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Test Results for Hardware Write Block Device: MyKey NoWrite (Firmware Version 1.05)

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Acting Director

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Introduction

The Computer Forensics Tool Testing (CFTT) program is a joint project of the National Institute of Justice (NIJ), the research and development organization of the U.S. Department of Justice, and the National Institute of Standards and Technology's (NIST's) Office of Law Enforcement Standards (OLES) and Information Technology Laboratory (ITL). CFTT is supported by other organizations, including the Federal Bureau of Investigation, the U.S. Department of Defense Cyber Crime Center, Internal Revenue Service Criminal Investigation's Electronic Crimes Program, and the U.S. Department of Homeland Security's Bureau of Immigration and Customs Enforcement and U.S. Secret Service. The objective of the CFTT program is to provide measurable assurance to practitioners, researchers, and other applicable users that the tools used in computer forensics investigations provide accurate results. Accomplishing this requires the development of specifications and test methods for computer forensics tools and subsequent testing of specific tools against those specifications.

Test results provide the information necessary for developers to improve tools, users to make informed choices, and the legal community and others to understand the tools' capabilities. This approach to testing computer forensics tools is based on well-recognized methodologies for conformance and quality testing. The specifications and test methods are posted on the CFTT Web site (http://www.cftt.nist.gov/) for review and comment by the computer forensics community.

This document reports the results from testing the MyKey NoWrite write blocker against *Hardware Write Blocker (HWB) Assertions and Test Plan Version 1.0,* which is available on the CFTT Web site (http://www.cftt.nist.gov/HWB-ATP-19.pdf). This specification identifies the following top-level tool requirements:

- A hardware write block (HWB) device shall not transmit a command to a protected storage device that modifies the data on the storage device.
- An HWB device shall return the data requested by a read operation.
- An HWB device shall return without modification any access-significant information requested from the drive.
- Any error condition reported by the storage device to the HWB device shall be reported to the host.

Test results from other software packages and the CFTT test methodology can be found on NIJ's computer forensics tool testing Web page (http://www.ojp.usdoj.gov/nij/topics/ecrime/cftt.htm.).

Test Results for Hardware Write Block Devices

Device Tested: MyKey NoWrite
Serial No: 1062
Firmware: 1.05

Host to Blocker Interface: IDE (ATA)
Blocker to Drive Interface: IDE (ATA)

Supplier: MyKey Technology, Inc.

Address: 7851–C Beechcraft Ave.
Gaithersburg, MD 20879
888–892–9081

1 Results Summary by Requirements

An HWB device shall not transmit a command to a protected storage device that modifies the data on the storage device.
For all test cases run, the HWB device always blocked any commands that would have changed user or operating system data stored on a protected drive.

An HWB device shall return the data requested by a read operation.
For all test cases run, the HWB device always allowed commands to read the protected drive.

An HWB device shall return without modification any access-significant information requested from the drive.
For all test cases run, the HWB device always returned access-significant information from the protected drive without modification.

Any error condition reported by the storage device to the HWB device shall be reported to the host.
For all test cases run, the HWB device always returned error codes from the protected drive without modification.

2 Observations

- Specific commands allowed are identified in test cases 01-h, 01-m, 01-r, 01-w, and 01-x.
- For the commands that manipulate the Host Protected Area (HPA) of a drive, 0xF9 and 0x37, the volatile variant of the commands is allowed, but the nonvolatile variant is blocked.
- The tool transformed the **read multiple** and **read multiple ext** commands into **read DMA** and **read DMA ext,** respectively.

The tested device allowed the following commands only:

```
20=READ W/ RETRY
24=READ SECTOR EXT
25=READ DMA EXT
27=RD MAX ADR EXT
37=SET MAX ADR EXT (volatile)
70=SEEK
91=INIT DRV PARAMS
B1=Device Config
C8=Read DMA
F8=RD NATV MAX ADD
F9=SET MAX ADDRESS (volatile)
```

When the device is turned on it issues the following commands to the protected drive:

```
EC=IDENTIFY DRIVE
EF=SET FEATURES
C6=SET MULTPLE
EF=SET FEATURES
C6=SET MULTPLE MOD
```

Note that the **identify device** command is blocked if issued by the host, but the device returns the values obtained at power on even if the number of user-accessible sectors is changed by a **set max address [ext]** command.

3 Test Case Selection

Since a protocol analyzer was available, the following test cases are appropriate: HWB-01, HWB-03, HWB-06, HWB-08, and HWB-09.

For test case HWB-01, the command set was divided into five sets of commands: 01-r (read), 01-w (write), 01-x (potential to damage a drive), 01-h (host protected area), and 01-m (everything else).

For test case HWB-03, two variations were selected: boot (attempt to boot from a protected drive) and image (use an imaging tool to attempt to write to a protected drive).

For test case HWB-06, two variations were selected: en (use a DOS-based imaging tool (EnCase) to read from a protected drive) and ix (use a stand-alone imaging tool (IXimager) to read from a protected drive.

4 Testing Environment

The tests were run in the NIST CFTT lab. This section describes the hardware (test computers and hard drives) available for testing. Not all components were used in testing; for example, the ZIP drive on Beta-5 was not used.

4.1 Test Computers

The test computer for all test cases, except 03-boot, was **Freddy:**

Intel Desktop Motherboard D865GB/D865PERC (with ATA-6 IDE on board controller)
BIOS Version BF86510A.86A.0053.P13
Adaptec SCSI BIOS V3.10.0
Intel Pentium® 4 CPU
SONY DVD RW DRU–530A, ATAPI CD/DVD–ROM drive
1.44MB floppy drive
Two slots for removable IDE hard disk drives
Two slots for removable SATA hard disk drives
Two slots for removable SCSI hard disk drive

Beta-5 was used for only one test case, 03-boot. Beta-5 is a Dell Computer Corporation system with 256MB RAM, one hard disk drive bay, one installed 15.37GB hard disk, a CD–ROM drive, a 1.44MB floppy drive, and a 250MB ZIP drive. The BIOS is PhoenixBios 4.0 Release 6.0.

4.2 Protocol Analyzer

A Data Transit bus protocol analyzer (Bus Doctor Rx) was used to monitor and record commands sent from the host to the write blocker and from the write blocker to the protected hard drive. Two identical protocol analyzers were available for monitoring commands.

One of two Dell laptop computers (either Chip or Dale) was connected to each protocol analyzer to record commands observed by the protocol analyzer.

4.3 Hard Disk Drives

The hard disk drives that were used were selected from the drives listed below. These hard drives were mounted in removable storage modules. The drives are set up in a variety of ways with the common partition types (FAT and NTFS) represented. The setup of each drive is documented below.

```
Drive label: 7c
Partition table Drive /dev/hdc
04865/254/63 (max cyl/hd values)
04866/255/63 (number of cyl/hd)
78177792 total number of sectors
IDE disk: Model (MAXTOR 6L040J2) serial # (662201137769)
 N   Start LBA Length    Start C/H/S End C/H/S   boot Partition type
 1 P 000000063 078156162 0000/001/01 1023/254/63 Boot 07 NTFS
 2 P 000000000 000000000 0000/000/00 0000/000/00      00 empty entry
 3 P 000000000 000000000 0000/000/00 0000/000/00      00 empty entry
 4 P 000000000 000000000 0000/000/00 0000/000/00      00 empty entry
```

```
Drive label: 74
Partition table Drive /dev/hdc
05004/254/63 (max cyl/hd values)
05005/255/63 (number of cyl/hd)
80418240 total number of sectors
IDE disk: Model (IC35L040AVER07-0) serial # (SXPTXHQ6113)
 N   Start LBA Length    Start C/H/S End C/H/S   boot Partition type
 1 P 000000063 080405262 0000/001/01 1023/254/63      0C Fat32X
 2 P 000000000 000000000 0000/000/00 0000/000/00      00 empty entry
```

```
 3 P 000000000 000000000 0000/000/00 0000/000/00      00 empty entry
 4 P 000000000 000000000 0000/000/00 0000/000/00      00 empty entry
```

```
Drive label: a8
Partition table Drive /dev/hdc
02433/254/63 (max cyl/hd values)
02434/255/63 (number of cyl/hd)
39102336 total number of sectors
IDE disk: Model (WDC WD200BB-00AUA1) serial # (WD-WMA6Y3401179)
 N   Start LBA Length    Start C/H/S End C/H/S   boot Partition type
 1 P 000000063 000016002 0000/001/01 0000/254/63      01 Fat12
 2 X 000016065 039086145 0001/000/01 1023/254/63      0F extended
 3 S 000000063 039086082 0001/001/01 1023/254/63      0B Fat32
 4 S 000000000 000000000 0000/000/00 0000/000/00      00 empty entry
 5 P 000000000 000000000 0000/000/00 0000/000/00      00 empty entry
 6 P 000000000 000000000 0000/000/00 0000/000/00      00 empty entry
```

```
Drive label: bf
Partition table Drive /dev/hdc
30400/254/63 (max cyl/hd values)
30401/255/63 (number of cyl/hd)
488397168 total number of sectors
IDE disk: Model (WDC WD2500JB-00GVA0) serial # (WD-WCAL73854148)
 N   Start LBA Length    Start C/H/S End C/H/S   boot Partition type
 1 P 000000063 409609242 0000/001/01 1023/254/63      0C Fat32X
 2 X 409609305 000016065 1023/000/01 1023/254/63      0F extended
 3 S 000000063 000016002 1023/001/01 1023/254/63      01 Fat12
 4 S 000000000 000000000 0000/000/00 0000/000/00      00 empty entry
 5 P 000000000 000000000 0000/000/00 0000/000/00      00 empty entry
 6 P 000000000 000000000 0000/000/00 0000/000/00      00 empty entry
```

Drive xx is used as it is and is not set up. This drive is used to test commands that do low level changes to the drive.

P primary partition (1-4)
S secondary (sub) partition
X primary extended partition (1-4)
x secondary extended partition

4.4 Support Software

The software in the following table was used to send commands to the protected drive. Two widely used imaging tools, EnCase and IXimager, were used to generate disk activity (reads and writes) consistent with a realistic scenario of an accidental modification of an unprotected hard drive during a forensic examination. This does not imply an endorsement of the imaging tools.

Program	**Description**
ATASEND	A tool to send ATA commands to a drive.
FS–TST	Software from the FS–TST tools was used to generate errors from the hard drive by trying to read beyond the end of the drive. The FS–TST software was also used to set up the hard drives and print partition tables and drive size.
EnCase	An imaging tool (EnCase 3.22g, DOS) for test case 03-img.
IXimager	An imaging tool (ILook IXimager Version 1.0, August 25, 2004) for test case 03-img.

5 Test Results

The main item of interest for interpreting the test results is determining the device's conformance with the test assertions. This section lists each test assertion and identifies the information in the log files relevant to conformance to that assertion. Conformance to each assertion tested by a given test case is evaluated by examining the Blocker Input and Blocker Output boxes of the test report summary.

5.1 Test Results Report Key

A summary of the actual test results is presented in this report. The following table presents a description of each section of the test report summary.

Heading	Description
First Line	Test case ID, name and version of software tested.
Case Summary	Test case summary from *Hardware Write Blocker (HWB) Assertions and Test Plan Version 1.0.*
Assertions Tested	Test assertions tested by the test case from *Hardware Write Blocker (HWB) Assertions and Test Plan Version 1.0.*
Tester Name	Name or initials of person executing test procedure.
Test Date	Time and date that test was started.
Test Configuration	Identification of the following: 1. Label of the protected hard drive. 2. Interface between host and blocker. 3. Interface between blocker and protected drive. 4. Protocol analyzers monitoring each interface. 5. Laptop attached to each protocol analyzer. 6. Execution environment for tool sending commands from the host.
Hard Drives Used	Description of the protected hard drive.
Blocker Input	A list of commands sent from the host to the blocker. For test case HWB-01, a list of the command codes sent is provided, followed by a count of the commands sent. For test cases HWB-03 and HWB-06, a list of the commands sent and the number of times each command was sent.
Blocker Output	A list of commands observed by the protocol analyzer on the bus from the blocker to the protected drive. For test case HWB-01, a list of the command codes observed on the bus between the blocker and the protected drive is provided, followed by a count of the commands sent (from the Blocker Input box) and a count of the number of commands observed on the bus between the blocker and the protected drive.

Heading	Description
	For test cases HWB-03 and HWB-06, a list of the commands sent and the number of times each command was sent.
Results	Expected and actual results for each assertion tested.
Analysis	Whether or not the expected results were achieved.

5.2 Test Details

Test Case HWB-01 Variation HWB-01-H MyKey NoWrite Version 1.05	
Case Summary:	HWB-01 Identify commands blocked by the HWB.
Assertions Tested:	HWB-AM-01 The HWB shall not transmit any modifying category operation to the protected storage device. HWB-AM-05 The action that an HWB device takes for any commands not assigned to the modifying, read, or information categories is defined by the vendor.
Tester Name:	JRL
Test Date:	run start Wed Sep 7 10:27:32 2005 run finish Wed Sep 7 10:32:15 2005
Test Configuration:	HOST: Freddy HostToBlocker Monitor: Dale HostToBlocker PA: AA00111 HostToBlocker Interface: IDE BlockerToDrive Monitor: Chip BlockerToDrive PA: AA00155 BlockerToDrive Interface: IDE Run Environment: DOS
Drives:	Protected drive: 92 92 is a WDC WD300BB-00CAA0 serial # WD-WMA8H2140350 with 58633344 sectors
Blocker Input:	Commands Sent to Blocker Command LBA/CHS F8=RD NATV MAX ADD LBA=0000000 F9=SET MAX ADDRESS LBA=8000000 F8=RD NATV MAX ADD LBA=0000000 F9=SET MAX ADDRESS LBA=8000000 27=RD MAX ADR EXT LBA=000000000000 37=SET MAX ADR EXT LBA=000000000000 27=RD MAX ADR EXT LBA=000000000000 37=SET MAX ADR EXT LBA=000000000000 8 commands sent
Blocker Output:	Commands Allowed by Blocker Command LBA/CHS F8=RD NATV MAX ADD LBA=0000000 F9=SET MAX ADDRESS LBA=8000000 F8=RD NATV MAX ADD LBA=0000000 F9=SET MAX ADDRESS LBA=8000000 27=RD MAX ADR EXT LBA=000000000000 37=SET MAX ADR EXT LBA=000000000000

	8 commands sent, 6 commands allowed
Results:	Assertion & Expected Result AM-01 Modifying commands blocked AM-05 HWB behavior recorded Actual Result Modifying commands blocked HWB behavior recorded
Analysis:	Expected results achieved

Test Case HWB-01 Variation HWB-01-M MyKey NoWrite Version 1.05	
Case Summary:	HWB-01 Identify commands blocked by the HWB.
Assertions Tested:	HWB-AM-01 The HWB shall not transmit any modifying category operation to the protected storage device. HWB-AM-05 The action that an HWB device takes for any commands not assigned to the modifying, read, or information categories is defined by the vendor.
Tester Name:	JRL
Test Date:	run start Wed Sep 7 09:59:36 2005 run finish Wed Sep 7 10:19:54 2005
Test Configuration:	HOST: Freddy HostToBlocker Monitor: Dale HostToBlocker PA: AA00111 HostToBlocker Interface: IDE BlockerToDrive Monitor: Chip BlockerToDrive PA: AA00155 BlockerToDrive Interface: IDE Run Environment: DOS
Drives:	Protected drive: 92 92 is a WDC WD300BB-00CAA0 serial # WD-WMA8H2140350 with 58633344 sectors
Blocker Input:	Commands Sent to Blocker Command LBA/CHS 00=NOP Cyl: 0000, Head: 0, Sec: 00 01=Reserved Cyl: 0000, Head: 0, Sec: 00 02=Reserved Cyl: 0000, Head: 0, Sec: 00 03=CFA REQ ERR CODE Cyl: 0000, Head: 0, Sec: 00 04=Reserved Cyl: 0000, Head: 0, Sec: 00 05=Reserved Cyl: 0000, Head: 0, Sec: 00 06=Reserved Cyl: 0000, Head: 0, Sec: 00 07=Reserved Cyl: 0000, Head: 0, Sec: 00 08=DEVICE RESET Cyl: 0000, Head: 0, Sec: 00 09=Reserved Cyl: 0000, Head: 0, Sec: 00 0A=Reserved Cyl: 0000, Head: 0, Sec: 00 0B=Reserved Cyl: 0000, Head: 0, Sec: 00 0C=Reserved Cyl: 0000, Head: 0, Sec: 00 0D=Reserved Cyl: 0000, Head: 0, Sec: 00 0E=Reserved Cyl: 0000, Head: 0, Sec: 00 0F=Reserved Cyl: 0000, Head: 0, Sec: 00 10=RECALIBRATE Cyl: 0000, Head: 0, Sec: 00 11=RECALIBRATE Cyl: 0000, Head: 0, Sec: 00

```
12=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
13=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
14=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
15=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
16=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
17=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
18=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
19=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
1A=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
1B=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
1C=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
1D=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
1E=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
1F=RECALIBRATE      Cyl: 0000, Head: 0, Sec: 00
28=Reserved         Cyl: 0000, Head: 0, Sec: 00
2C=Reserved         Cyl: 0000, Head: 0, Sec: 00
2D=Reserved         Cyl: 0000, Head: 0, Sec: 00
2E=Reserved         Cyl: 0000, Head: 0, Sec: 00
3C=WRITE VERIFY     Cyl: 0000, Head: 0, Sec: 00
43=Reserved         Cyl: 0000, Head: 0, Sec: 00
44=Reserved         Cyl: 0000, Head: 0, Sec: 00
45=Reserved         Cyl: 0000, Head: 0, Sec: 00
46=Reserved         Cyl: 0000, Head: 0, Sec: 00
47=Reserved         Cyl: 0000, Head: 0, Sec: 00
48=Reserved         Cyl: 0000, Head: 0, Sec: 00
49=Reserved         Cyl: 0000, Head: 0, Sec: 00
4A=Reserved         Cyl: 0000, Head: 0, Sec: 00
4B=Reserved         Cyl: 0000, Head: 0, Sec: 00
4C=Reserved         Cyl: 0000, Head: 0, Sec: 00
4D=Reserved         Cyl: 0000, Head: 0, Sec: 00
4E=Reserved         Cyl: 0000, Head: 0, Sec: 00
4F=Reserved         Cyl: 0000, Head: 0, Sec: 00
51=CONFIG STREAM    LBA=000000000000
52=Reserved         Cyl: 0000, Head: 0, Sec: 00
53=Reserved         Cyl: 0000, Head: 0, Sec: 00
54=Reserved         Cyl: 0000, Head: 0, Sec: 00
55=Reserved         Cyl: 0000, Head: 0, Sec: 00
56=Reserved         Cyl: 0000, Head: 0, Sec: 00
57=Reserved         Cyl: 0000, Head: 0, Sec: 00
58=Reserved         Cyl: 0000, Head: 0, Sec: 00
59=Reserved         Cyl: 0000, Head: 0, Sec: 00
5A=Reserved         Cyl: 0000, Head: 0, Sec: 00
5B=Reserved         Cyl: 0000, Head: 0, Sec: 00
5C=Reserved         Cyl: 0000, Head: 0, Sec: 00
5D=Reserved         Cyl: 0000, Head: 0, Sec: 00
5E=Reserved         Cyl: 0000, Head: 0, Sec: 00
5F=Reserved         Cyl: 0000, Head: 0, Sec: 00
60=Read FPDMA       Cyl: 0000, Head: 0, Sec: 00
Queued
61=Write FPDMA      Cyl: 0000, Head: 0, Sec: 00
Queued
62=Reserved         Cyl: 0000, Head: 0, Sec: 00
63=Reserved         Cyl: 0000, Head: 0, Sec: 00
64=Reserved         Cyl: 0000, Head: 0, Sec: 00
65=Reserved         Cyl: 0000, Head: 0, Sec: 00
66=Reserved         Cyl: 0000, Head: 0, Sec: 00
67=SEP_ATTN         Cyl: 0000, Head: 0, Sec: 00
68=Reserved         Cyl: 0000, Head: 0, Sec: 00
69=Reserved         Cyl: 0000, Head: 0, Sec: 00
```

```
6A=Reserved          Cyl: 0000, Head: 0, Sec: 00
6B=Reserved          Cyl: 0000, Head: 0, Sec: 00
6C=Reserved          Cyl: 0000, Head: 0, Sec: 00
6D=Reserved          Cyl: 0000, Head: 0, Sec: 00
6E=Reserved          Cyl: 0000, Head: 0, Sec: 00
6F=Reserved          Cyl: 0000, Head: 0, Sec: 00
70=SEEK              Cyl: 0000, Head: 0, Sec: 00
71=SEEK              Cyl: 0000, Head: 0, Sec: 00
72=SEEK              Cyl: 0000, Head: 0, Sec: 00
73=SEEK              Cyl: 0000, Head: 0, Sec: 00
74=SEEK              Cyl: 0000, Head: 0, Sec: 00
75=SEEK              Cyl: 0000, Head: 0, Sec: 00
76=SEEK              Cyl: 0000, Head: 0, Sec: 00
77=SEEK              Cyl: 0000, Head: 0, Sec: 00
78=SEEK              Cyl: 0000, Head: 0, Sec: 00
79=SEEK              Cyl: 0000, Head: 0, Sec: 00
7A=SEEK              Cyl: 0000, Head: 0, Sec: 00
7B=SEEK              Cyl: 0000, Head: 0, Sec: 00
7C=SEEK              Cyl: 0000, Head: 0, Sec: 00
7D=SEEK              Cyl: 0000, Head: 0, Sec: 00
7E=SEEK              Cyl: 0000, Head: 0, Sec: 00
7F=SEEK              Cyl: 0000, Head: 0, Sec: 00
80=Reserved          Cyl: 0000, Head: 0, Sec: 00
81=Reserved          Cyl: 0000, Head: 0, Sec: 00
82=Reserved          Cyl: 0000, Head: 0, Sec: 00
83=Reserved          Cyl: 0000, Head: 0, Sec: 00
84=Reserved          Cyl: 0000, Head: 0, Sec: 00
85=Reserved          Cyl: 0000, Head: 0, Sec: 00
86=Reserved          Cyl: 0000, Head: 0, Sec: 00
87=CFA TRNSLT        LBA=0000000
SCTR
88=Reserved          Cyl: 0000, Head: 0, Sec: 00
89=Reserved          Cyl: 0000, Head: 0, Sec: 00
8A=Reserved          Cyl: 0000, Head: 0, Sec: 00
8B=Reserved          Cyl: 0000, Head: 0, Sec: 00
8C=Reserved          Cyl: 0000, Head: 0, Sec: 00
8D=Reserved          Cyl: 0000, Head: 0, Sec: 00
8E=Reserved          Cyl: 0000, Head: 0, Sec: 00
8F=Reserved          Cyl: 0000, Head: 0, Sec: 00
90=EXEC DRIVE        Cyl: 0000, Head: 0, Sec: 00
DIAG
93=Reserved          Cyl: 0000, Head: 0, Sec: 00
94=STANDBY           Cyl: 0000, Head: 0, Sec: 00
IMMEDIA
95=IDLE IMMEDIATE    Cyl: 0000, Head: 0, Sec: 00
96=STANDBY           Cyl: 0000, Head: 0, Sec: 00
97=IDLE              Cyl: 0000, Head: 0, Sec: 00
98=CHECK POWER       Cyl: 0000, Head: 0, Sec: 00
MOD
99=SLEEP             Cyl: 0000, Head: 0, Sec: 00
9A=Reserved          Cyl: 0000, Head: 0, Sec: 00
9B=Reserved          Cyl: 0000, Head: 0, Sec: 00
9C=Reserved          Cyl: 0000, Head: 0, Sec: 00
9D=Reserved          Cyl: 0000, Head: 0, Sec: 00
9E=Reserved          Cyl: 0000, Head: 0, Sec: 00
9F=Reserved          Cyl: 0000, Head: 0, Sec: 00
A1=ATAPI ID DRIVE    Cyl: 0000, Head: 0, Sec: 00
A2=ATAPI SERVICE     Cyl: 0000, Head: 0, Sec: 00
A3=Reserved          Cyl: 0000, Head: 0, Sec: 00
```

	A4=Reserved Cyl: 0000, Head: 0, Sec: 00 A5=Reserved Cyl: 0000, Head: 0, Sec: 00 A6=Reserved Cyl: 0000, Head: 0, Sec: 00 A7=Reserved Cyl: 0000, Head: 0, Sec: 00 A8=Reserved Cyl: 0000, Head: 0, Sec: 00 A9=Reserved Cyl: 0000, Head: 0, Sec: 00 AA=Reserved Cyl: 0000, Head: 0, Sec: 00 AB=Reserved Cyl: 0000, Head: 0, Sec: 00 AC=Reserved Cyl: 0000, Head: 0, Sec: 00 AD=Reserved Cyl: 0000, Head: 0, Sec: 00 AE=Reserved Cyl: 0000, Head: 0, Sec: 00 AF=Reserved Cyl: 0000, Head: 0, Sec: 00 B0=SMART Cyl: 0000, Head: 0, Sec: 00 D9=Smart Disable Operation B0=SMART Cyl: 0000, Head: 0, Sec: 00 DA=Smart Return Stats B0=SMART Cyl: 0000, Head: 0, Sec: 00 D2=Smart Enable/Disable AT B0=SMART Cyl: 0000, Head: 0, Sec: 00 D8=Smart Enable Operation B0=SMART Cyl: 0000, Head: 0, Sec: 00 D4=Smart Execute Offline B1=Device Config Cyl: 0000, Head: 0, Sec: 00 B1=Device Config Cyl: 0000, Head: 0, Sec: 00 B1=Device Config Cyl: 0000, Head: 0, Sec: 00 B1=Device Config Cyl: 0000, Head: 0, Sec: 00 B2=Reserved Cyl: 0000, Head: 0, Sec: 00 B3=Reserved Cyl: 0000, Head: 0, Sec: 00 B4=Reserved Cyl: 0000, Head: 0, Sec: 00 B5=Reserved Cyl: 0000, Head: 0, Sec: 00 B6=Reserved Cyl: 0000, Head: 0, Sec: 00 B7=Reserved Cyl: 0000, Head: 0, Sec: 00 B8=Reserved Cyl: 0000, Head: 0, Sec: 00 B9=Reserved Cyl: 0000, Head: 0, Sec: 00 BA=Reserved Cyl: 0000, Head: 0, Sec: 00 BB=Reserved Cyl: 0000, Head: 0, Sec: 00 BC=Reserved Cyl: 0000, Head: 0, Sec: 00 BD=Reserved Cyl: 0000, Head: 0, Sec: 00 BE=Reserved Cyl: 0000, Head: 0, Sec: 00 BF=Reserved Cyl: 0000, Head: 0, Sec: 00 C1=Reserved Cyl: 0000, Head: 0, Sec: 00 C2=Reserved Cyl: 0000, Head: 0, Sec: 00 C3=Reserved Cyl: 0000, Head: 0, Sec: 00 C6=SET MULTPLE MOD Cyl: 0000, Head: 0, Sec: 00 CF=Reserved Cyl: 0000, Head: 0, Sec: 00 D0=Reserved Cyl: 0000, Head: 0, Sec: 00 D1=CHK MD Card Type Cyl: 0000, Head: 0, Sec: 00 D2=Reserved Cyl: 0000, Head: 0, Sec: 00 D3=Reserved Cyl: 0000, Head: 0, Sec: 00 D4=Reserved Cyl: 0000, Head: 0, Sec: 00 D5=Reserved Cyl: 0000, Head: 0, Sec: 00 D6=Reserved Cyl: 0000, Head: 0, Sec: 00

	D7=Reserved Cyl: 0000, Head: 0, Sec: 00 D8=Reserved Cyl: 0000, Head: 0, Sec: 00 D9=Reserved Cyl: 0000, Head: 0, Sec: 00 DA=Get Media Sts Cyl: 0000, Head: 0, Sec: 00 DB=ACK MEDIA CHG Cyl: 0000, Head: 0, Sec: 00 DC=BOOT POST-BOOT Cyl: 0000, Head: 0, Sec: 00 DD=BOOT PRE-BOOT Cyl: 0000, Head: 0, Sec: 00 DE=MEDIA LOCK Cyl: 0000, Head: 0, Sec: 00 DF=MEDIA UNLOCK Cyl: 0000, Head: 0, Sec: 00 E0=STANDBY IMMEDIA Cyl: 0000, Head: 0, Sec: 00 E1=IDLE IMMEDIATE Cyl: 0000, Head: 0, Sec: 00 E2=STANDBY Cyl: 0000, Head: 0, Sec: 00 E3=IDLE Cyl: 0000, Head: 0, Sec: 00 E5=CHECK POWER MOD Cyl: 0000, Head: 0, Sec: 00 E6=SLEEP Cyl: 0000, Head: 0, Sec: 00 EB=Reserved Cyl: 0000, Head: 0, Sec: 00 EC=IDENTIFY DRIVE Cyl: 0000, Head: 0, Sec: 00 ED=MEDIA EJECT Cyl: 0000, Head: 0, Sec: 00 EE=IDENT DEVICE DM Cyl: 0000, Head: 0, Sec: 00 EF=SET FEATURES 00=Unknown Cyl: 0000, Head: 0, Sec: 00 F0=Reserved Cyl: 0000, Head: 0, Sec: 00 F2=SECURITY UNLOCK Cyl: 0000, Head: 0, Sec: 00 F5=SECURITY FREEZE Cyl: 0000, Head: 0, Sec: 00 F6=SECUR DSABL PAS Cyl: 0000, Head: 0, Sec: 00 F7=Reserved Cyl: 0000, Head: 0, Sec: 00 FA=Reserved Cyl: 0000, Head: 0, Sec: 00 FB=Reserved Cyl: 0000, Head: 0, Sec: 00 FC=Reserved Cyl: 0000, Head: 0, Sec: 00 FD=Reserved Cyl: 0000, Head: 0, Sec: 00 FE=Reserved Cyl: 0000, Head: 0, Sec: 00 FF=Reserved Cyl: 0000, Head: 0, Sec: 00 208 commands sent
Blocker Output:	Commands Allowed by Blocker Command LBA/CHS 70=SEEK Cyl: 0000, Head: 0, Sec: 00 B1=Device Config LBA=0000000 208 commands sent, 2 commands allowed
Results:	Assertion & Expected Result: Actual Result AM-01 Modifying commands blocked: Modifying commands blocked AM-05 HWB behavior recorded: HWB behavior recorded
Analysis:	Expected results achieved

Test Case HWB-01 Variation HWB-01-R MyKey NoWrite Version 1.05	
Case Summary:	HWB-01 Identify commands blocked by the HWB.
Assertions Tested:	HWB-AM-01 The HWB shall not transmit any modifying category operation to the protected storage device. HWB-AM-05 The action that an HWB device takes for any commands not assigned to the modifying, read, or information categories is defined by the vendor.
Tester Name:	JRL
Test Date:	run start Wed Sep 7 09:27:42 2005 run finish Wed Sep 7 09:43:15 2005
Test Configuration:	HOST: Freddy HostToBlocker Monitor: Dale HostToBlocker PA: AA00111 HostToBlocker Interface: IDE BlockerToDrive Monitor: Chip BlockerToDrive PA: AA00155 BlockerToDrive Interface: IDE Run Environment: DOS
Drives:	Protected drive: 92 92 is a WDC WD300BB-00CAA0 serial # WD-WMA8H2140350 with 58633344 sectors
Blocker Input:	Commands Sent to Blocker Command LBA/CHS 20=READ W/ RETRY LBA=0002000 21=READ W/O RETRY LBA=0002100 22=READ/L W/ RETRY LBA=0002200 23=READ/L W/O RETR LBA=0002300 24=READ SECTOR EXT LBA=000000002400 25=READ DMA EXT LBA=000000002500 26=RD DMA QUE EXT LBA=000000002600 27=RD MAX ADR EXT LBA=000000002700 29=READ MULTI EXT LBA=0002900 2A=READ STREAM DMA LBA=000000002A00 2B=READ STREAM PIO LBA=000000002B00 2F=READ LOG EXT LBA=000000002F00 40=READ/V W/ RETRY LBA=0004000 41=READ/V W/O RETR LBA=0004100 42=READ/V W/ EXT LBA=000000004200 B0=SMART D0=SMART Cyl: 0000, Head: 0, READ DATA Sec: 00 B0=SMART D5=Smart Cyl: 0000, Head: 0, Read Log Sec: 00 C4=READ MULTIPLE LBA=000C400 C7=READ DMA QUEUED LBA=000C700 C8=Read DMA LBA=000C800 C9=RD DMA W/O RETR LBA=000C900 E4=READ BUFFER Cyl: 00E4, Head: 0, Sec: 00 F8=RD NATV MAX ADD LBA=000F800 23 commands sent

Blocker Output:	Commands Allowed by Blocker Command LBA/CHS 20=READ W/ RETRY LBA=0002000 24=READ SECTOR EXT LBA=000000002400 25=READ DMA EXT LBA=000000002500 27=RD MAX ADR EXT LBA=000000002700 25=READ DMA EXT LBA=000000002900 C8=Read DMA LBA=000C400 C8=Read DMA LBA=000C800 F8=RD NATV MAX ADD LBA=000F800 23 commands sent, 8 commands allowed
Results:	Assertion & Expected Result Actual Result AM-01 Modifying commands blocked Modifying commands blocked AM-05 HWB behavior recorded HWB behavior recorded
Analysis:	Expected results achieved

Test Case HWB-01	Variation HWB-01-W MyKey NoWrite Version 1.05
Case Summary:	HWB-01 Identify commands blocked by the HWB.
Assertions Tested:	HWB-AM-01 The HWB shall not transmit any modifying category operation to the protected storage device. HWB-AM-05 The action that a HWB device takes for any commands not assigned to the modifying, read, or information categories is defined by the vendor.
Tester Name:	JRL
Test Date:	run start Wed Sep 7 09:44:07 2005 run finish Wed Sep 7 09:58:20 2005
Test Configuration:	HOST: Freddy HostToBlocker Monitor: Dale HostToBlocker PA: AA00111 HostToBlocker Interface: IDE BlockerToDrive Monitor: Chip BlockerToDrive PA: AA00155 BlockerToDrive Interface: IDE Run Environment: DOS
Drives:	Protected drive: 92 92 is a WDC WD300BB-00CAA0 serial # WD-WMA8H2140350 with 58633344 sectors
Blocker Input:	Commands Sent to Blocker Command LBA/CHS 30=WRITE W/ RETRY LBA=0000000 31=WRITE W/O RETRY LBA=0000000 32=WRITE/L W/ RETR LBA=0000000 33=WRITE/L W/O RTR LBA=0000000 34=WRITE SECTOR EXT LBA=000000000000 35=WRITE DMA EXT LBA=000000000000 36=WR DMA QUE EXT LBA=000000000000 38=CFA WRT SEC W/O LBA=0000000 39=WRITE MULTI EXT LBA=000000000000

	3A=WRITE STREAM DMA LBA=000000000000 3B=WRITE STREAM PIO LBA=000000000000 3D=Reserved LBA=0000000 3E=Reserved LBA=0000000 3F=WRITE LOG EXT LBA=000000000000 Pkt= B0=SMART D6=Smart Cyl: 0000, Head: 0, Write Log Sec: 00 C0=CFA ERASE SECTR LBA=0000000 C5=WRITE MULTIPLE LBA=0000000 CA=Write DMA LBA=0000000 CB=WRT DMA W/O RTR LBA=0000000 CC=WRITE DMA QUEUE LBA=0000000 CD=CFA WRT MULT W/ LBA=0000000 CE=Reserved LBA=0000000 E7=FLUSH CACHE Cyl: 0000, Head: 0, Sec: 00 E8=WRITE BUFFER Cyl: 0000, Head: 0, Sec: 00 E9=WRITE SAME Cyl: 0000, Head: 0, Sec: 00 EA=FLUSH CACHE EXT LBA=000000000000 F3=SECUR ERASE PRE Cyl: 0000, Head: 0, Sec: 00 F4=SECUR ERASE UNI Cyl: 0000, Head: 0, Sec: 00 29 commands sent
Blocker Output:	Commands Allowed by Blocker Command LBA/CHS (none) 29 commands sent, 0 commands allowed
Results:	Assertion & Expected Result / Actual Result AM-01 Modifying commands blocked / Modifying commands blocked AM-05 HWB behavior recorded / HWB behavior recorded
Analysis:	Expected results achieved

Test Case HWB-01 Variation HWB-01-X MyKey NoWrite Version 1.05	
Case Summary:	HWB-01 Identify commands blocked by the HWB.
Assertions Tested:	HWB-AM-01 The HWB shall not transmit any modifying category operation to the protected storage device. HWB-AM-05 The action that an HWB device takes for any commands not assigned to the modifying, read, or information categories is defined by the vendor.
Tester Name:	JRL
Test Date:	run start Wed Sep 7 10:21:44 2005 run finish Wed Sep 7 10:26:02 2005

Test Configuration:	HOST: Freddy HostToBlocker Monitor: Dale HostToBlocker PA: AA00111 HostToBlocker Interface: IDE BlockerToDrive Monitor: Chip BlockerToDrive PA: AA00155 BlockerToDrive Interface: IDE Run Environment: DOS
Drives:	Protected drive: 92 92 is a WDC WD300BB-00CAA0 serial # WD-WMA8H2140350 with 58633344 sectors
Blocker Input:	Commands Sent to Blocker Command LBA/CHS 50=FORMAT TRACK Cyl: 0000, Head: 0, Sec: 00 91=INIT DRV PARAMS Cyl: 0000, Head: 0, Sec: 00 92=DOWNLD MICROCOD Cyl: 0000, Head: 0, Sec: 00 F1=SECUR SET PASSW Cyl: 0000, Head: 0, Sec: 00 4 commands sent
Blocker Output:	Commands Allowed by Blocker Command LBA/CHS 91=INIT DRV PARAMS Cyl: 0000, Head: 0, Sec: 00 4 commands sent, 1 commands allowed
Results:	Assertion & Expected Result / Actual Result AM-01 Modifying commands blocked / Modifying commands blocked AM-05 HWB behavior recorded / HWB behavior recorded
Analysis:	Expected results achieved

Test Case HWB-03 Variation HWB-03-boot MyKey NoWrite Version 1.05	
Case Summary:	HWB-03 Identify commands blocked by the HWB while attempting to modify a protected drive with forensic tools.
Assertions Tested:	HWB-AM-01 The HWB shall not transmit any modifying category operation to the protected storage device. HWB-AM-05 The action that an HWB device takes for any commands not assigned to the modifying, read, or information categories is defined by the vendor.
Tester Name:	kbr
Test Date:	run start Thu Sep 1 11:23:28 2005 run finish Thu Sep 1 11:26:11 2005

Test Configuration:	HOST: beta5 HostToBlocker Monitor: dale HostToBlocker PA: aa00155 HostToBlocker Interface: IDE BlockerToDrive Monitor: chip BlockerToDrive PA: aa00111 BlockerToDrive Interface: IDE Run Environment: W2k
Drives:	Protected drive: 7c 7c is a MAXTOR 6L040J2 serial # 662201137769 with 78177792 sectors
Blocker Input:	Commands Sent to Blocker Count Commands 1 90=EXEC DRIVE DIAG 1 C6=SET MULTPLE MOD 2603 C8=Read DMA 1 E3=IDLE 1 EC=IDENTIFY DRIVE 2 EF=SET FEATURES 03=Set Transfer Mode (Use Sec Cnt)
Blocker Output:	Commands Allowed by Blocker Count Commands 2 C6=SET MULTPLE MOD 2603 C8=Read DMA 1 EC=IDENTIFY DRIVE 4 EF=SET FEATURES 03=Set Transfer Mode (Use Sec Cnt)
Results:	Assertion & Expected Result / Actual Result AM-01 Modifying commands blocked / Modifying commands blocked AM-05 HWB behavior recorded / HWB behavior recorded
Analysis:	Expected results achieved

Test Case HWB-03 Variation HWB-03-img MyKey NoWrite Version 1.05	
Case Summary:	HWB-03 Identify commands blocked by the HWB while attempting to modify a protected drive with forensic tools.
Assertions Tested:	HWB-AM-01 The HWB shall not transmit any modifying category operation to the protected storage device. HWB-AM-05 The action that an HWB device takes for any commands not assigned to the modifying, read, or information categories is defined by the vendor.
Tester Name:	JRL
Test Date:	run start Wed Sep 7 13:35:39 2005

Test Configuration:	HOST: Freddy HostToBlocker Monitor: Dale HostToBlocker PA: AA00111 HostToBlocker Interface: IDE BlockerToDrive Monitor: Chip BlockerToDrive PA: AA00155 BlockerToDrive Interface: IDE Run Environment: IXimager
Drives:	Protected drive: 92 92 is a WDC WD300BB-00CAA0 serial # WD-WMA8H2140350 with 58633344 sectors
Blocker Input:	Commands Sent to Blocker Count Commands 42 C8=Read DMA 20 CA=Write DMA
Blocker Output:	Commands Allowed by Blocker Count Commands 42 C8=Read DMA
Results:	Assertion & Expected Result / Actual Result AM-01 Modifying commands blocked / Modifying commands blocked AM-05 HWB behavior recorded / HWB behavior recorded
Analysis:	Expected results achieved

Test Case HWB-06 Variation HWB-06-en MyKey NoWrite Version 1.05	
Case Summary:	HWB-06 Identify read and information commands used by forensic tools and allowed by the HWB.
Assertions Tested:	HWB-AM-02 If the host sends a read category operation to the HWB and no error is returned from the protected storage device to the HWB, then the data addressed by the original read operation is returned to the host. HWB-AM-03 If the host sends an information category operation to the HWB and if there is no error on the protected storage device, then any returned access-significant information is returned to the host without modification. HWB-AM-05 The action that an HWB device takes for any commands not assigned to the modifying, read, or information categories is defined by the vendor.
Tester Name:	JRL
Test Date:	run start Wed Sep 7 15:00:53 2005 run finish Wed Sep 7 15:05:08 2005
Test Configuration:	HOST: Freddy HostToBlocker Monitor: Dale HostToBlocker PA: AA00111 HostToBlocker Interface: IDE BlockerToDrive Monitor: Chip BlockerToDrive PA: AA00155 BlockerToDrive Interface: IDE Run Environment: DOS

Drives:	Protected drive: 92 92 is a WDC WD300BB-00CAA0 serial # WD-WMA8H2140350 with 58633344 sectors
Blocker Input:	Commands Sent to Blocker Count Commands 256 C8=Read DMA
Blocker Output:	Commands Allowed by Blocker Count Commands 256 C8=Read DMA
Results:	Assertion & Expected Result — Actual Result AM-02 Read commands allowed — Read commands allowed AM-03 Access Significant Information unaltered — Access Significant Information unaltered AM-05 HWB behavior recorded — HWB behavior recorded
Analysis:	Expected results achieved

Test Case HWB-06 Variation HWB-06-ix MyKey NoWrite Version 1.05	
Case Summary:	HWB-06 Identify read and information commands used by forensic tools and allowed by the HWB.
Assertions Tested:	HWB-AM-02 If the host sends a read category operation to the HWB and no error is returned from the protected storage device to the HWB, then the data addressed by the original read operation is returned to the host. HWB-AM-03 If the host sends an information category operation to the HWB and if there is no error on the protected storage device, then any returned access-significant information is returned to the host without modification. HWB-AM-05 The action that an HWB device takes for any commands not assigned to the modifying, read, or information categories is defined by the vendor.
Tester Name:	JRL
Test Date:	run start Wed Sep 7 14:03:48 2005 run finish Wed Sep 7 14:48:09 2005
Test Configuration:	HOST: Freddy HostToBlocker Monitor: Dale HostToBlocker PA: AA0011 HostToBlocker Interface: IDE BlockerToDrive Monitor: Chip BlockerToDrive PA: AA00155 BlockerToDrive Interface: IDE Run Environment: IXimager
Drives:	Protected drive: 92 92 is a WDC WD300BB-00CAA0 serial # WD-WMA8H2140350 with 58633344 sectors

Blocker Input:	Commands Sent to Blocker Count Commands 136 C8=Read DMA
Blocker Output:	Commands Allowed by Blocker Count Commands 136 C8=Read DMA
Results:	Assertion & Expected Result / Actual Result AM-02 Read commands allowed / Read commands allowed AM-03 Access Significant Information unaltered / Access Significant Information unaltered AM-05 HWB behavior recorded / HWB behavior recorded
Analysis:	Expected results achieved

Test Case HWB-08 Variation HWB-08 MyKey NoWrite Version 1.05	
Case Summary:	HWB-08 Identify access significant information unmodified by the HWB.
Assertions Tested:	HWB-AM-03 If the host sends an information category operation to the HWB and if there is no error on the protected storage device, then any returned access-significant information is returned to the host without modification.
Tester Name:	JRL
Test Date:	run start Wed Sep 7 15:23:49 2005 run finish Thu Sep 8 15:30:03 2005
Test Configuration:	HOST: Freddy HostToBlocker Monitor: none HostToBlocker PA: none HostToBlocker Interface: IDE BlockerToDrive Monitor: none BlockerToDrive PA: none BlockerToDrive Interface: IDE Run Environment: Helix
Drives:	Protected drive: 92 92 is a WDC WD300BB-00CAA0 serial # WD-WMA8H2140350 with 58633344 sectors
Blocker Output:	cmd: partab HWB-08 Freddy JRL /dev/hdc 92 -all 58633344 total number of sectors
Results:	Assertion & Expected Result / Actual Result AM-03 Access Significant Information unaltered / Access Significant Information unaltered
Analysis:	Expected results achieved

Test Case HWB-09	Variation HWB-09 MyKey NoWrite Version 1.05
Case Summary:	HWB-09 Determine if an error on the protected drive is returned to the host.
Assertions Tested:	HWB-AM-04 If the host sends an operation to the HWB and if the operation results in an unresolved error on the protected storage device, then the HWB shall return an error status code to the host.
Tester Name:	JRL
Test Date:	run start Thu Sep 8 15:30:59 2005 run finish Thu Sep 8 15:33:10 2005
Test Configuration:	HOST: Freddy HostToBlocker Monitor: none HostToBlocker PA: none HostToBlocker Interface: IDE BlockerToDrive Monitor: none BlockerToDrive PA: none BlockerToDrive Interface: IDE Run Environment: Helix
Drives:	Protected drive: 92 92 is a WDC WD300BB-00CAA0 serial # WD-WMA8H2140350 with 58633344 sectors
Blocker Output:	03648/254/63 (max cyl/hd values) 03649/255/63 (number of cyl/hd) 58633344 total number of sectors cmd: diskchg HWB-09 Freddy JRL /dev/hdc -read 68633344 0 16 Disk addr lba 68633344 C/H/S 4272/58/11 offset 0 Disk read error 0xFFFFFFFF at sector 4272/58/11
Results:	Assertion & Expected Result AM-04 Error code returned Actual Result Error code returned
Analysis:	Expected results achieved

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1. Partner with State and local practitioners and policymakers to identify social science research and technology needs.
2. Create scientific, relevant, and reliable knowledge—with a particular emphasis on terrorism, violent crime, drugs and crime, cost-effectiveness, and community-based efforts—to enhance the administration of justice and public safety.
3. Develop affordable and effective tools and technologies to enhance the administration of justice and public safety.

Dissemination

4. Disseminate relevant knowledge and information to practitioners and policymakers in an understandable, timely, and concise manner.
5. Act as an honest broker to identify the information, tools, and technologies that respond to the needs of stakeholders.

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