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CERTIFICATION TEST PLAN

Prepared for:

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Manufacturer System	Unity 5.0.0.0 System
EAC Application No.	**ESSUNITY5000**
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U.S. Election Assistance Commission
VSTL
EAC Lab Code 0704

Revisions

REVISION A

REPORT NO. Test Plan T57936-01, Rev. A

DATE February 28, 2011

REV	DATE	PAGE OR PARAGRAPH AFFECTED	DESCRIPTION OF CHANGES
---	12-21-10	Entire Document	Original Release
A	2-28-11	Section 1.2, Table 1-1	Revised definition for FCA.
A	2-28-11	Section 1.4.1	Added photographs of the A100, A200, and DS200(i) metal diverter and replaced photograph of the DS200(i).
A	2-28-11	Section 1.4.1	Corrected grammatical error.
A	2-28-11	Section 1.4.1	Added verbiage to differentiate between the terms “Election Management System” and “Election Management Suite”.
A	2-28-11	Section 1.4.1	Removed the following sentence: “These digital buttons meet all applicable guidelines regarding size and readability”.
A	2-28-11	Section 1.4.1	Removed the following sentence: “The physical keypad has been tested and modified through consultation with special needs groups”.
A	2-28-11	Section 1.4.1	Removed the following sentence: “The keys are arranged to allow for an intuitive voting session”.
A	2-28-11	Section 1.4.2	Replaced block diagram.
A	2-28-11	Section 1.4.3, Table 1-2	Completed table.
A	2-28-11	Section1.4.3, Table 1-3	Added space where needed.
A	2-28-11	Section 1.4.7	Added additional information pertaining to the results of the Dust and Rain tests.
A	2-28-11	Section 2.2.1	Changed “of” to “by” in the following sentence: “The EMC testing performed by Criterion was directed of iBeta for…”

Revisions

REVISION A

REPORT NO. Test Plan T57936-01, Rev. A

DATE February 28, 2011

REV	DATE	PAGE OR PARAGRAPH AFFECTED	DESCRIPTION OF CHANGES
A	2-28-11	Section 2.2.1	Added "Unity 5.0.0.0".
A	2-28-11	Section 2.3	Added verbiage to clarify the version of the DS200(i) being tested.
A	2-28-11	Section 2.3.1	Added the following: "Since the Unity 5.0.0.0 certification testing does not include the 1.X.X.X branch of firmware…"
A	2-28-11	Section 3.1, Table 3-2	Changed "AVG Free Antivirus" to "AVG Business Antivirus".
A	2-28-11	Section 3.1, Table 3-3	Corrected justification and added missing hash values.
A	2-28-11	Section 3.2, Table 3-7	Added information for the Sip & Puff.
A	2-28-11	Section 3.2	Added second paragraph.
A	2-28-11	Section 3.2, Table 3-8	Added detail on equipment.
A	2-28-11	Section 4.0	Updated RFI list.
A	2-28-11	Section 4.1, Section 2	Corrected typo.
A	2-28-11	Section 4.1, Section 9	Changed sentence to read as follows: "Any anomalies will be formally reported to ES&S and the EAC".
A	2-28-11	Section 4.1.2	Added bulleted list.
A	2-28-11	Section 4.2	Re-worded description of DS200(i) hardware configuration.

Revisions

REVISION	A
REPORT NO.	Test Plan T57936-01, Rev. A
DATE	February 28, 2011

REV	DATE	PAGE OR PARAGRAPH AFFECTED	DESCRIPTION OF CHANGES
A	2-28-11	Section 4.4.1, Table 4.2	Added missing information for Electrical Fast Transient Test.
A	2-28-11	Section 4.4.3	Added the word “not”.
A	2-28-11	Section 4.6	Corrected table reference from “Table 4-1” to “Table 4-3” for TDP evaluation.
A	2-28-11	Table 4-6	Revised table and added missing information.
A	2-28-11	Section 5.1	Added the following sentence: “Incremental reports will be submitted to ES&S and the EAC at the completion of major test areas to communicate progress and results as deemed necessary by the stakeholders”.
A	2-28-11	Section 5.2	Added “and the VVSG” in the following sentence: “The acceptable range for system performance and the expected results for each test case shall be derived from the Unity 5.0.0.0 System documentation and the 2005 VVSG.”
A	2-28-11	Section 6.1	Deleted last paragraph.
A	2-28-11	Section 6.3.2	Added reference to Volume II.
A	2-28-11	Entire Document	Reformatted due to revisions (updated TOC, page numbering, etc.)
A	2-28-11	Entire Document, where applicable	Removed (i)

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1.0 INTRODUCTION

The purpose of this National Certification Test Plan (Test Plan) is to document the procedures that Wyle Laboratories, Inc., will follow to perform certification testing of Election Systems and Software (ES&S) Unity 5.0.0.0 System, to the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (2005 VVSG). The Unity 5.0.0.0 System has been submitted to Wyle Laboratories, Inc., for testing to the EAC 2005 VVSG. Prior to submitting the system for certification testing, ES&S submitted an application to the EAC for certification of the Unity 5.0.0.0 to the requirements of the EAC 2005 VVSG.

At test conclusion, the results of all testing performed as part of this test campaign will be submitted to the EAC in the form of a final report.

1.1 References

The documents listed below were used in the development of the Test Plan and are utilized to perform certification testing.

- Election Assistance Commission 2005 Voluntary Voting System Guidelines, Volume I, Version 1.0, "Voting System Performance Guidelines", and Volume II, Version 1.0, "National Certification Testing Guidelines", dated December 2005
- Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date January 1, 2007
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 1.0, effective date July 2008
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2006 Edition, "NVLAP Procedures and General Requirements (NIST Handbook 150)", dated February 2006
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, "Voting System Testing (NIST Handbook 150-22)", dated May 2008
- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Wyle Laboratories' Test Guidelines Documents: EMI-001A, "Wyle Laboratories' Test Guidelines for Performing Electromagnetic Interference (EMI) Testing", and EMI-002A, "Test Procedure for Testing and Documentation of Radiated and Conducted Emissions Performed on Commercial Products"
- Wyle Laboratories' Quality Assurance Program Manual, Revision 4
- ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"
- ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"
- EAC Requests for Interpretation (listed on www.eac.gov)
- EAC Notices of Clarification (listed on www.eac.gov)

A listing of the Unity 5.0.0.0 System Technical Data Package (TDP) documents submitted for this certification test effort is listed in Section 3.4: Deliverable Materials.

1.0 INTRODUCTION (CONTINUED)

1.2 Terms and Abbreviations

This subsection defines all terms and abbreviations applicable to the development of this Test Plan.

Table 1-1 Terms and Abbreviations

Term	Abbreviation	Definition
Americans with Disabilities Act of 1990	ADA	ADA is a wide-ranging civil rights law that prohibits, under certain circumstances, discrimination based on disability.
Configuration Management	CM	---
Commercial Off the Shelf	COTS	---
United States Election Assistance Commission	EAC	Commission created per the Help America Vote Act of 2002, assigned the responsibility for setting voting system standards and providing for the voluntary testing and certification of voting systems.
Election Data Manager	EDM	Unity EMS data entry component.
Election Management System	EMS	Within the Unity 5.0.0.0 System, the EMS equivalent is the Unity Suite.
Election Reporting Manager	ERM	Unity EMS reporting component.
Election Systems and Software	ES&S	---
Equipment Under Test	EUT	---
Functional Configuration Audit	FCA	Verification of system functions and combination of functions cited in the manufacturer's documentation.
Help America Vote Act	HAVA	Act created by United States Congress in 2002.
National Institute of Standards and Technology	NIST	Government organization created to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhances economic security and improves our quality of life.
Physical Configuration Audit	PCA	Review by accredited test laboratory to compare voting system components submitted for certification testing to the manufacturer's technical documentation, and confirmation the documentation meets national certification requirements. A witnessed build of the executable system is performed to ensure the certified release is built from tested components.
Quality Assurance	QA	---
System Under Test	SUT	---
Technical Data Package	TDP	Manufacturer documentation related to the voting system required to be submitted as a precondition of certification testing.
Test Case Procedure Specifications	TCPS	Wyle-developed document that specifies test items, input specifications, output specifications, environmental needs, special procedural requirements, inter-case dependencies, and all validated test cases that will be executed during the area under test.

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1.0 INTRODUCTION (CONTINUED)

1.2 Terms and Abbreviations (continued)

Table 1-1 Terms and Abbreviations (continued)

Term	Abbreviation	Definition
Uninterruptible Power Supply	UPS	---
Voter Assist Terminal	VAT	Unity 5.0.0.0 ballot marking device and ADA component
Voluntary Voting System Guidelines	EAC 2005 VVSG	Published by the EAC, the third iteration of national level voting system standards.
Wyle Laboratories, Inc.	Wyle	---
Wyle Operating Procedure	WoP	Wyle Test Method or Test Procedure.

1.3 Testing Responsibilities

Wyle will utilize testing from previous test campaigns performed by EAC accredited VSTL's. This section will detail the testing that is accepted by Wyle. All other core and non-core software and hardware certification testing will be conducted under the guidance of Wyle by personnel verified by Wyle to be qualified to perform the testing.

1.3.1 Project Schedule

This information is contained in a Wyle-generated Microsoft Project schedule. This schedule is presented in Appendix C "ES&S Project Schedule". The dates on the schedule are not firm dates but planned estimates presented for informational purposes.

1.3.1.1 Owner Assignments

This information is contained in a Wyle generated Microsoft Project schedule. This schedule is presented in Appendix C "ES&S Project Schedule".

1.3.1.2 Test Case Development

Wyle will utilize the "Wyle Baseline Test Cases" for the Functional Configuration Audit (FCA), Usability and System Integration Tests. These will be augmented with specially designed test cases tailored to the ES&S Unity 5.0.0.0 System. Wyle has designed specific election definition and test cases for the Operational Status Check and the Logic and Accuracy Tests. The "Baseline" functional test cases, "Baseline" usability test cases, and the election definitions are being submitted as part of this test plan package.

1.3.1.3 Test Procedure Development and Validation

Wyle will utilize the Wyle Operating Procedures (WoPs) during the duration of this test program. These procedures are validated and are being submitted as part of the test plan package.

1.3.1.4 Third-Party Tests

Wyle will utilize 3rd party testing to perform the product safety portion of the ES&S Unity 5.0.0.0 system test campaign. Wyle will monitor the product safety tests throughout the duration of testing. The remainder of the tests will be conducted at Wyle's Huntsville, Alabama test facility.

1.0 INTRODUCTION (CONTINUED)

1.3 Testing Responsibilities (continued)

1.3.1 Project Schedule (continued)

1.3.1.5 EAC and Manufacturer Dependencies

This information is contained in a Wyle-generated Microsoft Project schedule. This schedule is presented in Appendix C "ES&S Project Schedule".

1.4 Target of Evaluation Description

The following sections address the design methodology and product description of the Unity 5.0.0.0 System, as taken from the ES&S technical documentation.

1.4.1 System Overview

The ES&S Unity 5.0.0.0 Election System is a comprehensive suite of vote tabulation equipment and software solutions providing end-to-end election management. The Unity 5.0.0.0 voting system includes the election management system, central tabulator, electronic ballot marking device, precinct ballot tabulators, and COTS computing equipment and peripherals.

Election Management System

The Unity 5.0.0.0 Election Management System is an application suite comprised of four components: Election Data Manager, Unity Event Log Service, ElectionWare, and Election Reporting Manager. A

ES&S Unity Election Data Manager (EDM) is the entry point for the Unity Election Management System. Election Data Manager is a single-entry database that stores precinct, office, and candidate information. Data entered for an initial election is stored to a re-useable database to be recalled and edited for all elections that follow. Once an election data is configured and merged, Election Data Manager passes election configuration files to ElectionWare which uses these to format and print ballots, program ballot scanning equipment, and produce Election Day reports.

Unity Event Log Service provides event logging for the ES&S Election Management System. Unity Event Log Service leverages the Windows Event Viewer, included with a standard Windows install, to provide a full account of all events that occur within the ES&S Election Management System.

ElectionWare generates the ballot formats and election programs used by ES&S for the DS200, DS850, and ES&S AutoMARK as well as the parameter files used to configure Election Report Manager (ERM). ElectionWare imports an election definition file generated in EDM and uses the county and election specific information included on this file to create ballot formats and election programs used by ES&S ballot marking equipment and tabulators.

Election Reporting Manager (ERM) generates paper and electronic reports for election workers, candidates, and the media. Jurisdictions can use a separate ERM installation to display updated election totals on a monitor as ballot data is tabulated, and send results reports directly to media outlets. ERM support accumulation and combination of ballot results data from all ES&S tabulators. Precinct and accumulated totals reports provide a means to accommodate candidate and media requests for totals and are available upon demand. High-speed printers are configured as part of the system accumulation/reporting stations - PC and related software. A

1.0 INTRODUCTION (CONTINUED)

1.4 Target of Evaluation Description (continued)

1.4.1 System Overview (continued)

<u>Central Tabulator: DS850</u>

The central tabulator component is the DS850. The DS850 is a high-speed, optical scan central ballot counter. During scanning, the DS850 prints a continuous audit log to a dedicated audit log printer and can print results directly from the scanner to a second connected printer. The scanner saves results internally and to results collection media that officials can use to format and print results from a PC running Election Reporting Manager. The DS850 has an optimum throughput rate of nearly 400 ballots per minute and uses advanced cameras and imaging algorithms to image the front and back of a ballot, evaluate the results and sort ballots into discrete bins to maintain continuous scanning within fractions of a second.

Photograph 1: DS850

1.0 INTRODUCTION (CONTINUED)

1.4 Target of Evaluation Description (continued)

1.4.1 System Overview (continued)

<u>Electronic Ballot Marking Device: AutoMARK Voter Assist Terminal (VAT)</u>

The electronic ballot marking device component is the ES&S AutoMARK Voter Assist Terminal (VAT). The AutoMARK VAT assists voters with disabilities by marking optical scan ballots.

The AutoMARK VAT includes two user interfaces, to accommodate voters who are visually or physically impaired or voters who are more comfortable reading or hearing instructions and choices in an alternative language. The AutoMARK is equipped with a touch screen, and keypad. The touch screen interface includes various colors and effects to prompt and guide the voter through the ballot marking process. Each key has both Braille and printed text labels designed to indicate function and a related shape to help the voter determine its use. A

Regardless whether the voter uses the touch screen or other audio interface, changes can easily be made throughout the voting process by simply navigating back to the appropriate screen and selecting the change or altering selections at the mandatory vote summary screen that closes the ballot marking session.

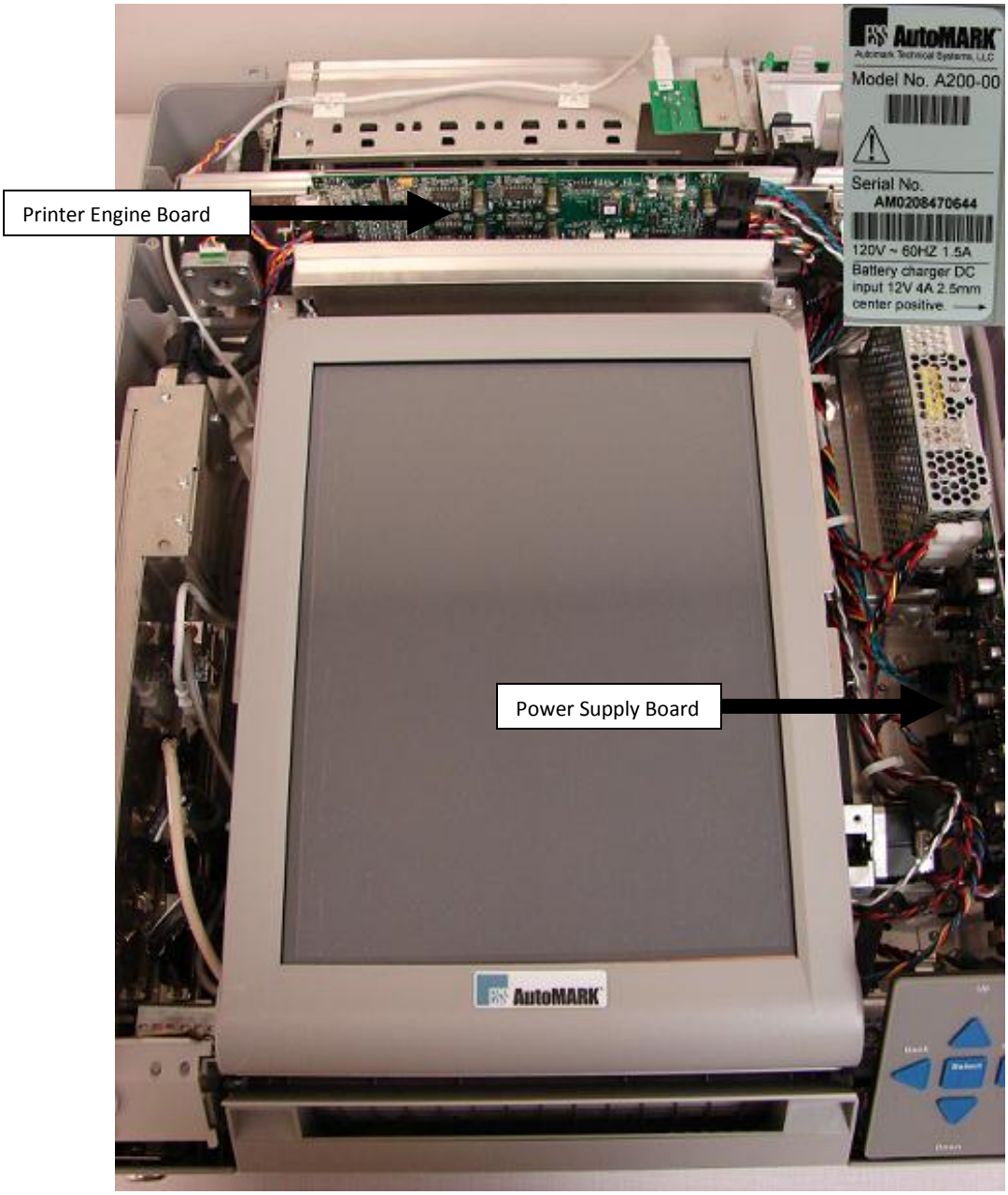
Photograph 2: AutoMARK A200 VAT A

1.0 INTRODUCTION (CONTINUED)

1.4 Target of Evaluation Description (continued)

1.4.1 System Overview (continued)

Presented below is an internal picture of the A200. The Printer Engine Board and the Power Supply Board are inside of the unit.



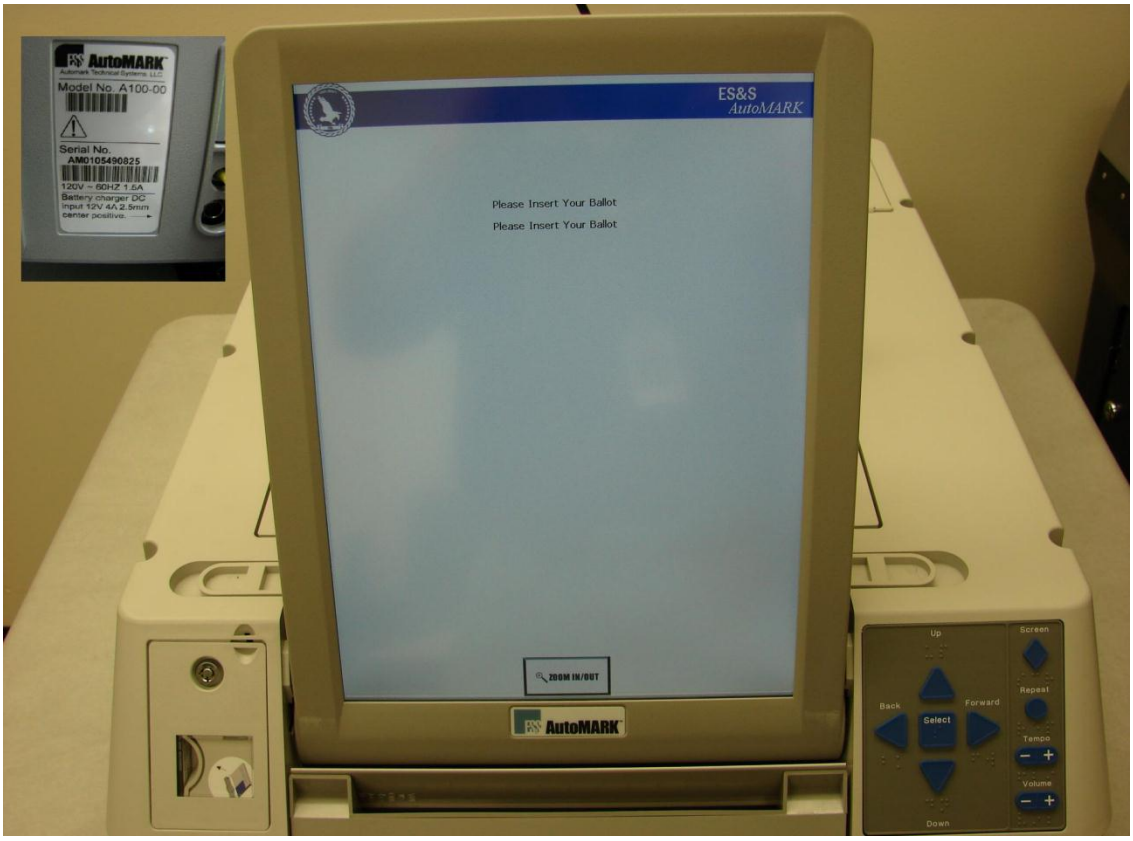
A

Photograph 3: AutoMARK A200 VAT (Internal)

1.0 INTRODUCTION (CONTINUED)

1.4 Target of Evaluation Description (continued)

1.4.1 System Overview (continued)



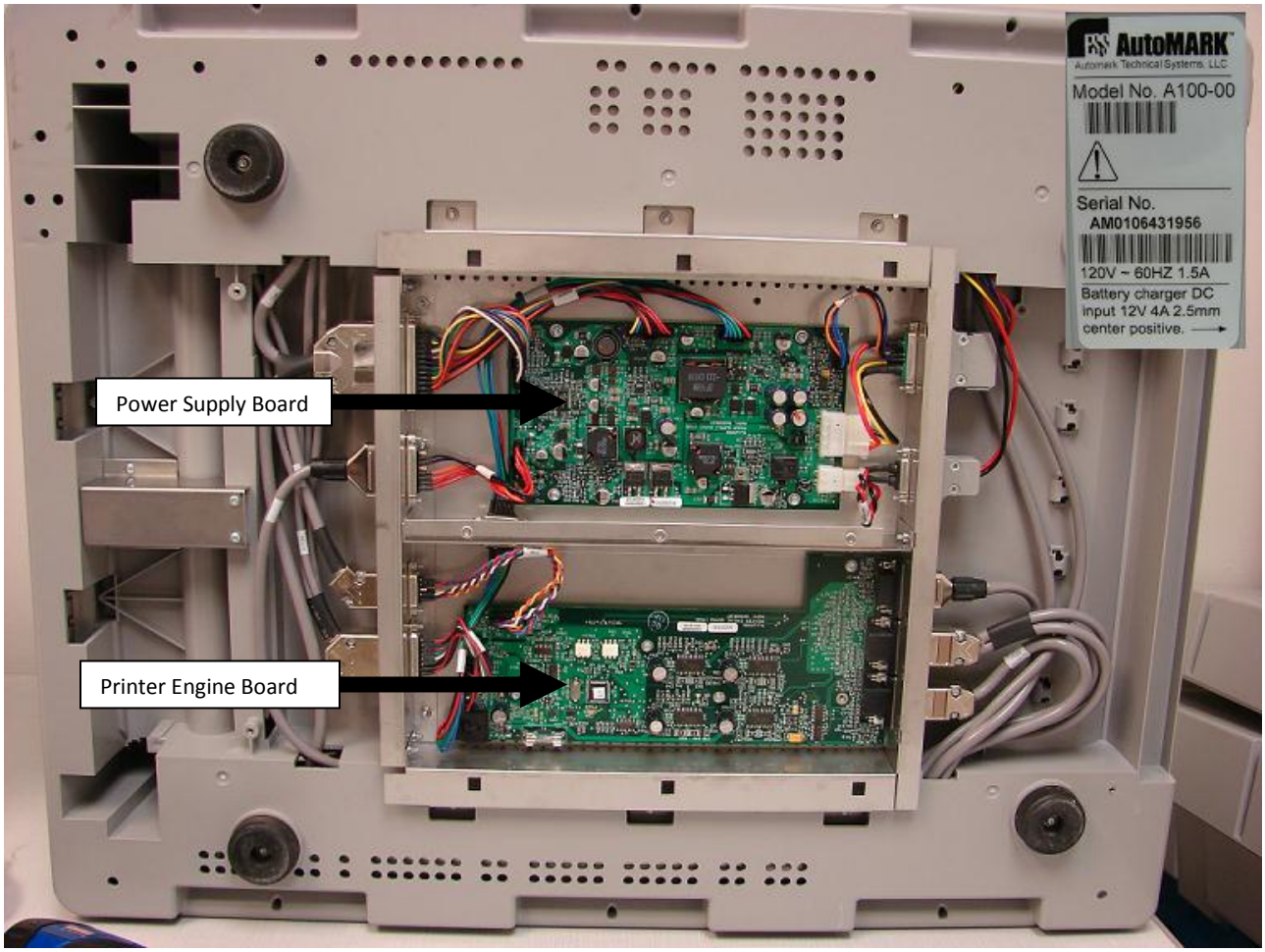
Photograph 4: AutoMARK A100 VAT

1.0 INTRODUCTION (CONTINUED)

1.4 Target of Evaluation Description (continued)

1.4.1 System Overview (continued)

Presented below is an internal picture of the A100. The Printer Engine Board and the Power Supply Board are on the bottom of the unit behind a metal plate.



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Photograph 5: AutoMARK A100 VAT (internal)

1.0 INTRODUCTION (CONTINUED)

1.4 Target of Evaluation Description (continued)

1.4.1 System Overview (continued)

<u>Precinct Ballot Tabulator: DS200</u>

The precinct ballot tabulator component is the DS200. The DS200 is an optical scan paper ballot tabulator designed for use at the polling place level. After the voter marks a paper ballot, their ballot is inserted into the unit and immediately tabulated. The tabulator uses a high-resolution image-scanning device to image the front and rear of the ballot simultaneously. The resulting ballot images are then decoded by a proprietary recognition engine.

The system includes a 12-inch touch screen display providing clear voter feedback and poll worker messaging. Once a ballot is tabulated and the system updates internal vote counters, the ballot is dropped into an integrated, secure ballot box. The DS200 includes an internal thermal printer for the printing of the printing of zero reports, log reports, and polling place totals upon the official closing of the polls.

A

Photograph 6: DS200 (on plastic ballot box)

1.0 INTRODUCTION (CONTINUED)

1.4 Target of Evaluation Description (continued)

1.4.1 System Overview (continued)

Photograph 7: DS200 (on metal ballot box)

1.0 INTRODUCTION (CONTINUED)

1.4 Target of Evaluation Description (continued)

1.4.1 System Overview (continued)

Photograph 8: DS200 metal ballot box with diverter (internal)

A

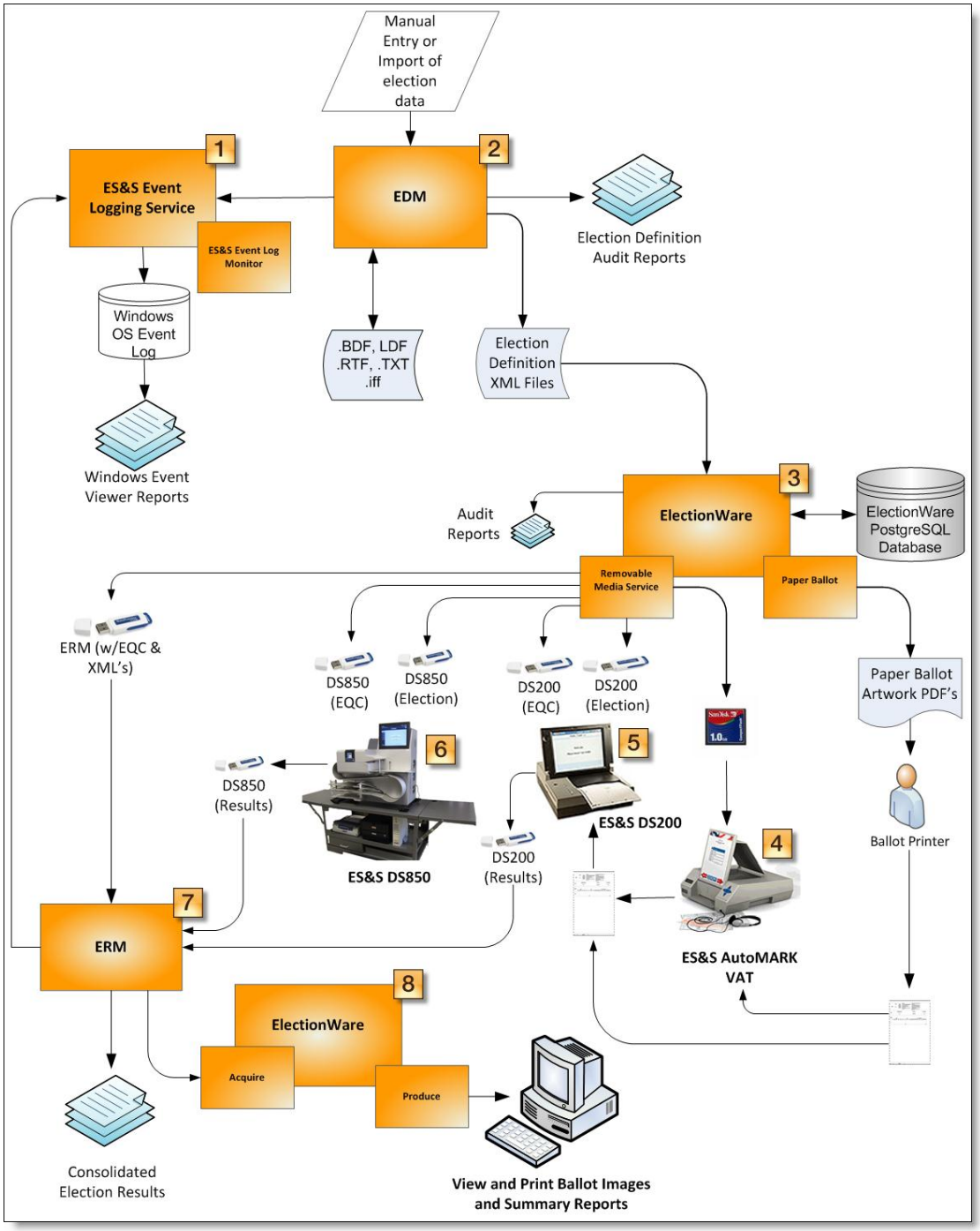
Photograph 9: DS200 metal ballot box with diverter (internal)

1.0 INTRODUCTION (CONTINUED)

1.4 Target of Evaluation Description (continued)

1.4.2 Block Diagram

The entire system diagram is presented in Figure 1.1 and shows their relationships.



A

Figure 1-1 System Overview Diagram

1.0 INTRODUCTION (CONTINUED)

1.4 Target of Evaluation Description (continued)

1.4.3 System Limits

The system limits and the ballot target limits that ES&S has stated to be supported by the Unity 5.0.0.0 System are compiled in the tables below.

Table 1-2 Unity 5.0.0.0 System Limits 17

Limit (Maximum Number of)	Value	Limiting Component
Ballot Positions	See Table 1.3	Physical Paper
Precincts in Election	9900	ERM
Contests in Election	5200 (1 candidate)	ERM
Candidates/Counters in Election	21,000	ERM
Candidates/Counters in Precinct	1,000	ERM
Candidates/Counters in Tabulator	21,000	ERM
Ballot Styles in Election	9900	ERM
Contests in a Ballot Style	165	ERM
Candidates in a Contests	175	ERM
Count for any Precinct Element	65,500	---
Ballot Styles in a Precinct	Precinct ID: 1200, Ballot ID: 5500	---
Number of Parties	General: 75, Primary: 30	ERM
Vote For in Contest	98	ERM
Supported Languages per Election	See Section 1.4.4	---
Number of Write-ins	Same as Candidate Limits	---

A

Table 1-3 Unity 5.0.0.0 Ballot Target Limits

Ballot Size (targets per inch (tpi))	Positions per Row x Column
8 ½ x 11” (4 tpi)	24 Columns x 38 = 912/side
8 ½ x 11” (5 tpi)	24 Columns x 50 = 1200/side
8 ½ x 14” (3 tpi)	24 Columns x 41 = 984/side
8 ½ x 14” (4 tpi)	24 Columns x 50 = 1200/side
8 ½ x 14” (5 tpi)	24 Columns x 65 = 1560/side
8 ½ x 17” (3 tpi)	24 Columns x 50 = 1200/side
8 ½ x 17” (4 tpi)	24 Columns x 62 = 1488/side
8 ½ x 17” (5 tpi)	24 Columns x 81 = 1944/side
8 ½ x 19” (3 tpi)	24 Columns x 56 = 1344/side
8 ½ x 19” (4 tpi)	24 Columns x 70 = 1680/side
8 ½ x 19” (5 tpi)	24 Columns x 91 = 2184/side

A

1.0 INTRODUCTION (CONTINUED)

1.4 Target of Evaluation Description (continued)

1.4.4 Supported Languages

The following languages have been stated by ES&S to be supported by the Unity 5.0.0.0 System:

- English
- Spanish
- Chinese
  - Cantonese (audio)
  - Mandarin (audio)
- Korean
- Creole
- Russian

1.4.5 Supported Functionality

The Unity 5.0.0.0 is designed to support the following voting variations:

- General Election
- Closed Primary
- Open Primary
- Early Voting
- Partisan offices
- Non-Partisan offices
- Write-in voting
- Straight Ticket voting
- Split Precincts
- Ballot Rotation
- Vote for N of M
- Audio Ballot

As stated in the System Overview document, the Unity 5.0.0.0 System does not include functions for Rank Choice Voting, Cumulative Voting, or Recall Issues; therefore, testing will not be conducted on these functions.

1.4.6 VVSG

The Unity 5.0.0.0 System will be tested to all applicable EAC 2005 VVSG requirements. Please refer to Appendix A titled “2005 EAC Program Requirements Matrix” submitted by Wyle along with this test plan for further reference.

1.0 INTRODUCTION (CONTINUED)

1.4 Target of Evaluation Description (continued)

1.4.7 Beyond VVSG

ES&S has submitted hardware test reports for Dust and Rain Tests for the DS200 and the AutoMARK VAT units. These tests were performed for prior state certification testing and are not part of this test campaign. These results will be submitted in the final test report. This will allow all test data to be compiled into a single source. A

2.0 PRE-CERTIFICATION TESTING AND ISSUES

Miscellaneous Pre-Certification testing was performed by iBeta Quality Assurance prior to ES&S contracting with Wyle to perform testing as the lead VSTL. The specifics of these tests are detailed in Section 2.1 of this document.

2.1 Evaluation of Prior VSTL Testing

ES&S began the test campaign for the Unity 5.0.0.0 at iBeta Quality Assurance. iBeta performed an initial baseline high level TDP review, source code review for ERM and DS850, COTS source verification, and performed the operational status checks for the DS850 hardware testing. Wyle was provided a summary report detailing what was performed and the discrepancies discovered during testing. iBeta report number **(V)2010-17SEP-001(A)** was provided to Wyle**.** Wyle has received a new TDP submission and ERM source code submission along with all verified COTS software from iBeta. Wyle will track all discrepancies discovered by iBeta to resolution and complete all further testing where needed.

2.2 Evaluation of Prior Non-VSTL Testing

During the test campaign with iBeta, EMC testing was performed on the DS850 by Criterion Technology. iBeta submitted "EMC Qualification Test Report Election Systems and Software Digital Scan Central-Count Vote Tabulation System, DS850(i)" to Wyle for evaluation for the following tests:

- Electrical Power Disturbance
- Electromagnetic Radiation
- Electrostatic Disruption
- Electrical Power Disturbance
- Electromagnetic Susceptibility
- Electrical Fast Transient
- Lightning Surge
- Conducted RF Immunity
- Magnetic Fields Immunity

For details of the hardware qualitative examination performed by Wyle, refer to Section 4.4.1 of this test plan.

ES&S also performed usability testing on both the AutoMARK and the DS200. ES&S submitted the following reports: "ES&S AutoMARK(i) Voter Assist Terminal (VAT), Version 1.X" for the AutoMARK and "DS200 (i) Precinct Ballot Scanner" for the DS200. Wyle evaluated these reports and determined they are in ISO/IEC 25062 Common Industry Format for Usability. These reports are included for reference in Appendix E of this test plan.

2.0 PRE-CERTIFICATION TESTING AND ISSUES (CONTINUED)

2.2 Evaluation of Prior Non-VSTL Testing (continued)

2.2.1 Reason for Testing and Results

The EMC testing performed by Criterion was directed by iBeta for an EAC 2005 VVSG test campaign for Unity 5.0.0.0. Wyle is accepting the stated tests based on a review of the test reports. Wyle will be performing further testing on the DS850 cited in Section 4.4 of this document. A

The usability testing was performed to meet the requirement of Volume I Section 3.1.1 of the EAC 2005 VVSG. Wyle has evaluated the reports and has determined them to be in ISO/IEC 25062 Common Industry Format for Usability.

2.3 Known Field Issues

The EAC released a memo documenting issues that have been discovered in the field related to multiple versions of the DS200. This memo includes known field issues related to the DS200 which is part of the Unity 5.0.0.0 testing campaign. This memo is presented in Appendix D. A

2.3.1 Listing of Relevant Issues

All known field issues are relevant to this test campaign and will be evaluated in-depth during test performance. Wyle is aware that the DS200 has two main branches of firmware; versions 1.X.X.X and versions 2.X.X.X. These two branches are two completely different branches of code that run on two different operating systems. Versions 1.X.X.X is the branch of code based on the M100 code base. Version 2.X.X.X is a complete re-write of the firmware from the ground up. Many of these reported issues may be present in one version of the firmware and not present in the other. Since the Unity 5.0.0.0 certification testing does not include the 1.X.X.X branch of firmware, Wyle will perform targeted test cases to insure these issues are not in the version 2.X.X.X branch of code being evaluated during this test campaign. A

3.0 MATERIALS REQUIRED FOR TESTING

The materials required for certification testing of the Unity 5.0.0.0 System include software, hardware, test materials, and deliverable materials to enable the test campaign to occur will be delivered by ES&S to Wyle.

3.1 Software

The tables below list the software the manufacturer must submit for testing. This section defines the two types of software needed for testing:

- software used for the testing of hardware, software, telecommunications, security and system integration
- supporting software required for the test environment (operating systems, compliers, assemblers, database managers, and any other supporting software)

The Unity 5.0.0.0 System software and firmware submitted for review is identified in the table below. All software listed below will be built by Wyle using reviewed source code and will have a MD5 hash made of the resulting software files or disc images.

3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

3.1 Software (continued)

Table 3-1 Unity 5.0.0.0 System Software and Firmware

Software and Firmware	Language	Unity 5.0.0.0 Version
DS850 UI 850	C++	2.0.0.0i
DS850 Cong _engine850	C	2.0.0.0i
DS850 MCP 850	C/C++	2.0.0.0i
Election Report Manager	Cobol	8.3.1.0a
CB_Evt.DLL	C/C++	1.0.1.0a
CB_XML.DLL	C/C++	1.0.1.0c
CB_XMLConv.DLL	C/C++	1.1.0.0a
CreateLog.EXE	C++	1.1.0.0a
Election Data Manager	C++	8.3.1.0b
ElectionWare	Java	2.1.1.0a
ElectionWarePaperBallot.exe	C++	1.1.1.0a
ERMXMLConvDLL.dll	C++	2.0.0.0d
ERMxmlData.dll	C++	1.0.1.0g
ESSCrypt.dll	C++	2.0.1.0a
EssDecpt.EXE	C++	2.0.1.0a
ESSEvt.dll	C++	1.1.0.0a
ESSEvtA.dll	C++	1.1.0.0a
ESSEvtMsg.dll	C++	1.1.0.0a
ESSxml.dll	C++	3.1.0.0a
ESSxmlA.dll	C++	3.1.0.0b
EvtSvc.exe	C++	1.1.0.0a
LogEvent.exe	C++	1.1.0.0a
MFCSharedScource	C++	2.1.0.0e
PBMtoBMP.EXE	C++	1.1.3.0d
RegUtil.dll	C++	1.1.3.0b
RmuCli.exe	C++	1.1.0.0a
RMUDll.dll	C++	1.1.0.0a
RmuSVC.exe	C++	1.1.0.0a
RSACrypto.exe	C++	2.0.1.0a
DS200	C++	2.3.0.0za
DS200_DS200PresentLayer	Java	2.3.0.0za
Mydll.dll	C	1.1.3.0a
PowerManagement_Msp4300	C	1.2.4.0b
Scanner_C8051	C	2.14.0.0a
ES&S AutoMARK	Assembler	1.7.1.0a
ES&S AutoMARK	C	1.7.1.0a
ES&S AutoMARK	C++	1.7.1.0a
ES&S AutoMARK	C#	1.7.1.0a
ES&S AutoMARK	VB	1.7.1.0a

3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

3.1 Software (continued)

The Unity 5.0.0.0 System includes the following third-party software which has been delivered by ES&S:

Table 3-2 Unity 5.0.0.0 System Third Party Software Descriptions

Software Product	Software Version	Filename	Hash Value
Microsoft Windows XP, SP3	5.1	Original Disk	N/A
Microsoft Windows XP Updates	N/A	N/A	N/A
Micro Focus RM/COBOL Runtime	11.01	Original Disc	N/A
Microsoft Server 2003	R2	Original Disc	N/A
Microsoft Server 2003 Updates	N/A	N/A	N/A
Adobe Acrobat Standard	9.0	N/A	N/A
AVG Business Edition	9.0	N/A	N/A
Microsoft Excel 2003	Office 2003	Original Disc	N/A

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Table 3-3 Unity 5.0.0.0 Third Party Build Software Descriptions

Software Product	Software Version	Filename	SHA1 Hash Value
EMS Build Environment			
Macrovision Corp. InstallShield 2008 Standalone Build	14.00.0000	Original CD	N/A
Microsoft Visual Studio	6.0	Original CD	N/A
Microsoft Visual Studio	2005	Original CD	N/A
Microsoft Windows Driver Development Kit (DDK)	2600.1106	Original CD	N/A
Microsoft Windows XP with Service Pack 3	5.1	Original CD	N/A
Apache Software Foundation Apache Ant	1.7.1	apache-ant-1.7.1-bin.zip	a7e8fa7bc2102a8d8df99c64db73c2eae3d8b483
Apache Software Foundation Xalan C++	1.10.0	Xalan-C_1_10_0-win32-msvc_60.zip	1f07401bf7c9785ea4be6d20ef93ca263b5593dc
Apache Software Foundation Xerces C++	2.7.0	xerces-c_2_7_0-windows_2000 msvc_60.zip	1887a204bfd208971daf993881e331a99ca89f8f
Boost C++ Libraries	1.34.1	boost_1_34_1.zip	90a10d2e3591fcaa2b8cd10121980133af3eb2ff
Code Synthesis Tools CC CodeSynthesis XSD Includes Apache Software Foundation Xerces C++ 2.8.0	3.1.0	xsd-3.1.msi	aa5f2fb2c815e8e1aa94314c08697751d056690b

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3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

3.1 Software (continued)

Table 3-3 Unity 5.0.0.0 Third Party Build Software Descriptions (continued)

Software Product	Software Version	Filename	SHA1 Hash Value
EMS Build Environment (continued)			
Micro Focus RM/COBOL Development System	11.01	setup.exe	b8b2a175511130633d6f10bcb2545f732944caf8
Liant WOW Designer	11.01	setup.exe	23a6d81415db51683360dd55e8c11eb091610c4f
Macrovision Corp. InstallShield 2008 InstallScript Objects	14	installshieldinstallscriptobjects.exe	6cb960636c4474277fe12a51ee0d0704ee9246ed
Microsoft Visual Studio	6.0 Service Pack 6	Vs6sp6.exe	2292437a8967349261c810ae8b456592eeb76620
MicrosoftVisual Studio	2005 Service Pack 1	VS80sp1-KB926601-X86-ENU.exe	d4b5c73253a7a4f5b4b389f41b94fea4a7247b57
Oracle NetBeans	6.5.1	netbeans-6.5.1-ml-javase-windows.exe	783c2fb2356b269c4b88909351fabcb6cb10911b
Oracle Sun Developer Network (SDN) Java SE Development Kit	6 Update 13 Platform: Windows	jdk-6u13-windows-i586-p.exe	5f50688b2bb3da056eb6430818bd9839b75886df
PostgreSQL Global Development Group pgAdmin III	1.10.0	pgadmin3-1.10.0.zip	9e0dbabfbc8cfeac0e2fb3d61c248b456b9281fe
PostgreSQL Global Development Group PostgreSQL	8.3.7.1	postgresql-8.3.7-1.zip	1e722ed67d3b9ee1dfff8e22f21a11c65db71faf
Sequiter Software CodeBase	6.5 Release 3	cb_setup.exe	797ad01a3297fb36cbf0bd7313d904f1d32714b0
RSA BSAFE Crypto-C ME	2.0 Platform: Microsoft Windows 32-bit	cryptocme-2_0-win32.pkg	30e9023ee8df38117a95f1f93dfbebd6fa391eb0
RSA BSAFE Packaging Utility	Unknown Version Platform: Microsoft Windows 32-bit	r_unpack.exe	20271575aebca44be0aeb23e8d511cbd93026a76
InfoZip	2.32	unzip.exe	e1652b058195db3f5f754b7ab430652ae04a50b8
	5.52	zip.exe	55c5a72010291fca2275ccfb5b497dd0bac11a60
MarshallSoft	0.0.0.0 Linker Rev. 3	WSC32.DLL	ac0d9b7d7ac30e98af162735bc9e7b1b24c48d23

3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

3.1 Software (continued)

Table 3-3 Unity 5.0.0.0 Third Party Build Software Descriptions (continued)

Software Product	Software Version	Filename	Hash Value
EMS Build Environment (continued)			
Microsoft	2.40.4275.1	asycfilt.dll	72fb4f088c6ac02097b55fb267c76fbf5e0fa1f7
	4.71.1460.1	COMCAT.DLL	c2a409311853ad4608418e790621f04155e55000
	6.7.0.8988	COMCT332.OCX	398f64c00b026d1c6d94a6efd180f20c010f5ee9
	6.0.84.18	COMDLG32.OCX	34e4213d8bf0e150d3f50ae0bd3f5b328e1105f5
	6.0.88.4	MSCOMCT2.OCX	c0c55de97f41a24bf50b2d08eb428371bb4a3cce
	6.0.88.62	MSCOMCTL.OCX	d904d2fa7639c38ffb6e69f1ef779ca1001b8c18
	5.1.43.19	MSVBVM50.DLL	75d05db7085de3222951eaa5fee2b74feaf88e17
	6.0.89.64	MSVBVM60.DLL	ce82d1ccf593088d09694ef90e44c4ea2761be92
	6.0.8168.0	MSVCP60.DLL	8770ec0910b7cc9a0461a40dfb495ee7f5b4267b
	5.0.0.7022	MSVCRTD.DLL	d24d0335eae1cfa63c8a68718b54ce223baee9d3
	2.40.4275.1	oleaut32.dll	6b58e20b2538cb308091da838710f6aad933a301
	5.0.4275.1	olepro32.dll	8adff69050d14a57d7f553ca8978439af188c192
	6.0.88.4	RICHTX32.OCX	90fec763edfb0b0924700be6b914292c591a152c
	2.40.4275.1	stdole2.tlb	36f701ccec78a5d218fea23fd05351890f14cf7d
	6.0.81.69	SYSINFO.OCX	fc5cd0599a43faebf9e7e9179defb79999215286
	6.0.90.43	TABCTL32.OCX	e8648d6d69fd5cf900c4bf98b210f6921bed3ef5
RoboHelp_2000	8.0.131.0	ROBOEX32.DLL	964d83c7f4dedc10241408de04e7d44cb599ef3d
RoboHelp_X5	13.10.606.0	wh2robo.dll	4ff22cf837373459232906078dc1d4d1464598db
Shamir_Optical	1.0.0.0	OpenSaveFile.ocx	47f736752a9894553ec11134bffcd5a4455e29ef
AutoMARK Build Environment			
Cosmic Software 68C08 C Compiler	4.1h	Original CD	N/A
InstallShield InstallShield Professional 10.5 with Sevice Pack 1	144	Original CD	N/A
Keil Software µVision2	2.40	Original CD	N/A
Keil Software PK51 Professional Developers Kit Add-On Disk	7.09	Original 3-1/2" Floppy Diskette	N/A
Microsoft Windows XP with Service Pack 3	5.1	Original CD	N/A
Microsoft Visual Studio .NET 2003	7.1.3088	Original CD	N/A

3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

3.1 Software (continued)

Table 3-3 Unity 5.0.0.0 Third Party Build Software Descriptions (continued)

Software Product	Software Version	Filename	Hash Value
AutoMARK Build Environment (continued)			
Microsoft Windows CE	5.00.1400	Original CD	N/A
Microsoft eMbedded Visual C++ with Service Pack 4	4.00.0000.0	Original CD	N/A
Texas Instruments Code Composer Studio 2	2.00.00	Original CD	N/A
AutoIT Team AutoIT	3.2.10.0	autoit-v3-setup.exe	bb913c21b1eeb8a580ea226d0a524f339d752596
Applied Data Systems XSCALE 4.2 Software Development Kit	4.20.0000	ADS_XSCALE_4_2_SDK.msi	991746a6251c28fe8b28b439c00565f23603f35e
Microsoft Windows CE Updates Microsoft	2004 - Cumulative	WinCEPB50-041231-Product-Update-Rollup-Armv4I.msi	2a33a1540e25118e9360e7298af7c96da206006f
	2005 - Cumulative	WinCEPB50-051231-Product-Update-Rollup-Armv4I.msi	331f874c41fd2abe79ddc97ac9a47b91d203bdf9
	2006 - January	WinCEPB50-060131-2006M01-Armv4I.msi	884241dd89bd1fda9683fb6d6ba14f1c82cf9b2c
	2006 - February	WinCEPB50-060228-2006M02-Armv4I.msi	4695c80aff3707a1926ec54d0756af3a426d8e0f
	2006 - March	WinCEPB50-060331-2006M03-Armv4I.msi	39dc323b9736441893322fc1b159bc94dd2ec3b5
	2006 - April	WinCEPB50-060430-2006M04-Armv4I.msi	823c496b554f9d3d29cd491f80ffda9729176b89
	2006 - May	WinCEPB50-060531-2006M05-Armv4I.msi	29df27801c8bd2a3a68567cfa65e1ff54de8ae63
	2006 - June	WinCEPB50-060630-2006M06-Armv4I.msi	7421d73ec31cd1e9250e6c591e14f00a98988f59
	2006 - July	WinCEPB50-060731-2006M07-Armv4I.msi	f8ab5055a648ea23a64e3e89ef01e88ec9836b5c
	2006 - August	WinCEPB50-060831-2006M08-Armv4I.msi	43b5d5a6f1be643e9dd4af970dc1785188bbe622
RSA BSAFE Crypto-C ME	2.0 Platform: Windows Mobile 2003 ARM (32-bit)	cryptocme-2_0-ppc2003.pkg	2c9c870137755c76445df640aebf871434877128
RSA BSAFE Packaging Utility	Unknown Version Platform: Microsoft Windows 32-bit	r_unpack.exe	20271575aebca44be0aeb23e8d511cbd93026a76

3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

3.1 Software (continued)

Table 3-3 Unity 5.0.0.0 Third Party Build Software Descriptions (continued)

Software Product	Software Version	Filename	Hash Value
AutoMARK Build Environment (continued)			
Enounce, Inc TimeScale Tailor library Note: Files extracted from the following zip file. File: tstevc40_ARMV4I.zip Hash: 843083dcdda1528aafe775716cea4a16a3a84356	4.0	enresult.h	026f14e00f2ffac65ff78ff219523ec702a8971c
		entypes.h	62f2e746d9e10e33167a8252523e72dc38489c0f
		tsmiface.h	45e4323d1c24134fea1d653072a116b330474742
		TSMStrmObj.h	d6bd6b1a0c6815c6935c3f7b5439baa5f879491e
		tstarmv4I.lib	57f18b940f5cd0bf404f3cd10b003db40bfb4e7c
Future Technology Devices Intl. Ltd. D2XX WinCE Driver Note: Files extracted from the following zip file. File: ARM4D2XXDriver.zip Hash: be6d74e8a9a038af3fadbddd30153609621267a9	Unknown	FTD2XX.lib	f5c94c2f3f367970c5b342991a8e27b40353c323
	Unknown	ftd2XX.h	2d753f2d72fa3adab894b0dbf8c85a97466ec89c
Zip Utils Note: Files extracted from the following zip file. File: zip_utils_src.zip Hash: 17d8fc37a477de0c5e3217a2b82245bd3de2fae1	Unknown	unzip.cpp	8cf4379f0dd162e3d3fdb8345badfe0639fd3860
	Unknown	unzip.h	5d6a56bd1daab11ac05e801b8b5111d4736e88ed
SpeechWorks International, Inc. ETI-Eloquence TTS Engine	6.1.0.0	chsrom.dll	f3ae8a1f7d0369d387b8f2ee0a47a76efee2bc2f
		eci.dll	7aa1085174b7bce6016c8074297bc6cb40b823df
		jpnrom.dll	7557c00e8ace29affdabebddb73f466d0877a866
		korrom.dll	76219d7f9f76f021b4815fa796f80e3ca49e3446
		chs.syn	ff7c1873b84256c25da601d70ad280333e5ce167
		enu.syn	3e69875d11e0a53c39c211c484cb6520f8d87f25
		esm.syn	d8037d86e5f677e89eca7834ae47fbd030a043aa
		jpn.syn	99a931e76e6008da9f01b91b4d91c116ece8f7d7
		kor.syn	f32f8ae286ed278320dbb829df338b97a2c846b5
DS200			
Linux From Scratch (LFS)	6.2.5	lfslivecd-x86-6.2-5.iso	b3e3947bf2c3616fa45541c0643a2adfa0618207
Microsoft Windows XP with Service Pack 3	5.1	Original CD	N/A
IAR Embedded Workbench for MPS430	3.40A	Original CD	N/A
Keil µVision3	3.51	Original CD	N/A
Cypress EZ-USB Dev Kit	2.31	Original CD	N/A
DS850			
Linux From Scratch (LFS)	6.2.5	lfslivecd-x86-6.2-5.iso	b3e3947bf2c3616fa45541c0643a2adfa0618207

3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

3.2 Equipment

This subsection categorizes the equipment the manufacturer has submitted for testing. Each test element is included in the list of the equipment required for testing of that element, including system hardware, general purpose data processing and communications equipment, and any required test instrumentation.

Every effort is made to verify that the COTS equipment has not been modified for use. Wyle will perform research using the manufactures' website based on the serial and service tag numbers for each piece of equipment. For PCs, laptops, and servers, the service tag information is compared to the system information found on each machine. Physical external and internal examination is also performed to the best of Wyle's abilities when the equipment is easily accessible without the possibility of damage. Hard drives, RAM memory, and other components are examined to verify that the components match the information found on the manufacturers' websites. A

Table 3-4 Unity 5.0.0.0 Voting System Equipment Description

Equipment	Manufacturer	Version/Model	Serial Number	COTS/Non-COTS
PC1	Dell Optiplex 780	Processor: Intel Duo Core E7500,2.93 Ghz Memory: 2x 2GB, 1066 Mhz Ram Hard Drive Capacity: 160 GB	3T79QM1	COTS
PC2	Dell Optiplex 780	Processor: Intel Duo Core E7500,2.93 Ghz Memory: 2x 2GB, 1066 Mhz Ram Hard Drive Capacity: 160 GB	5T79QM1	COTS
PC3	Dell Optiplex GX520	Processor: Intel Pentium 4, 3.00 Ghz Memory: 2x 512 MB, 533 Mhz Ram Hard Drive Capacity: 80 GB	7YMP091	COTS
Server1	Dell PowerEdge T410	Processor: Intel Xeon E5504,2.00/4.8 Ghz Memory: 2x 2GB, 1066 Mhz Ram Hard Drive Capacity: 500 GB	6D6BQM1	COTS
Server2	Dell PowerEdge 1800	Processor: Intel Xeon 2.8 Ghz Memory: 4x 512GB, 400 Mhz Ram Hard Drive Capacity: 4x 73 GB	3M4CQB1	COTS
Laptop1	Dell Latitude E6410	Processor: Intel Core VPro I5-520 2.4 Ghz Memory: 2x 1GB, 1067 Mhz Ram Hard Drive Capacity: 250 GB	232F0M1	COTS
Laptop2	Dell Latitude E6400	Processor: Intel Duo Core P8600 2.4 Ghz Memory: 1x 2GB, 800 Mhz Ram Hard Drive Capacity: 80 GB	47SXNJ1	COTS
Laptop3	Dell Latitude E6410	Processor: Intel Core VPro I5-520 2.4 Ghz Memory: 2x 1GB, 1067 Mhz Ram Hard Drive Capacity: 250 GB	132F0M1	COTS
Laptop4	Dell Latitude 610	Processor: Intel Pentium M Dothan 1.86Ghz Memory: 1x 512 GB, 533 Mhz Ram Hard Drive Capacity: 40 GB	H4TGM81	COTS

3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

3.2 Equipment (continued)

In order to perform the software witness and trusted builds, four Personal Computers have been provided as build machines. The build machines are described in the table below:

Table 3-5 Unity 5.0.0.0 Voting System Build Machine Description

Equipment	Manufacturer	Version/Model	Serial Number	COTS/Non-COTS
Build 1	Dell Optiplex 760	Processor: Intel Duo Core E8400 Wolfdale Memory: 4x 1GB, 800 Mhz Ram Hard Drive Capacity: 80 GB	6D7DJG1	COTS
Build 2	Dell Optiplex 760	Processor: Intel Duo Core E8400 Wolfdale Memory: 4x 1GB, 800 Mhz Ram Hard Drive Capacity: 80 GB	6DCKJG1	COTS
Build 3	Dell Precision T3500	Processor: Intel X5650 2.66/6.4 12MB Xeon Westmere Memory: 1x 2GB, 1333 Mhz Ram Hard Drive Capacity: 160 GB	15TMMN1	COTS
Build 4	Dell Precision T3500	Processor: Intel X5650 2.66/6.4 12MB Xeon Westmere Memory: 1x 2GB, 1333 Mhz Ram Hard Drive Capacity: 160 GB	15TNMN1	COTS

To support the test program, ES&S has provided additional supporting hardware for the test campaign. A list of these items is provided below:

Table 3-6 Unity 5.0.0.0 Voting System Support Equipment Description

Test Material	Make	Model	Serial Number
COTS Printer	OKI	B410DN	AF89027328A0
COTS Printer Tray	OKI	Optional 19” Tray	004A1000240
COTS Printer	OKI	C711	AK04009031C0
COTS Printer	OKI	C9650	AF85027113A0
COTS Printer	OKI	B3600	502A2138674
COTS DVD writer	Samsung	SE-S084C/RSBN	R0546GLZ806517
COTS DVD writer	Samsung	SE-S084C/RSBN	R0546GKZ106812
COTS DVD writer	Samsung	SE-S084C/RSBN	R0546GLZ806209
COTS DVD writer	Lite On	eZAU120-086	290902402108

3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

3.2 Equipment (continued)

The table below provides the serial numbers of the components which comprise each System Under Test (SUT):

Table 3-7 Unity 5.0.0.0 Voting System Equipment Configurations

SUT ID	AutoMARK	DS200	Plastic Ballot Box	Peripheral Equipment	
				Headphones	Sip & Puff
1	AM0208470644	DS0110340903	Box-57936-01	HP-57936-1	Air Voter /SP-57936-1
2	AM0206443325	DS0110340837	Box-57936-02	HP-57936-2	Air Voter /SP-57936-2

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Note: The DS850 subsystem identified below will be used as a part of SUT 1 and SUT2

Subsystem	DS850(i)	Cart	Laser Printer	UPS	Dot Matrix Printer
DS850	DS8509420009	Cart-57936-02	Oki B430dn AF97052470A0	APC-RS 1500 BB0932033646	Oki 420 AE72011853C0
DS850	DS8509420002	Cart-57936-01	Oki B430dn AF97052472A0	APC-RS 1500 BB0911006709	Oki 420 AE72036784C0

COTS equipment that is used by the Unity 5.0.0.0 is listed below with its make, model, and serial number:

Table 3-8 Unity 5.0.0.0 COTS Equipment Identification

COTS Equipment	Make	Model	Serial Numbers
Network Switch	SMC	SMC-EZ6505TX	T133203608 and T143601392
Headphones	Avid	Avid FV 60	HP-57936-1, HP-57936-2, HP-57936-3, HP-57936-4, HP-57936-5, HP-57936-6, HP-57936-7, HP-57936-8 and HP-57936-9
UPS	APC	RS-1500	BB0911006709 and BB0932033646
Transport Media (USB Flash Drives)	Delkin	512 MB Capacity	Wyle-assigned numbers: TM-XXX
	Delkin	4.0 GB Capacity	Wyle-assigned numbers: TM-XXX
	Delkin	8.0 GB Capacity	Wyle-assigned numbers: TM-XXX
	SanDisk	2.0 GB Capacity	Wyle-assigned numbers: TM-XXX
Compact Flash	SanDisk	512 MB Capacity	Wyle-assigned numbers: CF-XXX
	SanDisk	1.0 GB Capacity	Wyle-assigned numbers: CF-XXX
	SanDisk	2.0 GB Capacity	Wyle-assigned numbers: CF-XXX
	Toshiba	1.0 GB Capacity	Wyle-assigned numbers: CF-XXX

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Wyle has performed research on the transport media. ECOs 837, 838, 839, and 851 from iBeta document any de minimis changes that have occurred to these transport media.

3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

3.3 Test Support Materials

This subsection enumerates any and all test support materials needed to perform voting system testing. The scope of testing determines the quantity of a specific material required.

The following test materials are required to support the Unity 5.0.0.0 System certification testing.

Table 3-9 Unity 5.0.0.0 System Test Support Materials

Test Material	Quantity	Make	Model
9 ½" X 11" Paper in Speed Loading Box (2700 Sheets)	4	Dot Matrix	951027
COTS Printer	1	EPSON LQ-590	FSQY140868
Security Seals	5000	Intab	800-0038R
Security Locks	20	E. J. Brooks	86022
	25	E. J. Brooks	6024
	50	American Casting Corp.	00561-03
	50	A. Rifkin	RIFSI
ES&S Pens	10	BIC	Grip Roller
Security Sleeves	7	ES&S	PS-S7-936-XX(1-7)
CF Card Reader	1	SanDisk	018-6305
Magnifier	3	---	---
Headphone Covers	30	---	---
Paddles (yes/no)	3	---	---

3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

3.4 Deliverable Materials

The materials listed below are to be delivered as part of the Unity 5.0.0.0 System to the users.

Table 3-10 Deliverable Materials

Deliverable Material	Version	Description
Election Data Manager	8.3.1.0	EMS
Unity Event Logging	1.1.0.0	EMS
ElectionWare	2.1.1.0	EMS
Election Reporting Manager	8.3.1.0	EMS
AutoMARK(i) A100/A200	1.7.1.0	Accessible voting station
DS200(i)	2.3.1.0	Precinct ballot scanner
DS850(i)	2.0.0.0	Central ballot scanner
Transport Media (512MB, 2GB, 4GB, and 8GB)	---	USB flash drives
Headphones	Avid FV 60	Stereo headphones
System Overview	9.0	TDP Document
System Functionality Description	4.0	TDP Document
ES&S AutoMARK(i) System Operations Procedures	1.7	TDP Document
ES&S DS200(i) System Operations Procedures HW Ver. 1.2.3.0, FW Ver. 2.3.1.0		TDP Document
ES&S DS850(i) System Operations Procedures	2.0.0.0	TDP Document
ES&S Election Data Manager System Operations Procedures	8.3.1.0	TDP Document
ES&S ElectionWare System Operations Procedures	2.1.1.0	TDP Document
ES&S Election Reporting Manager System Operations Procedures	8.3.1.0	TDP Document
Voting System Security Specification	3.0	TDP Document
Jurisdiction Security Practices Template	1.0.0.1	TDP Document
Hardening the EMS PC Guide	1.3	TDP Document
ES&S AutoMARK(i) Election Day Checklist	1.7.x	TDP Document
ES&S AutoMARK(i) Pre-Election Day Checklist	1.7.x	TDP Document
Voting System Validation Guide	2.0	TDP Document
Voting System Hardware-Physical Security Guide	2.0	TDP Document
ES&S DS850(i) Election Day Checklist	1.0.x	TDP Document
ES&S DS850(i) Pre-Election Day Checklist	1.0.x	TDP Document
Systems Operations Procedures-Election Reporting Manager	8.3.1.0	TDP Document
Systems Operations Procedures -UELS	1.1.0.0	TDP Document

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4.0 TEST SPECIFICATIONS

Certification testing of the Unity 5.0.0.0 System is to the configuration submitted in the EAC application ESSUNITY5000. Wyle qualified personnel will ensure that all certification testing performed on the manufacturer's voting system follows Wyles procedures for testing and the specific test cases to ensure the requirements of the EAC 2005 VVSG and EAC Testing and Certification Program Manual.

Below is a list of EAC Request for Interpretations (RFI) and Notice of Clarifications (NOC) that will be incorporated in the test campaign:

4.0 TEST SPECIFICATIONS (CONTINUED)

Interpretations A

2010-08 EAC Decision on Calling Sequence

2010-07 EAC Decision on Module Length

2010-06 EAC Decision on DRE Accessibility Requirements and Other Accessible Voting stations

2010-05 EAC Decision on Testing of Modifications to a Certified System

2010-04 EAC Decision on Functional Requirements with Respect to Security

2010-03 EAC Decision on Database Coding Conventions

2010-02 EAC Decision on Coding Conventions

2010-01 EAC Decision on Voltage Levels and ESD Test

2009-06 EAC Decision on Temperature and Power Variation

2009-05 EAC Decision on T-Coil Requirements

2009-04 EAC Decision on Audit Log Events

2009-03 EAC Decision on Battery Backup for Central Count Systems

2009-02 EAC Decision on Alternate Languages

2009-01 EAC Decision on VVPAT Accessibility New

2008-12 EAC Decision on Ballot Marking Device/Scope of Testing

2008-10 EAC Decision on Electrical Fast Transient

2008-09 EAC Decision on Safety Testing

2008-08 EAC Decision on Automatic Bar Code Readers

2008-07 EAC Decision on 0' Count to Start Election

2008-06 EAC Decision on Battery Backup for Central Count

2008-05 EAC Decision on Durability

2008-04 EAC Decision on Supported Languages

2008-03 EAC Decision on OS Configuration

2008-02 EAC Decision on Battery Backup for Optical Scan Voting Machines

2008-01 EAC Decision on Temperature and Power Variation

2007-06 EAC Decision on Recording and Reporting Undervotes

2007-05 EAC Decision on Testing Focus and Applicability

2007-04 EAC Decision on Presentation of Alternative Language

2007-03 EAC Decision on Summative Usability Testing

2007-02 EAC Decision on Variable Names

2007-01 EAC Decision on Accessible Design

4.0 TEST SPECIFICATIONS (CONTINUED)

Notice of Clarifications

NOC 09-005 – Development and Submission of Test Plans for Modifications to EAC Certified Systems

NOC 09-004 – Development and Submission of Test Reports

NOC 09-003 – De Minimis Change Determination Requirement

NOC 09-002 -- Laboratory Independence Requirement

NOC 09-001 -- Requirements for Test Lab Development and Submission of Test Plans

NOC 08-003 -- EAC Conformance Testing Requirements

NOC 08-002 -- EAC Mark of Certification

NOC 08-001 -- Validity of Prior Non-core Hardware Environmental and EMC Testing

NOC 07-005 -- Voting System Test Laboratory Responsibilities in the Management and Oversight of Third Party Testing

NOC 07-004 -- Voting System Manufacturing Facilities

NOC 07-003 -- State Testing Done in Conjunction with Federal Testing within the EAC Program

NOC 07-002 -- VSTL Work with Manufacturers Outside of Voting System Certification Engagements

NOC 07-001 -- Timely Submission of Certification Application

4.1 Requirements (Strategy of Evaluation)

To evaluate the system test requirements, each section of the EAC 2005 VVSG will be analyzed to determine the applicable tests. The EAC 2005 VVSG Volume I Sections, along with the strategy for evaluation, are described below:

- **Section 2: Functional Requirements** – The requirements in this section will be tested during the FCA and System Integration test utilizing the "Wyle Baseline Test Cases" along with test cases specially designed for the ES&S Unity 5.0.0.0 System. The data input during these tests will be the predefined election definitions submitted as part of the Test Plan Package. A
- **Section 3: Usability and Accessibility** – The requirements in this section will be tested during the Usability Test utilizing a combination of the "Wyle Baseline Test Cases" and the "Wyle Baseline Usability Test Cases". The data input during this test will be the predefined election definitions submitted as part of the Test Plan Package.
- **Section 4: Hardware Requirements** – The requirements in this section will be tested by trained Wyle personnel per Section 4.4.2 and Table 6.4.
- **Section 5: Software Requirements** – The requirements in this section will be tested during source code review, TDP review, and FCA. A combination of review and functional testing will be performed to insure these requirements are met.
- **Section 6: Telecommunication** – A test of the telecommunication technologies utilized by the ES&S Unity 5.0.0.0 System will be tested for data accuracy and correctness by analyzing the packet level information being transmitted. Section 6.2.6 will be excluded since the ES&S Unity 5.0.0.0 System does not support the use of public telecomminications networks.

4.0 TEST SPECIFICATIONS (CONTINUED)

4.1 Requirements (Strategy of Evaluation) (continued)

- **Section 7: Security Requirements** – The requirements in this section will be tested during source code review, FCA, System Integration, and Security Tests. In addition to functional testing, the source code for the ES&S Unity 5.0.0.0 System will be analyzed utilizing Fortify Source Code Analysis (SCA) for security vulnerabilities in addition to the manual line by line review.
- **Section 8: Quality Assurance (QA) Requirements** – The requirements in this section will be tested throughout the test campaign via various methods. TDP review will be performed on ES&S QA documentation to determine compliance to EAC 2005 VVSG requirements and the requirements stated in the ES&S QA Program document. All source code will be checked to ensure that proper QA documentation has been completed. All equipment received for initial testing and follow up testing will be checked against ES&S documentation to ensure their QA process is being followed. Wyle personnel will complete the requirements of EAC 2005 VVSG Vol. 2 Section 7, Quality Assurance Testing and Section 1.3.1.5, Focus of Vendor Documentation that requires Wyle personnel to physically examine documents at the customer's location.
- **Section 9: Configuration Management (CM) Requirements** – The requirements in this section will be tested throughout the test campaign. TDP review will be performed on the ES&S configuration management documentation to determine EAC 2005 VVSG compliance and to further determine whether ES&S is following its documented CM requirements within the TDP. Any anomalies will be formally reported to ES&S and the EAC. Wyle personnel will conduct an audit of the ES&S CM Program at the ES&S facility at the conclusion of the test campaign. A

4.1.1 Mapping of Requirements to Equipment Type and Features

Refer to the "2005 EAC Program Requirements Matrix" submitted as Appendix A of this document.

4.1.2 Rationale for 'Not Applicable' Requirements

The ES&S Unity 5.0.0.0 System is a paper-based precinct counting system that supports a closed network (does not support transmission over public networks). Therefore, all EAC 2005 VVSG requirements intended for DRE with the exceptions below will be excluded from this test campaign.

- Volume I Section 3 (Usability and Accessibility Requirement) per RFI 2010-06
- Volume I Section 6.2.6 (Telecommunication Requirements)
- Volume I Section 7.5.2 (Telecommunications and Data Transmission)
- Volume I Section 7.6 (Use of Public Communication Networks)
- Volume I Section 7.7 (Wireless Communications)
- Volume I Section 7.9 (Voter Verifiable Paper Audit Trail Requirements)

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4.0 TEST SPECIFICATIONS (CONTINUED)

4.1 Requirements (Strategy of Evaluation) (continued)

4.1.2 Rationale for 'Not Applicable' Requirements (continued)

The rationale for not evaluating the Unity 5.0.0.0 System to the requirements contained in the indicated sections of the EAC 2005 VVSG is described below:

Table 4-1 Not Applicable Requirements

EAC 2005 VVSG Volume I Section	Rationale for 'Not Applicable'
6.2.6, 7.5.2, and 7.5.3	These requirements are written for use on public networks. The ES&S Unity 5.0.0.0 System does not use public networks.
7.5.4	This section was intended for a shared operating environment on ballot recording and vote counting equipment. The AutoMARK, DS200 and DS850 are all dedicated operating environments.
7.6	This section pertains to "Voting systems that transmit data over public telecommunications…" The ES&S Unity 5.0.0.0 System does not support transmission over public networks.
7.7	No wireless technology is present in the ES&S Unity 5.0.0.0 System.
7.9	The ES&S Unity 5.0.0.0 System is a paper based system.

Refer to the "2005 EAC Program Requirements Matrix" submitted as Appendix A of this document for specific requirements that are excluded during this test campaign.

4.2 Hardware Configuration and Design

The ES&S Unity 5.0.0.0 System is a paper-based precinct voting system using touch screen and scan technology to scan and validate ballots, provide voter-assisted ballots, and tabulate precinct results. The ES&S Unity 5.0.0.0 System consists of an election management system (an application suite consisting of EDM, Event Log Service, ElectionWare, and ERM); the DS200 voting device that scans, validates and tabulates voter ballots; either the AutoMARK model A100 or A200 voter assisted terminal to facilitate special needs voters; and the DS850 high-speed optical scanner to process large ballot batches at a central location.

The ES&S Unity 5.0.0.0 System is comprised of three proprietary pieces of hardware, DS200, DS850 and the AutoMARK. All EMS functions are handled by proprietary software run on COTS PC/Laptops and Servers. Wyle has determined that these COTS PC/Laptops and Servers are not subject to the hardware test requirements per the EAC 2005 VVSG per "2007-05 Decision on Testing Focus and Applicability".. The provided PC/Laptops documented in Section 3 Materials Required For Testing all contained "CE", "UL", and "FCC" labeling.

<u>DS200</u> – The DS200 will be set on a metal ballot box with a ballot diverter to simulate real election configuration. The metal ballot box with a diverter was chosen for all electrical testing. The metal and the internal electronics are more susceptible to electrical failures. During operational tests the unit will be in auto feed mode ("Shoe-Shine") and scan test ballots for the duration of operational test. Each unit will be loaded with the Operational Status Check election definition configured for early voting. This will allow all data generated for the Pre-operational, Operational, and Post-operational test to be further analyzed, compiled and included in the Reliability, Availability, and Accuracy Test results. No operational data will be collected during non-operational tests. A

4.0 TEST SPECIFICATIONS (CONTINUED)

4.2 Hardware Configuration and Design (continued)

AutoMARK A100 – The AutoMARK A100 is classified as a table top unit for EMC hardware testing purposes. Each unit will be loaded with the Operational Status Check election definition configured for early voting. This will allow all the data generated for the Pre-operational, Operational, and Post-operational test to be further analyzed, compiled and included in the Reliability, Availability, and Accuracy Test results .

AutoMARK A200 – The AutoMARK A200 had an extensive hardware qualitative examination performed as a pre-test activity. The details of this examination can be found in Section 4.4.1. Wyle determined there were four significant ECO's applied to the A200. These ECO's pertained to ROHS compliant SBC boards, Intel processor "end-of-life", second source battery back-up, and LCD monitor "end-of-life". Testing was performed when required and reports were generated.

To determine which configuration for these components will be subjected to the battery of hardware tests required by the EAC 2005 VVSG Wyle will perform an electromagnetic radiation scan in a semi-anechoic chamber. Wyle will utilize both biconical and horn antennas on a vertical and horizontal plane measured one meter from the hardware for the emissions scan. Of the tested configurations, the configuration that performs at or near the boundary will be selected to undergo all environmental and EMC hardware tests. This unit will be loaded with the Operational Status Check election definition configured for early voting. This will allow all the data generated for the Pre-operational, Operational, and Post-operational test to be further analyzed, compiled and included in the Reliability, Availability, and Accuracy Test results.

DS850 – The DS850 was subjected to EMC testing by Criterion Technology. iBeta submitted 'EMC Qualification Test Report Election Systems and Software Digital Scan Central-Count Vote Tabulation System, DS850(i)" Wyle is accepting the results of this test program and will not perform EMC testing on this unit. All environmental tests are waived on this unit because this unit is a central count scanner. For other hardware tests this unit will be setup on the metal cart with a report printer, a real-time audit printer, and a UPS. This unit will be loaded with the Operational Status Check election definition. This will allow all the data generated for the Pre-operational, Operational, and Post-operational test to be further analyzed, compiled and included in the Reliability, Availability, and Accuracy Test results.

4.3 Software System Functions

ES&S Unity 5.0.0.0 System software is comprised of multiple applications written in many languages. The main four components and their subcomponents are as follows:

- EDM (C++)
  - ESSXmlA.dll
  - MFC Shared Source
- ElectionWare (Java)
  - ElectionWare/SQL
  - ElectionWare PaperBallot
  - EssXML
  - Removable Media Service
    - RmuCli.exe
    - RmuDLL.dll
    - RmuSvc.exe

4.0 TEST SPECIFICATIONS (CONTINUED)

4.3 Software System Functions (continued)

- EventLog (C++)
  - CreatLog
  - EssEvt
  - EssEvtA
  - EssEvtMsg
  - EvtSvc
  - LogEvent
- ERM (COBOL)
  - CB_EVT.DLL
  - CB_XML.DLL
  - CB_XMLConv.DLL
  - ERMXMLConvDLL.DLL
  - ERMXMLData.DLL
  - ExitWin.EXE
  - MyDLL.DLL
  - RegUtil.DLL
  - Shell.EXE
  - ShellSetup.EXE
  - ESSCRYPT.DLL
  - ESSDECPT.EXE
  - RSACrypto.EXE

The DS200 package consists of six components packaged together to function as the firmware:

- DS200 CoNG(C)
- Image(C),
- HAL(C)
- DS200 Presentation Layer(Java)
- PowerManagement_Msp430(C)
- Scanner_C8051(C)

The DS850 consists of three components packaged together to function as the firmware:

- UI(C++)
- MCP(C++)
- CoNG.

The AutoMARK VAT consists of twenty components packaged together to act as the firmware:

- AutoMarkEncode.exe(C++)
- AutoMARK.exe(VB)
- AutoMark.dll(C#)
- AutomarkDataHelperLibrary.dll(C++)

4.0 TEST SPECIFICATIONS (CONTINUED)

4.3 Software System Functions (continued)

- AutomarkEncoder.dll(C++)
- AutomarkService.exe(C++)
- AutomarkStartup.exe(C++)
- DiagnosticLogger.dll(C++)
- GETMARKS.dll(C++)
- MAKEBIN.EXE(C++)
- NonVolatileLibrary.dll(C++)
- OperationLogger.dll(C++)
- PEB.hex(C/Assembler)
- RSASecurityLibrary.dll (C++)
- scandriver.dll C++
- SCANNER.BIN(C/Assembler)
- ScannerPrinterLibrary.dll(C++)
- SecurityLibrary.dll(C++)
- SIB.hex(C/Assembler)
- Ultra.s19(C/Assembler)

4.4 Test Case Design

Wyle uses the V-Model Life Cycle as defined by the Institute of Electrical and Electronics Engineers (IEEE). The IEEE definition of the V-Model Life Cycle uses two concepts “Verification” and “Validation”. Wyle’s test approach is to use both “Verification” and “Validation” to some degree. There are four basic levels of testing in the V-Model Life Cycle: Component, Integration, System, and Acceptance. Wyle will be evaluating the ES&S Unity 5.0.0.0 to all four levels.

4.4.1 Hardware Qualitative Examination Design

ES&S submitted the results of previous testing in the form of the following test reports:

- Criterion Technology Test Report Number 091014-1481, “EMC Qualification Test Report, Election Systems and Software, Digital Scan Central-Count Vote Tabulation System, DS850(i)”, dated August 4, 2010
- Criterion Technology Test Report Number 091130-1503R, “EMC Qualification Test Report, Election Systems and Software, Intelelect Precinct Ballot Counter, DS200 HW Rev. 1.2.1”, dated March 31, 2010
- Percept Technology Labs Test Report “AutoMARK Voter Assist Terminal Test Report”, Revision 1.3, dated May 19, 2005
- Criterion Technology Test Report Number 041223-857m “EMC Qualification Test Report, AutoMARK Technical Systems, LLC, Voter Assist Terminal”, dated January 31, 2005
- Components Reliability & Safety, Inc. Test Report Number 07-1001-A, “Product Safety Testing and Evaluation for Ballot Reader Model Number DS200(i) with or without ballot box”, dated 2006
- Percept Technology Labs Test Report “ES&S Unity 3.2.0.0, DS200(i) and Ballot Box Voting System Test Report”, Revision 1.0, dated May 1, 2007

4.0 TEST SPECIFICATIONS (CONTINUED)

4.4 Test Case Design (continued)

4.4.1 Hardware Qualitative Examination Design (continued)

Wyle performed a hardware qualitative examination to assess if the testing was performed under the guidelines of the EAC program, if the tests were performed per the EAC 2005 VVSG, and the scope of the engineering changes implemented since test performance. The results from this examination deemed that the majority of the previous test results could not be accepted for the current test campaign based on the following:

- Firmware versions could not be established.
- Evidence of operational status checks was not present
- Testing occurred prior to the establishment of the EAC program.
- Multiple revisions of firmware since testing had been performed.

Based on the results of the examination, the summary of acceptable testing is provided in the table below. All testing that is deemed rejected will be performed by Wyle personnel under this test campaign. The details of those tests are presented in Section 6.0.

Table 4-2 Hardware Test Examination Results

Test/EAC 2005 VVSG Section	Procedure/Description	Unity 5.0.0.0 System Component		
		DS200	DS850	AutoMARK
Electromagnetic Radiation/4.1.2.9	FCC Part 15 Class B for both radiated and conducted emissions	Reject	Accept	Reject
Low Temperature/4.1.2.14	MIL-STD-810D minimum temperature shall be -4 degrees F	Reject	N/A	Reject
Vibration/4.1.2.14	MIL-STD-810D, Meth0d 514.3 physical shock and vibration during handling and transport	Reject	N/A	Reject
Lightning Surge/4.1.2.7	IEC 61000-4-5 (1995-02)	Reject	Accept	Reject
High Temperature/4.1.2.14	MIL-STD-810D, Method 501.2 maximum temperature shall be 140 degrees F	Reject	N/A	Reject
Bench Handling	MIL-STD-810D, Method 516.3 Procedure VI six 4” drops on each edge totaling 24 drops	Reject	N/A	Reject
Electrical Fast Transient/4.1.2.6	IEC 61000-4-4	Reject	Accept	Reject
Humidity Test/4.1.2.14	MIL-STD-810D, Method 501.2 ten 24 hour humidity cycles	Reject	N/A	Reject
Electrostatic Disruption/4.1.2.8	IEC 61000-4-2 (1995-01) 15kV air discharge and 8kV contact discharge	Reject	Accept	Reject
Electromagnetic Susceptibility/4.1.2.10	IEC 61000-4-3 electromagnetic field of 10V/m modulated by a 1kHZ, 80% AM modulation at 80MHz to 1000MHz frequency	Reject	Accept	Reject

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4.0 TEST SPECIFICATIONS (CONTINUED)

4.4 Test Case Design (continued)

4.4.1 Hardware Qualitative Examination Design (continued)

Table 4-2 Hardware Test Examination Results (continued)

Test/EAC 2005 VVSG Section	Procedure/Description	Unity 5.0.0.0 System Component		
		DS200(i)	**DS850(i)**	**AutoMARK**(i)
Conducted RF Immunity/4.1.2.11	IEC 61000-4-6 (1996-04) conducted radio frequency energy	Reject	Accept	Reject
Magnetic Fields Immunity/4.1.2.12	IEC 61000-4-8 (1993-06) AC magnetic fields of 30 A/m at 60Hz	Reject	Accept	Reject
Electrical Power Disturbance/4.1.2.5	IEC 61000-4-11 (1994-06) power surges and dips	Reject	Accept	Reject
Temperature/Power Variation/4.1.2.13	MIL-STD-810D, Method 502.2 and Method 501.2 163 hours at 50 degrees to 95 degrees	Reject	Accept	Reject
Safety/4.3.8	UL 60950-1 product safety review	Reject	Accept	Reject
Maintainability/4.3.4	The ease with which preventive maintenance actions can be performed	Reject	Reject	Reject
Electrical Supply/4.1.2.4	Meets voltage and power requirements of EAC 2005 VVSG Vol. 1 Section 4.1.2.4	Reject	Accept	Reject

ES&S submitted COTS PCs and Laptops to be used during the test campaign that were labeled “CE”, “UL”, and “FCC” compliant. The supporting documentation for this testing has not been submitted to Wyle at this time. During this test campaign Wyle will review this documentation to ensure that it meets the requirements of the EAC 2005 VVSG.

4.4.1.1 Mapping of Requirements to Specific Interfaces

Please refer to the Wyle proprietary document “Wyle's EAC Program Req Matrix - VVSG 2005”, submitted by Wyle along with this test plan for further reference on requirements mapping.

4.4.2 Hardware Environmental Test Case Design

The ES&S Unity 5.0.0.0 System hardware will be tested by the Wyle EMI, Dynamics, and Environmental test facilities for testing to the hardware requirements in accordance with Wyle’s A2LA certifications 845.01-.03. All EMI testing will be performed per the following Wyle Test Guidelines Documents: EMI-001A, “Wyle Laboratories’ Test Guidelines for Performing Electromagnetic Interference (EMI) Testing”, and EMI-002A, “Test Procedure for Testing and Documentation of Radiated and Conducted Emissions Performed on Commercial Products”. These proprietary documents shall be submitted under separate cover for reference. All hardware testing will be performed per the guidelines of ANSI/NCSL Z540-1, “Calibration Laboratories and Measuring and Test Equipment, General Requirements”, and ISO 10012-1, “Quality Assurance Requirements for Measuring Equipment” and the governing MIL-STD to which the test is required. All pre-and post- tests will be conducted by Wyle qualified personnel at the Wyle Huntsville, AL, facility.

4.0 TEST SPECIFICATIONS (CONTINUED)

4.4 Test Case Design (continued)

4.4.3 Software Module Test Case Design and Data

Wyle implements Component Level Testing during the FCA for each component and subcomponent, exercising the functionality of each component and subcomponent as designed and documented. Wyle will utilize limited structural-based techniques (white-box testing) mainly in the area of Source Code Review, Compliance Builds and Security Testing and Review. Wyle will depend heavily on specification-based techniques (black-box testing) for the individual software components. The most common specification-based techniques applied to the ES&S Unity 5.0.0.0 System during the software testing portion of testing will be "equivalence partitioning" and "boundary value testing".

- "Equivalence Partitioning" will be used to evaluate specific software functions and data entry points of the Unity 5.0.0.0 System for valid and invalid data during the FCA. For software functions and data entry points, an entry will be made for a valid data requirement and at least one invalid data requirement to test for normal and abnormal conditions.

- "Boundary Value Testing" will be used to evaluate specific software functions and data entry points for minimums and maximums during the FCA. For software functions and data entry points, an entry will be made for all minimum and all maximum documented requirements to test for normal and abnormal conditions. This technique will be used for numeric ranges as well as non-numeric ranges.

Wyle will document an expected result for each test. The ACCEPT/REJECT criteria at the Component Level will be based on the expected result. If the tested system performs as expected the results will be accepted including entries for invalid data. If the tested system does not perform as expected the test will be evaluated for tester error. If it is determined there was no tester error, the test will be re-run in an attempt to reproduce the results. If the results can be reproduced and the expected results are not met the tested system will have failed the test. If the results cannot be reproduced the results would be determined to be not repeatable and the test would continue. Wyle will document the error and track the error through resolution. Wyle will not move to the next level of testing until all documented errors are resolved to try and minimize errors that might occur farther along in the test campaign. Engineering analysis will be performed to determine what effect the resolution has on the component. A determination will be made whether regression testing will be sufficient or a complete re-test is necessary. A

4.4.4 Software Functional Test Case Design and Data

Wyle implements Integration Level Testing primarily focusing on the interface between components and applications. The test approach to be used for the ES&S Unity 5.0.0.0 System will be a bottom-up approach where the lower level components will be tested first and then used to facilitate the testing of higher-level components. The specification-based technique used by Wyle at the Integration Level is "Use Case". The actors that have been identified to use the ES&S Unity 5.0.0.0 System are the following:

- Election Administrator – the actor with responsibility of entering the election definition with translation and audio. This actor is also responsible for maintaining EMS users and the election database.
- Warehouse Technician – the actor responsible for loading the election definition onto DS850, DS200, and AutoMARK VAT units. This actor also runs diagnostic test and maintains the units.
- Poll Worker- the actor at the precinct location to set up and close down the DS200 and the AutoMARK VAT on Election Day.

4.0 TEST SPECIFICATIONS (CONTINUED)

4.4 Test Case Design (continued)

4.4.4 Software Functional Test Case Design and Data (continued)

- Voter – the actor who physically casts the ballot on Election Day.
- ADA Voter – the actor with special needs who has to vote unassisted on Election Day.
- Election Official – the actor who reports and audits the election result post Election Day.

"Use Case" will be used during the FCA with a single pass through each component using only valid data. This pass will be considered the "Master Copy" of data to be passed between interfacing points of applications during Integration level testing. If a component down stream in the test process needs data from previous processes, the "Master Copy" of data can be used or altered to accelerate the test process. Known tests that will be utilize the "Master Copy" of data at the Integration Level are Security, Telecommunication, and Usability.

Wyle expects the components and applications at the Integration Level to interface without error. If an error occurs between data interfaces or in the process flow, an engineering analysis will be performed to determine if the error is data, process, or tester error. The ACCEPT/REJECT criteria for Integration Level testing is whether the components and applications interface using the documented process for each actor. If there is an error interfacing between components, the error will be documented and tracked through resolution. Engineering analysis will be performed to determine what effect the resolution has on the component. A determination will be made whether regression testing will be sufficient or a complete re-test is necessary.

4.4.5 System-Level Test Case Design

Wyle implements System Level testing focusing on a complete system including all proprietary software, proprietary hardware, proprietary peripherals, COTS software, COTS hardware, and COTS peripherals in a configuration of the systems intended use. The ES&S Unity 5.0.0.0 System is intended to support both large and small jurisdictions. Wyle's approach for the ES&S Unity 5.0.0.0 System will be to execute most System Level Testing for a large jurisdiction. Wyle will have three different test setup configurations for the EMS components.

Wyle expects all hardware, software, and peripherals to function as a complete system without error during System Level Testing. The ACCEPT/REJECT criteria for System Level testing is whether the system can continue if an error is encountered or if the system is too unstable to continue. If an error occurs during System Level Testing the error will be documented. If the ES&S Unity 5.0.0.0 System is able to recover and continue, the test will continue. If the error causes the system to become unstable the test will be halted. All errors documented during System Level Testing will be tracked through resolution. Engineering analysis will be performed to determine what effect the resolution has on the system. A determination will be made by Wyle's senior level engineer, whether regression testing will be sufficient or a complete re-test is necessary.

Wyle implements Acceptance Level testing focusing on all the data collected during the entire test campaign along with performing the "Trusted Build" for the system. All data from pre-testing, hardware testing, software testing, functional testing, security testing, volume testing, stress testing, telecommunication testing, usability testing, accessibility testing, and reliability testing activities will be combined to ensure all requirements that are supported by the ES&S Unity 5.0.0.0 System in the EAC 2005 VVSG have been tested. All requirements will be checked against the test data to ensure the EAC 2005 VVSG requirements are met. Items not supported by the ES&S Unity 5.0.0.0 System will be documented. Any issues documented during testing will be resolved.

4.0 TEST SPECIFICATIONS (CONTINUED)

4.4 Test Case Design (continued)

4.4.5 System-Level Test Case Design (continued)

Wyle expects that every EAC 2005 VVSG requirement supported by the ES&S Unity 5.0.0.0 System will be tested. Wyle will report all issues discovered during this test campaign to the EAC. The EAC has the final determination on whether the system meets all the requirements for an EAC certified system. The ACCEPT/REJECT criteria for Acceptance Level testing is whether the data for the test campaign supports a recommendation for certification by the EAC or not. If Wyle determines there is not enough data to insure a requirement was met, the test plan will be altered and further testing will be done.

4.5 Security Functions

The purpose of the security testing will be to evaluate the effectiveness of the Unity 5.0.0.0 System in detecting, preventing, logging, and recovering from any security risks identified by simulating attacks on the system. To accomplish this, Wyle has developed internal operating procedures to evaluate the ES&S Unity 5.0.0.0 System to the security requirements set forth in the EAC 2005 VVSG. These procedures have been specifically tailored to assess the ES&S Unity 5.0.0.0 System to the applicable requirements. Wyle will attempt to defeat the access controls and physical security measures documented in the ES&S technical data package. A threat matrix will be created to determine the risks and vulnerabilities.

Wyle will utilize a combination of functional testing, source code review, and Fortify SCA to evaluate the Unity 5.0.0.0 System. The following areas are not applicable to the Unity 5.0.0.0 System and are therefore not included in the scope of the security testing:

- Use of Public Networks
- Wireless Communication

Testing will be performed by a qualified security expert. Wyle will report all findings to ES&S for comment and/or resolution. A report containing all findings will be issued to the EAC as an addendum to the final test report.

4.6 TDP Evaluation

Wyle qualified personnel will perform a comprehensive review of the ES&S TDP to determine compliance to the EAC 2005 VVSG, EAC requirements, and ES&S-specific requirements. Wyle qualified personnel utilize a TDP Review Matrix which lists every EAC 2005 VVSG requirement pertaining to TDP review. Wyle qualified personnel will record the results of the review of each document to the applicable requirements listed in the TDP Review Matrix.

During the TDP review process, each document will be reviewed for completeness, clarity, and correctness, and continuity between the TDP documents. The review results will be formally reported to ES&S for resolution. If a revised document is received, it will be re-reviewed as discussed in this section.

The TDP will be continuously reviewed during the entire testing process as these documents will be utilized to set up the systems, verify correct operational results and numerous other tests.

4.0 TEST SPECIFICATIONS (CONTINUED)

4.6 TDP Evaluation (continued)

At the end of the TDP review process, an Anomaly Report will be issued listing the non-compliant items on a document-by-document basis.

A listing of all documents contained in the ES&S Unity 5.0.0.0 System TDP is provided in Table 4-3. A

Table 4-3 Unity 5.0.0.0 TDP Documents

Unity 5.0.0.0 TDP Documents	Version	Date	Doc #	Document Code
Unity System Overview	11.0	02/03/2011	01-01	U5000_OVR00
System Functionality Description				
System Functionality Description – Unity 5.0.0.0	6.0	02/03/2011	02-01	U5000_SFD00
System Hardware Specification				
ES&S System Hardware Specification DS850	3.0	02/08/2011	03-01	U5000_SHS00_DS850
ES&S DS850 - BOM	1.0		03-01-01	U5000_SHS00_DS85001_BOM
ES&S System Hardware Specification DS200	3.0	02/08/2011	03-02	U5000_SHS00_DS200
ES&S DS200 - BOM	1.0	05/12/2008	03-02-01	U5000_SHS00_DS20001_BOM
AutoMARK System Hardware Overview	3.0	02/08/2011	03-03	AQS-17-5002-000-S
AutoMARK System Hardware Specification	3.0	02/08/2011	03-04	AQS-17-5000-001-F
AutoMARK_SHSatt1_MODELS	1.0		03-04-01	U5000_SHS00_AutoMARK01_Models
AutoMARK_SHSatt2_Indented_BOM	1.0		03-04-02	U5000_SHS00_AutoMARK02_BOM
Schematics AutoMARK Cable Phase 2	G	10/25/2005	03-04-03	Cables
AutoMark Schematics			**03-04-04**	**Multiple Documents**
Drawing – AutoMARK lock assembly		03/18/2005	03-04-04	5K509175-LA
Drawing – AutoMARK lock assembly		01/06/2005	03-04-04	5K509177-L-
Schematic – AutoMARK Software Inspection Port	B	03/12/2008	03-04-04	5K509618_SIP_B
Schematic – Printer Engine Board Rev2	B	08/10/2005	03-04-04	PEB_RevB
Schematic – Power Supply Board Rev2	B	10/07/2005	03-04-04	PSB_RevB
Schematic – AutoMARK Card BUS	B	11/22/2004	03-04-04	SBC_640117-4000C-2AGP
Schematic – AutoMARK Scanner Board	A	04/20/2004	03-04-04	Scanner_PI211MC-B4DR May04
Schematic – AutoMARK Gas Gauge Board	A	01/06/2005	03-04-04	SD_GGB_REV_A
Schematic – AutoMARK Scanner Interface Board	A3	10/25/2005	03-04-04	SIB_A3
Schematic – AutoMARK Ultrasonic Sheet Detector	A	11/11/2004	03-04-04	USD-A-SCH
Software Design and Specification				
Software Design and Specification – Unity Event Log Service	3.0	08/13/2010	04-01	U5000_SDS00_UELS
Software Design and Specification – Election Data Manager	6.0	02/04/2011	04-02	U5000_SDS00_EDM
EDM – Appendices B-D	2.0	02/09/2011	04-02-01	U5000_SDS00_EDM01_Appendices B-D
Software Design and Specification – ElectionWare	6.0	02/04/2011	04-03	U5000_SDS00_ElectionWare
ElectionWare – EW Specifications and Interfaces	5.0	02/04/2011	04-03-01	U5000_SDS00_ElectionWare01_EW Specification and Interfaces
ElectionWare – PB Specifications and Interfaces	5.0	02/07/2011	04-03-02	U5000_SDS00_ElectionWare02_PB Specification and Interfaces
ElectionWare – System Process Flowchart			04-03-05	U5000_SDS00_ElectionWare05_System Process Flowchart
ElectionWare Appendix 6 – Entity Relationship Diagrams	2.0	02/04/2011	04-03-06	U5000_SDS00_ElectionWare06.00_ PostGreSQL Entity Diagrams

4.0 TEST SPECIFICATIONS (CONTINUED)

4.6 TDP Evaluation (continued)

Table 4-3 Unity 5.0.0.0 TDP Documents (continued)

Unity 5.0.0.0 TDP Documents	Version	Date	Doc #	Document Code
Software Design and Specification (continued)				
ElectionWare Appendix 7 –Database Table Descriptions	1.0	02/15/2010	04-03-07	U5000_SDS00_ElectionWare07_ PostGreSQL Descriptions
ElectionWare Appendix 8 –Reports	4.0	02/04/2011	04-03-08	U5000_SDS00_ElectionWare08_Reports
ElectionWare Appendix 11–ES&S DS200-DS850 Media Description and Structure	6.0	02/04/2011	04-03-11	U5000_SDS00_ElectionWare11_ DS200- DS850 Media Description and Structure
ElectionWare Appendix 12 –AutoMARK Media Description and Structure	4.0	02/04/2011	04-03-12	U5000_SDS00_ElectionWare12_AutoMARK Media Description and Structure
ElectionWare Appendix 13 – ERM Created Media and Structure	4.0	02/04/2011	04-03-13	U5000_SDS00_ElectionWare13_ERM Created Media Description and Structure
Software Design and Specification – Election Reporting Manager	6.0	02/04/2011	04-04	U5000_SDS00_ERM
ERM – Software Design and Specification Appendices	3.0	02/04/2011	04-04-01	U5000_SDS00_ERM01_ Appendices
Software Design and Specification – ES&S DS850	5.0	02/09/2011	04-05	U5000_SDS00_DS850
Software Design and Specification – DS200	6.0	02/04/2011	04-06	U5000_SDS00_DS200
DS200 Appendix 1 – System Flow Charts	3.0	01/08/2010	04-06-01	U5000_SDS00_DS20001_Flowcharts
DS200 Appendix 2 – Sample Reports	4.0	01/07/2010	04-06-02	U5000_SDS00_DS20002_Reports
DS200 Appendix 3 – Business Layer Model			04-06-03	U5000_SDS00_DS20003_Business Layer Model
DS200 Appendix 4 - Presentation Layer Classes	2.0	02/09/2011	04-06-04	U5000_SDS00_DS20004_Appendix4-Presentation Layer Classes
DS200 Appendix 5 – System Messages	2.0	01/10/2010	04-06-05	U5000_SDS00_DS20005_System Messages
DS200 Appendix 6 – Results Media XML	3.0	01/10/2010	04-06-06	U5000_SDS00_DS20006_Results Media XMLs
Software Design and Specification Overview – AutoMARK	1.8	02/08/2011	04-07	U5000_SDS00_AutoMARK SDS Overview
AutoMARK Operating Software Design Specifications	3.0	02/08/2011	04-07-01	AQS-18-5001- 002-R
AutoMARK Software Design Specifications	3.0	02/08/2011	04-07-01	AQS-18-5001-004-S
AutoMARK Software Development Environment	3.0	02/08/2011	04-07-01	AQS-18-5001-006-R
AutoMARK Graphical User Interface Specifications	3.0	02/08/2011	04-07-01	AQS-18-5001-005-R
AutoMARK Software Diagnostics Specifications	3.0	02/08/2011	04-07-01	AQS-18-5000-004-F
AutoMARK Embedded Database Interface Specifications	3.0	02/08/2011	04-07-01	AQS-18-5002-005-S
AutoMARK Ballot Image Processing Specifications	3.0	02/08/2011	04-07-01	AQS-18-5002-003-S
AutoMARK Ballot Scanning and Printing Specifications	3.0	02/08/2011	04-07-01	AQS-18-5002-007-S
AutoMARK Driver API Specifications	3.0	02/08/2011	04-07-01	AQS-18-5000-002-F
AutoMARK Programming Specifications Details	3.0	02/08/2011	04-07-01	AQS-18-5001- 011-R
AutoMARK Operations and Diagnostic Log Specifications	3.0	02/08/2011	04-07-01	AQS-18-5002-004-S
Software Standards Specification	3.0	02/08/2011		AQS-18-4000-000-S

4.0 TEST SPECIFICATIONS (CONTINUED)

4.6 TDP Evaluation (continued)

Table 4-3 Unity 5.0.0.0 TDP Documents (continued)

Unity 5.0.0.0 TDP Documents	Version	Date	Doc #	Document Code
System Security Specification				
System Security Specification	4.0	02/08/2011	06-01	U5000_SSS00
AutoMARK System Security Specification	4.0	02/09/2011	06-02	AQS-18-5002-001-S
SSS Appendices			**06-03**	**Multiple Documents**
Jurisdiction Security Procedures Template	1.0.0.1	06/30/2010	06-03	U5000_SSS01_JSP Template
System Hardening Procedures	1.3	09/02/2010	06-03	U5000_SSS02_Hardening Procedures
Voting System Validation Guide	2.0	04/08/2010	06-03	U5000_SSS03_Voting System Validation Guide
Voting System Validation File List – DS200	1.0	04/28/2010	06-03	U5000_SSS03_Validation Guide01_File Listing_DS200
Voting System Validation File List – AutoMARK	1.0	04/28/2010	06-03	U5000_SSS03_Validation Guide02_File Listing_AutoMARK
Voting System Validation File List – Election Data Manager	1.0	04/28/2010	06-03	U5000_SSS03_Validation Guide03_File Listing_EDM
Voting System Validation File List – ElectionWare	2.0	04/28/2010	06-03	U5000_SSS03_Validation Guide01_File Listing_ElectionWare
Voting System Validation File List – Removable Media Service	1.0	04/28/2010	06-03	U5000_SSS03_Validation Guide01_File Listing_RMS
Voting System Validation File List – Unity Event Log Service	1.0	04/28/2010	06-03	U5000_SSS03_Validation Guide01_File Listing_UELS
Voting System Validation File List – VAT Preview	1.0	04/28/2010	06-03	U5000_SSS03_Validation Guide01_File Listing_VATPreview
Voting System Validation File List – Election Reporting Manager	1.0	03/22/2010	06-03	U5000_SSS03_Validation Guide01_File Listing_ERM
Voting System Validation File List – DS850	1.0	04/28/2010	06-03	U5000_SSS03_Validation Guide01_File Listing_850
Recommended best practices for securing ES&S equipment	3.0	02/08/2011	06-03	U5000_SSS08_PhysEquipmentSecurityBestPract
System Test/Verification Specification				
Unity 5.0.0.0 System Test Plan	3.0	02/08/2011	05-01	U5000_STP00
System Test Cases – Election Data Manager	1.0	03/25/2010	05-02	U5000_TC00_EDM
System Test Cases – ElectionWare: Home/Manager	2.1.0.0	03/16/2010	05-03	U5000_TC00_ElectionWare_Manage
System Test Cases – ElectionWare:Define	2.1.0.0	03/25/2010	05-04	U5000_TC00_ElectionWare_Define
System Test Cases – ElectionWare:Design	1.0	03/12/2010	05-05	U5000_TC00_Electionware02_Design
System Test Cases – ElectionWare:Deliver	2.1.0.0zj	04/06/2010	05-06	U5000_TC00_Electionware03_Deliver
System Test Cases – Election Reporting Manager	8.3.0.0	04/01/2010	05-08	U5000_TC00_ERM
System Test Cases – ES&S DS850	2.0.0.0	04/30/2010	05-09	U5000_TC00_DS850
System Test Cases – ES&S DS200	2.3.0.0	04/08/2010	05-10	U5000_TC00_DS200
System Test Cases – ES&S AutoMARK	1.7.0.0	02/22/2010	05-11	U5000_TC00_AutoMARK
Systems Operations Manual				
System Operations Procedures – Unity Event Log Service	1.1.0.0	02/10/2010	07-01	U5000_SOP00_UELS
System Operations Procedures – Election Data Manager	8.4	01/31/2011	07-02	U5000_SOP00_EDM
System Operations Procedures – ElectionWare	0.6	02/07/2010	07-03	U5000_SOP00_ElectionWare
System Operations Procedures – Election Reporting Manager	8.4	02/07/2011	07-04	U5000_SOP00_ERM

4.0 TEST SPECIFICATIONS (CONTINUED)

4.6 TDP Evaluation (continued)

Table 4-3 Unity 5.0.0.0 TDP Documents (continued)

Unity 5.0.0.0 TDP Documents	Version	Date	Doc #	Document Code
Systems Operations Manual (continued)				
System Operations Procedures – ES&S DS850	2.1	02/07/2011	07-05	U5000_SOP00_DS850
System Operations Procedures – ES&S DS200	2.4	02/07/2011	07-06	U5000_SOP00_DS200
System Operations Procedures – ES&S AutoMARK	1.8	02/07/2011	07-07	U5000_SOP00_AMVAT
System Maintenance Manuals				
System Maintenance Manual – ES&S DS850	2.0.0.0	08/27/2010	08-01	U5000_SMM00_DS850
System Maintenance Manual – ES&S DS200	2.4	02/07/2011	08-02	U5000_SMM00_D200
System Maintenance Manual – ES&S AutoMARK	1.8	01/31/2011	08-03	U5000_SMM00_AMVAT
Deployment and Training				
Personnel Deployment and Training Recommendations	1.0	03/01/2010	09-01	U5000_TRN00_ESSTraining Recommendations
Training Manual – Unity EventLog Service	1.0.x	12/23/2009	09-02	U5000_TRN00_EventLogger_ TrainingManual
Training Manual – Election Data Manager	8.4.x	02/04/2011	09-03	U5000_TRN00_EDM_Training Manual
Training Manual – ElectionWare	3.0.x	02/04/2011	09-04	U5000_TRN00_ElectionWare_ TrainingManual
Training Checklists			**09-05**	**Multiple Documents**
Training Checklist – Election Reporting Manager: Pre-Election	1.7.x	12/21/2009	09-05	U5000_TRN00_ERM_ PreElection
Training Checklist – Election Reporting Manager: Election Day	1.7.x	12/21/2009	09-05	U5000_TRN00_ERM_Election
Training Checklist – ES&S DS200: Pre-Election	2.3.x	12/23/2009	09-05	U5000_TRN00_DS200_ PreElection
Training Checklist – ES&S DS200: Election Day	2.3.x	10/23/2009	09-05	U5000_TRN00_DS200_ Election
Training Checklist – ES&S DS850: Pre-Election	1.0.x	01/22/2011	09-05	U5000_TRN00_DS850_ PreElection
Training Checklist – ES&S DS850: Election Day	1.0.x	1/22/2011	09-05	U5000_TRN00_DS850_ Election
Training Checklist – AutoMARK: Pre-Election	1.7.x	12/21/2009	09-05	U5000_TRN00_AutoMARK_ PreElection
Training Checklist – AutoMARK: Election Day	1.7.x	12/21/2009	09-05	U5000_TRN00_AutoMARK_ Election
Configuration Management Plan				
ES&S Configuration Management Plan	5.0	02/03/2011	10-1	U5000_CMP00
CM Plan Appendices			**10-2**	**Multiple Documents**
ES&S Development Practices and Coding Standards	4.6	02/10/2011	10-2	U5000_CMP01_DevelPractices andStandards
ES&S COTS License Agreements		06/10/2005	10-2	U5000_CMP02_ License Agreements
Product Release Request			10-2	U5000_CMP08_Product Release Request
Engineering Change Order Policies and Procedures	2.0	08/11/2010	10-2	U5000_CMP09_ECOPoliciesandProcedure s
Open Source & 3rd Party Code Management Procedure	1.6	01/02/2006	10-2	U5000_CMP07_OpenSource CodeMmng
ES&S COTS License Agreements		06/10/2005	10-2	U5000_CMP02_ License Agreements
Product Release Request			10-2	U5000_CMP08_Product Release Request

4.0 TEST SPECIFICATIONS (CONTINUED)

4.6 TDP Evaluation (continued)

Table 4-3 Unity 5.0.0.0 TDP Documents (continued)

Unity 5.0.0.0 TDP Documents	Version	Date	Doc #	Document Code
Configuration Management Plan (continued)				
Engineering Change Order Policies and Procedures	2.0	08/11/2010	10-2	U5000_CMP09_ECOPoliciesandProcedures
Open Source & 3rd Party Code Management Procedure	1.6	01/02/2006	10-2	U5000_CMP07_OpenSource CodeMmng
Build Documentation:			**10-2**	**Multiple Documents**
Build Documents of COTS for DS850 & DS200	4.1	04/19/2010	10-2	U5000_CMP10_COTS_DS850_DS200
Build Documents of COTS for Unity 5.0.0.0 EMS	2.0	02/18/2010	10-2	U5000_CMP10_COTS_ UnityEMS
AutoMARK AIMS -VAT Software and Firmware Compilation Instructions	6.0	05/03/2010	10-2	AQS-16-5013- 000-A
AutoMARK VAT Firmware and Hardware Installation Instructions	1.0	08/31/2010	10-2	AQS-17-5014-000-E
COTS Install Guild for AutoMark and VAT Preview	3.2	04/23/2010	10-2	U5000_CM_VAT_1.7.0.0_UnityBuildEnvironment
Pre-Build Task List forAutoMark	2.0	03/26/2010	10-2	Unity_PreBuildTaskList_ VAT_1.7.0.0
Build Procedure for DS200 Firmware	2.1.0	04/19/2010	10-2	U5000_CMP10_BLD04_SEC01_ DS200FirmwareBuildProcedure
Build Procedure for DS200 Ancillary Devices Firmware	1.6	04/23/2010	10-2	U5000_CMP10_BLD03_SEC01_DS200AncillaryBuildProcedure
Build Procedure for DS850 Firmware	3.4	04/07/2010	10-2	U5000_CMP10_BLD05_SEC01_ DS850FirmwareBuildProcedure
COTS Install Guild Unity 5.0.0.0 EMS	1.3	04/22/2010	10-2	U5000_CMP10_BLD01_SEC01_ UnityEMSBuildEnvironment
Build Procedure Unity 5.0.0.0 EMS	3.0	04/22/2010	10-2	U5000_CMP10_BLD01_SEC01_ UnityEMSBuildProcedure
QA Program				
Quality Assurance Program - Manufacturing	3.0	02/09/2011	11-01	U5000_QAP00_MN
Acceptance Test Procedure – DS200			11-01-01	U5000_QAP00_MN01.01_ AcceptanceTestProcedure_DS200
Acceptance Test Checklist – DS200			11-01-01	U5000_QAP00_MN01.02_ AcceptanceTestChecklist_DS200
Acceptance Test Procedure – DS850			11-01-01	U5000_QAP00_MN02.01_ AcceptanceTestProcedure_DS850
Acceptance Test Checklist – DS850			11-01-01	U5000_QAP00_MN02.02_ AcceptanceTestChecklist_DS850
Quality Assurance Program – Software and Firmware	2.0	02/09/201	11-02	U5000_QAP00_SWF
Software/Firmware Acceptance Test Checklists	3.0	02/08/2011	11-02-01	U5000_QAP00_SWF01_ SWFAcceptance
QAP Program Appendices			**11-03**	**Multiple Documents**
ISO Quality Assurance Manual: Ricoh	3.0	04/21/2010	11-03	U5000_QAP02_REI Quality Manual
ISO Overall Certificaiton – Ricoh		09/03/2009	11-03	U5000_QAP03_QMS overall REI cert 2009
ISO 9001 Certification: Ricoh		07/24/2009	11-03	U5000_QAP04_iso9001_COG_QMS_2009
ISO 14001 Certification: Ricoh		07/24/2009	11-03	U5000_QAP05_iso14001_COG_EMS_2009
ISO Quality Assurance Manual: DataWin	8.8	01/07/2008	11-03	U5000_QAP07_DataWin Quality Assurance Manual
ISO 9001 Certification: DataWin		11/27/2008	11-03	U5000_QAP08_ISO cert -- Datawin
System Change Notes				
Unity 5.0.0.0 System Change notes	1.0	02/15/2011		U5000_OVR03_CngNts
Other VSTL Reports				
ES&S Ballot Production Handbook	2.0.0.0	01/15/2008	13-01	U5000_ORPT02_BallotProductionGuide

4.0 TEST SPECIFICATIONS (CONTINUED)

4.7 Source Code Review

The ES&S Unity 5.0.0.0 System source code will be reviewed to the EAC 2005 VVSG coding standards and the manufacturer supplied coding standards.

As the source code is received, an MD5 hash value will be created for each source code file. The source code team will then conduct a visual scan of every line of source code for an initial review and every line of modified source code for a re-review. This is done to identify any violation of EAC 2005 VVSG coding standards or manufacturer supplied coding standards. Each identified violation will be recorded by making notes of the standards violation along with directory name, file name, and line number.

During the initial review, the source code team will perform a peer-review on a percentage of the code. This is done to evaluate the correctness of the review and look for standards violations that may have been missed or violations that were noted in error. Any standards violations that the team concludes are recorded in error or missed are then corrected in the code review notes.

A technical summary report of all identified standards violations will be sent to ES&S for resolution. ES&S will then correct all standards violations and re-submitted the source code for re-review. This process will be repeated as many times as necessary, until all identified standards violations are corrected. All reports will be included in an anomaly report for source code and submitted to the EAC and included in the final test report.

ES&S uses an auto-feed option designed in the system to repetitively feed ballots in and out of the scanner. This feature is documented as “Auto-Feed” mode or “Shoe Shine” mode. As part of the source code review this function will be inspected in detail to meet the requirements of EAC 2005 VVSG Volume 1 Section 2.2.4 g and h.

The final step in the source code review will be to create a “Trusted Build” from the reviewed source code. The “Trusted Build” follows the steps below:

- Clean the build machine
- Retrieve the compliant source code
- Retrieve the installation media for OS, compilers, and build software
- Construct the build environment
- Create digital signatures of the build environment
- Load the compliant source code into the build environment
- Create a digital signature of the pre build environment
- Create a disk image of the pre-build environment
- Build executable code
- Create a digital signature of executable code
- Create a disk image of the post-build environment
- Build installation media
- Create a digital signature of the installation media
- Install executable code onto the system to validate the software/firmware
- Deliver source code with digital signature, disk image of pre-build environment with digital signatures, disk image of post-build environment with digital signatures, executable code with digital signatures, and installation media with signatures to EAC Approved Repository.

4.0 TEST SPECIFICATIONS (CONTINUED)

4.7 Source Code Review (continued)

The "Trusted Build" for the ES&S Unity 5.0.0.0 System includes source code, data, and script files, in clear text form. The build also includes COTS software on commercially available media, COTS software downloaded by the VSTL, COTS software verified by digital signature from the software supplier, and picture and sound files in binary format provided by ES&S. The first step of the process is to clean the hard drives by writing zeros to every spot on the hard drive, so the drive is cleared of existing data. The operating system will then be loaded and the applications from the VSTL reviewed source along with the VSTL verified COTS software will be built. The final step is installing the applications on the hardware.

4.8 QA and CM System Review

Both the ES&S QA Plan and CM Plan will be reviewed to determine compliance with EAC 2005 VVSG Volume II Section 2, and Volume I Sections 8 and 9, EAC stated requirements, and with the requirements of the internal ES&S documentation. Also, the ES&S TDP documentation package will be reviewed to determine if the ES&S QA Plan and the CM Plan are being followed. The results of the TDP review will be entered on a spreadsheet as previously described in Section 4.6 TDP Evaluation of this test plan. The results of the TDP review, including the QA and CM compliance results Technical Data Package Review. The results of the TDP review will also be included in the final Test Report.

5.0 TEST DATA

5.1 Test Data Recording

All equipment utilized for test data recording shall be identified in the test data package. For hardware environmental and operational testing, the equipment will be listed on the Instrumentation Equipment Sheet for each test. The output test data will be recorded in an appropriate manner as to allow for data analysis. For source code and TDP reviews, results will be compiled in output reports and submitted to ES&S for resolution. Additionally, all test results, including functional test data, will be recorded on the relevant Wyle Laboratories' Operating Procedure and Test Cases. Results will also be recorded real-time in engineering log books. Incremental reports will be submitted to ES&S and the EAC at the completion of major test areas to communicate progress and results as deemed necessary by the stakeholders. A

5.2 Test Data Criteria

Wyle will evaluate all test results against the ES&S-provided technical documentation for the Unity 5.0.0.0 System and the requirements set forth in the EAC 2005 VVSG. The Unity 5.0.0.0 System shall be evaluated for its performance against the EAC 2005 VVSG. The acceptable range for system performance and the expected results for each test case shall be derived from the Unity 5.0.0.0 System documentation and the 2005 VVSG. Per the EAC 2005 VVSG, these parameters shall encompass the test tolerances, the minimum number of combinations or alternatives of input and output conditions that can be exercised to constitute an acceptable test of the parameters involved, and the maximum number of interrupts, halts or other system breaks that may occur due to non-test conditions (excluding events from which recovery occurs automatically or where a relevant status message is displayed). A

5.3 Test Data Reduction

Test data shall be manually processed and recorded in the relevant Wyle Operating Procedures and Test Cases. Results will also be recorded real-time in engineering log books.

6.0 TEST PROCEDURES AND CONDITIONS

The following subsections describe test procedures and a statement of the criteria by which readiness and successful completion shall be indicated and measured.

6.1 Facility Requirements

All testing will be conducted at the Wyle Huntsville, AL facility unless otherwise annotated. Hardware environmental non-operating (storage) and operating testing will be conducted utilizing an adequately sized environmental test chamber or dynamic shaker system equipped with the required data gathering support equipment. All remaining operating hardware tests will be conducted at the appropriate test site with the required support equipment. All instrumentation, measuring, and test equipment used in the performance of this test program will be listed on the Instrumentation equipment Sheet for each test and shall be calibrated in accordance with Wyle Laboratories' Quality Assurance Program, which complies with the requirements of ANSI/NCSL Z540-1 and ISO 10012-1. Standards used in performing all calibrations are traceable to the National Institute of Standards and Technology (NIST) by report number and date. When no national standards exist, the standards are traceable to international standards or the basis for calibration is otherwise documented.

Unless otherwise specified herein, all remaining tests, including system level functional testing, shall be performed at standard ambient conditions:

- Temperature: 25°C ± 10°C (77°F ± 18°F)
- Relative Humidity: 20 to 90%
- Atmospheric Pressure: Local Site Pressure

Unless otherwise specified herein, the following tolerances shall be used:

- Time ± 5%
- Temperature ± 3.6°F (2°C)
- Vibration Amplitude ± 10%
- Vibration Frequency ± 2%
- Random Vibration Acceleration
  - 20 to 500 Hertz ± 1.5 dB
  - 500 to 2000 Hertz ± 3.0 dB
- Random Overall grms ± 1.5 dB
- Acoustic Overall Sound Pressure Level +4/-2 dB

6.0 TEST PROCEDURES AND CONDITIONS (CONTINUED)

6.2 Test Set-Up

All voting machine equipment (hardware and software), shall be received and documented utilizing Wyle Receiving Ticket (WL-218, Nov'85) and proper QA procedures. When voting system hardware is received, Wyle Shipping and Receiving personnel will notify Wyle QA personnel. With Wyle QA personnel present, each test article will be unpacked and inspected for obvious signs of degradation and/or damage that may have occurred during transit. Noticeable degradation and/or damage, if present, shall be recorded, photographs shall be taken, and the ES&S Representative shall be notified.

Wyle QA personnel shall record the serial numbers and part numbers. Comparison shall be made between those numbers recorded and those listed on the shipper's manifest. Any discrepancies noted shall be brought to the attention of the ES&S Representative for resolution.

TDP items, including all manuals, and all source code modules received will be inventoried and maintained by the Wyle Project Engineer assigned to testing.

For hardware test setup, the system will be configured as would for normal field use. This includes connecting all supporting equipment and peripherals. Wyle personnel will properly configure and initialize the system, and verify that it is ready to be tested, by following the procedures detailed in the Unity 5.0.0.0 System technical documentation. Wyle will develop an Operational Status Check to be performed prior to and immediately following each hardware test. Wyle will develop the system performance levels to be measured during operational tests.

Wyle has developed eight election definitions to be used during this test campaign.

<u>Operational Status Check</u>

This election definition will exercise the operational status of the Unity 5.0.0.0 System, during the operational hardware tests, and prior to and immediately following the non-operational hardware tests.

<u>Logic and Accuracy</u>

This test must exercise all possible voting positions for the ballot. The AutoMARK will be used to mark each "test decks" which will then be scanned into the DS850 and the DS200.

<u>General Election: GEN-01</u>

A basic election held in 4 precincts one of which is a split precinct. This election contains 19 contests compiled into 4 ballot styles. 5 of the contests are in all 4 ballot styles. The other 15 contests are split between at least 2 of the precincts with a maximum of 4 different contest spread across the 4 precincts. This election was designed to functionally test the handling of multiple ballot styles, support for at least two languages, support for common voting variations, and audio support for at least two languages.

<u>General Election: GEN-02</u>

A basic election held in 3 precincts. This election contains 15 contests compiled into 3 ballot styles. 10 of the contests are in all 3 ballot styles with the other five split across the 3 precincts. This election was designed to functionally test the handling of multiple ballot styles, support for ballot rotation, support for two languages, support for complex voting variations, and audio support for multiple languages

6.0 TEST PROCEDURES AND CONDITIONS (CONTINUED)

6.2 Test Set-Up (continued)

General Election: GEN-03

A basic election held in 2 precincts. This election contains 8 contests and compiled into 2 ballot styles. 4 of the contests are in both ballot styles. The other 4 contests are split between the two precincts. This election was designed to functionally test the handling of multiple ballot styles, support for at least three languages including a character-based language, support for common voting variations, and audio support for at least three languages and an ADA binary input device.

Primary Election: PRIM-01

An open primary election in 2 precincts. This election contains 30 contests compiled into 5 ballot styles. Each ballot style contains 6 contests. This election designed to functionally test an open primary with multiple ballot styles, support for two languages, and support for common voting variations.

Primary Election: PRIM-02

A basic election held in 2 precincts. This election contains 13 contests compiled into 3 ballot styles. 1 contest is in all 3 ballot styles all other contests are independent. This election was designed to functionally test the handling of multiple ballot styles, support for Primary presidential delegation nominations, support for two languages, support for complex voting variations, and audio support for multiple languages.

Primary Election: PRIM-03

A basic election held in 2 precincts. This election contains 10 contests and is compiled into 2 ballot styles. 2 of the contests are in both ballot styles. The other 8 contests are split between the two parties' ballots. This election was designed to functionally test the handling of multiple ballot styles, support for at least three languages including an Ideographic based language, support for common voting variations, and audio support for at least three languages and an ADA binary input device.

6.3 Test Sequence

The components of the Unity 5.0.0.0 System will undergo all hardware, software, and system level tests described in the EAC 2005 VVSG. The following sections provide a list of each hardware and software test, a brief description of each, and a planned sequence along with the location of each test.

6.3.1 Hardware Test Descriptions

Hardware tests are divided into two categories: Non-Operating and Operating. The Non-Operating tests are intended to simulate the storage and transport of equipment between the storage facility and the polling location. The Operating tests are intended to simulate conditions that the EUT may encounter during operation. Prior to and immediately following Non-Operating and Operating test, the EUT will be subjected to an operational status check.

The Non-Operating tests include the following:

Low Temperature – This requirement addresses a range of tests for voting machines and precinct counters, as such devices are stored between elections and are transported between the storage facility and polling place, to meet specific minimum performance standards for low temperatures.

6.0 TEST PROCEDURES AND CONDITIONS (CONTINUED)

6.3 Test Sequence (continued)

6.3.1 Hardware Test Descriptions (continued)

Vibration – This requirement addresses a range of tests for voting machines and precinct counters, as such devices are stored between elections and are transported between the storage facility and polling place, to meet specific minimum performance standards for vibration.

High Temperature – This test addresses a range of tests for voting machines and precinct counters, as such devices are stored between elections and are transported between the storage facility and polling place, to meet specific minimum performance standards for high temperature.

Bench Handling – The bench handling test simulates stresses faced during maintenance and repair of voting machines and ballot counters.

Humidity Test – This requirement addresses a range of tests for voting machines and precinct counters, as such devices are stored between elections and are transported between the storage facility and polling place, to meet specific minimum performance standards.

The Operating tests include the following:

Electromagnetic Radiation – This test verifies that radiated and conducted emissions from the voting system hardware do not exceed the allowable limits of CFR Part 15, Class B. The test for electromagnetic radiation shall be conducted in compliance with the FCC Part 15 Class B requirements by testing per ANSI C63.4 (Volume II, Section 4.8.b).

Lightning Surge – This test demonstrates the voting system's hardware to withstand power line lightning surges during normal operation. This test is equivalent to the procedure of IEC 61000-4-5. The test for lightning surge protection shall be conducted in compliance with the test specified in IEC 61000-4-5 (Volume II, Section 4.8.f).

Electrical Fast Transient – This test demonstrates the voting system's hardware to withstand electrical fast transients during normal operation. This test is equivalent to the procedure of IEC 61000-4-4. The test for electrical fast transient protection shall be conducted in compliance with the test specified in IEC 61000-4-4 (Volume II, Section 4.8.e).

Electrostatic Disruption – This test demonstrates the voting system's hardware to withstand electrostatic discharges during normal operation. This test is equivalent to the procedure of IEC 61000-4-2. The test for electrostatic disruption shall be conducted in compliance with the test specified in IEC 61000-4-2 (Volume II, Section 4.8.c).

Electromagnetic Susceptibility – This test demonstrates the voting system's hardware to withstand radiated electromagnetic fields during normal operation. This test is equivalent to the procedure of IEC 61000-4-3. The test for electromagnetic susceptibility shall be conducted in compliance with the test specified in IEC 61000-4-3 (Volume II, Section 4.8.d.).

Conducted RF Immunity – This test demonstrates the voting system's hardware ability to withstand conducted RF energy on power and I/O lines during normal operation. This test is equivalent to the procedure of IEC 61000-4-6. The test for conducted RF immunity shall be conducted in compliance with the test specified in IEC 61000-4-6 (Volume II, Section 4.8.g).

Magnetic Fields Immunity – This test demonstrates the voting system's hardware ability to withstand Magnetic Fields during normal operation. This test is equivalent to the procedure of IEC 61000-4-8. The test for AC magnetic fields RF immunity shall be conducted in compliance with the test specified in IEC 61000-4-8 (Volume II, Section 4.8.h).

6.0 TEST PROCEDURES AND CONDITIONS (CONTINUED)

6.3 Test Sequence (continued)

6.3.1 Hardware Test Description (continued)

Electrical Power Disturbance – This test demonstrates the voting system's hardware to withstand power disturbances during normal operation. This test is equivalent to the procedure of IEC 61000-4-11 (Volume I, Section 4.1.2.5). The test for power disturbance disruption shall be conducted in compliance with the test specified in IEC61000-4-11 (Volume II, Section 4.8.a)

Temperature Power Variation – The Environmental Test, Operating, subjects the system hardware to varying temperatures and voltages, demonstrating hardware/data recording accuracy reliability Mean-Time-Between-Failure (MTBF) of 163 hours.

Maintainability – Maintainability represents the ease with which preventive and corrective maintenance actions can be performed based on the design characteristics of equipment and software and the processes the manufacturer and election officials have in place for preventing failures and for reacting to failures.

Electrical Supply – This requirement addresses the battery power source for providing electrical supply during a power failure.

Additionally, a safety inspection will be performed to verify that the EUT meets the following requirements for safety:

a. All voting systems and their components shall be designed to eliminate hazards to personnel or to the equipment itself.

b. Defects in design and construction that can result in personal injury or equipment damage must be detected and corrected before voting systems and components are placed into service.

c. Equipment design for personnel safety shall be equal to or better than the appropriate requirements of the Occupational Safety and Health Act, Code of Federal Regulations, Title 29, Part 1910.

6.3.2 Software Test Description

The software tests include the following:

Source Code Compliance Review – Wyle Laboratories personnel will compare the source code to the manufacturer's software design documentation to ascertain how completely the software conforms to the manufacturer's specifications. Source code inspection shall also assess the extent to which the code adheres to the requirements in Section 5 of Volumes I and II. A

Compliance Build of the Unity 5.0.0.0 System Software, Firmware, and Utilities– Before testing can begin a compliance build of all the applications will be constructed by Wyle personnel using the build environment, build documentation and reviewed source code. This is to insure the software being tested is constructed from the same source code that was reviewed.

COTS Source Code Review – Unmodified, general purpose COTS non-voting software (e.g., operating systems, programming language compilers, data base management systems, and Web browsers) is not subject to the detailed examinations specified in this section. However, Wyle Laboratories personnel will examine such software to confirm the specific version of software being used against the design specification to confirm that the software has not been modified. Portions of COTS software that have been modified by the manufacturer in any manner are subject to review. Unmodified COTS software is not subject to code examination. However, source code generated by a COTS package and embedded in software modules for compilation or interpretation will be provided in human readable form to Wyle Laboratories. Wyle Laboratories personnel may inspect COTS source code units to determine testing requirements or to verify the code is unmodified.

6.0 TEST PROCEDURES AND CONDITIONS (CONTINUED)

6.3 Test Sequence (continued)

6.3.2 Software Test Description (continued)

Wyle Laboratories may inspect the COTS generated software source code in preparation of test plans and to provide some minimal scanning or sampling to check for embedded code or unauthorized changes. Otherwise, the COTS source code is not subject to the full code review and testing. For purposes of code analysis, the COTS units shall be treated as unexpanded macros.

Baseline of EMS Operating and Build Machine OS – Wyle will review the submitted NIST SCAP FDCC checklist for the EMS Operating System and Build Machine OS ES&S. The review will be performed for completeness, clarity, and consistency.

Error Recovery Test – This will be tested to ensure that unit is capable of recovering from a non- catastrophic failure of a device, or from any error or malfunction that is within the operator's ability to correct and restoration of the device gracefully from the failures. Testing will include powering units off while operating, disconnecting various cables and components to ensure operation once restored.

Security Source Code Review – The security source code review is and detailed review of the functionality of the source code that has been submitted. Both a manual line by line review and an automated analysis of the source code will be performed.

Trusted Build – The trusted build is a process of converting the reviewed source code into machine-readable binary instructions for a computer. This test will follow Section 5.6 of the EAC Testing and Certification Program manual.

Table 6-1 Unity 5.0.0.0 System Software Test Sequence

Test	Description	Procedure	Test Level	Specimen
Compliance Source Code Review (Pre-testing Activity)	Source code review for compliance	WHVS07.2 WOP 5a	Component	Source Code
Compliance Build	Using the build documents and source code to construct the EMS	WHVS07.3 WOP 25	Component	Source Code
Source Code COTS Review	Source code review to examine 3rd party products for modification and versions	WHVS07.2 WOP 5d	Component	COTS Source Code
Baseline OS	RFI 2008-03 OS Configuration	WHVS07.3 WOP 25	Component	NIST SCAP FDCC Checklist
Source Code Functional Review	Source code review for functionality and high level software design	WHVS07.2 WOP5b	Component & Integration	Source Code
Source Code Security Review (manual – automated)	Source code review for specific security concerns and an automated review using Fortify	WHVS07.2 WOP5d WOP 6a	Component & Integration	Source Code

6.0 TEST PROCEDURES AND CONDITIONS (CONTINUED)

6.3 Test Sequence (continued)

6.3.3 System Testing

Physical Configuration Audit – The Physical Configuration Audit compares the voting system components submitted for qualification to the manufacturer's technical documentation, and shall include the following activities:

- Establish a configuration baseline of software and hardware to be tested; confirm whether manufacturer's documentation is sufficient for the user to install, validate, operate, and maintain the voting system
- Verify software conforms to the manufacturer's specifications; inspect all records of manufacturer's release control system; if changes have been made to the baseline version, verify manufacturer's engineering and test data are for the software version submitted for certification
- Review drawings, specifications, technical data, and test data associated with system hardware, if non-COTS, to establish system hardware baseline associated with software baseline
- Review manufacturer's documents of user acceptance test procedures and data against system's functional specifications; resolve any discrepancy or inadequacy in manufacturer's plan or data prior to beginning system integration functional and performance tests
- Subsequent changes to baseline software configuration made during testing, as well as system hardware changes that may produce a change in software operation are subject to re-examination

Functional Configuration Audit – The functional configuration audit encompasses an examination of manufacturer's tests, and the conduct of additional tests, to verify that the system hardware and software perform all the functions described in the manufacturer's documentation submitted for the TDP. In addition to functioning according to the manufacturer's documentation tests will be conducted to insure all applicable EAC 2005 VVSG requirements are met.

TDP Review – The technical data package must be submitted as a precondition of national certification testing. These items are necessary to define the product and its method of operation; to provide technical and test data supporting the manufacturer's claims of the system's functional capabilities and performance levels; and to document instructions and procedures governing system operation and field maintenance. Any information relevant to the system evaluation shall be submitted to include source code, object code, and sample output report formats.

Security Test – The security test is designed and performed to test the capabilities of the voting system against the requirements defined in Volume I Section 7. These procedures shall focus on the ability of the system to detect, prevent, log, and recover from a broad range of security risks identified. This test will also examine system capabilities and safeguards claimed by ES&S in the TDP to go beyond these risks. The range of risks tested is determined by the design of the system and potential exposure to risk.

Telecommunication Test – The telecommunication test focuses on system hardware and software function and performance for the transmission of data that is used to operate the system and report election results. This test applies to the requirements for Volume I, Section 6 of the EAC 2005 VVSG.

Usability – The usability test is a measure of the effectiveness, efficiency, and satisfaction achieved by a specified set of users with a given product in the performance of specified tasks. This test applies to the requirements for Volume I, Section 3 of the EAC 2005 VVSG.

6.0 TEST PROCEDURES AND CONDITIONS (CONTINUED)

6.3 Test Sequence (continued)

6.3.3 System Testing (continued)

Volume/Stress/Reliability – The volume/stress/reliability test is designed to test the System's ability to process more data at a high rate then is expected within the Mean Time Between Failure (MTBF) ratio.

Logic and Accuracy – The logic and accuracy test insures the voting system can process 1,549,703 consecutive ballot positions correctly with in the Mean Time Between Failure (MTBF) ratio.

System Integration – System Level certification test address the integrated operation of both hardware and software, along with any telecommunication capabilities. Compatibility of the voting system software components or subsystems with one another, and with other components of the voting system environment, shall be determined through functional tests integrating the voting system software with the remainder of the system.

Table 6-2 Unity 5.0.0.0 System Testing Sequence

Test	Description	Procedure	Test Level	Specimen	Election Data
Technical Data Package (TDP) Review	Documentation review for compliance, correctness, and completeness	WHVS07.1 WOP 3	Document	TDP package	---
Physical Configuration Audit	Audit hardware and software models and versions	WHVS07.3 WOP 25	Component & System	System hardware and software	---
Functional Configuration Audit	Functional testing to the system documentation and EAC 2005 VVSG requirements	WHVS07.4 WOP 26 WOP30a	Component & Integration	System	Gen-01 Prim-01
Telecommunication	Test of telecommunication technology of the system for accuracy and correctness	WHVS07.6 WOP 31	Integration & System	System	Gen-01 Volume & Stress
Usability/ Accessibility	Testing to the system documentation and EAC 2005 VVSG requirements	WOP 22 WOP 24-1 WOP 24-1a WOP 24-1b WOP 24-1c WOP 24-1d WOP 24-1f WOP 24-1g WOP 24-2 WOP 24-2a WOP 24-2b WOP 24-2c WOP 24-2d WOP 24-2e WOP 24-2f	Integration	System	Gen-01 Prim-01

6.0 TEST PROCEDURES AND CONDITIONS (CONTINUED)

6.3 Test Sequence (continued)

6.3.3 System Testing (continued)

Table 6-2 Unity 5.0.0.0 System Testing Sequence (continued)

Test	Description	Procedure	Test Level	Specimen	Election Data
Volume, Stress, & Reliability Test	Test to investigate the system's response to larger amounts of data than it is expecting.	WOP 21	System	System	Volume and Stress Election
Security	Assess the system to the 2005 VVSG requirements and execute basic system security tests.	WHVS07.7 WOP 6 WOP 6a WOP 6b WOP 6c WOP 6d	Integration & System	System	Gen-01 Prim -01
Logic and Accuracy (Temp Power)	Test of accuracy to ~1.6 million ballot positions	WHVS07.9 WOP 30	System	System	L&A Election
System Integration Test	Test of all system hardware, software and peripherals.	WOP 30	System	System	Gen-01-03 Prim-01-03
Trusted Build	Creation and installation of the final system software	WHVS07.6 WOP 7 WOP 7a	Component	System software	Unity 5.0.0.0 Source Code Package

7.0 TEST OPERATIONS PROCEDURES

7.1 Proprietary Data

All proprietary data that is marked will be distributed only to those persons that the manufacturer or EAC identifies as needing the information to conduct of qualification testing. The manufacturer is required to mark all proprietary documents as such. All organizations and individuals receiving proprietary documents will ensure those documents are not available to non-authorized persons.

Table 7-1 Proprietary Data

Document/Data	Scope Of Restriction
N/A	N/A