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	Test Results for Hardware Write Block Device: FastBloc FE (FireWire Interface)
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# NIJ

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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, the Internal Revenue Service Criminal Investigation Division's Electronic Crimes Program, and the U.S. Department of Homeland Security's Bureau of U.S. Immigration and Customs Enforcement and U.S. Secret Service. The objective of the CFTT project 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 for testing computer forensic 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 **FastBloc FE** (**FireWire Interface**) write blocker against the *Hardware Write Blocker (HWB) Assertions and Test Plan Version 1.0,* available on the CFTT web site (<u>http://www.cftt.nist.gov/HWB-ATP-19.pdf</u>). 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 shall return the data requested by a read operation.
- An HWB shall return without modification any access-significant information requested from the drive.
- Any error condition reported by the storage device to the HWB shall be reported to the host.

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

# **Test Results for Hardware Write Block Devices**

Device Tested:
Model:
Serial No:

FastBloc Field Edition (Firewire Interface) FastBloc FE 172900

Host to Blocker Interface:	FIREWIRE
Blocker to Drive Interface:	IDE

Supplier: Guidance Software, Inc.

Address: 215 North Marengo Ave. Pasadena, CA 91101 Tel: 626–229–9191 Fax: 626–229–9199

# **1** Results Summary by Requirements

# An HWB shall not transmit a command to a protected storage device that modifies the data on the storage device.

For all test cases run, the device always blocked any commands that would have changed user or operating system data stored on a protected drive.

#### An HWB shall return the data requested by a read operation.

For all test cases run, the device always allowed commands to read the protected drive.

# An HWB shall return without modification any access-significant information requested from the drive.

For all test cases run, the device always returned access-significant information from the protected drive without modification.

# Any error condition reported by the storage device to the HWB shall be reported to the host.

For all test cases run, the device always returned error codes from the protected drive without modification.

# 2 Test Case Selection

Since a protocol analyzer was available for the interface between the blocker and the protected drive, the following test cases were appropriate: HWB–01, HWB–02, HWB–03, HWB–05, HWB–06, HWB–08, and HWB–09.

For test case HWB-03, two variations were selected: file (attempt to use operating system commands to create and delete file system objects, such as files and directories, from a protected drive) and image (use an imaging tool to attempt to write to a protected drive).

# **3 Testing Environment**

The tests were run in the NIST CFTT lab. This section describes the hardware (test computers and hard drives) available for testing.

## 3.1 Test Computer

One test computer was used, Max, with the following configuration:

Intel<sup>®</sup> 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<sup>®</sup> 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 IDE hard disk drives Two slots for removable SATA hard disk drives Two slots for removable SCSI hard disk drive

## 3.2 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. 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.

# 3.3 Hard Disk Drives

The hard disk drives used in testing are described below.

```
Drive label: 8B
Partition table Drive /dev/sda
00011/254/63 (max cyl/hd values)
00012/255/63 (number of cyl/hd)
201600 total number of sectors
Non-IDE disk
                       ) serial # (WD-WTAAV4044563)
Model (0EB-00CSF0
N
   Start LBA Length Start C/H/S End C/H/S boot Partition type
1 P 00000063 000096327 0000/001/01 0005/254/63 OB Fat32
 2 X 000096390 000096390 0006/000/01 0011/254/63
                                                       05 extended
5 P 00000000 00000000 0000/000/00
6 P 00000000 0000000 0000/00 0000/000/00
                                                       07 NTFS
                                                       00 empty entry
                                                       00 empty entry
                                                       00 empty entry
```

```
Drive label: A8
Partition table Drive /dev/sda
00011/254/63 (max cyl/hd values)
00012/255/63 (number of cyl/hd)
201600 total number of sectors
Non-IDE disk
Model (0BB-00AUA1
                      ) serial # (WD-WMA6Y3401179)
N
    Start LBA Length
                      Start C/H/S End C/H/S boot Partition type
1 P 000000063 000096327 0000/001/01 0005/254/63 OB Fat32
2 X 000096390 000096390 0006/000/01 0011/254/63
                                                    05 extended
3 S 00000063 000096327 0006/001/01 0011/254/63
                                                   07 NTFS
00 empty entry
5 P 00000000 0000000 0000/000/00 0000/00
                                                    00 empty entry
00 empty entry
Drive label: BE
Partition table Drive /dev/sda
24320/254/63 (max cyl/hd values)
24321/255/63 (number of cyl/hd)
390721968 total number of sectors
Non-IDE disk
Model (00JB-00KFA0
                      ) serial # (
                                       WD-WMAMR10220)
    Start LBA Length Start C/H/S End C/H/S boot Partition type
Ν
1 P 00000063 039070017 0000/001/01 1023/254/63 OC Fat32X
2 X 039070080 351646785 1023/000/01 1023/254/63
                                                    0F extended
3 S 00000063 307194867 1023/001/01 1023/254/63
                                                    07 NTFS
4 x 307194930 000016065 1023/000/01 1023/254/63
5 S 000000063 000016002 1023/001/01 1023/254/63
6 x 307210995 004096575 1023/000/01 1023/254/63
7 S 00000063 004096512 1023/001/01 1023/254/63
                                                    05 extended
                                                    01 Fat12
                                                    05 extended
                                                    06 Fat16
8 S 00000000 00000000 0000/000/00 0000/00
                                                     00 empty entry
9 P 00000000 0000000 0000/00/00 0000/00/00
                                                     00 empty entry
10 P 00000000 0000000 0000/00 0000/00 0000/00
                                                     00 empty entry
```

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

## 3.4 Support Software

The software in the following table was used to send commands to the protected drive. One widely used imaging tool, IXimager, was 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 tool.

Program	Description
sendSCSI	A tool to send SCSI commands wrapped in the USB or IEEE 1394 (FireWire)
	protocols 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 setup the hard drives and print partition tables and drive size.
IXimager	An imaging tool (ILook IXimager Version 1.0, Aug 25 2004) for test case 04-img.
-	

Program	Description
Helix 1.7	Linux bootable CD runtime environment.

# 4 Test Results

The main item of interest for interpretation of the test results is determining the conformance of the device to the test assertions. Conformance of each assertion tested by a given test case is evaluated by examination of the Blocker Input and Blocker Output boxes of the test report summary.

# 4.1 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, model, and interface of device tested.
Case Summary	Test case summary from <i>Hardware Write Blocker (HWB)</i>
	Assertions and Test Plan Version 1.0.
Assertions Tested	The test assertions applicable to the test case, selected 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 and completed.
Test Configuration	Identification of the following:
	1. Host computer for executing the test case.
	2. Laptop attached to each protocol analyzer.
	3. Protocol analyzers monitoring each interface.
	4. Interface between host and blocker.
	5. Interface between blocker and protected drive.
	6. Execution environment for tool sending commands
	from the host.
Hard Drives Used	Description of the protected hard drive.
Blocker Input	For test case HWB–01 and HWB–02, a list of each
	command sent is provided.
	For test case HWB–02, an SHA1 value for the entire drive is
	provided for reference.
	For test case HWB–05, a string of known data from a given
	location is provided for reference.
Blocker Output	For test cases HWB–02 and HWB–07, an SHA1 value
BIOCKCI Output	computed after commands are sent to the protected drive is
	given for comparison to the reference SHA1 value.
	given for comparison to the ference of the value.
L	

Heading	Description
	For test case HWB–05, a string read from a given location is provided for comparison to known data.
	For test case HWB–08, the number of sectors determined for the protected drive and the partition table are provided.
	For test case HWB–09, any error return obtained by trying to access a nonexistent sector of the drive is provided.
Results	Expected and actual results for each assertion tested.
Analysis	Whether or not the expected results were achieved.

## 4.2 Test Details

## 4.2.1 HWB-01

Test Case HWB-0	1 Variation hwb-01 FastBloc FE (Firewire)
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:	kbr
Test Date:	run start Tue Aug 1 10:59:11 2006 run finish Tue Aug 1 11:22:49 2006
Test Configuration:	HOST: max HostToBlocker Monitor: chip HostToBlocker PA: aa00111 HostToBlocker Interface: fw BlockerToDrive Monitor: dale BlockerToDrive PA: aa00155 BlockerToDrive Interface: ide Run Environment: helix
Drives:	Protected drive: BE BE is a WDC WD2000JB-00KFA0 with 390721968 sectors (200 GB)
Blocker Input:	Commands Sent to Blocker         Count       Commands         1       AC MANAGE         1       ASYNCHRONOUS CONNECTION         1       BLANK         1       CHANNEL USAGE         1       CHG DEFINITN         1       CLOS SESSION         1       CONNECT         1       CONNECT AV         1       CONNECT AV         1       COPY/VERIFY         1       CREATE DESCRIPTOR         1       DIGITAL INPUT         1       DISCONNECT         1       DISCONNECT AV         1       DISCONNECT AV         1       DISCONNECT INPUT         1       DISCONNECT INPUT         1       DISCONNECT AV         1       DISCONNECT INPUT         1       DISCONNECT INPUT         1       DISCONNECT AV         1       ERASE         1       ERASE(10)         1       FORMAT UNIT

1         GET PERFERSING           1         GET PERFERSING           1         NUT IF JUG SIGNAL FORMAT           1         OUGE SIELECT           2         MODE SIELECT           1         OPEN INFO BLOCK           0         OUTPUT FUG SIGNAL FORMAT           0         OUTPUT PLUG SIGNAL FORMAT           1         PLAY ALDID           1         PLAY ALDID           1         PLAY RESIT           1         PLA	Test Case HWB-01 Varia	tion hwb-01 FastBloc FE (Firewire)	-
I         OFT FRERENCE           I         INPUT SELECT           I         NPULUS SIGNAL FORMAT           I         NUMUK CACH           I         LACUNE CACH           I         LOOD           I         LOOS SELECT           I         LOOS SELECT           I         LOOS SELECT           I         LOOS SENECIO           I         OBJECT NUMER SELECT           I         OPEN TUNDERS SELECT           I         OUTPUT PLUS SIGNAL FORMAT           I         OUTPUT PLUS SIGNAL FORMAT      <			
1         INPUT SELECT           1         ILQUIRY           1         LOUNLACAD           1         IOADVINIOAD           1         IOAS SENSE           1         IMGE STATUS           1         MERTSTATUS           2         MODE SELECT           2         MODE SELECT           1         OPENDESCREPTOR           1         OUTPUT FLIG SUGNAL FORMAT           1         PLAY AUD DO           2         PLAY AUD DO           1         PLAY AUD DO           1         PLY TRK KLIVU           1         READ EXCERTY           1         READ EXCERTY           1         READ EXC			
1         INQUIRY           1         LOADUNACAD           1         LOG SELECT           1         LOG SELECT           1         MCD STATUS           1         MEDUM SCAN           2         MODE SFRET           1         MEDUM SCAN           2         MODE SFRET           1         OFEN DESCRIPTOR           1         OPEN DESCRIPTOR           1         PALSUMENT RESERVE OUT           1         PALSUMENT DESCRIPTOR           1         READ CAPACITY		1 INPUT PLUG SIGNAL FORMAT	
1       LAKUNIK CACH         1       LOG SENSE         1       LOG SENSE         1       MEGUSSTATUS         2       MODE SEISE(T)         2       MODE SEISE(T)         1       OBLICT NUMBER SELECT         1       PLAY SELECT         1       PLAY TAUDO DO         1       PLAY AUDIO         1       PLAY AUDIO         1       PLAY TAK INTY         1       PLAY TAK INTY         1       PLAY TAK KI TYUID         1       PLAY TAK KI TYUID         1       PLAY TAK KI TYUID </th <th></th> <th>1 INPUT SELECT</th> <th></th>		1 INPUT SELECT	
1       LOG SELECT         1       LOG SELECT         1       MEDUM SCAN         2       MODE SELECT         1       OBJECT NUMBER SELECT         1       OBJECT NUMBER SELECT         1       OPEN DESCRIPTOR         1       OPEN NNO BLOCK         1       OPEN NNO BLOCK         1       OUTPUT FREE         1       OPEN NNO BLOCK         1       OUTPUT FREE         1       PAUSERISTMER SERVE IN         1       PAUSERISTMER SERVE OUT         1       PAUSERISTMER SERVE         1       PAUSERISTMER SERVER         1       PAUSERISTMER SERVER         1       PAUSERISTMER SERVER <t< th=""><th></th><th></th><th></th></t<>			
1       10G SELSET         1       MECH STATUS         1       MEDUM SCAN         2       MODE SHEECT         1       OBJECT NUMBER SELECT         1       OPEN DESCRIFTOR         1       OPEN DESCRIFTOR         1       OPEN DESCRIFTOR         1       OPEN NEO BLOCK         1       OTHUT PLUG SIGNAL FORMAT         1       OUTPUT PLUG SIGNAL FORMAT         1       OUTPUT PLUG SIGNAL FORMAT         1       OUTPUT PRESET         1       PRANSITENT RESERVE OUT         1       PLAY AUD DN         2       PLAY AUD MSF         1       PLUG NFO         1       PLUG NFO         1       PLY TAK RUVU         1       PLY AUD MSF         1       PLY AUD MSF         1       PLY TAK NUVU			
1       IOG SENSE         1       MEDIUM SCAN         2       MODE SUBJECT         1       OBJECT NUMBER SELECT         1       OPEN DESCENTOR         1       OPEN NINO BLOCK         1       OPEN NINO BLOCK         1       OPTUT FUG SIGNAL FORMAT         1       OTTUT FUG SIGNAL FORMAT         1       OTTUT FUG SIGNAL FORMAT         1       OTTUT FUG SIGNAL FORMAT         1       OUTTUT FUG SIGNAL FORMAT         1       OUTTUT FUG SIGNAL FORMAT         1       OUTTUT FUG SIGNAL FORMAT         1       PLAY AUD DO         2       PLAY AUD DO         1       PLY TAK RUTV(12)         1       PROFENTALLOW MEDIUM REMOVAL         1       RO BUF CPCTY         1       RO STR CUE         1       RO STRUCTURE         1       RO STRUCTURE         1       RO SUB-CINL         1       READ (10)         1       READ COMSET         1       READ COMSET <t< th=""><th></th><th></th><th></th></t<>			
1         MEDIA SCAN           2         MODE SELECT           2         MODE SENSI(0)           1         OBECT NUMBER SELECT           1         OPEN INFO BLOCK           1         OUPN INFO BLOCK           1         OUPN INFO BLOCK           1         OUTPUT PEUG SIGNAL FORMAT           1         PLAY ALDI DIX           2         PLAY ALD DIX           1         PLAY ALDI DIX           1         RED GE CENTA           1         RD GE REATIN           1         RED GE CENTA			
1         MEDIUM SCAN           2         MODE SELECT           1         OBDE SELECT           1         OPEN DESCRIPTOR           1         OPEN NEGO BLOCK           1         OPEN NEGO BLOCK           1         OUTPUT PLUG SIGNAL FORMAT           1         PLAY RESERVE           1         PLAY ALD DIS           2         PLAY ALD DIS           1         PLAY ALD DIS           1         PLAY ALD DIS           1         PLAY ALD DIS           1         PLAY CD           1         PLAY CD           1         PLAY CD           1         PLAY CD           1         PLAY TRK RUV(12)           1         PRD-HETCH           1         RD SUB-CTNRE           1         RD SUB-CTNRE           1         RD SUB-CTNRE           1         RD SUB-CTNRE           1         READ COM SEF           2         READ COM SEF           3         READ ED GENERATN           1			
2         MODE SELECT           1         OPEN SENSE(0)           1         OPEN INSO BLOCK           1         OPEN INSO BLOCK           1         OUTPUT PLUG SIGNAL FORMAT           1         PULSEEREVINE           1         PENSISTEM RESERVE OUT           1         PLAY AUDIO           2         PLAY AUDIO           1         PLAY AUDIO           1         PLAY AUDIO           1         PLAY TER RETVI           1         PLAY TER RETVI           1         PLAY TER RETVI           1         PLAY TER RETVI           1         PLY TER RETVI           1         PLUG INFO           1			
2         MODE SENSEL00           1         OPEN DESCRIPTOR           1         OPEN DESCRIPTOR           1         OUTPNT PLUG SIGNAL FORMAT           1         PLUSENEEN TRESERVE IN           1         PLAY AUD DIO           2         PLAY AUD DIO           1         PLAY AUD MSF           1         PLAY AUD MSF           1         PLAY AUD MSF           1         PLAY COD           1         READ COD           1         READ COD <th></th> <th></th> <th></th>			
1         OPECT NUMBER SELECT           1         OPEN INFO DESCRIPTOR           1         OUTPUT PLUG SIGNAL FORMAT           1         OUTPUT PLUG SIGNAL FORMAT           1         PULY PLUG SIGNAL FORMAT           1         PULY PLUG SIGNAL FORMAT           1         PULY PLUG SIGNAL FORMAT           1         PENSISTENT RESERVE OUT           1         PELAY ALDIO           2         PLAY ALD           1         PLAY CD           1         PLY THER RETVE           1         PLAY CD           1         PLG INTO           1         PLAY CD           1         PLAY CD           1         PLAY CD           1         PLAY CD			
1         OPEN INFO BLOCK           1         OUTPUT FLUG SIGNAL FORMAT           1         OUTPUT PERSET           1         PAUSERSIUME           1         PERSISTENT RESERVE IN           1         PERSISTENT RESERVE OUT           1         PERSISTENT RESERVE OUT           1         PERSISTENT RESERVE OUT           1         PLAY AUD INSF           1         PLAY AUD MSF           1         PLAY GO INSO           1         PLAY GO INSF           1         PLAY GO INSF           1         PLAY GO INSF           1         PLAY GO INSF           1         PLAY AUD INSF           1         PLAY AUD INSF           1         PLAY AUD INSF           1         PLAY GO INSF           1         PLAY GO INSF           1         PLAY TAK RUTV(12)           1         PREVENTALLOW MEDIUM REMOVAL           1         READ GO INSTR           1         READ MUK CUE			
1         OPEN INPO BLOCK           1         OUTPUT PT LEGISMAL FORMAT           1         PLAY AUDION           1         PLAY AUDION           2         PLAY AUDION           1         PLAY AUDION           2         PLAY AUDION           1         PLAY TAK RUTVIZ           1         PLAY TAK RUTVIZ           1         PLAY TAK RUTVIZ           1         PLAY TALOW MEDIUM REMOVAL           1         REAPERTN           1         REAPERTN           1         REAPERTN           1         REAPERTN           1         REAPERTN      <			
1       OUTPUT PLUG SIGNAL FORMAT         1       PAUSERSTIME         1       PLAYANDIX         2       PLAY AUDIOX         2       PLAY AUDIOX         1       PLENSTENT RESERVE OUT         1       PLAY AUDIOX         2       PLAY AUDIOX         1       REVENTALLOW MEDIUM REMOVAL         1       REVENTALICUN MEDIUM REMOVAL         1			
1       PAUSE-RESUME         1       PERSISTENT RESERVE OUT         1       PERSISTENT RESERVE OUT         1       PLAY AUD DX         2       PLAY AUD DX         1       PLAY AUD DX         1       PLAY AUD DX         1       PLAY CD         1       PLAY TRK RUTV(12)         1       PREVENTALLOW MEDIUM REMOVAL         1       RD BUF CPCTY         1       RD MSTR CUE         1       RD SUB_CHNL         1       RD SUB_CHNL         1       RD DUF CPCTY         1       RD OPATED BLK         548       READ(10)         1       READ INF         1       READ DESCHNL         1       READ CDACTY         1       READ CDACTY         1       READ DESCHITOR         1       READ DESCHITOR         1       READ DESCHITOR         1       READ FORMAT CAPACTY         1       READ DESCH			
1       PERSISTENT RESIRVE IN         1       PLAY AUD DX         2       PLAY AUD DX         1       PLAY AUD DX         2       PLAY AUD DX         1       PLAY AUD DX         1       PLAY AUD DX         1       PLAY CD         1       PLAY CD         1       PLAY CD         1       PLAY RUTY         1       PLAY RUTY         1       PRE-FETCH         1       PRE-FETCH         1       RD BUF CPCTY         1       RD DED CPCTY         1       RD STRUCTURE         1       RD SUB-CHN         1       RD SUB-CHN         1       RD DUPOATED BLK         548       READ(10)         1       READ BUFFER         1       READ BUFFER         1       READ BUFFER         1       READ CD MSF         2       READ CD MSF         1       READ CD MSF         2       READ DESCRIPTOR         1       READ ELMENT STATUS         1       READ ELMENT STATUS         1       READ FORMAT CAPACITY         1       READ FORMAT CAPACITY <th></th> <th>1 OUTPUT PRESET</th> <th></th>		1 OUTPUT PRESET	
1         PERSISTENT RESERVE OUT           1         PLAY AUDIO           2         PLAY AUDIO           1         PLAY AUDIO           1         PLAY CD           1         PLAY CD           1         PLUG INFO           1         PLUY TRK RLITV           1         PLVT TKK RLITV(12)           1         PREFETCH           1         PLVT TKK RLITV(12)           1         REF.FETCH           1         RD UF CPCTY           1         RD GENERATN           1         RD DSTRUCTURE           1         RD STRUCTURE           1         RD DTOCPMA           1         RD DTOCPMA           1         READ COD           1         READ COD     <			
1       PLAY AUD DIO         2       PLAY AUD MSF         1       PLAY AUD MSF         1       PLAY CD         1       PLAY CD         1       PLAY RENT         1       PLAY RENT         1       PLY TER RLIV(12)         1       PREFETCH         1       PREFETCH         1       RD GENERATN         1       RD DETCUTURE         1       RD STRUCTURE         1       RD TOC/PMA         1       RD DUPDATED BLK         548       READ(10)         1       READ BLYFER         1       READ SCHPTOR         1       READ SCHPTOR         1       READ DEFECT         1       READ DEFECT         1       READ DESCRIPTOR         1       READ EDEMENT STATUS         1       READ FORMAT CAPACITY         1       READ EDMERSE         1       READ SCHPTOR         1       READ EDMERSE         1       READ EDMERSE         1       READ INFO BLOCK         1       READ SCHPTORIT CAPACITY         1       READ SCHPTORICAPACITY         1 <t< th=""><th></th><th></th><th></th></t<>			
2       PLAY AUDIO         1       PLAY AUDIONSF         1       PLAY CD         1       PLUGINFO         1       PLUTRK RLTVU         1       PLYTRK RLTVU         1       PLYTRK RLTVU         1       PLYTKK RLTVU         1       PLYTKK RLTVU         1       PLYTKK RLTVU         1       PRE-FETCH         1       RD BUF CCTY         1       RD BUF CCTY         1       RD STRUCTURE         1       RD OCPMA         1       RD TOCPMA         1       READ BULK LIMITS         1       READ BULK LIMITS         1       READ COP         1       READ COP         1       READ DESCRIPTOR         1       READ DESCRIPTOR         1       READ ELEMENT STATUS         1       READ ELEMENT STATUS         1       READ INFO BLOCK         1       READ INFO BLOCK         1       READ STATUS ATTACHED         1       READ STATUS ATTACHED         1       READ STATUS ATTACHED         1       READSE(0)         1       REASE(0)         1			
1       PLAY CD         1       PLUG INFO         1       PLY TKK RLTV         1       PLY TKK RLTV(2)         1       PRE-FETCH         1       PRE-FETCH         1       REVENT/ALLOW MEDIUM REMOVAL         1       RD GENERATN         1       RD GENERATN         1       RD SUB-CHNL         1       RD FOR-PMAN         1       READ FOR         1       READ FOR         1       READ FOR         1       READ CDA-CAPCITY         1       READ CDA-CAPCITY         1       READ CDA-CAPCITY         1       READ ELEMENT STATUS         1       READ ELEMENT STATUS         1       READ ELEMENT STATUS         1       READ			
1       PLAY CD         1       PLY TRK RLTV         1       PLY TRK RLTV(12)         1       PLY TRK RLTV(12)         1       PLY TRK RLTV(12)         1       PRE-FETCH         1       PREVENT/ALLOW MEDIUM REMOVAL         1       RD BUF CPCTY         1       RD BUF CPCTY         1       RD SUB-CHNL         1       RD MSTR CUE         1       RD TOC/PMAL         1       READ DIOL         1       READ DIOL         1       READ BUTK LIMITS         1       READ COD         1       READ COMSE         2       READ DESCRIPTOR         1       READ DESCRIPTOR         1       READ DESCRIPTOR         1       READ INFO BLOCK         1       READ REVERSE         1       READ REVERSE         1       READ REVERSE         1       READ REVERSE         1 <td< th=""><th></th><th></th><th></th></td<>			
1       PLU TIK RITV         1       PLY TIK RITV(12)         1       PRFFETCH         1       PRFVENT/ALLOW MEDIUM REMOVAL         1       RD BUF CPCTY         1       RD GENERATN         1       RD SUB-CHNL         1       RD SUB-CHNL         1       RD SUB-CHNL         1       RD DOCPMA         1       RD UPOATED BLK         548       READ(10)         1       READ C12)         1       READ DEFECT         1       READ FACHY         1       READ FACHY         1       READ BEVENTSATUS         1       READ FACHY         1       READ FACHY			
1         PLY TRK RLTV           1         PRLY TRK RLTV(12)           1         PRE-FETCH           1         RD BUF CFCT           1         RD GENERATN           1         RD STRUCTURE           1         RD STRUCTURE           1         RD DUP CPCTY           1         RD MSTR CUE           1         RD DUPCME           1         READ(10)           1         READ(10)           1         READ ELK           1         READ CUE           1         READ CUE           1         READ COMSE           2         READ DUPFER           1         READ COMSE           2         READ DUPTOR           1         READ COMSE           1         READ COMSE           1         READ FORMAT CAPACITY           1         READ FORMAT CAPACITY           1         READ FORMAT CAPACITY           1         READ FORMAT CAPACITY           1         READ FORTUS ATTACHED			
1       PLY TRK RLTV(12)         1       PREVENT ALLOW MEDIUM REMOVAL         1       RD BUF CPCTY         1       RD GENERATN         1       RD SUB-CPCTY         1       RD GENERATN         1       RD SUB-CHNI         1       RD SUB-CHNI         1       RD SUB-CHNI         1       RD DUPCPMA         1       RD UPDATED BLK         548       READ(10)         1       READ BULK LIMITS         1       READ BULK LIMITS         1       READ CD MSF         2       READ DEFECT         1       READ DESCRIPTOR         1       READ DESCRIPTOR         1       READ FORMAT CAPACITY         1       READ FORMAT CAPACITY         1       READ FORMAT CAPACITY         1       READ FORMAT CAPACITY         1       READ STATUS ATTACHED         1       READ STATUS ATTACHED         1       READ STATUS ATTACHED         1       READ STATUS ATTACHED         1			
1       PRE-FETCH         1       RD EUFCT/ALLOW MEDIUM REMOVAL         1       RD BUFCCTY         1       RD GENBRATN         1       RD STRUCTURE         1       RD STRUCTURE         1       RD SUB-CHNL         1       RD TOC/PMA         1       RD TOC/PMA         1       RD TOC/PMA         1       RD TOC/PMA         1       READ(1)         1       READ(1)         1       READ BUFFER         1       READ BUFFER         1       READ BUFFER         1       READ CD         1       READ CD         1       READ CD         1       READ DESCRIPTOR         1       READ ELEMENT STATUS         1       READ ELEMENT STATUS         1       READ HADER         1       READ TONG         1			
1         PREVENT/ALLOW MEDIUM REMOVAL           1         RD BUF CPCTY           1         RD GENERATN           1         RD MSTR CUE           1         RD STRUCTURE           1         RD SUB-CHNL           1         RD SUB-CHNL           1         RD DOLATED BLK           548         READ(10)           1         READ(12)           1         READ BUFER           1         READ BUK LIMITS           1         READ BUK LIMITS           1         READ CD MSF           2         READ DESCRIPTOR           1         READ INFO BLOCK           1         READ ENCRESE           1         READ INFO BLOCK           1         READ ENCRESE           1         READ STATUS ATTACHED           1         REASIGN BLK           1         RELEASE(10)           1         RELEASE(6)           1			
1       RD GENERATN         1       RD MSTR CUE         1       RD MSTR CURE         1       RD SUB-CHNL         1       RD TOC/PMA         1       RD UPDATED BLK         548       READ(10)         1       READ (12)         1       READ BULK LIMITS         1       READ CAPACITY         1       READ COMSF         2       READ DEFECT         1       READ COMSF         2       READ DESCRIPTOR         1       READ COMSF         2       READ DESCRIPTOR         1       READ ELEMENT STATUS         1       READ FORMAT CAPACITY         1       READ HEADER         1       READ INFO BLOCK         1       RESERVENDE			
1       RD MSTR CUE         1       RD STRUCTURE         1       RD SUB-CHNL         1       RD TOC/PMA         1       RD UPDATED BLK         548       READ(10)         1       READ BUFFER         1       READ BUFFER         1       READ BUFFER         1       READ CAPACITY         1       READ CD MSF         2       READ DESCRIPTOR         1       READ DESCRIPTOR         1       READ DESCRIPTOR         1       READ FORMAT CAPACITY         1       READ DESCRIPTOR         1       READ FORMAT CAPACITY         1       READ HEADER         1       READ INFO BLOCK         1       READ INFO BLOCK         1       READ REVERSE         1       READ STATUS ATTACHED         1       RECOVER BUFF DATA         1       RECOVER DUFF DATA         1       REDASE(10)         1       REPAR RZONE         4       REPOR		1 RD BUF CPCTY	
1       RD STRUCTURE         1       RD SUB-CHNL         1       RD UPDATED BLK         548       READ(0)         1       READ(12)         1       READ BUFFER         1       READ BUFFER         1       READ BUFFER         1       READ BUFFER         1       READ CAPACITY         1       READ CD         1       READ CD         1       READ DEFECT         1       READ TATUS TATUS         1       READ TAUS ATTAUS         1       READ TAUS ATTAUS         1       READ TAUS ATTACHED         1       RECEIVE DIAGNOSTIC RESULTS         1       RECEVER BUFF DATA         1       RELASE(6)         1       RELASE(6)         1       REDART RZONE         4       REPORT LUNS<			
1       RD SUB-CHNL         1       RD TOCCPMA         1       RD UPDATED BLK         548       READ(10)         1       READ(2)         1       READ BUFFER         1       READ BUFFER         1       READ BULK LIMITS         1       READ CAPACITY         1       READ CD         1       READ CD         1       READ CD         1       READ CD         1       READ CAPACITY         1       READ DEFECT         1       READ DEFECT         1       READ FORMAT CAPACITY         1       READ FORMAT CAPACITY         1       READ FORMAT CAPACITY         1       READ INFO BLOCK         1       READ INFO BLOCK         1       READ STATUS ATTACHED         1       READ STATUS ATTACHED         1       READ STATUS ATTACHED         1       RECEVE BLAGNOSTIC RESULTS         1       RECEVE BLAGNOSTIC RESULTS         1       RECEVE BLAGNOSTIC RESULTS         1       RELEASE(0)         1       RELEASE(6)         1       REPORT KEY         1       REPORT LUNS			
1         RD TOC/PMA           1         RD UPDATED BLK           548         READ(10)           1         READ           1         READ BUFFER           1         READ BULK LIMITS           1         READ CAPACITY           1         READ CD MSF           2         READ CD MSF           2         READ DEFECT           1         READ DESCRIPTOR           1         READ FORMAT CAPACITY           1         READ HADER           1         READ HADER           1         READ HADER           1         READ ROCKK           1         READ ROCK           1         READ ROCK           1         READ ROCK           1         READ ROCKK           1         READ ROCK           1         READ ROCK           1         READ ROCKK           1         READ ROCKKESE           1         READ ROCKKESE           1         READ ROWERSE           1         RELEASE(0)           1         RELEASE(0)           1         REPORT LUNS           1         REPORT KEY           1			
1RD UPDATED BLK548READ(10)1READ(12)1READ BUFFER1READ BULK LIMITS1READ CAPACITY1READ CAPACITY1READ CD MSF2READ DEFECT1READ ELEMENT STATUS1READ FORMAT CAPACITY1READ FORMAT CAPACITY1READ HEADER1READ HEADER1READ NFO BLOCK1READ REVERSE1READ NEVERSE1READ STATUS ATTACHED1RECEIVE DIAGNOSTIC RESULTS1RELEASE(0)1RELEASE(0)1RELEASE(0)1RELASE(0)1REPAIR RZONE4REPORT KEY1RESERVE1RESERVE1RESERVE1RESERVELO1RESERVELO1RESERVELO1RESERVELO1RESERVED1RESERVED1SCAN			
548       READ(10)         1       READ BUFFER         1       READ BULK LIMITS         1       READ BULK LIMITS         1       READ CAPACITY         1       READ CD         1       READ CD D         1       READ DEFECT         1       READ DEFECT         1       READ DESCRIPTOR         1       READ FORMAT CAPACITY         1       READ HEADER         1       READ FORMAT CAPACITY         1       READ STATUS         1       READ FORMAT CAPACITY         1       READ FORMAT CAPACITY         1       READ STATUS         1       READ STATUS ATTACHED         1       REASIGN BLK         1       RECEVE DIAGNOSTIC RESULTS         1       RECEVE DIAGNOSTIC RESULTS         1       RELEASE(10)         1       RELEASE(6)         1       REPORT LUNS         1       REPORT KEY         1       RESERVE(6)         34			
1       READ BUFFER         1       READ BULK LIMITS         1       READ CAPACITY         1       READ CD         1       READ CD         1       READ CD MSF         2       READ DEFECT         1       READ ESCRIPTOR         1       READ ESCRIPTOR         1       READ EDENCITY         1       READ FORMAT CAPACITY         1       READ HEADER         1       READ HEADER         1       READ HEADER         1       READ IONG         1       READ IONG         1       READ STATUS ATTACHED         1       READ STATUS ATTACHED         1       RECEIVE DIAGNOSTIC RESULTS         1       RECEIVE DIAGNOSTIC RESULTS         1       RECEIVE DATA         1       RELEASE(10)         1       REPART RZONE         4       REPORT LUNS         1       REPORT LUNS         1       RESERVE         1       RESERVE(6)         34       RESERVE(0)         1       RESERVED         1       RESERVED         1       RESERVED         1       <			
1READ BUFFER1READ BULK LIMITS1READ CAPACITY1READ CD1READ CD MSF2READ DEFECT1READ DESCRIPTOR1READ ELEMENT STATUS1READ FORMAT CAPACITY1READ HEADER1READ INFO BLOCK1READ STATUS ATTACHED1READ STATUS ATTACHED1REASIGN BLK1RECEIVE DIAGNOSTIC RESULTS1RELASE(6)1RELASE(6)1REPORT LUNS1REPORT LUNS1REPORT LUNS1RESERVE1RESERVE(6)1RESERVE(6)1RESERVE(10)1RESERVE(6)1RESERVE(6)1RESERVE(6)1RESERVE(10)1RESERVE(6)1RESERVE(6)1RESERVE(6)1RESERVE(6)1RESERVE(6)1RESERVE(6)1RESERVE(6)1RESERVE(6)1RESERVE(70)1RESERVE(70)1RESERVE			
1READ CAPACITY1READ CD1READ CD MSF2READ DEFECT1READ DESCRIPTOR1READ ELEMENT STATUS1READ FORMAT CAPACITY1READ HEADER1READ INFO BLOCK1READ REVERSE1READ REVERSE1READ STATUS ATTACHED1READ STATUS ATTACHED1RECIVE DIAGNOSTIC RESULTS1RECOVER BUFF DATA1RELASE(10)1REPORT KEY1REPORT KEY1REPORT LUNS1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED			
1READ CD1READ CD MSF2READ DESCRIPTOR1READ DESCRIPTOR1READ ELEMENT STATUS1READ FORMAT CAPACITY1READ FORMAT CAPACITY1READ HEADER1READ NFO BLOCK1READ REVERSE1READ STATUS ATTACHED1REASIGN BLK1RECEIVE DIAGNOSTIC RESULTS1RECEVER BUFF DATA1RELASE(6)1RELASE(6)1REPAIR RZONE4REPORT KEY1RESERVE1RESERVE1RESERVE1RESERVE(10)1RESERVE(6)34RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED		1 READ BULK LIMITS	
1READ CD MSF2READ DEFECT1READ DESCRIPTOR1READ ELEMENT STATUS1READ FORMAT CAPACITY1READ HEADER1READ INFO BLOCK1READ LONG1READ LONG1READ STATUS ATTACHED1RECEIVE DIAGNOSTIC RESULTS1RECEIVE DIAGNOSTIC RESULTS1RELEASE(6)1REPAIR RZONE4REPORT KEY1RESERVE1RESERVE1RESERVE1RESERVE1RESERVE1RESERVED		1 READ CAPACITY	
2READ DEFECT1READ DESCRIPTOR1READ ELEMENT STATUS1READ FORMAT CAPACITY1READ HEADER1READ HEADER1READ INFO BLOCK1READ STATUS ATTACHED1READ STATUS ATTACHED1REASIGN BLK1RECEVER DIAGNOSTIC RESULTS1RECEVER BUFF DATA1RELEASE(6)1REPORT LUNS1REPORT LUNS1RESERVE1RESERVE1RESERVE1RESERVE1RESERVE1RESERVE1RESERVED			
1READ DESCRIPTOR1READ DESCRIPTOR1READ FORMAT CAPACITY1READ HEADER1READ INFO BLOCK1READ INFO BLOCK1READ REVERSE1READ STATUS ATTACHED1RECEIVE DIAGNOSTIC RESULTS1RECEIVE DIAGNOSTIC RESULTS1RELEASE(0)1RELEASE(6)1REPORT KEY1REPORT KEY1RESERVE1RESERVE1RESERVE1RESERVE1RESERVE1RESERVE1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1REVIND/REZERO1SCAN			
1       READ ELEMENT STATUS         1       READ FORMAT CAPACITY         1       READ HEADER         1       READ INFO BLOCK         1       READ INFO BLOCK         1       READ REVERSE         1       READ REVERSE         1       READ STATUS ATTACHED         1       REASIGN BLK         1       RECEIVE DIAGNOSTIC RESULTS         1       RECEVE BUFF DATA         1       RELEASE(10)         1       RELEASE(6)         1       REPORT KEY         1       REPORT LUNS         1       RESERVE         1       RESERVE         1       RESERVE         1       RESERVED         1       RESERVED         1       RESERVED         1       RESERVED         1       RESERVED         1       RESERVED         1       REWIND/REZERO         1       SCAN			
1READ FORMAT CAPACITY1READ HEADER1READ INFO BLOCK1READ INFO BLOCK1READ REVERSE1READ STATUS ATTACHED1REASSIGN BLK1RECEIVE DIAGNOSTIC RESULTS1RECOVER BUFF DATA1RELEASE(10)1RELEASE(6)1REPAIR RZONE4REPORT KEY1RESERVE1RESERVE1RESERVE1RESERVE1RESERVE1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1REVIND/REZERO1SCAN			
1READ HEADER1READ INFO BLOCK1READ LONG1READ REVERSE1READ STATUS ATTACHED1REASSIGN BLK1RECEIVE DIAGNOSTIC RESULTS1RECOVER BUFF DATA1RELEASE(10)1RELEASE(6)1REPORT KEY1REPORT LUNS1RESERVE1RESERVE1RESERVE1RESERVE1RESERVE1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1RESERVED1SCAN			
1READ INFO BLOCK1READ LONG1READ REVERSE1READ STATUS ATTACHED1REASSIGN BLK1RECEIVE DIAGNOSTIC RESULTS1RECOVER BUFF DATA1RELEASE(10)1RELEASE(6)1REPORT KEY1REPORT LUNS1RESERVE1RESERVE1RESERVE1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVE(10)1RESERVED1RESERVED1REVIND/REZERO1SCAN			
1READ LONG1READ REVERSE1READ STATUS ATTACHED1REASSIGN BLK1RECEIVE DIAGNOSTIC RESULTS1RECOVER BUFF DATA1RELEASE(10)1RELEASE(6)1REPAIR RZONE4REPORT KEY1REPORT KEY1RESERVE1RESERVE1RESERVE1RESERVE1RESERVE1RESERVE1RESERVE(10)1RESERVE(6)34RESERVED1REWIND/REZERO1SCAN			
1READ REVERSE1READ STATUS ATTACHED1REASSIGN BLK1RECEIVE DIAGNOSTIC RESULTS1RECOVER BUFF DATA1RELEASE(10)1RELEASE(6)1REPAIR RZONE4REPORT KEY1REPORT LUNS1RESERVE1RESERVE1RESERVE1RESERVE1RESERVE1RESERVE1RESERVED1RESERVED1RESERVED1RESERVED1REVIND/REZERO1SCAN			
1READ STATUS ATTACHED1REASSIGN BLK1RECEIVE DIAGNOSTIC RESULTS1RECOVER BUFF DATA1RELEASE(10)1RELEASE(6)1REPAIR RZONE4REPORT KEY1REPORT LUNS1RESERVE1RESERVE1RESERVE(10)1RESERVE(6)34RESERVED1REWIND/REZERO1SCAN			
1REASSIGN BLK1RECEIVE DIAGNOSTIC RESULTS1RECOVER BUFF DATA1RELEASE(10)1RELEASE(6)1REPAIR RZONE4REPORT KEY1REPORT LUNS1RESERVE1RESERVE1RESERVE1RESERVE(10)1RESERVE(6)34RESERVED1SCAN			
1RECOVER BUFF DATA1RELEASE(10)1RELEASE(6)1REPAIR RZONE4REPORT KEY1REPORT LUNS1REQ VOL ADDR1RESERVE1RESERVE(10)1RESERVE(6)34RESERVED1REWIND/REZERO1SCAN			
1RELEASE(10)1RELEASE(6)1REPAIR RZONE4REPORT KEY1REPORT LUNS1REQ VOL ADDR1RESERVE1RESERVE(10)1RESERVE(6)34RESERVED1REWIND/REZERO1SCAN			
1RELEASE(6)1REPAIR RZONE4REPORT KEY1REPORT LUNS1REQ VOL ADDR1RESERVE1RESERVE(10)1RESERVE(6)34RESERVED1REWIND/REZERO1SCAN			
1REPAIR RZONE4REPORT KEY1REPORT LUNS1REQ VOL ADDR1RESERVE1RESERVE(10)1RESERVE(6)34RESERVED1REWIND/REZERO1SCAN			
4REPORT KEY1REPORT LUNS1REQ VOL ADDR1RESERVE1RESERVE(10)1RESERVE(6)34RESERVED1REWIND/REZERO1SCAN			
1REPORT LUNS1REQ VOL ADDR1RESERVE1RESERVE(10)1RESERVE(6)34RESERVED1REWIND/REZERO1SCAN			
1REQ VOL ADDR1RESERVE1RESERVE(10)1RESERVE(6)34RESERVED1REWIND/REZERO1SCAN			
1         RESERVE           1         RESERVE(10)           1         RESERVE(6)           34         RESERVED           1         REWIND/REZERO           1         SCAN			
1         RESERVE(10)           1         RESERVE(6)           34         RESERVED           1         REWIND/REZERO           1         SCAN			
1RESERVE(6)34RESERVED1REWIND/REZERO1SCAN			
34RESERVED1REWIND/REZERO1SCAN			
1 SCAN			
		i beint	

Test Case HWB-0	1 Variation hwb-01 FastBloc FE (Firewire)
	1 SEARCH DESCRIPTOR
	1 SECURITY
	1 SEEK(10)
	1 SEEK(6)
	1 SEND CUE SHT
	1 SEND DIAGNOSTIC
	1 SEND EVENT
	6 SEND KEY
	1 SET CD SPEED
	1 SET LIMITS
	1 SET RD AHEAD
	1 SET STREAMNG
	1 SIGNAL SOURCE
	1 SND OPC INFO
	1 SND STRUCTUR
	1 SPACE
	2 SRCH DATA EQ
	1 SRCH DATA HI
	1 SRCH DATAHI
	2 SRCH DATA LO
	1 START/STOP
	1 STOP PLY/SCN
	1 SUBUNIT INFO
	1 SYNCH CACHE
	2 TEST UNIT READY
	1     UNIT INFO       1     UPDATE BLOCK
	1     VENDOR-DEPENDENT       1     VERIFY(10)
	$\frac{1}{1} \frac{\text{VERFT(10)}}{\text{VERFY}(12)}$
	$\frac{1}{1} \frac{\text{VERIF1(12)}}{\text{VERIFY(6)}}$
	$\frac{1}{2}  \text{WRITE(10)}$
	$\frac{2}{1}  \text{WRITE(10)}$
	1 WRITE BUFFER
	1 WRITE DESCRIPTOR
	1 WRITE FILEMARK
	1 WRITE INFO BLOCK
	1 WRITE LONG
	1 WRITE SAME
	2 WRITE/VERIFY
	1 XDREAD(10)
	1 XDWRITE(10)
	1 XDWRITEREAD(10)
	1 XPWRITE(10)
	133 commands sent
D1 1 C	
Blocker Output:	Commands Allowed by Blocker
	Count Commands
	548 25=READ DMA EXT
	1 42=READ/V W/ EXT
	4 70=SEEK
	1 EC=IDENTIFY DRIVE
	133 commands sent, 4 commands allowed
Results:	Assortion & Exported Desult
Results.	Assertion & Expected Result         Actual Result           AM-01 Modifying commands blocked         Modifying commands blocked
	AM-05 HWB behavior recorded HWB behavior recorded
	AM-05 HWB behavior recorded HWB behavior recorded
	AW-05 HWB behavior recorded

## 4.2.2 HWB-02

Test Case HWB-02	Variation hwb-02 FastBloc FE (Firewire)	
Case Summary:	HWB-02 Identify modifying commands blocked by the HWB.	
Assertions Tested:	HWB-AM-01 The HWB shall not transmit any modifying category operation to the protected storage device.	
Tester Name:	Kbr	
Test Date:	run start Tue Aug 22 10:20:42 2006	
	run finish Tue Aug 22 13:42:06 2006	
Test Configuration:	HOST: max	
	HostToBlocker Monitor: chip	
	HostToBlocker PA: aa00111	
	HostToBlocker Interface: fw	
	BlockerToDrive Monitor: none	
	BlockerToDrive PA: none	
	BlockerToDrive Interface: ide	
	Run Environment: helix	
Drives:	Protected drive: BE	
	BE is a WDC WD2000JB-00KFA0 with 390721968 sectors (200 GB)	
Blocker Input:	SHA of BE is 8F470B10EA370171543380CA0CD55B406C6359BD -	
	Commands Sent to Blocker	
	Count Commands	
	42 READ(10)	
	2 WRITE(10)	
	1 WRITE(12)	
	1 WRITE BUFFER	
	1 WRITE LONG	
	1 WRITE SAME	
	2 WRITE/VERIFY	
	1 XDWRITE(10)	
	1 XDWRITEREAD(10)	
	1 XPWRITE(10)	
	;	
Blocker Output:	CMD: /mnt/floppy/diskhash.csh hwb-02 max kbr /dev/sdc be -after 8F470B10EA370171543380CA0CD55B406C6359BD -	
Results:	Assertion & Expected Result Actual Result	
	AM-01 Modifying commands blocked Modifying commands blocked	
Analysis:	Expected results achieved	

## 4.2.3 HWB-03-file

Test Case HWB-0	3 Variation hwb-03-file FastBloc FE (Firewire)			
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 a HWB device takes for any commands not assigned to the modifying, read or information categories is defined by the vendor.			
Tester Name:	Mrw			
Test Date:	run start Wed Aug 2 14:38:30 2006 run finish Wed Aug 2 15:27:02 2006			
Test Configuration:	HOST: max HostToBlocker Monitor: chip HostToBlocker PA: aa00111 HostToBlocker Interface: fw BlockerToDrive Monitor: dale BlockerToDrive PA: aa00155 BlockerToDrive Interface: ide Run Environment: wxp			
Drives:	Protected drive: BE BE is a WDC WD2000JB-00KFA0 with 390721968 sectors (200 GB)			
Blocker Input:	Commands     Commands       8     READ(10)       42     WRITE(10)			
Blocker Output:	Commands Allowed by Blocker       Count     Commands       8     25=READ DMA EXT			
Results:	Assertion & Expected ResultActual ResultAM-01 Modifying commands blockedModifying commands blockedAM-05 HWB behavior recordedHWB behavior recorded			
Analysis:	Expected results achieved			

# 4.2.4 HWB-03-img

Test Case HWB-0	3 Variation hwb-03-img FastBloc FE (Firewire)		
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 a 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 Wed Aug 2 14:14:40 2006 run finish Wed Aug 2 14:22:26 2006		
Test Configuration:	HOST: max HostToBlocker Monitor: chip HostToBlocker PA: aa00111 HostToBlocker Interface: fw BlockerToDrive Monitor: dale BlockerToDrive PA: aa00155 BlockerToDrive Interface: ide Run Environment: IX		
Drives:	Protected drive: BE BE is a WDC WD2000JB-00KFA0 with 390721968 sectors (200 GB)		
Blocker Input:	Commands Sent to Blocker       Count     Commands       1     READ(10)       267     WRITE(10)		
Blocker Output:	Commands Allowed by Blocker       Count     Commands       1     25=READ DMA EXT		
Results:	Assertion & Expected ResultActual ResultAM-01 Modifying commands blockedModifying commands blockedAM-05 HWB behavior recordedHWB behavior recorded		
Analysis:	Expected results achieved		

## 4.2.5 HWB-05

Test Case HWB-	05 Variation hwb-05 FastBloc FE (Firewire)		
Case Summary:	HWB-05 Identify read commands allowed by the HWB.		
Assertions	HWB-AM-02 If the host sends a read category operation to the HWB and no error is returned from the protected storage		
Tested:	device to the HWB, then the data addressed by the original read operation is returned to the host.		
Tester Name:	kbr		
Test Date:	run start Thu Aug 3 13:32:51 2006		
	run finish Thu Aug 3 13:40:16 2006		
Test	HOST: max		
Configuration:	HostToBlocker Monitor: chip		
	HostToBlocker PA: aa00111		
	HostToBlocker Interface: fw		
	BlockerToDrive Monitor: none		
	BlockerToDrive PA: none		
	BlockerToDrive Interface: ide		
	Run Environment: helix		
Drives:	Protected drive: A8		
	A8 is a WDC WD200BB-00AUA1 configured to report 201600 sectors (103 MB)		
Blocker Input:	Commands Sent to Blocker		
	Read sector 32767 for the string: 00002/010/08 000000032767		
Blocker Output:	00002/010/08 000000032767		
Results:	Assertion & Expected Result Actual Result		
	AM-02 Read commands allowed Read commands allowed		
Analysis:	Expected results achieved		

### 4.2.6 HWB-06

Test Case HWB-	06 Variation hwb-06 FastBloc FE (Firewire)		
Case Summary:	HWB-06 Identify read and information commands us	sed 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 a 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 Aug 3 13:46:30 2006 run finish Thu Aug 3 14:06:02 2006		
Test Configuration:	HOST: max HostToBlocker Monitor: chip HostToBlocker PA: aa00111 HostToBlocker Interface: fw BlockerToDrive Monitor: dale BlockerToDrive PA: aa00155 BlockerToDrive Interface: ide Run Environment: IX		
Drives:	Protected drive: 8B 8B is a WDC WD200EB-00CSF0 configured to report 201600 sectors (103 MB)		
Blocker Input:	Commands Sent to Blocker           Count         Commands           1         LK/UNLK CACH           778         READ(10)		
	2 commands sent		
Blocker Output:	Commands Allowed by Blocker         Count       Commands         778       C8=Read DMA		
	2 commands sent, 1 commands allowed		
Results:	Assertion & Expected Result           AM-02 Read commands allowed           AM-03 Access Significant Information unaltered           AM-05 HWB behavior recorded	Actual Result Read commands allowed Access Significant Information unaltered HWB behavior recorded	
	Expected results achieved		

### 4.2.7 HWB-08

Case Summary:	08 Variation hwb-08 FastBloc FE (Firewire) HWB-08 Identify access significant information unmodified by the HWB.		
Assertions Tested:	HWB-08 Identify access significant information unmodified by the HWB.         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:	kbr		
Test Date:	run start Wed Aug 2 13:52:00 2006 run finish Wed Aug 2 13:53:13 2006		
Test Configuration:	HOST: max HostToBlocker Monitor: none HostToBlocker PA: none HostToBlocker Interface: fw BlockerToDrive Monitor: none BlockerToDrive PA: none BlockerToDrive Interface: ide Run Environment: helix		
Drives:	Protected drive: BE BE is a WDC WD2000JB-00KFA0 with 390721968 sectors (200 GB)		
Blocker Output:	cmd: partab hwb-08 max kbr /dev/sdc be -all 390721968 total number of sectors		
Results:	Assertion & Expected Result         Actual Result           AM-03 Access Significant Information unaltered         Access Significant Information unaltered		
Analysis:	Expected results achieved		

### 4.2.8 HWB-09

	09 Variation hwb-09 FastBloc FE (Firewire)	
Case Summary:	HWB-09 Determine if an error on the protected drive is returned to the host.	
Assertions	HWB-AM-04 If the host sends an operation to the HWB and if the operation results in an unresolved error on the protected	
Tested:	storage device, then the HWB shall return an error status code to the host.	
Tester Name:	kbr	
Test Date:	run start Wed Aug 2 13:53:37 2006	
	run finish Wed Aug 2 13:55:39 2006	
Test	HOST: max	
Configuration:	HostToBlocker Monitor: none	
	HostToBlocker PA: none	
	HostToBlocker Interface: fw	
	BlockerToDrive Monitor: none	
	BlockerToDrive PA: none	
	BlockerToDrive Interface: ide	
	Run Environment: helix	
Drives:	Protected drive: BE	
	BE is a WDC WD2000JB-00KFA0 with 390721968 sectors (200 GB)	
Blocker Output:	24320/254/63 (max cyl/hd values)	
	24321/255/63 (number of cyl/hd)	
	390721968 total number of sectors	
	cmd: diskchg hwb-09 max kbr /dev/sdc -read 490721968 0 1	
	Disk addr lba 490721968 C/H/S 30546/7/38 offset 0	
	Disk read error 0xFFFFFFF at sector 30546/7/38	
Results:	Assertion & Expected Result Actual Result	
	AM-04 Error code returned Error code returned	
Analysis:	Expected results achieved	

#### About the National Institute of Justice

NIJ is the research, development, and evaluation agency of the U.S. Department of Justice. NIJ's mission is to advance scientific research, development, and evaluation to enhance the administration of justice and public safety. NIJ's principal authorities are derived from the Omnibus Crime Control and Safe Streets Act of 1968, as amended (see 42 U.S.C. §§ 3721–3723).

The NIJ Director is appointed by the President and confirmed by the Senate. The Director establishes the Institute's objectives, guided by the priorities of the Office of Justice Programs, the U.S. Department of Justice, and the needs of the field. The Institute actively solicits the views of criminal justice and other professionals and researchers to inform its search for the knowledge and tools to guide policy and practice.

#### **Strategic Goals**

NIJ has seven strategic goals grouped into three categories:

#### Creating relevant knowledge and tools

- 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.

#### Agency management

- 6. Practice fairness and openness in the research and development process.
- 7. Ensure professionalism, excellence, accountability, cost-effectiveness, and integrity in the management and conduct of NIJ activities and programs.

#### **Program Areas**

In addressing these strategic challenges, the Institute is involved in the following program areas: crime control and prevention, including policing; drugs and crime; justice systems and offender behavior, including corrections; violence and victimization; communications and information technologies; critical incident response; investigative and forensic sciences, including DNA; lessthan-lethal technologies; officer protection; education and training technologies; testing and standards; technology assistance to law enforcement and corrections agencies; field testing of promising programs; and international crime control.

In addition to sponsoring research and development and technology assistance, NIJ evaluates programs, policies, and technologies. NIJ communicates its research and evaluation findings through conferences and print and electronic media.

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