

TABLE OF CONTENTS

	<u>Page No.</u>
1.0 INTRODUCTION.....	1
1.1 Objective	1
1.2 Test Report Overview	1
1.3 Customer	1
1.4 References	2
1.5 Terms and Abbreviations	3
2.0 EQUIPMENT UNDER TEST IDENTIFICATION.....	4
2.1 Software	4
2.2 Hardware	5
2.3 Test Tools/Materials	6
3.0 CERTIFICATION TEST BACKGROUND.....	6
3.1 Certification Test Process	6
3.1.1 Requirements	6
3.1.2 Hardware Configuration and Design	7
3.1.3 Software System Functions.....	8
3.2 Scope of Testing.....	8
3.2.1 Enhancement.....	8
3.2.2 Defect.....	8
3.2.3 Feature.....	8
3.2.4 Hardware.....	8
4.0 TEST FINDINGS AND RECOMMENDATIONS.....	9
4.1 Summary Findings	9
4.1.1 Hardware Analysis.....	9
4.1.1.1 Electromagnetic Radiation Analysis	9
4.1.2 System Level Testing.....	10
4.1.2.1 Volume and Stress Test.....	10
4.1.2.2 Functional Configuration Audit (FCA).....	11
4.1.2.3 Physical Configuration Audit (PCA)	12
4.1.3 Source Code Review	12
4.1.4 Technical Data Package (TDP) Review.....	13
4.2 Deficiencies and Resolutions	13
4.3 Recommendation for Certification.....	14

APPENDICES

APPENDIX A ±ELECTROMAGNETIC RADIATION ANALYSIS	A-1
APPENDIX B ±AS-RUN TEST PLAN.....	B-1

1.0 INTRODUCTION

1.1 Objective

This report presents the results for the regression testing of the modifications made to the Unisyn Voting Solutions, Inc., OpenElect Voting System (OVS), Version 1.0.1. The previous version of this system, Unisyn OVS, Version 1.0, has been fully tested to the EAC 2005 VVSG. As a result of this testing, the Unisyn OVS Version 1.0 was granted certification under EAC Certification No. UNS10121966-OE. Since that time, Unisyn Voting Solutions has incorporated modifications to the certified system, resulting in the release of the Unisyn OVS, Version 1.0.1. The modifications include: a performance enhancement, introduction of an alternative hardware component for the OVO, a defect repair, and added a feature to the system. The modification resulted in the need for regression testing and the performance of an Electromagnetic Radiation Analysis WR G H W H U P L Q H Z K D W H I I H F W W K H K D U G Z electronic signature.

The full system details for the previous test campaign, including system, performance, security, telecommunication, usability, system verification, and TDP deliverables can be reviewed in the EAC test report "Unisyn Voting Solutions, Inc., OpenElect Voting System Version 1.0 VSTL Certification Test Report Revision B" (listed on www.eac.gov).

1.2 Test Report Overview

This test report consists of five main sections (including appendices):

- x 1.0 Introduction ±Provides: the architecture of the National Certification Test Report (hereafter referred to as Test Report); a brief overview of the testing scope of the Test Report; a list of documentation, customer information, and references applicable to the voting system hardware, software, and this test report.
- x 2.0 System Identification and Overview ±Provides information about the system tested that includes the system under test, test support hardware, and specific documentation provided by the vendor used to support testing.
- x 3.0 Certification Test Background ±Contains information about the certification test process and the system tested.
- x 4.0 Test Findings and Recommendation ±Provides a summary of the results of the testing process.

Appendices ±Information and data supporting testing of the voting system and hardware analysis are included as appendices to this report. This includes: The Electromagnetic Radiation Analysis data and the ³As Run Test Plan.

1.3 Customer

Unisyn Voting Solutions, Inc.
2310 Cousteau Court
Vista, CA 92018

1.0 INTRODUCTION (CONTINUED)

1.4 References

The documents listed below were utilized to perform certification testing.

- x Unisyn Voting Solutions, Inc. Purchase Order No. 003180
- x Wyle / DERUDWRULHV ¶ 4 XSRWIDW L R Q 1 R
- x Wyle Laboratories Certification Test Plan No. T58440-01 Rev C, dated May 27, 2011
- x 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
- x Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date January 1, 2007
- x Election Assistance Commission Voting System Test Laboratory Program Manual, Version 1.0, effective date July 2008
- x National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2006 Edition, "NVLAP Procedures and General Requirements (NIST Handbook 150)", dated February 2006
- x National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, "Voting System Testing (NIST Handbook 150-22)", dated May 2008
- x United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- x : \OH / DERUDWRULHV ¶ 7 HVW * XLSGHQOQHDE RFDWRQWV ¶ (OHVW Performing Electromagnetic Interference (EMI) Testing", and EMI-002A, "Test Procedure for Testing and Documentation of Radiated and Conducted Emissions Performed on Commercial Products"
- x : \OH / DERUDWRULHV ¶ 4 XDOLW \ \$VVXUDQFH 3URJUDP ODQXDC
- x ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"
- x ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"
- x EAC Requests for Interpretation (listed on www.eac.gov)
- x EAC Notices of Clarification (listed on www.eac.gov)
- x Unisyn Voting Solutions, Inc., OpenElect Voting System Version 1.0 VSTL Certification Test Report Revision B (listed on www.eac.gov)
- x Unisyn Voting Solutions, Inc., Open Elect Voting System Version 1.0.1 Technical Data Package

1.0 INTRODUCTION (CONTINUED)

1.5 Terms and Abbreviations

Table 1-1 defines all terms and abbreviations applicable to this Test Report.

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
Ballot Layout Manager	BLM	Unisyn OVS application used to layout ballot information.
Configuration Management	CM	---
Commercial Off the Shelf	COTS	---
Direct Record Electronic	DRE	---
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 Manager	EM	Utilizes the election definition file from the Ballot Layout Manager, adds jurisdiction voting device specific options and produces the CD used to load the election onto the voting devices and OVCS.
Election Management System	EMS	Within the OpenElect system, the EMS equivalent is OCS.
Election Server	ES	A component of the OCS, the ES updates the system clock and downloads new Election data to the voting devices prior to each election, typically at the warehouse.
Equipment Under Test	EUT	---
Functional Configuration Audit	FCA	Exhaustive verification of every system function and combination of functions cited in t KH PDQXID 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.
OpenElect Central Suite	OCS	Set of applications supplied by Unisyn to run at the Election Headquarters to support elections on the OVO, OVI, and OVCS systems. Includes: allot Layout Manager, Election Manager, Election Server, Tabulator Client, Tabulator Server and Tabulator Reports. In addition, the OCS includes the Software Server (SS) system for updating and validating OVO and OVI (voting device) software.
OpenElect Voting Central Scan	OVCS	A bulk scanner solution at the Central Site, used for casting provisional and mail-in ballots; can also be used to perform recounts.
OpenElect Voting Interface	OVI	Used as an ADA solution and early voting device.

1.0 INTRODUCTION (CONTINUED)

1.5 Terms and Abbreviations (continued)

Table 1-1 Terms and Abbreviations (continued)

Term	Abbreviation	Definition
OpenElect Voting Optical Scan	OVO	Scanning and tabulating voting device located at the precinct and used during early voting.
OpenElect Voting System	OVS	The Unisyn voting system submitted for certification testing.
Physical Configuration Audit	PCA	Review by accredited test laboratory to compare voting system components submitted for certification 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	---
Software Server	SS	Updates and validates voting device client software.
Specimen Under Test	SUT	---
Tabulator	TAB	The Tabulator receives and consolidates election results from the counted OVO and OVCS ballots that have been uploaded by the Tabulator Client (in the case of OVO results) and directly by the OVCS. The Tabulator stores the vote data in the database, provides a status for uploaded vote data and handles Rank Choice Voting functionality.
Tabulator Client	TC	Retrieves vote files from Transport Media devices and provides that data to the tabulator.
Technical Data Package	TDP	Manufacturer documentation related to the voting system required to be submitted as a precondition of certification testing.
Tabulator Reports	TR	Accesses data from the Tabulator database to generate the necessary unofficial and official reports.
Uninterruptible Power Supply	UPS	---
Voter Verifiable Paper Audit Trail	VVPAT	---
Voluntary Voting System Guidelines	2005 VVSG	Published by the EAC, the third iteration of national level voting system standards.
Wyle Operating Procedure	WoP	Wyle Test Method or Test Procedure

2.0 EQUIPMENT UNDER TEST IDENTIFICATION

The materials required for certification testing of the Unisyn OVS, Version 1.0.1, which include software, hardware, test materials, and deliverable materials, were shipped directly to Wyle by Unisyn with the exception of the OVCS high speed scanner which was shipped to Wyle by VisionShape, Inc. When possible, the equipment used during this test effort was the same equipment used during the original certification campaign performed by Wyle.

2.1 Software

The software being evaluated comprised the source code for the OVCS Application, version 1.0.1, and the OVO Firmware, version 1.0.1.

2.0 EQUIPMENT UNDER TEST IDENTIFICATION (CONTINUED)

2.1 Software (continued)

The Certified EMS, version 1.0.0, in conjunction with the updated OVCS Application, version 1.0.1, was used for regression testing of the added feature and enhancement made to the system.

Table 2-1 presents the software the manufacturer submitted for testing.

Table 2-1 Software Submitted for Testing

Software Required For Testing	Software Version
OVCS Application	1.0.1
OVO Firmware	1.0.1

2.2 Hardware

This subsection categorizes the equipment the manufacturer submitted for testing listed in Table 2-2. 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.

Table 2-2 Test Equipment

Equipment	Description	Serial Numbers
OVO 1	Model: OpenElect Voting Optical, Rev. A Firmware Version 1.0.1 Motherboard: J7F2WE2GS-OC-LF Rev 3.1	UNI000001
OVO 2	Model: OpenElect Voting Optical, Rev. A Firmware Version 1.0.1 Motherboard: J7F2WE1G5S-OC-LF Rev 4.0	UNI000004
OVO 3	Model: OpenElect Voting Optical, Rev. A Firmware Version 1.0.1 Motherboard: J7F2WE2GS-OC-LF Rev 4.0	UNI000036
EMS PC	Dell Optiplex 755 (with all EMS applications installed)	G5HW3J1
OVCS High Speed Scanner	Canon ImageFormula DR-X10C	ED300631
UPS	Minuteman Entrust Series ETR1500	AE58080900407, AE580906PA114
Transport Media	STEC 1GB industrial flash drive Model Number: SLUFD1GU1U-A	TM100027
Transport Media (ECO)	STEC 1GB industrial flash drive Model Number: SLUFD1GU2U	TM100131, TM100132, TM100100
Gigabit LAN Switch	Linksys SR2024 Business Series 24- Port 10/100/1000 Gigabit Switch	REM30H600558 GGR1807 JJ

2.0 EQUIPMENT UNDER TEST IDENTIFICATION (CONTINUED)

2.3 Test Tools/Material

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

Table 2-3 Test Tools/Materials

Test Material	Quantity
Software tools (i.e. ExamDiff Pro for source code analysis)	as required
Elections	2
: R 3 ¶ V	10
Miscellaneous Office equipment and supplies (such as report paper)	as required
Printer Thermal Paper Rolls	as required
External DVD-ROM Drive	1
Printed Ballots	as required

3.0 CERTIFICATION TEST BACKGROUND

Wyle Laboratories is an independent testing laboratory for systems and components under harsh environments, including dynamic and climatic extremes as well as the testing of electronic voting systems. Wyle holds the following accreditations:

- x ISO-9001:2000
- x Nationally Recognized Testing Laboratory (NRTL)
- x OSHA Accredited
- x NVLAP Accredited ISO 17025:2005
- x EAC Accredited VSTL, NIST 150,150-22
- x A2LA Accredited (Certification No ¶ V) D Q G
- x FCC Approved Contractor Test Site (Part 15, 18, 68)

3.1 Certification Test Process

3.1.1 Requirements

All testing performed as part of the test effort was performed at the Wyle Labs Huntsville, AL, facility. Testing was limited to the Unisyn OVS, Version 1.0.1, which includes items listed in Section 2.0 of this report.

The strategy for evaluating the Unisyn OVS, Version 1.0.1, was to review the change log, source changes, and the engineering changes submitted for the modified system. Wyle Laboratories has assessed that no additional functionality was added to the modified system that would add additional requirements that were not tested in the previous test campaign.

3.0 CERTIFICATION TEST BACKGROUND (CONTINUED)

3.1 Certification Test Process (continued)

3.1.1 Requirements (continued)

Wyle determined that the software changes affect the following requirements in the 2005 VVSG Volume 1: Section 2.4.2; Section 2.4.3 a, c, d, f ±h, & j; Section 4.1.5.1 d ii; Section 4.7.1.1; and Section 5.4.4 b & d.

Regression testing of the software was required to verify that the modifications did not introduce any defects into the unchanged areas and that the new modifications functioned as designed.

The test campaign included the following tests:

- x Source code review in accordance with 2005 EAC VVSG.
- x Technical Data Package review to ensure all modifications were documented as applicable.
- x A limited Physical Configuration Audit (PCA) to baseline the modified system.
- x Functional Configuration Audit of the new feature and enhancement made to the voting system.
- x All functionality performed by new or modified subsystems/modules.
- x Volume and Stress Test to ensure that the system could handle the large amounts of data associated with the write- L Q ³ L P D J H ⁷ F D S W X U L Q J D E L O L W \ R I W K H 2 9 2 D Q G 2 9 & ballots that were cast and counted during the Volume and Stress Test ensured that over 1.6 million ballot positions were read by both the OVO and the OVCS, which fulfilled the requirements of the Accuracy Test.

The Certified EMS Version 1.0.0, including the updated OVCS application version 1.0.1, was configured as follows for the Functional Configuration Audit and the Volume and Stress Test:

EMS ±A COTS desktop computer, as documented in Section 2.0, was loaded with the Certified EMS version 1.0.0 and the updated OVCS application version 1.0.1.

Central Count Scanner ±A COTS high speed scanner, as documented in Section 2.0, was attached to the EMS.

The OVO was configured as follows for the Functional Configuration Audit and the Volume and Stress Test:

Optical Scanner - An OVO configured with firmware version 1.0.1 was used for most tests. Three OVO units were used during system level testing.

3.1.2 Hardware Configuration and Design

The submitted hardware changes for this test campaign are documented in Section 3.2. Wyle Laboratories conducted an engineering analysis of the system performance characteristics in accordance with Volume II, Appendix A, Section 4.3.1 of the 2005 VVSG and determined that the best approach to verifying that the new motherboard is electronically and mechanically interchangeable with the existing motherboard was to perform an Electromagnetic Radiation Analysis and compare the electronic signatures of a baseline OVO, versus an OVO with the new motherboard installed.

3.0 CERTIFICATION TEST BACKGROUND (CONTINUED)

3.1 Certification Test Process (continued)

3.1.3 Software System Functions

The submitted changes for this test campaign are documented in Section 3.2. The new feature and modification were tested using "Regression testing". Regression testing was used to ensure the modification did not introduce any defects into unchanged areas. Wyle used partial regression testing to test the directly interacting elements at both the Component and Integration Levels of testing.

The strategy for evaluating the depth of regression testing was to review the source code modifications during the source code review. Minor enhancements to variables, input fields, and restrictions were tested by inputting both valid and invalid data to the documented modification. Once the physical modification had been observed the interacting functions were fully regression tested to ensure the enhancement performed as expected. After the new function and modification were tested on a component level a full system level test was performed to ensure all interacting components functioned as a system without issues.

3.2 Scope of Testing

As stated previously, the Unisyn OpenElect Voting System Version 1.0 was granted certification under EAC Certification No. UNS10121966-OE. Since that time, Unisyn Voting Solutions has developed a performance enhancement, repaired a defect, added a new feature, and added an alternative motherboard with integrated processor that can be used on the OVO. These modifications are detailed in the following subsections.

3.2.1 Enhancement

E-01 ±The OVO and OVCS are capable of extracting write-in locations from cast full page ballots, as images, for use in election results reporting.

3.2.2 Defect

D-01 ±A defect was discovered by Unisyn regarding the close polls time. The defect occurred when using a Close Card to close the polls on the OVO with the date set to Election Day. Using a Close Card would not cause the polls to close. Internal testing by Unisyn has shown this issue to be corrected.

3.2.3 Feature

F- 01 ±\$ IHDWXUH KDV EHHQ DGGHG W-RQW5KHS R U W ' WZK ISUKL Q M QDW D:LUQ images extracted using the enhancement above.

3.2.4 Hardware

H-01- Unisyn submitted an alternative motherboard and processor that can be used on the OVO. The Jetway 1.5GHz rev 4.0 model number J7F2WE1G5S-OC-LF motherboard and processor was introduced as an alternative to the Jetway 2GHz rev 3.1 model number J7F2WE2GS-OC-LF motherboard and processor used in the OVO. Thus an OVO can use either model.

4.0 TEST FINDINGS AND RECOMMENDATIONS

4.1 Summary Findings

The results of the hardware analysis, system level testing, source code review, and technical data package review performed on the Unisyn OpenElect Voting System Version 1.0.1 as required by this test effort are summarized in the following paragraphs.

4.1.1 Hardware Analysis

An engineering analysis, conducted by Wyle, of the system performance characteristics in accordance with Volume II, Appendix A, Section 4.3.1 of the 2005 VVSG, was used to determine that the best approach to verifying that the new motherboard is electronically and mechanically interchangeable with the existing motherboard was to perform an Electromagnetic Radiation Analysis and compare the electronic signatures of a baseline OVO, versus an OVO with the new motherboard installed.

4.1.1.1 Electromagnetic Radiation Analysis

The Unisyn OVO was subjected to an Electromagnetic Radiation Analysis. The following paragraphs describe how the Electromagnetic Radiation Analysis was performed as well as the results of the analysis.

The Electromagnetic Radiation Analysis was performed by Wyle in a semi-anechoic chamber. The antennas used for testing were placed at a distance of one meter from the OVO unit being analyzed. Wyle utilized a logarithmic antenna on both vertical and horizontal planes, to perform the analysis. The OVO unit was configured to run in auto feed mode, where continual ballot processing would occur during the analysis.

For the first scan, OVO unit UNI000004 was loaded with firmware version 1.0.1 and an election used during the original EAC Certification effort. The Jetway 1.5GHz rev 4.0 model number J7F2WE1G5S-OC-LF motherboard and integrated processor was installed in the unit. \$ 3 3 U H S H U D W L R Q D O 6 W D W was performed, after which the unit was placed in the chamber and set to auto feed mode. Electromagnetic Radiation scans were performed while the unit was actively scanning ballots.

For the second scan, the Jetway 2GHz rev 4.0 model number J7F2WE2GS-OC-LF motherboard and integrated processor was installed into OVO unit UNI000004. The OVO was loaded with firmware version 1.0.1 and an election used during the original EAC Certification effort and set to auto feed mode. Electromagnetic Radiation scans were performed while the unit was actively scanning ballots. At the conclusion of the Electromagnetic Radiation scans, the unit Z D V V X E M H F W O p e r a t i o n S t a t u s 3 R V W Check. ✓

Summary Findings: The two scans provided Wyle with enough data to make the assessment that the hardware update was not significant and to suggest that the change be considered minor. The scans revealed that although there were some differences in the emissions profiles of the two motherboards, both the old and new emissions profiles fall within the acceptable limits. Wyle believes that this change maintains and does not alter the reliability, functionality, capability and operability of the system. The Electromagnetic Radiation analysis demonstrated that the replacement hardware has the same functionality and is electronically and mechanically interchangeable with the old hardware. The results of the Electromagnetic Radiation Analysis scans are presented in Appendix A.

4.0 TEST FINDINGS AND RECOMMENDATIONS (CONTINUED)

4.1 Summary Findings (continued)

4.1.2 System Level Testing

System level tests were performed to evaluate the integrated operation of the voting system hardware and software. These tests included: Volume and Stress Test (with sufficient ballots cast to satisfy the Data Accuracy requirements set forth in the VVSG Volume 2 Section 4.7.1.1) and a Functional Configuration Audit.

4.1.2.1 Volume and Stress Test

The OVS Version 1.0.1 was subjected to a Volume and Stress Test in accordance with the requirements of Section 6.2.3 of Volume II of the VVSG. The purpose of the test is to verify the system's response to conditions that simulate a high volume of ballots. For all systems, the Volume Test parameters are dependent upon the maximum number of active voting positions and the maximum number of ballot styles that the TDP claims the system can support. During the Volume and Stress Test, a sufficient number of ballots were cast and counted to satisfy the data accuracy requirements of Section 4.7.1.1 of Volume II of the VVSG.

Per the VVSG, data accuracy is defined in terms of ballot position error rate. This rate applies to the voting functions and supporting equipment that capture, record, store, consolidate, and report the selections (or absence thereof) made by the voter for each ballot position. To meet the requirements of this test, the voting system must be subjected to the casting of a large number of ballots to verify vote recording accuracy, i.e. at least 1,549,703 ballot positions correctly read and recorded.

Testing was performed by exercising an election definition developed specifically to test for volume and stress. The election definition parameters are summarized in Table 4-1.

Table 4-1 Volume and Stress Election Definition Parameters

Ballot Positions	240 possible
Ballot Styles	400
Election Parameters	Closed Primary: No Open Primary: No Partisan offices: Yes Non-Partisan offices: Yes Write-in voting: Yes Primary presidential delegation nominations: No Ballot Rotation: No Straight Party voting: No Cross-party endorsement: No Split Precincts: No Vote for N of M: Yes Recall issues, with options: No Cumulative voting: No Ranked order voting: No Provisional or challenged ballots: No Early Voting: Yes
Districts	400
Precincts	2000

4.0 TEST FINDINGS AND RECOMMENDATIONS (CONTINUED)

4.1 Summary Findings (continued)

4.1.2 System Level Testing (continued)

4.1.2.1 Volume and Stress Test (continued)

Table 4-1 Volume and Stress Election Definition Parameters (continued)

Parties	35																												
Languages	English																												
Voting Pattern	7 KH 2 9 2 3 7 H V W ' H F N V ' Z H U H F U H D W H G X V L Q J inch card stock. These ballots were hand-marked ballots in a matrix pattern creating 44 ballot test deck. A total RI 2 9 2 3 7 H V W ' H F N V ' Z H Each OVO processed seven 3 7 H V W s ' which were hand fed eleven times each, except for the seventh deck which was fed ten times, to produce a total of 3344 cast ballots. An additional 20,000 ballots were cast using 3 6 K R M K L Q H mode on two OVO units. 7 KH 2 9 2 3 7 H V W were fed into the OVCS a total of 153 times.																												
Total Ballots Cast	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">System</th> <th style="width: 15%;"># Ballots</th> <th style="width: 15%;"># Machines</th> <th style="width: 15%;"># Runs</th> <th style="width: 25%;">Total</th> </tr> </thead> <tbody> <tr> <td>OVO</td> <td>44</td> <td>2</td> <td>76</td> <td>6688</td> </tr> <tr> <td>OVO (shoe-shine)</td> <td>10,000</td> <td>2</td> <td>1</td> <td>20,000</td> </tr> <tr> <td>OVCS</td> <td>44</td> <td>1</td> <td>153</td> <td>6,732</td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td></td> <td>23,420</td> </tr> </tbody> </table> <p>Total Ballots scanned by OVO: 6,688 Total Ballots scanned by OVO (Shoeshine Mode): 20,000 Total Ballots scanned by OVCS: 6,732 Resulting in 8,020,800 ballot positions scanned accurately</p>				System	# Ballots	# Machines	# Runs	Total	OVO	44	2	76	6688	OVO (shoe-shine)	10,000	2	1	20,000	OVCS	44	1	153	6,732	Total				23,420
System	# Ballots	# Machines	# Runs	Total																									
OVO	44	2	76	6688																									
OVO (shoe-shine)	10,000	2	1	20,000																									
OVCS	44	1	153	6,732																									
Total				23,420																									

Summary Findings: The Unisyn OVS Version 1.0.1 successfully processed 23,420 ballots without error. The two OVO units and the OVCS accurately read over 1.6 million ballot positions thereby fulfilling the requirements of the Accuracy Test. Additionally, two OVO units in shoeshine mode each processed 10,000 ballots with maximum write-ins. The OVO Write-In report was processed and printed on all OVO units after the polls were closed, without issue. No anomalies were noted during the Volume and Stress Test.

4.1.2.2 Functional Configuration Audit

An abbreviated Functional Configuration Audit (FCA) was performed on the Unisyn OVS Version 1.0.1 in accordance with Section 6.7 of Volume II of the VVSG. The purpose of the FCA was to verify the modification performed as documented in the Unisyn supplied technical documentation and validate that the modifications meet the requirements of the EAC 2005 VVSG.

To perform the FCA, the Unisyn OVS Version 1.0.1 was subjected to a series of tests to regression test all modifications to the certified system and retest areas around the modification to ensure that those areas continue to function properly. The modifications included the performance enhancement, repaired defect, and added feature previously described in Section 3.2 of this report.

4.0 TEST FINDINGS AND RECOMMENDATIONS (CONTINUED)

4.1 Summary Findings (continued)

4.1.2 System Level Testing (continued)

4.1.2.2 Functional Configuration Audit (continued)

Summary Findings: A Functional Configuration Audit of the Unisyn OVO version 1.0.1 was performed during which K W K H P R G L I L F D W L R Q D Q G D G G H G I X Q F W L R Q D O L W \ R S H U documentation. The OVO correctly extracted write-ins from cast full page ballots and printed them in an OVO Write-In Report in both Standard and Compressed Formats. During the performance of the FCA, a Close Card was used to close the polls on an OVO in Election Day mode, thus verifying that the defect listed in section 3.2.2 was correctly repaired. No anomalies were noted during the performance of the Functional Configuration Audit.

4.1.2.3 Physical Configuration Audit

A limited Physical Configuration Audit (PCA) of the OVS was performed as part of the pre-testing activities in accordance with Section 6.6 of Volume II of the VVSG. The PCA compares the voting sy V W H P F R P S R Q H Q W V V X E P L W W H G I R U F H U W L I L F D W L R Q Z L W K W K that the documentation submitted meets the requirements of the Guidelines. The purpose of the PCA is to: establish a configuration baseline (both hardware and software) of the system to be tested; verify that the U H Y L H Z H G V R X U F H F R G H F R Q I R U P V W R W K H Y H Q G R U ¶ V V S H F L I L F test procedures and data.

The PCA performed on the OVS 1.0.1 consisted of inspecting the following: The OpenElect Voting Central Scan (OVCS) scanner and software application, the OpenElect Voting Optical Scan unit (OVO), and the documentation used with the OVS system.

Summary Findings: A limited PCA was performed to baseline the system ¶ V K D U a d Z o f t w a r e components prior to commencement of the test campaign. No discrepancies were noted during the PCA.

4.1.3 Source Code Review

The source code for the modifications made to the Unisyn OVS Version 1.0.1 was reviewed for conformance with the requirements set forth in Section 5.4 of the EAC 2005 VVSG coding standards and the vendor supplied coding standards. The review was conducted as part of the pre-testing activities and was performed per the guidelines described in the following paragraphs.

Wyle used the source code from the original EAC Certification effort as a baseline to compare against the modified source code. As source code was received, an MD5 hash value was created for each source file. The source code team then conducted a visual scan of every line of modified source code. Each identified violation was recorded by making notes of the standard violation along with directory name, file name, and line number.

Summary Findings: The source code review of the Unisyn OVS 1.0.1 revealed four units called issues and six header revision history issues. A technical summary report of all identified standards violations was sent to Unisyn for resolution. Unisyn then corrected all standards violations and re-submitted the source code for re-review. This process was repeated as many times as necessary until all identified standards violations were corrected. Other than coding standards noted in the technical summary report, no other deficiencies or significant problems were found during the source code review.

4.0 TEST FINDINGS AND RECOMMENDATIONS (CONTINUED)

4.1 Summary Findings (continued)

4.1.4 Technical Data Package (TDP) Review

The Unisyn Voting Solutions, Inc., OpenElect Voting System Technical Data Package version 1.0.1 was reviewed to the 2005 VVSG. This review was performed as part of the pre-testing activities.

The TDP documents were reviewed to ensure that all modifications to the system are described as applicable. The TDP documents were reviewed for accuracy, completeness, and compliance to the VVSG. The TDP documentation served as the basis for design and development of all functional tests. The TDP documents are listed in the table below:

Table 4-2 TDP Documents

OVS Release 1.0.1 TDP Documents	Release	Version	Document Number
System Functionality Description	1.0.1	1.4	04-00444
System Overview	1.0.1	1.14	04-00446
System Operations Procedures: Warehouse 7 HFKQLFLDQ¶V * XLGH	1.0.1	1.5	04-00460
System Operations Procedures: Election 'D\ 3ROOZRUNHU¶V * XLGH	1.0.1	1.7	04-00463
Tabulator User Guide	1.0.1	1.8	04-00432

Summary Findings: The TDP review results were recorded in a worksheet and sent to Unisyn. Unisyn corrected all issues and resubmitted the associated documents for review. This process continued until the TDP accurately described the modifications to the system and complied with all TDP Standards.

4.2 Deficiencies and Resolutions

During the test campaign, deficiencies were noted that were related to system functionality and usability. The deficiencies were discovered during test setup activities for the Functional Configuration Audit. These deficiencies were reported to Unisyn for resolution and were corrected prior to the start of testing. All deficiencies were documented during real-time test performance and tracked through resolution. The deficiencies are listed in the table below:

Table 4-3 Deficiencies

Wyle ID	OVS Component	Description	Resolution
0000207	OVO	When the printer paper became low during the printing of an OVO write-in report, the OVO TXLFNO\ GLVSOD\HG D VFUH (UURU 3ULQWHU LV RND\` W by the OVO when you replace the paper roll). However, within just a few seconds, the message: 3 5HSRUW 3ULQWHU (UURU Q3W was displayed. The paper roll was replaced and the OVO continued printing the write-in report.	A new OVO software release fixed this issue. The OVO no longer exhibits this behavior when a low printer paper situation occurs.

4.0 TEST FINDINGS AND RECOMMENDATIONS (CONTINUED)

4.2 Deficiencies and Resolutions (continued)

Table 4-3 Deficiencies (continued)

Wyle ID	OVS Component	Description	Resolution
0000208	OVCS	During the performance of OVCS diagnostics, the OVCS would process two ballots and display; count: 2 valid: 2 with the precinct ID being displayed incorrectly. However, for all ballots processed after the first two, the precinct ID and other ballot information was not displayed and the count did not increment.	A new OVCS software release fixed this issue. OVCS diagnostics now properly displays ballot information and increments the count for all ballots scanned.
0000209	OVCS	Closing a session in the OVCS application caused the Session ID to be incremented by one when it was recorded to the audit log.	A new OVCS software release fixed this issue. The OVCS no exhibits this behavior when closing a session.

Additionally, Wyle discovered an issue with reading a ballot accurately when using a pen that was not on the list of approved instruments. Once discovered Wyle informed the manufacturer of this issue for research. Wyle used another marking instrument that was not listed on the list of approved instruments.

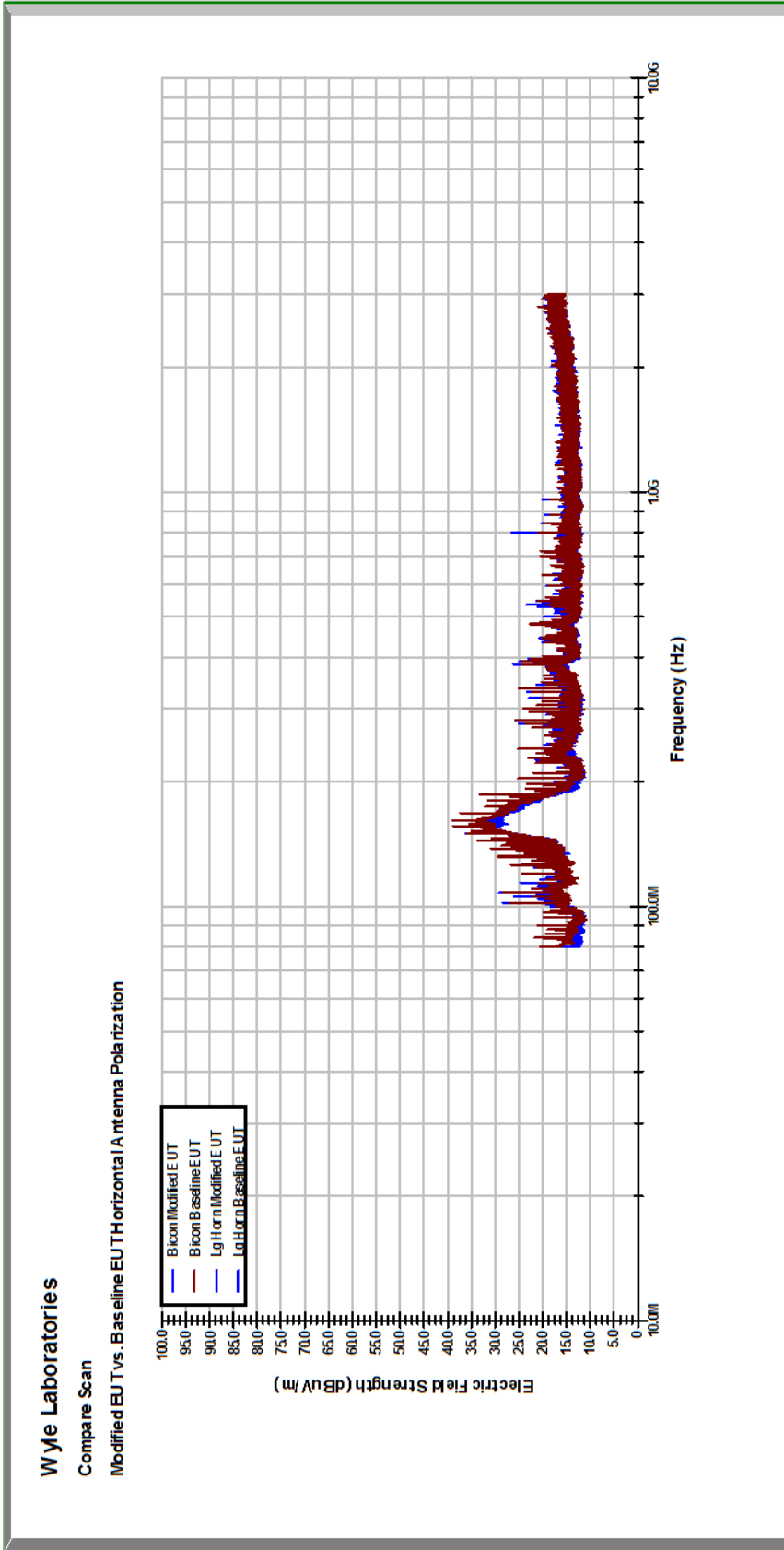
4.3 Recommendation for Certification

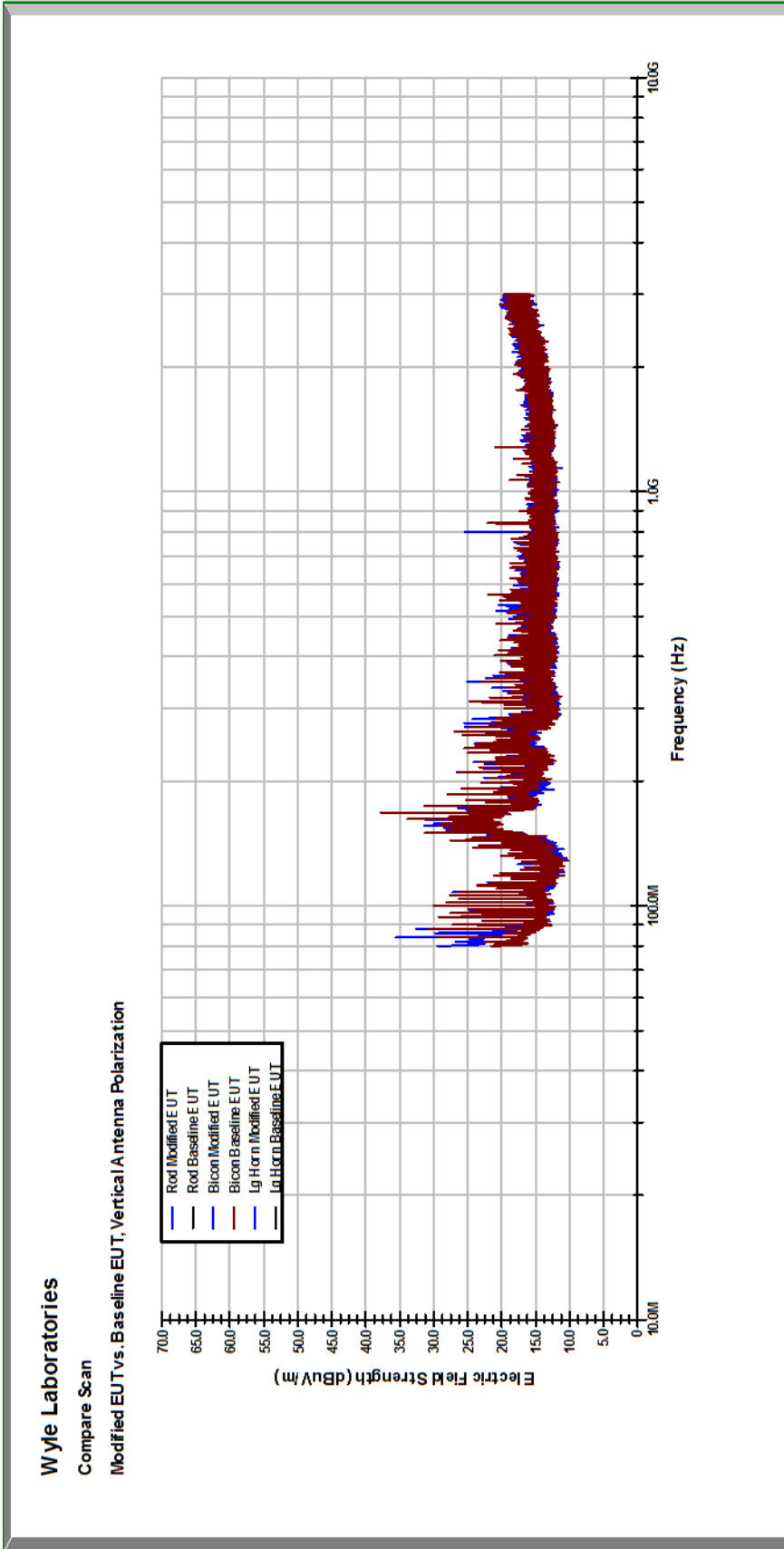
Wyle performed regression testing on all modifications submitted to the Unisyn Voting Solutions, Inc., OpenElect Voting System Version 1.0.1. Wyle only tested the OpenElect Voting System Version 1.0.1 for the modification and modules that interface with the modified modules. These modifications meet the requirements of the EAC 2005 VVSG. Wyle recommends the EAC grant the OpenElect Voting System Version 1.0.1 certification to the EAC 2005 VVSG.

This report is valid only for the system identified in Section 2.0 of this report. Any changes, revisions, or corrections made to the system after this evaluation shall be submitted to the EAC to determine if the modified system requires a new application, or can be submitted as a modified system. The scope of testing required will be determined based upon the degree of modification.

Due to the varying requirements of individual jurisdictions, it is recommended by the EAC 2005 VVSG that local jurisdictions perform pre-election logic and accuracy tests on all systems prior to their use in an election within their jurisdiction.

APPENDIX A
ELECTROMAGNETIC RADIATION ANALYSIS





APPENDIX B
AS-RUN TEST PLAN



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Job No. T58440
Certification Test Plan No. T58440-01, Rev. B
June 6, 2011

CERTIFICATION TEST PLAN

EAC Application Number UNS1101

Prepared for:

Manufacturer Name	Unisyn Voting Solutions, Inc.
Manufacturer System	OpenElect Voting System
EAC Application No.	UNS1101
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U.S. National Standards Consortium
EAC Lab Code 0704


Revisions			REVISION B
			REPORT NO. Test Plan T58440-01, Rev. B
			DATE June 6, 2011
REV	DATE	PAGE OR PARAGRAPH AFFECTED	DESCRIPTION OF CHANGES
A	4-15-11	Paragraph 1.3.1	Reworded as follows: "E-01 – The OVO and OVCS are capable of extracting write-in locations from cast full page ballots, as images, for use in election results reporting."
A	4-15-11	Paragraph 1.3.2	Reworded as follows: "F-01 – A feature has been added to the OVO, to print a "Write-In Report" which contains the write-in images extracted using the enhancement above."
A	4-15-11	Paragraph 3.1	Added Physical Configuration Audit Test and provided additional detail to Volume and Stress Test.
A	4-15-11	Table 2-2	Revised description of OVO 2 and OVO 3
A	4-15-11	Table 5-1	Removed WoP 30A from Functional Configuration Audit
A	4-15-11	Page A-2	Updated E-01 and F-01 descriptions so that they are consistent with sections 1.3.1 and 1.3.2
A	4-15-11	Page B-2	Updated WoP 25 Description
B	6-6-11	Table 2-2	Revised description of OVO 3
B	6-6-11	Paragraph 1.3.4	Added detail to paragraph.
B	6-6-11	Paragraph 2.4	Revised text, added PCA to list of deliverables, and removed Notice of Anomaly from list of deliverables.
B	6-6-11	Paragraph 3.2	Updated description of Electromagnetic Radiation Analysis process.
B	6-6-11	Page A-2	Added detail to description of item D-01.

TABLE OF CONTENTS

	<u>Page No.</u>
1.0 INTRODUCTION.....	1
1.1 References	1
1.2 Terms and Abbreviations	2
1.3 Scope of Testing.....	3
1.3.1 Enhancement.....	4
1.3.2 Feature.....	4
1.3.3 Hardware	4
1.3.4 Defect	4
2.0 MATERIALS REQUIRED FOR TESTING	4
2.1 Software.....	4
2.2 Equipment	5
2.3 Test Tools/Materials.....	5
2.4 Deliverable Materials	6
2.5 Proprietary Data	6
3.0 TEST SPECIFICATIONS.....	6
3.1 Requirements.....	6
3.2 Hardware Configuration and Data.....	8
3.3 Software System Functions	8
4.0 TEST DATA	8
4.1 Data Recording.....	8
4.2 Test Data Acceptance Criteria.....	9
5.0 TEST PROCEDURE AND CONDITIONS	9
5.1 Test Facilities	9
5.2 Test Set-Up.....	10
5.3 Test Sequence.....	10
5.4 Test Operation Procedures	11
5.5 System Level Test	11

APPENDICES

APPENDIX A – FUNCTIONALITY REQUIREMENTS MATRIX.....	A-1
APPENDIX B – TEST PROCEDURE DESCRIPTION.....	B-1

1.0 INTRODUCTION

The purpose of this Test Plan is to document the procedures that Wyle will follow to perform certification testing of the Unisyn Voting Solutions, Inc., OpenElect Voting System (OVS), Version 1.0.1. The previous version of this system, Unisyn OVS, Version 1.0, has been fully tested to the EAC 2005 VVSG. As a result of this testing, the Unisyn OVS Version 1.0 was granted certification under EAC Certification No. UNS10121966-OE. Since that time, Unisyn Voting Solutions has incorporated modifications to the certified system, resulting in the release of the Unisyn OVS, Version 1.0.1. The modifications include a performance enhancement, introduction of an alternative hardware component for the OVO, a defect repair, and added a feature to the system. The modification resulted in the need for regression testing and the performance of an Electromagnetic Radiation Analysis to determine what effect the hardware change has on the unit's electronic signature.

The full system details for the previous test campaign, including system, performance, security, telecommunication, usability, system verification, and TDP deliverables can be reviewed in the EAC test report "Unisyn Voting Solutions, Inc., OpenElect Voting System Version 1.0 VSTL Certification Test Report Revision B" (listed on www.eac.gov).

1.1 References

The list below includes all documents cited in the Test Plan and used in the development of the Test Plan. The documents listed shall be 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 5
- 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)

1.0 INTRODUCTION (CONTINUED)

1.1 References (continued)

- Unisyn Voting Solutions, Inc., OpenElect Voting System Version 1.0 VSTL Certification Test Report Revision B (listed on www.eac.gov)
- Unisyn Voting Solutions, Inc., Open Elect Voting System Version 1.0.1 Technical Data Package

1.2 Terms and Abbreviations

Table 1-1 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
Ballot Layout Manager	BLM	Unisyn OVS application used to layout ballot information.
Configuration Management	CM	---
Commercial Off the Shelf	COTS	---
Direct Record Electronic	DRE	---
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 Manager	EM	Utilizes the election definition file from the Ballot Layout Manager, adds jurisdiction voting device specific options and produces the CD used to load the election onto the voting devices and OVCS.
Election Management System	EMS	Within the OpenElect system, the EMS equivalent is OCS.
Election Server	ES	A component of the OCS, the ES updates the system clock and downloads new Election data to the voting devices prior to each election, typically at the warehouse.
Equipment Under Test	EUT	---
Functional Configuration Audit	FCA	Exhaustive verification of every system function 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.
OpenElect Central Suite	OCS	Set of applications supplied by Unisyn to run at the Election Headquarters to support elections on the OVO, OVI, and OVCS systems. Includes: ballot Layout Manager, Election Manager, Election Server, Tabulator Client, Tabulator Server and Tabulator Reports. In addition, the OCS includes the Software Server (SS) system for updating and validating OVO and OVI (voting device) software.

1.0 INTRODUCTION (CONTINUED)

1.2 Terms and Abbreviations (continued)

Table 1-1 Terms and Abbreviations

Term	Abbreviation	Definition
OpenElect Voting Central Scan	OVCS	A bulk scanner solution at the Central Site, used for casting provisional and mail-in ballots; can also be used to perform recounts.
OpenElect Voting Interface	OVI	Used as an ADA solution and early voting device.
OpenElect Voting Optical Scan	OVO	Scanning and tabulating voting device located at the precinct and used during early voting.
OpenElect Voting System	OVS	The Unisyn voting system submitted for certification testing.
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	---
Software Server	SS	Updates and validates voting device client software.
Specimen Under Test	SUT	---
Tabulator	TAB	The Tabulator receives and consolidates election results from the counted OVO and OVCS ballots that have been uploaded by the Tabulator Client (in the case of OVO results) and directly by the OVCS. The Tabulator stores the vote data in the database, provides a status for uploaded vote data and handles Rank Choice Voting functionality.
Tabulator Client	TC	Retrieves vote files from Transport Media devices and provides that data to the tabulator.
Technical Data Package	TDP	Manufacturer documentation related to the voting system required to be submitted as a precondition of certification testing.
Tabulator Reports	TR	Accesses data from the Tabulator database to generate the necessary unofficial and official reports.
Uninterruptible Power Supply	UPS	---
Voter Verifiable Paper Audit Trail	VVPAT	---
Voluntary Voting System Guidelines	2005 VVSG	Published by the EAC, the third iteration of national level voting system standards.
Wyle Operating Procedure	WoP	Wyle Test Method or Test Procedure

1.3 Scope of Testing

The Unisyn OpenElect Voting System Version 1.0 was granted certification under EAC Certification No. UNS10121966-OE. Since that time, Unisyn Voting Solutions has developed a performance enhancement, repaired a defect, added a new feature, and added an alternative motherboard with integrated processor that can be used on the OVO. These modifications are detailed in the following subsections.

1.0 INTRODUCTION (CONTINUED)

1.3 Scope of Testing (continued)

1.3.1 Enhancement

E-01 – The OVO and OVCS are capable of extracting write-in locations from cast full page ballots, as images, for use in election results reporting. | A

1.3.2 Feature

F-01 – A feature has been added to the OVO, to print a “Write-In Report” which contains the write-in images extracted using the enhancement above. | A

1.3.3 Hardware

H-01 – Unisyn is submitting an alternative motherboard and processor that can be used on the OVO. The Jetway 1.5GHz rev 4.0 model number J7F2WE1G5S-OC-LF motherboard and processor is being introduced as an alternative to the Jetway 2GHz rev 3.1 model number J7F2WE2GS-OC-LF motherboard and processor used in the OVO. Thus an OVO can use either model.

1.3.4 Defect

D-01 – A defect was discovered by Unisyn regarding the close polls time. The defect occurred when using a Close Card to close the polls on the OVO with the date set to Election Day. Using a Close Card would not cause the polls to close. Internal testing by Unisyn has shown this issue to be corrected. | B

2.0 MATERIALS REQUIRED FOR TESTING

The materials required for certification testing of the Unisyn OVS, Version 1.0.1, which include software, hardware, test materials, and deliverable materials, were shipped directly to Wyle by Unisyn with the exception of the OVCS high speed scanner which was shipped to Wyle by VisionShape, Inc. Some of the equipment to be used during this test effort is the same equipment used during the original certification campaign performed by Wyle.

2.1 Software

The software being evaluated comprises the source code for the OVCS Application version 1.0.1, and the OVO Firmware version 1.0.1.

The Certified EMS version 1.0.0 in conjunction with the updated OVCS Application version 1.0.1, shall be used for regression testing of the added feature and enhancement made to the system.

Table 2-1 presents the software the manufacturer has submitted for testing.

Table 2-1 Software Submitted for Testing

Software Required For Testing	Software Version
OVCS Application	1.0.1
OVO Firmware	1.0.1

2.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

2.2 Equipment

This subsection categorizes the equipment the manufacturer submitted for testing listed in Table 2-2. 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.

Table 2-2 Test Equipment

Equipment	Description	Serial Numbers
OVO 1	Model: OpenElect Voting Optical, Rev. A Firmware Version 1.0.1 Motherboard: J7F2WE2GS-OC-LF Rev 3.1	UNI000001
OVO 2	Model: OpenElect Voting Optical, Rev. A Firmware Version 1.0.1 Motherboard: J7F2WE1G5S-OC-LF Rev 4.0	UNI000004
OVO 3	Model: OpenElect Voting Optical, Rev. E Firmware Version 1.0.1 Motherboard: J7F2WE2GS-OC-LF Rev 4.0	UNI000036
EMS PC	Dell Optiplex 755 (with all EMS applications installed)	G5HW3J1
OVCS High Speed Scanner	Canon ImageFormula DR-X10C	ED300631
UPS	Minuteman Entrust Series ETR1500	AE58080900407, AE580906PA114
Transport Media	STEC 1GB industrial flash drive Model Number: SLUFD1GU1U-A	TM100027
Transport Media (ECO)	STEC 1GB industrial flash drive Model Number: SLUFD1GU2U	TM100131, TM100132, TM100100
Gigabit LAN Switch	Linksys SR2024 Business Series 24-Port 10/100/1000 Gigabit Switch	REM30H600558 GGR1807 JJ

A
B

2.3 Test Tools/Material

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

Table 2-3 Test Materials

Test Material	Quantity
Software tools (i.e. ExamDiff Pro for source code analysis)	as required
Elections	2
WoP's	10
Miscellaneous Office equipment and supplies (such as report paper)	as required
Printer Thermal Paper Rolls	as required
External DVD-ROM Drive	1
Printed Ballots	as required

2.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

2.4 Deliverable Materials

At test conclusion, Wyle shall deliver a final report to Unisyn Voting Solutions, Inc. and the EAC that includes the following:

- Functional Configuration Audit (FCA) results
- Electromagnetic Radiation Analysis results
- TDP review results
- Source code review results
- Volume and stress test results
- Physical Configuration Audit (PCA) results

B

All supplied equipment and software furnished to Wyle for this program, except for hardware from the initial certification test campaign, shall be returned to the customer at the conclusion of testing unless otherwise agreed in writing.

2.5 Proprietary Data

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

3.0 TEST SPECIFICATIONS

3.1 Requirements

The strategy for evaluating the Unisyn OVS, Version 1.0.1, was to review the change log, source changes, and the engineering changes submitted for the modified system. Wyle Laboratories has assessed that no additional functionality was added to the modified system that would add additional requirements that were not tested in the previous test campaign.

Wyle has determined that the software changes affect the following requirements in the 2005 VVSG Volume 1: Section 2.4.2; Section 2.4.3 a, c, d, f – h, & j; Section 4.1.5.1 d ii; Section 4.7.1.1; and Section 5.4.4 b & d. Regression testing of the software is required.

This test campaign includes the following tests:

- Source code review in accordance with 2005 EAC VVSG.
- Technical Data Package review to ensure all modifications are documented as applicable.
- A limited Physical Configuration Audit (PCA) to baseline the modified system.
- Functional Configuration Audit of the new features and enhancements made to the voting system.
- All functionality performed by new or modified subsystems/modules.
- Volume and Stress Test to ensure that the system can handle the large amounts of data associated with the write-in “image” capturing ability of the OVO and OVCS. Additionally, the number of ballots that will be cast and counted during the Volume and Stress Test will ensure that over 1.6

A

A

3.0 TEST SPECIFICATIONS (CONTINUED)

3.1 Requirements (continued)

million ballot positions will be read by both the OVO and the OVCS, which will fulfill the requirements of the Accuracy Test. | A

Wyle personnel shall maintain a test log of the procedure(s) employed. This log identifies the system and equipment by model and serial number.

In the event that the project engineer deems it necessary to deviate from requirements pertaining to the test environment, the equipment arrangement and method of operation, the specified test procedure, or the provision of test instrumentation and facilities, the deviation shall be recorded in the test log. (A discussion of the reasons for the deviation and the effect of the deviation on the validity of the test procedure shall also be provided and approved.)

The designated Wyle Operating Procedures (WoP's) for this program are listed below together with the identification and a brief description of the hardware and software to be tested and any special considerations that affect the test design and procedure.

The specific Wyle WoP's to be used during testing include the following:

- WoP 1 Operations Status Checks
- WoP 2 Receipt Inspection
- WoP 3 Technical Data Package Review
- WoP 4 Test Plan Preparation– Unisyn OpenElect Voting System Version 1.0.1 (*This document*)
- WoP 5a Source Code Compliance Review
- WoP 7 Trusted Build
- WoP 7a Trusted Build Form
- WoP 25 Physical Configuration Audit | A
- WoP 26 Functional Requirements
- WoP 34 Test Report
- WoP 40 System Level Stress and Volume Test

The Certified EMS version 1.0.0 including the updated OVCS application version 1.0.1 shall be configured as follows for the Functional Configuration Audit and the Volume and Stress Test:

EMS – A COTS desktop computer documented in Section 2 shall be loaded with the Certified EMS version 1.0.0 and the updated OVCS application version 1.0.1.

Central Count Scanner – A COTS high speed scanner documented in Section 2 shall be attached to the EMS.

The OVO shall be configured as follows for the Functional Configuration Audit and the Volume and Stress Test:

Optical Scanner - An OVO configured with firmware version 1.0.1 will be used for most tests. Three OVO units will be used during system level testing.

3.0 TEST SPECIFICATIONS (CONTINUED)

3.2 Hardware Configuration and Design

The submitted hardware changes for this test campaign are documented in Section 1.3. Wyle Laboratories has conducted an engineering analysis of the system performance characteristics in accordance with Volume II, Appendix A, Section 4.3.1 of the 2005 VVSG and determined that the best approach to verifying that the new motherboard is electronically and mechanically interchangeable with the existing motherboard is to perform an Electromagnetic Radiation Analysis and compare the electronic signatures of a baseline OVO, versus the same OVO with the new motherboard installed. |B

Wyle Laboratories views this analysis as the minimum hardware testing that needs to be performed. Based on the data collected in these tests further testing maybe required. Wyle Laboratories shall analyze the data collected to determine if further testing is required. If further testing is required this test plan shall be updated as needed.

3.3 Software System Functions

The submitted changes for this test campaign are documented in Section 1.3. The new feature and modification shall be tested using "Regression testing". Regression testing shall be used to ensure the modification did not introduce any defects into unchanged areas. Wyle plans to use partial regression testing which shall be used to test the directly interacting elements at both the Component and Integration Levels of testing.

The strategy for evaluating the depth of regression testing shall be to review the source code modifications during the source code review. Minor enhancements to variables, input fields, and restrictions shall be tested by inputting both valid and invalid data to the documented modification. Once the physical modification has been observed the interacting functions shall be fully regression tested to ensure the enhancement performs as expected. After the new function and modification have been tested on a component level a full system level test shall be performed to ensure all interacting components function as a system without issues.

4.0 TEST DATA

4.1 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 shall be listed on the Instrumentation Equipment Sheet for each test. The output test data shall be recorded in an appropriate manner as to allow for data analysis. For source code and TDP reviews, results shall be compiled in output reports and submitted to Unisyn Voting Solutions, Inc. for resolution. Additionally, all test results, including functional test data, shall be recorded on the relevant WoP's and Test Cases. Results shall also be recorded real-time in engineering log books.

4.0 TEST DATA (CONTINUED)

4.2 Test Data Acceptance Criteria

Wyle shall evaluate all test results against the Unisyn Voting Solutions, Inc. provided technical documentation for the Unisyn OVS, Version 1.0.1, and the requirements set forth in the EAC 2005 VVSG. The Unisyn OVS, Version 1.0.1, 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 Unisyn OVS, Version 1.0.1, documentation. 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).

5.0 TEST PROCEDURE AND CONDITIONS

This section describes Wyle's proposed test procedures and the conditions under which those tests shall be conducted.

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

5.1 Test Facilities

All testing shall be conducted at the Wyle, Huntsville, AL facility unless otherwise annotated. Hardware operating testing shall 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 campaign shall be listed on the Instrumentation equipment Sheet for each test and shall be calibrated in accordance with Wyle's 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

5.0 TEST PROCEDURE AND CONDITIONS

5.2 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 Quality Assurance (QA) procedures. When voting system hardware is received, Wyle Shipping and Receiving personnel shall notify Wyle QA personnel. With Wyle QA personnel present, each test article shall 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 Unisyn Voting Solutions, Inc. 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 Unisyn Voting Solutions, Inc. representative for resolution.

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

For hardware test setup, the system shall be configured as it would be for normal field use. This includes connecting all supporting equipment and peripherals. Wyle personnel shall properly configure and initialize the system, and verify that it is ready to be tested, by following the procedures detailed in the Unisyn OVS, Version 1.0.1, technical documentation. Wyle will use the operational status test and will measure the system performance levels used during the original certification.

5.3 Test Sequence

There is no specific sequencing enforced for the execution of the required tests.

The components of the Unisyn OVS, Version 1.0.1, shall only undergo the tests described in Table 5-1. Table 5-1 includes a list of tests and a brief description of each test and a planned sequence for testing:

Table 5-1 Unisyn OpenElect Voting System 1.0, Software and System Testing Sequence

Test	Description	Procedure	Test Level	Specimen	Election Data
<i>Technical Data Package (TDP) Review</i> <i>(Pre-testing Activity)</i>	Documentation review for compliance, correctness, and completeness	WHVS07.1 WOP 3	Document	TDP package	---
<i>Compliance Source Code Review</i> <i>(Pre-testing Activity)</i>	Source code review for compliance	WHVS07.2 WOP 5a	Component	EMS Source Code package	---
<i>Compliance Build</i>	Use the build documents and source code to construct the application	WHVS07.3 WOP 25	Component & System	EMS Source Code package	---

5.0 TEST PROCEDURE AND CONDITIONS (CONTINUED)

5.3 Test Sequence (continued)

Table 5-1 Unisyn OpenElect Voting System 1.0, Software and System Testing Sequence

Test	Description	Procedure	Test Level	Specimen	Election Data
<i>Physical Configuration Audit</i>	Audit hardware and software models and versions	WHVS07.3 WOP 25	Component & System	---	---
<i>Functional Configuration Audit</i>	Functional testing to the system documentation and 2005 VVSG requirements	WHVS07.4 WOP 26	Component & Integration	---	GEN-01
<i>Volume and Stress</i>	Test to investigate the system's response to larger amounts of data than it is expecting.	WOP 40	System	---	V & S-01
<i>Trusted Build</i>	Creation and installation of the final system software	WHVS07.6 WOP 7 WOP 7a	Component	EMS Source Code package	---

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5.4 Test Operation Procedures

Wyle shall provide the step-by-step procedures for each test case to be conducted. Each step is assigned a test step number and this number, along with critical test data and test procedures information, shall be tabulated onto a Test Control Record for control and the recording of test results.

Any test failures shall be recorded on WH1066, Notice of Anomaly form. These Anomalies shall be reported to the manufacturer and the EAC.

5.5 System Level Test

After functional testing of the new feature and enhancement has been completed, a full system level test shall be performed to ensure all interacting components function as a system without issues. Wyle has chosen the Volume and Stress Test for system level testing and will use the Volume and Stress election used during the original certification testing. The rationale for using the Volume and Stress test is that during the original certification testing, an anomaly occurred during the performance of the Volume Test where the system failed to tally 10,000 ballots with maximum write-ins. An Engineering Analysis was performed which determined that the OVO was storing write-in "images" in memory which caused a failure to tally error. A source code revision was performed in which the write-in "image" capture functionality was disabled. Performing the Volume and Stress Test will verify that the OVO can handle and tally maximum write-ins with the new enhancement. In addition, during the performance of the Volume and Stress Test, a sufficient number of ballots will be cast and counted in order to fulfill Accuracy Testing requirements.

APPENDIX A
FUNCTIONALITY REQUIREMENTS MATRIX

Item	Description	Test	Comments
E-01	The OVO and OVCS are capable of extracting write-in locations from cast full page ballots, as images, for use in election results reporting.	FCA, Volume and Stress	Wyle will use the V&S-01 Volume and Stress election to perform the Volume Test. The General election, GEN-01, will be used to perform the FCA.
F-01	A feature has been added to the OVO, to print a "Write-In Report" which contains the write-in images extracted using the enhancement above.	FCA	Wyle will use the General election, GEN-01, to perform the FCA.
D-01	A defect was discovered by Unisyn regarding the close polls time. The defect occurred when using a Close Card to close the polls on the OVO with the date set to Election Day. Using a Close Card would not cause the polls to close.	FCA	Wyle will use the General election, GEN-01, to perform the FCA.

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APPENDIX B
TEST PROCEDURE DESCRIPTION

Test Procedure	Test Procedure Description
WoP 1 Operational Status Checks	When all tests, inspections, repairs, and adjustments have been completed, normal operation shall be verified by conducting an operational status check. During this process, all equipment shall be operated in a manner and under environmental conditions that simulate election use to verify the functional status of the system. Prior to the conduct of each of the environmental hardware non-operating tests, a supplemental test shall be made to determine that the operational state of the equipment is within acceptable performance limits.
WoP 2 Receipt Inspection	Documenting the receiving inspection of equipment.
WoP 3 Technical Data Package Review	Track all enhancements, new features, and hardware changes through the technical data package.
WoP 4 Test Plan Preparation – Unisyn OpenElect Voting System Revision 1.0.1 (<i>This Document</i>)	Approval of this document shall fulfill the requirements of this procedure.
WoP 5a Source Code Compliance Review	Compare the source code to the vendor's software design documentation to ascertain how completely the software conforms to the vendor's specifications. Source code inspection shall also assess the extent to which the code adheres to the requirements in the 2005 VVSG, Volume I, Section 5.
WoP 7 Trusted Build	To ensure that the system version tested is the correct version, Wyle Laboratories personnel shall witness the build of the executable version of the system immediately prior to or as part of, the physical configuration audit. (Additionally, should components of the system be modified or replaced during the testing process, Wyle Laboratories shall require Unisyn Voting Solutions, Inc. to conduct a new "build" of the system to ensure that the certified executable release of the system is built from tested components).
WoP 7a Trusted Build Form	Form required to be filled out as part of the Trusted Build Process which describes the software built during the Trusted Build Process as well as the build environment and source code used to perform the build.
WoP 25 Physical Configuration Audit	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.

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