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**REPORT**

**Test Results for Forensic Media Preparation Tool:  
Image MASSter Solo-4 Forensics; Software Version 4.2.63.0**

**National Institute of  
Justice website**

**U.S. Department of Justice  
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DEC. 2011

**Test Results for Forensic Media  
Preparation Tool: Image MASter Solo-4  
Forensics; Software Version 4.2.63.0**

NCJ 235711



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This report was prepared for the National Institute of Justice, U.S. Department of Justice, by the Office of Law Enforcement Standards of the National Institute of Standards and Technology under Interagency Agreement 2003-IJ-R-029.

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**December 2010**

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## Introduction

The Computer Forensics Tool Testing (CFTT) program is a joint project of the National Institute of Justice (NIJ), the U.S. Department of Homeland Security (DHS), and the National Institute of Standards and Technology 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, U.S. Internal Revenue Service Criminal Investigation Division Electronic Crimes Program, and DHS's Bureau of Immigration and Customs Enforcement, U.S. Customs and Border Protection 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. The CFTT approach to 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 website](#) for review and comment by the computer forensics community.

This document reports the results from testing the wipeout function of Image MASSter Solo-4 Forensics using Software Version 4.2.63.0, against the *Forensic Media Preparation Tool Test Assertions and Test Plan Version 1.0* available at the

[CFTT website](#).

Test results for other devices and software packages using the CFTT tool methodology can be found on [NIJ's computer forensics tool testing web page](#).

## How to Read This Report

This report is divided into four sections. The first section is a summary of the results from the test runs. This section is sufficient for most readers to assess the suitability of the tool for the intended use. The remaining sections of the report describe how the tests were conducted and provide documentation of test case details that support the report summary. Section 2 gives the selection of each test case from the set of possible cases defined in the test plan for forensic media preparation tools. The test cases are selected, in general, based on features offered by the tool. Section 3 lists hardware and software used to run the test cases with links to additional information about the items used. Section 4 contains

a description of each test case listing all test assertions that apply, the expected result and the actual result. Please refer to the vendor's owner manual for guidance on using the tool.



# Test Results for Forensic Media Preparation Tool

Tool Tested: Image MASter Solo-4 Forensics  
Version: 4.2.63.0  
Serial No. 350280  
Run Environments: Custom

Supplier: Intelligent Computer Solutions, Inc  
9350 Eton Ave.  
Chatsworth, CA 91311  
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WWW: <http://www.ics-iq.com/index.cfm>

## 1. Results Summary

The Image MASter Solo-4 Forensics is a multifunctional forensics hand-held disk duplicator. It supports disk wiping on drives attached to the *Evidence Collecting* interface. The wipeout function supports three modes for executing a drive wipe: single pass, full Department of Defense (DoD) Sanitization, and secure erase.

The following anomalies were observed for the Image MASter Solo-4:

- For one particular hard drive model used in testing, Seagate ST3160815AS, the Solo-4 device halted after drive identification and did not erase any sectors. (Test case FMP-02-SATA48.)
- The Solo-4 did not handle drives correctly if there was a Device Configuration Overlay (DCO) present on the test drive. The following three behaviors were observed:
  - Test Case FMP-03-DCO: The DCO was not erased and the 48 visible sectors immediately preceding the DCO also were not erased. However, the remaining visible sectors were erased.
  - Test case FMP-03-DCO2: The last sector of the DCO was not erased. All other sectors, both hidden and visible, were erased.
  - Test cases FMP-03-DCO-HPA and FMP-04-DCO-HPA: The sectors in the DCO were not erased. All visible sectors and all sectors in the Host Protected Area (HPA) were erased.

The following table provides a quick overview of the test case results:

Test Case	First Sector Overwritten	Last Sector Overwritten	Unchanged Sectors	
			First	Last
FMP-01-ATA28	0	156301487		
FMP-01-ATA48	0	488397167		
FMP-01-SATA28	0	78140159		
FMP-01-SATA48	0	312581807		
FMP-01-USB	0	488397167		
FMP-02-ATA28	0	156301487		
FMP-02-ATA48	0	490234751		
FMP-02-SATA28	0	156301487		
FMP-02-SATA48	n/a	n/a	0	312581807
FMP-03-DCO	0	146301439	146301440	156301487
FMP-03-DCO-2	0	156301486	156301487	156301487
FMP-03-HPA	0	390721967		
FMP-03-DCO-HPA	0	478397167	478397168	488397167
FMP-04-DCO	0	976773167		
FMP-04-DCO-HPA	0	380721967	380721968	390721967
FMP-04-HPA	0	234441647		
FMP-05	NA	NA	NA	

## 2. Test Case Selection

The Image MASSter Solo-4 Forensics was only tested for its ability to overwrite sectors of disk drives attached to the *Evidence Collection* interface. The device supports three wipe modes: (1) a User mode that overwrites target drives using the ATA WRITE command, (2) a Secure Erase mode where the device issues the ATA SECURITY ERASE command and (3) a multi-pass DoD wipe command.

The test cases were selected from cases defined by *Forensic Media Preparation Tool Test Assertions and Test Plan Version 1.0* based on features supported by this tool.

The following wipeout modes were selected in testing.

Test Case	Mode
FMP-01-ATA28	User
FMP-01-ATA48	DoD
FMP-01-SATA28	User
FMP-01-SATA48	DoD
FMP-01-USB	User
FMP-02-ATA28	Secure Erase
FMP-02-ATA48	Secure Erase
FMP-02-SATA28	Secure Erase
FMP-02-SATA48	Secure Erase
FMP-03-DCO	User
FMP-03-DCO-2	User

FMP-03-DCO-HPA	User
FMP-03-HPA	DoD
FMP-04-DCO	Secure Erase
FMP-04-DCO-HPA	Secure Erase
FMP-04-HPA	Secure Erase
FMP-05	Secure Erase

The following source interfaces were used in testing: USB, ATA28, ATA48, SATA28, and SATA48.

### 3. Test Materials

#### 3.1 Support Software

Several programs were used in the setup and analysis of the test drives. These include **hdat2** (download from: <http://www.hdat2.com/download.html>), **dsumm** (download from: <http://www.cftt.nist.gov/>), **ransom** (download from: <http://www.cftt.nist.gov/>), and **diskwipe** from **FS-TST Release 2.0** (download from: <http://www.cftt.nist.gov/diskimaging/fs-tst20.zip>).

The **hdat2** program is used to create, remove and document hidden areas on a drive.

The **dsumm** program analyzes the content of a hard drive. It produces a summary of disk contents in terms of counts for each byte value present on the drive. For example, if a drive can contain 10GB (19531250 sectors of 512 bytes per sector) and the drive is wiped with zero bytes, then **dsumm** reports 10,000,000,000 zero bytes. The program also prints the first sector found with printable ASCII content.

The **ransom** program examines a hard drive to identify sectors that do not contain the content written to the drive by the **diskwipe** program. The **ransom** output is a list of sector ranges classified as either *overwritten* or *unchanged*.

The **diskwipe** program initializes a hard drive with known content.

#### 3.2 Test Drive Creation

The following steps are used to setup a test drive:

1. The drive is initially filled with known content by the **diskwipe** program from FS-TST. The **diskwipe** program writes the sector address to each sector in both C/H/S and LBA format. The remainder of the sector bytes are set to a constant fill value unique for each drive. The fill value is noted in the **diskwipe** tool log file.
2. The **dsumm** program analyzes the drive contents. This documents the content of the drive. Each sector has unique content after the setup.

3. If the drive is intended for hidden area tests (FMP-03, FMP-04), an HPA, a DCO or DCO+HPA are created.
4. The drive size after creation of a hidden area is recorded.

### 3.3 Test Drive Analysis

The following steps are used to analyze a test drive after it has been wiped by the tool under test:

The size of the drive is recorded. This determines if the tool changes the size of a hidden area.

Any hidden areas still remaining on the drive are removed.

The **dsum** program is run to determine the final content of the drive.

The **ransum** program is run to classify sectors as either *overwritten* or *unchanged*.

### 3.4 Test Drives

The following hard drives were used in testing. The column labeled **Test Case** identifies the test case. The fill value written by **diskwipe** to initialize the drive is reported in the column labeled **Target Fill**. The column labeled **Sectors** is the size of the drive with no DCO or HPA. The column labeled **Model** is the model of the drive as returned by the ATA IDENTIFY DEVICE command. The column labeled **Serial #** is the serial number as returned by the ATA IDENTIFY DEVICE command.

Test Case	Target Fill (hex value)	Sectors	Model	Serial #
FMP-01-ATA28	0xFF	156301488	WDC WD800BB-75CAA0	WD-WMA8E2108916
FMP-01-ATA48	0xF6	488397168	WDC WD2500JB-00GVC0	WD-WCAL78188039
FMP-01-SATA28	0x5A	78140160	FUJITSU MHW2040BH	K10XT7B278AP
FMP-01-SATA48	0x90	312581808	ST3160815AS	9RX7Y1DP
FMP-01-USB	0xFF	488397168	WD2500JB-00FUA0	
FMP-02-ATA28	0x00	156301488	Hitachi HTS541680J9AT00	SB0241HGGAWN9E
FMP-02-ATA48	0x00	490234752	Maxtor 7Y250P0	Y63FSHTE
FMP-02-SATA28	0x00	156301488	Hitachi HDS721680PLA380	PVF804Z31NKPSN
FMP-02-SATA48	0x00	312581808	ST3160815AS	9RX7Y1DP
FMP-03-DCO	0x00	156301488	FUJITSU MHW2080AT	K004T832CK2R
FMP-03-DCO-2	0xFF	156301488	Hitachi HTS541680J9AT00	SB0241HGGAWN9E
FMP-03-HPA	0xF6	390721968	TOSHIBA MK2049GSY	788DT0FLT
FMP-03-DCO-HPA	0xFF	488397168	WDC WD2500JB-00GVC0	WD-WCAL78188039
FMP-04-DCO	0x00	976773168	SAMSUNG HM500LI	S1HMJD0Q908367
FMP-04-DCO-HPA	0x00	390721968	TOSHIBA MK2049GSY	788DT0FLT
FMP-04-HPA	0x00	234441648	WDC WD1200JD-00GBB0	WD-WMAES2049679
FMP-05	NA	156301488	WDC WD800BB-75CAA0	WD-WMA8E2108916

The table that follows lists the drive configurations for hidden sector test cases. The column labeled **Test Case** identifies the test case. The column labeled **Size** is the number of visible sectors presented to the device for the test case. The size of the drive including both visible and hidden sectors is reported in the column labeled **Total**. The column labeled **Hidden** is the size in sectors of the hidden area.

Test Case	Size	Total	Hidden (DCO+HPA)
FMP-03-DCO	146301488	156301488	10000000
FMP-03-DCO-2	146301488	156301488	10000000
FMP-03-DCO-HPA	463397168	488397168	25000000 (10000000+15000000)
FMP-03-HPA	15000001	390721968	15000000
FMP-04-DCO	966773168	976773168	10000000
FMP-04-DCO-HPA	365721968	390721968	25000000 (10000000+15000000)
FMP-04-HPA	375721968	390721968	15000000

## 4. Test Results

The main item of interest for interpreting the test results is determining the conformance of the tool under test with the test assertions. Conformance with each assertion tested by a given test case is evaluated by examining the **Log Highlights** box of the test report details.

### 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 and version of tool tested.
Case Summary:	Test case summary from <i>Forensic Media Preparation Tool Test Assertions and Test Plan Version 1.0</i> .
Assertions:	The test assertions applicable to the test case, selected from <i>Forensic Media Preparation Tool Test Assertions and Test Plan Version 1.0</i> .
Tester Name:	Name or initials of person executing test procedure.
Analysis Host:	Host used to setup test drive and analyze final drive state.
Test Host:	Host computer executing the test.
Test Date:	Time and date that test was started.
Test Drive:	Drive erased by the tool under test.
Source Setup:	Report of the native drive size, the size of any hidden areas, the apparent size of the drive (as reported by an ATA IDENTIFY DEVICE command) and an analysis of initial drive contents.
Tool Settings:	Report of tool parameters set for each test run.
Log Highlights:	Report of the state of the drive after executing the tool under test, including the apparent drive size, size of hidden area and analysis of drive contents. The ASCII content of the first non-binary-zero sector is reported.
Results:	Expected and actual results for each assertion tested.
Analysis:	Whether or not the expected results were achieved.











## 4.2.4 FMP-01-SATA48

Test Case FMP-01-SATA48 Image MASter Solo-4 version 4.2.63.0					
Case Summary:	FMP-01. Overwrite visible sectors using WRITE commands.				
Assertions:	FMP-CA-01 All visible sectors shall be overwritten with the specified benign data.				
Tester Name:	csr				
Analysis host:	frank				
Test host:	none				
Test date:	Sun Jul 11 07:26:24 2010				
Test drive:	43-SATA				
Source Setup:	<p>Initial setup size: 312581808 from total of 312581808 (with 0 hidden)            IDE disk: Model (ST3160815AS) serial # (9RX7Y1DP)</p> <p>Sector 0 is first sector with printable text            ===== Start text =====            00000/000/01 000000000000cc            ccc            ccc            ccc            ccc            ccc            ccc            ccc            ccc            ccc            ===== End text Sector 0 =====            9 &lt;new line&gt; characters inserted for readability</p> <p>Totals for all sectors            summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...            312581808 00 312581808 20 ( ) 625163616 2F (/)            1850492169 30 (0) 906528227 31 (1) 696435016 32 (2)            541016511 33 (3) 522787395 34 (4) 514450557 35 (5)            478352540 36 (6) 458495114 37 (7) 458481159 38 (8)            449761088 39 (9) 151914758688 43 (C)</p> <p>Totals for non-ASCII sectors            summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...            160041885696 bytes, 312581808 sectors, 14 distinct values seen            312581808 sectors have printable text</p>				
Tool Settings:	Mode: DoD Iteration: 3 Pattern: 0xF6				
Log Highlights:	<p>Size after tool runs: 312581808 from total of 312581808 (with 0 hidden)            Analysis of tool result --            Totals for all sectors            summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...            160041885696 F6            Totals for non-ASCII sectors            summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...            160041885696 F6</p> <p>160041885696 bytes, 312581808 sectors, 1 distinct values seen            No sectors have printable text</p> <p>Runs of Sectors Unchanged or Overwritten            First Sector Last Sector State            0 -- 312581807 Overwritten</p>				
Results:	<table border="1"> <thead> <tr> <th>Assertion &amp; Expected Result</th> <th>Actual Result</th> </tr> </thead> <tbody> <tr> <td>FMP-CA-01 Visible sectors overwritten</td> <td>as expected</td> </tr> </tbody> </table>	Assertion & Expected Result	Actual Result	FMP-CA-01 Visible sectors overwritten	as expected
Assertion & Expected Result	Actual Result				
FMP-CA-01 Visible sectors overwritten	as expected				
Analysis:	Expected results achieved				



## 4.2.6 FMP-02-ATA28

Test Case FMP-02-ATA28 Image MASter Solo-4 version 4.2.63.0							
Case Summary:	FMP-02. Overwrite visible sectors using an ERASE command.						
Assertions:	FMP-AO-03 If the tool supports overwrite command selection and an ERASE command is selected then all visible sectors are overwritten.						
Tester Name:	csr						
Analysis host:	frank						
Test host:	none						
Test date:	Wed Jul 14 09:25:59 2010						
Test drive:	14-LAP						
Source Setup:	<p>Initial setup size: 156301488 from total of 156301488 (with 0 hidden)            IDE disk: Model (Hitachi HTS541680J9AT00) serial # (SB0241HGGAWN9E)</p> <p>Sector 0 is first sector with printable text            ===== Start text =====            00000/000/01 000000000000            ===== End text Sector 0 =====            1 &lt;new line&gt; character inserted for readability</p> <p>Totals for all sectors            summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...            156301488 00 75962523168 14 156301488 20 ( )            312602976 2F (/) 1051401436 30 (0) 387451758 31 (1)            303557105 32 (2) 269597920 33 (3) 267115444 34 (4)            259739282 35 (5) 234788791 36 (6) 223427887 37 (7)            222956329 38 (8) 218596784 39 (9)</p> <p>Totals for non-ASCII sectors            summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...            80026361856 bytes, 156301488 sectors, 14 distinct values seen            156301488 sectors have printable text</p>						
Tool Settings:	Mode: Secure Erase Iteration: 1 Pattern: 00						
Log Highlights:	<p>Size after tool runs: 156301488 from total of 156301488 (with 0 hidden)            Analysis of tool result --            Totals for all sectors            summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...            80026361856 00            Totals for non-ASCII sectors            summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...            80026361856 00</p> <p>80026361856 bytes, 156301488 sectors, 1 distinct values seen            No sectors have printable text</p> <p>Runs of Sectors Unchanged or Overwritten            First Sector      Last Sector      State                              0 --      156301487      Overwritten</p>						
Results:	<table border="1"> <thead> <tr> <th>Assertion &amp; Expected Result</th> <th>Actual Result</th> </tr> </thead> <tbody> <tr> <td>FMP-AO-03 Visible sectors erased</td> <td>as expected</td> </tr> </tbody> </table>		Assertion & Expected Result	Actual Result	FMP-AO-03 Visible sectors erased	as expected	
Assertion & Expected Result	Actual Result						
FMP-AO-03 Visible sectors erased	as expected						
Analysis:	Expected results achieved						





<b>Test Case FMP-02-SATA28 Image MASter Solo-4 version 4.2.63.0</b>		
	FMP-AO-03 Visible sectors erased	as expected
Analysis:	Expected results achieved	

## 4.2.9 FMP-02-SATA48

<b>Test Case FMP-02-SATA48 Image MASter Solo-4 version 4.2.63.0</b>	
Case Summary:	FMP-02. Overwrite visible sectors using an ERASE command.
Assertions:	FMP-AO-03 If the tool supports overwrite command selection and an ERASE command is selected then all visible sectors are overwritten.
Tester Name:	csr
Analysis host:	frank
Test host:	none
Test date:	Tue Jul 20 11:13:28 2010
Test drive:	43-SATA
Source Setup:	<p>Initial setup size: 312581808 from total of 312581808 (with 0 hidden)  IDE disk: Model (ST3160815AS) serial # (9RX7Y1DP)</p> <p>Sector 0 is first sector with printable text  ===== Start text =====  00000/000/01 000000000000cc  cc  cc  cc  cc  cc  cc  cc  cc  cc  ===== End text Sector 0 =====  9 &lt;new line&gt; characters inserted for readability</p> <p>Totals for all sectors  summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...  312581808 00 312581808 20 ( ) 625163616 2F (/)  1850492169 30 (0) 906528227 31 (1) 696435016 32 (2)  541016511 33 (3) 522787395 34 (4) 514450557 35 (5)  478352540 36 (6) 458495114 37 (7) 458481159 38 (8)  449761088 39 (9) 151914758688 43 (C)</p> <p>Totals for non-ASCII sectors  summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...  160041885696 bytes, 312581808 sectors, 14 distinct values seen  312581808 sectors have printable text</p>
Tool Settings:	Mode: Secure Erase Iteration: 1 Pattern: 00
Log Highlights:	Size after tool runs: 312581808 from total of 312581808 (with 0 hidden) Analysis of tool result --  Sector 0 is first sector with printable text ===== Start text ===== 00000/000/01 000000000000cc cc cc cc cc cc cc cc cc cc ===== End text Sector 0 =====

Test Case FMP-02-SATA48 Image MASter Solo-4 version 4.2.63.0						
<pre> 9 &lt;new line&gt; characters inserted for readability  Totals for all sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...  312581808 00          312581808 20 ( )      625163616 2F ( / ) 1850492169 30 (0)     906528227 31 (1)     696435016 32 (2)  541016511 33 (3)     522787395 34 (4)     514450557 35 (5)  478352540 36 (6)     458495114 37 (7)     458481159 38 (8)  449761088 39 (9)    151914758688 43 (C)  Totals for non-ASCII sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...  160041885696 bytes, 312581808 sectors, 14 distinct values seen 312581808 sectors have printable text  Runs of Sectors Unchanged or Overwritten First Sector      Last Sector      State  0 --            312581807      Unchanged </pre>						
Results:	<table border="1"> <thead> <tr> <th>Assertion &amp; Expected Result</th> <th>Actual Result</th> </tr> </thead> <tbody> <tr> <td>FMP-AO-03 Visible sectors erased</td> <td>No sectors erased</td> </tr> </tbody> </table>	Assertion & Expected Result	Actual Result	FMP-AO-03 Visible sectors erased	No sectors erased	
Assertion & Expected Result	Actual Result					
FMP-AO-03 Visible sectors erased	No sectors erased					
Analysis:	Expected results not achieved					

## 4.2.10 FMP-03-DCO

Test Case FMP-03-DCO Image MASter Solo-4 version 4.2.63.0	
Case Summary:	FMP-03. Overwrite hidden sectors using WRITE commands.
Assertions:	<pre> FMP-CA-01 All visible sectors shall be overwritten with the specified benign data. FMP-AO-01 If there is a hidden area present and the tool supports overwriting sectors contained in a hidden area, then all sectors contained in the hidden area shall be overwritten with the specified benign data. FMP-AO-02 A hidden area may optionally be removed from the storage device. </pre>
Tester Name:	csr
Analysis host:	frank
Test host:	none
Test date:	Tue Jul 20 07:33:14 2010
Test drive:	19-LAP
Source Setup:	<pre> Size with DCO: 146301488 74.91 GB (10000000 sectors in DCO) Initial setup size: 146301488 from total of 156301488 (with 10000000 hidden) IDE disk: Model (FUJITSU MHW2080AT) serial # (K004T832CK2R)  Sector 0 is first sector with printable text ===== Start text ===== 00000/000/01 000000000000 ===== End text Sector 0 ===== 1 &lt;new line&gt; character inserted for readability  Totals for all sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...  146301488 00          71057021680 19          146301488 20 ( ) 292602976 2F ( / )    1031882339 30 (0)      406485727 31 (1)  259778655 32 (2)     259680143 33 (3)     248749661 34 (4)  236399701 35 (5)     212482354 36 (6)     202891886 37 (7)  202891883 38 (8)     202891875 39 (9)  Totals for non-ASCII sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...  74906361856 bytes, 146301488 sectors, 14 distinct values seen 146301488 sectors have printable text </pre>
Tool	Mode: User



Test Case FMP-03-DCO Image MASter Solo-4 version 4.2.63.0										
Settings:	Iteration: 1 Pattern: 00									
Log Highlights:	<p>Size after tool runs: 156301488 from total of 156301488 (with 0 hidden) Analysis of tool result --</p> <p>Sector 146301440 is first sector with printable text            ===== Start text =====            145140/005/06 000146301440            ===== End text Sector 146301440 =====            1 &lt;new line&gt; character inserted for readability</p> <p>Totals for all sectors            summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...            74916337328 00 4850023280 19 10000048 20 ( )                20000096 2F ( / ) 60856330 30 ( 0 ) 38671912 31 ( 1 )                14962270 32 ( 2 ) 14962318 33 ( 3 ) 23410477 34 ( 4 )                26136711 35 ( 5 ) 13227260 36 ( 6 ) 12591280 37 ( 7 )                12591277 38 ( 8 ) 12591269 39 ( 9 )</p> <p>Totals for non-ASCII sectors            summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...            74906337280 00</p> <p>80026361856 bytes, 156301488 sectors, 14 distinct values seen            10000048 sectors have printable text</p> <p>Runs of Sectors Unchanged or Overwritten            First Sector      Last Sector      State                      0 --      146301439      Overwritten                  146301440 --      156301487      Unchanged</p>									
Results:	<table border="1"> <thead> <tr> <th>Assertion &amp; Expected Result</th> <th>Actual Result</th> </tr> </thead> <tbody> <tr> <td>FMP-CA-01 Visible sectors overwritten</td> <td>as expected</td> </tr> <tr> <td>FMP-AO-01 Hidden sectors overwritten</td> <td>DCO not overwritten</td> </tr> <tr> <td>FMP-AO-02 Hidden area final state is</td> <td>removed</td> </tr> </tbody> </table>	Assertion & Expected Result	Actual Result	FMP-CA-01 Visible sectors overwritten	as expected	FMP-AO-01 Hidden sectors overwritten	DCO not overwritten	FMP-AO-02 Hidden area final state is	removed	
Assertion & Expected Result	Actual Result									
FMP-CA-01 Visible sectors overwritten	as expected									
FMP-AO-01 Hidden sectors overwritten	DCO not overwritten									
FMP-AO-02 Hidden area final state is	removed									
Analysis:	Expected results not achieved									

## 4.2.11 FMP-03-DCO-2

Test Case FMP-03-DCO-2 Image MASter Solo-4 version 4.2.63.0	
Case Summary:	FMP-03. Overwrite hidden sectors using WRITE commands.
Assertions:	<p>FMP-CA-01 All visible sectors shall be overwritten with the specified benign data.            FMP-AO-01 If there is a hidden area present and the tool supports overwriting sectors contained in a hidden area, then all sectors contained in the hidden area shall be overwritten with the specified benign data.            FMP-AO-02 A hidden area may optionally be removed from the storage device.</p>
Tester Name:	csr
Analysis host:	frank
Test host:	none
Test date:	Sat Oct 16 10:24:37 2010
Test drive:	14-LAP
Source Setup:	<p>Size with DCO: 146301488 74.91 GB (10000000 sectors in DCO)            Initial setup size: 146301488 from total of 156301488 (with 10000000 hidden)            IDE disk: Model (Hitachi HTS541680J9AT00) serial # (SB0241HGGAWN9E)</p> <p>Sector 0 is first sector with printable text            ===== Start text =====            00000/000/01 000000000000            ===== End text Sector 0 =====            1 &lt;new line&gt; character inserted for readability</p> <p>Totals for all sectors</p>

Test Case FMP-03-DCO-2 Image MASter Solo-4 version 4.2.63.0									
	<pre>summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ... 146301488 00      71102523168 14      146301488 20 ( ) 292602976 2F (/)    993890325 30 (0)    358021591 31 (1) 285788447 32 (2)    254136647 33 (3)    248114389 34 (4) 238370729 35 (5)    220867833 36 (6)    211263767 37 (7) 211263764 38 (8)    196915244 39 (9)  Totals for non-ASCII sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...  74906361856 bytes, 146301488 sectors, 14 distinct values seen 146301488 sectors have printable text</pre>								
Tool Settings:	<pre>Mode: User Iteration: 1 Pattern: FF</pre>								
Log Highlights:	<pre>Size after tool runs: 156301488 from total of 156301488 (with 0 hidden) Analysis of tool result --  Sector 156301487 is first sector with printable text ===== Start text ===== 09729/080/63 000156301487 ===== End text Sector 156301487 ===== 1 &lt;new line&gt; character inserted for readability  Totals for all sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...   1 00      486 14      1 20 ( )   2 2F (/)    7 30 (0)    2 31 (1)   1 32 (2)    2 33 (3)    1 34 (4)   1 35 (5)    2 36 (6)    2 37 (7)   2 38 (8)    2 39 (9)   80026361344 FF  Totals for non-ASCII sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...   80026361344 FF  80026361856 bytes, 156301488 sectors, 15 distinct values seen 1 sector has printable text  Runs of Sectors Unchanged or Overwritten First Sector      Last Sector      State   0 --      156301486   Overwritten 156301487 --      156301487   Unchanged</pre>								
Results:	<table border="1"> <thead> <tr> <th>Assertion &amp; Expected Result</th> <th>Actual Result</th> </tr> </thead> <tbody> <tr> <td>FMP-CA-01 Visible sectors overwritten</td> <td>as expected</td> </tr> <tr> <td>FMP-AO-01 Hidden sectors overwritten</td> <td>Last sector of DCO not erased</td> </tr> <tr> <td>FMP-AO-02 Hidden area final state is</td> <td>removed</td> </tr> </tbody> </table>	Assertion & Expected Result	Actual Result	FMP-CA-01 Visible sectors overwritten	as expected	FMP-AO-01 Hidden sectors overwritten	Last sector of DCO not erased	FMP-AO-02 Hidden area final state is	removed
Assertion & Expected Result	Actual Result								
FMP-CA-01 Visible sectors overwritten	as expected								
FMP-AO-01 Hidden sectors overwritten	Last sector of DCO not erased								
FMP-AO-02 Hidden area final state is	removed								
Analysis:	Expected results not achieved								





Test Case FMP-03-HPA Image MASter Solo-4 version 4.2.63.0											
	<p>Totals for all sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...  390721968 00            390721968 20 ( ) 189890876448 26 (&amp;)  781443936 2F (/)    2245711842 30 (0)    1085211682 31 (1)  924880030 32 (2)    760620597 33 (3)    652451193 34 (4)  638095887 35 (5)    593223154 36 (6)    568337370 37 (7)  568314834 38 (8)    559036707 39 (9)</p> <p>Totals for non-ASCII sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...</p> <p>200049647616 bytes, 390721968 sectors, 14 distinct values seen 390721968 sectors have printable text</p>										
Tool Settings:	Mode: DoD Iteration: 1 Pattern: F6										
Log Highlights:	Size after tool runs: 390721968 from total of 390721968 (with 0 hidden) Analysis of tool result -- Totals for all sectors summary format: <count> <hex value> <(actual character if printable)> ... 200049647616 F6 Totals for non-ASCII sectors summary format: <count> <hex value> <(actual character if printable)> ... 200049647616 F6  200049647616 bytes, 390721968 sectors, 1 distinct values seen No sectors have printable text  Runs of Sectors Unchanged or Overwritten First Sector            Last Sector            State 0 --            390721967            Overwritten										
Results:	<table border="1"> <thead> <tr> <th>Assertion &amp; Expected Result</th> <th>Actual Result</th> </tr> </thead> <tbody> <tr> <td>FMP-CA-01 Visible sectors overwritten</td> <td>as expected</td> </tr> <tr> <td>FMP-AO-01 Hidden sectors overwritten</td> <td>as expected</td> </tr> <tr> <td>FMP-AO-02 Hidden area final state is</td> <td>removed</td> </tr> </tbody> </table>	Assertion & Expected Result	Actual Result	FMP-CA-01 Visible sectors overwritten	as expected	FMP-AO-01 Hidden sectors overwritten	as expected	FMP-AO-02 Hidden area final state is	removed		
Assertion & Expected Result	Actual Result										
FMP-CA-01 Visible sectors overwritten	as expected										
FMP-AO-01 Hidden sectors overwritten	as expected										
FMP-AO-02 Hidden area final state is	removed										
Analysis:	Expected results achieved										

#### 4.2.14 FMP-04-DCO

Test Case FMP-04-DCO Image MASter Solo-4 version 4.2.63.0	
Case Summary:	FMP-04. Overwrite hidden sectors using an ERASE command.
Assertions:	FMP-AO-01 If there is a hidden area present and the tool supports overwriting sectors contained in a hidden area, then all sectors contained in the hidden area shall be overwritten with the specified benign data. FMP-AO-02 A hidden area may optionally be removed from the storage device. FMP-AO-03 If the tool supports overwrite command selection and an ERASE command is selected then all visible sectors are overwritten.
Tester Name:	csr
Analysis host:	frank
Test host:	none
Test date:	Wed Oct 6 07:19:27 2010
Test drive:	28-LAP
Source Setup:	Size with DCO: 966773168 494.99 GB (10000000 sectors in DCO) Initial setup size: 966773168 from total of 976773168 (with 10000000 hidden) IDE disk: Model (SAMSUNG HM500LI) serial # (S1HMJDOQ908367)  Sector 0 is first sector with printable text ===== Start text ===== 00000/000/01 000000000000((



Test Case FMP-04-DCO Image MASter Solo-4 version 4.2.63.0

501077077	42 (B)	23940284	43 (C)	2199085762	44 (D)
7174833205	45 (E)	468447150	46 (F)	525321380	47 (G)
514900341	48 (H)	342301620	49 (I)	92671515	4A (J)
369042351	4C (L)	935933960	4D (M)	306710267	4E (N)
270457680	4F (O)	2519734415	50 (P)	5220879305	51 (Q)
694576708	52 (R)	304327143	53 (S)	5742277722	54 (T)
15902439881	55 (U)	2662527484	56 (V)	5413326779	57 (W)
1322661051	58 (X)	1100737359	59 (Y)	129542434	5A (Z)
480791190	5B (I)	1530021825	5C (\)	7580593143	5D (I)
125280091	5E (^)	2736642392	5F (_)	391284075	60 (`)
471678803	61 (a)	570428910	62 (b)	510275037	63 (c)
431001136	64 (d)	1527591192	65 (e)	467204689	66 (f)
649978745	67 (g)	168236427	68 (h)	330106136	69 (i)
1669252908	6A (j)	504412865	6B (k)	312310323	6C (l)
1334447877	6D (m)	628458562	6E (n)	650643387	6F (o)
201598319	70 (p)	700486502	71 (q)	98911849	72 (r)
499858133	73 (s)	1867137373	74 (t)	4814384784	75 (u)
306552297	76 (v)	1612779465	77 (w)	831782596	78 (x)
18823855	79 (y)	580914828	7A (z)	280607036	7B ({)
706327468	7C ( )	2714114344	7D (})	526977663	7E (~)
487451765	7F	1138833221	80	123661648	81
2824025341	82	366536954	83	586783131	84
775622089	85	519799071	86	369869653	87
2021511374	88	303480512	89	5137913138	8A
604397234	8B	627901702	8C	111562168	8D
925886169	8E	282622479	8F	341396319	90
702225221	91	665553076	92	364695367	93
613391059	94	2896648130	95	221080663	96
458538263	97	943622380	98	253249947	99
1237810204	9A	853985245	9B	118136042	9C
438673928	9D	219524564	9E	864441999	9F
2692981946	A0	537793289	A1	5134415487	A2
1929572066	A3	145442015	A4	101105065	A5
2658815638	A6	1092042075	A7	5525501549	A8
2373521688	A9	15675573797	AA	4807653768	AB
910170948	AC	643642842	AD	8112252534	AE
2482283086	AF	611937552	B0	353668728	B1
797046392	B2	468672035	B3	354417922	B4
162005283	B5	1448814423	B6	260247203	B7
1897761248	B8	565610846	B9	4149001951	BA
2649507975	BB	658745041	BC	582514637	BD
2899425384	BE	1210785600	BF	137666779	C0
588924441	C1	1170989063	C2	249582141	C3
6206616	C4	320465956	C5	3711355	C6
420920780	C7	693138406	C8	252234844	C9
1277320445	CA	1082146426	CB	469277288	CC
316354609	CD	293601023	CE	266701551	CF
837823715	D0	664558098	D1	118710652	D2
117902695	D3	817645538	D4	6711103831	D5
273212049	D6	2553366220	D7	245607503	D8
290384750	D9	599774971	DA	464244527	DB
565273595	DC	3115765667	DD	307057585	DE
1476548390	DF	572663952	E0	165916208	E1
1527506536	E2	490491845	E3	643155794	E4
646911932	E5	410878308	E6	1324270449	E7
465864602	E8	461042891	E9	4853812098	EA
1631754935	EB	642433277	EC	978709913	ED
3478808648	EE	1887422583	EF	300462826	F0
740735879	F1	505204494	F2	923715959	F3
707308466	F4	3294013483	F5	718558861	F6
337574435	F7	79162893	F8	374143270	F9
3709933092	FA	1853094643	FB	709152024	FC
1527727186	FD	332543172	FE	1077855388	FF

Totals for non-ASCII sectors  
summary format: <count> <hex value> <(actual character if printable)> ...  
180157733376 00

500107862016 bytes, 976773168 sectors, 255 distinct values seen  
624902595 sectors have printable text







Test Case FMP-04-HPA Image MASter Solo-4 version 4.2.63.0											
	<pre> ===== Start text ===== 00000/000/01 000000000000 ===== End text Sector 0 ===== 1 &lt;new line&gt; character inserted for readability  Totals for all sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...  234441648 00      113938640928 1C          234441648 20 ( )  468883296 2F (/)   1461085523 30 (0)    678339301 31 (1)  497617498 32 (2)   407041791 33 (3)    391715334 34 (4)  376075228 35 (5)   347651457 36 (6)    332766225 37 (7)  332765657 38 (8)   332658242 39 (9)  Totals for non-ASCII sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ...  120034123776 bytes, 234441648 sectors, 14 distinct values seen 234441648 sectors have printable text </pre>										
Tool Settings:	<pre> Mode: Secure Erase Iteration: 1 Pattern: 00 </pre>										
Log Highlights:	<pre> Size after tool runs: 234441648 from total of 234441648 (with 0 hidden) Analysis of tool result -- Totals for all sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ... 120034123776 00 Totals for non-ASCII sectors summary format: &lt;count&gt; &lt;hex value&gt; &lt;(actual character if printable)&gt; ... 120034123776 00  120034123776 bytes, 234441648 sectors, 1 distinct values seen No sectors have printable text  Runs of Sectors Unchanged or Overwritten First Sector      Last Sector      State 0 --             234441647      Overwritten </pre>										
Results:	<table border="1"> <thead> <tr> <th>Assertion &amp; Expected Result</th> <th>Actual Result</th> </tr> </thead> <tbody> <tr> <td>FMP-AO-01 Hidden sectors overwritten</td> <td>as expected</td> </tr> <tr> <td>FMP-AO-02 Hidden area final state is</td> <td>removed</td> </tr> <tr> <td>FMP-AO-03 Visible sectors erased</td> <td>as expected</td> </tr> </tbody> </table>	Assertion & Expected Result	Actual Result	FMP-AO-01 Hidden sectors overwritten	as expected	FMP-AO-02 Hidden area final state is	removed	FMP-AO-03 Visible sectors erased	as expected		
Assertion & Expected Result	Actual Result										
FMP-AO-01 Hidden sectors overwritten	as expected										
FMP-AO-02 Hidden area final state is	removed										
FMP-AO-03 Visible sectors erased	as expected										
Analysis:	Expected results achieved										

## 4.2.17 FMP-05

Test Case FMP-05 Image MASter Solo-4 version 4.2.63.0							
Case Summary:	FMP-05. Detect drive not supporting ERASE command.						
Assertions:	FMP-AO-04 If an overwrite command is selected and the storage device does not support the command then the user is notified.						
Tester Name:	csr						
Analysis host:	frank						
Test host:	none						
Test date:	Wed Jul 28 15:40:35 2010						
Test drive:	56-IDE						
Log Highlights:	Message: Operation failed						
Results:	<table border="1"> <thead> <tr> <th>Assertion &amp; Expected Result</th> <th>Actual Result</th> </tr> </thead> <tbody> <tr> <td>FMP-AO-04 Selected command not supported</td> <td>as expected</td> </tr> </tbody> </table>	Assertion & Expected Result	Actual Result	FMP-AO-04 Selected command not supported	as expected		
Assertion & Expected Result	Actual Result						
FMP-AO-04 Selected command not supported	as expected						
Analysis:	Expected results achieved						

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A component of the Office of Justice Programs, 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).

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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.

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5. Act as an honest broker to identify the information, tools and technologies that respond to the needs of stakeholders.

#### Agency management

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7. Ensure professionalism, excellence, accountability, cost-effectiveness and integrity in the management and conduct of NIJ activities and programs.

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