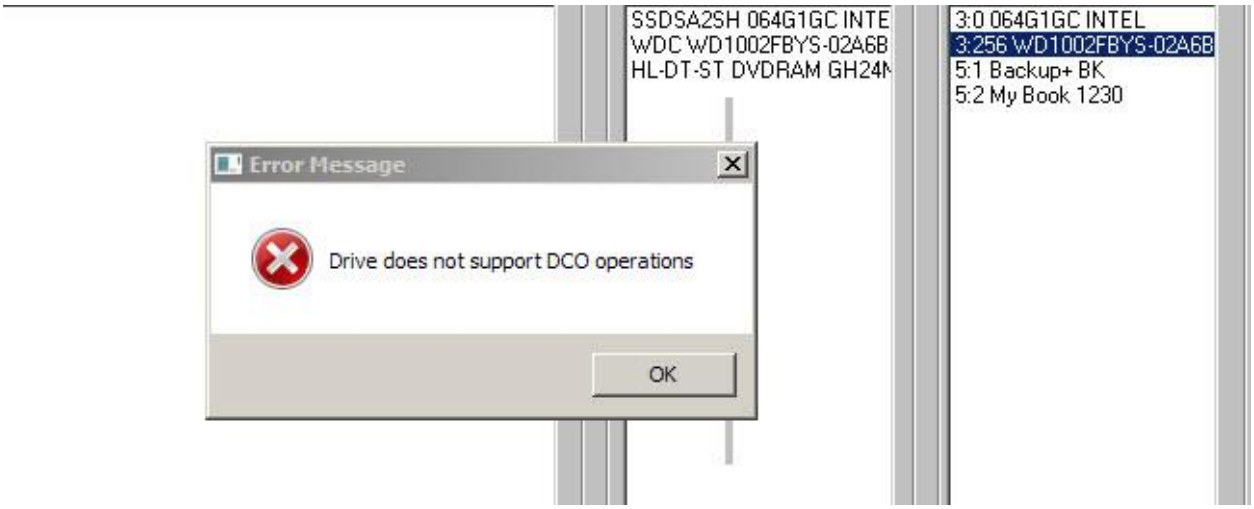


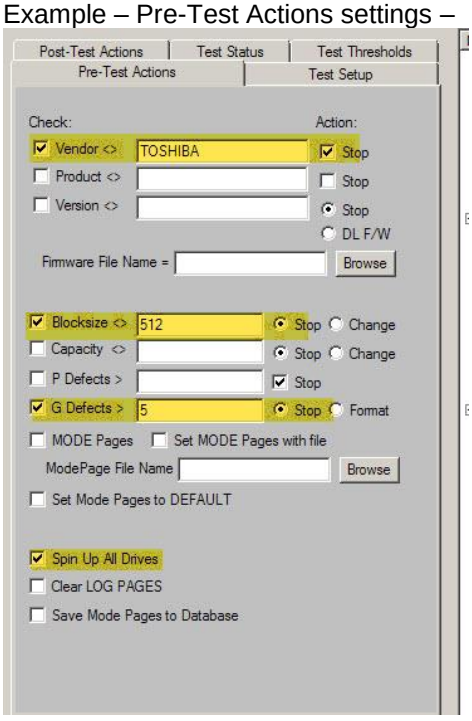
DMM (Multi-Drive Testing Mode) Changes/Fixes

1. All Pre-Test and Post-Test settings are now recorded into the .log files

See example below

2. Any Pre-Test Action failure will be have its details recorded into the .log files

Example – Pre-Test Actions settings –



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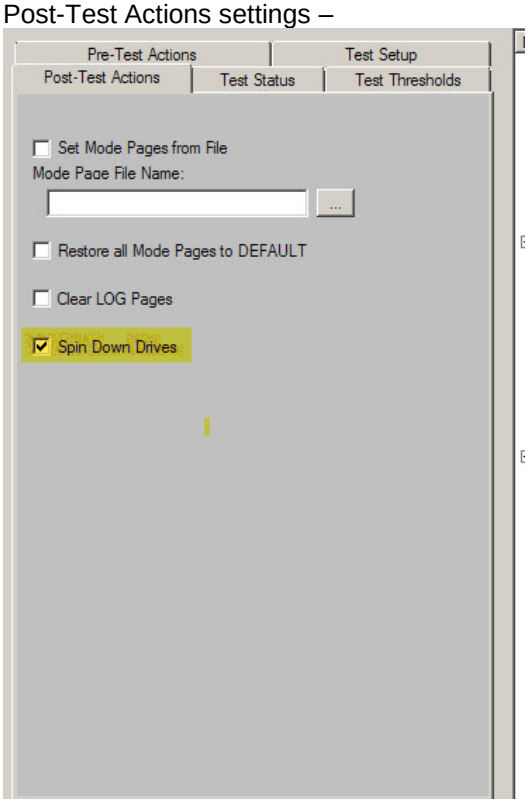
Post-Test Actions settings –



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Log File showing Pre-Test and Post-Test settings-

```
================================================================================
>> SCSI Toolbox32, Version 9. 1. 4 (build) 150818, running on \\W7TEST        <<
>> Default Driver: 10, Operating System: Windows 7<<
>> Number of Drives Under Test: 1 <<
>> Available Memory (in GB): 10.49 <<
================================================================================

Test Date:  08/27/2015  09:48:13
Test Pass:  1

   Device:  4:1:0   Vendor: TOSHIBA, Product: PX02SMF020   Serial: X3T0A013TY96,
Version: 0204

   Capacity: 1.02 GB, BlockSize: 512 (0x200)

Results:


    PreTest Action: Checking Vendor against TOSHIBA


    PreTest Action: Checking Blocksize against 512


    PreTest Action: Checking GList against 5


    PreTest Action: Spinning Up drive 4 - 1 - 0

  08/27/2015  09:48:15  TEST 1 of 1:
                        IDENTIFY Drive Test
                        Stop-on-Error Type: Stop Current Test

****************************************
Drive INQUIRY information:
Vendor = TOSHIBA
Product = PX02SMF020
Revision = 0204
Device Type =  Direct Access
Removeable Media = No
Dual Port
Width = 8 bit
Queuing Supported
SCSI Level = 6
Serial Number = X3T0A013TY96
WWN = 500003951C8863B2
Drive Temperature = 33

****************************************

  08/27/2015  09:48:15                                                  PASSED
  --------------------------------------------------------------------------------

    PostTest Action: Spinning down drive 4 - 1 - 0
```


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3. In Post-Test Actions if a command failed an error message box requiring an "OK Click" to continue was generated. This no longer happens in version 9.2

4. Post-Test Actions – spin down all drives moved to be the last choice on page

To match the layout of the Pre-Test Actions page

5. Make the Bus Reset Test Step thread safe

6. DOD Purge (Three-Step Test) was not writing "all ones" pattern correctly

*7. **Add Predefined Test Sequence** now stores/uses Pre-Test and Post-Test settings*

8. Timing of tests upgraded to millisecond resolution.

Useful to get accurate transfer rate information on short tests

9. Pre-Test Actions SATA Change Capacity fixed

Capacity can now be set to any number less than the full native capacity of the drive, or use "FULL" to restore factory full capacity.
Note: If specifying a capacity please note that you are actually specifying the new highest LBA, not the number of LBAs. Since LBAs are numbered starting at zero you should enter 1 less than the desired capacity.
For example, to specify a capacity of 1GB (1000MB or 2,000,000 512-byte blocks) you would enter 1999999 , not 2000000). This will result in a capacity of 2,000,000 blocks - blocks 0 through 1,999,999.

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DMM (Multi-Drive Testing Mode) New Features

1. Log SATA DRIVE INFORMATION and SMART data to DMM Database

Example – Data from SMART test step:

Com	Date	HBA	Tid	Lun	Vendc	Product	SerialNum	Version	Blk	Attribu	AttributeName	Data
win-e	6 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	1	** Raw Read Error Rate	Attribute 1 (** Raw Read Error Rate) - Flags = 2F, Current Value = 100, Threshold = 50, Worst = 10(
win-e	6 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	5	** Reallocated Sector Cou	Attribute 5 (** Reallocated Sector Count) - Flags = 33, Current Value = 100, Threshold = 10, Worst =
win-e	6 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	9	Power-On Hours Count	Attribute 9 (Power-On Hours Count) - Flags = 32, Current Value = 100, Threshold = 1, Worst = 100 I
win-e	6 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	12	Device Power-Cycle Count	Attribute 12 (Device Power-Cycle Count) - Flags = 32, Current Value = 100, Threshold = 1, Worst =
win-e	6 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	170		Attribute 170 () - Flags = 33, Current Value = 100, Threshold = 10, Worst = 100 Raw = (00 00 00 00
win-e	6 PM	4	4	0	ATA	ST4000NM0053	Z1Z08L	SS03	512	1	** Raw Read Error Rate	Attribute 1 (** Raw Read Error Rate) - Flags = 0F, Current Value = 76, Threshold = 44, Worst = 69 F
win-e	6 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	171	SSD Program Fail Count	Attribute 171 (SSD Program Fail Count) - Flags = 32, Current Value = 100, Threshold = 1, Worst = 1
win-e	6 PM	4	4	0	ATA	ST4000NM0053	Z1Z08L	SS03	512	3	Spin Up Time	Attribute 3 (Spin Up Time) - Flags = 03, Current Value = 92, Threshold = 0, Worst = 92 Raw = (00 0(
win-e	6 PM	4	3	0	ATA	ST2000NM0024	Z4H00V	SN02	512	1	** Raw Read Error Rate	Attribute 1 (** Raw Read Error Rate) - Flags = 0F, Current Value = 82, Threshold = 44, Worst = 66 F
win-e	6 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	172	SSD Erase Fail Count	Attribute 172 (SSD Erase Fail Count) - Flags = 32, Current Value = 100, Threshold = 1, Worst = 10(

Example – Data from Drive Info test step:

IDENTIFY : Table

ComputerName	DateTimeStamp	HBA	Tid	Lun	Vendor	Product	SerialNum	Version	BlkSz	Data
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	Model Number = M4-CT128M4SSD2
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	Serial Number = 0000000012350914BEAD
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	Firmware Version = 000F
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	# of Sectors transferred per interrupt = 16
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	Trusted Computing feature set NOT supported
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	Standby timer values supported
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	IORDY supported
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	IORDY may be disabled
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	LBA supported
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	DMA supported
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	The BLOCK ERASE EXT command is NOT supported
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	The OVERWRITE EXT command is NOT supported
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	The CRYPTO SCRAMBLED EXT command is NOT supported
win-e7qqns8j6sl	5/7/2015 7:38:49 PM	4	2	0	ATA	M4-CT128M4SS	0000000012350	000F	512	The Sanitize feature set is NOT supported

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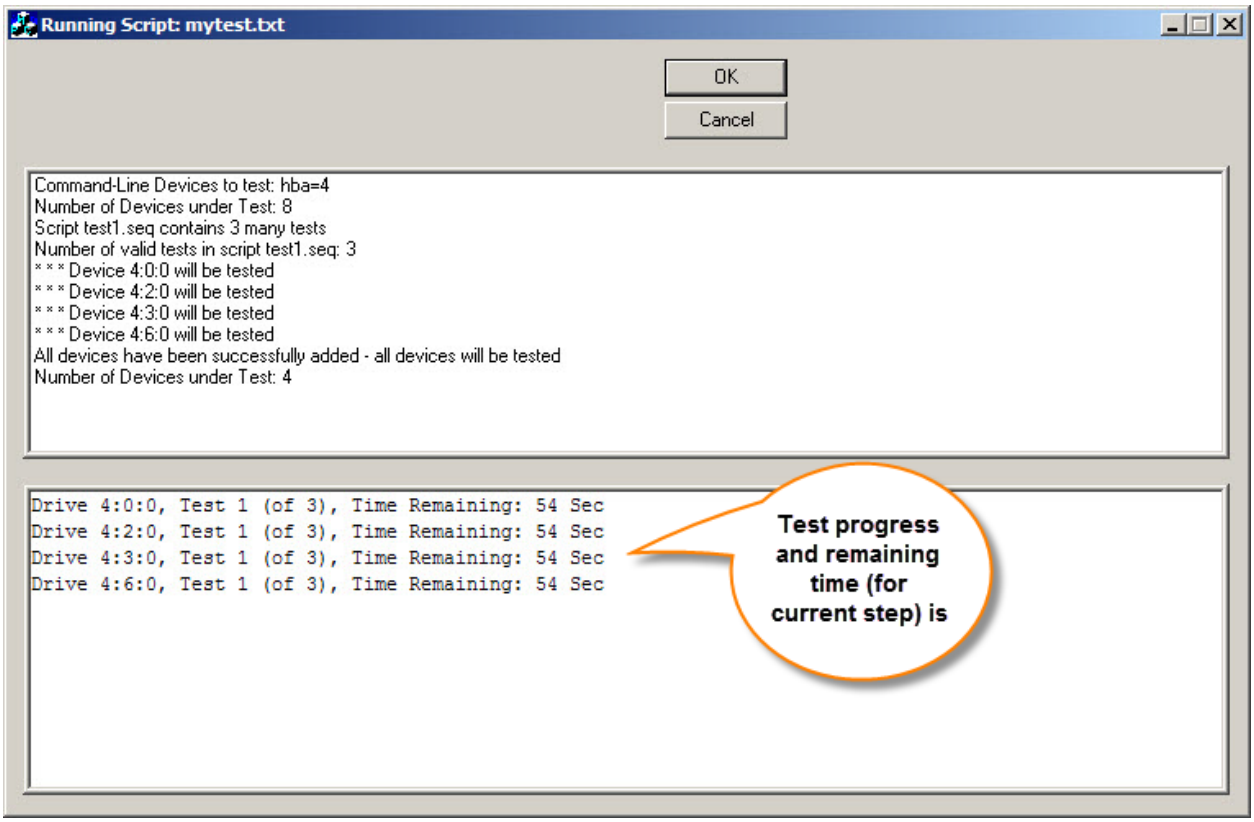
TMM (Tape Manufacturing Module) Changes/Fixes

1. *All REWIND commands now correctly set SRB DATA DIRECTION*

AME (Automated Manufacturing Engine) New Features

1. *Display test progress in GUI*



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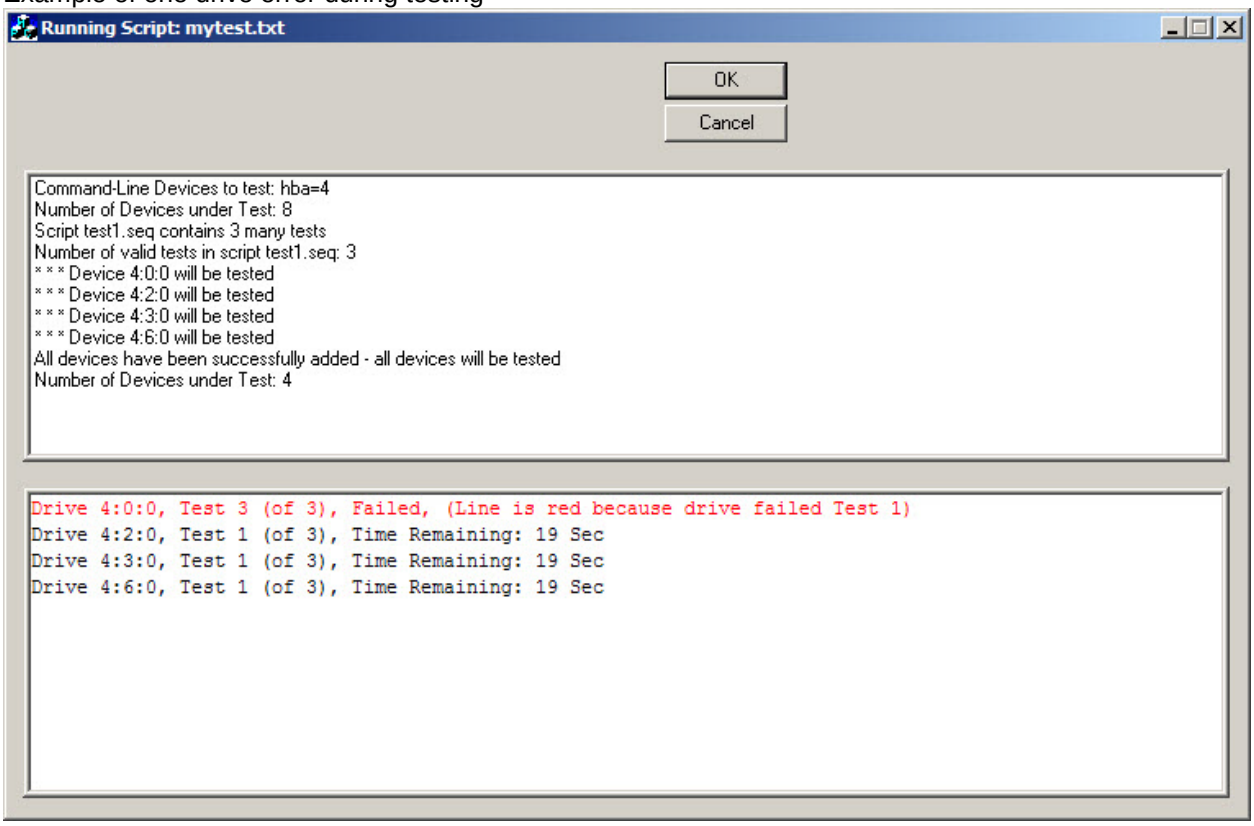
Example of one drive error during testing



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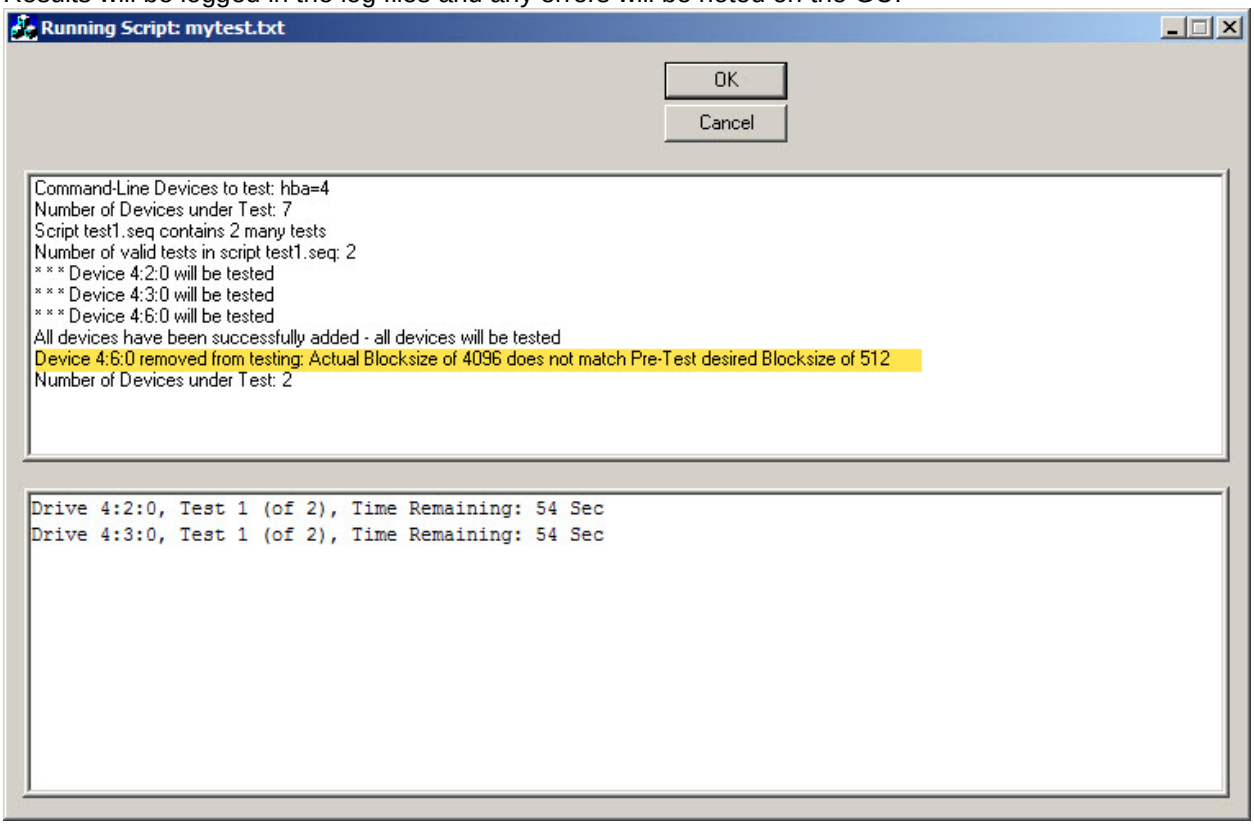
2. AME will now execute all Pre-Test and Post-Test Actions defined in the .seq file

Results will be logged in the log files and any errors will be noted on the GUI



DTB (Developers Toolbox) Changes/Fixes

1. Retrieving EVPD data can no longer write beyond buffer size

2. Quick Reports (Threaded Test Functions) now correctly displays SENSE data when data is in Descriptor Format.

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DTB (Developers Toolbox) New Features

1. Added Purge Test (identical to DMM) to Threaded Multi-Drive functions

2. Added Bus Reset Test (identical to DMM) to Threaded Multi-Drive functions

3. Added PList Test (identical to DMM) to Threaded Multi-Drive functions

4. Added GList Test (identical to DMM) to Threaded Multi-Drive functions

5. Added DST Test (identical to DMM) to Threaded Multi-Drive functions

6. Added Pre-Test Actions (identical to DMM) to Threaded Multi-Drive functions

7. Added Post-Test Actions (identical to DMM) to Threaded Multi-Drive functions

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Appendix B – STB Suite Version 9.3 Release Notes

DMM:

Fixes/Changes:

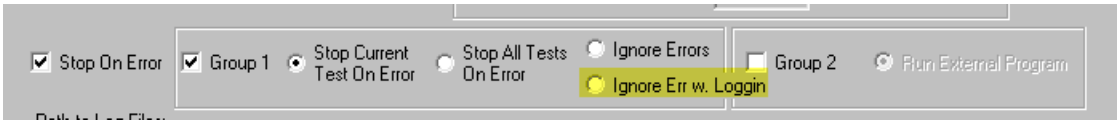
1. When retrieving Log Page/Parameter data for test thresholds that longer than 4 bytes, correctly retrieve all bytes

2. Use only the low-order byte of SMART att 194 (temperature) due to some Hitachi drives having unidentified data in the other bytes.

3. Update SATA SMART attribute definitions - added:
    a. Attribute 22 - “Current Helium Level”
    b. Attribute 176 - “Erase Fail Count”
    c. Attribute 190 - “Airflow Temperature Or Temp Difference from Att 100
    d. Attribute 210 - “Vibration During Write”
    e. Attribute 231 - “Temperature Or SSD Life Left”
    f. Attribute 232 - “Endurance Remaining Or Available Reserved Space”
    g. Attribute 240 - “ Head Flying Hours Or Transfer Error Rate”
    h. Attribute 243 - “Total LBAs Written Expanded”
    i. Attribute 244 - “Total LBAs Read Expanded”
    j. Attribute 251 - “Minimum Spares Remaining:
    k. Attribute 252 - “Newly Added Bad Flash Block”

New Features/Tests:

1. Added new error option on Advanced Options Page to “Ignore Error but also log the error”



2. Change 3-PAss DoD purge to “1-Pass DoD/NIST” per

http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-88r1.pdf

SATA/SATA Drives (above document, page 32)-

ATA Hard Disk Drives *This includes PATA, SATA, eSATA, etc*	
Clear:	Overwrite media by using organizationally approved and validated overwriting technologies/methods/tools. The Clear pattern should be at least a single write pass with a fixed data value, such as all zeros. Multiple write passes or more complex values may optionally be used.

SCSI/SAS/FC Drives (above document, page 33)-

SCSI Hard Disk Drives *This includes Parallel SCSI,Serial Attached SCSI (SAS), Fibre Channel, USB Attached Storage (UAS), and SCSI Express Partial sanitization is not supported in this section.*	
Clear:	Overwrite media by using organizationally approved and validated overwriting technologies/methods/tools. The Clear procedure should consist of at least one pass of writes with a fixed data value, such as all zeros. Multiple passes or more complex values may optionally be used.

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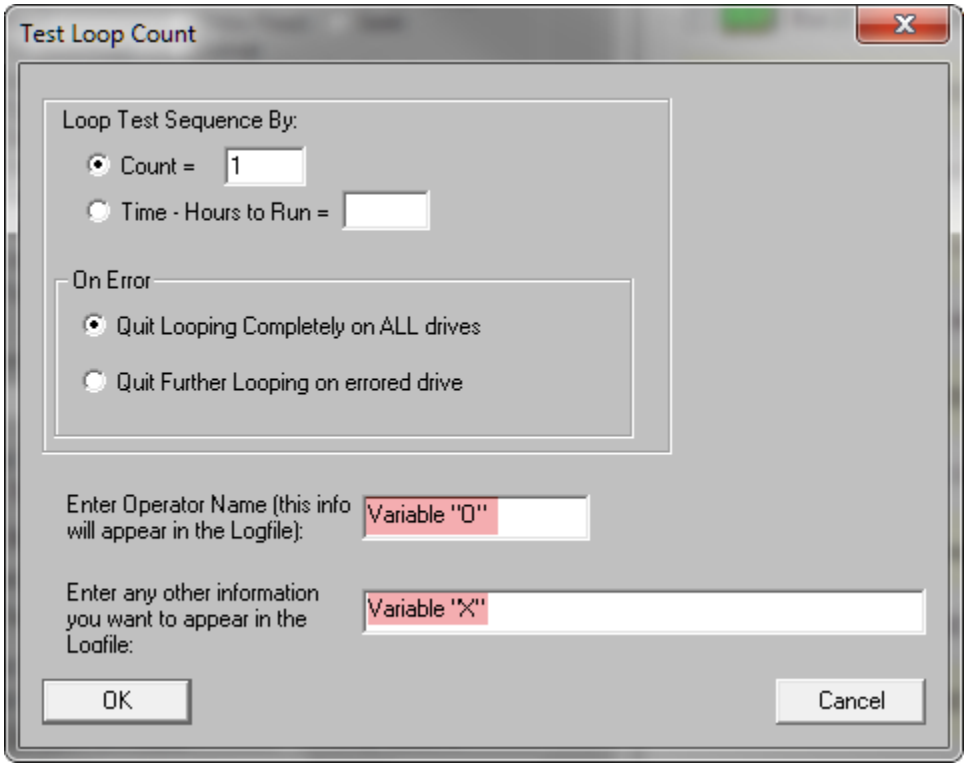
3. Updated default Purge Template file to conform to NIST SP 800-88 Rev. 1 “Guidelines for Media Sanitization” Appendix G

4. Added Two new Purge Certificate template variables -

    a. “X” inserts text from Test Start “Test Loop Count” dialog - “..any other information “ field

    b. “O” inserts text from Test Start “Test Loop Count” dialog - “..operator Name“ field



Variables for use in Purge Certificate Templates:

```
%d      prints time and date
%v      prints SCSI VENDOR data
%p      prints SCSI PRODUCT data
%r      prints SCSI VERSION data
%s      prints SCSI serial number
%a      prints SCSI target address
%c      prints capacity
%n      prints name of last test run
%f      prints a form feed
%e      prints test error count
%k      prints SCSI Sense information
%o          prints Operator Name field entry from DMM Start Test dialog
%x          prints “Other information field entry from DMM Start Test dialog
```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5. **New "SkipY" Test Access Methods for WriteSame test command**

   The following two new DMM test access methods address the growing problem of drive capacities being so large that testing the entire drive can become impossible – there just isn't enough time in a day.

   These two new access methods allow you to either:

   1. Tell the test how much time you can allow the test to run. The test will then:

      A. Access blocks, then

      B. Skip blocks

   In order to test as much of the drive as possible. These access methods are adaptive in that they will measure the actual transfer rate being achieved by the test and will adapt to insure that the most blocks possible will be tested.

   Also note: these new access methods are intelligent in that they do not just test the first n percent of the drive, but will spread the testing across the entire block range of the drive.

   So, for example, if you specify to test 15% of the drive the test will NOT just test the first 15% of the drives blocks, but will spread the testing across the entire drive surface. This insures that ALL areas of the drives will be tested, within the parameters of the test.

   In the same way, testing by time (telling the test "take up to 3 hours to test this drive" will also NOT just start at the beginning of the drive and test sequentially until the time is up, but will spread the tested blocks over the entire block range of the drive.

The first of these two new access methods uses the DMM external program "WriteSameScsi" and "WriteSameSata" tests, while the second version uses the ***DMM for Write, Read, Write/Read, Verify, and WriteVerify Tests.***

Each new method is described below:

SkipY can also be used with the DMM external program "WriteSameScsi" and "WriteSameSata". Recall that in order to use say WriteSameScsi you select the 'Type of Test' of "Extern. Step" and then type in the name 'writesamescsi' in the edit box labelled "Download File/External Program Executable" (see the pic below):

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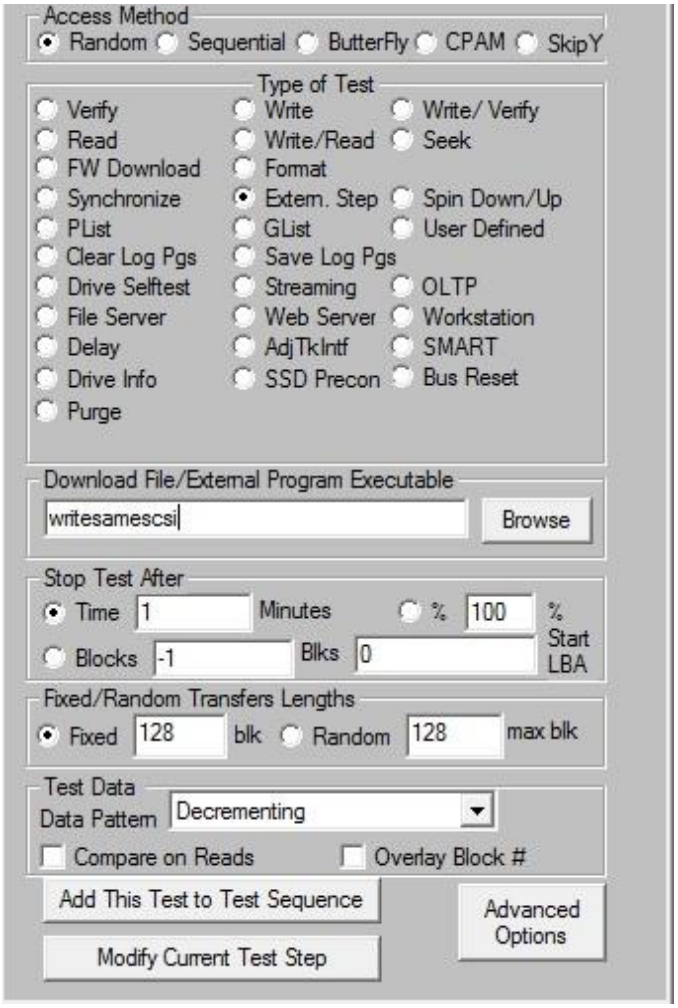

When you select 'Type of Test' of "Extern. Step" a dialog will appear so that you can enter the pattern you want to use with the WriteSame command. In the new STB version 9.3.0 you can also specify how long you want the test to take. See the picture below for an example:

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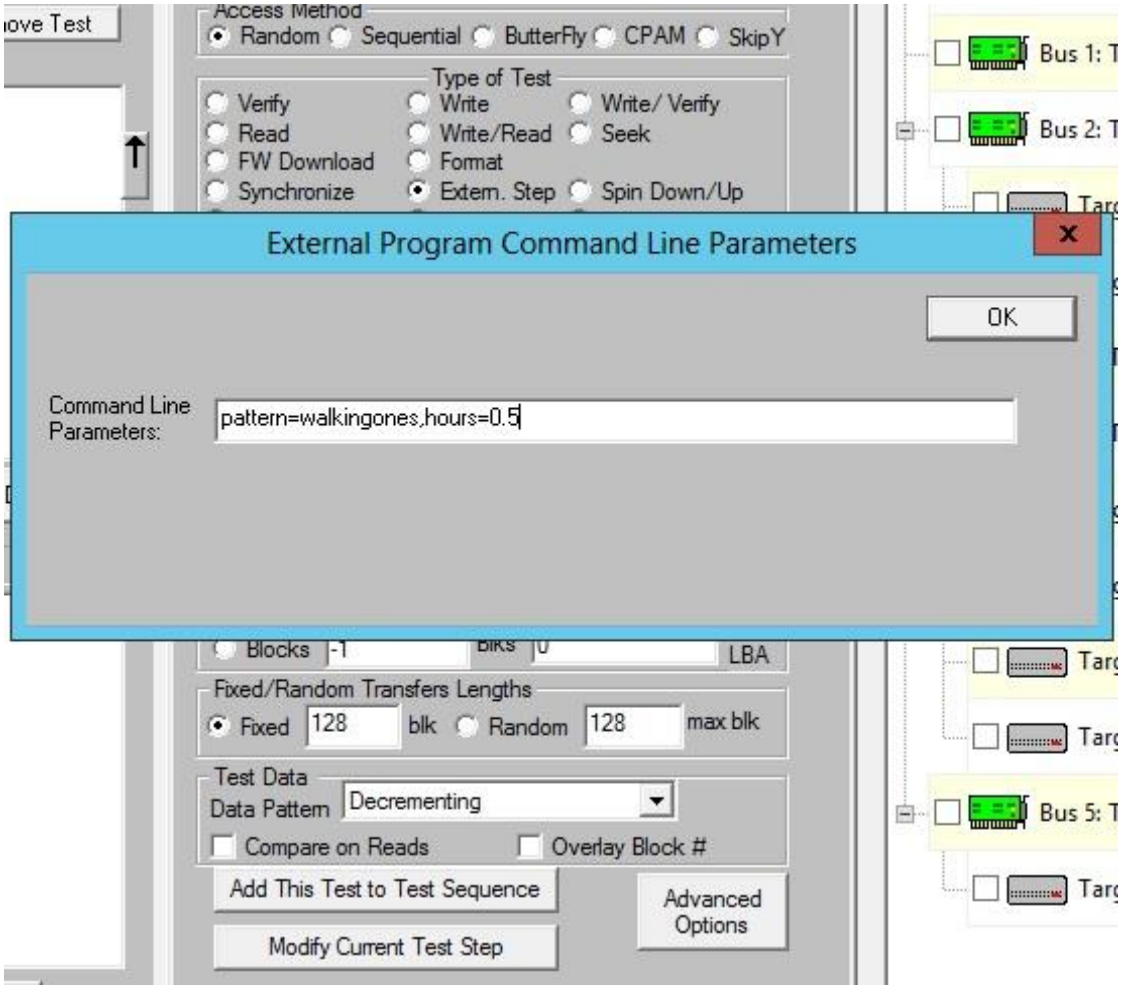

Notice the new command line parameter “hours=0.5”. You can enter any number of hours that suites your needs, so for example you can enter “pattern=decrementing,hours=3.2” (i.e. have the test run for 3.2 hours), or “pattern=incrementing,hours=1.25” (i.e. have the test run for 1.25 hours). What the WriteSameScsi external program will do is to “Write X blocks, Skip Y blocks” and the skipping factor will be chosen so that the test takes the desired amount of time!

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After the test is done, here's what the logfile looks like – note the detailed information given such as the exact number of blocks written, the exact number of blocks skipped, and the total number of blocks on the drive, and the percent of the drive written.

```
07/25/2016  11:15:14  TEST 1 of 1:
                      External Program Test, executable = writesamescsi
                      Stop-on-Error Type: Stop Current Test


                   String Data from the External Program follows:


  WriteSameScsi Wrote: 492,306,432 Blocks, Skipped: 7,321,730,736 Blocks, Percent Written: 6.30%,
  Cap: 7,814,037,168 Blocks,
  Transfer Rate: 133.10 MB/sec,
  Cmd Line Parameters: pattern=walkingones,hours=.5


07/25/2016  11:45:22  Worker ID: 1
07/25/2016  11:45:22  Test Completed Successfully


07/25/2016  11:45:22                                    PASSED
-------------------------------------------------------------------------------
```

The exact same procedure for using the WriteSameSata external program is used. See the picture below:

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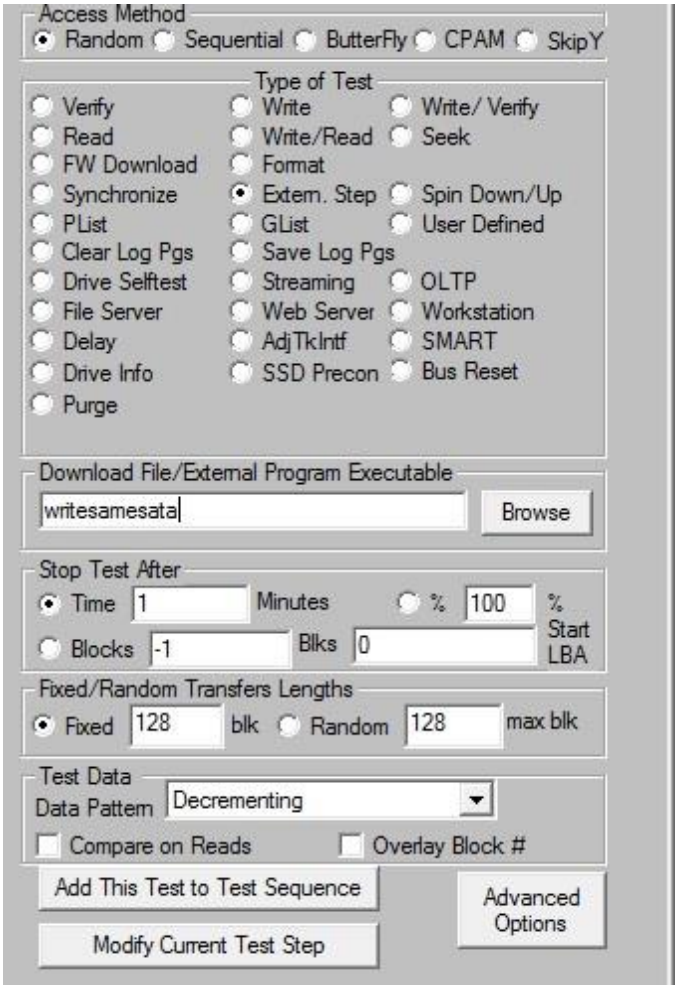

Notice in the above picture we again select ‘Type of Test’ set to “Extern. Step” and for the “Download File/External Program Executable” we enter “writesamesata”.

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Here's is a logfile example for running the "writesamesata" external program:

```
07/26/2016  10:38:49  TEST 1 of 1:
                External Program Test, executable = writesamesata
                Stop-on-Error Type: Stop Current Test


              String Data from the External Program follows:


 WriteSameSATA Wrote: 382,730,240 Blocks, Skipped: 7,431,306,928 Blocks, Percent Written: 4.90%,
 Cap: 7,814,037,168 Blocks,
 Transfer Rate: 103.65 MB/sec,
 Cmd Line Parameters: pattern=walkingones,hours=0.5


 07/26/2016  11:08:52  Worker ID: 1
 07/26/2016  11:08:52  Test Completed Successfully


 07/26/2016  11:08:52                                    PASSED
 --------------------------------------------------------------------------------
```

6. New "SkipY" Test Access Method for Write,Read,Write/Read,Verify, & Write/Verify Tests

The new Access Method "SkipY" allows the user to write "X blocks" to the drive, and then skip "Y blocks". There are two ways you can use the SkipY functionality, which we cover in detail below.

Using SkipY in DMM for Write, Read, Write/Read, Verify, and WriteVerify Tests

Along with the previous access methods "random", "sequential", "butterfly", and "CPAM", the 9.3 release now has the "SkipY" access method. Here is the new screen that will appear in version 9.3:

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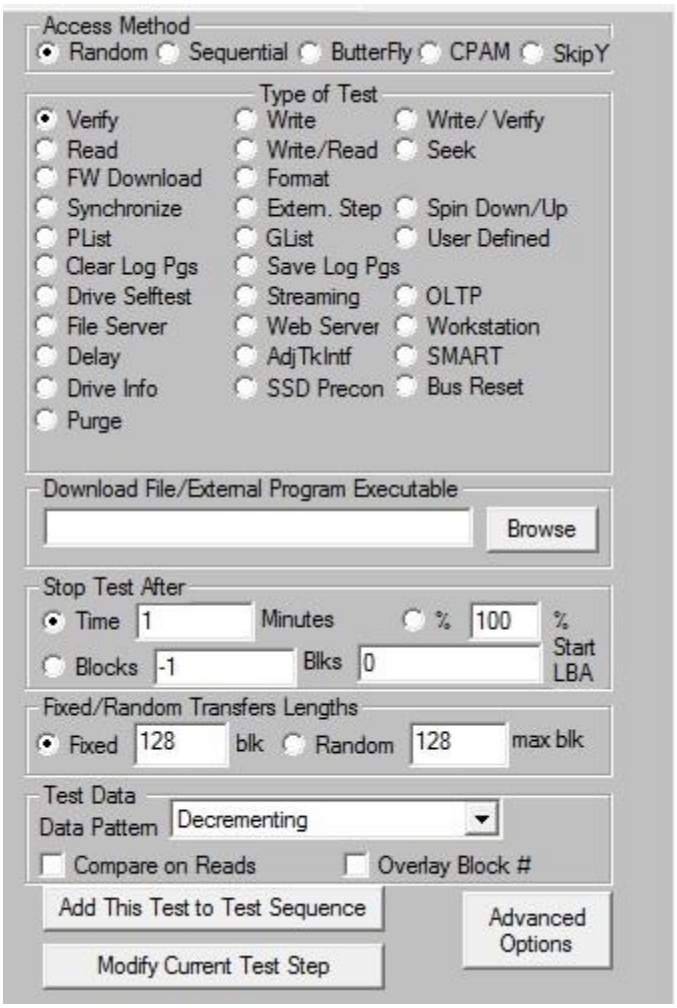

With SkipY, you specify what percentage of the drive you want to test – using this percentage the software will compute how much "skipping" is to be done so that the desired percentage of the drive is tested. The lower the percentage, the more skipping is require; on the other hand the higher the percentage the less skipping is done.

Let's set up a Write Test using the SkipY access method, where we want to test 7% of the drive. See the pic below – notice in the "Stop Test After" you have the "Time" option, the "Blocks" option, and also the "%" option. Make sure you click the "%" option and then enter the number "7".

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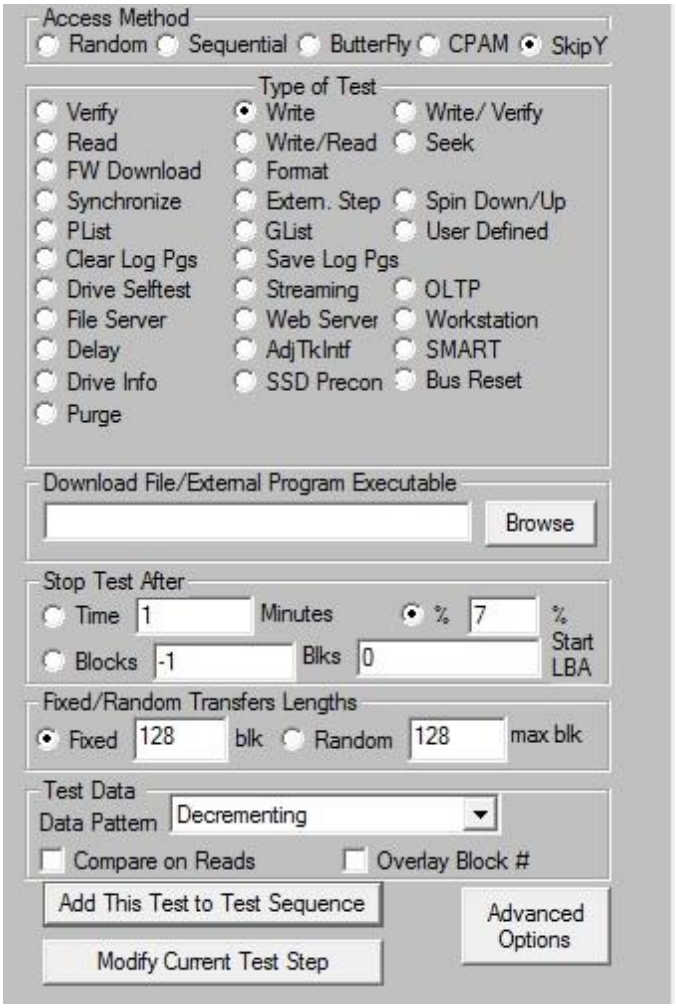

Now click the “Add This Test to Test Sequence” button. Let’s go ahead and also add a “Read” test using the SkipY access method.

If you now click the “View Test Sequence Details” button, you can get all the information on the tests that you have added. See the pic below:

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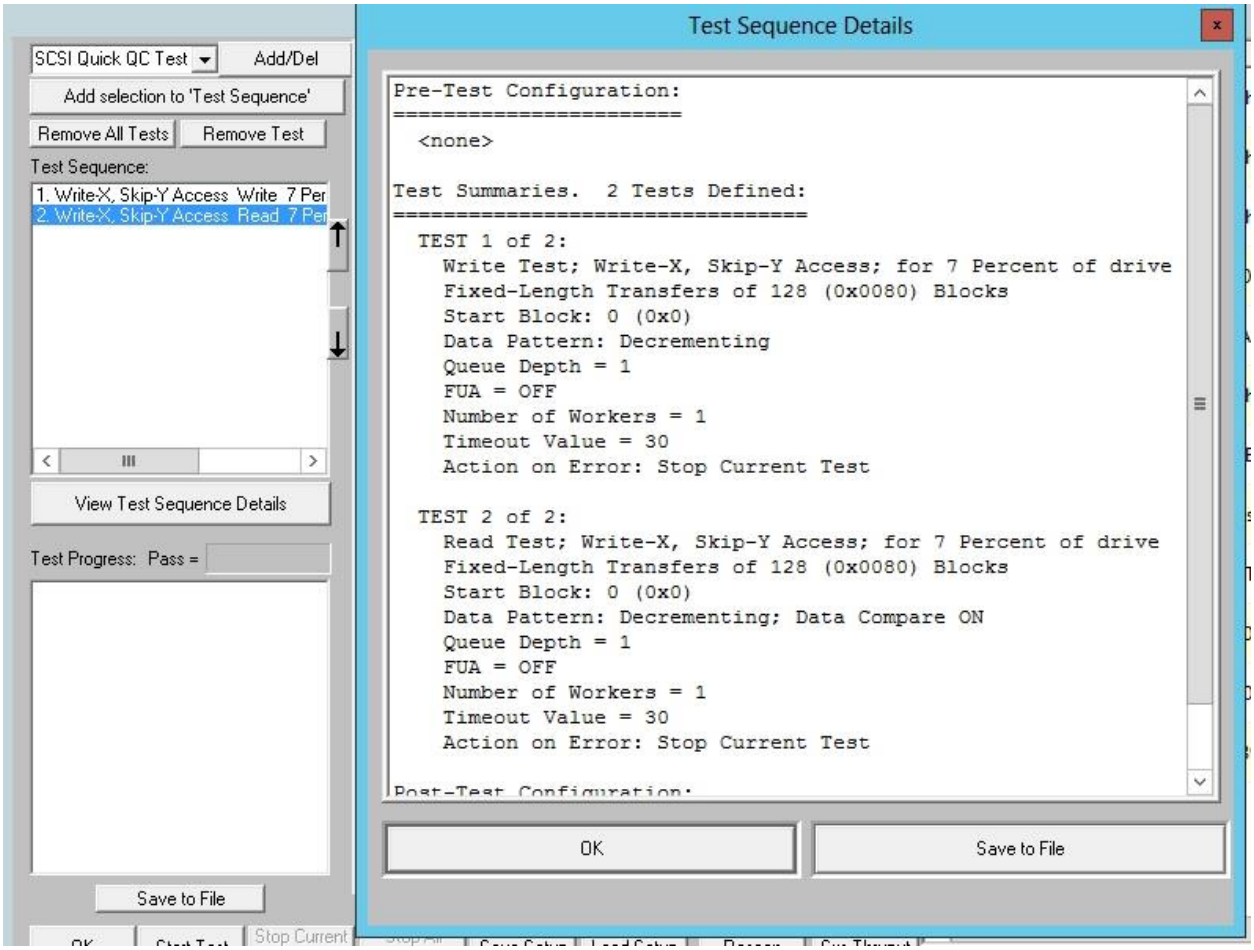

Notice in the above pic, for our first test, the Write test, it indicates the access method is “Write-X, Skip-Y Access” – due to space limitations on the screen the access method is shown as “SkipY”, but the way the SkipY access method should be thought of is that you are writing X blocks, skipping Y blocks, then writing X blocks, then skipping Y blocks, and so on, until the entire drive is done, skipping just the right amount so that 7% of the drive is written to (and hence 93% of the drive is skipped).

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After running the above tests, here's what the logfile looks like (the drive tested has 500,000,000 blocks so 7% of 500,000,000 is exactly 35,000,000 and the test indicates that 35,000,000 blocks were written, while 465,000,000 blocks were skipped).

```
07/25/2016  09:23:30  TEST 1 of 2:
                  Write Test; Write-X, Skip-Y Access; for 7 Percent of Drive
                  Fixed-Length Transfers of 128 (0x0080) Blocks
                  Start Block: 0
                  Data Pattern: Decrementing
                  Queue Depth = 1
                  FUA = OFF
                  Number of Workers = 1
                  Stop-on-Error Type: Stop Current Test


07/25/2016  09:36:02  Worker ID: 1
07/25/2016  09:36:02  Test Completed Successfully

                 Time for test: 12 Min, 32 Sec, 103 ms
                 Transfer Rate: 22.72 MB/sec
                 I/O Per Second: 363.56 IO/sec
                 Number of Blocks Transferred: 35,000,000
                 Number of Blocks Skipped: 465,000,000
                 Fastest Command Completion Time: 0.371 ms
                 Slowest Command Completion Time: 111.365 ms
                 Average Command Completion Time: 2.741 ms
                 Standard Deviation of Command Completion Times: 2.784 ms

07/25/2016  09:36:02                                    PASSED
-------------------------------------------------------------------------------
07/25/2016  09:36:02  TEST 2 of 2:
                  Read Test; Write-X, Skip-Y Access; for 7 Percent of Drive
                  Fixed-Length Transfers of 128 (0x0080) Blocks
                  Start Block: 0
                  Data Pattern: Decrementing; Data Compare ON
                  Queue Depth = 1
                  FUA = OFF
                  Number of Workers = 1
                  Stop-on-Error Type: Stop Current Test


07/25/2016  10:00:37  Worker ID: 1
07/25/2016  10:00:37  Test Completed Successfully

                 Time for test: 24 Min, 34 Sec, 745 ms
                 Transfer Rate: 11.59 MB/sec
                 I/O Per Second: 185.41 IO/sec
                 Number of Blocks Transferred: 35,000,000
                Number of Blocks Skipped: 465,000,000
                 Fastest Command Completion Time: 0.403 ms
                 Slowest Command Completion Time: 238.601 ms
                 Average Command Completion Time: 5.366 ms
                 Standard Deviation of Command Completion Times: 0.942 ms

07/25/2016  10:00:37                                    PASSED
-------------------------------------------------------------------------------
```

Let's now address the issue of what happens if you incorrectly use the SkipY access method. There are three things that have to happen for SkipY to be used correctly: it must be done with a Write Test, Read Test, Write/Read Test, Verify Test, or WriteVerify Test. It must be done by "%" (i.e. the "Stop Test After" radio button must be set to "%". And the third requirement is it must be

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done with fixed blocks (i.e. the “Fixed/Random Transfer Length” radio button must be set to “Fixed”). If any of the above 3 requirements are not fulfilled, the test will fail with error. Here’s what the logfile will say for each of the requirements:

IF the wrong test is used, the logfile will indicate so:
07/25/2016 16:24:48 Error On Params Passed

Invalid Param Reason: WriteX-SkipY requires a Write, Read, Write/Read, Verify, or WrVer Test
07/25/2016 16:24:48 *** FAIL ***

IF the wrong “Stop Test After” is used, the logfile will indicate so:
07/25/2016 16:24:48 Error On Params Passed

Invalid Param Reason: WriteX-SkipY requires test to be done by percent
07/25/2016 16:24:48 *** FAIL ***

IF the wrong “Fixed/Random Transfer Length” is used, the logfile will indicate so:
07/25/2016 16:24:48 Error On Params Passed

Invalid Param Reason: WriteX-SkipY requires fixed length transfers
07/25/2016 16:24:48 *** FAIL ***

STB - “Original Mode”:

Fixes/Changes:

1. Correctly retrieve all the sense data available (not just the first 18 bytes)
2. Correctly issue the Inquiry command for LUN <> 0
3. Update SATA SMART attribute definitions - added:
   A. Attribute 22 - “Current Helium Level”
   B. Attribute 176 - “Erase Fail Count”
   C. Attribute 190 - “Airflow Temperature Or Temp Difference from Att 100
   D. Attribute 210 - “Vibration During Write”
   E. Attribute 231 - “Temperature Or SSD Life Left”
   F. Attribute 232 - “Endurance Remaining Or Available Reserved Space”
   G. Attribute 240 - “ Head Flying Hours Or Transfer Error Rate”
   H. Attribute 243 - “Total LBAs Written Expanded”
   I. Attribute 244 - “Total LBAs Read Expanded”
   J. Attribute 251 - “Minimum Spares Remaining:
   K. Attribute 252 - “Newly Added Bad Flash Block”

5. Fix SAS/SCSI/FC Change Capacity to work with drives with >= 4,294,967,295 blocks

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DME/AME:

Fixes/Changes:

1. AME: When a device on a HBA can not be tested, we no longer stop all testing, but simply remove that device from the list of devices to be tested (fixed 160322)

New Features:

DTB:

Fixes/Changes:

New Features:

1. LinuxPSSL: Added external program test “WriteSameScsi” to the available internal external programs
2. LinuxPSSL: Added access method CPAM
3. LinuxPSSL: Added Test Thresholds

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Appendix C – STB Suite Version 10.0 Release Notes

STB32 – "Original Mode"

Fixes/Changes:

1. Crypto Sanitize command fixed.

Previous versions of the STB Suite did not issue the SANITIZE CRYPTO ERASE command properly. Version 10.0 corrects this.

The Crypto Sanitize command allows a full-encryption SED drive (SAS or SATA) to be completely erased or purged to government specs in a matter of seconds.

Self-Encrypting Drives (SED) use on-drive encryption circuitry to encrypt every block of the drive. This process uses an "Encryption Key" which is referenced for each WRITE and READ command. The Crypto Sanitize command regenerates this key, taking just a few seconds. Since the Encryption Key is now different than it was before, when old data is READ using the new key the result of the decryption will be scrambled random data.

Any new WRITE commands will use the new Encryption Key, so subsequent READs will properly decrypt the data.

The main thing to note with this process, which is completely different from other NIST-approved purge methods, is that after a Crypto Erase the drive will ***NOT*** contain all-zeros in every block, but will contain ***random*** data.

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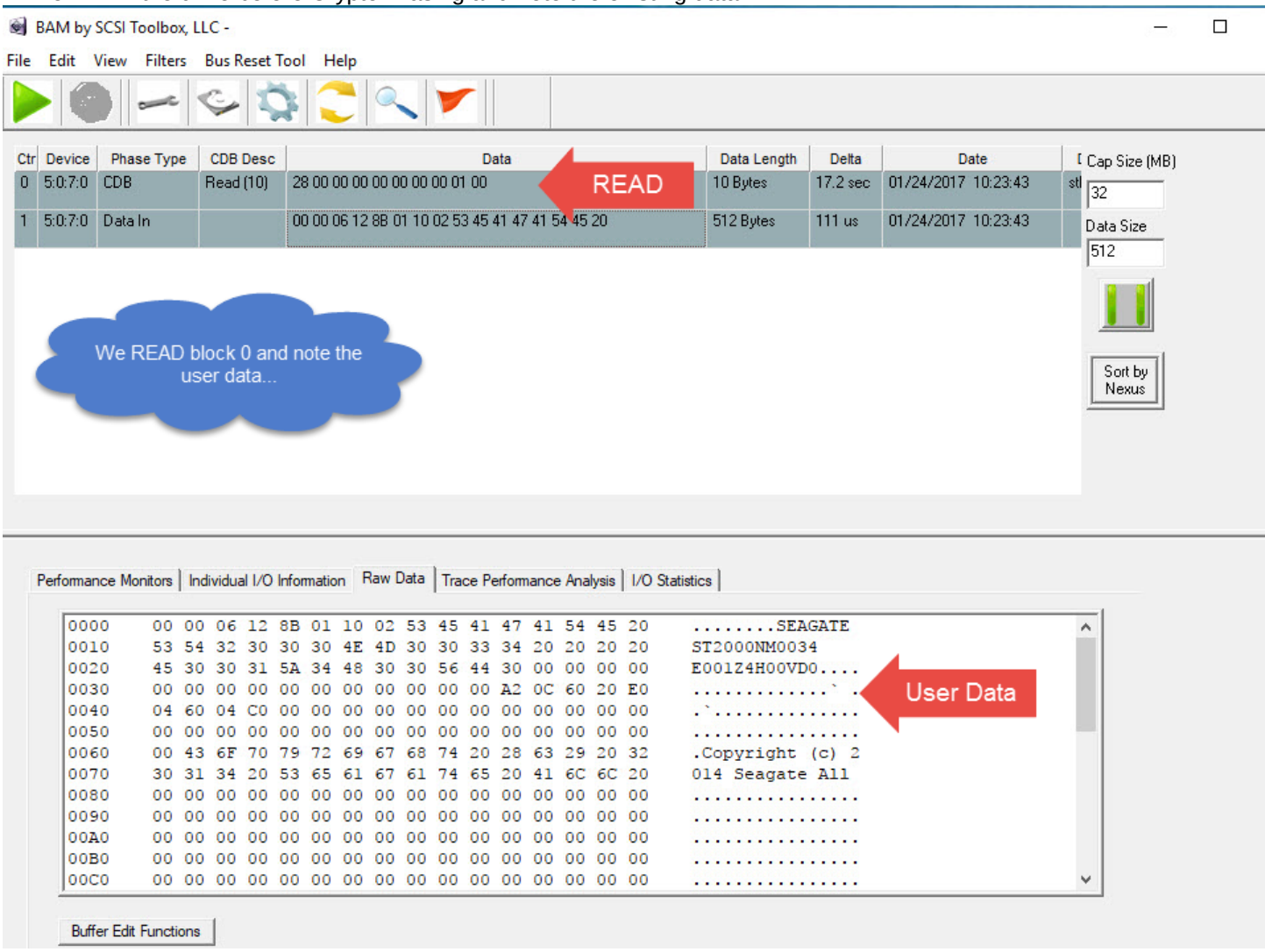
Example -
1. We READ the drive before Crypto Erasing and note the existing data –



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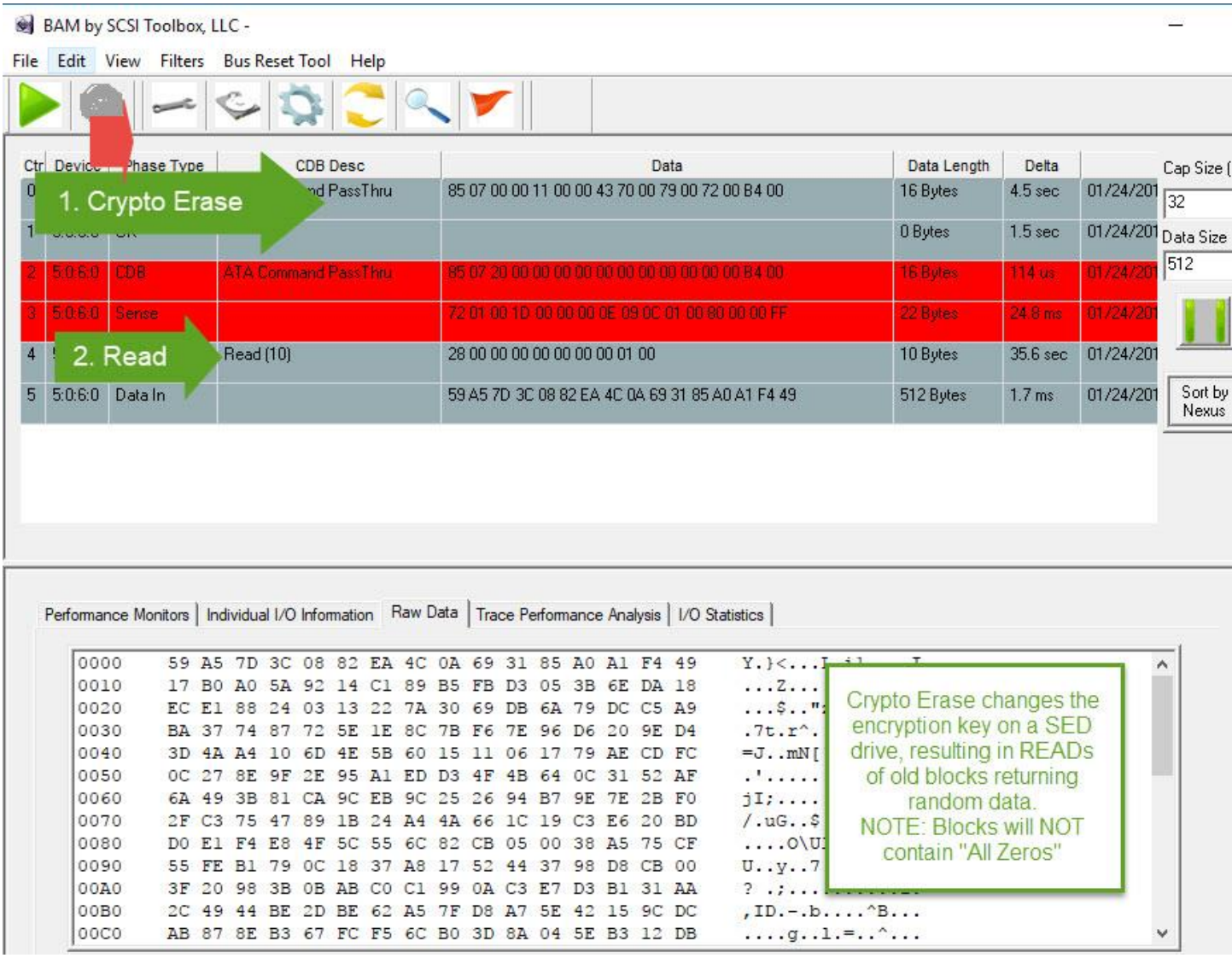
2. We use the Sanitize->Crypto Erase Function to Purge the drive, then READ the same block as before
–



Reading the same block after executing the Crypto Purge shows that the original data in that block is gone, replaced by random data.
The biggest advantage of SED drives and using Crypto Erase is the speed of the purge process. This example shows a 10 TB drive being completely purged in about **5 seconds!**

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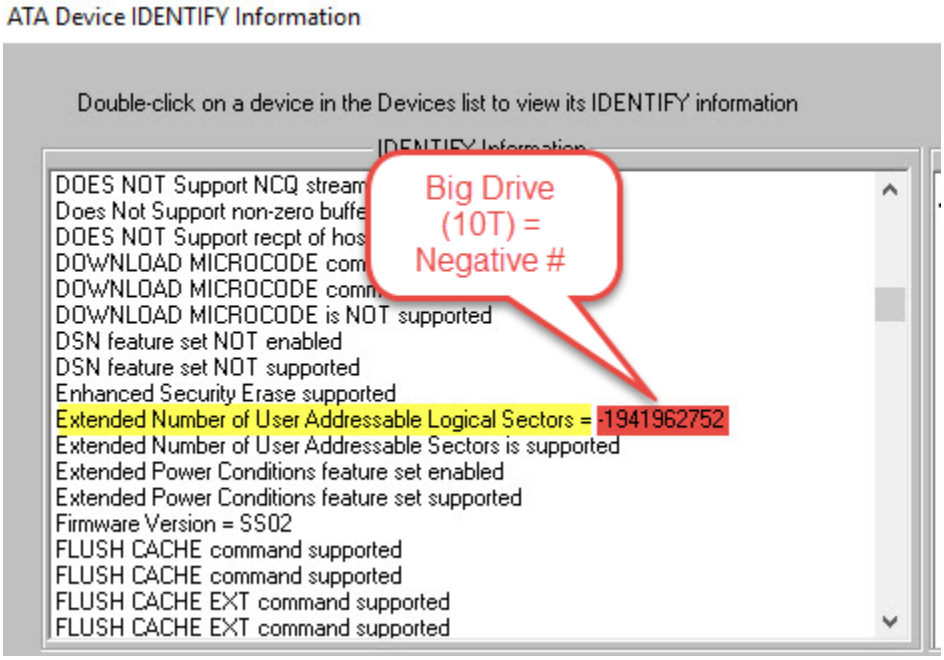
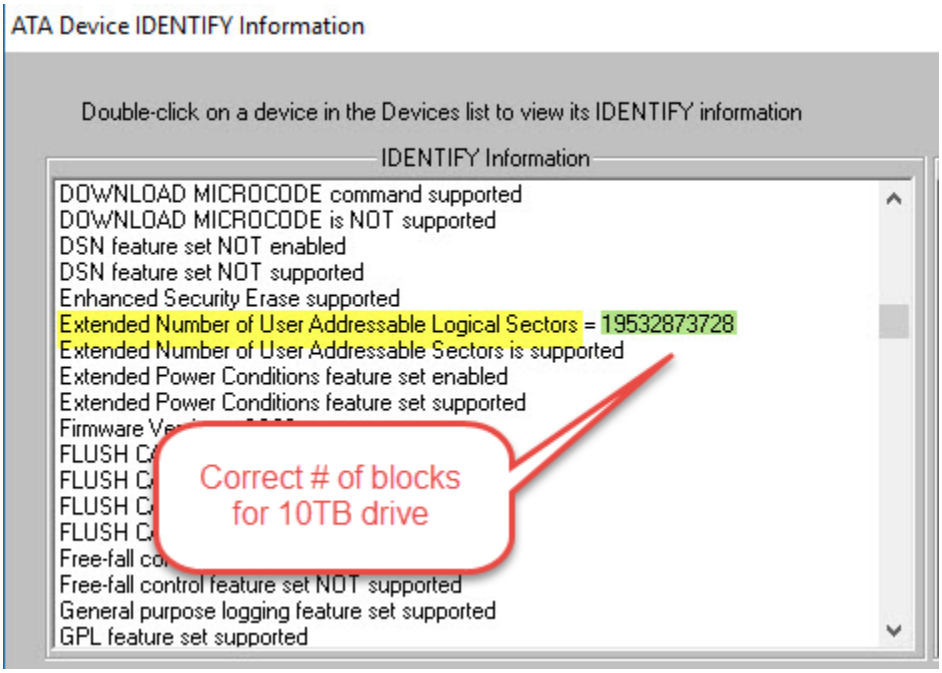
2. Fix SATA View IDENTIFY to display Extended # of User accessible blocks as an I64 number.

Previous versions of STB Suite would report a negative number of blocks for the capacity of SATA drives > 2TB



Version 10.0 fixes this



3. Open all predefined filenames like default.def, table_identify.txt, and others in the folder where the .exe resides

In certain conditions previous versions would forget where to open data files from.

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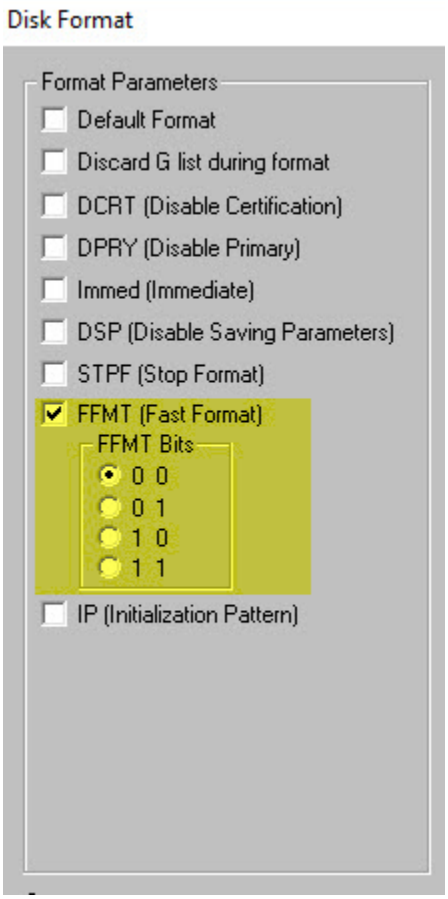
Version 10.0 always looks for its data files in the folder which STB32.exe was run from, typically ***Program Files (x86)>STB>SCSI toolbox32***

New Features:

1. Update Format Function - Add FFMT bit to FORMAT options

STB Suite versions 10.0 now allows the two **FFMT** option bits in the **FORMAT** command (SCSI/SAS/FC) to be set to any value. The options are shown when the ***Disk->Commands->Data Functions->Format*** function is chosen and the **Default** check box is **unchecked**, as shown here-



The use of the **FFMT** options are described in the **T10 SBC-4** documentation, and will effect the speed of the **FORMAT** command completion and the behavior of all **READ** operations after the **FORMAT**.
From **Working Draft SCSI Block Commands – 4 (SBC-4)**

4.35.3.2 Completing read commands after a successful format operation

4.35.3.2.1 Completing read commands overview

Following a successful format operation and before a write operation to an LBA, a read command or verify command that specifies that LBA shall be processed by the device server as described in 4.35.3.2.2,4.35.3.2.3, and 4.35.3.2.4.

4.35.3.2.2 With FFMT field set to 00b

If the FFMT field (see table 41) was set to 00b in the most recent successful FORMAT UNIT command, then subsequent read commands or verify commands (see 4.35.3.2.1) that complete without error are processed using:

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```
a) the user data set as specified by:
A) the initialization pattern, if any;
B) the provisioning initialization pattern, if applicable; or
C) the manufacturer's default initialization pattern;
and
b) the protection information, if any, set to FFFF_FFFF_FFFF_FFFFh.
```

4.35.3.2.3 With FFMT field set to 01b

```
If the FFMT field (see table 41) was set to 01b in the most recent successful FORMAT
UNIT command, then subsequent read commands or verify commands (see 4.35.3.2.1):
a) with unrecovered medium errors are processed as described in 4.18.1;
b) with pseudo unrecovered errors are processed as described in 4.18.2;
c) should be processed using unspecified logical block data and complete without
error, if protection information is disabled; or
d) if protection information is enabled, then:
   A) may be processed using unspecified logical block data and complete without
error; or
   B) may terminate with CHECK CONDITION status with sense data that indicates that
the protection
      information check fails.
```

4.35.3.2.4 With FFMT field set to 10b

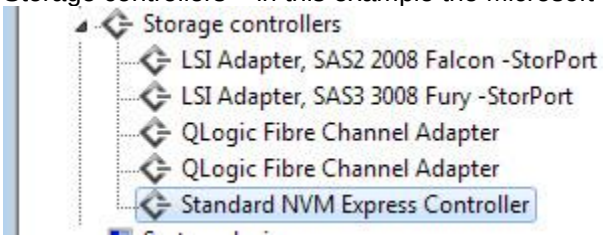
```
If the FFMT field (see table 41) was set to 10b in the most recent successful FORMAT
UNIT command, then the device server may:
a) return unspecified logical block data and complete subsequent read commands (see
4.35.3.2.1)
without error;
b) process unspecified logical block data and complete subsequent verify commands
without error; or
c) terminate subsequent read commands or verify commands with CHECK CONDITION status
with the
sense key set to HARDWARE ERROR, MEDIUM ERROR, or ABORTED COMMAND.
```

2. Add NVMe Admin Command functionality

Support to view and change **NVMe Management Options** has been added to STB Suite vs 10.0. Successful implementation and use of these features depends heavily upon a robust and complete NVMe driver being used in your test system. The driver must conform to the NVMe specification version 1.2. Note: As of this date (Feb 2017) the Standard OOB Microsoft NVMe driver is version 6.1.7601.19133 and this version does NOT support all NVMe management features. In particular the Get Features features are not currently supported. You can load in a more robust OEM NVMe driver to have access to the Get Features features.

How to load an OEM NVMe driver

To check what driver is currently being used by your test system use Device Manager to look at the Storage controllers – in this example the Microsoft driver has been loaded by default –



Now, browse to the web site of an NVMe device OEM who supplies their own driver. In this example we will use the Intel OEM driver version 1.8.0.1011

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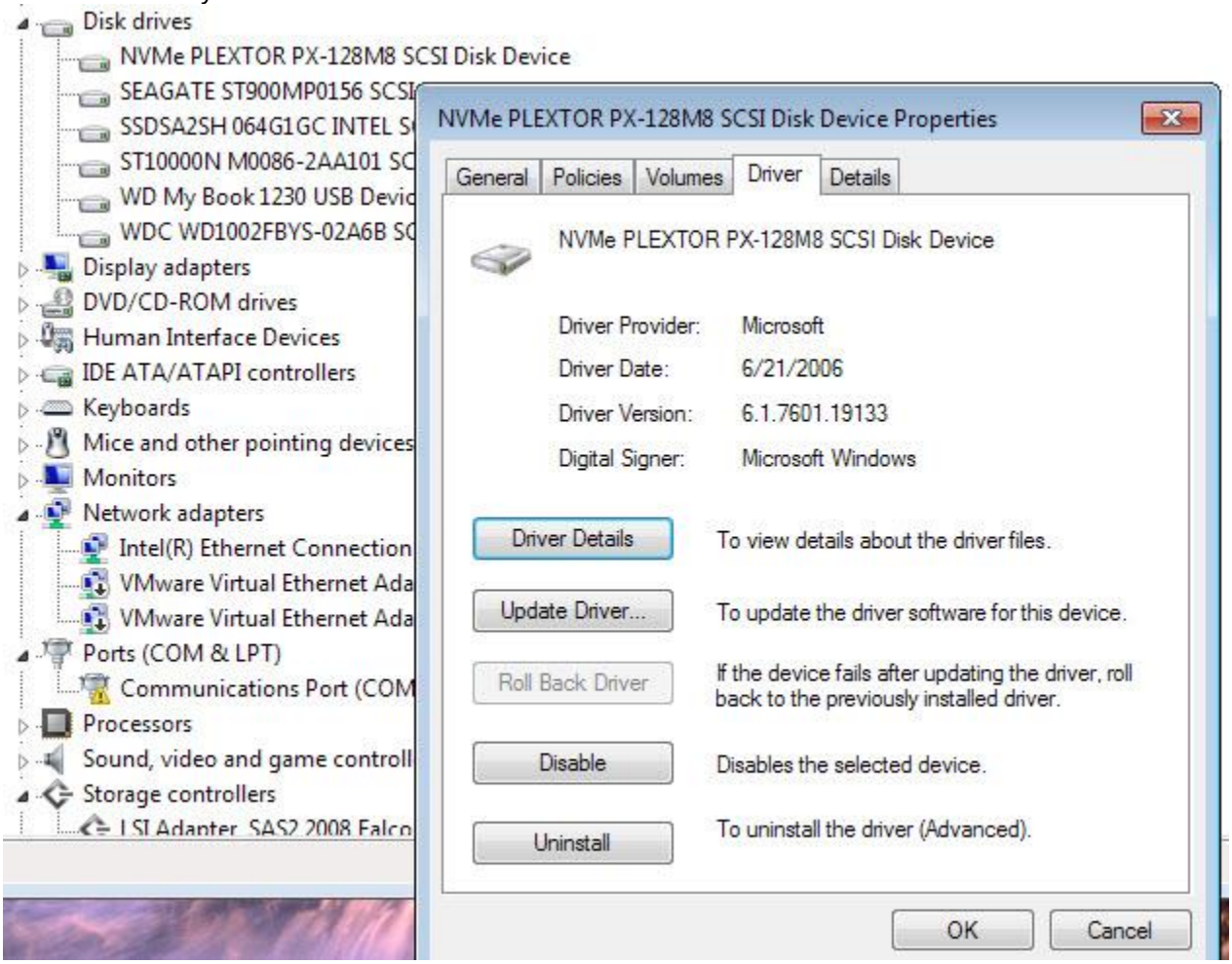
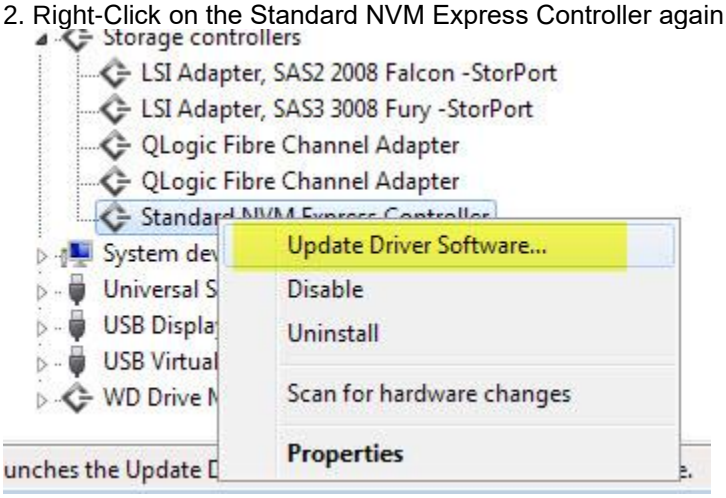
Update Driver Steps

1. Right-Click on the Standard NVM Express Controller entry and click on Properties. The Driver tab will show the currently used driver details



2. Right-Click on the Standard NVM Express Controller again, this time click on Update Driver Software…



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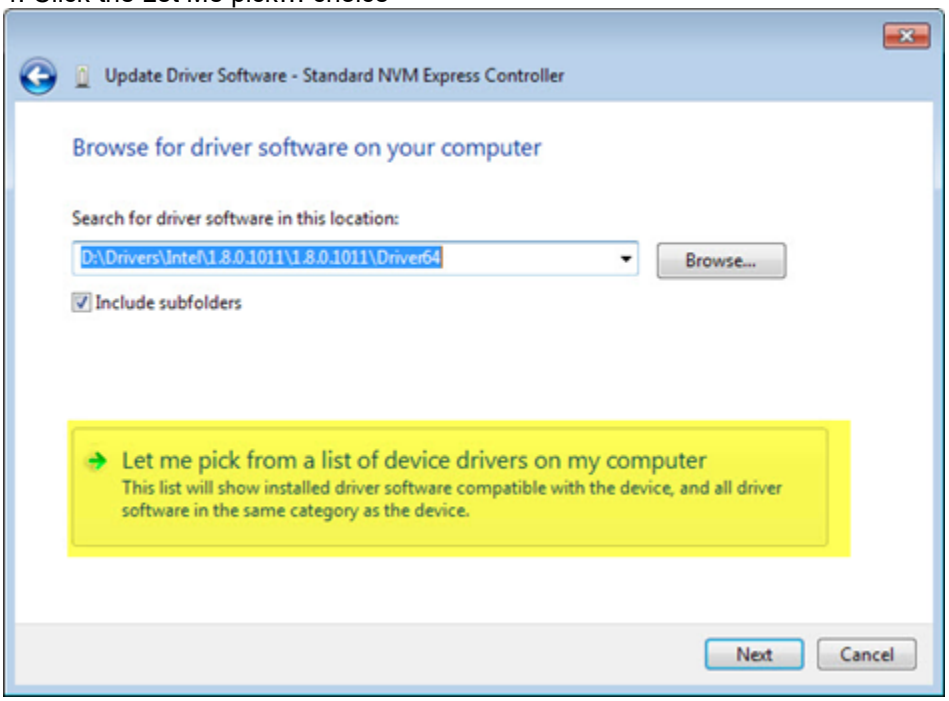
3. Click the Browse my Computer… choice

4. Click the Let Me pick… choice



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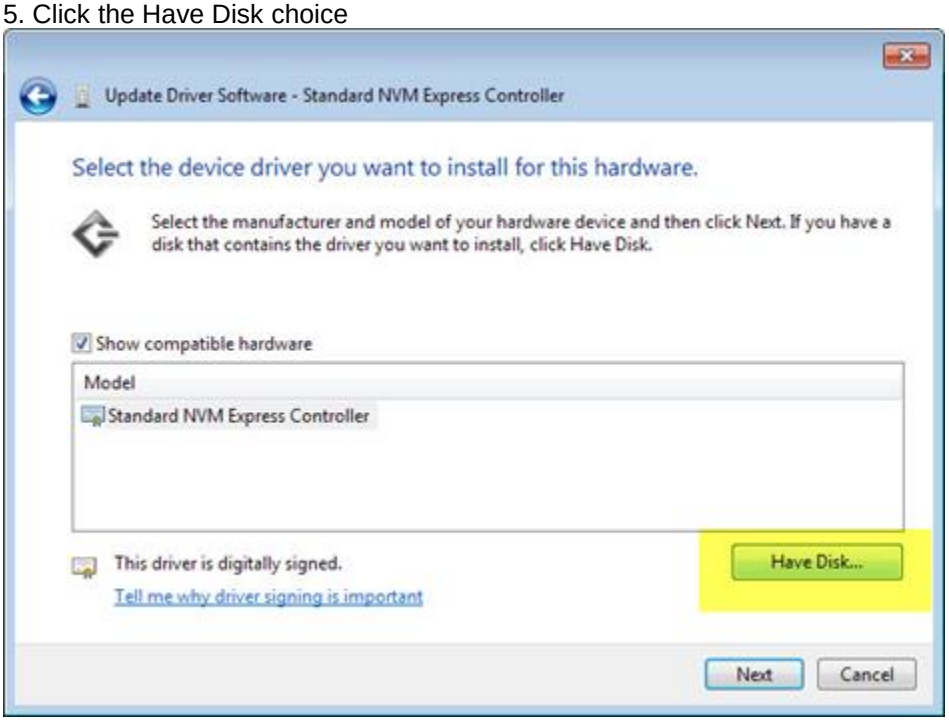
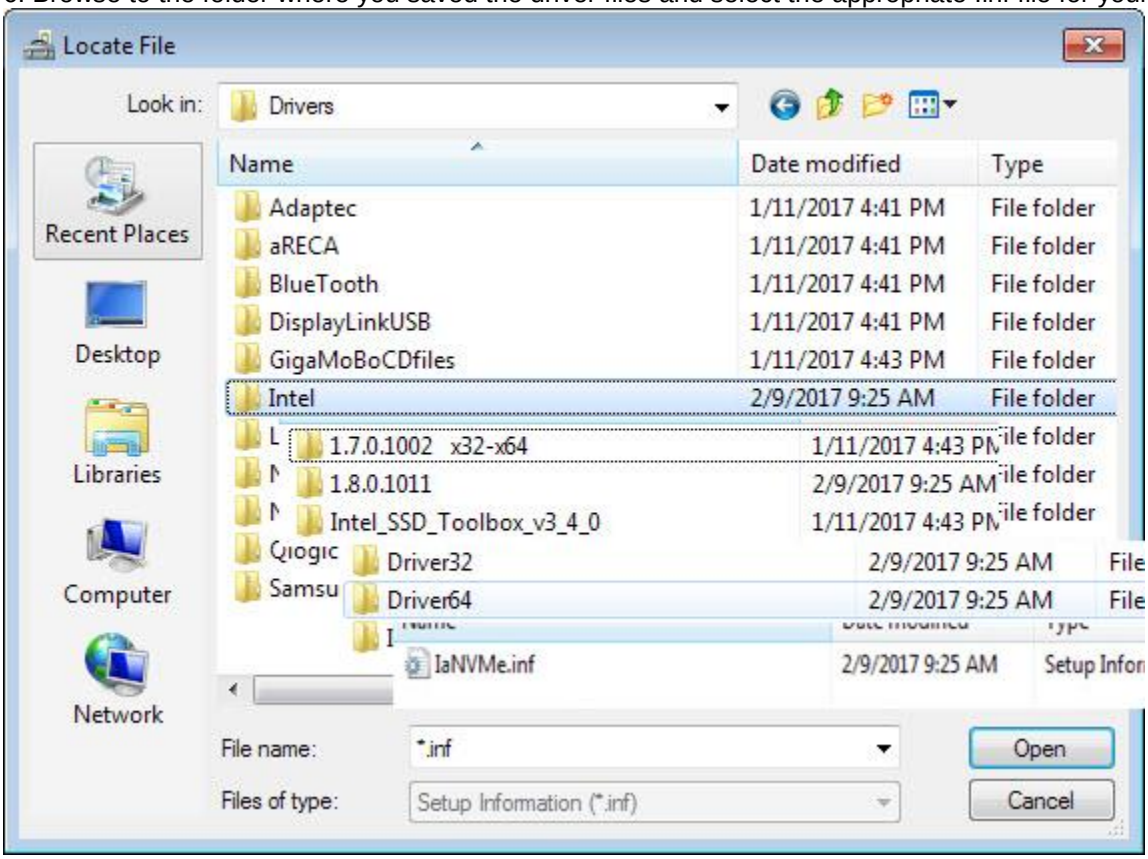
5. Click the Have Disk choice



6. Browse to the folder where you saved the driver files and select the appropriate .inf file for your system



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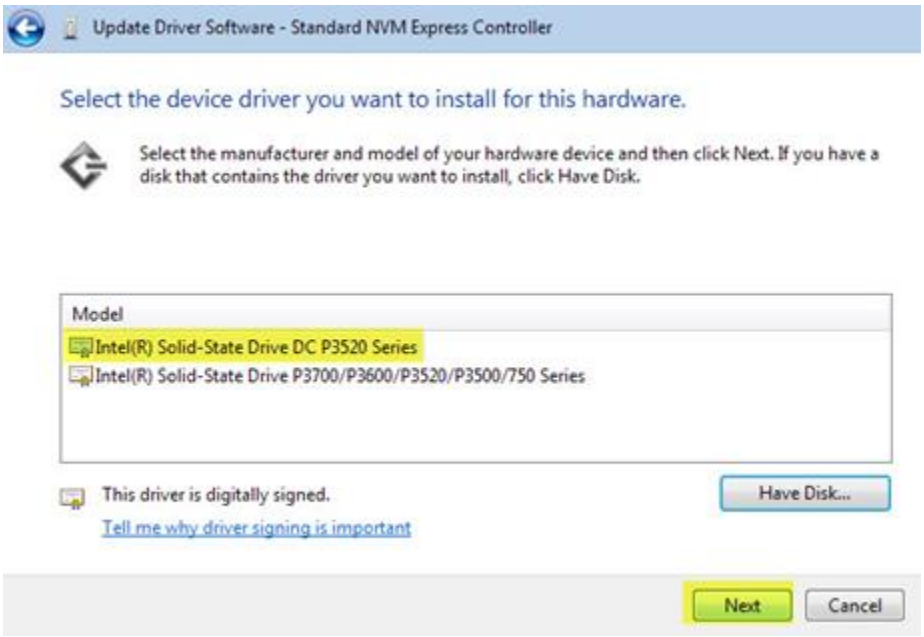
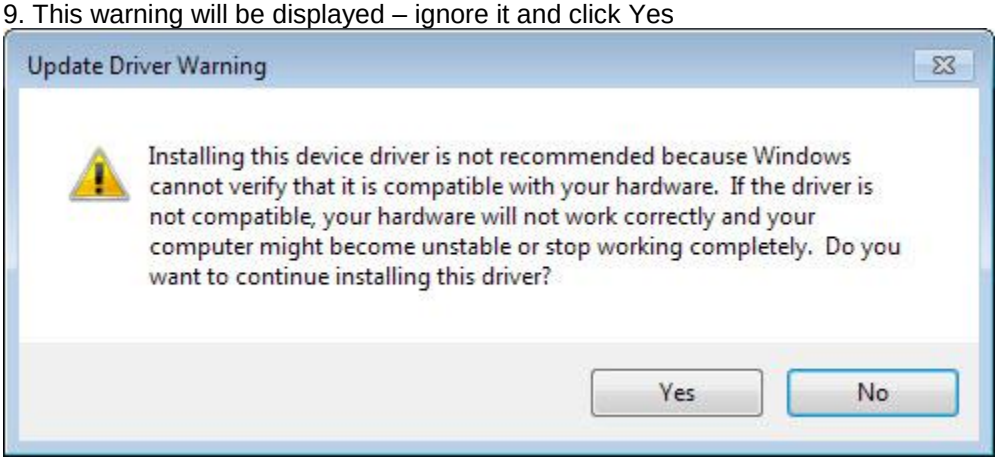
7. Now click the OK button

8. Select the most current device. It may not be the exact part number of your NVMe device – in our example we are using a Plextor M.2 drive module in a PCIe to M.2 adapter. It should not matter that the driver device name and your actual device name do not match.
Click the Next button



9. This warning will be displayed – ignore it and click Yes



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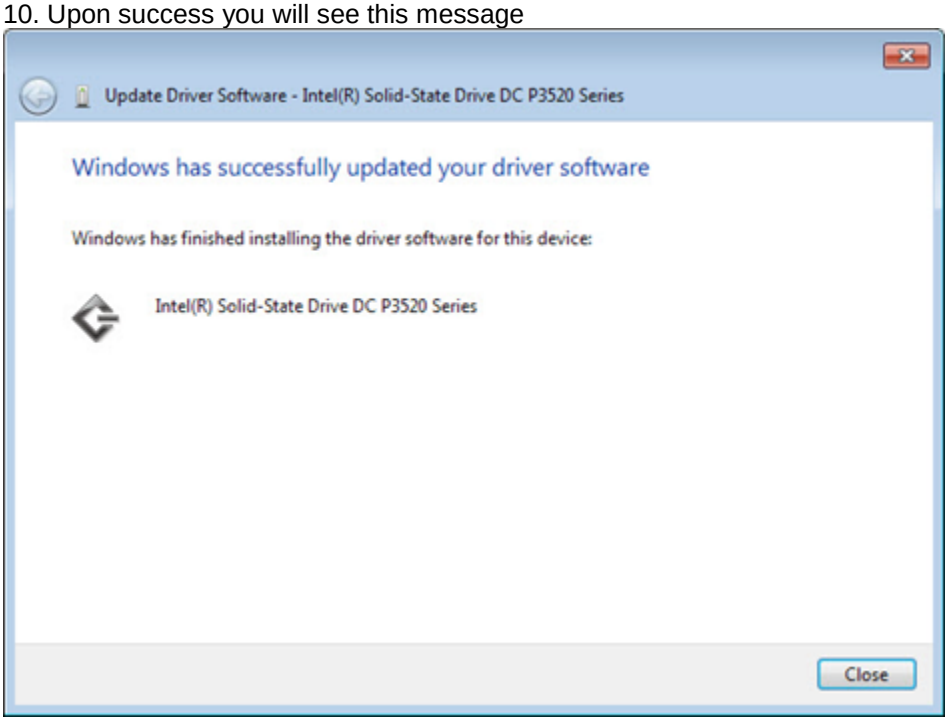
10. Upon success you will see this message

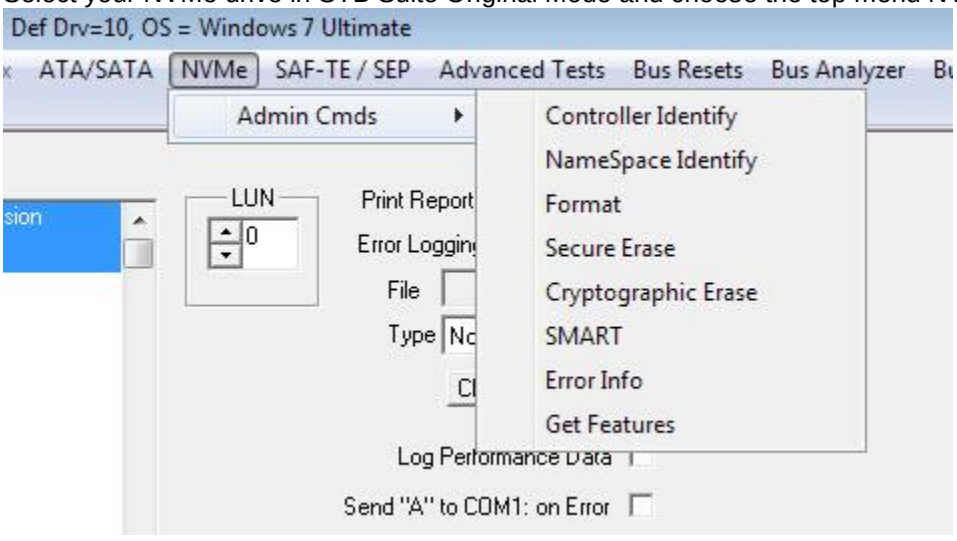


And the driver for the NVMe storage controller will have changed

You may need to reboot your system to finish up the driver install.

NVMe Features

Select your NVMe drive in STB Suite Original Mode and choose the top menu NVMe choice



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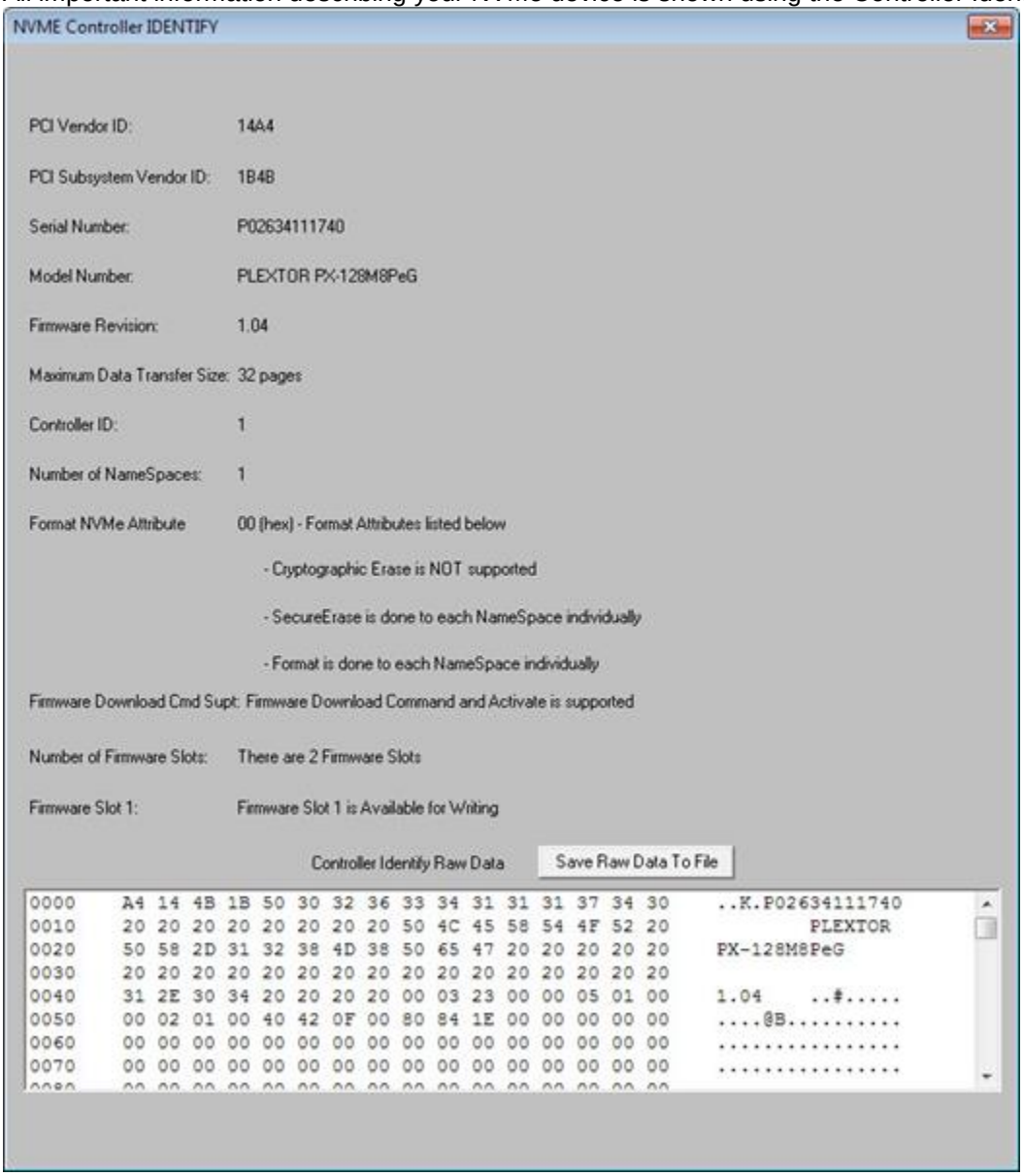
Controller Identify

All important information describing your NVMe device is shown using the Controller Identify Feature



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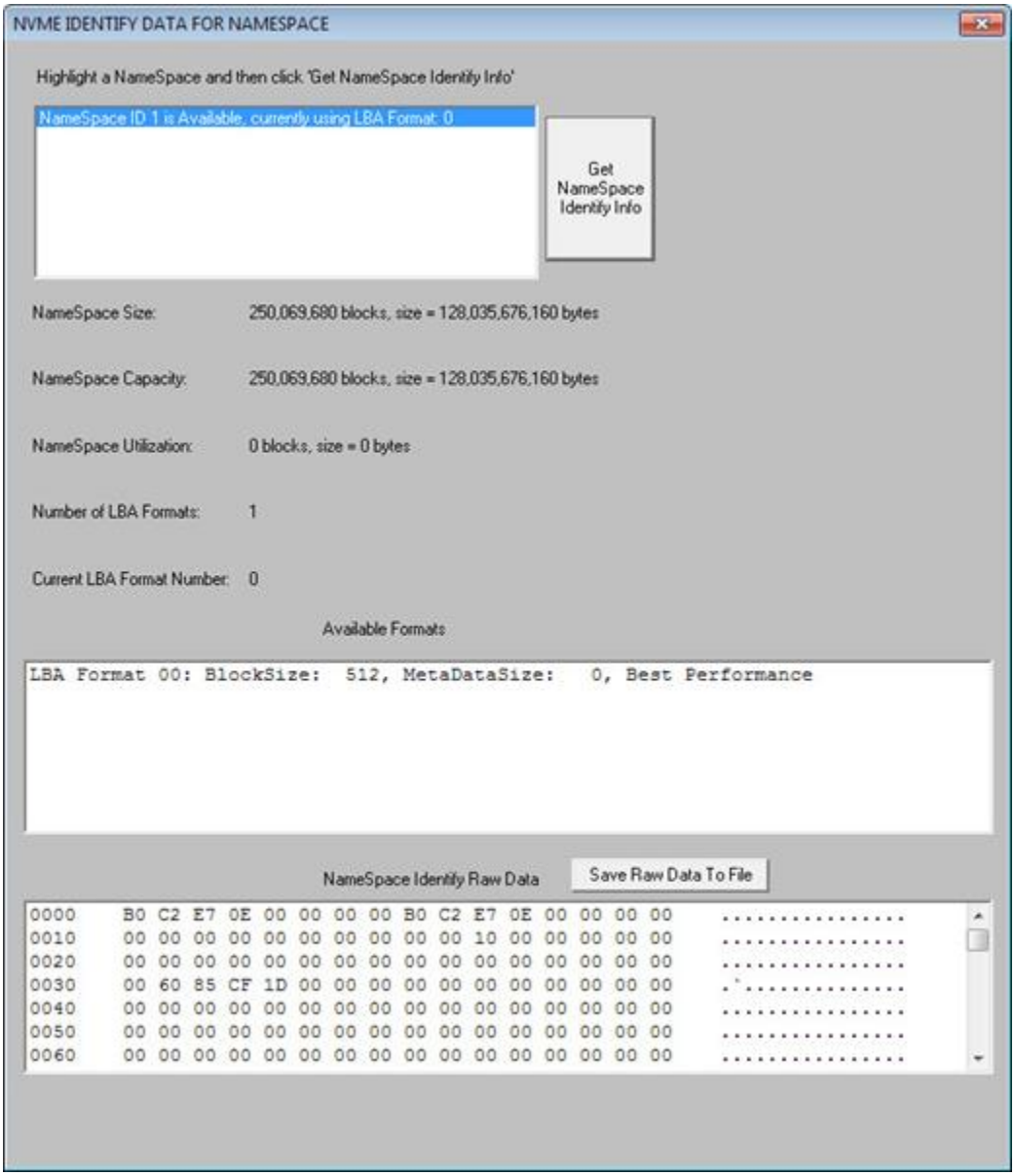
Name Space Identify

An NVMe device may have 1-n Name Spaces defined. Use the Name Space Identify feature to see all defined name spaces on your device. Double-click on one of the Name Spaces shown in the top box to see the details



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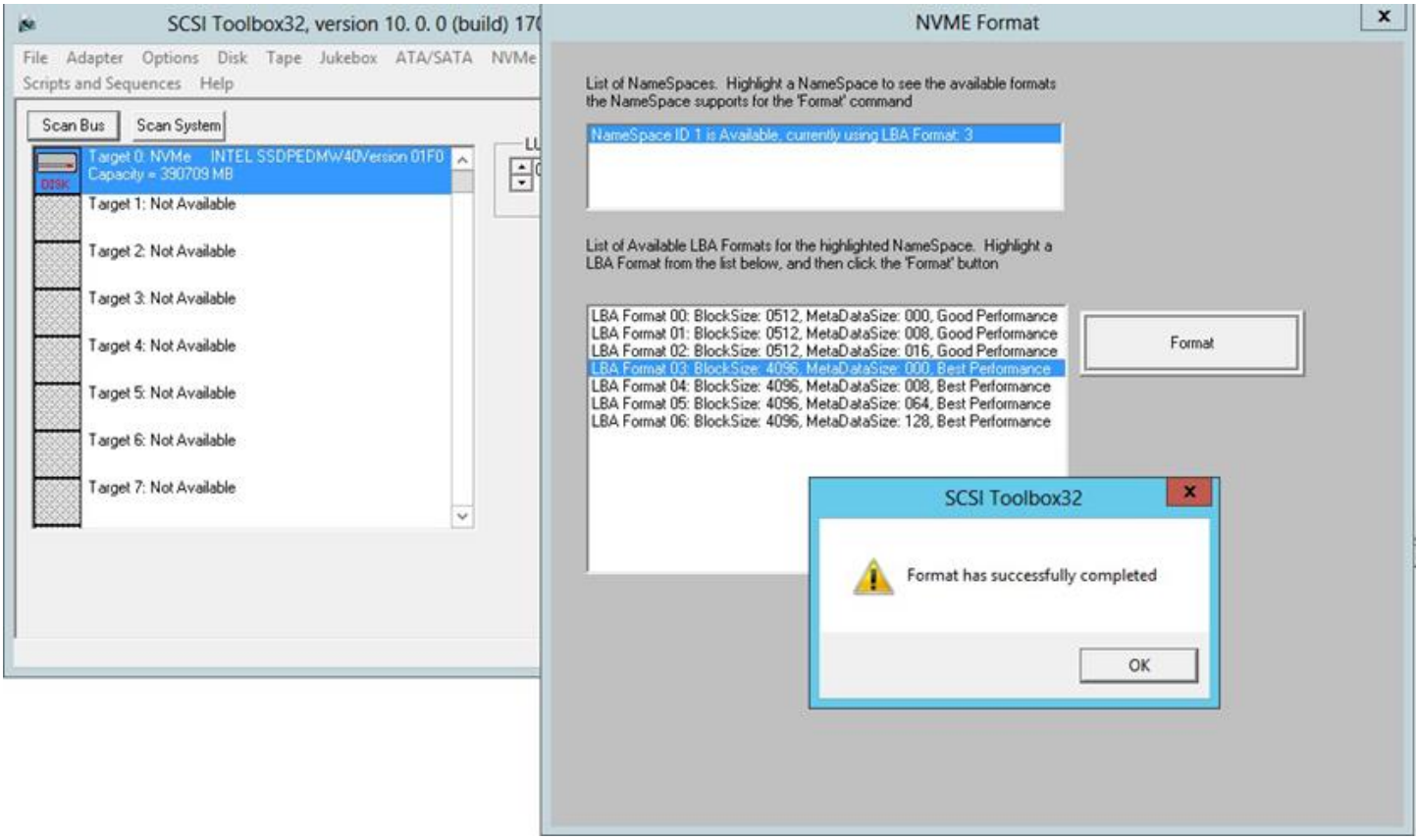
Format, Secure Erase, and Cryptographic Erase

Double-click to select the Name Space you want to format. The Controller Information feature will show which Format/NameSpace options are supported by your device. Your device may support more than one format type. All supported formats will be displayed in the lower window. Select the format type you wish to use for the selected Name Space, then click the FORMAT button to format the Name Space

Format



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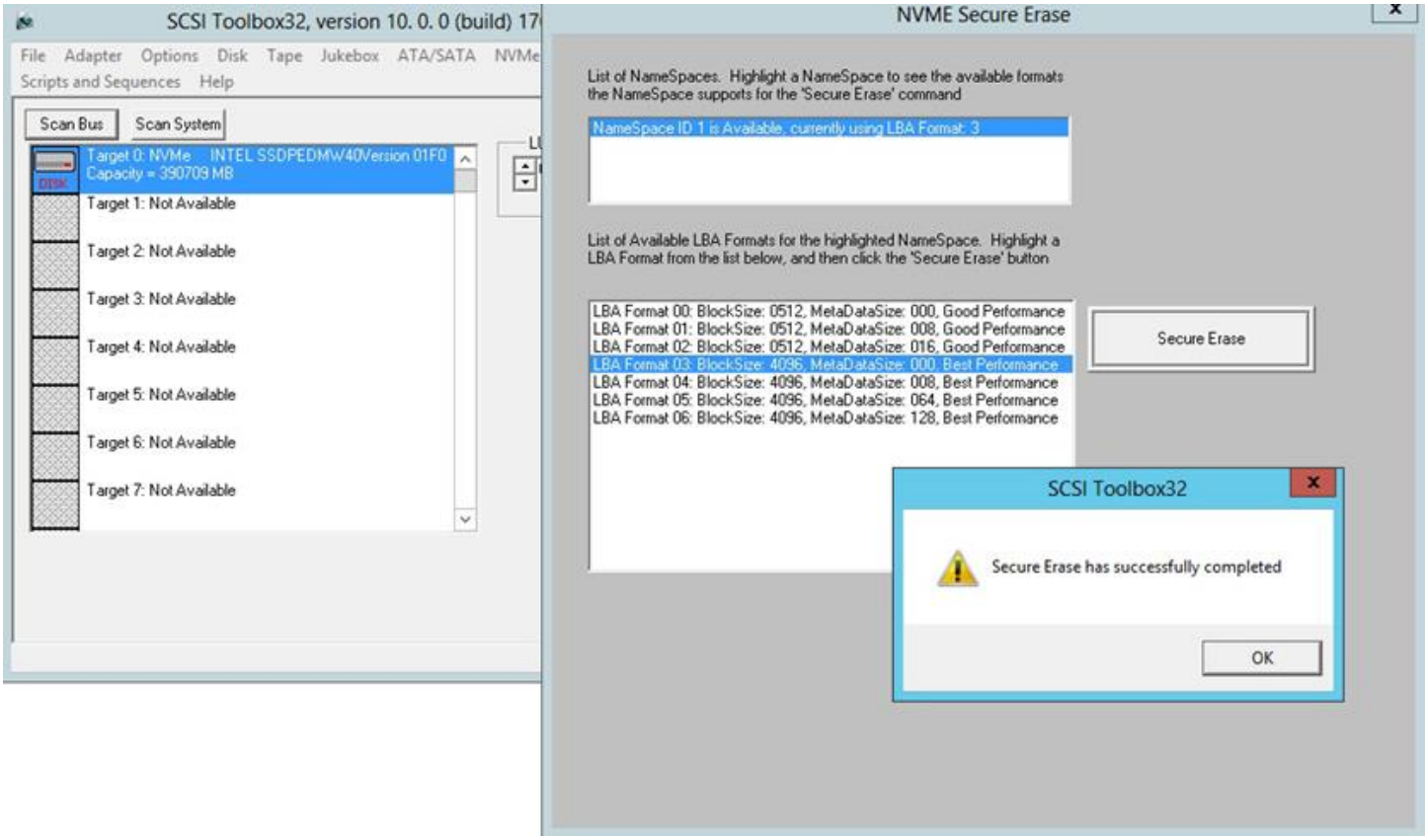
Secure Erase



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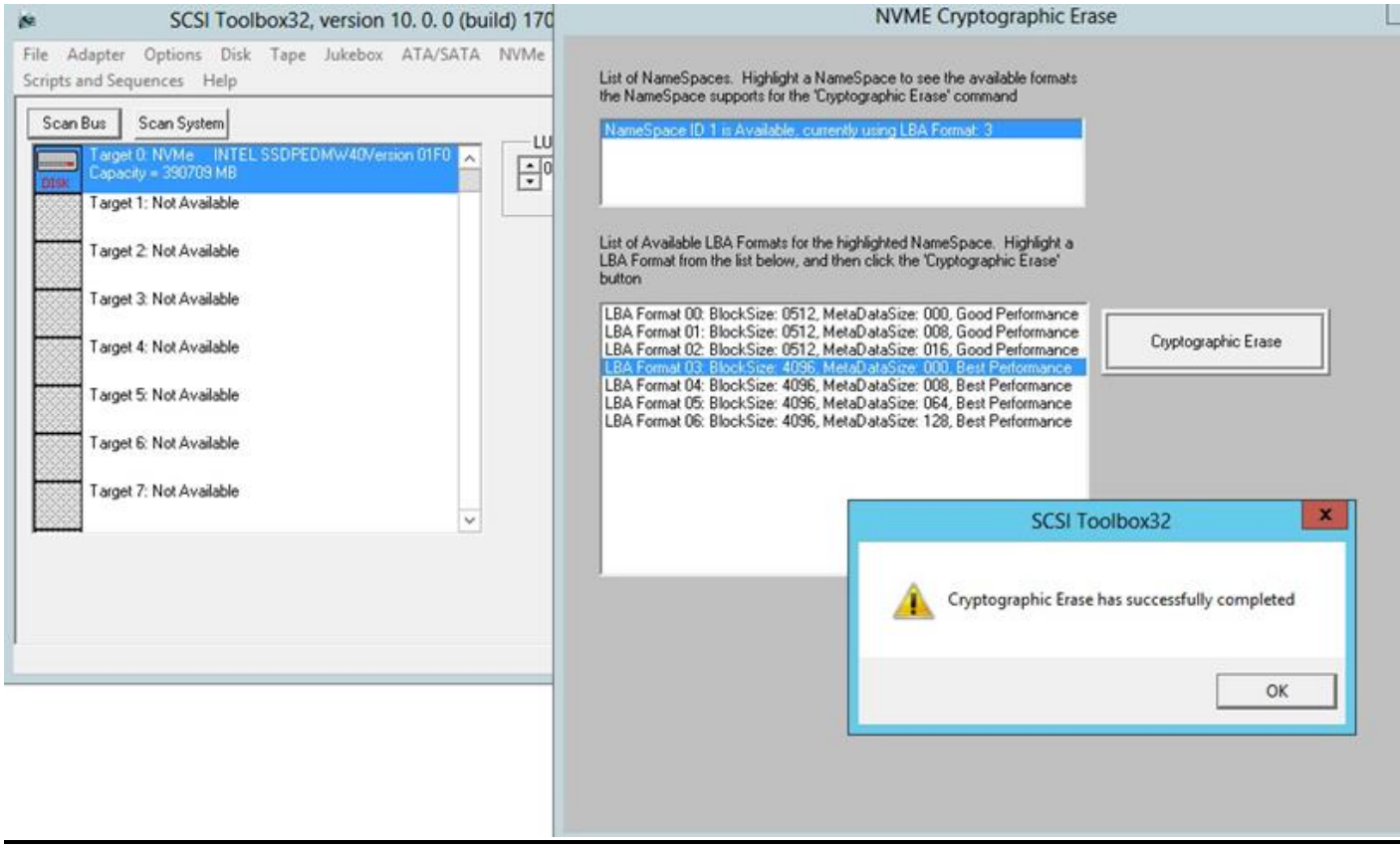
Cryptographic Erase



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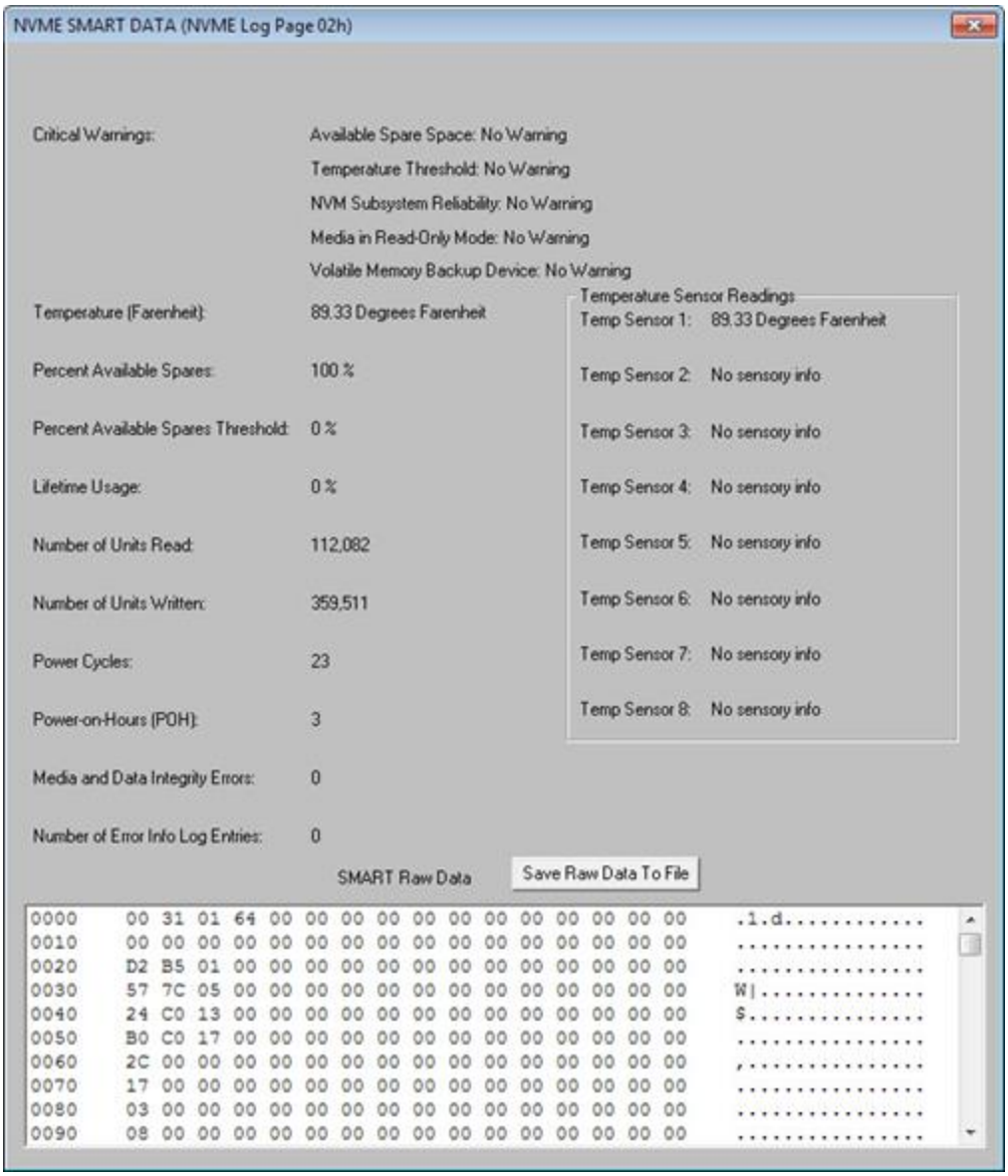
SMART Information

SMART Information, Critical Warnings, and Temperature Sensor readings are shown with the SMART feature



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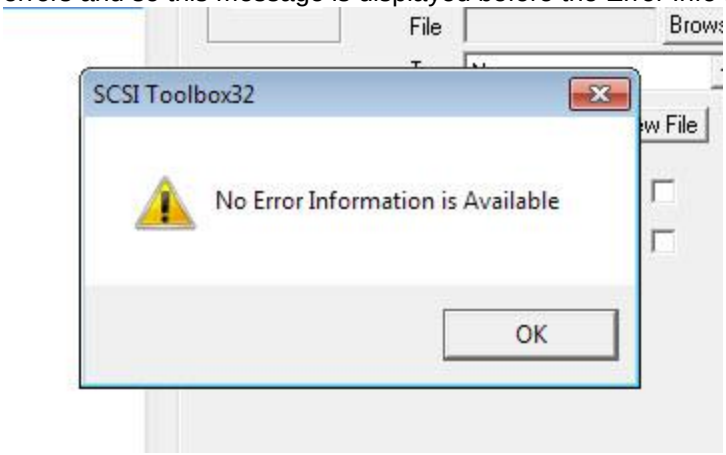
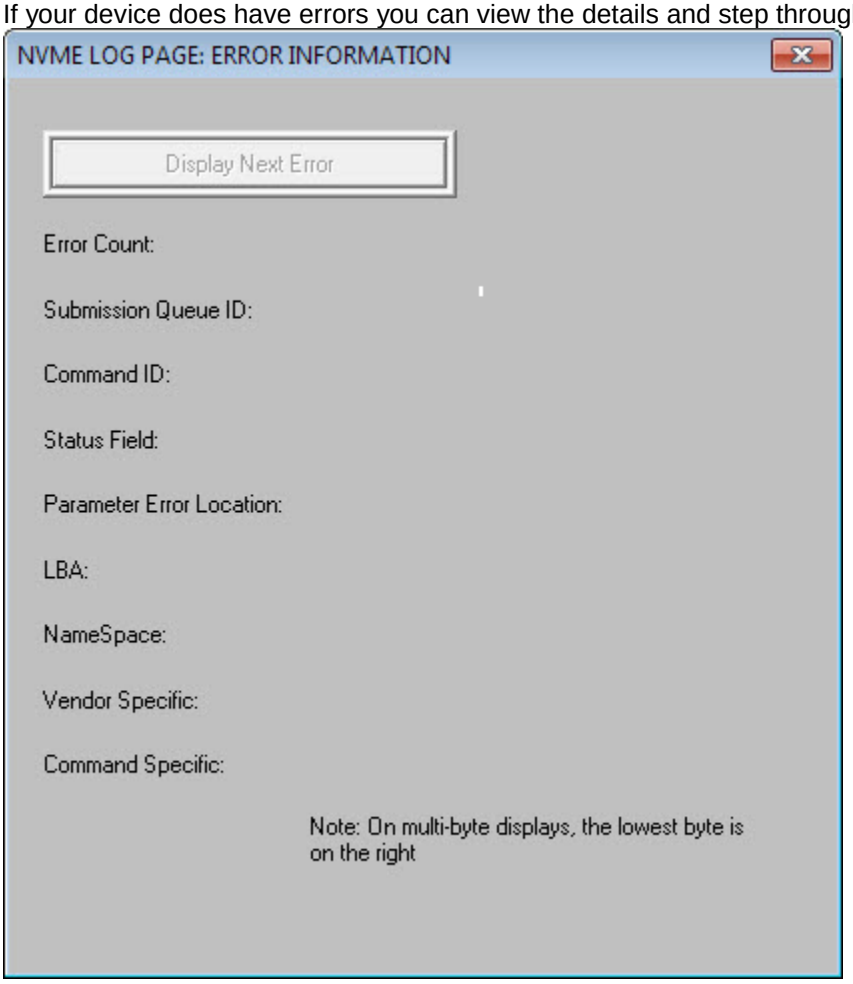
Error Info

Click the Error Info menu choice to view any device error details. Our example device does not have any errors and so this message is displayed before the Error Info screen



If your device does have errors you can view the details and step through the errors



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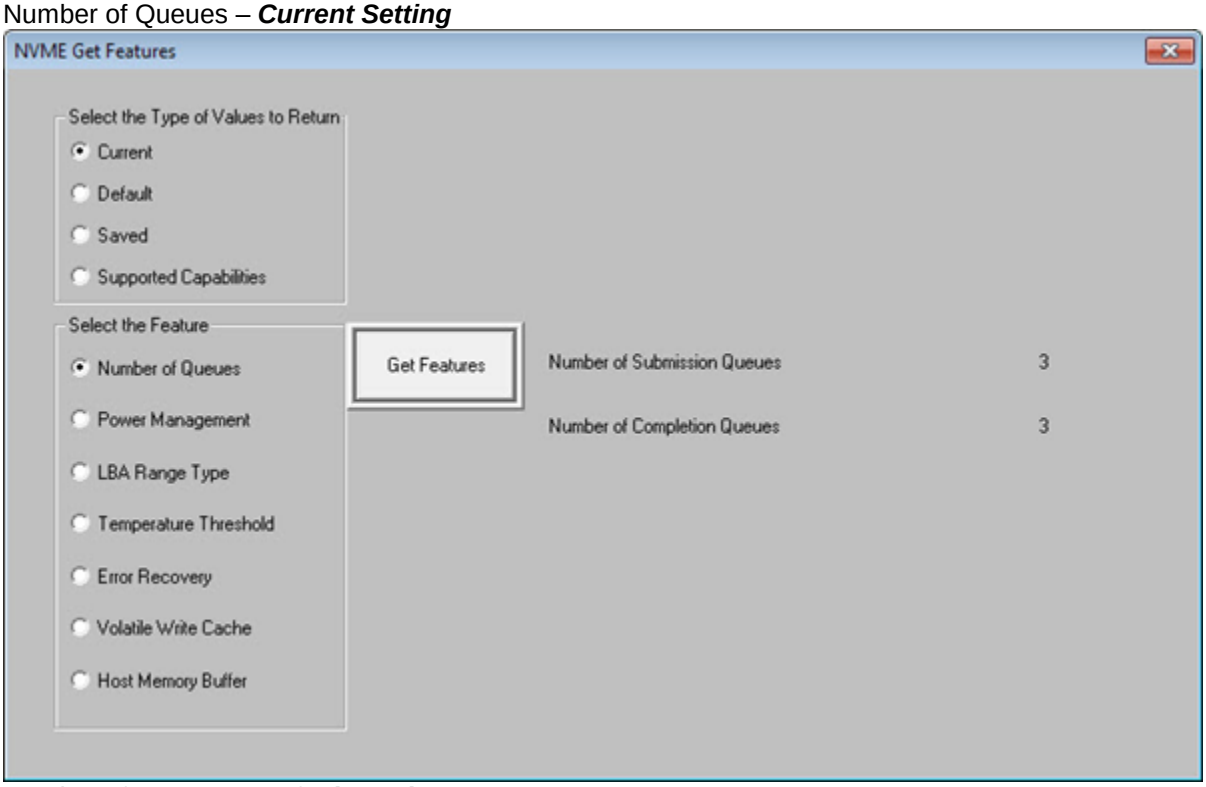
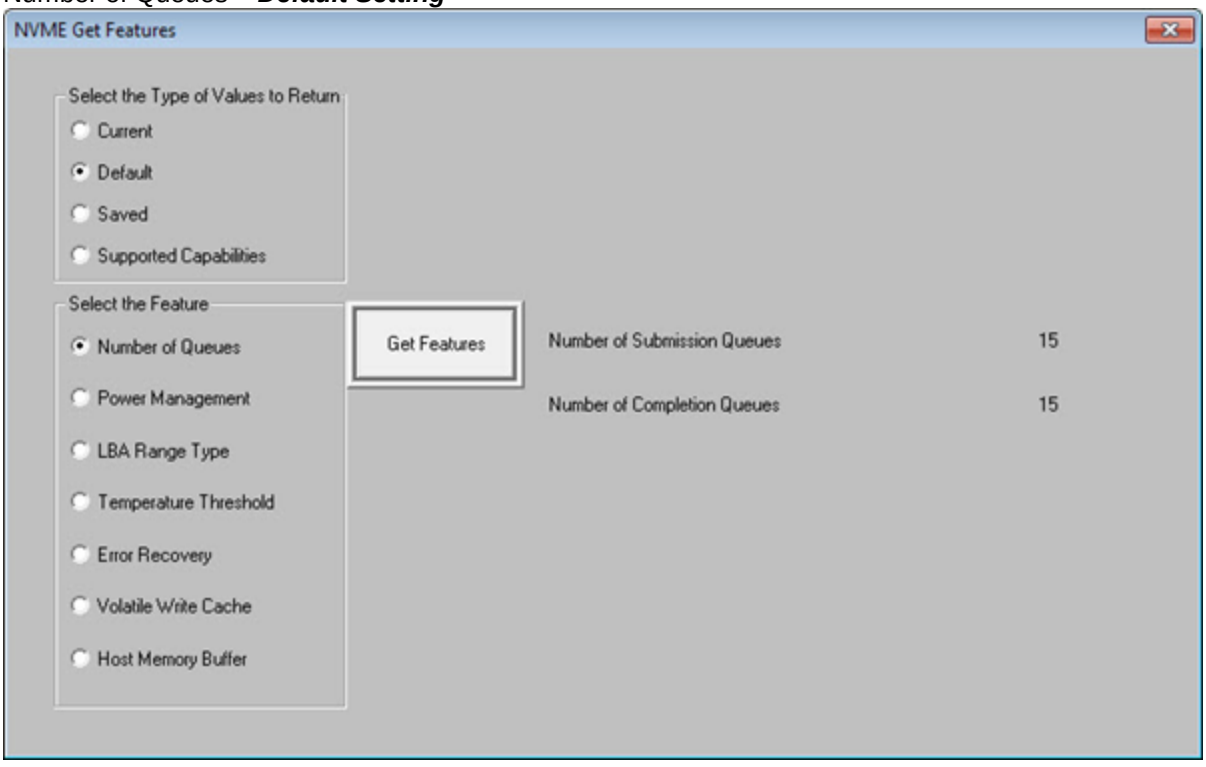
Get Features

The NVMe Get Features function allows certain device characteristics to be viewed and changed. Select the Feature to View/Change from the list of choices then click the Get Features button to see the Current, Default, Saved, or Supported types

Number of Queues – ***Current Setting***



Number of Queues – ***Default Setting***



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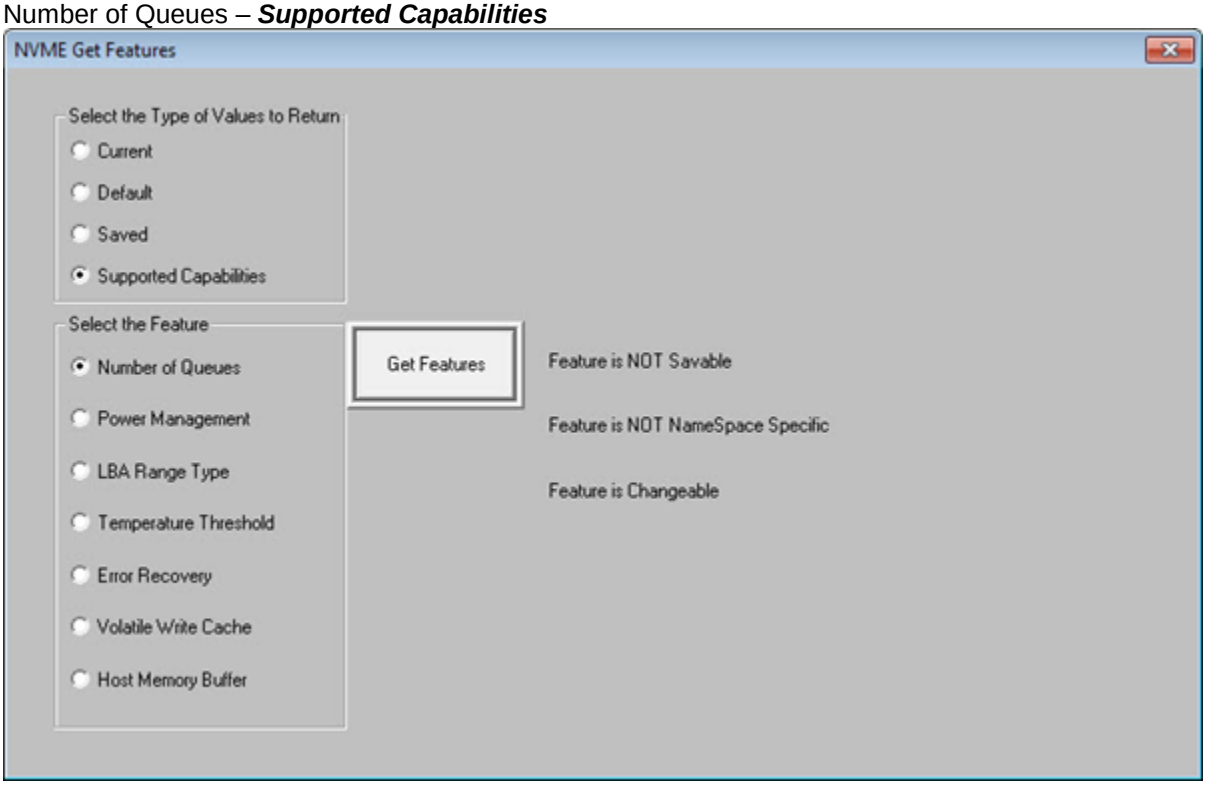
Number of Queues – ***Supported Capabilities***



Other Get Features Pages

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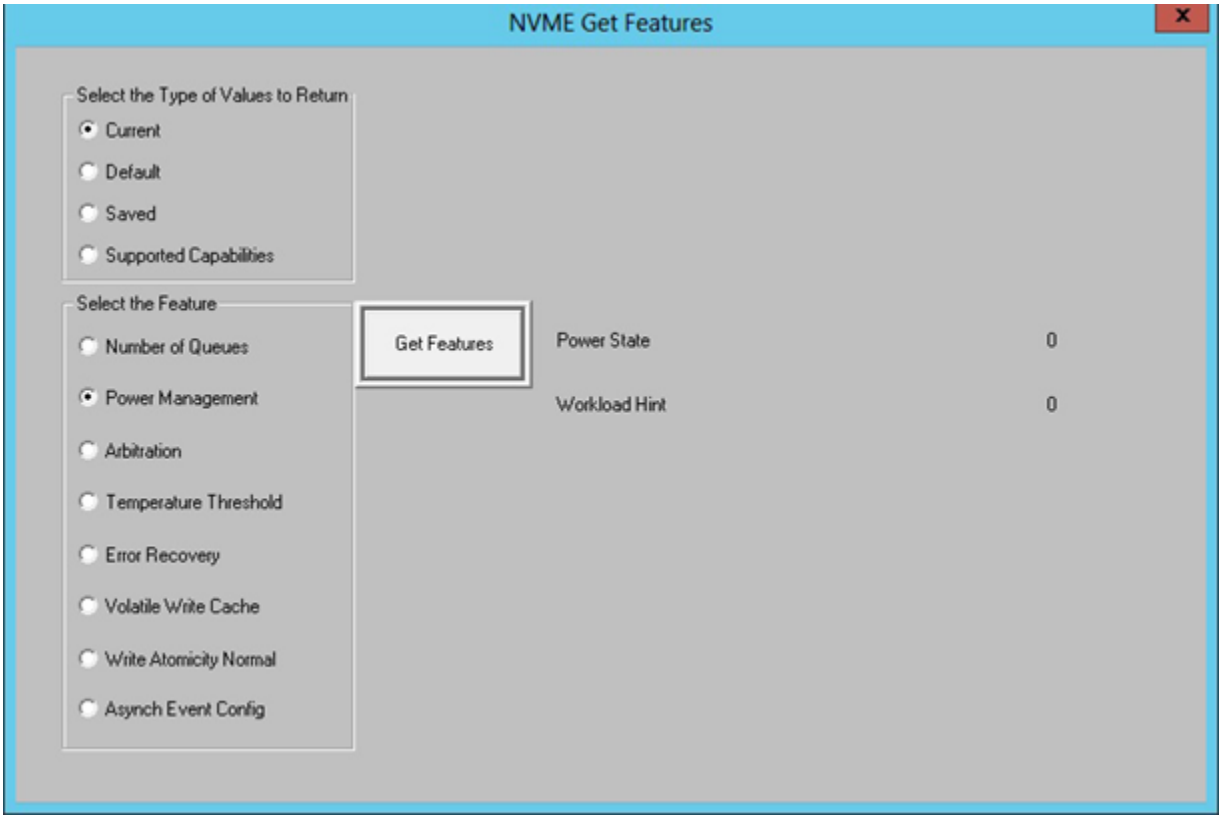
Power Management



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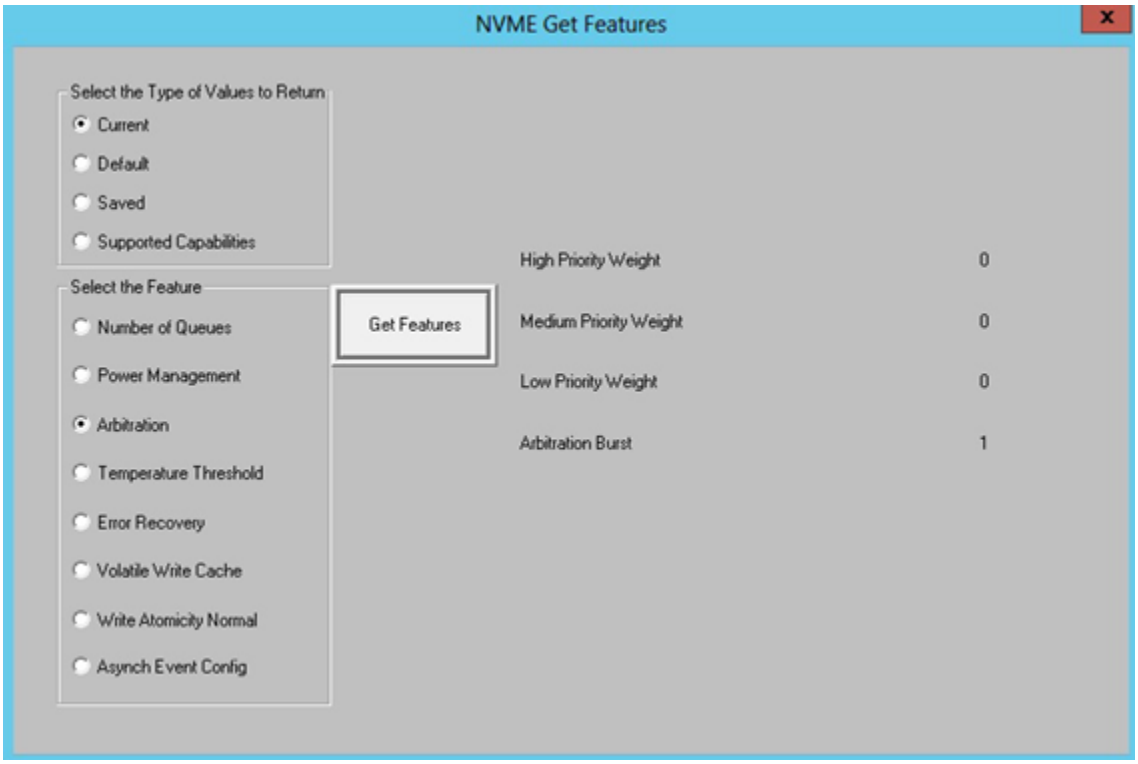
Arbitration



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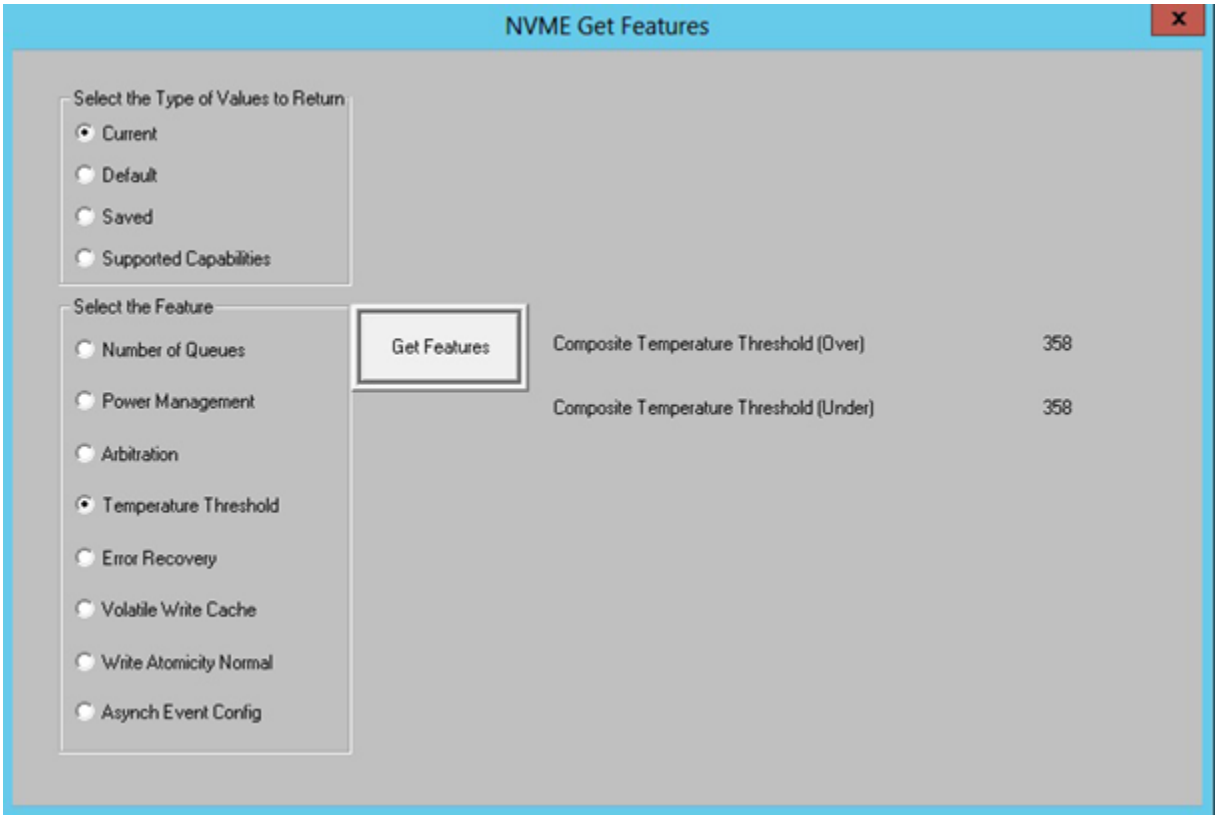
Temperature Threshold



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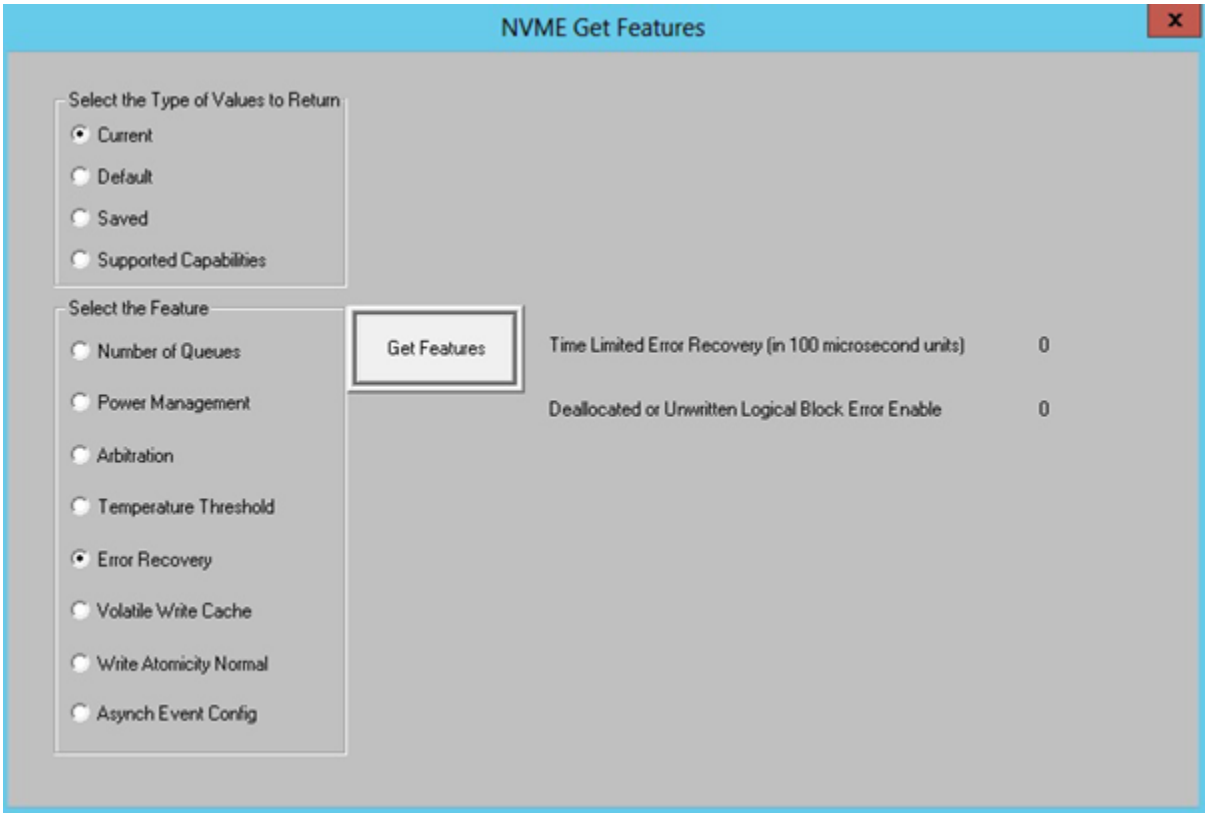
Error Recovery



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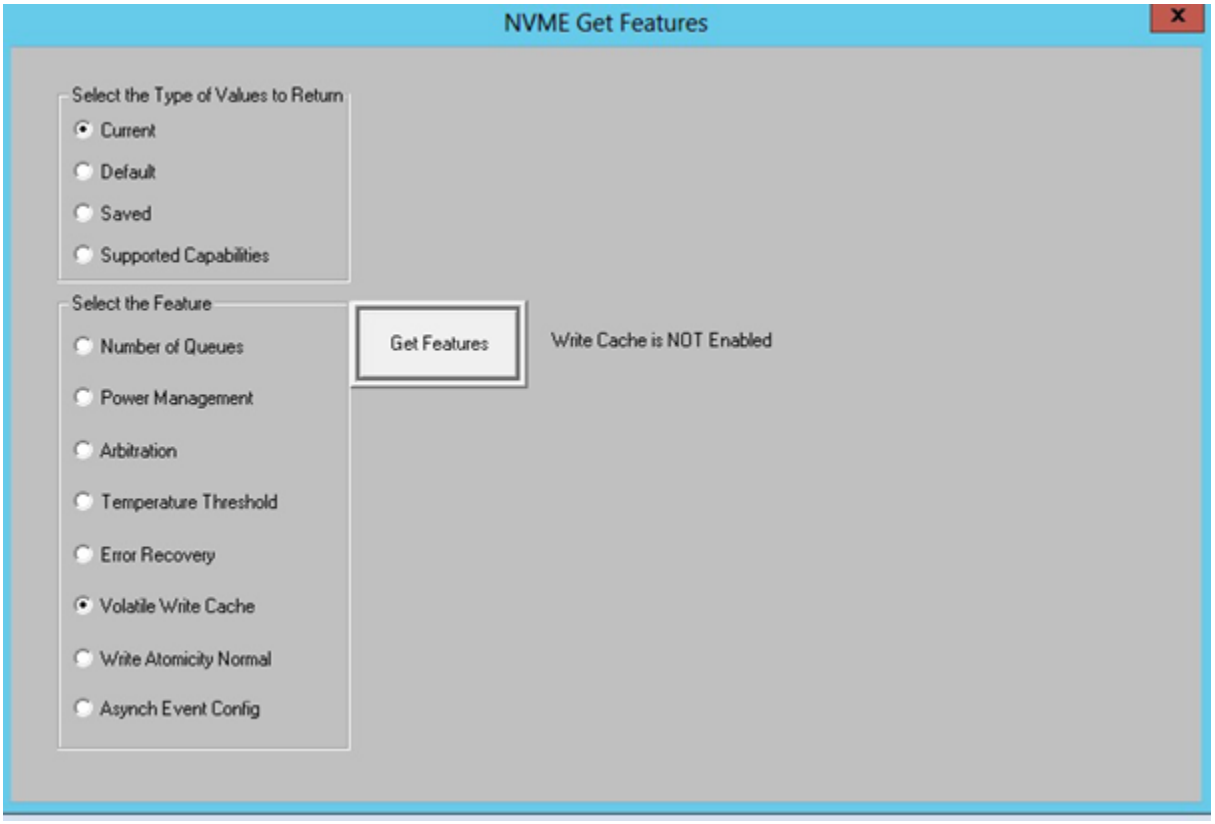
Volatile Write Cache



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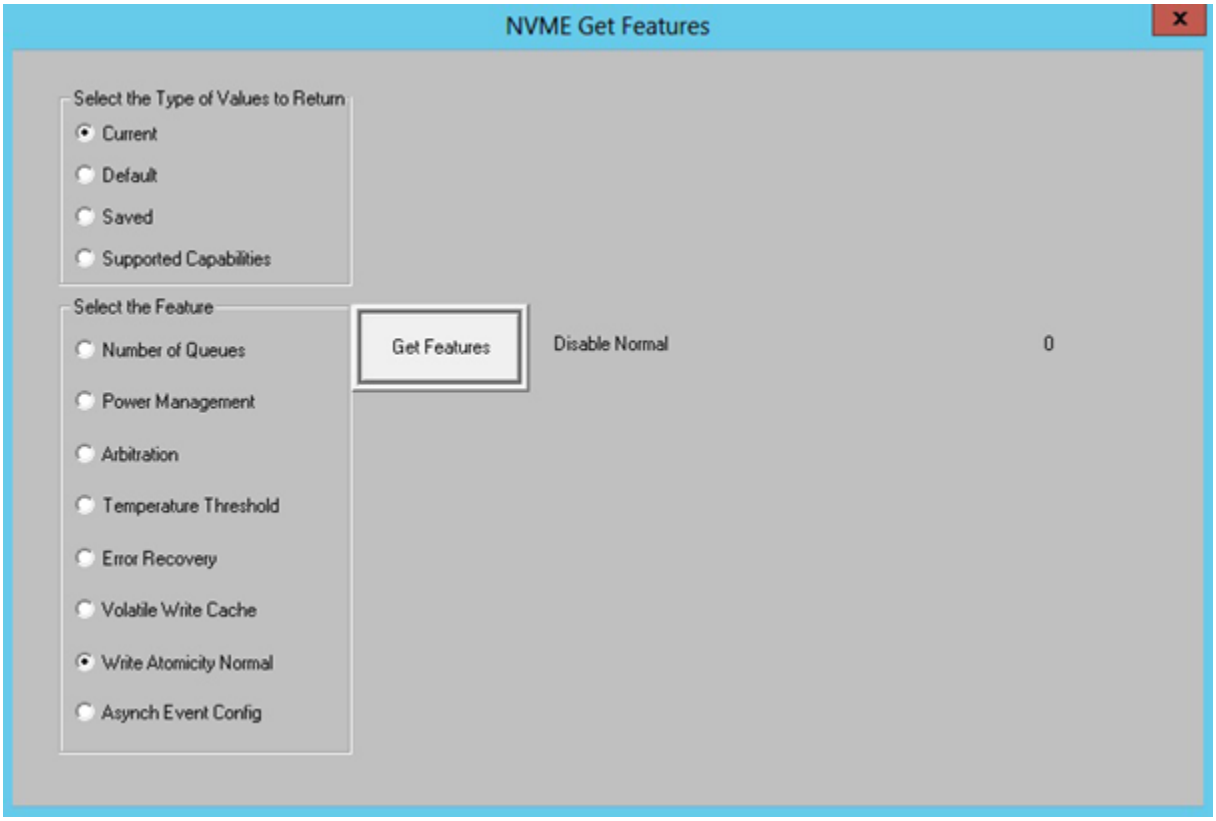
Write Atomicity Normal



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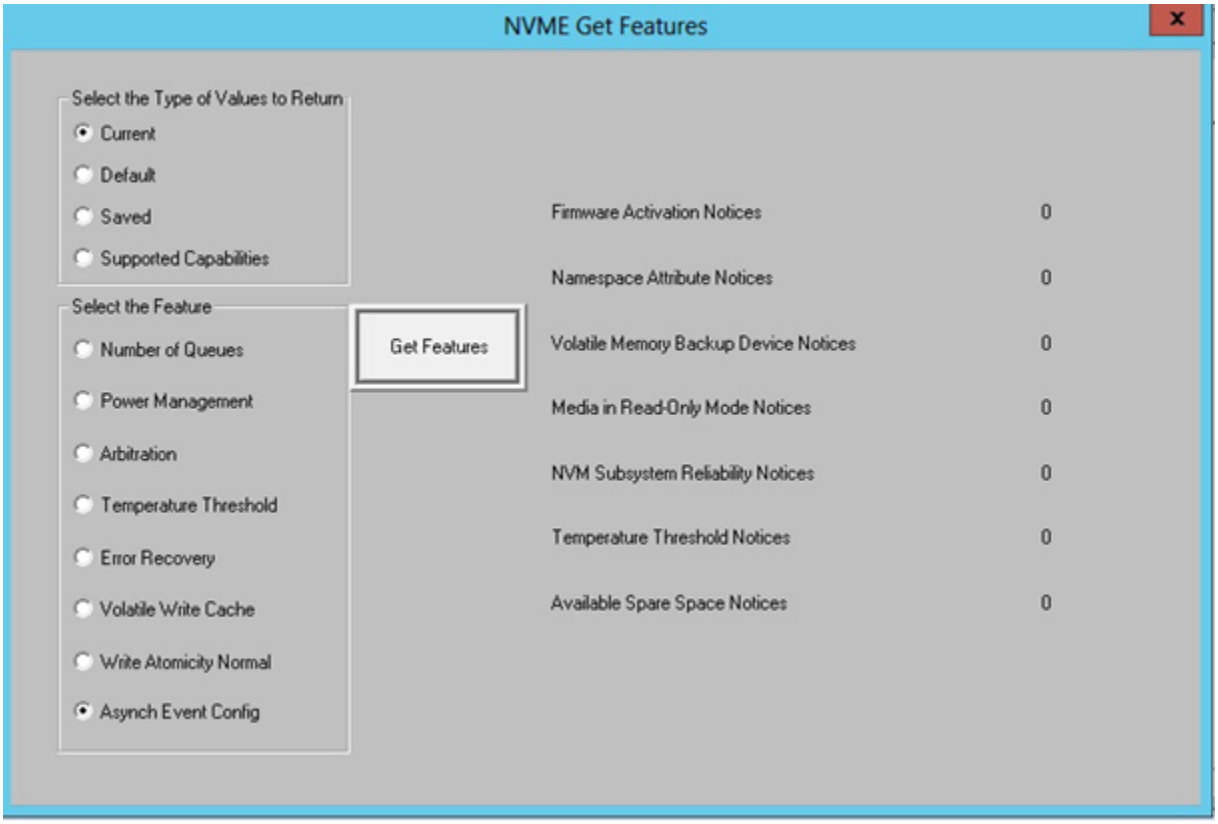
Async Even Config



3. Use a text file for SATA SMART attribute definitions - SMART_ATT_DEFINITIONS.TXT

The Top-Menu function ***ATA/SATA->Commands->View SMART Data*** now uses a user-editable text file to allow any text definition to be assigned to any SATA SMART ATTRUBUTE number. Previous versions of the STB Suite had these Attribute definitions hard-coded and were not user editable.
The file SMART_ATT_DEFINITIONS.TXT will be located in your default STB folder, typically
Program Files (x86)>STB>SCSI toolbox32
It is a plain text file and may be edited with any plain text editor. Do **NOT** use a word processor like Word to edit this file. You may use NotePad to edit this file.
The format of this file is as follows –

```
1,1,Raw Read Error Rate
2,0,Throughput Performance
3,0,Spin Up Time
4,1,Start/Stop Count
5,1,** Reallocated Sector Count
```

Where the first number is the ATTRIBUTE NUMBER (decimal), the second number is an option to determine if the ATTRIBUTE will also be displayed in the “RAW data may have meaning…” list, while the last text section is the text which will be displayed as the name of the ATTRIBUTE.
You may assign any text you wish to be displayed for any SATA SMART Attribute number.

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There is no “official” definition of SATA SMART ATTRIBUTE numbers. We have found the best source for finding the definition of these ATTRIBUTES is the S.M.A.R.T Wiki web site - https://en.wikipedia.org/wiki/S.M.A.R.T.
This change to allow the SATA SMART Attribute definitions to be accessed from a text file rather than being hard-coded lets you keep up to date with current definitions. These definitions change frequently so we recommend that you check the Wiki regularly and update your definition file as needed.

DMM

Fixes/Changes:

1. Update SATA SMART attribute definitions – now uses file “SMART_ATT_DEFINITIONS.TXT”

The DMM SMART Test Step now uses a user-editable text file to allow any text definition to be assigned to any SATA SMART ATTRUBUTE number.
The file SMART_ATT_DEFINITIONS.TXT will be located in your default STB folder, typically
Program Files (x86)>STB>SCSI toolbox32
It is a plain text file and may be edited with any plain text editor. Do **NOT** use a word processor like Word to edit this file. You may use NotePad to edit this file.
The format of this file is as follows –

```
1,1,Raw Read Error Rate
2,0,Throughput Performance
3,0,Spin Up Time
4,1,Start/Stop Count
5,1,** Reallocated Sector Count
```

Where the first number is the ATTRIBUTE NUMBER (decimal), the second number is an option to determine if the ATTRIBUTE will also be displayed in the “RAW data may have meaning…” list, while the last text section is the text which will be displayed as the name of the ATTRIBUTE.
You may assign any text you wish to be displayed for any SATA SMART Attribute number.
There is no “official” definition of SATA SMART ATTRIBUTE numbers. We have found the best source for finding the definition of these ATTRIBUTES is the S.M.A.R.T Wiki web site - https://en.wikipedia.org/wiki/S.M.A.R.T.
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2. Put "Defect List Count" into the database table

The DMM Test Steps P-List and G-List now log their results to the Access Database and Text Database files.
The results are stored in the Pattern column of the TESTS table as shown here –

Product	SerialNum	Vers	Comment	TestName	Pattern	TestResult
****	****	****	****	****	****	****
ST4000NM0043	Z1Z0814100000B	0004	Test Ended	2. Grown Defect List Count	Number of Defects: 1	Test Complete
ST4000NM0043	Z1Z0814100000B	0004	Test Started	2. Grown Defect List Count	Decrementing	Test Ready To S
ST4000NM0043	Z1Z0814100000B	0004	Test Ended	1. Primary Defect List Count	Number of Defects: 1705	Test Complete
ST4000NM0043	Z1Z0814100000B	0004	Test Started	1. Primary Defect List Count	Decrementing	Test Ready To S

3. Fix location of Log Page .def files to always use folder STB32 was started in

In certain conditions previous versions would forget where to open data files from.
Version 10.0 always looks for its data files in the folder which STB32.exe was run from, typically
Program Files (x86)>STB>SCSI toolbox32

4. Selecting the access method 'SkipY' no longer prevents tests that don't use the access method from running

In previous versions if you had selected the SkipY access method for a test step which does not use any access method – for instance the Format Test Step – DMM would stop running the Test Sequence with an error.
In STB Suite version 10.0 this is no longer the case and the Test Sequence will not stop.

New Features:

1. Use distinct Vendor Unique .def file based on drive VENDOR field

In previous versions of STB Suite DMM would always use the file Default.def to interpret Log Page data to store to the DMM .log file. Now DMM will use different .log files based on what the drive under test returns in it's **INQUIRY VENDOR** field.

a. SEA uses Seagate.def
b. HIT uses hitachi.def
c. FUJ uses Fujitsu.def
d. IBM uses IBM.def
e. WD uses WD.def

All of these files will reside in your default STB folder.

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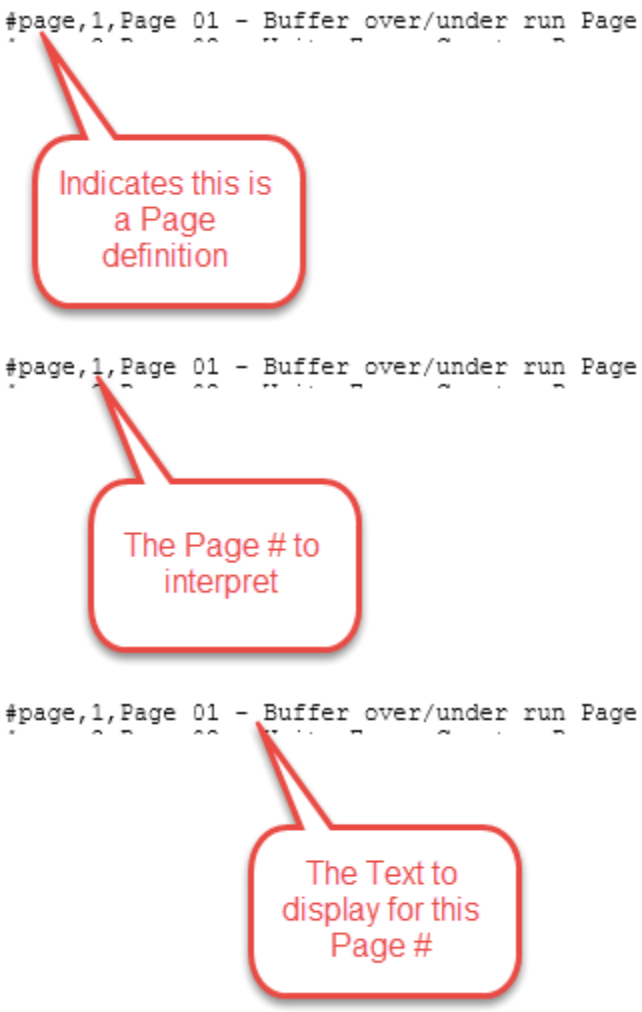
The DMM .def files are simple text files with comma-delimited fields, and have the following format –

```
#page,1,Page 01 - Buffer over/under run Page
#page,2,Page 02 - Write Error Counter Page
#page,3,Page 03 - Read Error Counter Page
.
.
.
#parameter,2,0,d,Errors corrected without substantial delays
#parameter,2,1,d,Errors corrected with possible delays
#parameter,2,2,d,Total rewrites
#parameter,2,3,d,Total Errors Corrected (soft errors) -
#parameter,2,4,d,Total Times Correction Algorithm Processed -
#
```

The first section of the file contains the descriptions which will be used to interpret the Log Page Page definitions. There are three comma-delimited fields -



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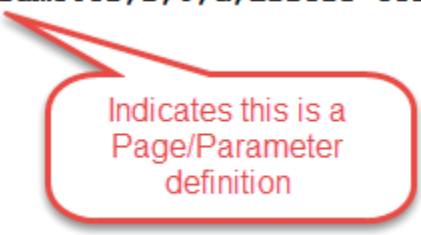
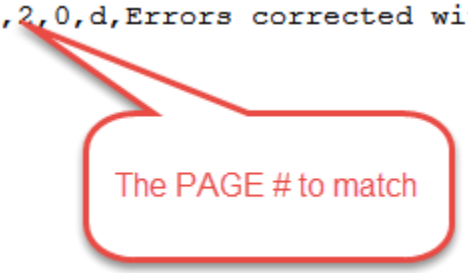
The next section of the file contains the descriptions which will be used to interpret the Log Page/Parameter pairs. There are five comma-delimited fields –

```
#parameter,2,0,d,Errors corrected without substantial delays
#parameter,2,1,d,Errors corrected with possible delays
#parameter,2,2,d,Total rewrites
#parameter,2,3,d,Total Errors Corrected (soft errors) -
```

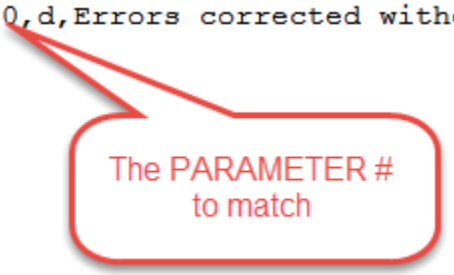
```
#parameter,2,0,d,Errors corrected without substantial delays
```




```
#parameter,2,0,d,Errors corrected without substantial delays
```




```
#parameter,2,0,d,Errors corrected without substantial delays
```



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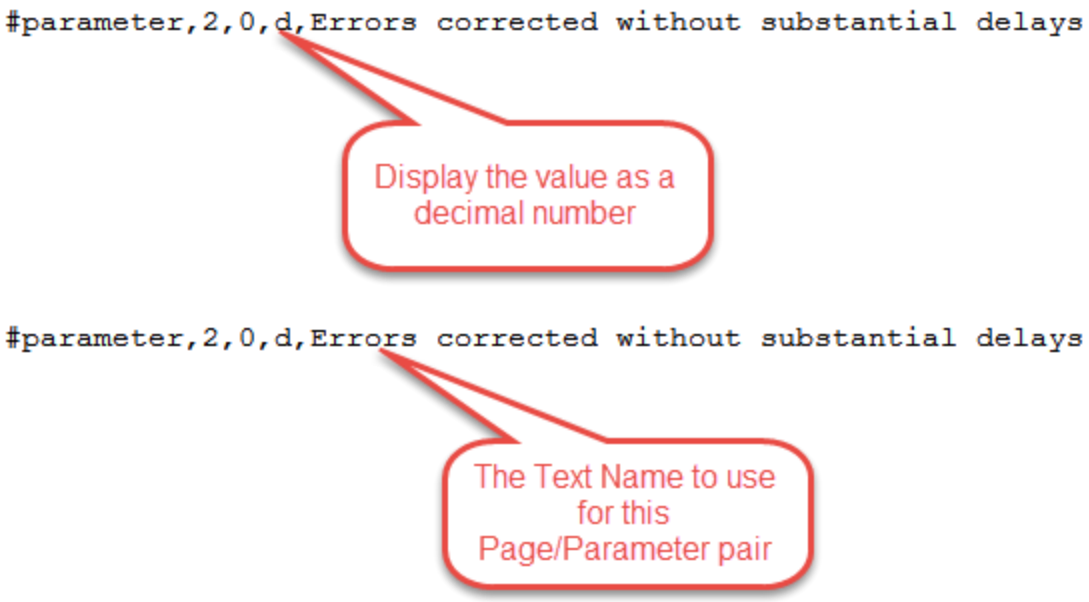

As delivered all of the disk .def files are simply copies of Default.def. You are free to edit them as you need.

2. Use a text file for SATA SMART attribute definitions

The **DMM SMART Test Step** now uses a user-editable text file to allow any text definition to be assigned to any SATA SMART ATTRUBUTE number. Previous versions of the STB Suite had these Attribute definitions hard-coded and were not user editable.
The file SMART_ATT_DEFINITIONS.TXT will be located in your default STB folder, typically
Program Files (x86)>STB>SCSI toolbox32
It is a plain text file and may be edited with any plain text editor. Do **NOT** use a word processor like Word to edit this file. You may use NotePad to edit this file.
The format of this file is as follows –

```
1,1,Raw Read Error Rate
2,0,Throughput Performance
3,0,Spin Up Time
4,1,Start/Stop Count
5,1,** Reallocated Sector Count
```

Where the first number is the ATTRIBUTE NUMBER (decimal), the second number is an option to determine if the ATTRIBUTE will also be displayed in the “RAW data may have meaning…” list, while the last text section is the text which will be displayed as the name of the ATTRIBUTE.
You may assign any text you wish to be displayed for any SATA SMART Attribute number.

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This change to allow the SATA SMART Attribute definitions to be accessed from a text file rather than being hard-coded lets you keep up to date with current definitions. These definitions change frequently so we recommend that you check the Wiki regularly and update your definition file as needed.

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BAM

Fixes/Changes:

1. fixed display to not blank phase display when capture is stopped

Version 10.0 fixes the problem where the phase display list appears empty when a capture is stopped. Resizing the BAM window would cause the phase display list to appear.

With BAM version 10.0 the phase list will appear instantly when the capture is stopped, positioned at the bottom of the phase list i.e. at the last command or phase captured.

A video describing this fix is available to view here –
https://youtu.be/HLWX2O8Aeo4

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Appendix D – STB Suite Version 10.1 Release Notes

STB Suite version 10.1 Quick Look

11-13-2017

STB:

Fixes/Changes:

4. In “Media Duplication”, fix “Ignore Errors”
5. On “Media Duplication”, fix the computation for checksum
6. When using menus to retrieve “Capacity”, the computation incorrectly uses “High Block” and then incorrectly divides by 1024 (losing precision)

New Features:

1. 32-Byte CDBs – stand-alone PI function + update to User Defined CDB

32-byte CDBs and PI Functions

Introduction

STB Suite version 10.1 introduces two new features –

1. 32-Byte User Defined CDBs
2. PI Functions

Requirements:

1. Your OS must be 32-byte CDB enabled. Qualified OSs are:
    a. Server 2012R2
    b. Server 2016
    c. Windows 10
2. Your HBA must be 32-byte CDB enabled.
    a. This may require you to install the latest HBA firmware, BIOS, and Windows drivers for your HBA.
    b. LSI SAS HBAs with current drivers should be compatible
    c. You can check if an HBA is 32-byte CDB enabled by looking in the manufacturers specifications or release notes for hints such as:

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i. 32-Byte CDBs …
ii. “End-To-End Protection…”

32-byte User Defined CDBs

This new functionality allows defining and issuing 32-byte CDBs via the STB Suite Original Mode User Defined CDB function.
All of the former features of User Defined CDB apply, the only change is a 32-Byte choice for CDB length which will display 32 bytes for CDB information.

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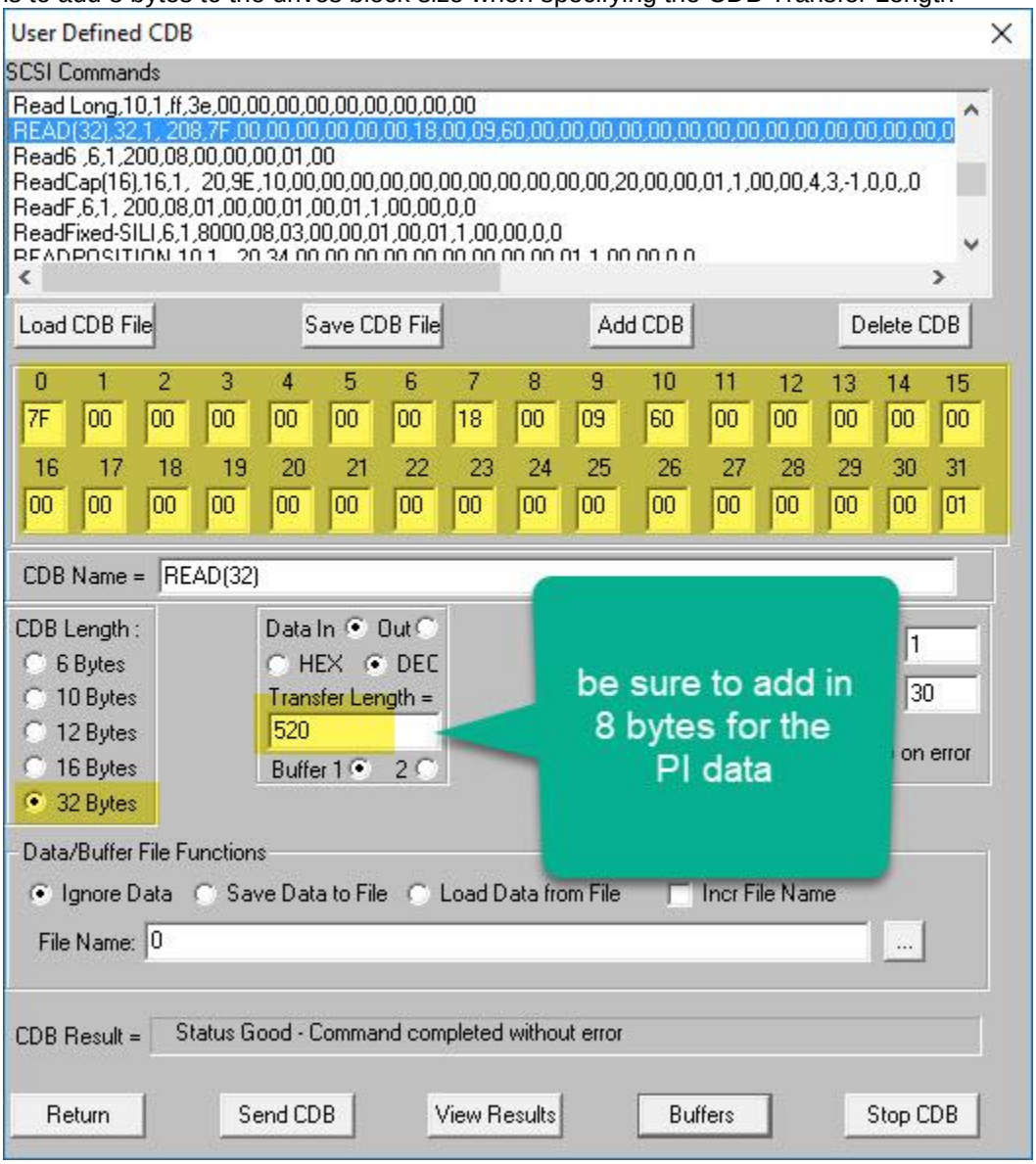
Since the principal use of 32-byte CDBs is working with PI data the only important change to bear in mind is to add 8 bytes to the drives block size when specifying the CDB Transfer Length



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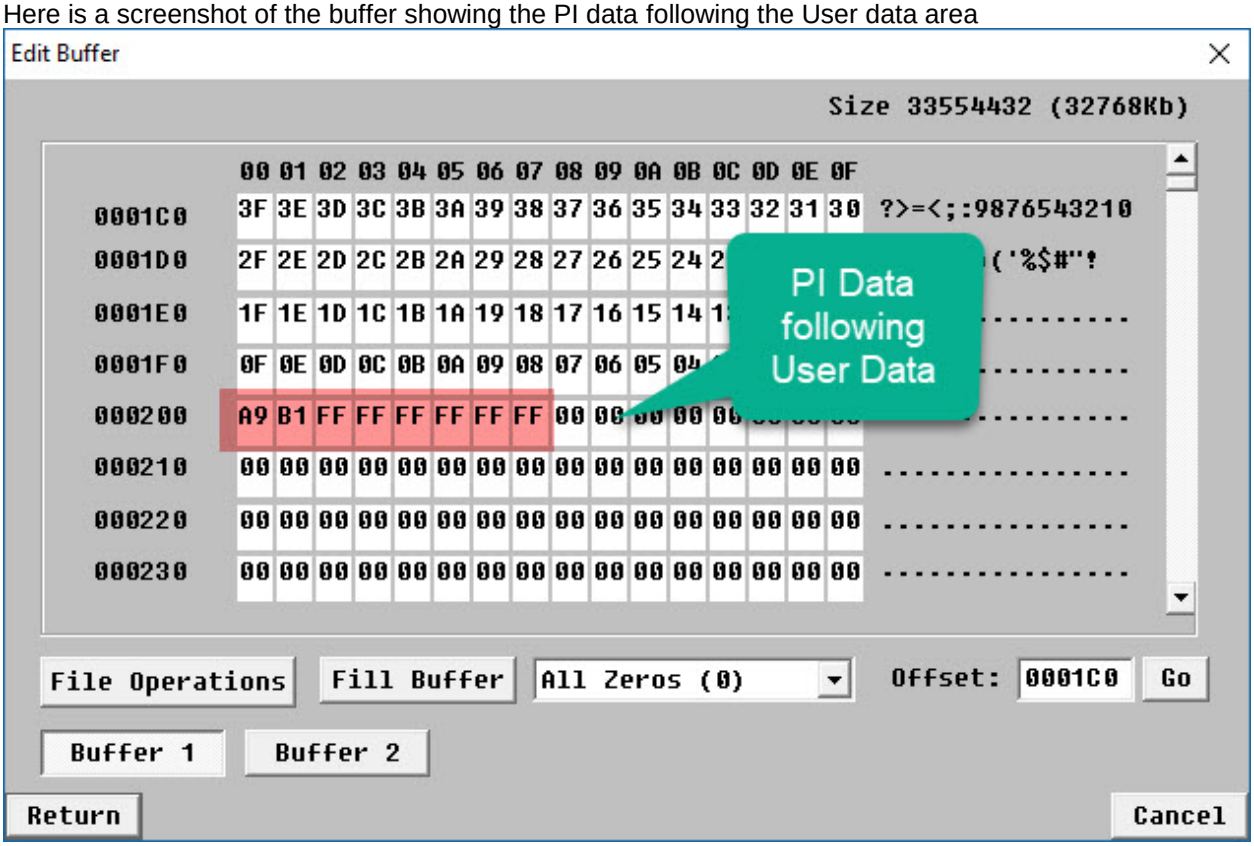
Here is a screenshot of the buffer showing the PI data following the User data area



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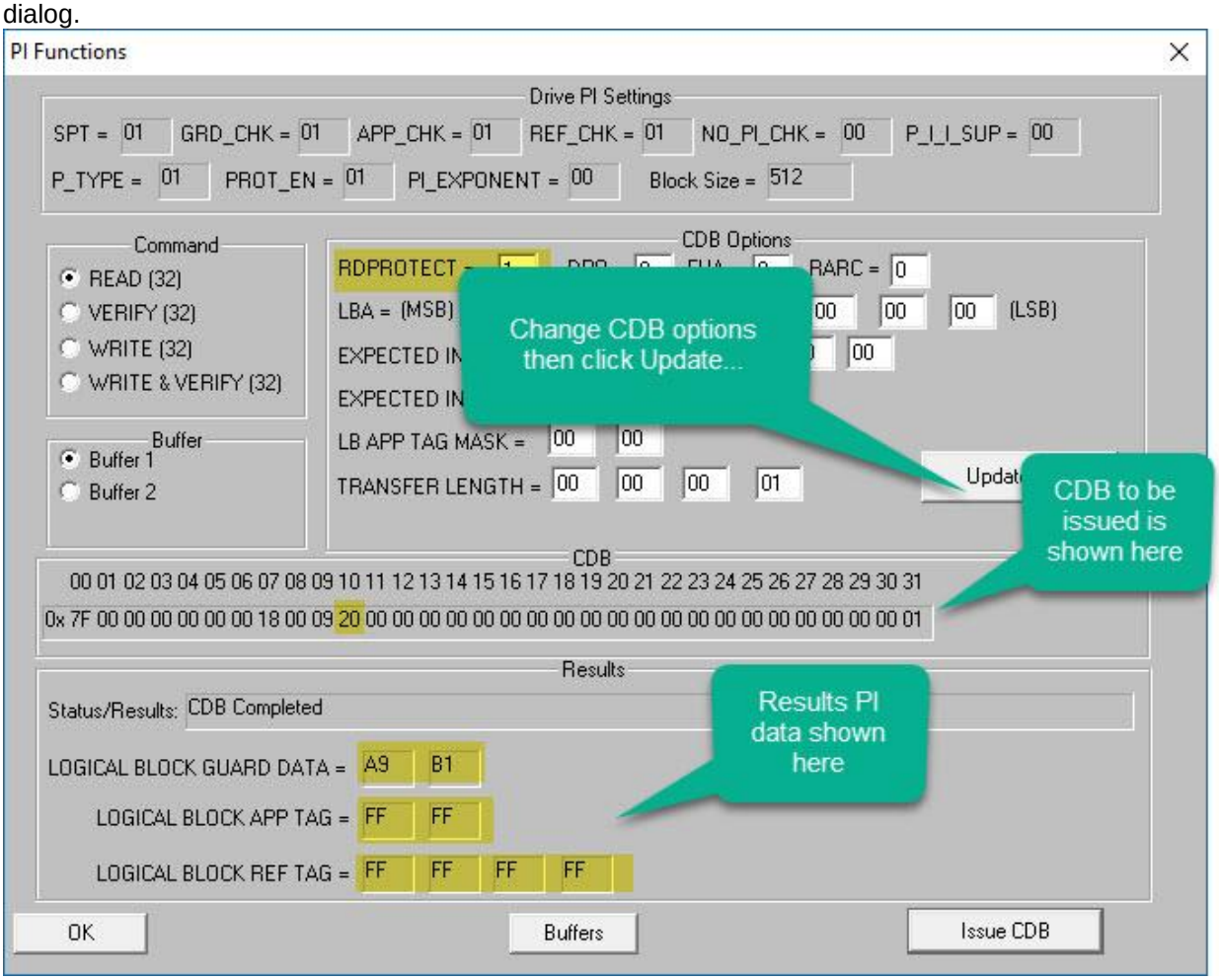
PI Functions

The new PI Functions can be found in the right-click Disk Quick Commands as well as in the Disk->Commands menu.
This function lets you specify what 32-byte CDB you want to issue, and allows you to specify all CDB options.
When entering the function all PI settings will be retrieved from the drive and displayed at the top of the dialog.



1. Make sure that the drive is formatted the way you expect it to be by checking ***Drive PI Settings***.
2. Set the ***Command*** choice, any CDB options, your ***buffer*** choice, then click ***Update CDB*** to apply the changes to the CDB
3. Check ***CDB*** bytes to insure that the CDB is set up the way you want
4. Use the ***Buffers*** function to set any necessary PI data in the eight bytes following the User Data area of your buffer
5. Click the ***Issue CDB*** button to send the CDB to the drive
6. CDB results will be shown

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DMM:

Fixes/Changes

2. Fix repeating last line (page/parameter) in Save Log Pages

3. For “DST Test”, if the drive does not successfully complete the DST for any reason (aborted, failed, etc), mark the test step DST Test as failed.

   Example – DST Aborted so mark test step FAILED–

```
================================================================================
>> SCSI Toolbox32, Version 10. 1. 0 (build) 171113, running on \\DELLR610-WIN10<<
>> Default Driver: 10, Operating System: Windows 10 Pro<<
>> Number of Drives Under Test: 12 <<
>> Available Memory (in GB): 1.67 <<
>> SN: 0x000004d2 (1234) <<
================================================================================

Test Date:  11/13/2017  09:13:40
Test Pass:  1

  Device:  7:2:0   Vendor: SATAST, Product: ST1000NMCLAR1000   Serial: WL250GSA872  WOL240020019
01.02B01, Version: 2B01

  Capacity: 250.06 GB, BlockSize: 520 (0x208)

Results:

 11/13/2017  09:13:40  TEST 1 of 1:
                  Drive Self Test Test
                  Stop-on-Error Type: Stop Current Test
Entry Number = 0, Timestamp = 22369
Self-Test Code =  000b "N/A"

Self-Test Results = 1 "The background self-test was aborted by the application using a
SEND DIAGNOSTIC command with Self-Test Code set to 100b"


 11/13/2017  09:16:08                                  *** FAIL ***
 --------------------------------------------------------------------------------
```

4. Fixed PreTest Change Block Size

New Features:

7. Added time stamp to log files for PreTest Format & Change Block size

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Appendix E – 32-Byte CDBs & PI Functions

Introduction

STB Suite version 10.1 introduces two new features –

3. 32-Byte User Defined CDBs
4. PI Functions

Requirements:

3. Your OS must be 32-byte CDB enabled. Qualified OSs are:
    a. Server 2012R2
    b. Server 2016
    c. Windows 10
4. Your HBA must be 32-byte CDB enabled.
    a. This may require you to install the latest HBA firmware, BIOS, and Windows drivers for your HBA.
    b. LSI SAS HBAs with current drivers should be compatible
    c. You can check if an HBA is 32-byte CDB enabled by looking in the manufacturers specifications or release notes for hints such as:
        i. 32-Byte CDBs …
        ii. “End-To-End Protection…”

32-byte User Defined CDBs – PI Functions

This new functionality allows defining and issuing 32-byte CDBs via the STB Suite Original Mode User Defined CDB function.
All of the former features of User Defined CDB apply, the only change is a 32-Byte choice for CDB length which will display 32 bytes for CDB information.

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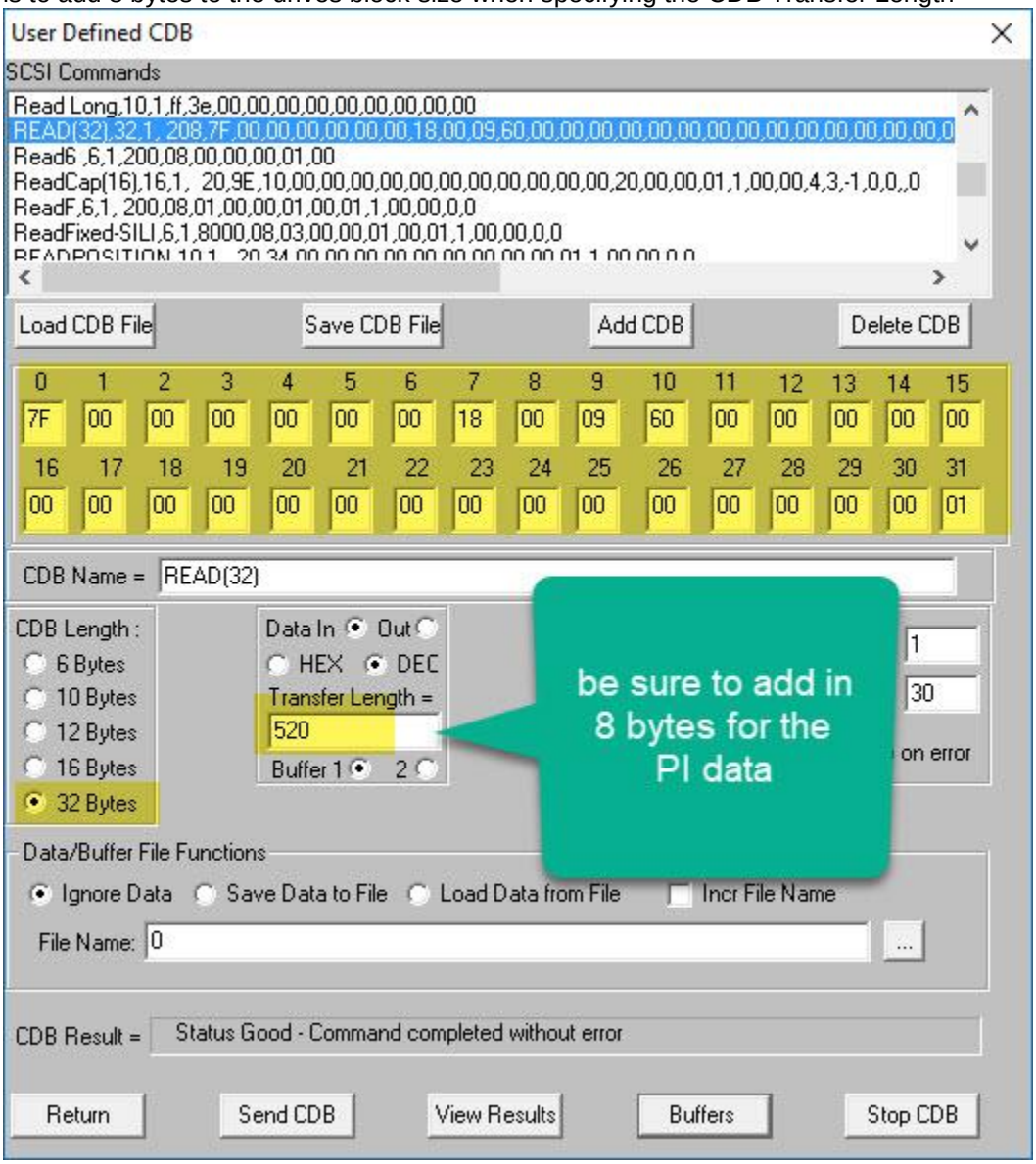
Since the principal use of 32-byte CDBs is working with PI data the only important change to bear in mind is to add 8 bytes to the drives block size when specifying the CDB Transfer Length



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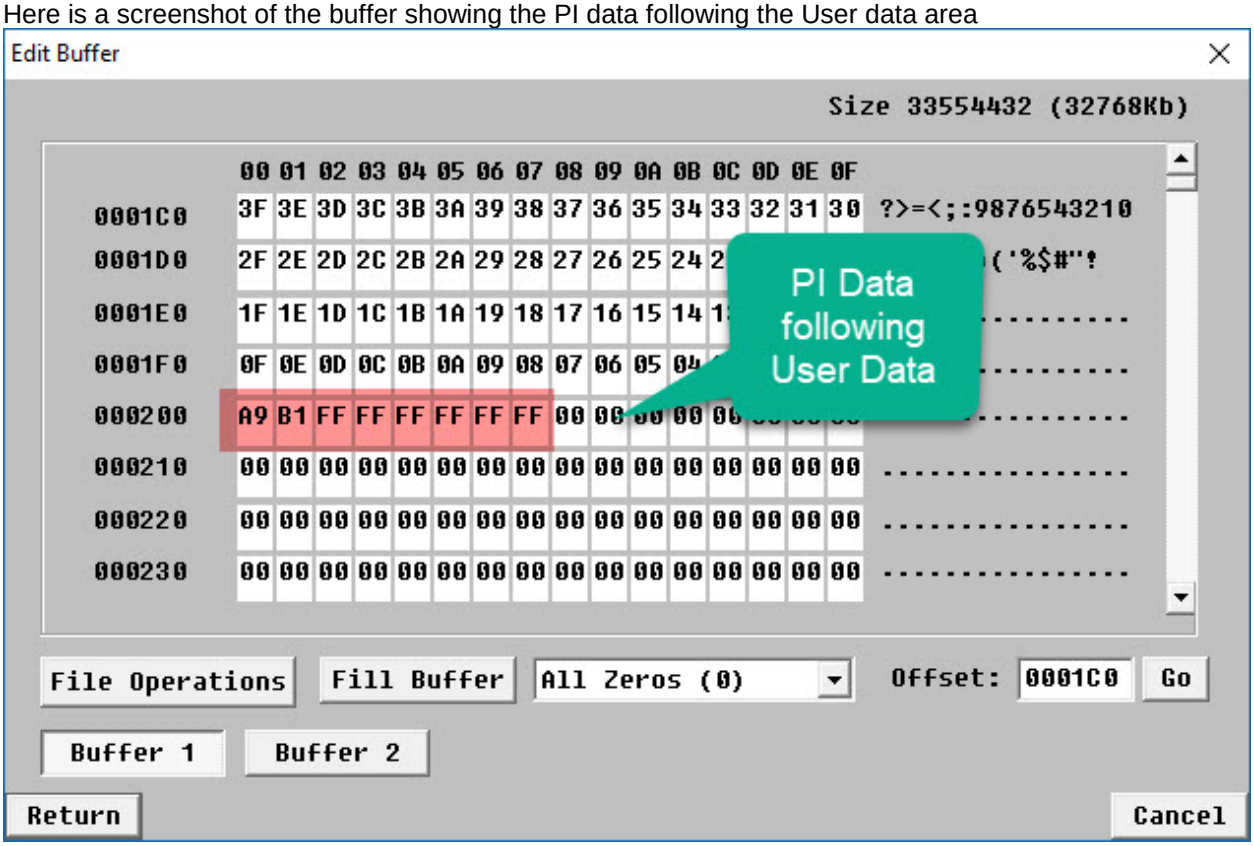
Here is a screenshot of the buffer showing the PI data following the User data area



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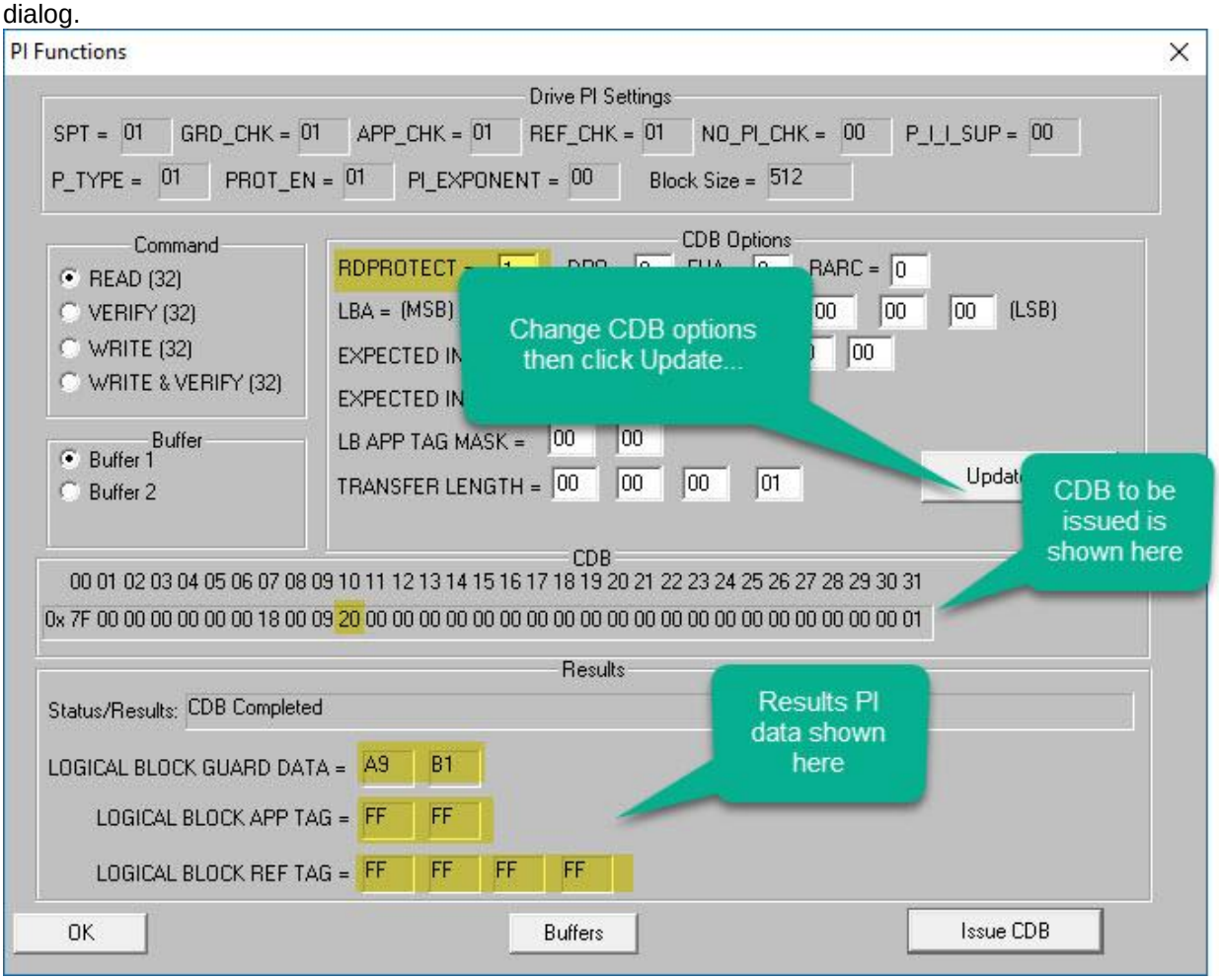
PI Functions

The new PI Functions can be found in the right-click Disk Quick Commands as well as in the Disk->Commands menu.
This function lets you specify what 32-byte CDB you want to issue, and allows you to specify all CDB options.
When entering the function all PI settings will be retrieved from the drive and displayed at the top of the dialog.



7. Make sure that the drive is formatted the way you expect it to be by checking ***Drive PI Settings***.
8. Set the ***Command*** choice, any CDB options, your ***buffer*** choice, then click ***Update CDB*** to apply the changes to the CDB
9. Check ***CDB*** bytes to insure that the CDB is set up the way you want
10. Use the ***Buffers*** function to set any necessary PI data in the eight bytes following the User Data area of your buffer
11. Click the ***Issue CDB*** button to send the CDB to the drive
12. CDB results will be shown

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