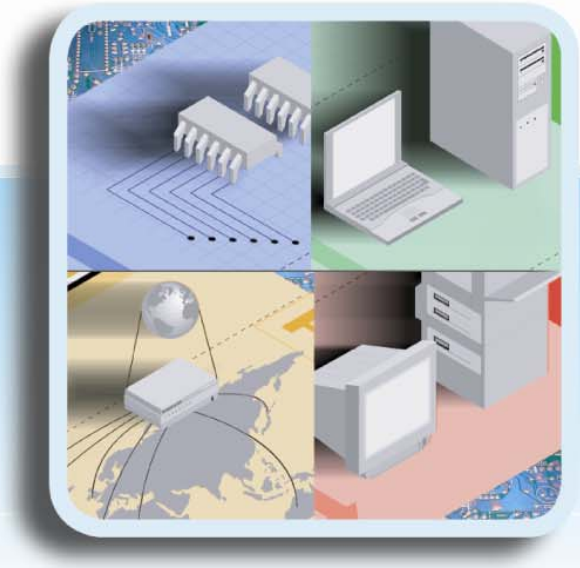
Eurosoft
pc reliability solutions

QA

Test Descriptions



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Eurosoft PC Reliability Solutions

QA Test Descriptions

QATD032005V8.37

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Contents

Introduction

The purpose of the QA Test Descriptions manual is to provide you with an understanding of the specifics involved in running Test Modules. The test descriptions include information about each of the tests, an example of the code operation, device information, test settings and possible causes of failure.

The term "QA+WIN32" is used throughout this document as generic coverage for:

the integrated PC Builder diagnostic program QaTest32;

the standalone diagnostic program QA+Win32;

the bundled diagnostic program Virtual QA+.

All of these test programs use the same test descriptions: however, they have different user interfaces and functionality.

Important

Interactive Tests are available only for the standalone diagnostic program QA+Win32.

By definition, they must NOT be specified for use with PC Builder via QaTest32.

If specified for Virtual QA+, they will be skipped.

The names of interactive tests are listed in italics, with the suffix "I".

QA Test Descriptions

Tests requiring a loopback plug are indicated with an **(L)** after the test name in the table below. Interactive tests (which **must** be run in interactive mode) are indicated with an **(I)**, and are in *italics*. The tests, their icons, and their abbreviations are shown below:

Test Group Number	Test Group Name	Tests	Icon	Abbreviation
AUD – 3600	Audio	201 – Basic Operation 202 – Gain 203 – Offset 204 – Noise 205 – Balance 206 – Crosstalk 207 – Distortion 208 – Frequency Response 210 – CD Audio 211 – Muting		AUD
CDN – 3200	CD Drives	201 – Reset 202 – Butterfly Seek 203 – Linear Seek 204 – Random Seek 205 – Eject CD		CDN
COM – 300	Communication Ports	201 – Data Path 202 – Internal Loopback 203 – RTS Loopback **(L)** 204 – DTR Loopback **(L)** 205 – Baud Rate **(L)** 206 – Stop Bit **(L)** 207 – Word Length **(L)** 208 – Interrupt **(L)**		COM
CRW – 4200	CD Recording/ Writing	201 – Buffer I/O 202 – Simulate Write 203 – 'RW' Write 204 – 'R' Write		CRW
DRW – 4300	DVD Recording/ Writing	201 – Buffer I/O 202 – Simulate Write 203 – '+RW' Write 204 – '-RW' Write 205 – 'R' Write		DRW
DVD – 3700	DVD Drives	201 – DVD Butterfly Seek 202 – DVD Linear Seek 203 – DVD Random Seek 204 – CD Butterfly Seek 205 – CD Linear Seek 206 – CD Random Seek 207 – Eject Media		DVD
FDN – 3300	Floppy Drives	201 – Butterfly Seek 202 – Linear Seek 203 – Read/Write *204 – Media Change* **(I)** *205 – Write Protect* **(I)**		FDN
FRW – 4400	FireWire	201 – IEEE1394 Bus Count		FRW
FSV – 4000	File Scan-Verify	201 – File Scan Test 202 – File Verify Test 203 – Report File		FSV

Test Group Number	Test Group Name	Tests	Icon	Abbreviation
HDN – 2600	Hard Drives	201 – Butterfly Seek 202 – Random Seek 203 – Read/Verify		HDN
IDE – 2800	IDE Drives	201 – SMART 202 – Surface Scan 203 – Zone Access 204 – Sequential Access 205 – Random Access 206 – Linear Seek		IDE
IOM – 3800	Iomega Drives	201 – Surface Scan 202 – Zone Access 203 – Sequential Access 204 – Random Access 205 – Linear Seek 206 – Eject Media 207 – Auto Sleep		IOM
KBD – 800	Keyboard	*201 – Keyboard Test* **(I)**		KBD
LPT – 200	Parallel Ports	201 – Data Port 202 – External Loopback **(L)**		LPT
MBD – 700	Motherboard	201 – CPU 203 – IC Data Path 204 – Interrupt Controller 207 – CMOS RAM 208 – Clock/Calendar 210 – Numeric Coprocessor 218 – MMX Basic Functionality		MBD
MDM – 2900	Modem	201 – AT Command 202 – Fax Command 203 – Local Loopback 204 – Dial Tone Detect		MDM
MEM – 1000	Memory	201 – Pseudo Random Data 202 – Walking Bit Left 203 – Walking Bit Right 204 – Inverse Walking Bit Left 205 – Inverse Walking Bit Right 206 – Checkerboard 208 – Bit Stuck High 209 – Bit Stuck Low 211 – Pseudo Random Address 212 – Quick 213 – Custom		MEM
MON – 3500	Monitor	*201 – Red Purity* **(I)** *202 – Green Purity* **(I)** *203 – Blue Purity* **(I)** *204 – Mesh* **(I)** *205 – Inverse Mesh* **(I)** *206 – White MEME* **(I)** *207 – Green MEME* **(I)** *208 – Tonality* **(I)** *209 – Grid* **(I)**		MON

Test Group Number	Test Group Name	Tests	Icon	Abbreviation
MUL – 2500	MultiMedia	*201 – AVI Video* **(I)** *202 – CD Audio* **(I)** *203 – Sequencer* **(I)** *204 – MPEG Video* **(I)** *207 – Wave Audio* **(I)**		MUL
NIC – 2200	Network Device	201 – Enumerate Devices 202 – Enumerate Group 203 – Ping Test 204 – Enumerate Protocols 205 – Throughput 206 – Server Enumeration		NIC
PDV – 900	Pointer Devices	*201 – Mouse Tracking* **(I)** *202 – Mouse Click* **(I)** *203 – Joystick Tracking* **(I)** *204 – Joystick Click* **(I)** *205 – Digitizer Grid* **(I)** *207 – Digitizer Diagonal* **(I)** *208 – Digitizer Offset* **(I)**		PDV
RMD – 4700	Removable Media Disk Group	201 – Linear Read 202 – Random Read		RMD
SEN – 4600	Sensors	201 – CPU Temperature 202 – Chassis Temperature 203 – Auxiliary Device Temperature 204 – Fan 1 Speed 205 – Fan 2 Speed 206 – Fan 3 Speed 207 – Fan 4 Speed 208 – +12 Volts Rail 209 – +5 Volts Rail 210 – -5 Volts Rail 211 – +3.3 Volts Rail 212 – CPU Voltage Rail		SEN
SER – 4500	Serial Ports	201 – Configuration Registers 202 – Quick Loopback **(L)** 203 – BAUD Rates **(L)** 204 – Sustained Loopback **(L)** 205 – Priority Transmit **(L)**		SER
STR – 2700	System Stress	201 – Extended Stress		STR
SYS – 1300	System Information	205 – Hardware Configuration 209 – PCI Bus Information 210 – Plug and Play Bus Information 213 – USB Bus Information 214 – WMI Information 215 – SMBIOS Information		SYS
USB – 3100	USB Drives	203 – Detected Devices 204 – Read Transfer Test		USB
VID – 600	Video	201 – RAM 202 – Line Drawing Test 203 – Polygon Drawing Test 204 – Bit-Blit Test 205 – Color Palette 206 – VGA Palette Test *208 – Color Separation* **(I)** *209 – 3D Animation* **(I)** *210 – 3D Effects* **(I)**		VID

Test Descriptions

Currently the following test groups are available:

Icon	Group Name	Group ID	Group Name Description
	AUD	3600	- Audio Group
	CDN	3200	- CD Drives Group
	COM	300	- Communication Ports Group
	CRW	4200	- CD Recording/Writing Group
	DRW	4300	- DVD Recording/Writing Group
	DVD	3700	- DVD Drives Group
	FDN	3300	- Floppy Drives Group
	FRW	4400	- FireWire Group
	FSV	4000	- File Scan Verify Group
	HDN	2600	- Hard Drives Group
	IDE	2800	- IDE Drives Group
	IOM	3800	- Iomega Drives Group
	KBD	800	- Keyboard Group
	LPT	200	- Parallel Ports Group
	MBD	700	- Motherboard Group
	MDM	2900	- Modem Group
	MEM	1000	- Memory Group
	MON	3500	- Monitor Group
	MUL	2500	- Multimedia Group
	NIC	2200	- Network Device Group
	PDV	900	- Pointer Devices Group
	RMD	4700	- Removable Media Disk Group
	SEN	4600	- Sensors Group
	SER	4500	- Serial Ports Group
	STR	2700	- System Stress Group
	SYS	1300	- System Information Group
	USB	3100	- USB Drives Group
	VID	600	- Video Group

To view the description of a test from within QA+WIN32, open the Tree View by selecting View->Tree View. There should now be a check mark in front of Tree View on the menu. Once in Tree View you should see a list of Icons in the leftmost section of the QA+WIN32 screen. Click an Icon once to get the test information for that particular test group, displayed under the Test Information tab on the right-hand side of the screen.

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Audio Group: AUD – 3600

Overview

This test group is designed to test the PC audio subsystem. The electrical characteristics of audio subsystems vary from manufacturer to manufacturer. Sample sizes can be either eight or sixteen bits. Standard sampling rates include 11.025 kHz, 22.05 kHz, and 44.1 kHz. Most boards support PCM recording at any sampling rate up to 44.1 kHz.

Test Setup

In most cases the audio tests require that a loopback cable be connected between the LINE OUT jack and the LINE IN and/or MIC IN jacks. Consequently, the actual speakers will **not** be connected during these tests. As listed below, each item describes the particular setup needed to conduct the test. The test group automatically selects the highest sample rate and sample size for a test as supported by the audio hardware during the testing process.

The allocation of audio ports to specific functions (e.g. line input, line output) is software configurable under Windows, which can thereby override the audio hardware's defaults. Therefore it may be necessary for the user to perform tests to determine the actual audio port allocations. The parameter "Input Port" can then be used to define the location of the actual input port (such as whether the port is front or rear loaded). If necessary, to ascertain how port numbers map onto audio functions, consult "Sounds and Audio Devices" in the Windows Control Panel. Under the "Audio" tab, the drop-down list for "Sound recording" will indicate the port number allocations.

Tests in this group

The following tests are included in the AUD – 3600 test group:
Test 201 – Basic Operation
Test 202 – Gain
Test 203 – Offset
Test 204 – Noise
Test 205 – Balance
Test 206 – Crosstalk
Test 207 – Distortion
Test 208 – Frequency Response
Test 210 – CD Audio
Test 211 – Muting

Limitations

Because a loopback mechanism is used to perform the audio tests, absolute measurements cannot be made.

Prerequisites

Audio loopback cable must be installed for various tests as indicated in test descriptions.

Description

As shown in Figure 1, in its simplest and most common form, the PC audio subsystem consists of a stereo input and output section.

Left and right channel audio inputs to LINE IN are first amplified then converted to digital form. A microphone connected to MIC IN produces a small signal that is amplified and distributed equally to the left and right channels forming a monophonic signal, which is then digitized.

Digital audio information to be played back is converted to analog form, and then amplified for output to LINE OUT. This output is normally used to connect audio recording or auxiliary equipment. For playback to speakers, the analog signal is routed through a power amplifier to LINE OUT. The output is usually capable of producing 250 milliwatts or more power into an eight-ohm load. In many cases users connect amplified speakers to the output instead of driving the speakers directly from the sound subsystem.

Many audio subsystems are capable of stereo, full-duplex operation. Keep in mind that much older subsystems are often not capable of stereo/full-duplex operation. Stereo consists of a left and right channel pair. Stereo microphone inputs are possible, though most subsystems are designed to use a single microphone. In this case, the audio signal is input to the left channel and power is applied to the microphone via the right channel connector.

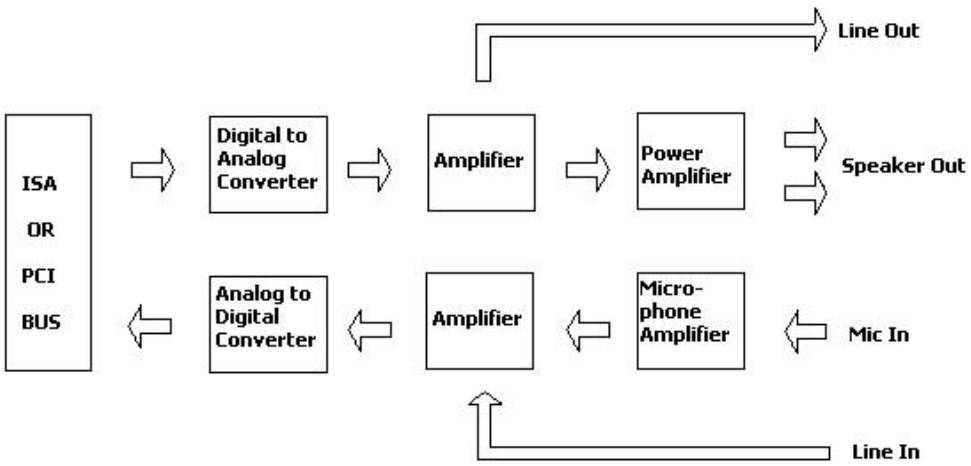

Figure 1 – Typical PC Audio Subsystem

An audio subsystem is capable of full-duplex operation if it can play and record audio simultaneously. The majority of modern subsystems support full-duplex operation, but older or inexpensive ones only support half-duplex. In half-duplex systems signals may be recorded or played, but not both at the same time.

Group Settings

None

Device Settings

Device Setup				
Loopback cable connected between LINE OUT and LINE IN or LINE OUT and MIC IN				
Device Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Test Frequency (Hz)	1000	50	5000	Frequency of generated device signal
Test Level	16383	3276	65535	Level of generated device signal
Master Volume	32767	0	65535	'Mixer' output level of sound card
Input port	0	0	Maximum available ports	Defines Port To Test e.g.. front or rear

Test 201 – Basic Operation

Group: AUD 3600

Check basic sound system operation

The purpose of this test is to verify the basic operation of the overall sound subsystem while using minimal auxiliary equipment. While the test is running, each output channel generates the test signal and the resulting input signals are measured. The measured signal level must be at least 1% of the test level or the test fails.

Test Time - 2 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Input Device	0	0	1	0=LINE IN 1=MIC IN

Test 202 – Gain

Group AUD 3600

Check the overall gain of the sound subsystem

The purpose of this test is to verify overall gain of the audio circuitry. During this test, the test signal is applied to each output channel and the resulting input signals are measured. The measured signal level must be at or above the threshold value (specified as tenths of a percent of the input level) for the test to pass.

Test Time - 2 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Tenth of Percent Gain	40	20	2000	Threshold in tenths of a percent

Note: this test may fail if the input port is not stereo.

Test 203 – Offset

Group: AUD 3600

Check DC offset level

The purpose of the Offset Voltage test is to ensure that the DC offset voltage is negligible. Any non-zero offset reduces the range of the AC input signal that can be digitized and may indicate a hardware problem with the input amplifier.

Without a signal applied to either channel output, the input signal offset of each channel is measured. The level must be below the specified value in order for the test to pass.

In most cases the measured offset level will be higher with the loopback cable installed than without it.

Test Time - 2 seconds

Test Settings

Test Setup				
Loopback cable may be installed				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Input Device	0	0	1	0 = LINE IN 1 = MIC IN
Maximum Offset	262	1	3276	Absolute value of level

Test 204 – Noise

Group: AUD 3600

Check quiescent AC noise level

The Noise test determines if the AC ambient noise is negligible. Ambient noise reduces the dynamic range of the output and may detract from audio quality. Therefore, this test can help determine if an audio circuit problem exists or if a component is noisy. It can also determine if the 50/60 Hz AC line frequency is bleeding into the audio due to defective circuitry or poor grounding.

With no signal applied to either output, the input signal noise is measured for each channel. The level of each channel must be below the specified value in order to pass the test.

In most cases the measured noise level will be higher with the loopback cable installed than without it.

Test Time - 2 seconds

Test Settings

Test Setup				
Loopback cable may be installed				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Input Device	0	0	1	0 = LINE IN 1 = MIC IN
Max. Noise Level	262	1	6553	RMS noise level

Test 205 – Balance

Group: AUD 3600

Check right/left channel balance levels

The Balance Test ensures that the output levels of each channel are within the specified tolerance. Each output channel generates the test signal; the resulting input signals are then measured. If the difference between the two measured levels is greater than the specified value, the test fails.

Test Time - 4 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Input device	0	0	1	0=Line in 1 = microphone
Tenth of Percent Imbalance	100	1	1000	Deviation in tenths of a percent

Note: this test may fail when using the Mic in, if the Microphone port is not stereo

Test 206 – Crosstalk

Group: AUD 3600

Check right/left channel crosstalk levels

The purpose of the Crosstalk Test is to ensure that crosstalk generated by one channel has a negligible effect on the other. First the right channel generates the test signal and the left channel input level is measured. Then the left channel generates the test signal and the right channel input level is measured. If either measured value is greater than the specified value, the test fails.

Test Time - 4 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Input Device	0	0	1	0=Line in 1 = Microphone
Max. Crosstalk	262	1	1310	RMS level

Note: this test may fail when using the Mic in, if the Microphone port is not stereo

Test 207 – Distortion

Group: AUD 3600

Check harmonic distortion level

The Distortion Test is used to ensure that the audio circuitry is not clipping or otherwise distorting the signal. The net effect of distortion is that unwanted harmonics are inadvertently produced by the audio subsystem.

During this test, the right output channel generates the test signal, while the right input channel level is measured for all frequencies. The process is repeated for the left channel. If the total of the non-test-frequency harmonics is greater than the acceptable level, the test fails.

To improve the accuracy of the distortion measurement, the generated test signal frequency is fixed at 689.0625 Hz.

Test Time - 2 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Input Device	0	0	1	0 = LINE IN 1 = MIC IN
Max. Distortion	65	1	655	RMS level

Test 208 – Frequency Response

Group: AUD 3600

Check frequency response levels

During the Frequency Response test, the audio subsystem is monitored to determine its ability to generate and detect sounds across the range of human hearing. The specified frequency range is subdivided into a set of individual frequencies. During the test, these frequencies are generated one at a time by the right output channel, while the right input channel level is measured. The process is repeated for the left channel. If any measured value is greater than or less than the specified deviation, the test fails.

Test Time - 6 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Input Device	0	0	1	0 = LINE IN 1 = MIC IN
Start Frequency (Hz)	100	20	2000	Delimits range of frequencies to test
Stop Frequency (Hz)	10000	2000	20000	Delimits range of frequencies to test
Tenth of Percent Deviation	250	1	1000	Deviation in tenths of a percent

Test 210 – CD Audio

Group: AUD 3600

Check the operation of the CD audio output.

The purpose of this test is to verify that an audio CD can play through the sound subsystem. When this test runs, the first available track of a music CD is played and signals are measured. The measured signal level must be at least 1% of the test level or the test will fail.

In general, a test failure indicates that the cable between the CD or DVD drive and the sound subsystem is disconnected.

The CD Audio test is available only if a CD or DVD drive is installed in the system. If more than one such drive is installed, the first logical drive must be the one connected to the audio subsystem; otherwise the test will fail.

If run non-interactively, the test will fail immediately if the test CD is not installed in the unit. The test CD may be a music-only CD, or may be a “mixed-media” CD containing data followed by one or more music tracks.

Note: If the CD/DVD drive has controls on its face like a standard home CD player then you can check whether it’s properly connected to the sound card without removing the machine’s case. Shut down any media players (e.g. Windows Media Player) and try to play the CD using the controls; if it plays then the drive’s properly connected. By contrast, media players make a software connection to the drive.

Test Time - 10 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Input Device	0	0	1	0=LINE IN 1=MIC IN
Minimum CD Audio Level	655	131	32767	Threshold for audio input level to sound card from the CD drive; the measured audio input level must be greater than or equal to this value for the test to pass

Test 211 – Muting

Group: AUD 3600

Check operation of the muting controls

The purpose of this test is to verify that the master output and wave output muting controls are working properly. When this test runs, the test signal is applied to each output channel and the resulting input signals are measured while the muting controls are off (i.e. no muting).

Then the master output muting control is enabled and the signal is measured again. Lastly, the master output muting control is disabled and the wave output muting control is enabled, and the signal is measured.

The ratio of each muted signal to that of the un-muted signal must be greater than 0.03 for the test to pass.

Test Time - 5 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Input Device	0	0	1	0=LINE IN 1=MIC IN

Possible Causes of Errors

No errors unique to this test

CD Drives Group: CDN – 3200

Overview

is a removable media CD drive test group that executes and runs on Windows® 98, Windows® NT, Windows® 2000, Windows® ME, or Windows® XP. The group consists of four tests that can be run on a drive: Butterfly Seek, Linear Seek, Random Seek, and Eject Media.

Tests in this Group

The following tests are included in the CDN – 3200 test group:

Test 201 – Reset
Test 202 – Butterfly Seek
Test 203 – Linear Seek
Test 204 – Random Seek
Test 205 – Eject Media

Group Settings

None

Device Settings

None

Test 201 – Reset

Group: CDN 3200

Performs a device reset by checking the device firmware.

Test Time[1] - 1 second

Test Settings

None

Test 202 – Butterfly Seek

Group: CDN 3200

Seeks back and forth, lower and higher, to sector positions centered on and around a "middle" sector. Each Butterfly Seek test iteration consists of two seeks: one seek is lower than (below) the middle sector, the other is higher than (above) the middle sector. After each iteration, the lower seek position increases by one sector increment and the higher seek position decreases by the same amount.

Test Time[1] - 1.9 to 6.3 minutes

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Sector Increment	Sectors per track * 10	0	Sectors per track * 10	The number of sectors incremented per test iteration
Test Iterations	Stop Sector / (2 * Sector Increment)	0	Stop Sector / (2 * Sector Increment)	The number of test iterations; each comprises 2 seeks

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Note: "Sectors per track" and "Number of tracks" are used for logical display only. These are synthetic (pseudo) values that make the idea of position on an LBA (Logical Block Address) CD disk logically consistent with the CHS (Cylinder, Head, Sector) position on a fixed media hard disk.

Test 203 – Linear Seek

Group: CDN 3200

Seeks linearly and sequentially between start and stop points. Each Linear Seek test iteration is one seek. With each iteration, the seek position increases by one Sector Increment. The Linear Seek test is always done with the seek position increasing each iteration. Manual entry of a Start Sector value larger/higher than the Stop Sector value is automatically reversed.

Test Time[1] - 0.4 to 2.2 minutes

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Sector Increment	Sectors per track * 10	0	Sectors per track * 10	The number of sectors incremented per test iteration

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Note: "Sectors per track" and "Number of tracks" are used for logical display only. These are synthetic (pseudo) values that make the idea of position on an LBA (Logical Block Address) CD disk logically consistent with the CHS (Cylinder, Head, Sector) position on a fixed media hard disk.

Test 204 – Random Seek

Group: CDN 3200

Seeks to pseudo randomly generated sector positions. Each Random Seek test iteration is one seek to a pseudo random sector position within the range of Start Sector through Stop Sector. The purpose of this test is to test the head actuator mechanism, not necessarily the read head mechanism; so the actual sectors that are read, and even the accuracy of the data found, are not really material. For this reason, it does not matter if the pseudo-random generator produces the same sector to check each time the test is run. If the tester wants to test the whole drive, then the "Test Iterations" parameter can be set for more seeks.

Test Time[1] - 1.7 to 5.3 minutes

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Test Iterations	Stop Sector / Sector Increment	0	Stop Sector / Sector Increment	The number of seeks

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Note: "Sectors per track" and "Number of tracks" are used for logical display only. These are synthetic (pseudo) values that make the idea of position on an LBA (Logical Block Address) CD disk logically consistent with the CHS (Cylinder, Head, Sector) position on a fixed media hard disk.

Test 205 – Eject Media

Group: CDN 3200

Exercises and confirms correct ejection and loading of the removable media and correct sensing of media present.

Test Time[1] - 12 seconds

Test Settings

None

Possible Causes of Errors

Error: Parameter validation failed.

This error message output indicates that a set of manually entered test settings does not correlate. This output occurs immediately upon attempt to run the test.

Error: <*???*> failed (<*n*>).

An error message output of this form indicates a failure (typically an I/O failure) in a CDN internal function. There will be the name of the failing internal function in place of "<*???*>" in the message string and there will be a numeric value in place of "<*n*>" in the message string.

For example, if the Butterfly Seek test's Sector Increment parameter is set to something higher than 320 without decreasing the Test Iterations parameter, then that is a "parameter error" and the test will "abort" because the number of iterations multiplied by the increment does not correlate with the size (total # of sectors) of the media.

[1] These are examples of some actual test run times on a 650-MB data CD. Test time varies greatly and depends on a number of factors. The examples above reflect average test times.

Communication Ports Group: COM – 300

Overview

The Communication Ports Tests verify the functionality of the serial ports as they transmit data, handle interrupts, and perform handshaking with external devices.

Tests in this Group

The following tests are included in the COM - 300 test group:

Test 201 – Data Path
Test 202 – Internal Loopback
Test 203 – RTS Loopback **L**
Test 204 – DTR Loopback **L**
Test 205 – Baud Rate **L**
Test 206 – Stop Bit **L**
Test 207 – Word Length **L**
Test 208 – Interrupt **L**

Note: Tests followed by an **L** require a serial loopback plug.
Also note that if ACPI is enabled on a system, tests 202 and 208 are disabled and as a result will not appear in the test list.

Prerequisites

The serial loopback cable must be installed for the above tests denoted by the **L**.

Group Settings

None

Device Settings

Device Setup				
Device Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Maximum Baud Rate	115200	300	115200	Maximum Baud rate for tests

Test 201 – Data Path

Group: COM – 300

This test writes patterns to the data port and then reads them back in to verify the operation. This is done at different baud rates. The base address is determined from the global base address parameter.

Test Time - 5 seconds

Test Settings

None

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Port to I/O interface (serial connector or interface chip) failure.
- Port does not support (all) status lines.
- Faulty port/device/serial chip (UAR/T or chipset).
- Improper IRQ configuration.
- Test data rates exceed device capability.

Test 202 – Internal Loopback

Group: COM – 300

This test puts the specified serial port into the internal loopback mode and program the serial port to a prescribe set of baud rates. At each baud rate data is written to the transmit buffer and the receive buffer is monitored. The test will validate that the correct data is received for each byte of data sent and return PASSED, otherwise it will return FAILED. The base address is determined from the global base address parameter.

Test Time - 5 seconds

Test Settings

None

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Faulty port/device/serial chip.
- Device/port or address conflict.
- Improper IRQ configuration.
- Test data rates exceed device capability.

Test 203 – RTS Loopback

Group: COM – 300

This test manipulates the RTS line.

Note: Loopback plugs are required for this test.

Test Time - 5 seconds

Test Settings

None

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Faulty/wrong loopback plug.
- Port to I/O interface (serial connector or interface chip) failure.
- Port does not support (all) status/flow control lines.
- Faulty port/device/serial chip (UAR/T or chipset).
- Improper IRQ configuration.
- Test data rates exceed device capability.

Test 204 – DTR Loopback

Group: COM – 300

This test manipulates the DTR line.

Note: Loopback plugs are required for this test.

Test Time - 5 seconds

Test Settings

None

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Faulty/wrong loopback plug.
- Port to I/O interface (serial connector or interface chip) failure.
- Port does not support (all) status/flow control lines.
- Faulty port/device/serial chip (UAR/T or chipset).
- Improper IRQ configuration.
- Test data rates exceed device capability.

Test 205 – Baud Rate

Group: COM – 300

This writes patterns to the data port and reads the data back in to verify the data flow at different baud rate settings.

Note: Loopback plugs are required for this test.

Test Time - 5 seconds

Test Settings

None

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Faulty/wrong loopback plug.
- Faulty port/device/serial chip (UAR/T or chipset).
- Improper IRQ configuration.
- Test data rates exceed device capability.

Test 206 – Stop Bit

Group: COM – 300

The Stop Bit test writes patterns to the data port and reads the data back in to verify the data flow at different Stop Bit settings.

Note: Loopback plugs are required for this test.

Test Time - 5 seconds

Test Settings

None

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Faulty/wrong loopback plug.
- Faulty port/device/serial chip (UAR/T or chipset).
- Improper IRQ configuration.
- Test data rates exceed device capability.

Test 207 – Word Length

Group: COM – 300

The Word Length test writes patterns to the data port and reads the data back in to verify the data flow at different Word Length settings.

Note: Loopback plugs are required for this test.

Test Time - 5 seconds

Test Settings

None

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Faulty/wrong loopback plug.
- Faulty port/device/serial chip (UAR/T or chipset).
- Improper IRQ configuration.
- Test data rates exceed device capability.

Test 208 – Interrupt

Group: COM – 300

The interrupt test sets up an interrupt handler, triggers an interrupt event by writing data, and checks to see whether the interrupt handler trapped the input. Please note that this test is not available on Windows® NT-based operating systems, like Windows® 2000 and Windows® XP

Note: Loopback plugs are required for this test.

Test Time - 5 seconds

Test Settings

None

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Faulty/wrong loopback plug.
- Faulty port/device/serial chip (UAR/T or chipset).
- Improper IRQ configuration.
- Software interrupt handler error.
- Device driver/TSR conflict.

CD Recording/Writing Test Group: CRW – 4200

Overview

CRW is a “CD Burner” drive test group for CD-R/RW or combo DVD-ROM/CD-R/RW “CD Burner” drives. It will execute and run on Windows 2000, Windows XP and beyond.

Tests in this Group

The following tests are included in the CRW – 4200 test group:

1. Test 201 – Buffer I/O
2. Test 202 – Simulate Write
3. Test 203 – ‘RW’ Write
4. Test 204 – ‘R’ Write

Prerequisites

None.

Group Settings

None.

Device Settings

None.

Test 201 – Buffer I/O

Group: CRW 4200

The Buffer I/O test exercises a drive’s cache buffer read/write capability. Some drives do not have cache buffer read/write capability. In such cases, the Buffer I/O test simply skips.

Note: Some drives have cache buffer read/write capability only if/when media is present in the drive. In such cases, media must be present in the drive at CRW initialization time in order for CRW to detect that the drive has such capability.

Test Settings

None.

Test 202 – Simulate Write

Group: CRW 4200

The Simulate Write test exercises a drive’s simulate write capability.

Test Settings

The Simulate Write test has a single test parameter:

“Size (block count) to write”, i.e. the number of data blocks to be written to the media during the course of the test.

Default value: 512 blocks. An explicit value can be manually entered.

Test 203 – ‘RW’ Write

Group: CRW 4200

The ‘RW’ Write test exercises the recording/writing capability of a drive’s re-writable media (CD-RW).

A specified number of data blocks are recorded/written, read back, and checked for an intact data pattern.

Test Settings

The ‘RW’ Write test has a single test parameter:

“Size (block count) to write”, i.e. the number of data blocks to be written to the media during the course of the test.

Default value: 512 blocks. An explicit value can be manually entered.

Test 204 – ‘R’ Write

Group: CRW 4200

The ‘R’ Write test exercises the recording/writing capability of a drive’s write-once media (CD-R).

A specified number of data blocks are recorded/written, read back, and checked for an intact data pattern.

Test Settings

The ‘R’ Write test has a single test parameter:

“Size (block count) to write”, i.e., the number of data blocks to be written to the media during the course of the test.

Default value: 512 blocks. An explicit value can be manually entered.

Possible Causes of Errors

["Error: <*???*> failed (<*n*>)."]

An error message output of this form indicates a failure (typically an I/O failure) in a CRW internal function. There will be the name of the failing internal function in place of ”<*???*>” in the message string and there will be a numeric value in place of ”<*n*>” in the message string. In this case, a failure is also "returned".

["Error: <*???*> failed."]

An error message output of this form indicates a failure in a CRW internal function wherein there is no associated internal numeric error value. There will be the name of the failing internal function in place of ”<*???*>” in the message string. In this case, a failure is also "returned".

["Error: <message>"]

An additional error message can accompany one or other of the above error messages, giving supplementary information about the error.

DVD Recording/Writing Test Group: DRW – 4300

Overview

DRW is a “DVD Burner” drive test group for either single format (DVD–R/-RW or DVD+R/+RW) or dual format (DVD-R/+R/-RW/+RW) “DVD Burner” drives. It will execute and run on Windows 2000, Windows XP and beyond.

Tests in this Group

The following tests are included in the DRW – 4300 test group:

5. Test 201 – Buffer I/O
6. Test 202 – Simulate Write
7. Test 203 – ‘+RW’ Write
8. Test 204 – ‘-RW’ Write
9. Test 205 – ‘R’ Write

Prerequisites

None.

Group Settings

None.

Device Settings

None.

Test 201 – Buffer I/O

Group: DRW 4300

The Buffer I/O test exercises a drive’s cache buffer read/write capability. Some drives do not have cache buffer read/write capability. In such cases, the Buffer I/O test simply skips.

Note: Some drives have cache buffer read/write capability only if/when media is present in the drive. In such cases, media must be present in the drive at DRW initialization time in order for DRW to detect that the drive has such capability.

Test Settings

None.

Test 202 – Simulate Write

Group: DRW 4300

The Simulate Write test exercises a drive’s simulate write capability (by drive design/definition, intrinsically limited to CD-R or CD-RW media only).

Test Settings

The Simulate Write test has a single test parameter:

“Size (block count) to write”, i.e. the number of data blocks to be written to the media during the course of the test.

Default value: 512 blocks. An explicit value can be manually entered.

Test 203 – ‘+RW’ Write

Group: DRW 4300

For single or dual format drives, the ‘+RW’ Write test exercises the recording/writing capability of ‘+’ format re-writable media (DVD+RW). This test will not be present in the test list for a drive that does not support this format.

A specified number of data blocks are recorded/written, read back, and checked for an intact data pattern.

Test Settings

The '+RW' Write test has a single test parameter:

"Size (block count) to write", i.e. the number of data blocks to be written to the media during the course of the test.

Default value: 512 blocks. An explicit value can be manually entered.

Test 204 – '-RW' Write

Group: DRW 4300

For single or dual format drives, the '-RW' Write test exercises the recording/writing capability of '-' format re-writable media (CD-RW and DVD-RW) if the drive supports the DVD '-' format.

A specified number of data blocks are recorded/written, read back, and checked for an intact data pattern.

Test Settings

The '+RW' Write test has a single test parameter:

"Size (block count) to write", i.e., the number of data blocks to be written to the media during the course of the test.

Default value: 512 blocks. An explicit value can be manually entered.

Test 205 – 'R' Write

Group: DRW 4300

For single or dual format drives, the 'R' Write test exercises the recording/writing capability of '-' and/or '+' format write-once media (CD-R, DVD-R and DVD+R) if the drive supports the appropriate formats.

A specified number of data blocks are recorded/written, read back, and checked for an intact data pattern.

Test Settings

The 'R' Write test has a single test parameter:

"Size (block count) to write", i.e., the number of data blocks to be written to the media during the course of the test.

Default value: 512 blocks. An explicit value can be manually entered.

Possible Causes of Errors

["Error: <*???*> failed (<*n*>)."]

An error message output of this form indicates a failure (typically an I/O failure) in a DRW internal function. There will be the name of the failing internal function in place of "<*???*>" in the message string and there will be a numeric value in place of "<*n*>" in the message string. In this case, a failure is also "returned".

["Error: <*???*> failed."]

An error message output of this form indicates a failure in a DRW internal function wherein there is no associated internal numeric error value. There will be the name of the failing internal function in place of "<*???*>" in the message string. In this case, a failure is also "returned".

["Error: <message>"]

An additional error message can accompany one or other of the above error messages, giving supplementary information about the error.

DVD Drives Group: DVD – 3700

Overview

DVD is a removable media DVD drive test group that will execute and run on Windows® 98, Windows® NT, Windows® 2000, Windows® ME and Windows® XP.

Tests in this Group

The following tests are included in the DVD – 3700 test group:

Test 201 – DVD Butterfly Seek
Test 202 – DVD Linear Seek
Test 203 – DVD Random Seek
Test 204 – CD Butterfly Seek
Test 205 – CD Linear Seek
Test 206 – CD Random Seek
Test 207 – Eject Media

Group Settings

None

Device Settings

None

Test 201 – DVD Butterfly Seek

Group: DVD — 3700

Each Butterfly Seek test iteration consists of two seeks: one seek is lower than (below) the middle/center sector and one seek is higher than (above) the middle/center sector. After each iteration, the lower seek position increases by one sector increment and the higher seek position decreases by the same amount.

Test Time[1] – 18.0 to 39.0 minutes

Test Setting

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Sector Increment	Sectors per track * 10	0	Sectors per track * 10	The number of sectors incremented per test iteration
Test Iterations	Stop Sector / (2 * Sector Increment)	0	Stop Sector / (2 * Sector Increment)	The number of test iterations; each comprises 2 seeks

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Test 202 – DVD Linear Seek

Group: DVD — 3700

Seeks linearly and sequentially between start and stop points. Each Linear Seek test iteration is one seek. With each iteration, the seek position increases by one Sector Increment. The Linear Seek test is always done with the seek position increasing each iteration. Manual entry of a Start Sector value larger/higher than the Stop Sector value is automatically reversed.

Test Time[1] – 3.0 to 6.7 minutes

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Sector Increment	Sectors per track * 10	0	Sectors per track * 10	The number of sectors incremented per test iteration

The default test settings are the entire space on the disk. They are selected only if a test's settings are *all* set to zero. Explicit test settings can be entered manually. NB. The last addressable sector is the number of 'sectors' minus 1.

Test 203 – DVD Random Seek

Group: DVD — 3700

Each Random Seek test iteration is one seek to a pseudo random sector position within the range of Start Sector through Stop Sector. The purpose of this test is to test the head actuator mechanism, not the read head mechanism; so the actual sectors that are read, and even the accuracy of the data found, are not necessarily relevant. For this reason, it does not matter if the pseudo-random generator produces the same sector to check each time the test is run. If you want to test the whole drive, then the "Test Iterations" parameter can be set for more seeks.

Test Time[1] – 15.4 to 36.7 minutes

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Test Iterations	Tracks / 10	0	Tracks / 10	The number of seeks

The default test settings are the entire space on the disk. They are selected only if a test's settings are *all* set to zero. Explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Test 204 – CD Butterfly Seek

Group: DVD — 3700

Each Butterfly Seek test iteration consists of two seeks: one seek is lower than (below) the middle/center sector and one seek is higher than (above) the middle/center sector. After each iteration, the lower seek position decreases by one sector increment and the higher seek position increases by one sector.

Test Time[1] - 1.9 to 6.3 minutes

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Sector Increment	Sectors per track * 10	0	Sectors per track * 10	The number of sectors incremented per test iteration
Test Iterations	Stop Sector/ (2 * Sector Increment)	0	Stop Sector/ (2 * Sector Increment)	The number of test iterations; each comprises 2 seeks

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Test 205 – CD Linear Seek

Group: DVD — 3700

Seeks linearly and sequentially between start and stop points. Each Linear Seek test iteration is one seek. With each iteration, the seek position increases by one Sector Increment. The Linear Seek test is always done with the seek position increasing each iteration. Manual entry of a Start Sector value larger/higher than the Stop Sector value is automatically reversed.

Test Time[1] – 0.4 to 2.2 minutes

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Sector Increment	Sectors per track * 10	0	Sectors per track * 10	The number of sectors incremented per test iteration

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Test 206 – CD Random Seek

Group: DVD — 3700

Each Random Seek test iteration is one seek to a pseudo random sector position within the range of Start Sector through Stop Sector. The purpose of this test is to test the head actuator mechanism, not the read head mechanism; so the actual sectors that are read, and even the accuracy of the data found, are not necessarily relevant. For this reason, it does not matter if the pseudo-random generator produces the same sector to check each time the test is run. If you want to test the whole drive, then the "Test Iterations" parameter can be set for more seeks.

Test Time[1] – 1.7 to 5.3 minutes

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Test Iterations	Tracks / 10	0	Tracks / 10	The number of seeks

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Test 207 - Eject Media

Group: DVD 3700

Exercises and confirms correct ejection and loading of the removable media and correct sensing of media present.

Test Time – 5 seconds

Test Settings

None

Possible Causes of Errors

Error: Parameter validation failed (87).

This error message ("message string") output indicates that a set of manually entered test settings does not correlate. This output occurs immediately upon attempt to run the test.

Error: <*???*> failed (<*n*>).

An error message output of this form indicates a failure (typically an I/O failure) in an DVD internal function. There will be the name of the failing internal function in place of "<*???*>" in the message string and there will be a numeric value in place of "<*n*>" in the message string.

[1]These are examples of some actual test run times. They are not examples of worst-case maximums or minimums.

Floppy Drives Group: FDN – 3300

Overview

FDN is a removable media floppy drive test group that will execute and run on Windows® 98, Windows® NT, Windows® 2000, Windows® ME and Windows® XP. The group consists of five tests that can be run on a drive: Butterfly Seek, Linear Seek, Read/Write, Media Change, and Write Protect.

Tests in this Group

Test 201 – Butterfly Seek Test
Test 202 – Linear Seek Test
Test 203 – Read/Write Test
Test 204 – Media Change ***I***
Test 205 – Write Protect ***I***

Prerequisites

Tests 204 and 205 must only be run in interactive mode, as denoted by the ***I*** above.

Group Settings

None

Device Settings

None

Test 201 – Butterfly Seek

Group: FDN — 3300

The Butterfly Seek Test seeks back and forth, lower and higher, to sector positions centered on and around a "middle" sector.

Each Butterfly Seek test iteration consists of two seeks: one seek lower than (below) the middle/center sector plus one seek higher than (above) the middle/center sector. After each iteration, the lower seek position increases by one sector increment and the higher seek position decreases by the same amount.

Test Time - 0.4 to 1.0 minutes[1]; 16.8 minutes[2]

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Sector Increment	Sectors per track	0	Sectors per track	The number of sectors incremented per test iteration
Test Iterations	Stop Sector / (2 * Sector Increment)	0	Stop Sector / (2 * Sector Increment)	The number of test iterations; each comprises 2 seeks

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Test 202 – Linear Seek

Group: FDN — 3300

Linear Seek Test seeks linearly and sequentially between start and stop points.

Each Linear Seek test iteration is one seek. Each iteration, the seek position increases by one sector increment. The Linear Seek test is always done with the seek position increasing each iteration. Manual entry of a Start Sector value larger/higher than the Stop Sector value is automatically reversed.

Test Time - 0.3 to 0.5 minutes[1]; 6.2 minutes[2]

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Sector Increment	Sectors per track	0	Sectors per track	The number of sectors incremented per test iteration

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Test 203 – Read/Write

Group: FDN — 3300

The Read/Write Test seeks linearly and sequentially between start and stop points. At each seek position, it reads from the disk and then writes what was read back to the disk.

Each Read/Write test iteration is one seek. Each iteration, the seek position increases by one sector increment, a read is done from a number of sectors, and a write is done back to the same set of sectors. The Read/Write test is always done with the seek position increasing each iteration. Manual entry of a Start Sector value larger/higher than the Stop Sector value is automatically reversed.

Test Time - 1.4 to 2.2 minutes[1]; 31.4 minutes[2]

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Sector Increment	Sectors per track	0	Sectors per track	The number of sectors incremented per test iteration

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Test 204 – Media Change

Group: FDN — 3300

The Media Change Test verifies that media change is correctly detected.

Test Time – 5 seconds; however, test times can vary considerably depending on user response

Test Settings

None

Test 205 – Write Protect

Group: FDN — 3300

The Write Protect Test verifies that disk write protect is correctly detected.

Test Time - 5 seconds; however, test times can vary considerably depending on user response

Test Settings

None

Possible Causes of Errors

Error: Parameter validation failed.

This error message ("message string") output indicates that a set of manually entered test settings does not correlate. This output occurs immediately upon attempt to run the test.

Error: <*???*> failed (<*n*>).

An error message output of this form indicates a failure (typically an I/O failure) in an FDN internal function. There will be the name of the failing internal function in place of "<*???*>" in the message string and there will be a numeric value in place of "<*n*>" in the message string.

[1]These are examples of some actual test run times on a 1.44MB floppy. Test time ranges are approximate only and may not be indicative of specific user experience.

[2] The following are examples of some actual test run times on a 120MB floppy. Test time ranges are approximate and may not be indicative of specific user experiences.

[3]Default test settings are selected if and when all test settings are set to zero. Explicit test settings can be manually entered. Some examples are given below. Manually entered test parameter combinations must correlate; that is, they must together create a sensible set.

At FDN initialization time, if and only if there is media in a drive, then that drive's test settings (test settings) are set to explicit values that are equal to default values for the media that is in the drive. These are explicit test settings. They are equal to default values for that media; however, they are not default test settings. When media changes (such as from 1.44 MB to 120 MB), these explicit values will then be invalid. In this situation, to actually select default test settings, the test settings must all be manually set to zero. If there is no media in a drive at FDN initialization time, then the test settings for that drive are all set to zero.

Test duration on different drives will vary somewhat due to seek time and rotation speed differences. Some examples are cited below:

Hypothetical drive:

	Number of Sectors:	100
	Sectors per track:	10
	Number of tracks:	10
1:	Start Sector:	9
	Stop Sector:	99 (the last sector on the drive)
	Sector Increment:	1 – 90 (90 exceeds the difference of 99 – 9)
2:	Start Sector:	0
	Stop Sector:	60
	Sector Increment:	10
	Test Iterations:	1 – 3 (Butterfly) (one half of (60 – 0) / 10)

With a test range of 61 sectors, there are 30 sectors above and below the center sector (31). One Butterfly iteration is two seeks, one above and one below the center. Ergo, at a sector increment of 10, the seek positions will increase/decrease to the center limit of the test range on the third iteration.

Again, bear in mind that when manually entering test settings, they must correlate. Unless all of the test parameter values are zero, there are no implied default values for any of the test parameter values. When a non-zero value has been entered for any one parameter, then all become explicit values. Ergo, once a non-zero Start Sector or Stop Sector is entered, then doing something such as leaving the Sector Increment or Test Iterations at zero is incorrect and does not correlate. Likewise, entering a non-zero Sector Increment and/or Test Iterations, and leaving both Start Sector and Stop Sector at zero is incorrect and does not correlate.

Explicit test settings must also correlate with the bounds of the removable media being used for the test. For example, Stop Sector may not be greater than the number of "Sectors" minus one on the disk.

FireWire Group: FRW – 4400

Overview

The group is a 32-bit dynamic link library called FRW.DLL. This group is loaded when IEEE1394 (FireWire) hardware exists on the system.

Tests in this Group

The following tests are included in the FRW – 4400 test group:

Test 201 – IEEE1394 Bus Count Test

Group Settings

None

Device Settings

None

Test 201 – IEEE1394 Bus Count

Group: FRW – 4400

The test counts the number of IEEE1394 buses that is required for the test to pass. The user specifies how many devices to check for via a 'Number of Buses' parameter: the test passes if it detects a corresponding number of devices, else it fails.

Test Time – less than 1 second

Test Settings

- **Number of Buses** – number of IEEE1394 buses (Controllers) to try to detect. The default value of 0 means that the test will pass if at least one bus is detected; if any other value is specified, then the test will only pass if that exact number of buses is detected.

Default	0
Minimum	0
Maximum	127

Possible Causes of Errors

Failure can occur if the specified number of buses is not detected, or one or more buses are not operating correctly.

File Scan-Verify Group: FSV – 4000

Overview

FSV is the File Scan-Verify test group used to validate driver installations on Windows® 98, Windows® NT, Windows® 2000, Windows® ME and Windows® XP. There are 3 tests in this group: File Scan, File Verify and Report File.

Tests in this Group

The following tests are included in the FSV– 4000 test group:

Test 201 – File Scan Test
Test 202 – File Verify Test
Test 203 – Report File

Group Settings

None

Device Settings

None

Test 201 – File Scan

Group: FSV - 4000

The File Scan test is designed for technical support. This test will look for all files listed in the ScanSet input file and document their file dates, creation times and checksums into an output log file in binary format.

If a file listed in the ScanSet input file does NOT exist on the system, the test will fail. The file scanning will stop at the first file that does not exist on the system and a message to this effect is displayed in the output log file.

Note: If no ScanSet filename is specified, the test will skip.

ScanSet input file -

For example, if the user wanted to gather information for all of the .SYS files in the C:\Windows\Drivers directory, then one of the lines in the file would need to be:

C:\Windows\Drivers*.SYS

Alternatively, individual files can be listed by name:

C:\Windows\Drivers\ CMD640X2.SYS
C:\Windows\Drivers\DBLBUFF.SYS
C:\Windows\Drivers\IFSHLP.SYS
C:\Windows\Drivers\KEYB.SYS

Output log file -

Here is an example of a log generated by the File Scan Test. The second file listed by the ScanSet file (which is called fsvtest.txt in this example) could not be found. As a result, there is an error message on that line and no further files were scanned.

05152003:1613: 4000:201:1:2:3:1:Starting File Scan Test
05152003:1613: 4000:201:1:2:3:1:Scanning C:\SynTP.ini
05152003:1613: 4000:201:1:2:3:1:Error: File Scan failed (2) : The system cannot find the file specified. (fsvtest.txt)
05152003:1613: 4000:201:1:5:3:1:Test failed

Test Time - The test time varies depending on how many files are being scanned. This test can take from 1 minute to upwards of 10 minutes.

Test Settings

- **ScanSet filename** – this text file lists the filepaths (including directories) that you wish to check for on the system. Any valid filename is accepted.

Note: If the ScanSet file is in a different directory from qawin32.exe, its full filepath must be specified.

Test 202 – File Verify

Group: FSV - 4000

The File Verify test checks the current existence of every file listed in the File Scan test's log file on the system under test. An entry for each file is written to the on-screen Result Log, appended by PASS or FAIL according to whether or not the file is still present and its recorded data (e.g. file date, creation time) is unchanged. If a file is absent or its recorded data does not match, then a failure is also written to the output log file.

Note: If the File Scan test has not been run or has skipped, then this test will skip.

Test Time – The test time varies depending on how many files are being verified. This test can take from 1 minute to upwards of 10 minutes.

Test Settings

- **ExitOnFail** – specifies whether the test should stop if a failure is detected

Default	True
Options	True/False

Test 203 –Report File

Group: FSV – 4000

The Report File test generates a report for informational purposes only; it identifies all the characteristics of the scanned files, such as attributes, file creation date, last modified date, etc.

Note: If the File Verify test has not been run or has skipped, then this test will skip.

Test Time – The test time varies. It can take from 1 minute to upwards of 10 minutes.

Test Settings

- **Report Filename** – filename of the report to be generated by the test

Default	fsv_rept.txt

Possible Causes of Error

Error: File Scan …

This error would occur if one of the patterns in the ScanSet file did not match anything in the system.

Error: File Verify …

This error would occur if one of the files is missing, has a different creation date or has a different checksum.

Hard Drives Group: HDN – 2600

Overview

HDN is a fixed media disk drive test group that executes on Windows® 98, Windows® NT, Windows® 2000, Windows® ME and Windows® XP.

Tests in this Group

The following tests are included in the HDN – 2600 test group:

Test 201 – Butterfly Seek
Test 202 – Random Seek
Test 203 – Read/Verify

Group Settings

None

Device Settings

None.

Note: SATA drives driven from a PCI card will be identified with a SCSI bus type by QA+Win32's Device Information pane, rather than a SATA bus type. This is the way that these drives are identified by the operating system.

Test 201 – Butterfly Seek

Group: HDN — 2600

Each Butterfly Seek test iteration consists of two seeks: one seek is lower than (below) the middle/center sector and one seek is higher than (above) the middle/center sector. After each iteration, the lower seek position increases by one sector increment and the higher seek position decreases by the same amount.

Test Time - 8.4 to 12.1 minutes per gigabyte

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Sector Increment	Sectors per track	0	Sectors per track	The number of sectors incremented per test iteration
Test Iterations	Stop Sector / (2 * Sector Increment)	0	Stop Sector / (2 * Sector Increment)	The number of test iterations; each comprises 2 seeks

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Test 202 – Random Seek

Group: HDN — 2600

Each Random Seek test iteration is one seek to a pseudo random sector position within the range of Start Sector through Stop Sector. The purpose of this test is to test the head actuator mechanism, not the read head mechanism; so the actual sectors that are read, and even the accuracy of the data found, are not necessarily relevant. For this reason, it does not matter if the pseudo-random generator produces the same sector to check each time the test is run. If you want to test the whole drive, then the "Test Iterations" parameter can be set for more seeks.

Test Time - 7.3 to 10.8 minutes per gigabyte

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Test Iterations	Stop Sector / Sector Increment	0	Stop Sector / Sector Increment	The number of seeks

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Test 203 – Read/Verify

Group: HDN — 2600

Each Read/Verify test iteration is one seek and verify. Each iteration, the seek position increases by one sector increment. The Read/Verify test is always done with the seek position increasing each iteration. Manual entry of a Start Sector value larger/higher than the Stop Sector value is automatically reversed.

Test Time - 1.5 to 6 minutes per gigabyte

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
Stop Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Sector Increment	Sectors per track	0	Sectors per track	The number of sectors incremented per test iteration

The default Start and Stop Sector values cover the entire space on the disk; explicit test settings can be entered manually. NB. The last addressable sector is the number of sectors minus 1.

Possible Causes of Errors

Error: Parameter validation failed (87).

This error message ("message string") output indicates that a set of manually entered test settings does not correlate. This output occurs immediately upon attempt to run the test.

Error: <*???*> failed (<*n*>).

An error message output of this form indicates a failure (typically an I/O failure) in an HDN internal function. There will be the name of the failing internal function in place of "<*???*>" in the message string and there will be a numeric value in place of "<*n*>" in the message string.

Known Issues

When running the HDN group on systems having either Windows® 98 SE or Windows® ME, the user may experience some temporary loss of time. The clock should refresh when the test has completed. This issue may be avoided by testing with the IDE group instead.

IDE Drives Group: IDE - 2800

Overview

IDE is a hard drive test group that tests the function of IDE drives and consists of the following tests: Surface Scan, Zone Access, Sequential Access, Random Access, Linear Seek, and SMART Test. Please note that this group is not available on Windows® NT-based operating systems, such as Windows® 2000 and Windows® XP.

Tests in this Group

The following tests are included in the IDE – 2800 test group:

Test 201 - SMART
Test 202 - Surface Scan
Test 203 - Zone Access
Test 204 - Sequential Access
Test 205 - Random Access
Test 206 - Linear Seek

Group Settings

None

Device Settings

None

Test 201 – SMART

Group: IDE - 2800

Tests all the following options sequentially for hard disk drives that support SMART features

- SMART Enable Operations
- SMART Enable Attribute AutoSave
- SMART Disable Attribute AutoSave
- SMART Return Status (SMART Device Reliability Status)
- SMART Execute off-line Immediate
- SMART Save Attribute Values
- SMART Disable Operations
- EXIT SMART Test: Again SMART Enable Operation & Exit from the smart drive test.

Test Time[1] - 1 minute

Test Settings

None

Test 202 – Surface Scan

Group: IDE - 2800

Performs the read verify operation on each sector of the hard drive starting with sector zero.

Test Time[1] - 30 minutes

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Number of Cycles	1	1	4	Number of times to repeat test

- The test settings can be entered manually. If settings are not changed then the test is performed with default values specified.

Test 203 – Zone Access

Group: IDE 2800

The Zone Access test performs data accesses on 200 evenly spaced "zones" on the disk. By reading and/or writing one sector in the center of each zone, the test ensures that accesses are working properly throughout the media.

Test Time[1] - 1 minute

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Number of Cycles	1	1	4	Number of times to repeat test
Data pattern	1	1	4	Data pattern to write to and read from device to verify its operation
Access type	0	0	3	Specifies how the disk should be accessed 0 = read only 1 = destructive write 2 = destructive write verify 3 = non-destructive write verify (see table at end of this section)

- The test settings can be entered manually. If settings are not changed then the test is performed with default values specified.

Test 204 – Sequential Access

Group: IDE – 2800

Performs sequential data accesses.

Test Time[1] - 81 minutes

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
End Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Duration Mode	0	0	1	Determines whether test duration should be measured in terms of cycles or time 0 = Number of cycles 1 = Time period
Number of Cycles	1	1	4	Number of times to repeat test
Time Period (seconds)	60	1	600	Length of time the test should run for
Access type	0	0	3	Specifies how the disk should be accessed 0 = read only 1 = destructive write 2 = destructive write verify 3 = non-destructive write verify (see table at end of this section)
Data Pattern	0	0	4	Data pattern to write to and read from device to verify its operation
Transfer Size Mode	0	0	1	Specifies whether transfer size should be settable 0 = fixed 1 = variable
Minimum transfer size	100	1	127	The minimum number of sectors per data transfer
Maximum transfer size	127	1	127	The maximum number of sectors per data transfer

- The test settings can be entered manually. If settings are not changed then the test is performed with default values specified.
- The last addressable sector is the number of 'sectors' minus 1.

Test 205 – Random Access

Group: IDE - 2800

Performs data transfer operations at randomly selected locations within the specified range. By default, the test performs 200 disk accesses, but this can be increased or decreased using the *Number of Hits* parameter. Alternatively, the test can be limited to a specific time period by making the *Duration Mode* parameter non-zero.

Test Time[1] - 1 minute

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
End Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Duration Mode	0	0	1	Determines whether test duration should be measured in terms of cycles or time 0 = Number of cycles 1 = Time period
Time Period (seconds)	60	1	600	Length of time the test should run for
Access type	0	0	3	Specifies how the disk should be accessed 0 = read only 1 = destructive write 2 = destructive write verify 3 = non-destructive write verify (see table at end of this section)
Data Pattern	0	0	4	Data pattern to write to / read from device to verify its operation
Transfer Size Mode	0	0	1	Specifies whether transfer size should be settable 0 = fixed 1 = variable
Minimum Transfer Size	1	1	127	The minimum number of sectors per data transfer
Maximum Transfer Size	127	1	127	The maximum number of sectors per data transfer
Number of Hits	200	1	65535	The number of disk accesses

- The test settings can be entered manually. If settings are not changed then the test is performed with default values specified.
- The last addressable sector is the number of 'sectors' minus 1

Test 206 – Linear Seek

Group: IDE - 2800

A "seek" to each track is performed on the media. The test will be repeated the specified number of times.

Test Time[1] - 15 minutes

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Number of Cycles	1	1	4	Number of times to repeat test

- The test settings can be entered manually. If settings are not changed then the test is performed with default values specified.

Possible Causes of Errors

IDE Test will fail if:

The test was not able to Read from Sector, Write to Sector, and Seek the requested location, or if a mismatch between the pattern written to and read from the disk drive is detected.

Following are the errors reported by the group.

"Time out error"

While issuing the command and waiting for command completion, if controller does not respond within specified time.

"Device Fault Error: Controller unable to execute the command"

After the command completion, DF –Device Fault bit is set in status register indicating device fault has occurred.

"Controller aborted the command "

After command completion, ABRT – Abort bit is set in error register. This bit is set if command is not supported, device is not able to complete the action requested by command or address out side range of user accessible range is requested.

"Error while Writing at Sector: nnn"

After command completion if ERR bit is set in status register.

"Error while Reading at Sector: nnn"

After command completion if ERR bit is set in status register.

"Data Comparison Error at Sector: nnn"

Selected data Pattern written and read subsequently will be compared and any mismatch will be reported as an error.

Data Access Types

The Zone Access, Sequential Access, and Random Access tests each have a test parameter that allows the disk access type to be selected. If the data access type is set to either '1' or '2', the test will "skip" if it is run in non-interactive mode. Otherwise, the user will be prompted with the message: "This is a Destructive Test. Do you want to continue?" "Yes or No".

The four access types are:

0 Read Only

Data is read from the disk, but no writing is performed. Read failures are reported.

1 Destructive Write

Data is written to the disk, but no reading is performed. Write failures are reported.

2 Destructive Write with Verify

Data is written to the disk and verified by reading it back and comparing it to the original data. Read, write, and compare failures are reported. **IMPORTANT: Data originally on the disk is destroyed when this access type is selected.**

3 Non-Destructive Write with Verify

Data is written to the disk and verified by reading it back and comparing it to the original data. Read, write, and compare failures are reported. The original disk data is saved prior to the test and restored when the test is complete. **IMPORTANT: If another application writes to the disk while running a test using this access type, the new data may be lost.**

[1]These are approximate test run times for a 6 GB Hard Disk drive.

Iomega Drives Group: IOM – 3800

Overview

This group allows testing of the following drives:

- ZIP 100MB
- ZIP 200MB
- ZIP 250MB
- JAZ 1GB
- JAZ 2GB

Tests in this Group

The following tests are included in the IOM-3800 test group:

Test 201 – Surface Scan
Test 202 – Zone Access
Test 203 – Sequential Access
Test 204 – Random Access
Test 205 – Linear Seek
Test 206 – Media Eject
Test 207 – Auto Sleep

Group Settings

None

Device Settings

None

In many cases, the disk tests may be run at the same time other applications are accessing the Iomega drives. To minimize testing time, however, it is recommended that such applications be shut down prior to running the test.

Important:
Some test settings can cause disk data to be permanently destroyed. Please refer to the Access Types section of this document to learn about the consequences of these test options.

Please note that Iomega Zip and/or Jaz devices may not be detected in QA+WIN32 if the IomegaWare version is prior to 4.0.2. To update or install IomegaWare, go to www.iomega.com.

Also note that the media is locked for the duration of each test, with the exception of the Media Eject test. This prevents inadvertent ejection of the media during testing.

Test 201 - Surface Scan

Group: IOM — 3800

Performs the read verify operation on each sector of the hard drive starting with sector zero.

Test Time[1] -

100MB ZIP	200MB ZIP	250MB ZIP	1GB JAZ	2GB JAZ
163 m	5.4 h	6.8 h	13.2 h	22.0 h

Test Settings

None

Test 202 - Zone Access

Group: IOM — 3800

The Zone Access test performs data accesses on a number of evenly spaced “zones” on the disk. By reading and/or writing one sector in the center of each zone, the test ensures that accesses are working properly throughout the media.

Test Time[1] -

100MB ZIP	200MB ZIP	250MB ZIP	1GB JAZ	2GB JAZ
27 s	54 s	67 s	5 s	8 s

Test Settings

Test Parameter	Default	Minimum	Maximum	Notes
Data Pattern	16 nibbles (characters)	1 nibble (character)	16 nibbles (characters)	The default pattern is: 55555555AAAAAAAA It may be set to any text string of arbitrary length; any non-hexadecimal characters have an equivalent numeric value of zero.
Number of Zones	200	0	Total number of sectors	The number of evenly spaced disk zones to test; more zones increases test time.
Access Type	0	0	2	Specifies how the disk should be accessed 0 = read only 1 = destructive write 2 = destructive write verify (see table at end of this section)

Test 203 - Sequential Access

Group: IOM — 3800

Performs sequential data accesses.

Test Time[1] -

100MB ZIP	200MB ZIP	250MB ZIP	1GB JAZ	2GB JAZ
6.0 h	12.0 h	15.0 h	39 m	65 m

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Access type	0	0	2	Specifies how the disk should be accessed 0 = read only 1 = destructive write 2 = destructive write verify (see table at end of this section)
Duration (seconds)	0	0	600	Test duration
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
End Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Data Pattern	16 nibbles (characters)	1 nibble (character)	16 nibbles (characters)	The default pattern is: 55555555AAAAAAAA It may be set to any text string of arbitrary length; any non-hexadecimal characters have an equivalent numeric value of zero.
Min. Transfer Size	100	1	127	The minimum number of sectors per data transfer
Max. Transfer Size	100	1	127	The maximum number of sectors per data transfer

- The test settings can be entered manually. If settings are not changed then the test is performed with default values specified.
- The last addressable sector is the number of ‘sectors’ minus 1.

Test 204 - Random Access

Group: IOM — 3800

Performs data accesses at randomly selected sectors within the specified range. By default, the test performs 200 disk accesses, but this can be increased or decreased using the *Number of Passes* parameter. Alternatively, the test can be limited to a specific time period by making the *Duration* parameter non-zero.

Test Time[1] -

100MB ZIP	200MB ZIP	250MB ZIP	1GB JAZ	2GB JAZ
18 s	36 s	45 s	5 s	9 s

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Access type	0	0	2	Specifies how the disk should be accessed 0 = read only 1 = destructive write 2 = destructive write verify (see table at end of this section)
Duration (seconds)	0	0	600	Test duration
Start Sector	0	0	Last addressable sector	Delimits the range to be tested
End Sector	Last addressable sector	0	Last addressable sector	Delimits the range to be tested
Data Pattern	16 nibbles (characters)	1 nibble (character)	16 nibbles (characters)	The default pattern is: 55555555AAAAAAAA It may be set to any text string of arbitrary length; any non-hexadecimal characters have an equivalent numeric value of zero.
Min. Transfer Size	1	1	127	The minimum number of sectors per data transfer
Max. Transfer Size	1	1	127	The maximum number of sectors per data transfer
Number of Passes	200	1	65535	Number of disk accesses

Test 205 - Linear Seek

Group: IOM — 3800

The Linear Seek test performs read operations on each data cluster of the media, starting with cluster zero. The number of sectors per cluster varies with the media type.

Test Time[1] -

100MB ZIP	200MB ZIP	250MB ZIP	1GB JAZ	2GB JAZ
35 m	70 m	87 m	12 m	20 m

Test Settings

None

Test 206 - Media Eject Test

Group: IOM — 3800

The Media Eject test issues a “spin down” command to the drive, which causes the media to be ejected. If the drive still indicates “unit ready” after ejection, the test fails.

This test has no user-adjustable settings.

Test Time[1] -

100MB ZIP	200MB ZIP	250MB ZIP	1GB JAZ	2GB JAZ
2 s	2 s	2 s	7 s	6 s

Test Settings

None

Test 207 - Auto Sleep Test

Group: IOM — 3800

The Auto Sleep test verifies the operation of the JAZ 2GB Drive auto-sleep timer. The test is only supported under Windows® 95/98. At the beginning of the test, the sleep timer is set to one minute. If the drive still indicates “unit ready” after 70 seconds, the test fails.

Important:
If other applications access the drive during this test, the drive will not go to sleep within the expected time and the test will fail.

Test Time[1] -

100MB ZIP	200MB ZIP	250MB ZIP	1GB JAZ	2GB JAZ
N/A	N/A	N/A	N/A	65 s

Test Settings

None

Data Access Types

The Zone Access, Sequential Access, and Random Access tests each have a test parameter that allows the disk access type to be selected. The four access types are:

0 Read Only

Data is read from the disk, but no writing is performed. Read failures are reported.

1 Destructive Write

Data is written to the disk, but no reading is performed. Write failures are reported.

2 Destructive Write with Verify

Data is written to the disk and verified by reading it back and comparing it to the original data. Read, write, and compare failures are reported.

Important: Data originally on the disk is destroyed when this access type is selected.

3 Non-Destructive Write with Verify

Data is written to the disk and verified by reading it back and comparing it to the original data. Read, write, and compare failures are reported. The original disk data is saved prior to the test and restored when the test is complete. **IMPORTANT: If another application writes to the disk while running a test using this access type, the new data may be lost.**

[1]The times shown are typical when using the default test settings. The actual test times will vary with the performance of the drive, the test parameter values, and the amount of system activity. Therefore, these times should be considered approximate.

Keyboard Group: KBD – 800

Overview
This group tests the individual keys on the keyboard based on the scan code, key code, and make-break conditions when a key is depressed and released.

Tests in this Group
The following tests are included in the KBD - 800 test group:

Test 201 – Keyboard ***I***

Prerequisites
Test 201 must only be run in interactive mode, as denoted by the ***I*** above.

Group Settings
None

Device Settings
None

Test 201 – Keyboard
Group: KBD - 800

The user is presented with the Keyboard Test dialog box, from which a keyboard template must be selected. The name of the current template is displayed in the dialog box title bar, for instance 'kbd101.kbd'. There are 4 templates to choose from as follows:

kbd84.kbd Template for an 84-key keyboard

kbd101.kbd Template for a 101-key keyboard

kbd104.kbd Template for a 104-key keyboard

kbd105.kbd Template for a 105-key keyboard

Click on the 'Next' or 'Previous' buttons (or press Alt-N or Alt-P) to step through the templates, then click on 'Select' (or press Alt-S) to select one. The dialog box's 'Previous', 'Next' and 'Select' buttons are then replaced with a single button showing the number of keys left to press (initially the number of keys on the template). Alternatively, the user can choose to abort the test without selecting a template, by clicking on 'Cancel'. In this case a dialog box stating 'Keyboard template was not selected' is displayed and the test aborts.

Once a template has been selected, the user should press each key of their keyboard in turn, and observe that the corresponding key on the keyboard template depresses and its label changes from black to grey. Additionally, the dialog box displays the pressed key's scan code and key code, while the count of keys left to press decreases by one.

This test takes over the keyboard interrupt at the hardware level (below the BIOS) and captures user keystrokes. As the keys are struck, a message is sent to the application indicating key-down, key-up, and typematic. After all keys are pressed, the test will end. If there is a key that is malfunctioning and doesn't register the test can be aborted by pressing the Quit Button.

If the keyboard is non-defective, once all the keys have been pressed the dialog box will close and the test will pass. If instead the user wishes to abort the test without pressing all the keys, (s)he should click on the Cancel button to close the dialog box and set the test status to aborted. Alternatively, if the user encounters a defective key, that is, if a key's image on the template doesn't respond when the key is pressed, then the test will be unable to complete since the dialog box will always show at least one key as being left to be pressed. In this case the user should click on 'Done' to close the dialog box and fail the test. In the absence of a mouse, the same effect can be achieved by pressing one of the non-defective keys 3 more times.

If a key is stuck when the test completes, then the test will fail and the stuck key will be identified in the log.

Note: a stuck key is one for which a key press has been detected, but no key release. In addition to identifying keys that are genuinely stuck, this effect can be achieved accidentally if the user is still depressing a key (which hasn't previously been pressed and released), whilst clicking 'Cancel' or 'Done' to quit the test. Hence the user should be sure to release all keys before clicking either button.

Note: This is an interactive test.

Test Time – 1 minute depending on typing speed.

Test Settings
None

Possible Causes of Errors

The following are possible causes of errors generated for this test:

Defective key(s) on keyboard.

Defective keyboard controller (system board or keyboard).

Parallel Ports Group: LPT – 200

Overview

The Parallel Ports tests verify the performance of the parallel ports as they transmit data, handle interrupts, and perform handshaking with external devices. Loopback plugs are required for certain tests in order to provide a controlled environment.

Note: Tests requiring a loopback plug are indicated with an **L** after the test name below.

Tests in this Group

The following tests are included in the LPT-200 test group:

Test 201 – Data Port
Test 202 – External Loopback **L**

Prerequisites

The parallel loopback cable must be installed for Test 202, as denoted by the **L**.

Group Settings

None

Device Settings

None

Possible Causes of Errors

- Device/port failure.
- Device driver/TSR conflict (CONFIG.SYS.)
- Port/address conflict (two ports at same address, non-LPT device at address.)
- Unknown/unsupported chipset.

Test 201 – Data Port

Group: LPT - 200

This test verifies that data can be transferred to and from the data port registers. The base address is determined from the global base address parameter. This test tests the internal portions of LPT; it does not test LPT connections.

Test Time - 5 seconds

Test Settings

None

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Device/port failure.

Test 202 – External Loopback

Group: LPT - 200

This test tests the connections to the back of the system case and header pins. The base address is determined from the global base address parameter.

Test Time - 5 seconds

Note: Loopback plugs are required for this test.

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Test ERROR loopback data bit	1	1	8	Determines which data bit will be tested for errors

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Faulty or incorrectly installed loopback plug.
- Port to I/O interface (printer connector) failure.
- Port does not support all status lines.

Motherboard Group: MBD – 700

Overview

The Motherboard Group Test consists of the following seven tests: CPU test, IC data path test, Interrupt controller test, CMOS RAM test, Clock/Calendar test, Numeric Coprocessor test and MMX Basic Functionality test.

Tests in this Group

The following tests are included in the MBD – 700 test group:

Test 201 - CPU
Test 203 - IC Data Path
Test 204 - Interrupt Controller
Test 207 - CMOS RAM
Test 208 - Clock/Calendar
Test 210 - Numeric Coprocessor
Test 218 - MMX Basic Functionality

Group Settings

None

Device Settings

None

Test 201 – CPU

Group: MBD – 700

This test performs certain CPU operations and checks the results against expected results. The CPU Test is made up of the following categories:

General: Loads registers with patterns, performs operations that affect certain flags, and then checks to see that everything is operating correctly.

Arithmetic: Performs various addition, subtraction, multiplication, and division operations. Verifies against expected results.

Logic: Tests shift and rotate instructions.

Test Time - Approximately 4 seconds

Test Settings

None

Note on Interpretation of Log File for CPU Test

Modern PCs permit several alternative CPU configurations, such as more than one processor, more than one core per processor, hyper-threading, etc. The QA diagnostic software reports on the particular configuration found, via a set of six parameters in the log file. These are defined below, followed by an example.

1. **“PhysicalProcessors”** denotes the total number of physical processor cores which were detected: there might be more than one core per physical package or one core per each physical package. The actual configuration can be determined with the aid of other parameters in the log, as seen below.
2. **“LogicalProcessors”** denotes the total number of logical processors for/within the given number of physical processor cores. Takes multi-core and hyper-threading into account.
3. **“EnumedProcessors”** denotes how many "processors" were detected / enumerated / recognized by PnP detection / enumeration processing during OS bootup/initialization, i.e. the number of processors detected by the OS boot process.
4. **“ActiveProcessors”** denotes how many "processors" are available for thread execution under the current operating system. Note that, for example, Windows XP only recognizes a maximum of two processors, even if the number of physical or logical processors is actually greater. So “ActiveProcessors” might be returned as 2 under Windows XP, even though there are more physical/logical processors present in the machine.
5. **“Multi-coreUnits”** denotes how many units exist that are multi-core physical units/packages.
6. **“CoresPerUnit”** denotes how many cores exist per physical unit/package.

Example

The log file extract might be:

10202005:1856: 1300:205:1:13:2:1:DPH=PhysicalProcessors: 2
10202005:1856: 1300:205:1:13:2:1:DPH=LogicalProcessors: 4
10202005:1856: 1300:205:1:13:2:1:DPH=EnumedProcessors: 2
10202005:1856: 1300:205:1:13:2:1:DPH=ActiveProcessors: 4
10202005:1856: 1300:205:1:13:2:1:DPH=Multi-coreUnits: 0
10202005:1856: 1300:205:1:13:2:1:DPH=CoresPerUnit: 1

“PhysicalProcessors: 2” denotes that two physical processors have been detected – either two cores in one physical package, or one core in each of two physical packages.

"LogicalProcessors: 4" denotes that four (total) logical processors exist for/within the given number of physical processor cores.

"EnumedProcessors: 2" denotes that two "processors" were detected / enumerated / recognized by PnP detection/enumeration processing during OS bootup/initialization.

"ActiveProcessors: 4" denotes that four "processors" are available for thread execution under the OS: four logical / physical processors as denoted above.

"Multi-coreUnits: 0" denotes that zero units exist that are multi-core physical units/packages.

"CoresPerUnit: 1" denotes that one core exists per physical unit/package.

Thus the value “1” for the Cores per Unit, taken in conjunction with the value “2” for the number of Physical Processors, and the value “4” for the number of Logical Processors, determines that two single-core hyper-threading processors are installed.

Test 203 - IC Data Path

Group: MDB – 700

The IC Data Path test performs certain operations on the interrupt controller, interval timer, and DMA controller to verify access and programmability of these components.

Test Time - Approximately 4 seconds

Test Settings

None

Test 204 - Interrupt Controller

Group: MDB – 700

Tests the real-time clock and interrupt controller components and includes two sub-tests: Real-Time Clock and Interrupt Controller.

Test Time - Approximately 4 seconds

Test Settings

None

Test 207 - CMOS RAM

Group: MDB – 700

The CMOS RAM Test checks and validates the CMOS checksum and then tests system CMOS for read/write operations

Test Time - Approximately 4 seconds

Test Settings

None

Test 208 - Clock/Calendar

Group: MDB – 700

The Clock/Calendar Test verifies the functionality of the clock/calendar in an AT system. It will also test the alarm and daylight savings time functions and features of the RTC for those systems that support it.

Test Time - Approximately 4 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Clock Test Time (seconds)	10	1	600	Specifies the duration of the test
Clock Deviation	5 (50 microseconds)	1	100	Allowable deviation limit for Clock Timer portion of test

Test 210 - Numeric Coprocessor

Group: MDB – 700

The first seven sub-tests apply math operations to the Numeric Coprocessor to see if it is functioning properly. The operation is compared to the expected result. A failure indicates a variance to the expected result.

Test Time - Approximately 4 seconds

Test Settings

None

Test 218 - The MMX Basic Functionality

Group: MDB – 700

The MMX Basic Functionality test verifies basic MMX instructions on processors that support the MMX instruction set.

Test Time - Approximately 4 seconds

Test Settings

None

Possible Causes of Errors

- User aborts test
- The test was not performed and/or validated successfully.

Return Values

TEST_PASSED	The individual test within the MBD group passed.
TEST_FAILED	The individual test within the MBD group failed.
TEST_ABORTED	The individual test within the MBD group was aborted by the user.

Modem Group: MDM – 2900

Overview

This test group tests the basic functions of the modem.

Tests in this Group

The following tests are included in the MDM - 2900 test group:

Test 201 – Base Command Set
Test 202 – Fax Command Set
Test 203 – Local Loopback
Test 204 – Dialtone

Group Settings

None

Device Settings

- **AnswerSet** – specifies the command set to be used by the modem for its responses. The default value 0 denotes the standard Hayes compatible AT command set, whereas values 1 or 2 should be used for WinModems (e.g. SmartLink modems).

Default	0
Settings	0/1/2

Test 201 – Base Command Set

Group: MDM — 2900

This test issues a set of Hayes compatible AT commands to the modem, and checks the responses returned.

Test Time - 15 seconds

Test Settings

None

Possible Causes of Errors

No errors unique to this test

Test 202 – Fax Command Set

Group: MDM — 2900

This test issues a set of fax commands to the modem and checks the responses to those commands.

Test Time - 15 seconds

Test Settings

None

Possible Causes of Errors

No errors unique to this test

Test 203 – Local Loopback

Group: MDM — 2900

This test puts the modem into local loopback mode. The test is comprised of three sub-tests: Analog loopback, digital loopback, and analog loopback with self-test patterns.

Test Time - 20 seconds

Test Settings

None

Possible Causes of Errors

- The hardware or driver does not support one or more of the tests.

Test 204 – Dialtone

This test verifies the RJ-11 connector is connected to the phone line and that a dialtone is present.

Test Time - 20 seconds

Test Settings

None

Possible Causes of Errors

- The modem is not connected to a phone line or the phone is in use at the time the test is run.

Memory Group: MEM – 1000

Overview

MEM tests physical memory using the strategy below:

1. Identifies the total range of memory addresses to test.
2. Acquires the memory to test via one of 3 different memory "allocation" methods.
3. Tests the memory.

Tests in this Group

The following tests are included in the MEM – 1000 test group:

Test 201 - Pseudo Random Data
Test 202 - Walking Bit Left
Test 203 - Walking Bit Right
Test 204 - Inverse Walking Bit Left
Test 205 - Inverse Walking Bit Right
Test 206 - Checkerboard
Test 208 - Bit Stuck High
Test 209 - Bit Stuck Low
Test 211 - Pseudo Random Address
Test 212 - Quick
Test 213 - Custom

Limitations

100% of the memory cannot be tested due to certain hardware devices and driver pointers that load in the Windows® environment. The memory between 641K and 1024K is not tested, as this is where BIOS and other system resources reside. The MEM.DLL group requires TLK.DLL to be present and will not run on an OS that it does not have the addresses for the non-paged pool.

Note: if the user tries to stop the running of a memory test or the entire group of tests when the system is busy, there may be a delay in the response.

Group Settings

None

Device Settings

Device Setup				
Device Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Test Block Size (KB)	65536	4	65536	Size of memory block used for testing
Memory Test Level	3	1	3	Specifies the depth of testing to be performed 1 = Minimum Depth (Perform only methods 4 and 16) 2 = Medium Depth (Perform methods 4, 8 and 16) 3 = Maximum Depth (Perform all test methods)
Memory Allocation Method[1]	2	1	3	Specifies the method to be used to acquire memory 1 = Invasive 2 = Big Buffer 3 = All Lockable (see description at end of this section)
Test With Caching Enabled[2]	True	False	True	Specifies whether the cache should be enabled for memory tests

[1] Memory Allocation Method: please note that this setting is not available on Windows® NT-based operating systems, like Windows® 2000 and Windows® XP.

[2] Test With Caching Enabled: this parameter does not affect the All Lockable method or the Big Buffer method under Windows® 98, Windows® NT, Windows® 2000, Windows® ME and Windows® XP; because the system calls that these operating systems use cannot create uncached memory.

Description

Mem.dll provides a physical memory test that conforms to the Eurosoft I97 diagnostic API.

Mem.dll utilizes this testing strategy:
1. Identify the total range of memory addresses to test.
2. Acquire the memory to test via one of 3 different memory “allocation” methods.
3. Test the memory.

The three memory allocation methods are:
1. “Invasive”. Determine “non-testable” memory addresses, and exclude them from the list of pages. This is done in order to avoid pages that may have active DMA in progress during the memory test. This determination is done in an operating system specific way, relying to some extent on internal knowledge of the operating systems. In NT, it uses the address of the non-paged pool. In 95/98, it finds all memory blocks that were allocated as fixed and that contain only fixed, contiguous memory. Since memory that is still in use in other parts of the system is being tested, a “save buffer” is allocated. Any memory that will be tested that is not itself part of the save buffer will be saved and restored here around the memory test. Since all of memory except what is in DMA buffers and in-use page tables is going to be altered, the memory test module takes over control of the processor. It creates its own system control structures, to ensure that no data outside its control will be accessed in the course of the memory test.
2. “Big Buffer”. Allocates a large portion of memory and locks it. Start with a moderate sized buffer and then grow it as much as the system will allow.
3. “All Lockable”. This method is Win 95/98 specific, and relies on the ability to specify the specific addresses of memory to allocate. The program is designed to allocate specific pages so that it can be assured that no pages are missed that otherwise could have been allocated but were not.

Memory is tested in units called memory blocks. The default size of the memory block is ¼ the total size of memory. Thus, each block of memory starting at address 0 is tested in sequence. In addition, with the Invasive and All Lockable allocation methods, for all of the tests other than the Random Address Test and the Quick Test, additional blocks are added that straddle the address lines that are powers of the block size. Thus, on a 64 MB machine, the block size would be 16 MB. The blocks of memory would be 0-16 MB, 16-32, 32-48, 48-64, and the additional blocks would be 8-24 and 24-40.

There are 11 different tests. With the exception only of the Pseudo Random test and the Custom test, each test specifies a particular DWORD to be used for the memory test, how many iterations through memory, and what is to be done to the start value between iterations.

There are 5 methods of testing for all tests other than Pseudo Random Data. Given a number to work with, as specified by the test type, a test method indicates how it is stored in memory and how it is determined if memory is working correctly. The methods are:

Method 1:

1. Store the value from the bottom.
2. If the block size is less than 2 megabytes, read the full block size from a displaced location in order to flush the cache.
3. Scan from the bottom to ensure that it is correct.

Method 2:

1. Store the value from the bottom.
2. Scan from the top to ensure that it is correct.

Method 4:

1. Store the inverse of the value from the bottom.
2. Store the value from the bottom.
3. DWORD by DWORD, from the bottom, ensure that the data is correct and store the inverse.
4. Store the inverse of the value from the bottom.
5. DWORD by DWORD, from the bottom, ensure that the data is correct and store the value.

Method 8:

1. Store the value from the bottom.
2. Scan from the bottom to ensure that it is correct.
3. Store the inverse of the value from the bottom.
4. Scan from the bottom to ensure that it is correct.

Method 16:

1. Store the value from the bottom.
2. Scan from the bottom to ensure that it is correct.
3. Store the inverse of the value from the bottom.
4. Scan from the top to ensure that it is correct.

Test 201 – Pseudo Random Data

Group: MEM — 1000

This test writes a Pseudo Random pattern into memory and verifies that it was written correctly.

Test Time[1]: 42 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Test Iterations	1	1	32	The number of iterations
Pseudo Random Seed	0	0	4294967295	Starting seed for pseudo random number generator; if zero, the seed is created based on a system timer

Test 202 – Walking Bit Left

Group: MEM — 1000

Walking Bit Left walks at 1 through a 8-bit BYTE of 0's from Right to Left shifting it 1 bit at a time. All 5 methods are performed.

Test Time[1]: 2 minutes, 15 seconds

Test Settings

None

Test 203 – Walking Bit Right

Group: MEM — 1000

Walks at 1 through an 8-bit BYTE of 0's from Left to Right shifting it 1 bit at a time. All 5 methods are performed.

Test Time[1]: 2 minutes, 15 seconds

Test Settings

None

Test 204 – Inverse Walking Bit Left

Group: MEM — 1000

Walks at 0 through a 8-bit BYTE of 1's from Right to Left shifting it 1 bit at a time. All 5 methods are performed.

Test Time[1]: 2 minutes, 15 seconds

Test Settings

None

Test 205 – Inverse Walking Bit Right

Group: MEM — 1000

Walks at 1 through a 8-bit BYTE of 1's from Right to Left shifting it 1 bit at a time. All 5 methods are performed.

Test Time[1]: 2 minutes, 15 seconds

Test Settings

None

Test 206 – Checkerboard

Group: MEM — 1000

Writes each 32-bit DWORD with 0xAAAAAAAA and verifies that it was written correctly. All 5 methods are performed.

Test Time[1]: 36 seconds

Test Settings

None

Test 208 – Bit Stuck High

Group: MEM — 1000

Write each 32-bit DWORD with 0x00000000 and verifies that it was written correctly. All 5 methods are performed. Perform each method 2 times.

Test Time[1]: 52 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Test Iterations	2	1	32	The number of iterations

Test 209 – Bit Stuck Low

Group: MEM — 1000

Writes each 32-bit DWORD with 0xffffffff and verifies that it was written correctly. All 5 methods are performed. Perform each method 2 times.

Test Time[1]: 52 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Test Iterations	2	1	32	The number of iterations

Test 211 – Pseudo Random Address

Group: MEM — 1000

Writes a randomly selected DWORD with the start seed value. When this has been done the number of times equal to the amount of memory, verifies that the data is correct. This is done 3 times, rotating the seed left once each time. The special address line straddle testing is not performed.

Test Time[1]: 2 minutes, 05 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Test Iterations	3	1	32	The number of iterations
Pseudo Random Seed	0	0	4294967295	Starting seed for pseudo random number generator; if zero, the seed is created based on a system timer

Test 212 – Quick

Group: MEM — 1000

Writes each 32-bit DWORD with 0xAAAAAAAA and verifies that it was written correctly. Only method #2 is performed. The special address line straddle testing is not performed.

Test Time[1]: 10 seconds

Test Settings

None

Test 213 – Custom

Group: MEM — 1000

Fully customizes a test, specifying the starting pattern, the number of iterations, whether the pattern is stored as a block or individually, how to manipulate the pattern between stores, how to manipulate the pattern between iterations, and the direction of the store and verify. The special address line straddle testing is not performed.

Test Time[1]: Varies according to test parameter settings

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Test Iterations	1	1	32	The number of iterations
Test Method	4	3	4	Specifies which test method to use 3 = Block method (store a single value as a block) 4 = Sequential method (store a value, then potentially change it before storing the next)
Initial Pattern	2863311530	0	4294967295	Specifies the pattern to store
Adjustment Between Iterations	1	0	6	Specifies how to manipulate the initial pattern between iterations 0 = No change 1 = Rotate left by 1 2 = Rotate right by 1 3 = Randomize 4 = Invert 5 = Increment by 1 6 = Decrement by 1
Adjustment for Each Value	5	0	6	Specifies how to manipulate the pattern between each store 0 = No change 1 = Rotate left by 1 2 = Rotate right by 1 3 = Randomize 4 = Invert 5 = Increment by 1 6 = Decrement by 1
Store Ascending	True	False	True	Specifies whether the data should be stored in ascending as opposed to descending order
Verify Ascending	True	False	True	Specifies whether the data should be checked in ascending as opposed to descending order

Possible Causes of Errors

- Memory test failure: The memory test finds that memory is bad.
  [MEM_INTEGRITY_CHECK_FAILED] This message is sent when the memory tests are unable to successfully initialize the test code area. This implies that the storage at that area is unreliable.

[1]Timing of the memory tests varies from system to system and depends on many factors. These factors include such things as amount of memory, type of memory, speed of the processor, test block size, etc. An example of how to calculate test time is as follows: If you are testing a system that has 64Mb of Memory, cut the range in half to get an estimate of how long your test will take. The ranges presented below come from various systems with 128 Megabytes (Mb) of Memory.

The test time provided here is an estimate only on a 128 MB 366 MHz Pentium II.

Monitor Group: MON – 3500

Overview

This test group provides testing of the display monitor connected to the primary video adapter. All of the monitor tests use the Windows® API and do not require additional software libraries such as DirectX.

To ensure accurate testing, the monitor tests should not be run while other graphics programs are running. In particular, game programs should be shut down prior to running the tests.

Each of the monitor tests display a pattern used to check a particular feature of the monitor. All of the tests require the operator to interactively verify proper operation. The tests may be run using all screen resolutions and color depths.

Because each test relies on user input, the actual duration is indeterminate. However, it should normally take no longer than 2-5 seconds for a user to determine whether the display is correct or not.

Interactive Test Operation

Interactive tests are those tests that require the user to inspect the display visually for errors. Because the monitor is being tested, it is imperative that a maximum amount of the display be used for the test rather than user interactions. For this reason, the visual cues to the operator are somewhat minimalist.

Before each test starts, a dialog box is displayed indicating which test will run. It also contains text indicating how to start the test and how to indicate whether the test ran correctly. This box will be displayed once any key is pressed while the test pattern is shown. Once a key has been pressed a dialog box appears asking whether the test was displayed correctly. The operator must answer Yes or No.

Tests in this Group

The following tests are included in the MON – 3500 test group:

Test 201 – Red Purity ***I***
Test 202 – Green Purity ***I***
Test 203 – Blue Purity ***I***
Test 204 – Mesh ***I***
Test 205 – Inverse Mesh ***I***
Test 206 – White MEME ***I***
Test 207 – Green MEME ***I***
Test 208 – Tonality ***I***
Test 209 – Grid ***I***

Prerequisites

All these tests must only be run in interactive mode, as denoted by the ***I*** above.

Group Settings

None

Device Settings

Device Setup			
Device Parameter	**Default**	**Options**	**Notes**
Display Initial Test Message	True	True/False	Specifies whether or not to display a test dialog box

Test 201 – Red Purity

Group: MON - 3500

The display is filled completely red. Any pixels not colored red indicate a DAC problem, color gun misalignment, or burned-out LCD panel element. This test is especially valuable for LCD panels.

Test Time - 3 seconds

Test Settings

None

Test 202 – Green Purity

Group: MON - 3500

The display is filled completely green. Any pixels not colored green indicate a DAC problem, color gun misalignment, or burned-out LCD panel element. This test is especially valuable for LCD panels.

Test Time - 3 seconds

Test Settings

None

Test 203 – Blue Purity

Group: MON - 3500

The display is filled completely blue. Any pixels not colored blue indicate a DAC problem, color gun misalignment, or burned-out LCD panel element. This test is especially valuable for LCD panels.

Test Time - 3 seconds

Test Settings

None

Test 204 – Mesh

Group: MON - 3500

The display is completely filled with an alternating one-zero mesh pattern. Any “splotches” of black or white indicate a DAC problem, phosphor bleeding, or LCD panel elements that are stuck off or on.

Test Time - 3 seconds

Test Settings

None

Test 205 – Inverse Mesh

Group: MON - 3500

The inverse mesh display is identical to the mesh display except that the pattern is reversed (i.e. ones become zeros and vice versa). Again, “splotches” of black or white indicate a DAC problem, phosphor bleeding, or LCD panel elements that are stuck off or on.
Test Time - 3 seconds

Test Settings

None

Test 206 – White MEME

Group: MON - 3500

The display is completely filled with a “MEME” pattern to allow adjustments to CRT displays.

Test Time - 3 seconds

Test Settings

None

Test 207 – Green MEME

Group: MON - 3500

The display is completely filled with a “MEME” pattern to allow other adjustments to CRT displays.

Test Time - 3 seconds

Test Settings

None

Test 208 – Tonality

Group: MON - 3500

The tonality display consists of shaded red, green, and blue bars in addition to a variety of vertical and horizontal lines and circles. This test pattern can be used to detect color granularity problems (i.e. transitions from one color to the next are not smooth). In addition, it can be used to adjust the “pincushion” control on CRT displays to attain minimal vertical skewing.

Test Time - 3 seconds

Test Settings

None

Test 209 – Grid

Group MON – 3500

The grid display consists of single pixel wide squares, which are 16 across by 12 high with a square white box in the middle. This test pattern is used to check geometry and color gun alignment.

Test Time – 3 seconds

Test Settings

None

Limitations

There are no known limitations for tests running on Windows® 98, Windows® NT, Windows® 2000, Windows® ME and Windows® XP.

Multimedia Group: MUL – 2500

Overview

The Multimedia test group verifies video and audio capabilities of the system being tested based on the hardware and software drivers installed. All Multimedia tests are interactive.

Note: You must have your devices connected, their drivers loaded, and Windows® must recognize them before they can be found and tested.

Note: The Multimedia test group may take up to 2 minutes to load on Windows PE, if there is no sound driver loaded on the system.

Tests in this Group

The following tests are included in the MUL – 2500 test group:

Test 201 – AVI Video ***I***
Test 202 – CD Audio ***I***
Test 203 – Sequencer ***I***
Test 204 – MPEG Video ***I***
Test 207 – Wave Audio ***I***

Prerequisites

All these tests must only be run in interactive mode, as denoted by the ***I*** above.

Group Settings

None

Device Settings

Device Setup		
Device Parameter	**Default**	**Notes**
AVI Test File	printer.avi	Contains settings for AVI Video Test
MPEG Test File	spotlight.mpeg	Contains settings for MPEG Video Test
Sequencer Test File	newage.mid	Contains settings for Sequencer Test
Wave Test File	spkrtest.wav	Contains settings for Wave Audio Test

Note: The device settings are customizable by the user. It is recommended however to use the supplied files for the tests.

Test 201 – AVI Video

Group: MUL - 2500

This test plays an AVI video.

Note: This is an interactive test.

Test Time - 15 seconds

Test Settings

None

Test 202 – CD Audio

Group: MUL - 2500

This test plays an audio CD.

Note: This is an interactive test.

Test Time - 5 seconds to the start of the CD. The CD plays for 15 seconds.

Test Settings

None

Test 203 – Sequencer

Group: MUL - 2500

This test plays a midi sequencer file.

Note: This is an interactive test.

Test Time - 20 seconds

Test Settings

None

Test 204 – MPEG Video

Group: MUL - 2500

This test plays an MPEG video.

Note: This is an interactive test.

Test Time - 15 seconds

Test Settings

None

Test 207 – Wave Audio

Group: MUL - 2500

This test plays a WAV audio file.

Note: This is an interactive test.

Test Time - 35 seconds

Test Settings

None

Possible Causes of Errors

- Incorrect/unsupported driver
- Unsupported format

Network Device Group: NIC – 2200

Overview

This test group tests the basic functions of the Network Interface Card.

Note: This group is not supported by Windows® NT.

Tests in this Group

The following tests are included in the NIC - 2200 test group:

Test 201 – Enumerate Devices
Test 202 – Enumerate Group
Test 203 – Ping
Test 204 – Enumerate Protocols
Test 205 – Throughput
Test 206 – Server Enumeration

Group Settings

None

Device Settings

None

Test 201 – Enumerate Devices

Group: NIC — 2200

Enumerates a list of all NICs installed on the system. Information returned includes the Adapter name, Adapter description, NIC Type, IP Address, Subnet Mask, MAC address, Hostname, Domain, etc. This test is supported for Windows® 98, ME, 2000 and XP.

Test Time[1] – Approximately 1 to 5 seconds

Test Settings

None

Test 202 – Enumerate Group

Group: NIC — 2200

Enumerates all visible PCs on the local network. Results are stored in a report showing one PC per line. Each line includes the PC name and its associated IP address.

Test Time[1] - Approximately 1 to 5 seconds

Test Settings

None

Test 203 – Ping

Group: NIC — 2200

Pings the specified IP address four times in order to obtain minimum, maximum and average ping times.

Test Time[1] - Approximately 5 seconds

Test Settings

Test Setup	
Test Parameter	**Default**
Ping IP Address	127.0.0.1

Test 204 – Enumerate Protocols

Group: NIC — 2200

Enumerate all the available protocols on the test PC and list the basic properties of each protocol.

Setting the Report Detail parameter to 1 provides a full report for this test. The default Report Detail setting of 0 provides a summary report.

Test Time[1] - Approximately 5 to 45 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Report Detail Level	0	0	1	0 = Summary report 1 = Full report

Test 205 – Throughput

Group: NIC — 2200

This test is used to measure throughput over the network. It currently returns the time taken to send multiple ping packets over the network. This can then be used as an indicator of comparative network speed, but not as a precise measurement.

Test Time[1] **-** Approximately 5 to 10 seconds

Test Settings

Test Setup	
Test Parameter	**Default**
Throughput IP Address	127.0.0.1

Test 206 – Server Enumeration

Group: NIC — 2200

This test enumerates all PCs across the network. The results are stored in a report detailing the following information:

- Platform Type (Operating system and version)
- Machine Name
- O/S Version No
- Properties of PC
- Comment

Note: This test is not supported by Windows® 98, ME or NT.

Setting the Report Detail parameter to 1 provides a full report for this test. The default Report Detail setting of 0 provides a summary report.

Test Time[1] **-** Approximately 5 to 60 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Report Detail Level	0	0	1	0 = Limited report 1 = Full report

Possible Causes of Errors

- Tests can fail if there are errors initializing the network or obtaining correct information
- Tests can fail if the Network card is not present or not connected to the network at the time the test is run.

[1]The time taken to run all the tests is largely dependant on the size of the network and its configuration. As such, a precise test time cannot be determined for this test, suffice to say that on a small local area network this test is not expected to take longer than a few seconds. Larger networks with more cards to test will, naturally incur greater time taken to run this test.

Pointer Devices Group: PDV – 900

Overview

This group tests the movement of the mouse pointer, proper mouse button operation, proper joystick movement, and proper joystick button operation. In the movement tests, the user is directed to move the mouse or joystick to specific points on the screen to determine if the pointing device utilizes full screen movement. In the clicking/button tests, the user will be prompted to click the mouse when it is pointing at various locations or press the various buttons on the joystick in a specific order. However, because of driver installation, Windows® does not always return the correct settings for the number of mouse buttons and scroll support. For additional information on configuring the settings, see Device Settings below.

Tests in this Group

The following tests are included in the PDV - 900 test group:

Test 201 – Mouse Tracking ***I***
Test 202 – Mouse Click ***I***
Test 203 – Joystick Tracking ***I***
Test 204 – Joystick Click ***I***
Test 205 – Digitizer Grid ***I***
Test 206 – Digitizer Diagonal ***I***
Test 207 – Digitizer Offset ***I***

Prerequisites

A mouse must be connected to the system to get the mouse tests to show up. A joystick must be connected to the system and the joystick driver must be installed for the joystick tests to show up. Also, the default device settings are information read back from system calls to Windows®.

All these tests must only be run in interactive mode, as denoted by the ***I*** above.

Group Settings

None

Device Settings

Device Setup				
Device Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Mouse Tracking GUI	Standard	Standard	Tech Support	Specify whether the 'Standard' or 'Tech Support' GUI should be displayed during the test (custom-build only)
Button Override	3	0	5	Specifies the number of buttons to be tested, independent of what Windows® may have reported
Scrolling Support[1]	True	False	True	Enable or disable scrolling support

[1] Scrolling Support: For systems that use an Intellimouse compatible mouse, this should be automatically detected, probably. But for other implementations that perform this function via the device driver, the user will have to set this parameter to TRUE.

Test 201 – Mouse Tracking

Group: PDV - 900

This test initializes the mouse and monitors its location. The mouse driver controls the mouse cursor.

Note: This is an interactive test.

Test Time - 15 seconds

Test Settings

None

Possible Causes of Errors

- Defective cable, mouse, port or adapter.

Test 202 – Mouse Click

Group: PDV - 900

This test monitors the mouse buttons while the user points at a specific location on screen and clicks them.

Note: This is an interactive test.

Test Time - 5 seconds

Test Settings

None

Possible Causes of Errors

- Defective cable, mouse, port or adapter.

Test 203 – Joystick Tracking

Group: PDV - 900

This test tracks the movement of the joystick.

Note: This is an interactive test.

Test Time - 10 seconds

Test Settings

None

Possible Causes of Errors

- Defective cable, mouse, port or adapter.

Test 204 – Joystick Click

Group: PDV - 900

This test monitors the joystick buttons.

Note: This is an interactive test.

Test Time - 10 seconds

Test Settings

None

Possible Causes of Errors

- Pointing device (joystick, mouse, trackball, pad) driver not loaded or active.
- Pointing device not connected
- Defective cable, mouse, joystick, port or adapter.

Test 205 – Digitizer Grid

Group: PDV - 900

This test monitors the tracking of the digitizer pen. The screen is divided into a grid of unfilled cells. Grid cells are filled when the pen moves over the cells. Move the pen over all cells to pass the test. Hit ESC or UP ARROW to cancel the test and record a FAIL result.

Note: This is an interactive test.

Test Time - 10 seconds to 60 seconds depending upon the detail level parameter and user speed.

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Detail Level	5	3	100	Sets the number of cells in the x-and y-axis of the test grid
Show Cursor	0	0	1	0 = hide cursor 1 = show cursor

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- An un-calibrated tablet
- Defective pen or tablet
- Hitting the ESC key to cancel the test

Test 206 – Digitizer Diagonal

Group: PDV - 900

This test monitors the functionality of the tablet's horizontal and vertical axes. The screen starts blank. Move the pen slowly from the top left corner of the screen to the bottom right corner. As the pen moves, lines and columns are drawn from the edges of the screen to meet at a diagonal, center line (blue lines vertically and green lines horizontally). The test continues until all rows or columns are filled or either ESC or UP ARROW is pressed.

Note: This is an interactive test.

Test Time - 10 seconds to 60 seconds depending upon the detail level parameter and user speed.

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Detail Level	1	0	2	Specifies how detailed a test to run 0 = quick test (check for multiple dead rows or columns) 1 = standard test (test alternate rows and columns on the tablet) 2 = full test (test every row and column, requiring multiple scans with the pen)
Maximum Failed Pixels	3	0	100	Specifies the number of dead rows and/or columns that can be detected prior to failing the test
Show Cursor	0	0	1	0 = hide cursor 1 = show cursor

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- An un-calibrated tablet
- Defective pen or tablet
- Hitting the ESC key to cancel the test

Test 207 – Digitizer Offset

Group: PDV - 900

This test monitors the accuracy of the pen in locating a point on the tablet and (optionally) in monitoring flutter of the pointer when it is held stationery over a target point.

A series of target points is presented to the user; the target point to select is displayed in flashing colors. For each target point, move the pen to the center of the target and press the DOWN ARROW. Keep the pen stationary over the target until it stops flashing and changes color. If the Flutter Test Duration is set to zero (default) the result will be displayed immediately as a pass or fail image. If the Flutter Test Duration is non-zero, hold the pen still over the target point until it changes state into a pass or fail image.

A green tick indicates a pass; a red cross indicates a fail result. Failed target points can be retried if the user thinks the fail results may have been due to human error. To cancel the test at any time and record a fail press either the ESC key or UP ARROW then select YES in the confirmation message box. When all target points have been changed to pass images the test is completed and a Pass result recorded.

Note: This is an interactive test.

Test Time - 20 seconds to 120 seconds depending upon the parameter settings. 20 seconds is the duration of the default test.

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Flutter Test Duration	0	0	30	The number of seconds to test for flutter
Offset Maximum Limit	16	0	100	The maximum distance in pixels that the pointer can move from the target point
Show Cursor	0	0	1	0 = hide cursor 1 = show cursor
Target Point Total	10	1	100	The total number of targets presented to the user. The first 10 targets are arranged symmetrically, while additional target points are allocated randomly over the screen

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- An un-calibrated tablet
- Defective pen or tablet
- User error, the option to retry targets is available for this possibility
- Hitting the ESC or UP ARROW key to cancel the test

Removable Media Disk Group: RMD – 4700

Overview

RMD is a test group for disk drives with “removable media”. This includes devices which plug directly into a port, such as USB flash memory “drives”, as well as those that have media which are inserted into purpose-built peripheral devices. RMD will execute and run on Windows 2000, Windows XP and beyond.

Tests in this Group

The following tests are included in the RMD – 4700 test group:

Test 201 – Linear Read test
Test 202 – Random Read test

Prerequisites

IMPORTANT:

Removable media MUST be present in the appropriate devices BEFORE running QA Test.

Group Settings

None.

Device Settings

None.

Test 201 – Linear Read

Group: RMD 4700

Exercises a drive’s read capability using linear (incrementally increasing) read addresses. Read data is ignored. Only success or failure of each read is monitored.

Test Settings

The Linear Read test has three test parameters: Start, Stop, and Increment.

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Block	0	0	Last Adressable block	The test’s beginning read address limit
Stop Block	Last Addressable block	0	Last addressable Block	The test’s ending read address limit.
Increment	Last Addressable block / 1000 (Min 4)	4	Last addressable Block	The amount by which the read address increases per read from Start to Stop.

The test ends when the incremented read address is greater than “Stop”.

Test 202 – Random Read

Group: RMD 4700

Exercises a drive’s read capability using pseudo-random (pseudo-randomly varying) read addresses. Read data is ignored. Only success or failure of each read is monitored.

Test Settings

The Random Read test has three test parameters: Start, Stop, and Iterations.

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Start Block	0	0	Last addressable Block	The test's beginning read address limit.
Stop Block	Last addressable Block	0	Last addressable Block	The test's ending read address limit.
Iterations	Last addressable block /Increment (See Above)	1	N/A	The number of times for the test to "loop"; i.e., generate a pseudo-random read address within the bounds of Start and Stop and thence read at that address.

The test ends when a number of reads equal to Iterations have been done.

Possible Causes of Errors

["Error: <*???*> failed (<*n*>)."]

An error message output of this form indicates a failure (typically an I/O failure) in an RMD internal function. There will be the name of the failing internal function in place of "<*???*>" in the message string and there will be a numeric value in place of "<*n*>" in the message string. In this case, a failure is also "returned".

["Error: <*???*> failed."]

An error message output of this form indicates a failure in an RMD internal function wherein there is no associated internal numeric error value. There will be the name of the failing internal function in place of "<*???*>" in the message string. In this case, a failure is also "returned".

["Error: <message>"]

An additional error message can accompany one or other of the above error messages, giving supplementary information about the error.

Sensor Group: SEN – 4600

Overview
The SENSOR Tests verify operational temperatures, voltages and fan speeds for certain supported chipsets.

Tests in this Group
Note: Not all chipsets support all the tests described below. If any test is not supported, it will not appear in the on-screen display.

The following tests are included in the SEN - 4600 test group:

Test 201 – CPU Temperature
Test 202 – Chassis Temperature
Test 203 – Auxiliary Device Temperature
Test 204 – Fan 1 Speed
Test 205 – Fan 2 Speed
Test 206 – Fan 3 Speed
Test 207 – Fan 4 Speed
Test 208 – +12 Volts Rail
Test 209 – +5 Volts Rail
Test 210 – -5 Volts Rail
Test 211 – +3.3 Volts Rail
Test 212 – CPU Voltage Rail

Prerequisites
The Unit Under Test must contain a supported test set.

Group Settings
None

Device Settings
None

Test 201 – CPU Temperature
Group: SEN - 4600

Tests the CPU Temperature.

Test Time - 1 second.

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Minimum CPU Temperature	0	0	100	Sets the minimum allowable CPU temperature (Celsius)
Maximum CPU Temperature	65	0	100	Sets the maximum allowable CPU temperature (Celsius)

Test 202 – Chassis Temperature
Group: SEN - 4600

Tests the Chassis Temperature.

Test Time - 1 second.

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Minimum Chassis Temperature	0	0	100	Sets the minimum allowable Chassis temperature (Celsius)
Maximum Chassis Temperature	65	0	100	Sets the maximum allowable Chassis temperature (Celsius)

Test 203 – Auxiliary Device Temperature

Group: SEN - 4600

Tests the Temperature of an auxiliary device.

Test Time - 1 second

.

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Minimum Auxiliary Device Temperature	0	0	100	Sets the minimum allowable Auxiliary Device temperature (Celsius)
Maximum Auxiliary Device Temperature	65	0	100	Sets the maximum allowable Auxiliary Device temperature (Celsius)

Test 204 – Fan 1 Speed

Group: SEN - 4600

Tests the speed of Fan 1.

Test Time – 1 second.

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Minimum Fan 1 Speed	0	0	100000	Sets the minimum allowable fan speed in rpm
Maximum Fan 1 Speed	8000	0	100000	Sets the maximum allowable fan speed in rpm

Important Warning for All Fan Tests

Chipset tests cannot distinguish between an unconnected fan and a connected but stationary fan – both situations return a value of zero rpm. Therefore, if the minimum acceptable fan speed is set above zero, the chipset will cause the test to fail falsely if no fan is present. But if the minimum value is set to zero, **all** stationary fans will pass. This value will allow thermal sensing fans, which may run very slowly or shut down completely under cool running conditions, to pass, but would not fail a faulty stationary fan.

The default minimum fan speed is set to zero, i.e. the absence of a fan will not cause a fail condition, but all stationary fans will pass. The user needs to consider what minimum value to use in their particular circumstances, and how to interpret the results, in view of the above information.

Test 205 – Fan 2 Speed

Group: SEN - 4600

Tests the speed of Fan 2.

Test Time – 1 second.

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Minimum Fan 2 Speed	0	0	100000	Sets the minimum allowable fan speed in rpm
Maximum Fan 2 Speed	8000	0	100000	Sets the maximum allowable fan speed in rpm

Important
See the note “Important Warning for All Fan Tests” under Test 204 above.

Test 206 – Fan 3 Speed
Group: SEN - 4600

Tests the speed of Fan 3.

Test Time – 1 second.

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Minimum Fan 3 Speed	0	0	100000	Sets the minimum allowable fan speed in rpm
Maximum Fan 3 Speed	8000	0	100000	Sets the maximum allowable fan speed in rpm

Important
See the note “Important Warning for All Fan Tests” under Test 204 above.

Test 207 – Fan 4 Speed
Group: SEN - 4600

Tests the speed of Fan 4.

Test Time – 1 second.

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Minimum Fan 4 Speed	0	0	100000	Sets the minimum allowable fan speed in rpm
Maximum Fan 4 Speed	8000	0	100000	Sets the maximum allowable fan speed in rpm

Important
See the note “Important Warning for All Fan Tests” under Test 204 above.

Test 208 – +12 Volts Rail
Group: SEN - 4600

Tests the voltage of the +12 volt rail.

Test Time – 1 second.

Test Settings

Test Parameter	Default	Notes
Minimum 12V rail Voltage	11.50	Sets the minimum allowable 12V rail voltage
Maximum 12V Rail Voltage	12.50	Sets the maximum allowable 12V rail voltage

Test 209 – +5 Volts Rail

Group: SEN - 4600

Tests the voltage of the +5 volt rail.

Test Time – 1 second.

Test Settings

Test Parameter	Default	Notes
Minimum 5V Rail Voltage	4.75	Sets the minimum allowable 5V rail voltage
Maximum 5V Rail Voltage	5.25	Sets the maximum allowable 5V rail voltage

Test 210 – -5 Volts Rail

Group: SEN - 4600

Tests the voltage of the -5 volt rail.

Test Time – 1 second.

Test Settings

Test Parameter	Default	Notes
Minimum -5V Rail Voltage	-4.75	Sets the minimum allowable -5V rail voltage
Maximum -5V Rail Voltage	-5.25	Sets the maximum allowable -5V rail voltage

Test 211 – +3.3 Volts Rail

Group: SEN - 4600

Tests the voltage of the +3.3 volt rail.

Test Time – 1 second.

Test Settings

Test Parameter	Default	Notes
Minimum 3.3V Rail Voltage	3.15	Sets the minimum allowable 3.3V rail voltage
Maximum 3.3V Rail Voltage	3.45	Sets the maximum allowable 3.3V rail voltage

Test 212 – CPU Voltage Rail

Group: SEN - 4600

Tests the voltage of the CPU voltage rail.

Test Time – 1 second.

Test Settings

Test Parameter	Default	Notes
Minimum CPU Rail Voltage	1.00	Sets the minimum allowable CPU rail voltage
Maximum CPU Rail Voltage	5.50	Sets the maximum allowable CPU rail voltage

Serial Ports Group: SER – 4500

Overview
The Serial Ports Tests verify the functionality of the serial ports as they transmit data, handle interrupts, and perform handshaking with external devices.

Tests in this Group
The following tests are included in the SER - 4500 test group:

Test 201 - Configuration Registers	
Test 202 - Quick Loopback	**L**
Test 203 - Baud Rates	**L**
Test 204 - Sustained Loopback	**L**
Test 205 - Priority Transmit	**L**

Note: Tests followed by an **L** require a serial loopback plug.

Prerequisites
The serial loopback plug must be installed for the above tests denoted by the **L**.

Group Settings
None

Device Settings
None

Test 201 - Configuration Registers
Group: SER - 4500

Tests the Configuration Settings of the serial port.

Test Time - 2 seconds

Test Settings
None

Possible Causes of Errors
The following are possible causes of errors generated for this test:

- Unable to read or write Configuration registers.
- Port does not support (all) status lines.
- Faulty port/device/serial chip (UAR/T or chipset).

Test 202 - Quick Loopback
Group: SER - 4500

This test performs an abbreviated loopback test at a single baud rate, to test the port's ability to transmit and receive a short message.

Note: Loopback plugs are required for this test.

Test Time - 3 seconds

Test Settings
None

Possible Causes of Errors
The following are possible causes of errors generated for this test:

- Faulty/wrong loopback plug.
- Port to I/O interface (serial connector or interface chip) failure.
- Port does not support (all) status/flow control lines.
- Faulty port/device/serial chip (UAR/T or chipset).
- Improper IRQ configuration.
- Test data rates exceed device capability.

Test 203 - Baud Rates

Group: SER - 4500

This test performs an abbreviated loopback test at a variety of baud rates, specified by minimum and maximum values, to test the port's ability to transmit and receive a short message.

Note: Loopback plugs are required for this test.

Test Time – up to 12 seconds

Test Settings

Minimum Baud Rate

Default	300
Minimum	300
Maximum	921600

Maximum Baud Rate

Default	115200
Minimum	300
Maximum	921600

If the entered value is not a preferred baud rate, the value is rounded down to the nearest preferred baud rate.

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Faulty/wrong loopback plug.
- Port to I/O interface (serial connector or interface chip) failure.
- Port does not support (all) status/flow control lines.
- Faulty port/device/serial chip (UAR/T or chipset).
- Improper IRQ configuration.
- Test data rates exceed device capability.

Test 204 - Sustained Loopback

Group: SER – 4500

Tests the ability to withstand a transmission of sustained duration at a specified baud rate.

Note: Loopback plugs are required for this test.

Test Time – as specified.

Test Settings

Baud Rate

Default	115200
Minimum	300
Maximum	921600

If the entered value is not a preferred baud rate, the value is rounded down to the nearest preferred baud rate.

Test Duration

Default	10 seconds
Minimum	10 seconds
Maximum	99999999 seconds

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Faulty/wrong loopback plug.
- Port to I/O interface (serial connector or interface chip) failure.
- Port does not support (all) status/flow control lines.
- Faulty port/device/serial chip (UAR/T or chipset).

- Improper IRQ configuration.
- Test data rates exceed device capability.

Test 205 - Priority Transmit

Group: SER - 4500

Tests serial port driver's priority transmit capability.

Note: Loopback plugs are required for this test.

Test Time - 25 seconds

Test Settings

None

Possible Causes of Errors

The following are possible causes of errors generated for this test:

- Faulty/wrong loopback plug.
- Port to I/O interface (serial connector or interface chip) failure.
- Port does not support (all) status/flow control lines.
- Faulty port/device/serial chip (UAR/T or chipset).
- Improper IRQ configuration.
- Test data rates exceed device capability.
- Priority Transmit mechanism inoperative.

System Stress Group: STR – 2700

Overview

The system stress test group executes and runs on Windows® 98, Windows® NT, Windows® 2000, Windows® ME and Windows® XP. The group consists of a single test, "Extended Stress," that executes memory and hard disk drive tests concurrently. The Extended Stress test (STR) is a multi-threaded test. The concept behind STR is that it has a single "LUN" (logical unit) and a single test. When the test is run on this "LUN" multiple threads fire up: the master test thread on the "LUN" for each disk drive detected at the time the test group is initialized (two drives, two threads; three drives, three threads; etc.) along with one memory test thread. All of the test threads run concurrently (to the extent that they can, given the limitations of the machine that they are running on). Test settings/settings can be used to enable/disable the disk test threads and/or memory test thread one by one or in any combination. The main/master test thread monitors the progress of the subordinate threads. The main test thread can also signal the subordinate threads to abort testing.

In a non-preemptive operating system (e.g., Win9x), multiple threads must "cooperate" with each other and not take up a large amount of CPU resources unless they have to (e.g., IDE bus PIO data transfer strains CPU resources). Therefore, in the Extended Stress test, multiple threads that are fired up "sleep" at certain points in their execution in order to give each other a chance to access CPU resources. Experiments with this test demonstrates that this procedure and other activity going on in a system can and does make the "concurrency" of thread execution vary from run to run on the same machine and from machine to machine.

Note: The progress bar starts at 100% and counts backward, and then when 0% is reached it counts upward.

Tests in this Group

The following test is included in the STR – 2700 test group:

Test 201 – Extended Stress

Group Settings

None

Device Settings

None

Test 201 – Extended Stress

Group: STR — 2700

Each disk test thread performs three sequential tests on its disk: a Butterfly Seek Test; a Random Seek Test; and a Read/Verify Test. The diagnostic test algorithms and code that do the actual disk drive testing are not in str.dll itself: they are in diskcomn.dll and its subordinate modules. These are the same diagnostic test algorithms and code used by the HDN.dll test group. These tests are done on the entire disk (across the entire surface or number of sectors of the disk). There are no test settings/settings to delimit that only a portion of a disk is to be tested.

The memory test thread does a sequential, write, read, and verify of four data values to each byte in a block of memory. The idea is to generate memory bus activity at the same time as I/O bus activity. It is not intended to be an exhaustive test for memory problems. One "cycle" of the memory test is when all of the bytes in the block have been written to and read from. A test setting/parameter exists to delimit the number of memory test cycles. A test setting/parameter also exists to delimit the block size to be allocated for the memory test. An "End when disk idle" test setting/parameter exists so that, when it is "on"/enabled, it indicates that the memory test should end and "pass" when all of the disk test threads go idle.

Test Time: Run time is indeterminate: an average is two hours but it can take significantly more time depending on system configuration.

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Memory Test Size (bytes)	4194304 (4MB	0	41943040 (40MB)	Delimits the memory test block size. Technically this setting should be an integral multiple of the system's page size, with a minimum value of 2x the page size; values below this cause the test to fail. For many systems, the page size is 4KB, so the minimum Memory Test Size is 8KB or 8192 bytes.
Enable Memory Test Thread	1 (On)	0 (Off)	1 (On)	Specifies whether the memory test thread should be enabled.
End When Disk Idle	1 (On)	0 (Off)	1 (On)	When 'on', indicates that the memory test should end and 'pass' when all of the disk test threads go idle.
Memory Test Cycles	4294967295	1	4294967295	Number of times that all the bytes in a block should be written to and read from.
Enable Hard Disk Test Thread, <drive type>, Drive <num>	1 (On)	0 (Off)	1 (On)	Specifies whether the disk test thread(s) should be enabled.

Possible Causes of Errors

- An error message indicates a failure (typically an I/O failure) in a STR internal function. The name of the failing internal function is displayed.

Known Issues

When running the STR group on systems having either Windows® 98 SE or Windows® ME, the user may experience some temporary loss of time. However, the clock will refresh once the test has completed.

System Information Group: SYS - 1300

Overview

This group reports various system configuration data. The purpose of this “test” group is actually more informational in nature as opposed to diagnostic.

Tests in this Group

The following tests are included in the SYS - 1300 test group:

Test 205 – Hardware Configuration
Test 209 – PCI Bus Information
Test 210 – Plug-and-Play Bus Information
Test 213 – USB Bus Information
Test 214 – WMI Information
Test 215 – SMBIOS Information

Group Settings

None

Device Settings

None

Test 205 – Hardware Configuration

Group: SYS - 1300

This test detects devices on the system. The following information is returned:

- Processor Type
- Numeric Processor Type
- Installed Memory Size
- Extended Memory Size
- Base Memory Size
- Video Adapters
- Floppy Drives
- COM Ports
- LPT Ports
- Mouse
- Joysticks
- Sound Board
- SCSI HA
- Network
- CDROM Drives
- Modem
- BIOS Type
- Level-2 Cache
- Sensor Data

Device information is described by a series of three digit codes described below; when QA+Win32 is run under PC Builder, these codes are written to the Results Log:

DPC (Device Product Code): This includes the device type and name.

DFW (Device Firmware): Displays firmware information if it is available.

DSR (Device Serial Number): Displays the Serial Number of the device if it is available.

DPH (Device Physical Hardware): Displays available descriptive information about the device.

COM Ports Displays a list of all serial ports installed on the machine you are testing. QA+WIN32 reports up to four serial ports and their respective I/O addresses. They are listed as: COM1, COM2, COM3, and COM4.

LPT Ports Displays a list of all parallel ports installed on the machine you are testing. QA+WIN32 reports up to three parallel ports and their respective memory addresses. They are listed as: LPT1, LPT2, and LPT3.

- Mouse
- Joystick(s)
- CDROM Device

Hard Drives Indicates the drive adapter types and addresses**.**

Note: SATA drives driven from a PCI card will be identified as SCSI disks by this test (and by the operating system).

Sound Board Identifies most sound card vendors, the card type, and the memory location of the driver in hexadecimal value.

Test Time - 5 seconds

Test Settings

Settings True or False

Default: True

- Check CPU Type
- Check NPU Type
- Check BASE Memory
- Check EXT Memory
- Check Video Adapters
- Check Floppy Drives
- Check COM Ports
- Check LPT Ports
- Check Mouse
- Check Joysticks
- Check Sound Board
- Check SCSI HA
- Check Network
- Check CDROM Drives
- Check Modem
- Check BIOS Type
- Check Level-2 Cache
- Check Sensor Data

Test 209 – PCI Bus Information

Group: SYS - 1300

This information item is only available if a PCI bus is present in the host system. Each PCI bus found in the system is scanned for devices. All such devices on each particular bus are reported. The following information is obtained for each device found:

- Slot Number
- Vendor
- Device ID
- Device Type

Test Time - 5 seconds

Test Settings

None

Test 210 – Plug-and-Play Bus Information

Group: SYS - 1300

This test reports any Plug and Play (PnP) information available in the system. If any Plug and Play cards are available the following information is shown for the card:

- PnP Device Number, Active/Inactive status
- PnP ID - type of card, such as Audio
- I/O Address(es)
- Interrupt Requests(s), Edge/Level Sensitive, Active High or Low
- DMA Channel(s)

Test Time - 5 seconds

Test Settings

- **Class to Filter** – specifies the class of PnP device to report.

Default	All Classes
Settings	Any valid class is permitted, e.g. “System Device”, “Multimedia Device”, “Network Device”

Test 213 – USB Bus Information

Group: SYS – 1300

The test displays information about the USB root hub(s), ports and any connected devices; it supports USB 1.1 and 2.0. Indentation is used in the result log to visually display the hierarchy of hub(s) and ports. Each detected device is identified by its Vendor ID and Device ID, and, where applicable, a descriptor string. The text file, ‘USBLIST.TXT’, contains a list of user descriptors for specified USB devices; by default the file has 2 entries, for blue and pink USB plugs. The user may edit this file to add descriptors for other devices, identified by vendor and device ID’s. If ‘USBLIST.TXT’ contains an entry for a specific device, then that descriptor will be displayed by the test. If the device is not listed in the file, then either the Windows descriptor will be used, or, in the case of Windows PE, the generic string “Device Connected” will be displayed. Hence file ‘USBLIST.TXT’ can be used to provide descriptors for Windows PE or to override the Windows descriptors of other operating systems. For instance, the ‘USBLIST.TXT’ file’s descriptor for USB pink plugs, namely “Eurosoft Diagnostic Device”, overrides the default Windows descriptor, “USB Human Interface Device” (or “Device Connected” on Windows PE).

Note: The possible test statuses are ‘Passed’, ‘Aborted’ and ‘Skipped’ (there is no ‘Failed’ status since the test simply retrieves information).

Note: When the USB Preferred Port Plug is initially attached, most systems will detect the plug and automatically install the new device. However, in some cases, Windows® will only detect the new hardware. In this case, the “Add New Hardware Wizard” should appear and automatically step you through the installation of the device. If you cancel the Wizard any time during the installation process, the result will be the failure of the USB test when it is run in QAWIN32.

Test Time – 2 seconds

Test Settings

None

Test 214 – WMI Information

Group: SYS - 1300

This test gathers selected information from the Microsoft Windows Management Instrumentation (WMI) information. The items to be gathered are listed in the QAWMI.ini file. Once this information is found in the WMI space, it is included in the log file. Information is typically returned on:

- Processor
- BIOS
- Bus
- Memory device
- Video controller
- Serial and parallel ports
- Disk drives
- Network adapter

Test Time - 5 seconds

Test Settings

None

Test 215 – SMBIOS Information

Group: SYS - 1300

This test gathers selected information from the System Management Basic Input/Output Subsystem (SMBIOS) and dumps it out. The SMBIOS specification states that all this information is grouped into specific “Types”. These SMBIOS types are mapped into

the standard DPC types as specified in the smb-dpc.txt. All fields of each type are included in this information dump. For SMBIOS Types above 126, they are listed as “OEM Defined” since those are specific to a given OEM.

Test Time - 2 seconds

Test Settings

None

USB Drives Group: USB – 3100

Overview

The group is a 32-bit dynamic link library called USB.DLL. This group is only loaded if Eurosoft USB hardware is detected when the program initialises: it will not load if there are no USB devices or only non-Eurosoft USB devices connected to the USB ports.

Note: Eurosoft USB devices should not be removed or inserted while QA+Win32 is running.

Tests in this Group

The following test is included in the USB - 3100 test group:

Test 203 – Detected Devices
Test 204 – Read Transfer Test

Group Settings

None

Device Settings

None

Test 203 – Detected Devices

Group: USB – 3100

The test counts the number of Eurosoft USB devices (plugs or a Eurosoft mass storage test device) plugged into USB ports. The user specifies how many devices to check for via a 'Number of Devices' parameter; the test passes if it detects a corresponding number of devices, else it fails.

The lefthand pane of QAWin displays details of each device detected, as follows:

Eurosoft USB plugs:

Type 1 Test Device, <serial number> - blue plug

Type 2 Test Device, <serial number> - pink plug

Mass Storage Test Device, <root directory path> - Eurosoft mass storage device

Test Time – less than 1 second

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Number of Devices	0	0	127	Number of Eurosoft USB devices to try to detect. The default value of 0 means that the test will pass if at least one USB device is detected; if any other value is specified, then the test will only pass if that exact number of USB devices is detected.

Possible Causes of Errors

Failure can occur if the driver is not installed for the USB device, if there is a USB communication failure or if a device is missing.

Test 204 – Read Transfer

Group: USB – 3100

The test transfers from a Eurosoft mass storage test device for a specified number of seconds. The results log records the amount of data transferred (in kilobytes) during this time.

Test Time – specified by the Test Duration parameter (see below)

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Test Duration (s)	10	1	4294080	Length of time in seconds to transfer data from the Eurosoft mass storage test device

Possible Causes of Errors

Failure can occur if the driver is not installed for the USB device, if there is a USB communication failure or if a device is missing.

Video Group: VID – 600

Overview

This group tests the primary video adapter and, depending on the system configuration, tests secondary video adapters including 3D accelerator card.

Each of the video tests is designed to verify the operation of a particular feature of the video card. Some of the tests require the operator to verify proper operation. Test names and several other user I/O items may be customized using the Windows® resource file editor.

All the Video tests, except for the RAM (201), VGA Palette (208) and Color Separation (209) tests, use the Microsoft DirectX interface for access to the graphics hardware. DirectX provides a largely hardware-independent way to access the card, but does not allow complete, unrestricted access to hardware functions.

If DirectX has not been installed only a subset of the tests can be performed. Windows® NT Versions (NT4.0, Windows® 2000 and Windows® XP), Windows® 98, and Windows® 95B are shipped with DirectX capabilities. On earlier versions of Windows® 95 DirectX must be installed manually. If you need to install DirectX, it is always best to use the latest version. However, as a minimum, the Video Test Group requires version 3.0b or later for the graphics accelerator tests. Windows® 98/ME or Win2K/XP are required for multi-monitor (i.e. multiple display adapters) support.

The video tests should not be run while other graphics programs are running. Game programs, in particular, should be shut down prior to running the tests.

Tests in this Group

The following tests are included in the VID – 600 test group:

Test 201 – RAM Tests
Test 202 – Line Drawing Test
Test 203 – Polygon Drawing Test
Test 204 – Bit-Blit Test
Test 205 – Color Palette
Test 206 – VGA Palette Test
Test 208 – Color Separation ***I***
Test 209 – 3D Animation ***I***
Test 210 – 3D Effects ***I***

Prerequisites

Tests 208, 209 and 210 must only be run in interactive mode, as denoted by the ***I*** above.

Group Settings

None

Device Settings

Device Setup			
Device Parameter	**Default**	**Options**	**Notes**
Display Initial Test Message	True	True/False	Specifies whether or not to display a test dialog box

Limitations

The API and its implementation in each video card driver restrict tests that use the DirectX.

Because of ambiguities in (and misinterpretations of) the DirectX specification, the drivers for each board/chipset may exhibit different behavior for the same DirectX command. For example, querying for memory pitch normally results in the number of bytes to the next scan line. In most Matrox drivers, however, the query results in the number of pixels to the next scan line.

More importantly, the DirectX specification does not clearly state whether all memory must be accessible to an application. As such, some drivers reserve parts of this memory for internal purposes and expect applications to avoid these areas. The net effect is that, in general, not all video memory can be tested.

Interactive Test Operation

Interactive tests are those tests that require the user to inspect the display visually for errors. On running an interactive test, this message box appears:

> "Please press OK to run the test. After you have checked the display you may press any key to continue.
>
> OK Cancel"

If "OK" is clicked, the test is run. Upon its conclusion, when any key is pressed, a second message box appears:

> "Was the test display correct?
>
> Yes No"

Press the appropriate button to register the result of the individual test.

About Screen Signatures

The most direct way to check the video memory data after drawing operations are complete would be to compare each memory location to a known standard. Unfortunately, this would require megabytes of file storage for the reference data (one per video mode). The comparisons would also execute quite slowly because of the necessary file accesses.

Instead, the VID group calculates a screen "signature". This calculation uses a proprietary algorithm, similar to a CRC, that creates a 32-bit value that uniquely identifies the pattern in video memory. To determine whether the data is correct, the calculation is performed using the actual data, and the resulting signature is compared against a known good 32-bit reference value. If the two signatures match, drawing was performed correctly. If the do not match, there was at least a single-pixel error during the drawing process.

The Windows® GDI could be used to read the video memory data; it is much slower than using DirectDraw. For this reason, DirectDraw is used to read the data and calculate the screen signature

Each video mode and drawing display has a different signature because it uses a different number of pixels and different number of bits-per-pixel for its color representation. Thus, the diagnostic maintains an internal list of the correct signature value for each video mode. By definition, every video subsystem must conform to these signatures; otherwise the display is not correct.

Some video chipsets use a graphics "pipeline" to perform drawing operations. In such cases, lines may be drawn after a short delay instead of instantaneously. For this reason, the VID group test wait up to two seconds for the proper screen signature. This ensures plenty of time for the pipeline to clear, and accounts for the noticeable delay that occurs when a drawing error is detected.

In summary, the screen signature technique provides the smallest, fastest, and most precise way to detect drawing errors. The algorithm will detect even one misplaced pixel. However, there is no obvious correlation between the expected and actual signature values. That is, from the signature alone, it is not possible to tell which pixel(s) were drawn incorrectly. If necessary, however, such analysis can be performed off-line using advanced troubleshooting tools.

Standards

Microsoft DirectX 6.0 and higher specification

Test 201 – RAM

Group: VID — 600

Video RAM testing is the mainstay of video card diagnostics. The RAM tests utilize the DirectX interface for changing the video mode and for direct frame buffer access. If DirectX is not present, then the GDI interface is utilized to access the viewport memory.

Depending upon your video driver and display monitor, the screen may become distorted or go blank during the RAM test. This does not affect testing in any way, and the original display should be restored when the test is complete.

Test Time - 12 seconds

Note: The RAM Test will fail if the video frame buffer gets updated by another application while the test is running. It is therefore important to disable any screensavers and to close other applications prior to running the test; also the machine should not be locked during video testing.

Note: Color depth must be at least 16 Bit (Hi Color).

Note: The total RAM test time depends upon the amount of installed video memory and the speed of the system processor. The time can be approximated using the following formula:

$$T = (500 * M) / S$$

where T = total test time in seconds

M = number of megabytes of video memory

S = system processor speed in megahertz

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Compare Delay	0	0	100	The number of milliseconds to delay between writing data to a surface and comparing the data
Error Limit	1	1	100	The number of errors that can be detected before the test will stop
Change Video Mode	False	False	True	Specifies whether or not to use maximal RAM

Test 202 – Line Drawing

Group: VID — 600

The line drawing test verifies the operation of the hardware line-drawing accelerator by drawing a sequence vertical, horizontal, and variable-slope lines in various colors.

The first phase consists of a go/no-go test, during which a group of red, blue, green, and white lines are drawn between the center and perimeter of the display.

During the second phase of the test, a group of vertical lines is drawn, and a 32-bit screen signature is calculated. This signature is compared against a reference value for the current video mode. A non-matching value indicates a drawing error.

In last phase of the test, a group of horizontal lines is drawn, and a 32-bit screen signature is calculated. As before, the signature is compared to a reference value and the lack of a match indicates a drawing error.

Both the vertical and horizontal line drawing phases are performed twice to ensure that the results are repeatable.

The line drawing test uses the DirectX interface to calculate the signature, and is available for all screen resolutions and color depths.

In some instances a non-compliant display driver rather than the graphics hardware can cause an error itself.

Test Time[1] – 5 seconds

Test Settings

None

Test 203 – Polygon Drawing

Group: VID — 600

The polygon-drawing test verifies the operation of the hardware polygon-drawing (or trapezoid-drawing) accelerator by drawing a sequence of polygons in random positions on the display using sixteen different colors.

After the first sequence of polygons has been drawn, a 32-bit screen signature is calculated and saved. For each of the subsequent sequences, the display is cleared to black, the polygons are redrawn, and a new 32-bit screen signature is calculated. If the signature calculated during any of the subsequent drawings differs from the first signature, and error has occurred.

During each drawing sequence, fifty three-sided polygons are drawn, followed by fifty four-sided polygons, followed by fifty five-sided polygons. The vertices, position, and color of each polygon are determined randomly.

The polygon-drawing test uses the DirectX interface to calculate the signature, and is available for all screen resolutions and color depths.

Test Time[1] – 5 seconds

Test Settings

None

Test 204 – Bit-Blit

Group: VID — 600

The bit-blit test verifies the operation of the hardware blit engine by blitting a series of patterns around the display in random locations.

After the first series of patterns has been blitted, a 32-bit screen signature is calculated and saved. For each of the subsequent series, the display is cleared to black, the patterns are blitted again, and a new 32-bit screen signature is calculated. If the signature calculated during any of the subsequent drawings differs from the first one, a blit error has occurred.

During each drawing sequence, a total of eight hundred images are blitted. The destination of each image is determined randomly. The bit-blit test uses the DirectX interface to calculate the signature, and is available for all screen resolutions and color depths.

Test Time[1] – 5 seconds

Test Settings

None

Test 205 – Color Palette

Group: VID — 600

The color palette test checks the RAM locations used to store the RGB color values used in pseudo-color (256-color) display modes. This RAM is also known as the color lookup table (LUT).

To perform this test the video mode is changed to a pseudo-color mode having the same height and width as the original display. Then a series of horizontal lines is drawn, each representing a single color from the palette. These appear as a series of four gradated color bands: one red, one blue, one green, and one gray.

Values in the palette RAM are rotated a total of forty times, giving the appearance of motion in the color bands. After each rotation all RAM values are read back and compared with expected values. A mismatch indicates a palette RAM error.

Test Time[1] – 4 seconds

Test Settings

None

Test 206 – VGA Palette Test

Group: VID — 600

The VGA palette test checks the RAM locations used to store the RGB color values used in VGA (16-256 color) display modes.

To perform this test, the standard VGA palette registers are directly accessed to perform a series of write/read/compare operations using both fixed and random data. DirectX services are not required and the video mode is not changed to perform the test.

Because of hardware differences, these RAM locations may or may not be the same as those tested in the color palette test. Thus, there may be no visible changes to the display during the test, or there may be color “flickering” as the palette values are modified.

This test may not be available for some Windows® video modes because the palette registers may be locked or disabled by the display driver. In addition, some boards/drivers may consistently fail the test due to reuse of one or more palette registers instead of an actual hardware failure.

Test Time[1] – 3 seconds

Test Settings

None

Test 208 – Color Separation

Group: VID — 600

The color separation display consists of four square colored blocks on a black background. The uppermost two squares are adjacent and have slightly different greenish colors. The lower two squares are adjacent and have slightly different reddish colors. Each of the reddish and greenish squares should appear distinctly. If either the reddish or greenish squares blend together appearing as a solid rectangular shape, an error is indicated. This test is primarily used to detect DAC voltage regulator problems.

Test Time[2] – 3 seconds

Test Settings

None

Test 209 – 3D Animation

Group: VID — 600

The 3D Animation test is available for any card having 3D hardware acceleration, such as the STB "Black Magic" board. This test uses the DirectX interface to rotate the image of a roller blade about the z-axis. This test is interactive, requiring the user to visually inspect the display for any signs of drawing errors.

Important: Each board/driver combination draws the display slightly differently. For this reason, each board/driver will have a different screen signature value.

Test Time[2] – 8 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Wider Animation	False	False	True	Specifies the minimum display width False = 500 pixels True = 640 pixels
Signature Value	0 (0x0)	0 (0x0)	4294967295 (0xFFFFFFFF)	32-bit value, converted to hex. If set to 0 (default), the test is user interactive.

Test 210 – 3D Effects

Group: VID — 600

The 3D effects test is used to verify the operation of 3D graphics accelerator hardware. Because the rendering of 3D images varies significantly from board to board, this interactive test relies on the operator to judge whether the image is correct or not.

The scene displayed during this test is composed of several parts. In the center of the display is a "floor" having a blue and orange checkerboard ("tile") pattern. In the background, adjoining the floor is a "wall" having the same checkerboard pattern.

Resting upon the left side of the floor is a series of four cubes having a bluish, stone-like texture. The cubes are positioned in a row from the foreground to the background.

Resting upon the right side of the floor is a series of four spheres having the same stone-like texture as the cubes. The spheres are also positioned in a row from the foreground to the background. Both the spheres and the cubes should exhibit shading as if light is emanating from the right side of the display.

For boards that support "decals", an orange-colored "moon" is displayed toward the upper left corner of the display, well above and to the left of the other images.

Because the quality of this 3D scene will vary from board to board, it is important to know how to detect errors. In general, the individual images comprising the scene should appear distinct and be noticeably shaded. The floor and wall should both appear patterned (although the tiles may appear skewed in some cases). The cubes and spheres should be clearly textured (i.e. they should not look smooth).

Hardware errors usually cause the images to look "grainy" or "smeary" instead of distinct. In severe cases, errors can cause the image patterns or textures to be completely absent. In this case, the surfaces will appear gray and smooth. Naturally, missing images (with the exception of the "moon") or a completely blank screen indicates a hardware or driver error.

Test Time[2] – 4 seconds

Test Settings

Test Setup				
Test Parameter	**Default**	**Minimum**	**Maximum**	**Notes**
Signature Value	0 (0x0)	0 (0x0)	4294967295 (0xFFFFFFFF)	32-bit value, converted to hex. If set to 0 (default), the test is user interactive.

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