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SCSI Toolbox LLC SCSItoolbox32 Manual Version 4.1

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DATA PATTERNS	
13 different data patterns are available for testing – and each p	pattern can optionally have the data
block overlaid, making a total of 26 data patterns ! All Zeros	
All Ones	
Alternating (0/1)	
Alternating (1/0)	
Incrementing	
Decrementing	
Block Number	
Random	
User Defined	
Walking Ones	
Walking Zeros	
Alt (0/1) then Alt (1/0)	
Alt (1/0) then (0/1)	
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Introduction

The SCSItolbox32 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 it's installed base of thousands.

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

The SCSItoolbox32 runs under Windows 9x, Windows NT, Windows 2000, and Windows XP 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 includes a complete Manufacturing environment, as well as development tools to develop test routines using Microsoft Visual Basic or Visual C++.

Installation

Insert the SCSItoolbox32 CD into your computer's CDROM drive. If the drive is auto-run enabled, the installation process will start automatically. If not, use Explorer to browse to the CDROM root director and double-click on the setup.exe icon.

The installation process will install the program executable and dll files, and all necessary device driver files. In addition, it will install software to operate the Hasp copy protection "dongle".

Upon completion of the installation process you will be prompted to reboot your computer. Install the hardware key (dongle) onto the printer port of your computer and reboot.

Windows 98 Users

PLEASE NOTE!!!!

If you are installing the SCSItoolbox under Windows 98 or ME you will need to rename the file "PTI2GBASE-98.dll" to "PTI2GBASE.DLL". This file is located in the SCSItoolbox folder.

Main Menu

Eie Adapter Options Disk Tape Trikebox SAF-TE (SEP	Buffer	r ScriptWriter Pro Help	- 🗆 🗵
Scan Bus Scan System Target 0: Not Available Target 1: Not Available Target 2: Not Available Target 2: Not Available Target 3: Not Available Target 3: Not Available Target 4: HITACHI DK32DJ-72FC Version A3A9 Capacity = 72205 MB Target 5: SEAGATE ST318304FC Version W60V Capacity = 17782 MB Target 7: Not Available Target 7: Not Available		Clear File View File Log Performance Data	
			11.



The System View shows all HBA's, all targets, and all LUN's attached to the system:

Options

The following options are available from the Options menu choice:



Lock Out (protecting a drive)

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.

Lock Out				×
Bus: 2	Unlocked Targets	Lock >> << Unlock Note: Lock buttons take 10 seconds to refresh	Locked Targets	
	Select All		Select All	
		Return		

When a drive is locked it will appear like this:

TUKEBOY	Target 0: SONY On Line	LIB-304	Version 2.4
	Target 1: Locked		
	Target 2: SONY Off Line	SDX-500C	Version 0108
	Target 3: Not Ava	ailable	
	Target 4: Not Ava	ailable	
	Target 5: Not Ava	ailable	
	Target 6: Not Ava	ailable	
	Target 7: aic78xx		
nonri			

Logging Options

Specify Log File Log Errors Only Log All CDB's Stop Logging Log Performance Data

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

Safe jukebox mode
 Print Reports
 Specify Custom Fields

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):

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

Specifiy 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 denined field 1 or 2.

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
- 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

SCSI DriveWatch				X
SCSI Target = 0	LUN = 0			io's per second
- Kead Data Kates Average Transfer Bate -	0.000	KR/Sec		0.0
Average mansier mate -	0.000	KD/JCC ADL A	'n	0.0
High Transfer Hate =	0.000	NB/Sec, at Block humber	0	0.0
Low Transfer Rate =	0.000	KB/Sec, at Block number	<u> </u>	0.0
Julia Data Batas				
Averade Transfer Bate -	45976.117	KR/Sec		718.4
Average Transfer Trate -	55249 222	KD/Sec	412440	964.9
High Transfer Hate =	5000 000	NB/Sec, at Block number	413440	004.0
Low Transfer Rate =	5968.396	KB/Sec, at Block number	256	93.3
Blocks per Transfer =	128			
Hard Error Count =	0	last error at Block number	0	
Soft Error Count =	0	last error at Block number	0	
T I I DI LI MAN	450432			
Total Blocks Written =	0			
I Otal Blocks Head =	0			
		Show Graphical Display	1	₩.
			_	
Return	Clear Driv	/e Stats	Refresh	LBA - C/H/S

The New 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

Test Alarms	×
Stop Test if:	
Hard errors are greater than 1	
Soft errors are greater than 5	
🗖 Read transfer rate is less than 1000 KB/sec 💿 Avg 🔿 Hi	O Low
□ Write transfer rate is less than 10000 KB/sec ⊙ Avg ○ Hi	O Low
ОК	

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

👪 SCSI To	oolbox32							
File Adapt	er Options	Disk Tape	Jukebox	SAF-TE / SEP	Buffer	Scripts and Sequences	Help	
C Correspondence		Tests			×.	Random Tests	►	
Scan Bu	s scans	Command:	5		•	Sequential Tests	•	□ SafeJukeBox □
I I I I I I I I I I I I I I I I I I I	arget 0: SEAG	Workstatic	on Prep		•	Quick QC		
DISK	apacity = 883	Media Dup	lication			Confidence Tests	•	
T	arget 1: Not A	Create Mo	dePage Fi	le for Diskscreer	ning	Seek Tests		Browse
		Disk Scree	ning Modu	ıle		Verify Media		
I I I I I I I I I I I I I I I I I I I	arget 2: SEAG.	ATE ST3910	2LC Ve	ersion HP03	Ξ	Confirm Drive		
DISK	apacity = 889 i	мв				Performance Tests	•	r File View File
I IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	arget 3: SEAG.	ATE ST3910	2LC Ve	ersion HP03		HP MO Diagnostics		
DISK	rr Line					Blocking Factor Tests		nance Data
T	arget 4: Not Av	vailable				Bus Load Test	•	
						Zone Test Outide Duine Duefile		
T	arget 5: Not Av	vailable				Quick Drive Pronie		
						A/V Data Data conformance		
T	arget 6: Not Av	vailable				Ayv - Data Performante Drive Self Test	-	
						Drive Screeping Test		
T (Carlor	arget 7: adpu1	60m				High Speed Data Test		
ADAPT					~	nigh speed bata rest	_	,
4								
							_	
								14

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.

SCSI Disk Device Te	sts		
Test Name:		12 A	
Sequential Read Test	(Non-Destructive)		🔲 Ignore Blank Checks
Total Blocks:	4109999	1	
Current Block:	0	1	
Last Error at Block:	0		
Time to Complete:			
Average Transfer Rate (KB / Sec.):	0]	
Start Block:	0		
End Block:	4109999		
Blocks per Transfer:	128		
Number of Passes:	1		
Use Block Numb	er		
Test Results :			
Click Start to be	gin test - Return to exi	t	
Return	Start Test	Drive Watch	Set Alarms

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.	
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.

SCSI Disk Device Te	sts		
Test Name:		N	
Sequential Write Test	(Destructive)	45	🔲 Ignore Blank Checks
Total Blocks:	4109999		
Current Block:	0		
Last Error at Block:	0		
Time to Complete:	()		
Average Transfer Rate (KB / Sec.):	0		
Start Block:	0		
End Block:	4109999		
Blocks per Transfer:	128		
Number of Passes:	1		
Use Block Numb	er Set Data Patterr	1 00 3E	B6 AF 00 00 02 00
Test Results :			
Click Start to be	gin test - Return to exit		
Return	Start Test	Drive Watch	Set Alarms

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	
	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.	

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.

SCSI Disk Device Te	sts			
Test Name:		5		
Sequential Write/Rea	d Test (Destructive)			Blank Checks
Total Blocks:	4109999			
Current Block:	0			
Last Error at Block:	0			
Time to Complete:				
Average Transfer Rate (KB / Sec.):	0			
Start Block:	0			
End Block:	4109999			
Blocks per Transfer:	128			
Number of Passes:	1			
Use Block Numb	er Set Data Pattern	00 3E	B6 AF 00	00 02 00
Test Results :				
Click Start to be	jin test - Return to exit			
Return	Start Test Driv	e Watch	Set Alarms	

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	
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.

ap Drive Defects	
Starting Block =	Blocks Scanned = 0
Ending Block = 4109999	Log Results to Disk
Errors reported via Sense Data Blocks Recovered = 0 Blocks Recovered with no ECC = 0 Blocks Recovered with retries = 0 Blocks Recovered with ECC = 0 Blocks Recovered with ECC = 0 Blocks Recovered with ECC + Retries = 0 Unrecovered Blocks = 0	Blocks Recovered using positive offset 0 Blocks Recovered using negative offset 0 Blocks Recovered Sata AutoReallocated 0 Blocks Recovered Previous Sector ID 0 Blocks Recovered w/ ECC - AutoReallocated 0 Blocks Recovered w/ ECC - AutoReallocated 0 Blocks Recovered w/ ECC - AutoReallocated 0
Errors reported via Log Pages Errors Recovered without delay = 0 Errors Recovered with retries = 0 Errors Recovered with ECC = 0	Total times recovery invoked = 0 Total unrecovered errors = 0 Total errors recovered = 0
Return Start Scan	

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	

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.

SCSI Disk Device Tests		
Test Name:		
Sequential Write/Veri	fy Test (Destructive)	🔲 Ignore Blank Checks
Total Blocks:	4109999	
Current Block:	0	
Last Error at Block:	0	
Time to Complete:		
Average Transfer Rate (KB / Sec.):	0	
Start Block:	0	
End Block:	4109999	
Blocks per Transfer:	128	
Number of Passes:	1	
Use Block Numb	er <u>Set Data Pattern</u> 00 3E	B6 AF 00 00 02 00
Test Results :		
Click Start to be	gin test - Return to exit	
Return	Start Test Drive Watch	Set Alarms

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	
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.

SCSI Disk Device Te	sts			
Test Name:				
Random Read Test (Non-Destructive)		🔲 Ignore Blank Checks	
Total Blocks:	4109999			
Current Block:	0			
Last Error at Block:	0			
Time to Complete:				
Average Transfer Rate (KB / Sec.):	0			
Start Block:	0			
End Block:	4109999			
Blocks per Transfer:	128			
Number of Passes:	1			
Use Block Numb	per			
Test Results :				
Click Start to be	gin test - Return to exit			
Return	Start Test Driv	ve Watch	Set Alarms	

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	
	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.

Test Name: Random Write Test ()	Destructive)	Lanara Plank Chaoka
riandom white rest [I Ignore blank checks
Total Blocks:	4109999	
Current Block:	0	
Last Error at Block:	0	
Time to Complete:	:	
Average Transfer Rate (KB / Sec.):	0	
Start Block:	0	
End Block:	4109999	
Blocks per Transfer:	128	
Number of Passes:	1	
Use Block Numl	ber Set Data Pattern 00 3E B6	AF 00 00 02 00
Test Results :		

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	

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.

SCSI Disk Device Te	sts			
Test Name:				
Sequential Write/Rea	ad Test (Destructive)		🔲 Ignore Blank Checks	
Total Blocks:	4109999			
Current Block:	0			
Last Error at Block:	0			
Time to Complete:	()			
Average Transfer Rate (KB / Sec.):	0			
Start Block:	0			
End Block:	4109999			
Blocks per Transfer:	128			
Number of Passes:	1			
Use Block Number Set Data Pattern 00 3E B6 AF 00 00 02 00				
Test Results :				
Click Start to begin test - Return to exit				
Return	Start Test)rive Watch	Set Alarms	

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 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.

SCSI Disk Device Te	sts			
Test Name:				
Random Write/Verify	Test (Destructive)	🗖 Ignore Blank Checks 🛛 📐		
Total Blocks:	4109999	Ů		
Current Block:	0			
Last Error at Block:	0			
Time to Complete:				
Average Transfer Rate (KB / Sec.):	0			
Start Block:	0			
End Block:	4109999			
Blocks per Transfer:	128			
Number of Passes:	1			
Use Block Number Set Data Pattern 00 3E B6 AF 00 00 02 00				
Test Results :	Test Results :			
Click Start to begin test - Return to exit				
Return	Start Test Drive Watch	Set Alarms		

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 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.

SCSI Disk Device Te	sts			
Test Name:				
Disk Quick Q/C Test	(Destructive) 🔽 Ignore Blank Checks			
Total Blocks:	0			
Current Block:	0			
Last Error at Block:	0			
Time to Complete:				
Average Transfer Rate (KB / Sec.):	0			
Start Block:	0			
End Block:	4109999			
Blocks per Transfer:	128			
Number of Passes:	1			
Use Block Number Set Data Pattern 3F 64 72 61 77 73 63 72				
Test Results :				
Click START TE	ST to begin			
Return	Start Test Drive Watch Set Alarms			

Quick Drive Profile

Quick Drive Profile			
Vendor = COMPAQ Product = ST32171W F/W = 0388			
Read Transfer Rate Average = 2407.64 High = 5817.89 KB/S Number of Blocks Read = 7626			
Write Transfer Rate Average = 592.58 High = 599.88 KB/S Number of Blocks Written = 970			
Read Blocks 2 = 0.27 8 = 241.18 64 = 5152.28 128 = 5588.40 256 = 5678.09 512 = 5817.89 KB/S			
Write Blocks 2 = 202.35 8 = 463.16 64 = 525.57 128 = 598.32 256 = 580.58 512 = 599.88 KB/S			
Average Seek = 8.805276 Ms Write Cache = OFF Read Cache = ON Number of Segments = 3			
Number of Primary Defects = 305 Number of Grown Defects = 0 Hard Errors = 0 Soft Errors = 0			
Status: Finished			
✓ Enable Destructive Tests			
Exit Profile Drive File Output Cancel			

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).

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.

Drive Profile File Output			<u>×</u>	<
Output File Name =			Browse	
ASCII Text File				
C Comma Delimited File				
- File Save Fields				
Vendor ID	Product ID	Firmware Version	🔽 Error Info	
Read Statistics	☑ Write Statistics	Seek Statistics		
🔽 Read Avg /High	🔽 Write Avg/High	🔽 Defect Info		
ОК	Save File	e	Cancel	

AV/Data Performance Comparison

Drive Optimization Test	×
Not Optimized Optimized for A/V .0002% Data Errors .0002% Data Errors Optimization Increase Read Speed: MB/s MB/s % Write Speed: MB/s MB/s %	
Status: This test will measure the data transfer rate of your drive with and without A/V optimization. A 10 MB data pattern that contains 24 bytes of errors is transferred in each test phase. This test will write data to this disk drive STARTING THIS TEST WILL DESTROY ANY DATA!!! Click START TEST to test, or OK to return	
OK Start Test	

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).			

Drive Optimization Test Dialog

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

Drive Optimizati	ion Test					X
.(Read Speed: Write Speed:	Not Optimized 0002% Data Erro 4.246 0.585	ors MB/s MB/s	Optimized for A. .0002% Data Err 5.739 0.616	/V ors MB/s MB/s	Optimization In 35 5	crease % %
Status: Running rea Setting drive Running rea Running writ Setting drive Running writ Restoring dri	to DATA optim d transfer rate to to AV optimizat d transfer rate to to DATA optim te transfer rate to ive to original st d - Click OK to r	ization est est est est ate eturn				
ОК		9	Start Test			

Drive Confidence Test 1

Disk Test Informa	tion					
Test Name	Disk Confi	dence Test				
						Select All Targets
DiskStart Block	0	Number of passes :	1	Starting Blocks Per Xfr	3	Target 4 Target 5
Disk Ending Block	35566477	Percent to test:	5	Ending Blocks PerXfr	28	Target 6
Current Test Block :	= 0	End of Test	= 0	☐ Ignore	e Errors	
Data Pattern: 00	00 00 00	00 00	00 00	, Logic	nois	
	Informatio	in / Test Resu	ults			
Enter data patte	rn and percer	it of disk to te:	st then clic	k Start Test	×	
Return	Start Test					Select All LUNs

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.

Drive Confidence Test 2

Disk Test Informati	on	
Test Name	Disk Confidence Test 2	Colors All Torrow
DiskStart Block (Disk Ending Block Current Test Block = Data Pattern: 00 0	Number of passes : 1 Starting Blocks Per Xfr 8 35566477 Percent to test: 5 Ending Blocks Per Xfr 128 0 End of Test = 0 Ignore Errors 10 00 00 00 00	Target 4 Target 5 Target 6
Enter percent of d	Information / Test Results	
Return	Start Test	Select All LUNs

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

Disk Seek Tests		
Device Information: Target 6 If	BM DDYF-T18350S	Select Devices
Seek Test Type: Random Seek 1/3 Stroke Seek Single-Track Seek Butterfly Seek User Defined Seek Average Seek Time: Choose test, then Click START	Block One 0 Block Two 35566477 Number of seeks 1000	
Return	st	

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 Seel	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 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

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

Disk Drive Performance Infor	mation
Read Transfer Rate Per	formance Test
MBytes to Transfer: 50 Starting Block: 0 Blocks per Transfer: 32	Ignore Errors ✓ Increment Blocks
Test Results:	
Elapsed Transfer Time = 2754	1 milliseconds
Sustained Average Transfer F	Rate = 18591 KB/sec
Return	Start Test

Disk Drive Perform	ance Informa	ation		
Write Trans	fer Rate Perfor	mance Test		
MBytes to Transfer: Starting Block: Blocks per Transfer:	50 0 32		Ignore Erro	ors Blocks
Test Results:				
Elapsed Transfer	Time = 3.000 s	seconds		
Sustained Averag	ge Transfer Rat	te = 17066.667 KB	3/sec	
Return				Start Test

HP MO (Magneto Optical) Tests

HP MO Disk Diagnostics	
Available Tests	Current Test
1 - Power on Test 2 - Processor Test 3 - NVRAM Test 4 - ROM Test 5 - CPU RAM Test 6 - SPIFI Test 7 - EDAC Test	Number of passes : 1
Test Result	3
Double-Click desired test,set the number of passes then Click START TEST to begin testing	
Cancel	

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

Blocking Factor Tests

Disk Test Information
Test Name Disk Read Transfer Rate Performance Test
DiskStart Block 0 Starting Blocks Per Xfr 8 Disk Ending Block 144410879 Ending Blocks Per Xfr 128
Current Test Block = 16000 End of Test =
Information / Test Results Target 4 HITACHI DK32DJ-72FC Read transfer rate using 8 block transfers = 5163.893 KB/sec Read transfer rate using 16 block transfers = 9733.840 KB/sec Read transfer rate using 32 block transfers = 17326.565 KB/sec Read transfer rate using 32 block transfers = 29210.331 KB/sec Read transfer rate using 128 block transfers = 44258.078 KB/sec Read transfer rate using 128 block transfers = 44258.078 KB/sec Read transfer rate using 128 block transfers = 44258.078 KB/sec Read transfer rate using 128 block transfers = 44258.078 KB/sec Read transfer rate using 128 block transfers = 44258.078 KB/sec Read transfer rate using 129 block transfers = 44258.078 KB/sec Read transfer rate using 512 block transfers = 4710.768 KB/sec Read transfer rate using 1024 block transfers = 47210.768 KB/sec Read transfer rate using 2048 block transfers = 47185.920 KB/sec Test finished - Click Return to continue
Return Start Test Graph

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.

Disk Test Informatio	DN		
Test Name	Disk Read Transfer Rate Performa	nce Test	
DiskStart Block Disk Ending Block Current Test Block = 1	6000 End of Test =	Starting Blocks Per Xfr Ending Blocks Per Xfr 128	
	Information / Test Results		
60000 40000 20000			
	500 1000 1500	2000 2500	
Return	Start Test	Text	

Bus Load Test

Disk Test Information			
Test Name Bus V	/rite Transfer Rate Performar	nce Test	Select All Targets
DiskStart Block 0 Disk Ending Block 19531 Current Test Block = 16000	End of Test =	Starting Blocks Per Xfr Ending Blocks Per Xfr 128 Ignore Errors	Target 4 Target 5 Target 6
Infor Click STABT TEST to be	mation / Test Results coin test		LUN 0
This test will cause slow	system response		
Return	Test		Select All LUNs

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.



Dick Test Information			
Disk rest information			
Test Name Bus Write	Transfer Rate Performance	e Test	
			Select All Targets
DiskStart Block	S	itarting	Taraat 4
	B	llocks Per Xfr	Target 5
Disk Ending Block 19531	E	nding Blocks	Target 6
Disk Ending block	F	erXfr 120	
Current Test Block = 16000	End of Test =	1	
[
Informati	on / Test Results		
Write transfer rate on device	5, using 16 block transfer	s = 17372.068 KB/se 🔺	LUN 0
Write transfer rate on device	6, using 16 block transfer: 122 KB /ago	s = 13031.421 KB/se	
Average device throughput = 6661.	= 22873.045 KB/sec		
Write transfer rate on device	4, using 32 block transfer	s = 38215.645 KB/se	
Write transfer rate on device	 5, using 32 block transfer; 6, using 32 block transfer; 	s = 27397.873 KB/se s = 13031 /21 KB/se	
Total bus throughput = 7864	4.938 KB/sec	s = 13031.421 KD786	
Average device throughput =	= 26214.979 KB/sec		
) (rite transfer rate on device	4 using 64 block transfer	a - 20215 C//5 // D /oc	
Write transfer rate on device	 - 4, using 64 block transfer - 5, using 64 block transfer 	s = 30653.377 KB/se 🖵	
1			
Return Start Tes	t	Graph	Select All LUNs

Drive Self Test

Drive Self Test	×
Test Type	
Short Test (120 Seconds)	
C Extended Test (667 Seconds)
0% Test Progress	100%
DST Results: (double-click on an entry to interpret re	sults)
01 - 03 10 2F 00 00 00 FF FF FF FF FF FF FF FF FF 00 02 - 03 10 20 00 00 05 FF FF FF FF FF FF FF FF FF 00	00 00 00
03 - 03 10 20 00 00 05 FF FF FF FF FF FF FF FF FF 00 04 - 03 10 20 00 00 02 FF FF FF FF FF FF FF FF FF 00	00 00 00 00 00 00
05 - 03 10 00 00 00 00 00 00 00 00 00 00 00 00	00 00 00
Test Interpretation/Test Status: Short Test started at 08/05/02 12:18:47	
Rahum Coursel Test	Drint
Lancel Test	Print

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.

Drive Self Test	×
Test Type Short Test (120 Seconds) Extended Test (667 Seconds)	
0% Test Progress	100%
DST Results: (double-click on an entry to interpret results) 01 - 03 10 2F 00 00 00 FF FF FF FF FF FF FF FF FF 00 00	
Test Interpretation/Test Status: Entry Number = 2, Timestamp = 0 Self-Test Code = 001b "Background short self-test" Self-Test Results = 0 "Self-test completed without error"	
Sense Key = UU, Sense Code = UU, ASU = UU Vendor Specific = 00	
Return Cancel Test	Print

Disk Zone Te	est						×
	Starting Block	Ending Block	Current Block	Last Error	Total Errors		
Zone 0	0	4979009				🔽 Test	
Zone 1	4979010	9659259				🔽 Test	- 1
Zone 2	9659260	13918869				🔽 Test	Zone 0-15
Zone 3	13918870	17877253				🔽 Test	
Zone 4	17877254	21465733				🔽 Test	Zone
Zone 5	21465734	24666833				🔽 Test	16-31
Zone 6	24666834	27521282				🔽 Test	
Zone 7	27521283	30051322				🔽 Test	
Zone 8	30051323	32291686				🔽 Test	
Zone 9	32291687	34269718				🔽 Test	
Zone 10	34269719	35964300				🔽 Test	
Zone 11						🗖 Test	
Zone 12						🗖 Test	
Zone 13						🔲 Test	
Zone 14						🔲 Test	
Zone 15						🗖 Test	
Percentage	of zones to test =	100 Total :	zones on drive =	11 Sta	atus =		
Current Tes	t Parameters = S	eq. Read , Blocks/	Xfer = 128, 100%	of zones tested	, Passes = 1		
Start Tes	st Build	Zone Map	Set Test Parar	neters	Stop	Ret	urn

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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Zone Test Parameters	×
Test Action Read C Verify C Write C Write/Read	
Blocks per Transfer = 128	
Percentage of zone to test = 100 Number of passes = 1	
Return	

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

Zone 0 (Zone 1 4 Zone 2 5 Zone 3 1 Zone 4 1 Zone 5 2 Zone 6 2	0 4979010 9659260 13918870 17877254 21465734	4979009 9659259 13918869 17877253 21465733	5760 4984770 9665020 13924630 17883014	0 0 0 0	0 0 0 0	I Test I Test I Test I Test I Test	Zone 0-15
Zone 1 2 Zone 2 5 Zone 3 1 Zone 4 1 Zone 5 2 Zone 6 2	4979010 9659260 13918870 17877254 21465734	9659259 13918869 17877253 21465733	4984770 9665020 13924630	0 0 0	0 0 0 0	I Test I Test I Test	Zone 0-15
Zone 2 § Zone 3 1 Zone 4 1 Zone 5 2 Zone 6 2	9659260 13918870 17877254 21465734	13918869 17877253 21465733	9665020 13924630 17883014	0	0	I Test I Test	Zone 0-15
Zone 3 1 Zone 4 1 Zone 5 2 Zone 6 2	13918870 17877254 21465734	17877253 21465733	13924630	0	0	🔽 Test	
Zone 4 🛛 🕅 Zone 5 🕅 🖓 Zone 6 🖓	17877254 21465734	21465733	17883014				_
Zone 5 🛛 💈 Zone 6 🛛 💈	21465734	2400000	11/003014	0	0	🔽 Test	Zone
Zone 6 🛛 🛛		2466633	21471494	0	0	🔽 Test	16-3
	24666834	27521282	24672594	0	0	🔽 Test	_
Zone 7 🛛 💈	27521283	30051322	27527043	0	0	🔽 Test	
Zone 8 🛛 🔅	30051323	32291686	30056955	0	0	🔽 Test	
Zone 9 🛛 🔅	32291687	34269718	32297319	0	0	🔽 Test	
Zone 10 🛛 🔅	34269719	35964300	34275351	0	0	🔽 Test	
Zone 11						🗖 Test	
Zone 12						🔲 Test	
Zone 13						🔲 Test	
Zone 14						🔲 Test	
Zone 15						🔲 Test	
Percentage of Current Test P	f zones to test = Parameters = Si	15 Total	zones on drive = Xfer = 128, 15% (11 Sta	atus = 🛛 🕹		

. 1

CD Performance Test

CD/CDR/DVD Test					×				
This test will check the read,seek, and start/stop functions . It will also measure drive performance.									
Read Transfer Rates:	Speed	Average	High	Low					
Inner Tracks:	32 X	5649.60	6241.58	2128.15	KB/s				
Outer Tracks:	32 X	5621.95	6228.00	343.64	KB/s				
Stop Time : 18.254	sec.								
Start Time : 13.178	sec.								
Status :									
Testing Finished									
ОК		Start Test							

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.

Drive Screen/Verify Test

😹 SCSI Toolbox32	
File Adapter Options Disk Tape Jukebox SAF-TE/SEP Buffer Scripts and Sequences Help	
St Drive Screening Test	X
This test will execute a sequential Verify Test (non-destructive) across the surface of either the selected drive, or all drives attached to all adapters on the system. At the end of the test a report will be displayed that will show the results of the Verify Test, and the number of Primary and Grown defects for each drive. Click the Start Test button to begin the test. Click the Cancel button at any time to abort the test.	
Image: State of Drive only Percent of Drive to Test = 100 Current Block = 12928 Elapsed Run Time = 0.5 Minutes Image: Test All Attached Drives Highest Block to Test = 144410879	
Testing diver: Bus 0. Target 0. VVDC W/D400EB-11CPF0 06.0 Capacity = 78155359 Blocks, S/N = _Primary Defects = 0, Grown Defects = 0, HP03 Capacity = 17783111 Blocks, S/N = LB64426, Primary Defects = 1021, Grown Defects = 0, HP03 Capacity = 17783111 Blocks, S/N = LB64426, Primary Defects = 1019, Grown Defects = 0, HP03 Capacity = 17783111 Blocks, S/N = LB64426, Primary Defects = 1021, Grown Defects = 0, HP03 Capacity = 17783111 Blocks, S/N = LB64426, Primary Defects = 1019, Grown Defects = 0, HP03 Capacity = 17783111 Blocks, S/N = LJA16690, Primary Defects = 3, Grown Defects = 0, HP03 Capacity = 17783111 Blocks, S/N = LJA16690, Primary Defects = 2, Grown Defects = 0, HP03 Capacity = 17783111 Blocks, S/N = LJA02455, Primary Defects = 3, Grown Defects = 0, HP03 Capacity = 17783111 Blocks, S/N = LJA02450, Primary Defects = 3, Grown Defects = 0, HP03 Capacity = 17783111 Blocks, S/N = LJA02450, Primary Defects = 3, Grown Defects = 0, HP03 Capacity = 17783111 Blocks, S/N = LJA02450, Primary Defects = 3, Grown Defects = 0, HP03 Capacity = 17783111 Blocks, S/N = LJA02450, Primary Defects = 3, Grown Defects = 0, HP03 Capacity = 17783111 Blocks, S/N = JLA02450, Primary Defects = 3, Grown Defects = 0, HP03 Capacity = 3556477 Blocks, S/N = SL005MO, Primary Defects = 37, Grown Defects = 0, F260 Capacity = 3556477 Blocks, S/N = 2002X/0, Primary Defects = 9, Grown Defects = 0, F260 Capacity = 3556477 Blocks, S/N = 2003589, Primary Defects = 4531, Grown Defects = 0, F260 Capacity = 3556477 Blocks, S/N = 2004369, Primary Defects = 4346, Grown Defects = 0, W60V Capacity = 3556477 Blocks, S/N = 2003589, Primary Defects = 233, Grown Defects = 0, W60V Capacity = 3556477 Blocks, S/N = 300A3589, Primary Defects = 1058, Grown Defects = 0, A349 Capacity = 144410879 Blocks, S/N = 300A3589, Primary Defects = 107, Grown Defects = 0, Bus 3 Target 1100000, Primasy Defects S, S/N = 300A3599, Primary Defects = 1058, Grown Defects = 0, A349 Capacity = 144410879 Blocks, S/N = 300A3599,	
Inquiry	11.

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

SCSI Toolbox32	
File Adapter Options Disk Tape Jukebox SAF-TE / SEP Buffer Scripts and Sequences Help	
Scan Bus Scr. High Speed Data Transfer Test Image: Comparison of the selected device can sustain. Target 0: S This Test will measure the highest data throughput that the selected device can sustain. The Test is NOT destructive - all data on the drive will be safe. Target 1: S Target 1: S The Test is NOT destructive - all data on the drive will be safe. Click the Start Test button to begin measurement. Target 2: F Target 3: S Test Status: Test Status: Target 3: S Target 4: It Starting test, please wait Read 100MB in 1.059585 seconds Read 100MB in 1.189709 seconds Wrote 100MB in 1.189709 seconds Write Tranfer rate = 84.054161 MB/second UTSK Target 7: F OK DTSK Capacity = OK	JukeBox Browse w File
Target selected = 0	1

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.

Disk Commands

The following commands may be accessed from the Commands Menu within SCSItoolbox32.

😹 SCSI Toolbox32		
File Adapter Options Disk Tape Jukebox S	iAF-TE / SEP Buffer ScriptWriter Pro Help	
Scan Bus Scan S: Commands Commands Target 0: Not A Workstation Prep Media Duplication Target 1: Not Available Target 2: Not Available Target 2: Not Available Target 3: Not Available Target 3: Not Available Target 4: HITACHI DK32DJ-72FC Ver Capacity = 72205 MB Target 5: SEAGATE ST318304FC Vec DISK Target 6: IBM DDYF-T18350S Version Capacity = 17782 MB Target 7: Not Available Target 7: Not Available	Information Functions Motion Functions Capacity/Block Functions Mode/Log Page Functions Optimize Download Firmware Data Functions User Defined CDB Build/Run Script Edit Buffer 1 Edit Buffer 2 NW60V	
	Log Sense	11.

INQUIRY

Test Output																	
	SCSI INQUIRY data Transfer Byte Length = 159 bytes 0 1 2 3 4 5 6 7 8 9 Å B C D E F ÅSCII								ASCII								
	$\begin{array}{c} 00\\ 44\\ 57\\ 00\\ 00\\ 17\\ 49\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 0$	$\begin{array}{c} 00\\ 44\\ 36\\ 00\\ 00\\ 17\\ 42\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 0$	03 59 30 00 28 4D 00 00 00 00 00 00 00 00	$22 \\ 46 \\ 56 \\ 00 \\ 00 \\ 43 \\ 20 \\ 00 \\ 00 \\ 00 \\ 00 \\ 00 \\ 00 \\ 0$	9F 2D 35 00 29 43 00 00 00 00 00 00 00 00 00	00 54 45 00 20 6F 00 00 00 00 00 00 00 00	$\begin{array}{c} 70\\ 31\\ 4C\\ 00\\ 00\\ 43\\ 72\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 0$	02 38 42 00 6F 70 00 00 00 00 00 00 00 00	49 33 46 00 20 2E 00 00 00 00 00 00 00 00	42 35 32 00 00 20 00 00 00 00 00 00 00 00 00 00	4D 30 33 00 00 72 31 00 00 00 00 00 00 00 00	20 53 00 00 69 00 00 00 00 00 00 00 00	20 20 00 00 67 39 00 00 00 00 00 00 00	20 20 00 00 68 39 00 00 00 00 00 00 00	20 20 00 00 74 2E 00 00 00 00 00 00 00	20 20 00 00 20 20 20 00 00 00 00 00 00 0	p.IBM DDYF.T18350S W60V5ELBF233 CCopyright. IBM.Corp1999.
Return																	

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

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.

Start Drive (Motion Commands)

This command will start the disk drive and report the time needed for the drive to report as on line.



Stop Drive (Motion Commands)

This command will stop the drive and report the time taken to stop.

📲 Information Message 🛛 🗙									
٩	Target 1 Stop Unit Command Status: Su cess Stop Time = 21.313 s	econds							
	ОК								

Start All (Motion Commands)

This command will start all drives on the selected HBA.

Stop All (Motion Commands)

This command will stop all drives on the selected HBA.

Read Capacity (Capacity/Block Functions)

🖫 Information Message 🛛 🗙									
Target 1 Read Capacity Command Status: Success Drive Reports: 4110000 Blocks 51 bytes / block 2006 MB (1 MB = 1,048,576 Bytes) 2054 MB (1 MB = 1,024,000 Bytes) 2103 MB (1 MB = 1,000,000 Bytes) OK									

Change Capacity (Capacity/Block Functions)

This command allows you to change the capacity (highest LBA) of the drive. The LBA is specified in hexadecimal. This command will only change the capacity of the drive if the drive firmware allows changing capacity.

Change Number of Blocks								
Current highest LBA : 3EB6AF								
New highest LBA: 3EB6AF								
Return	Cancel							

Change Blocksize (Capacity/Block Functions)

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!

Change Block Size
Current Size: 512 bytes per block
256 bytes per block
512 bytes per block
1024 bytes per block
2048 bytes per block
C User defined
Select block size, then click CHANGE
Return Change

Change Definition



View/Edit Mode Pages (Mode/Log Page Functions)

The following MODE PAGES can be viewed and edited:

Choose Mode Select Page 🔘 00 - Unit Attention Page O 0x0A - Control Mode 🔘 00 - IBM Vendor Unique Page C 0x10 - XOR Control 01 - Error Recovery O 0x14 - Enclosure Service Management C 02 - Disconnect/Reconnect O 0x19 - Fibre Channel Interface Control O 04 - Ridged Disc Drive Parameters C 0x1C - IE Control C 07 - Verify Error Recovery O 0x25 - Digital Special Function 🔘 08 - Caching O Display all available pages Edit Page Return

Select the MODE PAGE to view/edit, then click the Edit Page button. The example below shows the Caching Page:

Caching - Page Code 0:	ĸ08		
RCD 00	# of segments	03	R
MF 00			
WCE 00]		
Disable PreFetch Lenoth - MSB	FF	Maximum PreFetch - MSB	FF
Disable PreFetch Lenath - LSB	FF	Maximum PreFetch - LSB Maximum PreFetch	FF
Minimum PreFetch - MSB	00	Ceiling - MSB	FF
Minimum PreFetch - LSB	00	Maximum PreFetch Ceiling - LSB	FF
Display Values			
• Current • Saved			
🔿 Default 🔿 Change	able	ave Page Restore De	efaults Return

Any of the MODE PAGE parameters may be changed/edited. To save the page data (MODE SELECT) click the Save Page button.

The Restore Defaults button will restore the factory default values

The Display Values radio buttons allow you to view the current, default, saved, or changeable mask values.

View All Mode Pages (Mode/Log Page Functions)

Choose the Display all available pages choice of the Choose Mode Select Page dialog to display all of the MODE PAGES of a drive

Al	l availa	able mod	le pages	×
	Page	Length	Data	
	00	02	40 00	
	01	0A	00 46 40 00 00 00 22 00 FF FF	
	02	OE	80 80 00 04 00 00 00 00 00 00 00 00 00 00 00	
	03	16	00 1E 00 76 00 00 00 00 00 A5 02 00 00 01 00 28 00 4B 40 00 00 00	
	04	16	00 14 34 05 00 00 00 00 00 00 00 00 00 00 00 00	
	07	0A	OC 46 40 00 00 00 00 00 FF FF	
	08	12	10 00 FF FF 00 00 FF FF FF FF 80 03 00 00 00 00 00 00	
	09	0E	00 00 00 00 00 00 00 00 00 00 00 00 04 04	
	I A D	0A	02 00 00 00 00 00 00 00 00 00	
	0C	16	80 00 00 18 00 00 00 00 00 00 00 14 3D 04 00 00 00 00 00 00 10 00	
	1A 👘	0A	00 00 00 00 01 00 00 04	
	1C	0A	01 03 00 00 00 00 00 00 00 01	
	·			
	Retur	n		

Restore Default Mode Pages

This command will restore all of the drives MODE PAGES to their factory default values.

View Log Pages (Mode/Log Page Functions)

This commands displays the LOG PAGE data from the drive. The raw (uninterrupted) data is displayed as below:

View Log Pages	×
Available Pages Page 02 Page 05 Page 06 Page 2F Page 30 Page 37 Page 3E	Log Page Data - Page 02 Parameter Code 01 - 00 00 00 00 00 Parameter Code 02 - 00 00 00 00 00 Parameter Code 03 - 00 00 00 00 00 Parameter Code 04 - 00 00 00 00 00 Parameter Code 05 - 00 00 00 00 140 CA 00 00 Parameter Code 06 - 00 00 00 00 00
Use Description File	Browse
C Current Threshold © Current Cumula	tive C Default Threshold C Default Cumulative
OK Save to File	Cancel

Clicking on the Use Descriptor File will use a text file (disk.def) to interpret the log data, as below:

View Log Pages	×	
Available Pages Log P	age Data - Page 02	
Page 02 - Write Error Counter Page Error Page 03 - Read Error Counter Page Total Page 05 - Verify Error Counter Page Total Page 06 - Non-medium Error Counter Page Total Page 2F Page 30 Page 37 - Cache Statistics Page Total Page 3E - Factory Log Page Total	Errors corrected with possible delays 00 00 00 00 Total rewrites 00 00 00 00 Total Errors Corrected (soft errors) - 00 00 00 00 Total Times Correction Algorithm Processed - 00 00 00 00 Total Bytes Processed - 00 00 00 00 140 CE 00 Total Errors Uncorrected (hard errors) - 00 00 00 00	
	>	
Use Description File	Release\Disk. Browse	
C Current Threshold C Current Cumulative	O Default Threshold O Default Cumulative	
OK Save to File	Cancel	

Optimize drive for A/V use

This command sets the specified MODE PAGE variables to optimize the drive for highest A/V performance.

Disk Optimization		×
Optimize Drive for A/V use	Status/ Results: Optimizing Read Error Recovery for A/V Optimizing Write Error Recovery for A/V Optimizing Disconnect Parameters for A/V Optimizing Write Caching for A/V Optimizing Cache Segments for A/V Optimizing Read Caching for A/V Optimizing Logging Parameters for A/V Optimizing CACHINE Recoverations for A/V	ß
Optimize Drive for Data use	A/V Optimization finished	
ОК		

Optimize drive for Data use

This command sets the specified MODE PAGE variables to optimize the drive most reliable data operation.

Disk Optimization		N	×
	Status/ Results:	13	
Optimize Drive for A/V use	Optimizing Read Error Recovery for Data Optimizing Write Error Recovery for Data Optimizing Disconnect Parameters for Data Optimizing Write Caching for Data Optimizing Cache Segments for Data Optimizing Read Caching for Data Optimizing Logging Parameters for Data Optimizing SMABT Parameters for Data		
Optimize Drive for Data use	Data Optimization finished		
ОК			

Download firmware

😹 SCSI Toolbox32	
File Adapter Options Disk Tape Jukebox SAF-TE / SEP Buffer ScriptV	Vriter Pro Help
Scan Bus Scan S Commands Information Functions Target 0: Not A Workstation Prep Motion Functions Media Duplication Target 1: Not Available Capacity/Block Functions Target 2: Not Available Capacity/Block Functions Target 3: Not Available Download Firmware Data Functions User Defined CDB Build/Run Script Edit Buffer 1 Edit Buffer 2 Capacity = 17981 MB Target 6: IBM DDYF-T18350S Version W60V Capacity = 17782 MB Target 7: Not Available Version W60V	Print Reports Safe JukeBox F Error Logging : File Browse Type None Segmented Download Segmented Download Hitachi Download IBM Download HP MO Download Month Download Firmware Vendor + Product ID Configurations
Target selected = 5	Read Capacity //.

Firmware can be downloaded in drives via five Download Firmware commands.

Use the Browse button to specify the firmware file name, then click the Download button.

Most disk drives support the Segmented Download choice. If the disk is a Hitachi or IBM drive use the proper choice.

If the drive requires a non-segmented download use this choice.

Format

This command issues a "low-level" format command to the disk drive. The default format command will discard the Grown defect list.

Disk Format	x
Format Parameters Default Format	Format Time = min
Statue	
Return	Start Format

If the Default Format check box is "un-checked" the following format options can be specified:

Disk Format	×
Format Parameters Default Format Discard G list during format DCRT (Disable Certification) DPRY (Disable Primary) Immed (Immediate) DSP (Disable Saving Parameters) STPF (Stop Format) IP (Initialization Pattern) IP Modifier © 0 0 © 0 1 © 1 0 Pattern Type = 0 Pattern Length = 0	Format Time = min
Return	Start Format

Please note – not all disk drives support all format options.

Corrupt Data

Corrupt Disk Data	×
	Select Devices
Disk ECC Correction Span Length = 160 bits (decimal)	Select All Targets
Blocks to Corrupt : From Block # 0	
Number of Blocks to Corrupt =	
Corrupt every 0 block(s)	
Corruption Span Length = 160 bits (decimal)	
Current Block being Corrupted = 0	
Results =	
Return Start Corruption	Cancel

The corrupt data choice allows you to create soft ECC errors in any block of the drive. Note – these errors can be corrected or removed by writing over the corrupted blocks. The Sequential Write test is used to do this.

Specify the following:

Blocks to Corrupt – From Block # - the starting block to corrupt **Number of Blocks to Corrupt** – how many blocks should be corrupted? Must be > = 1 **Corrupt every** – allows you to skip blocks between corrupt blocks. Must be >= 1 **Corruption Span Length** – set this to > the ECC span length to create unrecoverable errors, or < the ECC span to create correctable errors.

Once you have filled in the above selections, click on the Start Corruption button to begin.

Translate Address

Tranlsate Address	×
LBA Address = 12345	
Physical Address	
Cylinder = 91	
Head = 8	
Sector = 510	
Translate	Return

Enter a LBA address, click the Translate button and the CHS address will be displayed

User Defined CDB

User Defined CDB	×
SCSI Commands	Select Devices
Extended Write,10,0,ff,2a,00,00,00,00,00,00,00,00,ff,00	Select Devices
Format, 6, 1, 00, 04, 00, 00, 00, 00, 00	
Induiry 6.1.ff.12.00.00.00.ff.00	Select All Targets
Lock Unlock Cache,0,00,36,00,00,00,00,00,00,00,00,00	
Log Select,10,0,ff,4c,00,00,00,00,00,00,00,00,00	
Load CDB File Save CDB File Add CDB Delete CDB	
0 1 2 3 4 5	
CDB Name - Inquiru	
CDB Length :	
● 6 Butes Data In ● Out O Data In ● Out O	
C 10 Bytes Dec	
C 12 Butes LBA MSB 0 C Stop on error	
Buffer 1 2 C LBA LSB 0	
CDB Result =	
Return Send CDB View Results Buffers Stop 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

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.

Results	
Results From: User Defined CDB	
CDB = 12 00 00 00 FF 00 Sent to Target 4, LUN 0, Host Adapter 3	A
Status Good - Command completed without error	
र	▼ }
OK Clear Wi	ite Results to File

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.

CDB Sequencer

Command Line CDB Edit Buffer		,
Command Results Inquiry,1 (12 00 00 00 FF 00) COMMAND COMPLETE (0.00113003 Sec) 00 00 03 12 88 00 01 3E 53 45 41 47 41 54 45 20		Options Results Data Length = 16 Bytes Stop On Error
	Clear Save to File	Command Execution Mode- Execute command(s) Queue command(s)
Command Entry		
	Execute	View Available Commands
Lommand History	Clear	
	Options	
	Save to File	
	Load from File	

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.

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.

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.
Build Run Script

SCSI Script		
CDP Eurotions	Script Contents	
STB Test Functions		
Target/LUN/Adapter Functions		
Script Control Functions		
Mode Page Functions		^
Buffer Functions		
	-	v
E dit Item		
Delete Item from Script		
Repeat Script 1 times		
Single Step - Step		
Don't store results		
Execute Script		
Stop Script	Load Script Save Script	
Return View Results	Edit Buffers Stop on Error 🗖 Log Results 🗖	

SCSI Script		
CDB Functions	Coript Contents	
	Inquiry,6,1, FF,12,00,00,00,FF,00,1,1,00,0,0,0,0,0	
STB Test Functions		
Target/LUN/Adapter Functions		
Script Control Functions		
Mode Page Functions Script Te	ests X	
Buffer Functions		
	Disk Tests	
Edit Item	Tape Tests	
Delete Item from Script		
	K Cancel	
Repeat Script 1 times		
Single Step - Step		
Don't store results		
Execute Script		
Stop Script	Load Script Save Script	
Return View Results	Edit Buffers Stop on Error 🗖 Log Results 🗖	

Scripting Disk Tests		×
C Sequential Read Test	C Random Read Test	C Random Seek Test
C Sequential Verify Test	🔿 Random Verify Test	C Single-TrackSeek Test
C Sequential Write Test	C Random Write Test	C Third-Stroke Seek Test
C Sequential Write/Read CompareTest	C Random Write/Read CompareTest	C User Defined Seek Test
C Sequential Write / Verify Test	🔘 Random Write / Verify Test	
O Blocking Factor Read Test		
C Blocking Factor Write Test		
Starting Block = 0 or Ending Block = 0 or	% of disk capacity = 0 % of disk capacity = 0	
Blocks per Transfer = 64	Ignore Errors	
Number of Passes = 1 F	Run time (minutes) = 0	
Return		Cancel

Scrip	t Control Functions	×
	Wait for Test Unit Ready	
	Insert Delay	
	Insert Goto	
	Insert Label	
	Insert "On Error" Label	
	Insert Report Functions	
_		
	UK Cancel	

Scripting Set Target Function	×
Enter Target Address:	Target Incrementation
Target Address = 4	Increment Target
LUN = 0	
Host Adapter = 3	
Return	Cancel

Mode S	elect fo	or Scrip	ot													×
Mode Blo	Page Ni H ock Des	umber = eader = criptor =		××	×	×	×	×	×	$\overline{\times}$			Γ	Set 9	SP bit	
Page I	Data:															
0	1	2	3	4	5	6	7	8	9	0A	OB	00	0D	0E	OF	
\times	\times	\times	\times	\times	\times	\times	\times	\times	\times	\times	\times	\times	\times	\times	$ \times $	
10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	
\sim	\propto	\times	\times	\mathbf{X}	\mathbf{X}	\propto	\mathbf{X}	\times	\mathbf{X}	\mathbf{X}	\times	\mathbf{X}	\mathbf{X}	\mathbf{X}	\mathbf{X}	
Re	eturn]												C	ancel	

Version 4.1

Scr	ipt Buffer Functions	×
	Load/Save/Append to/from Buffers	
	Buffer Comparison Functions	
	OK Cancel	

Script Buffer Functions		×
Disk File Name:		Browse
Buffer 1 💿 2 🔘	 Save Buffer TO FILE Bytes = 32768 Append Buffer TO FILE Bytes = 0 Load Buffer FROM FILE 	Return Cancel

Buffer Compare Script Function	×
Compare Buffer 1 with Buffer 2-Enter Start	ing and Ending bytes:
Starting Byte: 0	
Ending Byte: FFE00	
Return	Cancel



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.

Disk Drive Defect Information	
Primary Defects Grown Defects Defect Data Type = Sector address Number of Defects = 305	Defect List Format © Bytes from Index © Block © Physical Sector
Head = 04 Cylinder = 04144 Sector = 071 Head = 04 Cylinder = 04145 Sector = 064 Head = 04 Cylinder = 04145 Sector = 065 Head = 04 Cylinder = 04145 Sector = 066 Head = 04 Cylinder = 04145 Sector = 067 Head = 04 Cylinder = 04145 Sector = 057 Head = 04 Cylinder = 04385 Sector = 049 Head = 04 Cylinder = 04386 Sector = 042 Head = 04 Cylinder = 04387 Sector = 036	
Head 00> 21 Defects Head 01> 21 Defects Head 02> 50 Defects Head 03> 117 Defects Head 04> 96 Defects	T
OK Cancel Prin	nt Save to File

Please note - not all disk drives will support all three formats

Workstation Prep

SCSI Toolbox32	
File Adapter Options Disk Tape Jukebox SAF-TE / SEP Buffer ScriptWriter Pro Help	
Scan Bus Scan S. Tests Commands Superior Superior File Target 0: Not A Workstation Prep Superior Superior Media Duplication Superior Superior File Browse Target 2: SEAGATE ST31200W SUN1.05Version 9462 File Browse Target 2: SEAGATE ST31200W SUN1.05Version 9462 Capacity = 1030 MB Target 3: SEAGATE ST31200W SUN1.05Version 9462 Target 3: SEAGATE ST31200W SUN1.05Version 8724 Target 4: Not Available Log Performance Data Log Performance Data Target 5: HP Ultrium 1-SCSI Version E09D Off Line Target 7: aic78xx V Target 7: aic78xx V V V V V	
	11.

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, 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.

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.

Test Output
Automatic Drive Label (SUN)
SCSI Target Number 1 Drive Type = SEAGATE cyl 2724 alt 2 hd 9 sec 84 Data Cylinders = 2724 Alt Cylinders = 2 Phy Cylinders = 2726 Heads = 9 Sectors = 84 RPM = 5411
Drive Capacity = 2061108 Blocks (1030 MB) Label Capacity = 2060856 Blocks (1030 MB) Lost Capacity = 252 blocks
Converting Flaw Map Label Written - Click Return to Continue
Return

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.

Test Output

Automatic Drive Label (SUN)
SCSI Target Number 1 Drive Type = SEAGATE cyl 2724 alt 2 hd 9 sec 84 Data Cylinders = 2724 Alt Cylinders = 2 Phy Cylinders = 2726 Heads = 9 Sectors = 84 RPM = 5411
Drive Capacity = 2061108 Blocks (1030 MB) Label Capacity = 2060856 Blocks (1030 MB) Lost Capacity = 252 blocks
Converting Flaw Map Label Written - Click Return to Continue
Return

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.

Te	Test Output				
	Create format.dat Entry				
	Add the following entry to your /etc/format.dat file:				
	disk_type = "SEAGATE ST31200W" \ : ctlr = SCSI : fmt_time = 9 \ : ncyl = 2724 : acyl = 2 : pcyl = 2726 : nhead = 9 : nsect = 84 \ : rpm = 5411 : bpt = 50148				
	partition = "SEAGATE ST31200W" $\$: disk = "SEAGATE ST31200W" : ctlr = SCSI $\$: a = 0, 15876 : b = 21, 65016 : c = 0, 2059344 $\$: g = 107, 1978452				
	Return				

Edit Sun Partition Table

Edit Partition Table						
Drive Capacity = 1029 MB (756 Blocks / Cylinder)						
Partition:	Starting Cylinder	Ending Cylinder	Length (Blocks)	Length (MB)		
0	0	0	0	0		
1	0	0	0	0		
2	0	2724	2059344	1029		
3	0	0	0	0		
4	0	0	0	0		
5	0	0	0	0		
6	0	0	0	0		
7	0	0	0	0		
Save				Cancel		

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.

Test Output			
	Read SGI Drive Label		
Partit:	ion Size (blocks)	Size (MB)	
0 1 2 3 4 5 6 7 8 9 10	32508 80136 0 0 1943676 2056320 4536 0 2060856	16 40 0 0 971 1028 2 0 1030	
	Click Return t	o continue	
Return			

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 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

Test Output				
HP Drive Geometry				
Suggested HP disktab entry (HP 9000-7xx): ST31200W ST31200W:\ :No swap:ns#84:nt#9:nc#1363:\ :s0#1030428:b0#8192:f0#1024:\ :se#1024:rm#5411:				
Suggested HP disktab entry (HP 9000-8xx): ST31200W ST31200W:\ :ty=winchester:ns#84:nt#9:nc#1363:rm#5411:\ :s2#1030428:b2#8192:f2#1024:				
Add this entry to /etc/disktab. Create the filesystem with the command : newfs /dev/rdsk/1s0 ST31200W				
Target 1, Type 0, SEAGATE ST31200W				
Click Return to continue				
Return				

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:

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

The DEC Workstation Menu DEC Ultrix

Test Output
Ultrix Drive Geometry
Suggested Ultrix disktab entry:
ST31200W:\ :ty=winchester:ns#84:nt#9:nc#2726:\ :pa#0:ba#8192:fa#1024:\ :pb#0:bb#8192:fb#1024:\ :pc#2060856: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
Target 1, Type 0, SEAGATE ST31200W Click Return to continue
Return

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:ff#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_

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:ff#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.

	1		
Multiple Adapter Media D	uplication		
Source Device: Bus 2 TID 1 LUN 0 SEAGA Ignore Errors Write with Verify Checksum Verification Copy Progress Current Block: Sustem 10 Pate (KP/Cost	ATE ST31200W S Start Block: End Block:	UN1.05 - 0 2061106	Destination Devices: SOURCE: Bus 2 TID 1 LUN 0 SEAGATE ST31200W SU Bus 2 TID 2 LUN 0 SEAGATE ST31200W SUN1.05 Bus 2 TID 3 LUN 0 SEAGATE ST31200W SUN1.05 Bus 2 TID 5 LUN 0 HP Ultrium 1-SCSI
System TU Rate (KB/Sec Time to Complete Error Count:	 0		
Duplication Status:			Eject when finished 🔽 Select All Destinations
Return Start C	opy Calc. Che	cksum	Cancel

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 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.

Tape Tests

The following tests are available via the Tape Test menu



TapeWatch

Drive Watch	×			
Read Data Rates				
Average Transfer Rate = 0.000 KB/Sec SC	SI Target = 3 🗧			
High Transfer Rate = 0.000 KB/Sec				
Low Transfer Rate = 0.000 KB/Sec	LUN = U			
⊢ Write Data Rates				
Average Transfer Rate = 8011.622 KB/Sec				
High Transfer Rate = 9149.565 KB/Sec				
Low Transfer Rate = 7169.560 KB/Sec Number of ha	ard errors = 0			
Number of so	ft errors = 0			
Chara Carabiast Diaday				
Show draphical Display				
OK Refresh	Clear Drive Stats			

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:



Quick QC Test

SCSI Tape Test Results		
Test Name Tape Quick QC Test		Select All
Blocks Transfered	Transfer Rate	Target 1 KB/s Target 2
Test Started Wed Jul 31 10:39:40 2002	Elapsed Time	Seconds
Click START to begin test		
, Return START Data	Tape Params	R

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

SCSI Tape Test Results	
Test Name Tape Sequential Read Test Blocks Transfered 0 Test Started Wed Jul 31 10:39:55 2002 Elapsed Time	Select All Target 1 Target 2 econds
Click Start to begin test	
START Data Tape Params Alarms	DriveWatch Cancel

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.

Sequential Write Test

CSI Tape Test Results		
Test Name Tape Sequential Write Test		Select All
Blocks Transfered	Transfer Rate 0 KB/	Target 1 's Target 2
Test Started Wed Jul 31 10:40:12 2002	Elapsed Time 0 Seco	nds
Click Start to begin test		
	R	
START Data	Tape Params Alarms	DriveWatch Cancel

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

Tape Data Integrity Test	×			
This test writes, then reads, the specified amount of data, using the specified block size.				
Error statistics are displayed from the WRITE and READ LOG PAGEs.				
Insert a scratch tape - click Start Test				
Number of GB to write/read = 1 Block size (KB) = 32 Data transferred = MB				
	,			
Test Status:				
Relym Start Test				

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.

Map a Tape's Contents

Map Tape Contents	4
General Tape Information Vendor = SONY Firmware = 0108 Product = SDX-500C Read Errors (when test started) = Currently = Number of blocks read =	
Map of Tape Contents	
Status: Click the Map Tape button Map Tape Save Map -> File Cancel	

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.

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.

Quantum DLT Self Test

DLT Self Test	X
Send Diagnostic Parameters: Default Self Test	Select All
Pattern: 0 - Rotate - Rotate thru the other 9 patterns	Target 2
Block Size: 0	
Block Count: 0	
Test Passes: 1	
Run Time:	
Results:	
Return	

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.

DLT Receive Diagnostic Results

Test Output
Quantum Display DLT Diagnostic Results
Controller Present Flag = 0 Controller Error Flag = 0 Drive Present Flag = 0 Drive Error Flag = 0 Media Loader Present Flag = 0 Media Loader Error Flag = 0
Click Return to continue
Retign More

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.

Exabyte Warm Up Test

SCSI Tape Test Results		
Test Name Exabyte Warm-up Test		Select All
Blocks Transfered	Transfer Rate 10000 KB/s	Target 1 Target 2
Test Started Wed Jul 31 10:45:05 2002	Elapsed Time 160 Second	ds
This test is to be used on Exabyte tape drives that have been stored for six months or more. The test will write, then read 500 MB of data thre This test will run for approximately two hours, an interrupted by clicking the CANCEL button	ee times. d may be	
Data Written = 133 MB (Pass 1 of 6)		
START Data	Tape Params Alarms	DriveWatch Cancel

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.

DDS (4mm) Media Error Rate Test

SCSI Tape Test Results	
Test Name HP DDS (Media) Error Rate Test Select Al	
Blocks Transfered 0 Transfer Rate 0 KB/s Target 1 Target 2	
Test Started Wed Jul 31 10:48:25 2002I Elapsed Time 2 Seconds	
RAW Error Rate = 1.552795%	
C3 Error Rate = 0.000000%	
RAW and C3 error rates must be less than 1 %. If either rate exceeds 1 % the tape should not be used.	
Test Finished - Click OK	
Return Data Tape Params Alarms DriveWatch	

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

SCSI Tape Test Results		
Test Name HP Block (Drive) Error R	late Test	Select All
Blocks Transfered	Transfer Bat	Target 1 KB/s Target 2
Test Started Wed Jul 31 10:48:52 20	002I Elansed Time 6	Seconds
Rewinding		
	Data Tape Params /	Alarms DriveWatch Cancel

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

SCSI Toolbox32	
File Adapter Options Disk Tape Jukebox SAF-TE / SEP Buffer Scripts and Sequences Help	
Scan Bus Sca Target 0: S Capacity = This Test will measure the highest data throughput that the selected device can sustain. Target 1: S Capacity = The Test is NOT destructive - all data on the drive will be safe. Disk Target 2: H Capacity = Target 3: S Capacity = Click the Start Test button to begin measurement. Target 3: S Capacity = Test Status: Target 4: H Capacity = Starting test please wait Read 100MB in 1.059585 seconds Read Tranfer rate = 94.376534 MB/second Vite Tranfer rate = 94.376534 MB/second Wrote 100MB in 1.189709 seconds Write Tranfer rate = 84.054161 MB/second OK Start Test	JukeBox Browse w File
Target selected = 0	1.

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

Tape Performance Measurement	×
This test will measure the write and read transfer ra IT IS A DESTRUCTIVE TEST! - ALL DATA ON TH Insert a test tape, select the data pattern type, ther	ate performance of your tape drive. HE TEST TAPE WILL BE DESTROYED! n click "Start Test"
Data Pattern Type © Random, non-compressable data © 2:1 compressable data Besults:	Drive Compression Compression ON Compression OFF
Rewinding Tape Writing data for two minutes 2477 MB of data written - transfer rate = 20.642 M Rewinding Tape Reading data for two minutes Read 1965 MB of data - transfer rate = 16.375 MB Rewinding Tape Test Finished	1B/s B/sec
OK Start Test	Results->File

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-compressable 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.

Tape Commands

The following commands are available via the Tape Commands menu:

SC5I Toolbox32	_	
File Adapter Options Disk Tape Jukebox SAF-TE	/ SEP Buffer ScriptWriter Pro Help	
Scan Bus Scan System Target 0: SONY Life Media Duplication On Line Target 1: SONY SDX-500C Version 0108 On Line Target 2: SONY SDX-500C Version 0108 Off Line Target 3: Not Available Target 4: Not Available Target 5: Not Available Target 6: Not Available Target 7: aic78xx Target 7: aic78xx	Information Functions Inquiry Mode/Log4/age Functions Inquiry Motion / Data Commands Inquiry User Defined CDB Inquiry w/EVPD Build/Run Script Edit Buffer 1 Edit Buffer 2 Configure Tape Drive Download Firmware Inguiry Repair DLT Directory Create DLT FUP Tape	
		11.

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.
Inquiry

Test Output																	
	0	1	2	3	4	5	T1 6	rans 7	sfei 8	SCS : By 9	GI : 7te A	INQU Lei B	JIR ngth C	7 da n = D	ata 31 E	bytes F	ASCII
	01 53 00 00 00 00 00 00 00 00 00 00 00 00 00	$\begin{array}{c} 80\\ 44\\ 31\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 0$	02 58 30 00 00 00 00 00 00 00 00 00 00 00 00	02 2D 38 00 00 00 00 00 00 00 00 00 00 00 00 00	1F 35 32 00 00 00 00 00 00 00 00 00 00 00 00 00	00 30 2E 00 00 00 00 00 00 00 00 00 00 00 00 00	$\begin{array}{c} 00\\ 30\\ 34\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 00\\ 0$	30 43 2E 00 00 00 00 00 00 00 00 00 00 00 00 00	53 20 00 00 00 00 00 00 00 00 00 00 00 00	4F 20 00 00 00 00 00 00 00 00 00 00 00 00	4E 20 00 00 00 00 00 00 00 00 00 00 00 00	59 20 00 00 00 00 00 00 00 00 00 00 00 00	20 20 00 00 00 00 00 00 00 00 00 00 00 0	20 20 00 00 00 00 00 00 00 00 00 00 00 0	20 20 00 00 00 00 00 00 00 00 00 00 00 0	20 20 00 00 00 00 00 00 00 00 00 00 00 0	
Re	et ur	'n															

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.

Test Output Display Most Recent Request Sense Data 5 7 F 0 1 2 3 6 8 9 в С D Ε 4 A 70 00 02 00 00 00 00 1400 00 00 00 ЗÀ 00 ŌŌ 00 00 00 00 ŌŌ ŌŌ ŌŌ ŌŌ ŌŌ ŌŌ ŌŌ ŌŌ 00 00 00 00 00 00 00 \mathbb{Q} (Click Return to Continue) Return

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.

Mode Page Edit

Custom Mode P	age										2							
Bloc	Block Header								Block Descriptor									
00	00 00 00 00							00	00	00	00	00	00					
0	1	2	3			4	5	6	7	8	9	10	11					
Pag	e Da	ta 	_	_	_	_	_	_	_	_	_	_	_	_	_			
Default 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00			
Mask 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00			
Current 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Default 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00			
Mask 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00			
Current 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00			
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
Pag	ge #	00		Cu	rrent	Byte]								
Mode Sense		Мо	de Se	elect		Rest	ore D	efaul	ts	R	leturr	۱						

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

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
- White Error Counter Page
 Read Error Counter Page
 Tape Log Page
 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

Tape Motion & Data Commands								
Motion Commands								
Rewind Space Commands How Manu								
Unload © EDD								
Pead Paritien O Forward O Blocks								
Reverse O Files								
Locate Command Block Address								
Partition								
BOP Partition 0 Block Size: Fixed 512 byte								
EOP First Block Loc. 909629 Blocks in Buffer 0								
BPU Last Block Loc. 0 Bytes in Buffer 0								
Data Commands								
Write Filemark Execute I/D								
Write Setmark Beneat Count Single Block I/D Bead								
Flush Buffer 1 C Multi Block I/O C Write								
(Dec. Bytes)								
Configure Drive Data Pattern Return								

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.

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. 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.

User Defined CDB

User Defined CDB	×
SCSI Commands Select Devices Change Definition,10,0,00,40,00,00,00,00,00,00,00,00 Select Devices Compare,10,0,00,39,00,00,00,00,00,00,00 Select Devices Select All Targets Select All Targets Extended Read,10,1,ff,28,00,00,00,00,00,00,00,00 Select All Targets Extended Seek,10,0,0,2b,00,00,00,00,00,00,00 Select All Targets Extended Write,10,0,ff,2a,00,00,00,00,00,00,00,00 Select All Targets	
Load CDB File Save CDB File Add CDB Delete CDB 0 1 2 3 4 5 00 00 00 00 00 00	
CDB Length : Oata In Out O Transfer Length = 0 10 Bytes O 12 Bytes Buffer 1 O 2 O LBA LSB 4 Repeat 1 Timeout 0 C Stop on error	
CDB Result = Return Send CDB View Results Buffers Stop 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

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.

Results	
Results From: User Defined CDB	
CDB = 12 00 00 00 FF 00 Sent to Target 4, LUN 0, Host Adapter 3	*
Status Good - Command completed without error	
T	V
OK Clear	Write Results to File

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.

CDB Sequencer

Command Line CDB Edit Buffer		
Command Results Inquiry,1 (12 00 00 00 FF 00) COMMAND COMPLETE (0.00113003 Sec) 00 00 03 12 88 00 01 3E 53 45 41 47 41 54 45 20		Options Results Data Length = 16 Bytes Stop On Error
	Clear Save to File	Command Execution Mode Execute command(s) Queue command(s)
Command Entry		
	Execute	View Available Commands
Lommand History	Clear	
	Options	
	Save to File	
	Load from File	

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.

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.

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.

Build/Run Script

SCSI Script		
CDB Eurotions	Script Contents	
STB Test Functions		
Target/LUN/Adapter Functions	N	
Script Control Functions	43	
Mode Page Functions		^
Buffer Functions		
Edit Item		
Delete Item from Script		
Repeat Script 1 times		
🗌 Single Step - Step		
🔲 Don't store results		
Execute Script		
Stop Script	Load Script Save Script	
Return View Results	Edit Buffers Stop on Error 🗖 Log Results 🗖	

Edit Buffer 1/ Edit Buffer 2

The buffer functions allow the buffers used by the SCSItoolbox32 to be viewed, edited, saved to a disk file, or loaded from a disk file. The data in buffer 1 is used for all write tests. Buffer 1 will also contain all data read from the device.

dit Buffer																								x
																	Size	21	9961	128	(2	2047	KÞ)	
	00	01	02	03	04	05	06	07	08	09	ØA	ØB	0C	ØD	ØE	ØF							_	
000000	00	ØD	00	00	00	00	00	00	00	00	00	00	00	00	00	00		• • •						
000010	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
000020	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
000030	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00			h	ġ				
000040	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
000050	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
000060	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
000070	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
																							-	
		_1							r 4 1		n			61	1	7.0.1		/ 0 \			_			
File Operation	LON	S							FTT		BUI	rte	r	н1 А1	. L . 1 . 2	Zer Zer		(0) (0)		 				
Buffer 1		Buł	Ffe	r 2	2									Al	1 (Dne	s (1	1)						
	_	_	_	_	_									A1	ter	rna	ting	<u>, (</u>	0\1)	-			
Return																						(Canc	el

The drop box next to the Fill Buffer button allows you to choose a pattern to load into the buffer. Select the data pattern, then click the Fill Buffer button to load the data into the buffer. The File Operations button allows the buffer date to be saved to or loaded to a disk file.

Buffer File Operations	5			×
 Binary 		File Si:	ze 2096128	ĺ
🔿 ASCII1 (Data Only	J)	Buffer Off	fset 0	
🔘 ASCII 2 (Data, Ad	dress , Char	s)		
Return	⊳	Load Buffer From File	Save Buffer To File	

User choice allow the data to be saved either as binary data, or as ASCII data with or without the hex address of the data. The File size specifies how may bytes of data to read or write. The Buffer Offset choice allows data to be loaded starting at a specific address of the buffer.

Configure TapeDrive

Configure Tape	Drive
Block Length Density Code Buffer Mode I▼ Compressi © Compr	= 512 = 31 = 10 on Capable ession ON
C Compr	ession OFF
Status:	
	R
Return	Save Parameters

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:

- 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
 - o 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:



Segmented Download

Execute Download	
Selected File:	Browse
Download Status:	
Target 0 Target 1 Target 2	Γ.
	Download
	Return

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.

Non-Segmented Download

Execute Download	
Selected File:	Browse
Download Status:	
Target 0 Target 1 Target 2	R
	Download
	Return

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.

DLT Firmware Download

Test Output			
	Quantum DLT Download	l Drive Firmware (Single	Drive)
	Click Retu	urn to continue	
Return			

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

SuperDLT Download

SuperDLT Firmware Download	×
Download filename: Status: Enter download filename, or use Browse button to select download file. Then Click Download button	Brov e
	ок

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

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

HP Ultrium Firmware Download	×
Download filename:	
	Browse
Status: Enter download filename, or use Browse button to select download file. Then Click Download button	Download
	Return

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.

Seagate LTO Download

Seagate LTO Firmware Download	×
Download filename: Status: Enter download filename, or use Browse button to select download file. Then Click Download button	Browse Download
	ОК

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

M LTO Firmware Download		×
Download filename:	Browse	
Status:		
Enter download filename, or use Browse button to select download file.	Download	
Then Click Download button		
	0K	

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.

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 Check/Repair Tape Directory	×
07/31/02 11:05:52	
Internal Status Code (Sense Byte 18) = 0x58	Unload Tape
Tape Motion Hours = 11573	Request Sense
Power On Hours = 808469280	
	Repair Tape Directory
Status:	
Tape Directory Good, no repair needed	
OKS	Save to File

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

Create DLT FUP Tape		×
FUP File Name:	Browse	
1. Insert blank tape into drive - ALL DATA WILL BE DESTROYED!		
2. Enter FUP File name or use Browse button to choose file		
3. Click Create Tape button below		
$^{\circ}$ 4. Use this FUP tape to upgrade DLT drives as described in the DLT manual		
Create Tape	OK	

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.

Useage Medium Common Device Common Host Common
Medium Manufacturer = HP Medium Serial Number = AAAH00005B
Medium Length = 16 Medium Width = 127
Assigning Organization = LTO_CVE
Medium Density Code = 64
Medium Manufacture Date = 20000706
MAM Capacity = 4096
Medium Type = 0 Medium Type Information = 0

Useage Medium Common Device Common Host Common

Remaining Capacity in Partition = 95367	Max Capacity in Partition = 95367 Formatted Density Code = 64
TapeAlert Flags = 0	Load Count = 57
MAM Space Remaining = 1012	Assigning Organization = LTO_CVE
Device Make/Serial # at Last Load =	IBM
Device Make/Serial # at Last Load -1 =	IBM
Device Make/Serial # at Last Load -2 =	IBM
Device Make/Serial # at Last Load -3 =	IBM
Total MB Written in Medium Life =	3933661
Total MB Read in Medium Life =	-122226291
Total MB Written in Current/Last Load =	0
Total MB Read in Current/Last Load =	0

Jukebox Tests

The following tests are available via the Jukebox Test menu:

SCSI Toolbox32		
File Adapter Options Disk Tape Jukebox SAF-T	TE / SEP Buffer Scripts and Sequences Help	
Scan Bus Scan System Tests Commands Target 0: Not Available Target 0: NotA	Random Library Test Confirm Device HP Juke Tests Total Jukebox Test	× V
Target 1: Not Available	Full Range Jukebox Test File Bro	owse
Target 2: Not Available	Type None Clear File View File	
Target 3: SONY SDX-500C Version 0201	1 Log Performance Data 🗖	
Target 4: SONY SDX-500C Version 0200	o <u> </u>	
Target 5: Not Available		
Target 6: SONY LIB-304 Version 2.4		
ADAPT		
		11.

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

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.

HP Juke Tests

HP MO Disk Diagnostics	
Available Tests	Current Test
SureStor Family Solar Family DLT Family	Move time = 9.664 seconds
	Number of passes : 1
Test Re	sults
Double-Click on autochanger family	
Cancel	

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.

JukeB	JukeBox Exercizer														
Test	Drive	Slot Element	Picker Element	Unload	SCSI Address	Moves	Status								
◄	82	Random 💌	86 💌												
✓	83	Random 💌	86 💌												
~	84	Random 💌	86 💌												
◄	85	Random 💌	86 💌												
		•	•												
		•	•												
		•	•												
Dela	Delay between moves 0 Number of passes 1 Stop on error														
B	etum	Start	Stop File Fur	nctions	Generate WorkFr	orce file									

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.

JukeBox Full Range Test

This test will include moves from any location within the jukebox

Full Range Random Jukebox	Exerciser	×
Source Cell = 22	Destination Cell =	1
Moving from Cell 22 back to Click Stop Button to stop te) Cell 1 st	
ОК	Start Test	Stop Test

Jukebox Commands

The following commands are available via the Jukebox Commands menu:



Initialize Element Status

Autochanger Element Information	
Storage Slots Identifiers	Display In: 🔿 Dec 💿 Hex
0001 0002 0003 0004 0005 0006 0007 0008 0009 000A 000B 000C 000D 000E 000F 0010 0011 0012 0013 0014 0015 0016 0017 0018 0019 001A 001B 001C 001D 001E	Drive Id's 0052 0053 0054 0055 Image: Picker Id's Image: Picker Id's 0056 Image: Picker Id's Image: Note Picker Id's <tr< th=""></tr<>

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.

Read Element Status

Autochanger Element Information	
Storage Slots Identifiers	Display In: 🔿 Dec 💿 Hex
0001 0002 0003 0004 0005 0006 0007 0008 0009 000A 000B 000C 000D 000E 000F 0010 0011 0012 0013 0014 0015 0016 0017 0018 0019 001A 001B 001C 001D 001E	Drive Id's 0052 0053 0054 0055
Page Up Page Down	
Destination Id: Picker Id: 0 56 Flip Media Position	VolSer Return

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

Position to Element

Autochanger Element Information	
Storage Slots Identifiers	Display In: 🔿 Dec 💿 Hex
0001 0002 0003 0004 0005 0006 0007 0008 0009 000A 000B 000C 000D 000E 000F 0010 0011 0012 0013 0014 0015 0016 0017 0018 0019 001A 001B 001C 001D 001E	Drive Id's 0052 0053 0054 0055 • • • • • • • • • • • • • • • • • • •
Page Up Page Down	
Destination Id: Picker Id: 0 56 Flip Media Position	VolSer Return

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.

Move Media

Autochanger Element Information	
Storage Slots Identifiers	Display In: 🔿 Dec 💿 Hex
0001 0002 0003 0004 0005 0006 0007 0008 0009 000A 000B 000C 000D 000E 000F 0010 0011 0012 0013 0014 0015 0016 0017 0018 0019 001A 001B 001C 001D 001E	Drive Id's 0052 0053 0054 0055 • • • • • • • • • • • • • • • • • • •
Page Up Page Down	
Source Id: Destination Id: Picker Id:	
0 0 56 Flip Media Move Media	VolSer Return

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.

Inquiry

Te	st O	utpu	t															
		0	1	2	3	4	5	T1 6	rans 7	sfei 8	SCS	GI : 7te A	INQU Ler B	JIR ngth C	7 da n = D	ata 51 E	bytes F	ASCII
		08 4C 20 00 00 00 00 00 00 00 00 00 00 00 00	80 49 2E 20 00 00 00 00 00 00 00 00 00 00 00 00	02 42 34 20 00 00 00 00 00 00 00 00 00 00 00 00	02 2D 20 20 00 00 00 00 00 00 00 00 00 00 00	33 32 20 00 00 00 00 00 00 00 00 00 00 00 00	00 30 2E 00 00 00 00 00 00 00 00 00 00 00 00 00	00 34 20 00 00 00 00 00 00 00 00 00 00 00 00	00 20 2E 01 00 00 00 00 00 00 00 00 00 00 00 00	53 20 37 00 00 00 00 00 00 00 00 00 00 00 00 00	4F 20 00 00 00 00 00 00 00 00 00 00 00 00	4E 20 00 00 00 00 00 00 00 00 00 00 00 00	59 20 00 00 00 00 00 00 00 00 00 00 00 00	20 20 20 00 00 00 00 00 00 00 00 00 00 0	20 20 00 00 00 00 00 00 00 00 00 00 00 0	20 20 20 00 00 00 00 00 00 00 00 00 00 0	20 20 20 00 00 00 00 00 00 00 00 00 00 0	
	Re	etur K	m															

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

Set EVPD Bit	×
Set EVPD	
D C L 00 41	1
Page Lode = 112 (He	xadecimal)
Retrin	Cancel

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

View Request Sense

Test O	Jutput																
					Dis	Display Most Recent Request Sense Data						ata					
	0	1	2 🔈	3	4	5	6	7	8	9	A	в	С	D	E	F	
	70 00 00 00	00 02 00 00		000000000000000000000000000000000000000	000000000000000000000000000000000000000	00 00 00 00	00 00 00 00	0A 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	24 00 00 00	000000000000000000000000000000000000000	000000000000000000000000000000000000000	C0 00 00 00	
R	eturn																

This command will display the most recent request sense data.

Mode Page Edit

Custom Mode Page															
В	lock H	eader				Block	k Des	9	iP Bit						
0	0 00	00	00			00	00	00	00	00	00	00	00		
, C			4	5	6	7	8	9	10	11					
P	Page Data														
Default 0	0 00	00	00	00	00	OŬ	00	00	00	00	00	00	00	00	00
Mask 0	0 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
Current 0	0 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
C) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Default 0	0 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
Mask 0	0 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
Current 0	0 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1	16 17	' 18	19	20	21	22	23	24	25	26	27	28	29	30	31
F	^o age #	Ū		Cu	rrent	Byte									
Mode Sens	e	Мо	de Se	elect		Rest	ore D	efaul	ts	F	leturr	ו			

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.
View Log Pages

View Log Pages		×
Available Pages Page 2E Page 30 Page 31 Page 32 Page 33 Page 34 Page 35 Page 36	Log Page Data -	
Use Description File Current Threshold Current Current	Browse tive O Default Threshold	C Default Cumulative
Save to File	•	Cancel

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:



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

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

Execute Download	
Selected File:	Browse
Download Status:	
Target Select All	
Target 1 Target 2	
	Download
	Return

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.

Non-Segmented Download

Execute Download		
Selected File:		Browse
Download Status:		
Target	Select All	
Target 0 Target 1 Target 2	Ŀ₹	Download
		Return

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.

HP Jukebox Mode Pages

Autochanger Mode	Page	
Mode Pages Log Pages	Available Pages: Sun Spot - Solar Flare Mode Page Sure Store Mode Page Rialto Mode Page	
		▲
Return		

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.

User Defined CDB

User Defined CDB	×
SCSI Commands Change Definition,10,0,00,40,00,00,00,00,00,00,00,00,00,00,	Select Devices
Load CDB File Save CDB File Add CDB Delete CDB 0 1 2 3 4 5 00 00 00 00 00 00 CDB Name =	
CDB Length : Oata In O Ut O Transfer Length = [0 LBA MSB 3 Buffer 1 O 2 C Stop on error Repeat 1 Marcoline Inc. by 00 Inc. by 00 Inc. by 00 Buffer 1 O 2 C Inc. SB 4 Stop on error	
CDB Result =	
Return Send CDB View Results Buffers Stop 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

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.

Results	
Results From: User Defined CDB	
CDB = 12 00 00 00 FF 00 Sent to Target 4, LUN 0, Host Adapter 3	*
Status Good - Command completed without error	
T	V
OK Clear	Write Results to File

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.

CDB Sequencer

Command Line CDB Edit Buffer		
Command Results Inquiry,1 (12 00 00 00 FF 00) COMMAND COMPLETE (0.00113003 Sec) 00 00 03 12 88 00 01 3E 53 45 41 47 41 54 45 20		Options Results Data Length = 16 Bytes Stop On Error
	Clear Save to File	Command Execution Mode Execute command(s) Queue command(s)
Command Entry		
	Execute	View Available Commands
Lommand History	Clear	
	Options	
	Save to File	
	Load from File	

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.

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.

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.

Build/Run Script

SCSI Script		
CDB Functions	Script Contents	
STB Test Functions		
Target/LUN/Adapter Functions		
Script Control Functions		
Mode Page Functions		
Buffer Functions		
E dit Item		
Delete Item from Script	R R	
Repeat Script 1 times		
Single Step - Step		
Don't store results		
Execute Script		
Stop Script	Load Script	Save Script
Return View Results	Edit Buffers Stop on	Error 🗖 Log Results 🗖

Edit Buffers

The buffer functions allow the buffers used by the SCSItoolbox32 to be viewed, edited, saved to a disk file, or loaded from a disk file. The data in buffer 1 is used for all write tests. Buffer 1 will also contain all data read from the device.

Edit Bu	ffer																								×
																	:	Size	20	9961	28	(2	047k	(b)	
		00	04	00	00	01.	<u>ог</u>	07	07	00	00		00	00	00	or	or								
		00	01	θZ	03	94	85	UO	07	98	68	ŨН	ยช	ØC	υv	UE	ØF								
	000000	00	ØD	00	00	00	00	00	00	00	00	00	00	00	00	00	00	• • •	• • •	• • •			••		
	000010	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00					• • •			
	000020	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
	000030	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00			- hi	<u>.</u>				
	000040	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
	000050	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
	000060	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
	000070	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00								
																								-	
Fi	le Operati	lon	s							Fil	1	Buł	fe	r 📔	A1	1	Zer	os ((0)		•	•			
														_	A1	17	Zer	os ((0)			-			
E	luffer 1		Buł	Ffe	r 2	2									A1	1 (Dne	s (1	1)						
		-													A1	ter	rna	ting	j (0\1)	-			
Retu	Jrn 🛛																						C	anc	21

The drop box next to the Fill Buffer button allows you to choose a pattern to load into the buffer. Select the data pattern, then click the Fill Buffer button to load the data into the buffer. The File Operations button allows the buffer date to be saved to or loaded to a disk file.

Buffer File Operations		×
Binary	File Size	2096128
🔿 ASCII1 (Data Only)	Buffer Offset	0
ASCII 2 (Data, Address , Chars)		
Return	Load Buffer From File Sa	ve Buffer To File

User choice allow the data to be saved either as binary data, or as ASCII data with or without the hex address of the data. The File size specifies how may bytes of data to read or write.

The Buffer Offset choice allows data to be loaded starting at a specific address of the buffer.Buffer Functions

The buffer functions allow the buffers used by the SCSItoolbox32 to be viewed, edited, saved to a disk file, or loaded from a disk file. The data in buffer 1 is used for all write tests. Buffer 1 will also contain all data read from the device.

Edit Buffer																									×
																	Size	2	2 0 9	612	28	(28)47K	b)	
	00	64	69	69	<u>а</u> ь	0E	94	87	00	00	80	AD	90	an	0E	0E									
	00	01	UZ	00	04	20	00	97	00	07	UH	UD	00	90	UE	UF									
000000	មម	8D	មម	មម	មម	មម	មម	មម	មម	មម	មម	មម	មម	មម	មម	មម		• •		• • •		• • • •	• •		
000010	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				• • •			• •		
000020	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00									
000000	00	00	00	00			00	00	00	00				00	00	00				\mathbf{x}					
000030	មម	មម	មម	ចច	មម	មម	មម	មម	មម	មម	មម	មម	មម	មម	ចច	មម		• •		•••		• • • •	• •		
000040	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		• •		• • •		• • • •	• •		
000050	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00									
000060	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00									
666676	ឲឲ	66	66	66	66	66	88	88	66	66	66	66	66	66	66	66									
000010																								▼	
File Operat:	ion	e							Fil	1	Ruf	fe	rl	61	1	7.er	05	7.0	n i	-	-	1			
THE Operat.	TOU	2									bui		· ·	0.1		201	05	(• / 0				1			
Buffor 1		Dut	<u></u>		.									A1	1 1	cer Ane	us s fi	(ย 11)						
Burrer 1		DU	rre		<u> </u>									AI	ter	rna	tin	q ((0)	(1)	-				
Return																		-	-	,			Ca	anc	e1

The drop box next to the Fill Buffer button allows you to choose a pattern to load into the buffer. Select the data pattern, then click the Fill Buffer button to load the data into the buffer. The File Operations button allows the buffer date to be saved to or loaded to a disk file.

Buffer File Operations		×
Binary	File Size	2096128
🔿 ASCII1 (Data Only)	Buffer Offset	0
C ASCII 2 (Data, Address , Chars	2)	
Return	Load Buffer From File Sa	ve Buffer To File

User choice allow the data to be saved either as binary data, or as ASCII data with or without the hex address of the data. The File size specifies how may bytes of data to read or write. The Buffer Offset choice allows data to be loaded starting at a specific address of the buffer.

SCSI Tutorial

Introduction to SCSI Philosophy

The purpose of this chapter is to give an overview of SCSI. SCSI

encompasses hardware interfaces as well as software protocol specifications. The overall goal of the SCSI specification is to free system and peripheral designers from the physical specifications of the hardware they are working with, and to allow intelligence to be embedded within peripherals. This embedded intelligence should allow the host, or main processor, to concentrate its power on running application code, rather than mundane tasks needed to operate the peripheral.

The SCSI specification allows the system designer to view all peripherals as black boxes that contain blocks of data. This data may be accessible randomly, as in a disk drive, or it may be sequentially accessible, as in a tape drive or a scanner.

SCSI does away with dealing with heads, sectors, and cylinders on disk drives, because SCSI only deals with logical blocks of data in the device. In the case of disk drives, the SCSI specification allows the drive itself to deal with defective blocks, keeping track of spare blocks and remapping internally, that is, within the SCSI black box. This means that even though a drive may have defective blocks, the disk appears as a contiguous number of flawless blocks to the SCSI world.

This black box approach to data storage and retrieval makes the job of writing a universal device driver a fairly simple task. For instance, a disk device driver can accommodate drives of virtually any size, because the SCSI specification lets you ask a disk drive how many blocks of data it can hold.

And reading or writing data to a SCSI disk consists of simply telling the drive how many blocks you want to write, what block number to start writing at, then sending the data to the drive as the drive asks for it. The device driver never knows physically where on the drive the data is going because the SCSI peripheral takes care of all logical block to physical geometry mapping. As long as you do not try to read or write data beyond the highest accessible block number, everything is fine.

As SCSI specifications have evolved, support of input and output devices other than disk and tape have been added. The SCSI-2 specification defines standard methods for dealing with scanners, printers, and jukebox robotics. The SCSI-2 specification also defines a hardware upgrade path that allows higher data transfer rates and several wider data transfer paths.

SCSI Hardware

The SCSI bus is made up of eighteen lines that carry data: in the case of single-ended SCSI, several lines representing signal ground; in the case of differential SCSI, eighteen differential signal lines. These 18 signal lines can be thought of as two groups, nine (9) control lines and nine (9) data lines.

Data Lines

The data lines consist of eight bits of data and one bit of parity data. The SCSI-2 specification allows for a wide SCSI data path of 16 or 32 bits.

Control Lines

The nine control lines consist of two lines that control bus handshaking, six lines that define what state or phase the bus is in, and a reset line. The data and control lines that make up the physical SCSI bus can use two different electrical methods to convey information across the bus: single-ended and differential.

Single-ended SCSI

With the single-ended method, binary values on the SCSI bus are represented by two voltage levels on the bus lines. A high level is a voltage over 2.5 volts (+ - 5%) and a low level is a voltage that is less than .4 volts. The single-ended SCSI specification is an active low definition. That means that a logical one is represented by a low voltage level, and a logical zero is represented by a high voltage level. The single-ended SCSI specification allows for a bus cable length of up to 6 meters, although the maximum single-ended cable length is dependent upon the number of devices on the bus speeds at which they run.

Single-ended Termination

The SCSI bus must be terminated properly to prevent ringing and false signals. Single-ended termination consists of a resistor network on each signal line. This resistor network presents a constant impedance to the SCSI bus. The network consists of a 220 ohm resistor connected between 5 volts (the term power line on the SCSI bus) and the signal line, and a 330 ohm resistor connected between the signal line and ground. It is essential to proper termination that the terminating resistor network is supplied with +5 volts on the term power line.

Unfortunately, it is a common occurrence for the device supposed to be providing term power to have blown the fuse in line with the term power line. Unless you have a SCSI terminator with an LED to show that term power is valid, you may never know if the proper +5 volts is being supplied to your termination. Recalling that the SCSI bus is an active low bus, you can see why the lack of this +5 volts can lead to very unpredictable results! It is well worth using only terminators with term power indicators to avoid hours of troubleshooting headaches.

Differential SCSI

Differential SCSI consists of a pair of signal lines for each signal. The voltage levels on these pairs of lines move in opposite directions, and both the high and the low lines are checked in order for their data to be valid. This method provides its own noise cancellation and allows for cable lengths up to 25 meters. Single-ended SCSI to Differential SCSI converters are available, otherwise you can not mix single-ended and differential devices on the same SCSI bus.

Cables and Connectors

Typically, a raw SCSI device will have a 50 pin Dual in-line male connector for its SCSI bus connection. This type of connector has two rows of 25 pins spaced .1" apart. The active SCSI signals are connected to the even numbered pins, and the odd numbered pins are signal ground. Most systems use a connection other than the 50 pin dual in-line type. Some use a DB-50 type connector, some a 50 pin variation on the Centronics type connector, while others use a miniature version of the D-type connector. Some use only female gender connectors on their enclosures, while others use male gender. In other words, there is not one standard for connections and cables in the SCSI world!

SCSI Software

The SCSI specification describes a software protocol as well as a hardware definition. An understanding of this software aspect of SCSI will be helpful when interpreting SCSI problems and errors. A SCSI transaction happens between two SCSI devices, at which time each of the

devices takes on one of two roles: Initiator or Target. The initiator is typically the host computer, and the target is typically the peripheral device. The completion of the series of transactions that make up a full SCSI transaction between an initiator and a target is called a nexus. The intermediate steps that happen to complete a nexus are called **SCSI Bus Phases**. These phases are:

Bus Free Phase Arbitration Phase Selection Phase Reselection Phase Information Transfer Phases, which consist of: Command Phase Data In Phase Data Out Phase Status Phase Message Phase

The current bus phase is defined by the state of several of the control signal lines. Some phases can be entered from any other phase, while others must progress between phases in a specific order. Phase order, and transition between phases is controlled by the SCSI controller chips on the host adapter and on the SCSI peripherals. These chips are dedicated micro- processors that control all of the timing and signal transitions necessary to assure conformance with the SCSI specifications.

The Bus Free Phase

The bus free phase refers to the time when no SCSI activity is occurring on the bus. No devices are selected, no transfers are taking place during this phase. From this phase the SCSI bus can go to the arbitration phase, or in the case of a SCSI subsystem that does not support arbitration it can go to either the selection or reselection phase.

The Arbitration Phase

In this phase SCSI devices can negotiate for access to the bus. SCSI devices arbitrate by setting their ID number and the SCSI BUSY line. If more than one device wants the bus, the device with the highest SCSI address wins the arbitration and sets the SELECT line. Arbitration is required in SCSI II implementations.

The Selection\Reselection Phase

In this phase the SCSI initiator selects which SCSI target it will talk to. The SCSI initiator puts the bus in select phase, and sets the address of the target. Then it waits for the target to respond that it is there. Once the target has responded to selection the target device will control the SCSI bus until the transaction is completed or until the target disconnects from the bus.

If the SCSI target determines that it will need some time before it fulfills the request, it will disconnect itself from the bus, allowing the bus to be used by other peripherals. For instance, if a SCSI tape drive receives a command to space forward it will know that this is a time consuming operation. Rather than make the host computer and other peripherals wait for it the tape drive can send a disconnect message to the host. This messages effectively says, "I'm going to be busy for a while, I'll let you know when I'm ready to do something else." The host remembers that it started an operation with this peripheral, but that the operation is not finished yet. When the tape drive is ready, it will use the SCSI reconnect phase to tell the host, "Hey, I'm back now." The host will then pick up where it left off, finishing the command.

The Command Phase

The command phase is used to send a command code from the initiator to the target. This command code is made up of a number of bytes grouped into a data packet called a Command Descriptor Block (CDB).

Command Descriptor Blocks

A CDB can be 6, 10, or 12 bytes long. These bytes describe the command to the target, including information about any parameters that the target needs to execute the command. If more information is needed than can fit into the CDB, additional data blocks can be sent to the target. These additional data blocks are sent using the data phase of the SCSI bus.

CDB Format

The basic format of a six-byte CDB is as follows:

	Bit 7	6	5	4	3	2	1	0
Byte	0	C	Opera	tion C	ode			
	1 LUN	L	.ogica	al Bloc	k (MS	SB)		
	2	L	ogica	I Bloc	k Adc	lress		
	3	L	ogica	I Bloc	k Adc	lress	(LSB)	
4 Transfer Data Lei			ngth					
	5	C	Contro	ol Byte	;	Fl	ag Lir	ık

The operation code defines the command. The most basic SCSI command is the Test Unit Ready command, and its operation code is 0. The CDB for the Test Unit Ready command is

00 00 00 00 00 00

This command does not transfer any data, therefore the logical block address and the transfer data length are set to zero. Most SCSI commands will deal with logical unit 0, therefore the LUN field is also set to zero. It is very hard to set an illegal parameter in the Test Unit Ready command, since all of the parameters are zero!

A more complex command, The SCSI INQUIRY command will transfer data from the device, but it does not transfer the data from a data block on the device. Instead, it transfers the data from the device's controller. The operation code for the INQUIRY command is 0x12. The CDB for this command is:

12 00 00 00 ff 00

The 0xff value in byte 4 of the above CDB specifies that we want to transfer up to 255 bytes of information. If the device has fewer than 255 bytes to transfer, this will not result in an error. The device will send all of the data it has and then signal that it is finished. If we specified a transfer length of 5 bytes, and the device could have sent us 32 bytes, it will only transfer the 5 bytes we requested. Many of the SCSI commands that have a data phase will return a data header or special information about how many bytes were transferred.

The basic CDB structure is the same for the 10 and 12 byte CDBs– there is just more room in the command to specify a larger logical block address and a large transfer byte length. The more complex SCSI commands will have additional data phases that will send additional information to the device, as well as receive data from the device.

The Data In\Out Phase

The data phases are used to transfer data to or from the initiator. This data can be additional command parameters, such as Mode Select data or defect data, or it can be actual user data. Data transfers can happen in two different ways: Asynchronously or Synchronously.

Asynchronous Transfers

When a SCSI subsystem transfers data from a peripheral to a host there

needs to be a way for the devices to signal each other when they are ready for data or when they cannot receive data. This process is called handshaking. The peripheral that is receiving the data tells the sender when it is ready, and the sender always waits until it is told to send data. With Asynchronous SCSI, this handshaking process happens with each and every byte of data. The sender says, "I've got some data for you," then waits for the receiver to say, "O.K., send it over." This process happens with every byte sent, including SCSI commands, messages, user data, etc.

Synchronous Transfers

With Synchronous transfers, the target and initiator decide beforehand how fast they can talk. Using the SCSI message phase, a device asks another device, "Can you do sync transfers?" If the answer is yes, one device will ask the other, "How fast can you transfer?" If the reply is, "Five megabytes per second," but the first device can only run at 4.6 MB/sec, the dialog will continue until a transfer rate is agreed upon between the two devices.

Once a transfer rate has been negotiated, whenever data is transferred it is clocked out at that data rate. The two devices know how many bytes of data were supposed to transfer, and each device will toggle its handshaking line that many times while counting the handshaking line from the other device. As long as the number of handshakes agrees with the number of bytes transferred, everything is fine and the data transfer happens more quickly. In order to do synctype transfers, both the SCSI hardware and the host SCSI device driver must be designed to do so.

The Status Phase

The status phase is used for the target to let the initiator know if a command was completed successfully or not. If a command does not complete successfully, the initiator can issue a REQUEST SENSE command to ask the target what went wrong. The sense data returned will describe the problem and hopefully point the way to a solution.

The Message Phase

The message phase is used for several functions, such as sync transfer negotiations, signaling command complete, telling the host to save data pointers, disconnecting/reconnecting, and many others. This allows initiators and targets to learn about each other and optimize performance.

SCSI Commands

While the SCSI controller chips take care of switching between bus phases and handling all of the handshaking, it is up to the system device driver to assemble CDBs, send them in the proper order, and interpret the data returned by them. Understanding which SCSI commands are available, and what those commands do is essential to successful SCSI troubleshooting. Reading the Commands chapter of this manual, and browsing through SCSI software manuals for the peripherals that you work with will give you a good overview of how these commands work.

SCSI Bus Operation—An Example Typical SCSI Operation

This example describes the typical SCSI bus sequence between a SCSI host initiator and a target, in detail:

 The host arbitrates for the SCSI bus by asserting BSY and the data line corresponding to its bus ID. If any other devices wish to compete for the bus, they also assert BSY and the appropriate data line. Each arbitrating device then inspects the data bus and the device with the highest ID wins it. All the other devices must release BSY and their data lines.
 The host attempts to select the target by asserting SEL and releasing BSY. The host maintains its ID and asserts the target's ID on the data bus. Each target then checks the data lines. If the target ID matches that on the data bus, it accepts selection by asserting BSY. Once the host has detected BSY being asserted, it asserts ATN to indicate that it will want the target to go to the MESSAGE OUT phase. The host releases SEL.

3. The target now has control of the SCSI bus and it is the target which switches between phases. The target responds to the ATTENTION condition and initiates the MESSAGE OUT phase. The host sends an IDENTIFY message which tells the target which logical unit the host wishes to talk to. The fact that the target responds to the ATN indicates to the host that the target can accommodate more than just a COMMAND COMPLETE message.

4. The target initiates the COMMAND phase and transfers the Command Descriptor Block from the host. In the COMMAND phase, the target decodes the command and either executes the command (TEST UNIT READY) or sets itself up for a data transfer to the host (for example, READ, WRITE, INQUIRY). The target then either switches to the STATUS phase if the command is complete, or DATA phase if it is ready to transfer data.

5. The data transfer length is set by the host in the Command Descriptor Block. The target remains in the DATA phase until all the data is transferred.

6. The target then initiates a STATUS phase and transfers one byte to the host to indicate whether it has completed the command successfully. If the target has detected an error, the next command that the host is expected to send is REQUEST SENSE. This allows the target to return further status information to the host.

7. The target completes the SCSI sequence by going to the MESSAGE IN phase and transferring a COMMAND COMPLETE message to the host. The target then releases BSY, allowing the bus to go to the BUS FREE state.

Disconnect

In order to improve bus usage and performance, many SCSI devices are capable of disconnecting from the host in order to free the bus to allow other requests to be sent to other targets. To do so, however, the host needs to support Disconnect/Reselect. If Disconnect is implemented, the procedure is as follows:

1. The host arbitrates for the SCSI bus and if it wins it, selects the target device. Before releasing SEL and completing the selection phase, the host asserts the ATN line. The host then releases SEL and BSY. The target now has control of the SCSI bus. By asserting ATN, the host has indicated that the target should go to a MESSAGE OUT phase.

2. After the SELECTION phase is completed, the target responds to the host's ATTENTION condition by initiating a MESSAGE OUT phase. It receives a message from the host which tells it if the host can support Disconnect/Reselect and the desired logical unit number on the target.

3. The I/O activity from this point is controlled entirely by the target. The target initiates the COMMAND phase and reads in the Command Descriptor Block from the host. After decoding the command, the target determines whether it should disconnect from the bus. The target disconnects from the bus for any non-trivial commands.

4. The disconnect process is when the target initiates a MESSAGE IN phase and sends the host a SAVE DATA POINTERS (during a DATA phase only) and a DISCONNECT message. Following the MESSAGE IN phase, the target releases BSY, freeing the bus which then enters

the BUS FREE state. The host can now select another target, or allow another target to win the bus and reselect the host.

5. Although the host and the target are physically disconnected, they are still logically connected. Both know that they have a command to finish and will return to that job later. This principle allows many I/O commands to be executed simultaneously using a single peripheral bus. Once the target has completed a task and is ready to communicate with the host, it must reestablish the physical path. The reselection process involves the target arbitrating for the bus and reselecting the host. After the physical

reconnection is made, the target sends an IDENTIFY message to the host to indicate which target initiates the next appropriate phase for the command, usually a DATA phase.

6. During a large data transfer, the target may disconnect at intervals

depending on its use of the bus. The drive optimizes its use of the bus so as to maximize the transfer rate when it is connected to the host, and to

minimize the time for which it holds the bus without handshakes. If the target disconnects, during a data transfer, the target initiates a MESSAGE IN phase and send the host a SAVE DATA POINTERS message and a DISCONNECT message. The host responds to the SAVE DATA POINTERS message by saving the current data pointer. After transmission of the DISCONNECT message the target releases BSY, freeing the bus.

7. Once the target is again ready to reselect the host, it goes through the same process as before–arbitrating for the bus, reselecting the host and sending an IDENTIFY message. However, the host's response is slightly different in this case since the disconnect was during a data transfer. Host acceptance of the IDENTIFY message also implies a RESTORE DATA POINTERS message to the host. The data transfer can now be resumed.

8. After completion of the data transfer, the target initiates a STATUS phase and sends a single status byte to the host. The final action of the target is to initiate a MESSAGE IN phase and send a COMMAND COMPLETE message to the host.

Disconnection Notes

Certain devices will disconnect on completion of a data transfer if the final transfer occurs on a disconnect boundary, before initiating the STATUS phase. This is intended to optimize bus usage. Most devices do not disconnect on receipt of the following commands:

INQUIRY

REQUEST SENSE TEST UNIT READY The drive will disconnect on other commands if it is programmed or configured to do so.

Miscellaneous SCSI Issues

SCSI Standards

The SCSI standard describes the physical and electrical characteristics of a parallel I/O bus used when connecting computers and peripherals in a

daisy-chained manner. The connection of devices such as disk drives, tape drives, optical drives, printers, CD-ROM drives, and other devices without hardware modification is specified by the standard.

The SCSI bus provides two electrical specifications: single-ended and differential. The single-ended driver and receiver configuration uses TTL (Transistor-Transistor Logic levels and is primarily designed for applications within a cabinet. The single-ended version uses cable lengths up to 6 meters (19.68 feet). The differential driver and

receiver configuration uses EIA RS-485 signals and is primarily designed for applications requiring longer cable lengths. The differential version uses cable lengths of up to 25 meters (82.02 feet). The original SCSI standard was approved in 1986 and was called SCSI-1.

The SCSI-2 revision was released in 1992, and incorporates wide SCSI which permits 16 or 32 bit parallel transfer using two cables. Combined with the fast SCSI option, data transfer rates up to 40 megabytes per second are possible. Active termination was also specified for this standard. The SCSI-3 revision is currently being released. New features have been suggested and are being implemented to improve the SCSI-2 revision. Improvements include: the ability to address 32 devices, a single 16 bit data bus cable, and a serial SCSI protocol.

SCSI Cabling

The Small Computer System Interface (SCSI) is now being used by faster and more complex devices. The SCSI interface and associated ANSI standards are very flexible and allow for faster transmission rates. A major limiting factor to higher throughput and data integrity is SCSI cabling. SCSI cables must be engineered correctly in order to handle the increased transmission rates of today's SCSI devices.

Over the years that PTI has been involved with SCSI products and enhancements, experience shows that more than 80% of the problems with a new installation of external SCSI-based devices (disk drives, tapes, optical drives, etc.) have been related to the SCSI cables used in the installations. Ten percent of the problems relate to improper termination, and five percent to software improperly installed. With modern SCSI devices, only a small percentage actually involve true device failure (and even in these instances the power supply that powers the SCSI peripheral is often the problem source). When there is a problem with the cable, the symptoms vary greatly. The system may not operate at all, or there will be intermittent SCSI communication failures. In many cases the symptoms are initially thought to be due to the devices on the SCSI bus or the software drivers running the devices, resulting in excessive system installation delays and costs. Most SCSI integrators are using some form of shielded round cables when daisy-chaining external SCSI devices. Shielded round SCSI cables came into being because of the problems that unshielded flat ribbon cables have with electromagnetic interference (EMI).

Unshielded cable can not pass FCC requirements, whereas properly shielded round cable can function within FCC specifications. However, unlike poorly constructed round cabling, crosstalk noise in the bus is not a problem with flat ribbon cable. Crosstalk noise is best controlled in round cabling by careful conductor placement (clocks in the center, data around the periphery), and by using twisted-pair cables. The combination of cabling types (round versus flat) and quality (shielded, grounded, etc) within a single SCSI bus can create cable impedance mismatches. The 3 meter and 6 meter length limits suggested for 10 and 5 megabytes per second transfers (Fast SCSI-2 and SCSI-1 respectively), are aimed at

eliminating potential data problems on the SCSI bus. Where circumstances present a need for longer bus operation, special emphasis must be paid to the guidelines suggested above and in the standard.

With many integrators not readily able to provide specifications as to how their cables are constructed, it is usually very hard to determine if the purchased round SCSI cable will work error-free in the target SCSI environment. There are SCSI round cable suppliers providing cables with connectors that, though specified as SCSI 50-pin cables, may have as few as 25 lines wired from connector.

Differential applications will not operate under these conditions, and many single-ended SCSI applications will also have trouble maintaining uncorrupted signal transmissions with cable more than 6 feet long, as most of the ground lines are not connected. Even if all of the wires are connected, and even if twisted pair cable made specifically for SCSI is

used, depending upon how the cable is wired to the connector, there can also be problems. The twisted pairs on the cable must be matched with the correct pin numbers. Otherwise it is possible to have the plus side of two signal lines going through the same wire pair, inducing interference between the signals. This causes problems on fast SCSI-based systems, and systems with longer SCSI cable lengths. As is the case also with SCSI termination issues, PTI recommends careful examination of cabling specifications as part of a properly engineered SCSI environment. Cabling problems present challenging and frustrating problems in the

real-world of SCSI. Savings on poorly constructed cables is rapidly lost when the cable presents data integrity problems.

Simple Peripheral Installation Guidelines

SCSI gives new meaning to the term "plug-and-play." A single peripheral attached to a matching host adapter is usually easy to install, but when you plug several into a single host, things can get more complicated. The SCSI-2 draft specification, universal drivers, and easier installation routines go a long way toward making things easier. But even so, it's likely that you will come up against at least one or two problems along the way. Here are eight tips for getting your setup to go as smoothly as possible.

1. **Start simple**. Start with the basics. Rather than plugging a chain of peripherals into a single SCSI card and then booting up (and confronting the confusion and possible conflicts that are likely to result), get the host adapter installed first and then install the first hard disk. You will want to continue installing devices one at a time, checking to see that they are working before moving to the next. This may seem like a bit of extra work (you will have to install and reinstall device drivers for most of the peripherals, for example), but in a complex setup, this is often a shortcut in disguise.

2. **Make a list.** When adding a new device, make sure that you know all of the existing SCSI identification numbers on the chain before you start

installation. If you have a host adapter that reports the IDs during bootup (as the Adaptec AHA-1542C does), the task is easy; otherwise prepare to check the jumper or switch settings on each peripheral in the chain. Or better yet, keep an up-to-date, easily accessible list of all the SCSI peripheral IDs on the chain, as well as the I/O address and BIOS (Basic Input/Output System) location of the host adapter. Devices with low number settings have a higher priority. As a rule, you'll want to set your first hard disk at 0 and your second hard disk at 1. Host adapters are generally set at 7, and some operating systems (such as those that are Unix-based) expect to find them set there. In certain cases, some operating systems also expect other peripherals, such as CD-ROMs, to hold specific IDs; check your software and adapter manuals before installation. SCO Unix, for example, expects a CD-ROM to be

located at ID5. If you ignore such rules, the system may ignore your device.

3. **Internals first.** Try to install all your internal units first (starting with hard disks). But install them one ar a time and before you start experimenting with external devices and termination. Adding an external device means you need to make a change in the devices that are terminated.

4. **Observe proper termination.** In a SCSI set up, each end of the SCSI chain must be terminated. If you have only internal or external devices on the bus, the host adapter and last device on the chain should be terminated. If you have external and internal devices on the chain, you will generally terminate the first and last of these devices but not the SCSI host adapter.

5. Making connections. There are a variety of SCSI cable connectors:

25-pin for SCSI-1, 50-pin for SCSI-2, and 68-pin for the Wide-SCSI. Look at the connectors on the items you need to attach before you buy, and be sure to obtain quality cables with good shielding. Your best bet is to buy internal and external cables as short as possible, but no shorter than one foot long (to avoid signal noise.)

6. **Check and test.** Turn on any external devices before booting your PC; most external devices must be running to be recognized by their driver when the PC boots. If a unit (or the whole chain) fails, try the following: Check the ID numbers and cable connections to make sure that peripherals requiring specific IDs are set for them and that all devices are appropriately connected. Then power-down and power-up the system, watching the messages during the initialization of the configuration files. Make sure all drivers are loaded properly. If you can isolate an offending device, reposition it elsewhere on the chain. If that fails, change its ID number; perhaps the device is just unable to work at the ID number for which it was set. Next, try swapping cables between units and experiment with different combinations of termination, changing one element at a time. There may be a conflict, or the term power level may not be sufficient. In the latter case, you may have to add a terminator to the host adapter or even to another device on the chain.

Troubleshooting SCSI toolbox32 Problems

This chapter will describe some common problems that can be addressed with the SCSI *toolbox*. It will also help with troubleshooting the SCSI *toolbox* itself if the need arises.

Problem: The SCSI toolbox32 does not see any of the peripherals attached.

Solution: First, make sure that the SCSI bus has termination power. The SCSI *toolbox* hardware gets its power from the SCSI term power line. This power must be supplied either by one of the attached SCSI peripherals or by the PTI TermPower unit. Second, be sure that your SCSI cable is attached properly and alright. Last, be sure that the last attached SCSI peripheral is terminated, and that only the last one is terminated.

Problem: The attached SCSI peripheral shows up at all addresses when using the Device Menu.

Solution: The peripheral is probably set to SCSI address seven. The SCSI *toolbox* hardware adapter uses address seven, so be sure that none of the peripherals are set to seven.

Problem: Strange or intermittent data is displayed when using the Device Menu.

Solution: Be sure that each attached peripheral is set to a separate address. A defective SCSI cable or terminator can also show this symptom.

Problem: The SCSI *toolbox32* hangs.

Solution: Reboot the computer that is running the *toolbox*. (A variety of problems can cause "hangs.")

Problem: You have a dead SCSI disk drive.

Solution: Always check the block size and capacity of a SCSI disk. Either look at the DEVICE menu or use the READ CAPACITY command in the

COMMAND menu. If the block size or capacity numbers seem strange (too large or too small) the problem is that the low-level SCSI format on the drive has been damaged. Use the FORMAT command in the COMMAND menu to reformat the drive.

Problem: You need to test a CD-ROM.

Solution: To test a read-only device like a CD-ROM, use any of the tests that are read only, such as the sequential read test or the random read test.

Problem: You think that a disk drive may have had a head crash.

Solution: Examine the Grown Defect List using the READ DEFECT DATA command. Take note of many grown defects in the same general block range. Also, reformat the disk. Most disk drives will verify as they format, adding additional flaws to the Grown defect list. You can also run the VERIFY TEST, again noting if there are many flaws grouped together.

Problem: You think your SCSI cable may have a short or open connection.

Solution: The data lines of the SCSI bus are used both for addressing and for data transmission. Therefore, if the cable has a problem with the data lines it will be seen as either an addressing problem, or the INQUIRY data displayed in the DEVICE menu will be wrong. If the INQUIRY data is wrong, look in an ASCII table to see which bit of the data lines is stuck. If the problem is with the control lines, the program may hang in an unpredictable way.

Problem: A SCSI disk will not come on line, or it is on line but no capacity is reported. This is usually caused by a corrupted disk format. Solution: The FORMAT command in the Command Menu will attempt to run even if the disk is off

line. Try using the FORMAT command to restore the media format.

Problem: Still having problems?

Solution: Call our Technical Support Line at 303-763-7488.

Request Sense & Sense Key Interpretation

Sense Description Key

0hNO SENSE. Indicates that there is no specific sense key information to be reported for the designated logical unit. This would be the case for a successful command or a command that received CHECK CONDITION or COMMAND TERMINATED status because one of the filemark, EOM, or ILI bits is set to one.

1hRECOVERED ERROR. Indicates that the last command completed successfully with some recovery action performed by the target. 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 error to report (first, last, most severe, etc.) is device specific. 2h NOT READY. Indicates that the logical unit addressed cannot be accessed. Operator intervention may be required to correct this condition.

3hMEDIUM ERROR. Indicates that the command terminated with a non-recovered error condition which was probably caused by a flaw in the medium or an error in the recorded data. This sense key may also be returned if the target is unable to distinguish between a flaw in the medium and a specific hardware failure (sense key 4h).

4hHARDWARE ERROR. Indicates that the target detected a non-recoverable hardware failure (for example, controller failure, device failure, parity error, etc.) while performing the command or during a self test.

5hILLEGAL REQUEST. Indicates there was an illegal parameter in the command descriptor block or in the additional parameters supplied as data for some commands (FORMAT UNIT, SEARCH DATA, etc.). If the target detects an invalid parameter in the command descriptor block, then it shall terminate the command without altering the medium. If the target detects an invalid parameter in the additional parameters supplied as data, the target may have already altered the medium. This sense key may also indicate that an invalid IDENTIFY message was received. 6hUNIT ATTENTION. Indicates that the removable medium may have been changed or the target has been reset.

7hDATA PROTECT. Indicates that a command that reads or writes the medium was attempted on a block that is protected from this operation. The read or write operation is not performed.

8hBLANK 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 a write-once device encountered anon-blank medium while writing.

9hVendor Specific. This sense key is available for reporting vendor specific conditions.

AhCOPY ABORTED. Indicates a COPY, COMPARE, or COPY AND VERIFY command was aborted due to an error condition on the source device, the destination device, or both.

BhABORTED COMMAND. Indicates that the target aborted the command. The initiator may be able to recover by trying the command again.

ChEQUAL. Indicates a SEARCH DATA command has satisfied an equal comparison.

DhVOLUME OVERFLOW. Indicates that a buffered peripheral device has reached the end-of-partition and data may remain in the buffer that has not been written to the medium. A RECOVER BUFFERED DATA command(s) may be issued to read the unwritten data from the buffer.

EhMISCOMPARE. Indicates that the source data did not match the data read from the medium.

FhRESERVED.

Additional Sense Code/ Qualifier Interpretation

The additional sense codes and additional sense code qualifiers are defined below:

D - D	D - DIRECT ACCESS DEVICE					
. -\$	SEQ	JENTIAL ACCESS DEVICE				
. L -	PRIP					
. P -	' - PROCESSOR DEVICE					
w	2 - RF	FAD ONLY (CD-ROM) DEVICE				
	S - SCANNER DEVICE					
	0 - 0	OPTICAL MEMORY DEVICE				
	M - I	MEDIA CHANGER DEVICE				
	C -	COMMUNICATION DEVICE				
<u>ASC</u>	ASCO	DTLPWRSOMC DESCRIPTION				
13h	00h	D W O ADDRESS MARK NOT FOUND FOR DATA FIELD				
12h 00h	00h 11h	D W O ADDRESS MARK NOT FOUND FOR ID FIELD R AUDIO PLAY OPERATION IN PROGRESS				
00h	12h	R AUDIO PLAY OPERATION PAUSED				
00h	14h	R AUDIO PLAY OPERATION STOPPED DUE TO ERROR				
00h	13h	R AUDIO PLAY OPERATION SUCCESSFULLY COMPLETED				
00n 14h	04n 04h	T BLOCK SEQUENCE ERROR				
30h	02h	DT WR O CANNOT READ MEDIUM - INCOMPATIBLE FORMAT				
30h	01h	DT WR O CANNOT READ MEDIUM - UNKNOWN FORMAT				
52h	00h					
3⊢n 11h	02h 06h	DILPWRSOMC CHANGED OPERATING DEFINITION				
30h	03h	DT CLEANING CARTRIDGE INSTALLED				
4Ah	00h E	TLPWRSOMC COMMAND PHASE ERROR				
2Ch	00h	DTLPWRSOMCCOMMAND SEQUENCE ERROR				
2BN 41h	00h	D DATA PATH FAILURE (SHOULD LISE 40 NN)				
4Bh	00h	DTLPWRSOMC DATA PHASE ERROR				
11h	07h	W O DATA RESYCHRONIZATION ERROR				
16h	00h					
19h	00n 03h	D O DEFECT LIST ERROR IN GROWN LIST				
19h	02h	D O DEFECT LIST ERROR IN PRIMARY LIST				
19h	01h	D O DEFECT LIST NOT AVAILABLE				
1Ch	00h	D O DEFECT LIST NOT FOUND				
32N 40h	NNh	D W O DEFECTLIST UPDATE FAILURE DTI PWRSOMCDIAGNOSTIC FAILURE ON COMPONENT NN (80H-FEH)				
63h	00h	R END OF USER AREA ENCOUNTERED ON THIS TRACK				
00h	05h	T S END-OF-DATA DETECTED				
14h	03h					
51h	02n 00h	T O ERASE FAILURE				
0Ah	00h	DTLPWRSOMC ERROR TOO LONG TO CORRECT				
03h	02h	T EXCESSIVE WRITE ERRORS				
3Bh 3Bh	07h	L FAILED TO SENSE BOTTOM-OF-FORM				
00h	01h	T FILEMARK OR SETMARK NOT FOUND				
09h	02h	WR 0 FOCUS SERVO FAILURE				
31h	01h					
00h	000	DTI PWRS OMC. I/O PROCESS TERMINATED				
10h	00h	D W O ID CRC OR ECC ERROR				
22h	00h	D LEGAL FUNCTION(SHOULD USE 20 00, 24 00, OR 26 00)				
64h	00h	R ILLEGAL MODE FOR THIS TRACK				
2011 30h	00h	DT WR O M INCOMPATIBLE MEDIUM INSTALLED				
11h	08h	T INCOMPLETE BLOCK READ				
48h	00h	DTLPWRSO MC INITIATOR DETECTED ERROR MESSAGE RECEIVED				
3⊢h ₄₄ь	03h					
3Dh	00h	DTLPWRSO MC INVALID BITS IN IDENTIFY MESSAGE				
2Ch	02h	S INVALID COMBINATION OF WINDOWS SPECIFIED				
20h	00h	DTLPWRSO MC INVALID ELEMENT ADDRESS				
2411 26h	00h	DTLPWRSO MC INVALID FIELD IN ODB				
49h	00h	DTLPWRSO MC INVALID MESSAGE ERROR				
11h	05h	WR O LAMP FAILURE				
5Bh	02h	DTLPWRSO M LOG COUNTER AT MAXIMUM				
эвп 5Bh	00n 03h					
21h	00h	DT WR O M LOGICAL BLOCK ADDRESS OUT OF RANGE				
08h	00h	DTL WRS O MC LOGICAL UNIT COMMUNICATION FAILURE				
08h	02h	DTL WRS O MC LOGICAL UNIT COMMUNICATION PARITY ERROR				
4Ch	00h	DTLPWRSO MIC LOGICAL UNIT COMMUNICATION TIME-OUT DTLPWRSO MIC LOGICAL UNIT FAILED SELF-CONFIGURATION				
3Eh	00h	DTLPWRSO MC LOGICAL UNIT HAS NOT SELF-CONFIGURED YET				

DTLPWRSO MC LOGICAL UNIT IS IN PROCESS OF BECOMING READY DTLPWRSO MC LOGICAL UNIT NOT READY, CAUSE NOT REPORTABL 04h 01h DTLPWRSO MC LOGICAL UNIT IS IN PROCESS OF BECOMING READY DTLPWRSO MC LOGICAL UNIT NOT READY, CAUSE NOT REPORTABLE DTL 0 LOGICAL UNIT NOT READY, FORMAT IN PROGRESS DTLPWRSO MC LOGICAL UNIT NOT READY, INITIALIZINGCOMMAND REQUIRED DTLPWRSO MC LOGICAL UNIT NOT READY, MANUAL INTERVENTION REQUIRED 04h 00h 04h 04h 04h 02h 04h 03h 25h 00h 15h 01h LOGICAL UNIT NOT SUPPORTED DTLPWRSO MC MECHANICAL POSITIONING ERROR MEDIA LOAD OR EJECT FAILED MEDIUM DESTINATION ELEMENT FULL DTL WRS O M 53h 00h DTL WRS O M 3Bh 0Dh М DT W O MEDIUM FORMAT CORRUPTED MEDIUM REMOVAL PREVENTED MEDIUM SOURCE ELEMENT EMPTY 31h 00h DTL WRS O M 3Ah 00h 3Bh 0Eh М 43h 00h DTLPWRSOMC MESSAGE ERROR DTLPWRSOMC MICROCODE HAS BEEN CHANGED 3Fh 01h D W O DT O 1Dh 00h MISCOMPARE DURING VERIFY OPERATION 11h 0Ah 2Ah 01h MISCORRECTED ERROR MODE PARAMETERS CHANGED DTL WRSOMC 07h 00h DTL WRS OM MULTIPLE PERIPHERAL DEVICES SELECTED 11h 03h DT WSO MULTIPLE READ ERRORS 00h 00h DTLPWRSOMC NO ADDITIONAL SENSE INFORMATION 00h 15h NO CURRENT AUDIO STATUS TO RETURN NO DEFECT SPARE LOCATION AVAILABLE R D W O 32h 00h NO GAP FOUND NO INDEX/SECTOR SIGNAL NO REFERENCE POSITION FOUND T D W O D WR OM 11h 09h 01h 00h 06h 00h D WR OM NO SEEK COMPLETE NO WRITE CURRENT 02h 00h 03h 01h 28h 00h DTLPWRSOMC NOT READY TO READY TRANSITION, MEDIUM MAY HAVE CHANGED 5Ah 01h 5Ah 00h OPERATOR MEDIUM REMOVAL REQUEST OPERATOR REQUEST OR STATE CHANGE INPUT (UNSPECIFIED) DT WR OM DTLPWRSOM 5Ah 03h DT W OPERATOR SELECTED WRITE PERMIT 5Ah 02h DT W 0 OPERATOR SELECTED WRITE PROTECT S OUT OF FOCUS DTLPWRSOMC OVERLAPPED COMMANDS ATTEMPTED T OVERWRITE ERROR ON UPDATE IN PLACE 61h 02h 4Eh 00h 2Dh 00h L PAPER JAM DTLPWRSOMC PARAMETER LIST LENGTH ERROR 3Bh 05h 1Ah 00h 26h 01h DTLPWRSOMC PARAMETER VALUE INVALID DTL WRSOMC PARAMETERS CHANGED DTL W S O PERIPHERAL DEVICE WRITE FAULT 2Ah 00h 03h 00h POSITION ERROR RELATED TO TIMING 50h 02h т S POSITION PAST BEGINNING OF MEDIUM S POSITION PAST END OF MEDIUM 3Bh 0Ch 3Bh 0Bh 15h 02h DT WR O POSITIONING ERROR DETECTED BY READ OF MEDIUM 29h 0 DTLPWRSOMC POWER ON, RESET, OR BUS DEVICE RESET OCCURRED POWER ON, RESET, OR BUS DEVICE RESET OCCORRED POWER-ON OR SELF-TEST FAILURE (SHOULD USE 40NN) O PRIMARY DEFECT LIST NOT FOUND RAM FAILURE (SHOULD USE 40 NN) 42h 00h D 1Ch 01h D 40h 00h D 15h 00h DTL WRSOM RANDOM POSITIONING ERROR 38h 04h S READ PAST BEGINNING OF MEDIUM 38h 09h S READ PAST END OF MEDIUM 3Bh 09h 11h 01h 14h 01h DT W S O DT WR O READ RETRIES EXHAUSTED RECORD NOT FOUND RECORDED ENTITY NOT FOUND 14h 00h DTLWRS O RECOVERED DATA - DATA AUTO-REALLOCATED RECOVERED DATA - RECOMMEND REASSIGNMENT 18h 02h D WR O 18h 05h D WR O 18h 06h D WR O 17h 05h D WR O RECOVERED DATA - RECOMMEND REWRITE RECOVERED DATA USING PREVIOUS SECTOR ID RECOVERED DATA USING PREVIOUS SECTOR ID RECOVERED DATA WITH ERROR CORRECTION & RETRIES APPLIED RECOVERED DATA WITH L-EC RECOVERED DATA WITH NEGATIVE HEAD OFFSET RECOVERED DATA WITH NO ERROR CORRECTION APPLIED RECOVERED DATA WITH POSITIVE HEAD OFFSET RECOVERED DATA WITH POSITIVE HEAD OFFSET RECOVERED DATA WITH POSITIVE HEAD OFFSET 18h 03h R 18h 01h D WR O 18h 00h DT WR O 17h 03h DT WR O 17h 00h DT WRSO 17h 02h DT WR O RECOVERED DATA WITH RETRIES AND/OR CIRC APPLIED RECOVERED DATA WITH RETRIES AND/OR CIRC APPLIED RECOVERED DATA WITHOUT ECC - DATA AUTO-REALLOCATED RECOVERED DATA WITHOUT ECC - RECOMMEND REWRITE 17h 01h DT WRS O 17h 06h D W O 17h 07h D W O 0 1Eh 00h D W O 3Bh 08h T 36h 00h RECOVERED ID WITH ECC CORRECTION REPOSITION ERROR RIBBON, INK, OR TONER FAILURE L 37h 00h DTL WRSOMC ROUNDED PARAMETER 5Ch 00h D O RPL STATUS CHANGE 39h 00h DTL WR SOMCSAVING PARAMETERS NOT SUPPORTED
 39h
 00h
 DTL WR SOMCSAVING PARAMETERS NOT SUPPORTED

 62h
 00h
 S
 SCAN HEAD POSITIONING ERROR

 47h
 00h
 DTLPWRSOMCSCSI PARITY ERROR

 54h
 00h
 P
 SCSI TO HOST SYSTEM INTERFACE FAILURE

 45h
 00h
 DTLPWRSOM SELECT FAILURE

 38h
 00h
 TL
 SEQUENTIAL POSITIONING ERROR
 00h 03h Ť SETMARK DETECTED SLEW FAILURE SPINDLES SYNCHRONIZED 3Bh 04h 1 ŴR O 09h 03h 18h 00h DTLPWRSOMC SYNCHRONOUS DATA TRANSFER ERROR 55h 00h P SYSTEM RESOURCE FAILURE TAPE LENGTH ERROR TAPE OR ELECTRONIC VERTICAL FORMS UNIT NOT READY TAPE POSITION ERROR AT BEGINNING-OF-MEDIUM 33h 00h т 3Bh 03h L Т 3Bh 01h 3Bh 02h T TAPE POSITION ERROR AT END-OF-MEDIUM 3Fh 00h DTLPWRSOMC TARGET OPERATING CONDITIONS HAVE CHANGED 5Bh 01h DTLPWRSOM THRESHOLD CONDITION MET 26h 03h DTLPWRSOMC THRESHOLD PARAMETERS NOT SUPPORTED 2ch 01h S TOO MANY WINDOWS SPECIFIED 09h 00h DT WR O TRACK FOLLOWING ERROR

09h	01h		WF	20	TRACKING SERVO FAILURE
61h	01h		;	s	UNABLE TO ACQUIRE VIDEO
57h	00h		R	1	UNABLE TO RECOVER TABLE-OF-CONTENTS
53h	01h	Т			UNLOAD TAPE FAILURE
11h	00h	DT	WR	sо	UNRECOVERED READ ERROR
11h	04h	D	W	0	UNRECOVERED READ ERROR - AUTO REALLOCATE FAILED
11h	0Bh	D	W	0	UNRECOVERED READ ERROR - RECOMMEND REASSIGNMENT
11h	0Ch	D	W	0	UNRECOVERED READ ERROR-RECOMMEND REWRITE DATA
46h	00h	DTLPV	VRS	OMC	C UNSUCCESSFUL SOFT RESET
59h	00h			0	VIDEO ACQUISITION ERROR
50h	00h	Т			WRITE APPEND ERROR
50h	01h	Т			WRITE APPEND POSITION ERROR
0Ch	00h	Т		S	WRITE ERROR
0Ch	02h	D	W	0	WRITE ERROR - AUTO REALLOCATION FAILED
0Ch	01h	D	W	0	WRITE ERROR RECOVERED WITH AUTO REALLOCATION
27h	00h	DT	W	0	WRITE PROTECTED
80h	XXh\	THRU >	> FFł	ו XX/	VENDOR SPECIFIC
XXh	80h\	THRU >	> XXI	h FFI	vendor specific qualification of standard ABC.

ALL CODES NOT SHOWN ARE RESERVED.

SCSI Command Definitions

The following table is a numerical order listing of the command operation codes.

SCSI-2 Operation Codes

D - DIRECT ACCE .T - SEQUENTIAL .L - PRINTER DE P - PROCESSO .W - WRITE ON .R - READ ONI .S - SCANNER .O - OPTICAL .M - MEDIA C .C - COMMU	ESS DEVICE ACCESS DEVICE VICE R DEVICE CE READ MULTIPLE LY (CD-ROM) DEVICE DEVICE MEMORY DEVICE HANGER DEVICE INICATION DEVICE	D M O = O DEVICE	evice Column Key = Mandatory ptional V = Vendor Specific R = Reserved
OP DTLPWRSOMC 00 MMMMMMMMM 01 M 01 O V OO OO 02 VVVVV V 03 MMMMMMMMM 04 O 05 VMVVVV V 06 VVVVV V 06 VVVVV V 07 O 07 OVV O OV 08 M 08 OMV OO OV 08 O 09 VVVVV V 0A M 0A M 0A M 0A M 0A M 0A OV O OV 0B O 00 VVVVV V	DESCRIPTION M TEST UNIT READY REWIND REZERO UNIT M REQUEST SENSE FORMAT FORMAT UNIT READ BLOCK LIMITS INITIALIZE ELEMENTS GET MESSAGE(06) READ(06) READ(06) RECEIVE PRINT SEND MESSAGE(06) SEND(06) WRITE(06) SEEK(06) SLEW AND PRINT	STATUS	
0D VVVVVV V 0E VVVVVV V 0F V0VVVV V 10 0 0 10 VM VVV 11 VMVVVV 12 MMMMMMMMMM 13 V0VVV 14 V00VVV 15 0M0 000000 16 M MM M0 16 MM M 17 MM M 18 0000000 (0 19 VMVVVV 1B 0 18 0 19 MMVVVV 19 VVVV 19 VVVV 10 0 10 VVV 10 0 10 VVV 10 0 10 VVV 10 VVV 10 VVV 10 0 10 VVV 10 000000 10 MMVVV 10 0 10 VVV 10 VVV 10 0000000 10 MMVVV 10 VVV 10 000000 10 MVVV 10 VVV 10 0000000 10 MMVVV 10 VVV 10 VVV 10 0000000 10 MMVVV 10 VVV 10 0000000 10 MMVVV 10 VVV 10 0000000 10 MMVVV 10 VVV 10 000000 10 MMVVV 10 VVV 10 0000000 10 VVV 10 0000000 10 VVV 10 VVV 10 00000 10 VVV 10 000000 10 VVV 10 0000000 10 VVV 10 0000000 10 VVV 10 0000000 10 VVV 10 000000000 10 VVV 10 000000000 10 VVVV 10 000000000000 10 VVVV 10 00000000000000000000000000000000000	READ REVERSE SYNCHRONIZE BUFFER WRITE FILEMARKS SPACE MINQUIRY VERIFY(06) RECOVER BUFFERED MODE SELECT(06) RESERVE RELEASE RELEASE UNIT COPY MODE SENSE(06) LOAD UNLOAD SCAN STOP PRINT STOP START UNIT D RECEIVE DIAGNOSTIC PREVENT ALLOW MED	DATA RESULTS DIUM REM	5 OVAL
20 V VV V 21 V VV V 22 V VV V 23 V VV V 24 V VVM 25 O 25 M M M 26 V VV 27 V VV 28 O	SET WINDOW GET WINDOW READ CD-ROM CAPAC GET MESSAGE(10)	ITY	

28 M 29 V 2A 2B O 2B O 2D V 2F O 30 O 31 O 32 O 34 O 35 O 36 O 36 O 30 O 30 O 30 O 31 O 32 O 34 O 35 O 36 O 30 O 30 O 30 O 31 O 32 O 32 O 32 O 32 O 33 O 34 O 35 O 36 O 37 O 38 O 36 O 37 O 38 O 37 O 38 O 37 O 38 O 38 O 37 O 38 O 37 O 38 O 38 O 38 O 38 O 39 O 30 O 30 O 31 O 32 O 32 O 32 O 32 O 32 O 32 O 32 O 32	MMMM VV 0 0 0 M M 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	READ(10) READ GENERATION SEND MESSAGE(10) SEND(10) WRITE(10) LOCATE POSITION TO ELEMENT ERASE(10) WRITE AND VERIFY(10) VERIFY(10) SEARCH DATA HIGH(10) OBJECT POSITION SEARCH DATA EQUAL(10) SET LIMITS(10) GET DATA BUFFER STATUS READ POSITION SYNCHRONIZE CACHE LOCK UNLOCK CACHE READ DEFECT DATA(10) MEDIUM SCAN COMPARE COPY AND VERIFY DWRITE BUFFER DREAD BUFFER DREAD BUFFER UPDATE BLOCK READ LONG WRITE SAME READ TOC PLAY AUDIO(10)
46 47	0	
48	0	PLAY AUDIO TRACK INDEX
49 4A	0	PLAY TRACK RELATIVE(10)
4B	0	PAUSE RESUME
4C O(4E	00000000	5 LOG SENSE
4F 50 51 52 53 54 55 OC 56 57 58	00 00000	MODE SELECT(10)
59 5A OC	000000	MODE SENSE(10)
5B 5C 5D 5E 5F A0 A1 A2 A3 A4		
A5	М	
A5 A6	0	EXCHANGE MEDIUM
A7	0	
A8 A9 A4	000	READ(12) PLAY TRACK RELATIVE(12) WRITE(12)
AB	0	
AD	0	
AE AF	000	WRITE AND VERIFY(12) VERIFY(12)
BO	000	SEARCH DATA HIGH(12)
В1 В2	000	SEARCH DATA EQUAL(12) SEARCH DATA LOW(12)
B3	000	SET LIMITS(12)
B4 B5		
B5	0	REQUEST VOLUME ELEMENT ADDRESS
B6		

B6	0	SEND VOLUME TAG
B7	0	READ DEFECT DATA(12)
B8	0	READ ELEMENT STATUS
B9		
BA		
BB		

BC

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,

- 1. Pre-Test Actions
- 2. Testing
- 3. Post-Test Actions

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 = "SEAGATE"

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"

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.

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

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.

Drive Mode Pages – all mode page values can be set to conform to a "golden" drive setting.

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.

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.

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

Record Mode Page data – all Mode Pages 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. Depending upon the setting chosen, a drive that doesn't meet one of the qualifying parameters can either be removed from the test process at that point, or the condition can be corrected.

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 test parameters can be chosen for each test:

Random or *Sequential* test type – choose whether each drive block is accessed in a random manner, or sequentially through the test block range.

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.

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

Block Overlay on data pattern – the block number can be overlaid on top of any data pattern.
Data Compare on Read – this option can be chosen to confirm that the expected data was read from the disk.

Post-Test Actions

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, and clearing each drives LOG PAGE information.

Installation

Installation will vary depending on if you purchased the Stand Alone Disk Screening Toolbox or if you purchased the SCSItoolbox, which includes the Disk Screening Module.

In either case, simply insert your CD into your CD drive, and the installation process should begin. If the process does not autorun, use Explorer to navigate to the CD root folder, and double-click on the file Setup.exe to begin the install process.

Plug your hardware "dongle" key into your printer port or USB port.

Getting Started

Starting the Stand Alone Disk Screening Toolbox, or choosing the Disk Screening Module from the Disk Menu of the SCSItoolbox will present you with this screen:

Test Sequence: Bemove Test		
Sequential Write - 1 Blocks	Pre-Test Actions Test Setup Post Test Actions Test Status	🖃 💶 🗊 Bus 0: Target 255: atapi
Sequential Read - 1 Blocks		Target 0: WDC WD40 0EB-11CPF0
Random Verify - 15 Minutes	Check: Action.	Bus 1: Target 255: atapi
	Vendor (>) SEAGATE	Target 0: LITEON CD-ROM LTN486S
1	I Product ⇔ ST39102LC I Stop	Bus 2: Target 7: adpu160m
	Version <> 1234	Target 0: SEAGATE ST39102LC
	Download Firmware	Target 2: SEAGATE ST39102LC
	Firmware File Name = c:\fw\1234.lod Browse	Target 3: SEAGATE ST39102LC
		Target 9: SEAGATE ST39102LC
	✓ Blocksize ↔ 512 Stop ● Change	Target 10: SEAGATE ST39102LC
Test Progress:	Capacity <> FULL C Stop C Change	Target 11: SEAGATE ST39102LC
		Target 12: SEAGATE ST39102LC
	G Defects 1 C Stop	Target 14: HP A5294A
		Target 15: HP A5294A
	MUDE Pages V Set MODE Pages with file	Bus 3: Target 128: gl2100
	ModePage File Name ModePage.mpc Browse	Target 0: SEAGATE ST318451FC
	Spin Up All Drives	Target 1: SEAGATE ST318304FC
	Clear LOG PAGES	Target 2: HITACHI DK32DJ-72FC
	Save Mode Pages to Database	Target 3: SEAGATE ST318451FC
		Target 4: IBM DDYF-T18350R
		Target 5: IBM DDYF-T18350S
Save to File		Target 6: IBM DDYF-T18350S
		Target 7: HITACHI DK32DJ-72FC
Star	Current Stop All	Target 8: HITACHI DK32DJ-72FC
UK Start Test	Test Tests Save Setup Load Setup	

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:

Pre-Test Actions Test Setup Post Test	st Actions Test Status
Check: Vendor (>) SEAGATE Product (>) ST39102LC Version (>) 1234	Action: Stop Stop Stop Download Firmware
$rimwale rile Name = \int C (TW) (234)$	BIOWSE
 Blocksize <> 512 Capacity <> FULL P Defects < G Defects < 1 MODE Pages Set MODE F ModePage File Name ModePage 	Stop Change Stop Change Stop Stop Format Pages with file
 Spin Up All Drives Clear LOG PAGES Save Mode Pages to Database 	L3

Remember that your Pre-Test Actions can be made up of any, all, or none of these choices – it is up to you!

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 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

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 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

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 disk drive vendor. All drives that require a firmware download will be downloaded simultaneously.

Blocksize

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

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.

Capacity

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.

P-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 deselected and not tested further

G-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 deselected and not tested further

Action = Format- a low-level format will be run discarding the current Grown Defect List

MODE PAGES

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 DiskScreening" 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

Spin Up All Drives

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

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

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

Test Setup

Pre-Test Actions Test Setup Post Test Actions Test Status
Random or Sequential
Random C Sequential
Type of Test • Verify
○ Read ○ Write/Read
S FW Download S Format
Download File
Browse
Stop Test After
C Blocks -1 Blks 0 LBA
Test Data Data Pattern Decrementing 👤
Compare on Reads 🗌 Overlay Block #
Add This Test to Test Sequence

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.

All test definition choices are explained in detail below

Random or Sequential Access

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.

Type of Test

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.

<u>Write</u>

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.

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.

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.

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.

Blocks

This choice allows you to specify the number of blocks to transfer during the test. Entering -1 for number of blocks will test the entire disk capacity. 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 blocks, 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

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

Walking Zeros

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.

Overlay Block Number

Checking this box will overlay the block number over the first n bytes of each block of data.

Post-Test Actions

There are currently two choice, as shown below



You can choose to spin all disks down after testing, and to clear all Log Page data.

Selecting Disks to Test

Disks are selected for testing by using the tree display at the right of the Disk Screening Toolbox screen, as shown below

	~
Bus 2: Target 7: adpu160m	
Target 0: SEAGATE ST39102LC	
Target 2: SEAGATE ST39102LC	
Target 3: SEAGATE ST39102LC	
Target 9: SEAGATE ST39102LC	
Target 10: SEAGATE ST39102LC	
Target 11: SEAGATE ST39102LC	
Target 12: SEAGATE ST39102LC	
Target 14: HP A5294A	
Target 15: HP A5294A	
Bus 3: Target 128: ql2100	
Target 0: SEAGATE ST318451FC	
Target 9: IRM DDVE.T192500	
Target 10: SEAGATE ST318304EC	
Target 11: HITACHL DK32DL72EC	
< "	2

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. 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.

Here is a picture of the tree display where all drives had been selected, but there was a Pre-Test qualification of only testing SEAGATE drives:

🖶 🚛 🎫 Bus 2: Target 7: adpu160m
Target 0: SEAGATE ST39102LC
Target 2: SEAGATE ST39102LC
Target 3: SEAGATE ST39102LC
Target 9: SEAGATE ST39102LC
Target 10: SEAGATE ST39102LC
Target 11: SEAGATE ST39102LC
Target 12: SEAGATE ST39102LC
Target 15: HP A5294A
🗄 🛄 Bus 3: Target 128: ql2100
- Target 0: SEAGATE ST318451FC
Target 1: SEAGATE ST318304FC
Target 2: HITACHI DK32DJ-72FC
Target 3: SEAGATE ST318451FC
Target 4: IBM DDYF-T18350R
Target 5: IBM DDYF-T18350S
Target 6: IBM DDYF-T18350S
Target 7: HITACHI DK32DJ-72FC
🗟 – 🛲 Target 8: HITACHI_DK32DJ-72FC
Target 9: IBM DDYF-T18350S
Target 10: SEAGATE ST318304FC
Target 11: HITACHI DK32DJ-72FC

Saving and Loading 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:

	Pro Tost Actions Track Calver	Deal Teach Annual Teachanal	·
Sequential Write - 1 Blocks	The rest Actions Test Setup	Post Test Actions Test Status	🕞 💶 🗐 Bus 0: Target 255: atapi
Sequential Read 1 Blocks	Check:	Action	Target 0: WDC WD40 0EB-11CPF0
Handom Veniy - 15 Minutes	Vendor () SEAGATE	- Chan	🖨 🔚 🛄 Bus 1: Target 255: atapi
	Product () ST29102LC	J♥ Stop	Target 0: LITEON CD-ROM LTN486S
	Marrian () 1004	I♥ Stop	🖶 🚛 🗐 Bus 2: Target 7: adpu160m
	I Version (7 1234	C Stop	Target 0: SEAGATE ST39102LC
	Firmura File Marca	U Download Pirmware	Target 2: SEAGATE ST39102LC
	Firmware File Name = c:\h	WV1234.lod Browse	Target 3: SEAGATE ST39102LC
			Target 9: SEAGATE ST39102LC
	Rincksize (> 512	C Stop @ Change	Target 10: SEAGATE ST39102LC
Test Progress: Say	ve File - Disk Selection Choice		Target 11: SEAGATE ST39102LC
Pi	ease choose the Drive Selection option	h you would like to use when this	Target 12: SEAGATE ST39102LC
te	st configuration is loaded:		Target 14: HP A5294A
			Target 15: HP A5294A
	Select the same Disks as are curre	ntly selected	🗄 🛄 🛄 Bus 3: Target 128: ql2100
	C. David Calcul and Disks		Target 0: SEAGATE ST318451FC
	 Don't Select any Disks 		Target 1: SEAGATE ST318304FC
	ОК		Target 2: HITACHI DK32DJ-72FC
			Target 3: SEAGATE ST318451FC
_			Target 4: IBM DDYF-T18350R
· · · · · · · · · · · · · · · · · · ·			Target 5: IBM DDYF-T18350S
Save to File			Target 6: IBM DDYF-T18350S
Save to File			
Save to File			Target 7: HITACHI DK32DJ-72FC

You choose to not save the disk selection, or you can save the same disks are 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.

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.

Starting the Test Process

Once at least one test has been defined and added to the Test Sequence, and once at least one disk 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 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

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:

1 0 7 117 1	Carden Directory	TT IA C LT ICII		2: Target 7: adpu160m	_
ndom Verity - I Minutes guential Write - 2000000 Blocks	Status Display				
uential Read - 2000000 Blocks	2 202 00202020 0	150 10	ОК	Target 0: SEAGATE ST35102EC	
ndom veriry - 15 minutes	Test being run on HA 3, Target	0, Lun 0:		Target 2. SEAGATE ST35T02LC	
	Sequential Write - 200000	00 Blocks		Target 3: SEAGATE ST35T02LC	
				Target 9: SEAGATE ST39TU2LU	
	Test Status:	Test In Progress	Ν	Target 10: SEAGATE ST39102LC	
		_	νζ	Farget 11: SEAGATE ST39102LC	
	Number of Blocks Transferred:	740864		Target 12: SEAGATE ST39102LC	
				Target 14: HP A5294A	
	Number of Bytes Transferred:	361.75 MB		Target 15: HP A5294A	
Progress:		10.00 MP I		3: Target 128: ql2100	
3 Target 3 LUN 0 has complete 👗	This Drive's Transfer Hate:	12.92 MB/sec		Target 0: SEAGATE ST318451FC	
rting Test Number 2 on drive 3:3	Time Bunning:	28 seconds		Target 1: SEAGATE ST318304FC	
3 Target 1 LUN 0 has complete	rino rialining.	20 00001130		Target 2: HITACHI DK32DJ-72FC	
rting Test Number 2 on drive 3:1	Estimated Time Remaining:	47 seconds remaining		Target 3: SEAGATE ST318451FC	
3 Target 0 LUN 0 has complete				Target 4: IBM DDYF-T18350R	
rting Test Number 2 on drive 3:0	Total System Transfer Rate:	114.80 MB/sec		Target 5: IBM DDYF-T18350S	
2 Target 12 LUN 0 has complet	21.002 21.02	121.221.221		Target 6: IBM DDYF-T18350S	
rting Test Number 2 on drive 2:1	Total System Burst Rate:	131.56 MB/sec		Target 7: HITACHI DK32DJ-72FC	
×				Target 8: HITACHL DK32DJ-72EC	
				Target 9: IBM DDYF-T18350S	
				Target 10: SEAGATE ST31830/EC	

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.

The Test Status Page

The test status pages appears as below:



The Drives Pulldown

Use the Drives Pulldown box to choose which disk

Pre-Test Actions Test Setup Post Test Actions Test Status							
Drives HA 3, Target 0, Lun 0, SEAGATE, ST318451FC ▼ 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 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, ST39102LC HA 3, Target 0, Lun 0, SEAGATE, ST39102LC HA 3, Target 1, Lun 0, SEAGATE, ST39102LC HA 3, Target 1, Lun 0, SEAGATE, ST39102LC HA 3, Target 1, Lun 0, SEAGATE, ST318451FC Num HA 3, Target 3, Lun 0, SEAGATE, ST318451FC Num CEACATE, ST319404FC							
This Drive's Transfer Hate: 12.56 MB7sec							
Total System Burst Rate:112.05 MB/sec Sense Data:N/A							
Miscompare Info: N/A							

Just highlight the disk of interest

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

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 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	Т
•	Starting Test Se	303 1:10:59 PM	-1	-1	-1	****	****	****	****	-1	-1	****	****	****	****	****
	gateway	303 1:11:03 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	17664228	adpu160m	Test Started	Random Verify	Decrementing	Tes
	gateway	003 1:11:03 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	17783111	adpu160m	Test Started	Random Verify	Decrementing	Tes
	gateway	003 1:11:03 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	17783111	adpu160m	Test Started	Random Verify	Decrementing	Tes
	gateway	303 1:11:03 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Started	Random Verify	Decrementing	Tes
	gateway	303 1:11:03 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Started	Random Verify	Decrementing	Tes
	gateway	303 1:11:38 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	ql2100	Test Ended	Random Verify	Decrementing	Tes
	gateway	303 1:11:38 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	ql2100	Test Ended	Random Verify	Decrementing	Tes
	gateway	303 1:11:38 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	17783111	adpu160m	Test Ended	Random Verify	Decrementing	Tes
	gateway	303 1:11:38 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	17783111	adpu160m	Test Ended	Random Verify	Decrementing	Tes
	gateway	003 1:11:38 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	17664228	adpu160m	Test Ended	Random Verify	Decrementing	Tes
	Ending Test Sev	003 1:11:39 PM	-1	-1	-1	****	****	****	****	-1	-1	****	****	****	****	****
	Starting Test Se	303 1:16:34 PM	-1	-1	-1	****	****	****	****	-1	-1	****	****	****	****	****
_	gateway	303 1:16:50 PM	2	0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	17664228	adpu160m	Test Started	Random Write	Random	Tes
_	gateway	303 1:16:50 PM	2	2	0	SEAGATE	ST39102LC	LJB64426	HP03	512	17783111	adpu160m	Test Started	Random Write	Random	Tes
_	gateway	303 1:16:50 PM	2	3	0	SEAGATE	ST39102LC	LJA04046	HP03	512	17783111	adpu160m	Test Started	Random Write	Random	Tes
_	gateway	303 1:16:50 PM	2	9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	17783111	adpu160m	Test Started	Random Write	Random	Tes
_	gateway	303 1:16:50 PM	2	10	0	SEAGATE	ST39102LC	LJB93435	HP03	512	17783111	adpu160m	Test Started	Random Write	Random	Tes
_	gateway	003 1:16:50 PM	2	11	0	SEAGATE	ST39102LC	LJA02465	HP03	512	17783111	adpu160m	Test Started	Random Write	Random	Tes
_	gateway	003 1:16:50 PM	2	12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	17783111	adpu160m	Test Started	Random Write	Random	Tes
_	gateway	203 1:16:50 PM	- 3	0	0	SEAGATE	ST318451FC	300022VQ	F26D	512	35566477	al2100	Test Started	Random Write	Random	Tes
_	gateway	303 1:16:50 PM	3	1	0	SEAGATE	ST318304FC	3EL005MD	0001	512	35964300	al2100	Test Started	Random Write	Random	Tes
_	gateway	303 1:16:50 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	al2100	Test Started	Random Write	Random	Tes
_	gateway	303 1:16:50 PM	3	3	0	SEAGATE	ST318451FC	3CC01XJ4	F26D	512	35566477	al2100	Test Started	Random Write	Random	Tes
	gateway	303 1:16:50 PM	3	4	0	IBM	DDYF-T18350R		F61L	512	35566477	gl2100	Test Started	Random Write	Random	Tes
-	gateway	303 1:16:50 PM	3	5	0	IBM	DDYF-T18350S		W60V	512	35566477	al2100	Test Started	Random Write	Random	Tes
_	gateway	003 1:16:50 PM	3	6	0	IBM	DDYF-T18350S		W60V	512	35566477	al2100	Test Started	Random Write	Random	Tes
_	gateway	003 1:16:50 PM	3	7	0	HITACHI	DK32DJ-72FC	300A3589	A9A9	512	144410879	al2100	Test Started	Random Write	Random	Tes
_	gateway	003 1:16:50 PM	3	8	0	HITACHI	DK32DJ-72EC	300A2818	A9A9	512	144410879	al2100	Test Started	Random Write	Random	Tes
_	gateway	103 1:16:50 PM	3	- 9	0	IBM	DDYE-T18350S		W60V	512	35566477	al2100	Test Started	Random Write	Random	Tes
-	gateway	103 1:16:50 PM	3	10	0	SEAGATE	ST318304FC	3EL005NC	0001	512	35964300	al2100	Test Started	Random Write	Random	Tes
-	gateway	103 1:16:50 PM	3	11	0	HITACHI	DK32DJ-72EC	300A0594	A9A9	512	144410879	dl2100	Test Started	Random Write	Random	Tes
-	gateway	303 1:17:11 PM	3	8	0	HITACHI	DK32DJ-72FC	300A2818	A9A9	512	144410879	al2100	Test Ended	Random Write	Random	Mis
-	gateway	303 1:18:02 PM	3	2	0	HITACHI	DK32DJ-72FC	300A6804	A9A9	512	144410879	al2100	Test Ended	Random Write	Random	Mis
	gateway	303 1:21:22 PM	3	3	0	SEAGATE	ST318451FC	3CC01XJ4	F26D	512	35566477	al2100	Test Ended	Random Write	Random	Tes
_	gateway	303 1:21:24 PM	3	0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	35566477	al2100	Test Ended	Random Write	Random	Tes
_	gateway	303 1:22:31 PM	3	4	0	IBM	DDYE-T18350R		F61L	512	35566477	al2100	Test Ended	Random Write	Random	Tes
_	gateway	103 1:22:35 PM	3	. 9	0	IBM	DDYE-T18350S		W60V	512	35566477	al2100	Test Ended	Random Write	Random	Tes
_	gateway	303 1:22:36 PM	3	10	0	SEAGATE	ST318304FC	3EL005NC	0001	512	35964300	al2100	Test Ended	Random Write	Random	Tes
_	gateway	303 1:22:36 PM	3	1	0	SEAGATE	ST318304FC	3EL005MD	0001	512	35964300	al2100	Test Ended	Random Write	Random	Tes
-	gateway	303 1:22:44 PM	3	7	0	HITACHI	DK32DJ-72FC	300A3589	A9A9	512	144410879	al2100	Test Ended	Random Write	Random	Tes
	gateway	303 1:22:50 PM	3	11	0	HITACHI	DK32DJ-72FC	300A0594	A9A9	512	144410879	al2100	Test Ended	Random Write	Random	Tes
	gateway	303 1:23:02 PM	3	5	0	IBM	DDYF-T18350S		W60V	512	35566477	al2100	Test Ended	Random Write	Random	Tes
_		202 4 22 22 214	-	-	-	1014	DOVE THOSE		second 2	540	000000477	10400		B 1 942.5	n 1	T

Here is the rest of the test table:

	TimeToDoTest	NumMBToDev	NumMBFromDe	TotMBTrans	TransRateTo	TransRateFrom	TotTransRate	SenseOnFailure	MiscompareLB/ MiscompareOf	fs 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	כ	
	N/A	0	0	0	0	0	0	N/A	0	כ	
	N/A	0	0	0	0	0	0	N/A	0	כ	
	N/A	0	0	0	0	0	0	N/A	0	כ	
	35sec	0	124.81	124.81	0	3.57	3.57	N/A	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)	
_	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 Ser
	****	-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	2	
	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)	
_	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	2	
_	N/A	0	0	0	0	0	0	N/A	0	כ	
	N/A	0	0	0	0	0	0	N/A	0	כ	
_	N/A	0	0	0	0	0	0	N/A	0	כ	
	N/A	0	0	0	0	0	0	N/A	0	כ	
_	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		
_	N/A	0	0	0	0	0	0	N/A	0	2	
_	N/A	0	0	0	0	0	0	N/A	0	2	
_	N/A	0	0	0	0	0	0	N/A	0]	
	21sec	50.75	50.69	101.44	2.42	2.41	4.83	N/A	42515868 1	9 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 I	11285515 2	4 90 38 16 a2 e9 !	9a 38 16 02 ad !
_	4min 32sec	976.56	976.56	1953.13	3.69	3.69	7.18	N/A	U	J	
_	4min 34sec	976.56	976.56	1953.13	3.66	3.66	7.13	N/A	0		
_	5min 41sec	976.56	976.56	1953.13	2.86	2.86	5.73	N/A	0		
_	5min 45sec	976.56	976.56	1953.13	2.83	2.83	5.66	N/A	0		
_	5min 46sec	976.56	976.56	1953.13	2.82	2.82	5.64	N/A	0	1	
_	5min 46sec	976.56	976.56	1953.13	2.82	2.82	5.64	N/A	0	J	
_	5min 54sec	976.56	976.56	1953.13	2.76	2.76	5.52	N/A	0	J	
_	6min Usec	976.56	976.56	1953.13	2.71	2.71	5.43	N/A	0	J	
_	6min 12sec	976.56	976.56	1953.13	2.63	2.63	5.25	N/A	0	J	
	10 140	070 50	070 001	4050 401		0.00	F 47	18120			

The Information table stores Mode and Log page information – again a screen shot:

	Computer	rl DateTimeStamp HBA Tid I	Lur	Vendor	Product	SerialNum	Version	BlkSz	Page	Param	Data
•	gateway	003 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	003 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	003 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	003 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 00
	gateway	003 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	003 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	003 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	003 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	003 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	003 1:11:03 PM 2 0	0	SEAGATE	ST39102LC	LJA15511	HP03	512	0	-1	00 00
	gateway	003 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	003 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	003 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	003 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 00
	gateway	003 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	003 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	003 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	003 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	003 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	003 1:11:03 PM 2 9	0	SEAGATE	ST39102LC	LJA16690	HP03	512	0	-1	00 00
	gateway	003 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	003 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	003 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 00
	gateway	003 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	003 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	003 1:11:03 PM 2 12	0	SEAGATE	ST39102LC	LJ521079	HP03	512	10	-1	02 10 00 00 00 00 00 00 00 00 00
	gateway	003 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	003 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 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 0
	gateway	003 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	003 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 00
	gateway	003 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	003 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	003 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	003 1:11:03 PM 3 0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	25	-1	00 48 00 00 00 00
	gateway	003 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	003 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	003 1:11:03 PM 3 0	0	SEAGATE	ST318451FC	3CC022VQ	F26D	512	0	-1	00 00 0F 00 00 00
	gateway	003 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	003 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 0
		1000 4 44 00 DM 0 0		LITEOLU	DLOOD LITOPO	200 4 000 4	0000	E40	-	4	14 5 4 5 2 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2

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 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

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 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

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