Test Report of
EAC 2005 VVSG Certification Testing
Performed on Election Systems & Software EVS 5.4.0.0

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REVISIONS

Revision	Reason for Revision	Date
NR	Initial Release	12/14/16
1	Address EAC Comments	02/07/17

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1.0 INTRODUCTION

The purpose of this National Certification Test Report is to document the results of the certification testing performed on Election Systems & Software's (ES&S), herein referred to as manufacturer, Election Systems & Software Voting System 5.4.0.0 (EVS5400). EVS 5.4.0.0 was tested to the requirements set forth in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines Standards (2005 VVSG). EVS 5.4.0.0 is a modification to the previously 2005 VVSG certified EVS 5.2.0.0 voting system (Certification number: ESSEVS5200), and was tested by NTS Huntsville based on the "modified system" requirements set forth in section 4.6.2.3 of the EAC Testing and Certification Program Manual, Version 2.0, herein referred to as the Program Manual.

1.1 Description of EAC Certified System Being Modified

The following subsection describes the EAC Certified System that is baseline for the submitted modification. All information was derived from the previous Certification Test Report and/or EAC Certificate of Conformance.

1.1.1 Baseline Certified System

The baseline system for this modification is the EVS 5.2.0.0. Tables 1-1 and 1-2 describe both the baseline certified software versions and the hardware/firmware versions submitted for certification testing. For a complete description of the configuration and description of the EVS 5.2.0.0 product, refer to the EVS 5.2.0.0 Test Report located on the EAC's website at http://www.eac.gov.

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1.1.1 Baseline Certified System (Continued)

Table 1-1 Baseline Certified Software Versions

Software Component	Software/Firmware Version
Proprietary Software	
Electionware	4.6.0.0
Election Reporting Manager (ERM)	8.11.0.0
Event Log Service	1.5.5.0
Removable Media Service (RMS)	1.4.5.0
ExpressVote Previewer	1.4.0.0
VAT Preview	1.8.6.0
COTS Software	
Adobe Acrobat Standard	11
Cerberus FTP	6.0.7.1
Microsoft Server 2008	R2 w/ SP1
Microsoft Windows 7	64-bit/ SP1
WSUS Microsoft Windows Offline Update Utility	8.8
Micro Focus RM/COBOL Runtime	12.06
Symantec Endpoint Protection	12.1.4

Table 1-2 Baseline Certified Hardware/Firmware Versions

Hardware Component	Hardware Version	Firmware Version
Proprietary Hardware		
ExpressVote: Universal Voting System	1.0	1.4.0.0
DS200: Precinct Count Scanner	1.2.1, 1.2.3, and 1.3	2.12.0.0
DS850: Central Count Scanner	1.0	2.10.0.0
AutoMARK A100: Accessible Voting Station	1.0	1.8.6.0
AutoMARK A200 (SBC 2.0 & SBC 2.5) : Accessible Voting Station	1.1	1.8.6.0
AutoMARK A300 (SBC 2.0 & SBC 2.5) : Accessible Voting Station	1.3	1.8.6.0
Plastic Ballot Box	1.2 & 1.3	N/A
Metal Ballot Box	1.0, 1.1, & 1.2	N/A
COTS Hardware		
EMS Server – Dell	PowerEdge T710	N/A
EMS Reporting Workstation – Dell	OptiPlex 980	N/A
EMS Reporting Laptop – Dell	E6410	N/A
Motorola QR Code Scanner	DS9208	N/A
Delkin USB Flash Drives	512 MB, 1, 2, 4, & 8 GB	N/A
Delkin Compact Flash	1 GB	N/A
DS850 Report Printer	OKI B430dn & B431dn	N/A
DS850 Audit Printer	OKI Microline 420	N/A
Avid Headphones	Avid FV 60	N/A
SanDisk CF Card Reader	018-6305	N/A

1.2 References

- 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 2.0, effective date May 31, 2015
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 2.0, effective date May 31, 2015
- 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
- Test Guidelines Documents: EMI-001A, 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"
- Quality Assurance Program Manual, Revision 8
- ANSI/ISO/IEC 17025:2005 and ANSI/NCSL Z540.3-2007, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"
- ISO 10012:2003, "Quality Assurance Requirements for Measuring Equipment"
- EAC Requests for Interpretation (RFI) (listed on www.eac.gov)
- EAC Notices of Clarification (NOC) (listed on www.eac.gov)
- EAC Quality Monitoring Program residing on:

  http://www.eac.gov/testing_and_certification/quality_monitoring_program.aspx
- NTS Test Report No. T71379.01-01 Rev B – National Certification Test Report for Certification Testing of the Election Systems & Software EVS 5.2.0.0 Voting System
- ES&S EVS 5.2.0.0 Technical Data Package
- ES&S EVS 5.4.0.0 Technical Data Package

1.3 Terms and Abbreviations

Table 1-3 defines all terms and abbreviations applicable to this Test Report.

Table 1-3 Terms and Abbreviations

Term	Abbreviation	Definition
Anomaly	--	Any non-repeatable testing event that is not the expected result or interrupts the test operations.
Americans with Disabilities Act 1990	ADA	ADA is a wide-ranging civil rights law that prohibits, under certain circumstances, discrimination based on disability.
Configuration Management	CM	Systems engineering process for establishing and maintaining consistency of a product's performance, functional and physical attributes with its requirements, design and operational information throughout its life.
Commercial Off-the-Shelf	COTS	Commercial, readily available hardware or software.
Cast Vote Record	CVR	Permanent record of all votes produced by a single voter whether in electronic, paper, or other form. Also referred to as ballot image when used to refer to electronic ballots.
Deficiency	--	Any repeatable test result that was not the expected result or violates a requirement of the 2005 VVSG.
Direct-Recording Electronic	DRE	An electronic voting system that utilizes electronic components for the functions of ballot presentation, vote capture, vote recording, and tabulation which are logically and physically integrated into a single unit. A DRE produces a tabulation of the voting data stored in a removable memory component and in printed hardcopy.
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.
ES&S Event Log Service	ELS	ES&S Event Log Service is a Windows Service that runs in the background of any active ES&S Election Management software application to monitor the proper functioning of the Windows Event Viewer
Election Management System	EMS	Within the EVS 5.4.0.0 voting system, the EMS is comprised of five components: Electionware, ERM, ES&S Event Log Service, VAT Previewer, and ExpressVote Previewer.
Election Reporting Manager	ERM	EMS reporting component.
Election Systems and Software	ES&S	---
Engineering Change Order	ECO	---
Equipment Under Test	EUT	Refers to the individual system component or multiple piece of the same component
ES&S Voting System	EVS	---
ES&S Export Utility	EXP	Export utility, part of ERM
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.
Intelligent Mark Recognition	IMR	Visible light scanning technology to detect completed ballot targets.
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.

1.3 Terms and Abbreviations (Continued)

Table 1-3 Terms and Abbreviations (Continued)

Term	Abbreviation	Definition
Notice of Deviation	NOD	A NTS quality controlled document used to identify, access and describe any identified Anomaly or Deficiency witnessed by the VSTL during testing.
Notice of Clarification	NOC	Provides further guidance and explanation on the requirements and procedures of the EAC's Voting System Certification or Voting System Testing Laboratory programs.
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.
Personal Computer	PC	Computer component of the EVS 5.4.0.0 voting system.
Quality Assurance	QA	Administrative and procedural activities implemented as a way of preventing mistakes or defects.
Quantity	QTY	Number/Count of items
Quick Response Code	QR Code	Two-dimensional barcode
Request for Interpretation	RFI	A means by which a registered Manufacturer or Voting System Test Laboratory (VSTL) may seek clarification on a specific Voluntary Voting System Guidelines (VVSG) standard.
System Under Test	SUT	Refers to the system as a whole (all components)
Technical Data Package	TDP	Manufacturer documentation related to the voting system required to be submitted as a precondition of certification testing.
Trusted Build	---	Final build of source code performed by a trusted source and overseen by the manufacturer, which is delivered to the EAC designated repository; also referred to as a "Witness Build".
Underwriters Laboratories Inc.	UL	Safety consulting and certification company
Uninterruptible Power Supply	UPS	Electrical apparatus providing emergency power when an input power source fails.
Voter Assist Terminal	VAT	The electronic ballot marking device component is the ES&S AutoMARK.
National Technical Systems, Inc.	NTS	---
National Voluntary Laboratory Accreditation Program	NVLAP	Program that provides an unbiased third-party test and evaluation program to accredit laboratories in the respective fields to ISO 17025 standard.
NTS Operating Procedure	OP	NTS Test Method or Test Procedure.
Virtual Review Tool	VRT	Test campaign management software used by the EAC and vendors applying for qualification testing.
Voting System Test Laboratory	VSTL	NTS
Voluntary Voting System Guidelines	VVSG	EAC Voluntary Voting System Guidelines Version 1.0.

2.0 CERTIFICATION TEST BACKGROUND

NTS Huntsville, an independent testing laboratory, assesses systems and components under harsh environments to include dynamic and climatic extremes and test electronic voting systems. NTS Huntsville holds the following accreditations:

- ISO-9001:2008
- NVLAP Accredited ISO 17025:2005
- EAC Accredited VSTL, NIST 150,150-22
- A2LA Accredited (Certification No.'s 0214.40, 0214.41, and 0214.42)
- FCC Approved Contractor Test Site (Part 15, 18)

2.1 Revision History

Table 2-1 describes the version history of the submitted voting system.

Table 2-1. Revision History

System Version	Certification Type	System Modified	Certification Date	Certification Number
EVS 5.0.0.0	New System	Original	05/16/2013	ESSEVS5000
EVS 5.0.1.0	Modification	EVS 5.0.0.0	03/18/2014	ESSEVS5010
EVS 5.2.0.0	Modification	EVS 5.0.0.0	07/02/2014	ESSEVS5200
EVS 5.4.0.0	Modification	EVS 5.2.0.0	TBD	ESSEVS5400

2.2 Scope of Testing

The focus of the test campaign was to verify functionality of EVS 5.4.0.0 submitted by the manufacturer for EAC certification.

This report is valid only for the system identified in Section 1.1 Description of EAC Certified System being modified. Any changes, revisions, or corrections not listed in this report or made to the system after this evaluation, are required to be submitted to the EAC for assessment.

2.2.1 Modification Overview

Modifications to the voting system include changes to address conformance with new RFIs released before application submission, functional upgrades, software fixes, software to enhance usability, and replacement of hardware parts nearing end-of-life. This modification includes a new hardware component with two operating modes: the ExpressVote 2.0 Tabulator and the ExpressVote 2.0 Marker. A full description of submitted modifications can be found in Appendix E – Details of Submitted Modifications. Additional testing on the ExpressVote was requested by the EAC to prove the ability to reliably manufacture these units. ExpressVote 2.0 was replaced by ExpressVote 2.1 to eliminate the EMC concerns and be reproduced/manufactured in a consistent and reliable manner. This testing and the results can be found in the respective test section of the test report.

2.2.2 Test Materials

EVS 5.4.0.0 Proprietary and COTS software submitted by the manufacturer for testing are listed in Table 2-2. Proprietary and COTS hardware are listed in Table 2-3.

Table 2-2. Proprietary and COTS Software

Software	Software/Firmware Version	Installed Environment
Proprietary Software		
Electionware	4.8.0.0	Client / Standalone
Election Reporting Manager (ERM)	8.13.0.0	Client / Standalone
ES&S Event Log Service (ELS)	1.5.6.0	Client / Standalone
Removable Media Service (RMS)	1.4.6.0	Client / Standalone
VAT Previewer	1.8.7.0	Client / Standalone
ExpressVote Previewer	2.1.0.0	Client / Standalone
COTS Software		
Adobe Acrobat Standard	11	Client / Standalone
Cerberus FTP	8.0.6 (x64)	Client / Standalone / Server
Microsoft Server 2008	R2 w/ SP1	Client / Standalone / Server
Microsoft Windows 7	64-bit, SP1	Client / Standalone
WSUS Microsoft Windows Offline Update Utility	10.7.4	Client / Standalone / Server
RM/COBOL Runtime	12.06	Client / Standalone
Symantec Endpoint Protection	12.1.6	Client / Standalone / Server
Symantec Endpoint Protection Intelligent Updater	20160829-002-v5i64	Client / Standalone / Server

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2.2.2 Test Materials (Continued)

Table 2-3. Proprietary and COTS Hardware

Classification	System Component		Hardware Version	Firmware Version
Proprietary Hardware				
ADA Compliant Ballot Marking Device	AutoMARK A100		1.0	1.8.7.0
	AutoMARK A200 (SBC 2.0)		1.1	1.8.7.0
	AutoMARK A200 (SBC 2.5)			
	AutoMARK A300 (SBC 2.0)		1.3	1.8.7.0
	AutoMARK A300 (SBC 2.5)			
Universal Voting System	ExpressVote 2.1 (Marker)	ExpressVote Carrying Case	2.1	2.1.0.0
		ExpressVote Rolling Kiosk		
		ExpressVote Tabletop		
Precinct Tabulator	ExpressVote 2.1 (Tabulator)	ExpressVote Carrying Case	2.1	2.1.0.0
		ExpressVote Rolling Kiosk		
		ExpressVote Tabletop		
	DS200 Precinct Count Scanner		1.2.1, 1.2.3, and 1.3	2.14.0.0
	DS200 Carrying Case		N/A	N/A
	DS200 Plastic Ballot Box		1.2 and 1.3	N/A
	DS200 Metal Ballot Box		1.0, 1.1, and 1.2	N/A
Central Count	DS850 Central Count Scanner		1.0	2.11.0.0
	DS850 Central Count Scanner (networked)			
COTS Hardware				
Election Management System	EMS Server		Dell PowerEdge T710	N/A
	Client Workstation		Dell OptiPlex 7010	N/A
	Standalone Workstation		Dell Latitude E6410	N/A
	Network Switch		Dell Power Connect 5524	N/A
Storage Media	USB Flash Drive 2.0		Delkin 512 MB, 1 GB, 2GB, 4 GB, 8 GB, and 16 GB	N/A
	Compact Flash Card		Delkin 1 GB (max)	N/A
Ancillary Device	Avid Headphone		Avid 86002	N/A
	Zebra QR Code Scanner		DS457-SR20009	N/A

2.2.2 Test Materials (Continued)

Table 2-4. Proprietary and COTS Hardware Tested (ExpressVote 2.0)* *Removed from Campaign*

Classification	System Component		Hardware Version	Firmware Version
Proprietary Hardware				
Universal Voting System	ExpressVote 2.0 (Marker)	ExpressVote Carrying Case	2.0	2.1.0.0
		ExpressVote Rolling Kiosk		
Precinct Tabulator	ExpressVote 2.0 (Tabulator)	ExpressVote Carrying Case	2.0	2.1.0.0
		ExpressVote Rolling Kiosk		
COTS Hardware				
Ancillary Device	Motorola QR Code Scanner		DS9208	N/A
	Denso QR Code Scanner		QK30	N/A

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2.2.3 Test Block Diagram

EVS 5.4.0.0 is an integrated suite of election management products, as depicted in Figure 2-1.

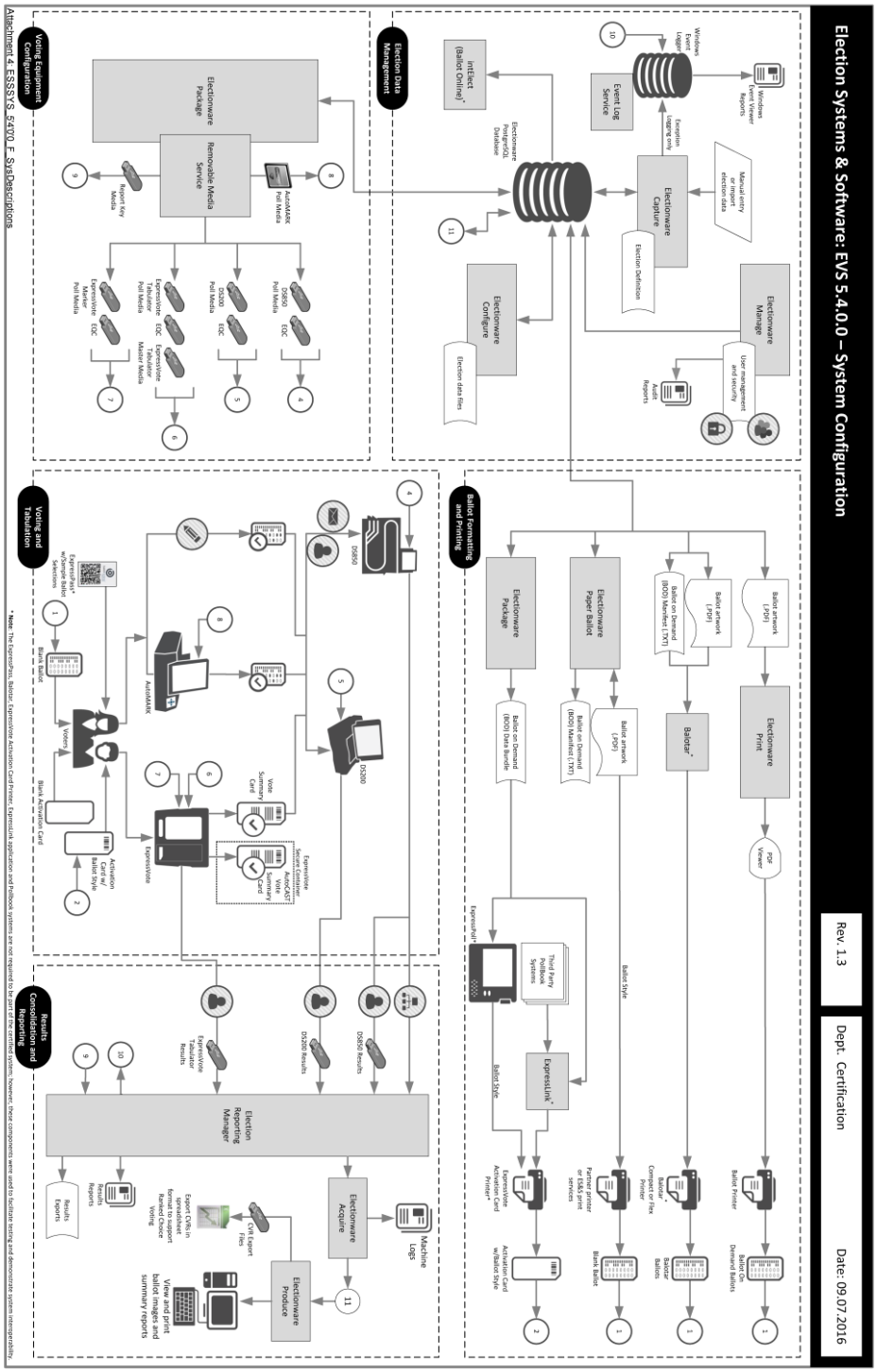

Figure 2-1. Visual System Overview

2.2.3 Test Block Diagram (continued)

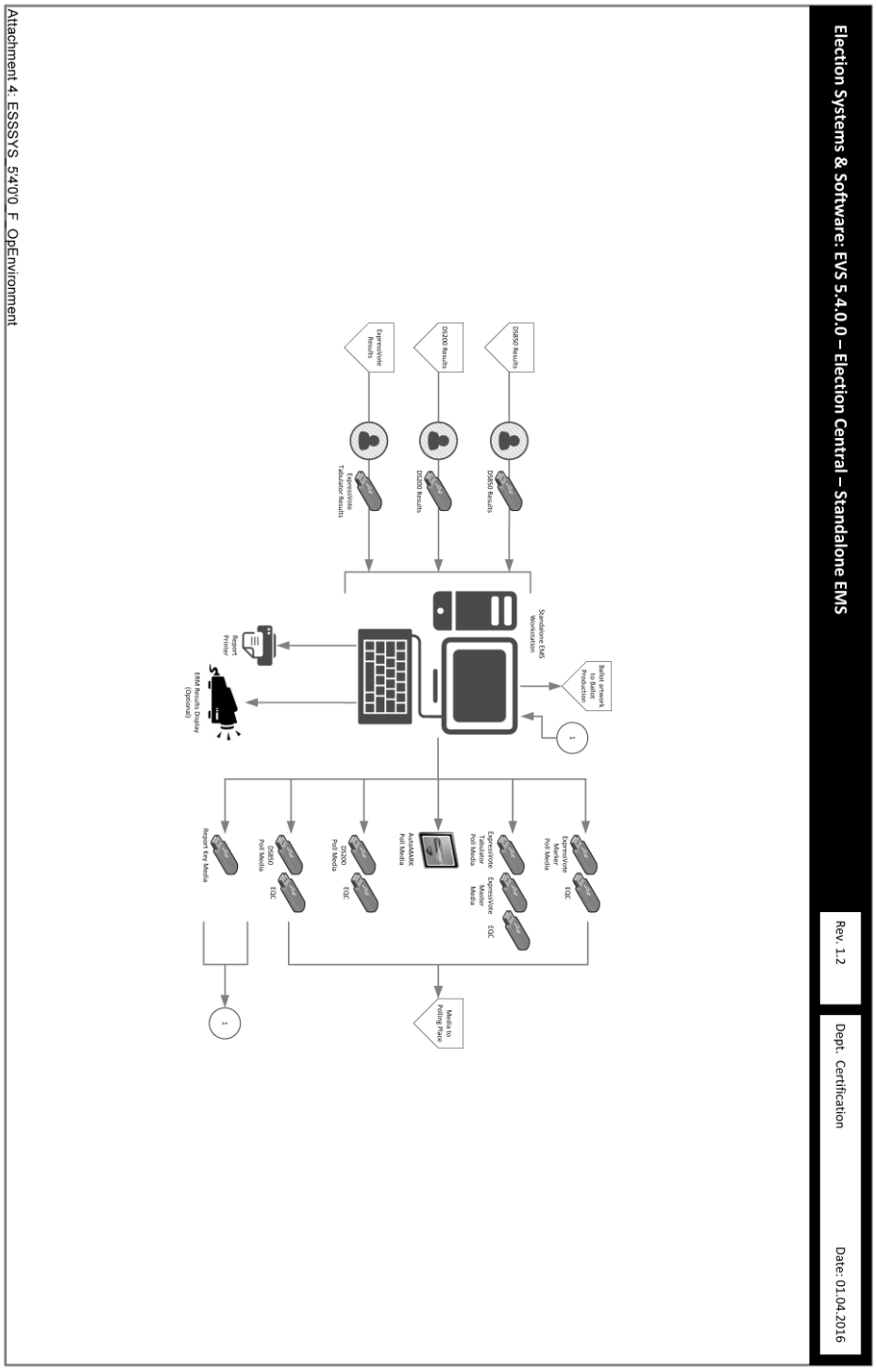

Figure 2-2. Standalone EMS Workstation

2.2.4 Supported Languages

The submitted voting system supports English, Spanish, Chinese, Korean, Japanese, and Hindi languages.

2.2.5 RFIs

Table 2-5 lists the applicable RFIs the EAC has released as of the date of the report as it pertains to this test campaign.

Table 2-5. Applicable RFIs

RFI ID	Name
2007-01	EAC Decision on Accessible Design
2007-02	EAC Decision on Variable Names
2007-03	EAC Decision on Summative Usability Testing
2007-04	EAC Decision on Presentation of Alternative Language
2007-05	EAC Decision on Testing Focus and Applicability
2007-06	EAC Decision on Recording and Reporting Undervotes
2008-01	EAC Decision on Temperature and Power Variation
2008-02	EAC Decision on Battery Backup for Optical Scan Voting Machines
2008-03	EAC Decision on OS Configuration
2008-04	EAC Decision on Supported Languages
2008-05	EAC Decision on Durability
2008-06	EAC Decision on Battery Backup for Central Count
2008-07	EAC Decision on “0” Count to Start Election
2008-08	EAC Decision on Automatic Bar Code Readers
2008-09	EAC Decision on Safety Testing
2008-10	EAC Decision on Electrical Fast Transient
2008-12	EAC Decision on Ballot Marking Device/Scope of Testing
2009-01	EAC Decision on VVPAT Accessibility
2009-02	EAC Decision on Alternate Languages
2009-03	EAC Decision on Battery Back Up for Central Count Systems
2009-04	EAC Decision on Audit Log Events
2009-05	EAC Decision on T-Coil Requirements
2009-06	EAC Decision on Temperature and Power Variation
2010-01	EAC Decision on Voltage Levels and ESD Test
2010-02	EAC Decision on Coding Conventions
2010-03	EAC Decision on Database Coding Conventions
2010-04	EAC Decision on Functional Requirements with Respect to Security
2010-05	EAC Decision on Testing of Modifications to a Certified System
2010-06	EAC Decision on DRE Accessibility Requirements and Other Accessible Voting Stations
2010-07	EAC Decision on Module Length
2010-08	EAC Decision on Calling Sequence
2012-01	EAC Decision on Ballot Handling - Multifeed
2012-03	EAC Decision on Configuration Management of COTS Products
2012-04	EAC Decision on Software Setup Validation
2013-02	EAC Decision on Audio Presentation Volume Levels
2013-03	EAC Decision on Timestamps
2013-04	EAC Decision on Usability Testing

2.2.6 NOCs

Table 2-6 lists the applicable NOCs the EAC has released as of the date of the report as it pertains to this test campaign.

Table 2-6. Applicable NOCs

NOC ID	Name
2007-001	Timely Submission of Certification Application
2007-003	State Testing Done in Conjunction with Federal Testing within the EAC Program
2007-005	Voting System Test Laboratory Responsibilities in the Management and Oversight of Third Party Testing
2008-001	Validity of Prior Non-core Hardware Environmental and EMC Testing
2008-003	EAC Conformance Testing Requirements
2009-001	Requirements for Test Lab Development and Submission of Test Plans
2009-002	Laboratory Independence Requirement
2009-004	Development and Submission of Test Reports
2009-005	Development and Submission of Test Plans for Modifications to EAC Certified Systems
2013-01	Discrepancy Listing in Test Report
2013-02	Detailed Description of Changes for Modifications

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3.0 TEST FINDINGS

EVS 5.4.0.0, as identified in Section 2.2.1 of this report, was subjected to the tests as summarized in this section.

3.1 Deficiencies and Resolutions

NTS Huntsville defines a deficiency as any repeatable test result or event that is counter to the expected result or violates the specified requirements. Deficiencies are tracked using the NTS NOD process and are provided to the EAC for disposition and resolution.

During non-operational hardware testing, the ExpressVote 2.0 failed EMC testing multiple times, as referenced in Appendix B: NOD 1, NOD 3, NOD 5, NOD 6, NOD 7, and NOD 8. ES&S implemented several mitigations and retested each mitigation of the equipment. After several rounds of retesting, the equipment with mitigations passed the testing, but EAC raised concerns about the ability to reproduce the proposed mitigations in production. EAC requested to pull an additional 5 production units for EFT, Electrostatic Disruption, Electrical Power Disturbance, FCC Radiated and Conducted emissions. Three out of the five units selected for testing failed this suite of EMC tests.

At this time, ES&S chose to withdraw ExpressVote 2.0 from testing for analysis and engineering changes. After a thorough review, ES&S re-engineered the wiring and grounding schemes on the boards. This new version of the ExpressVote is known as 2.1.

3.2 Details of Hardware Modifications

ES&S performed a complete ESD evaluation and mitigation of the ExpressVote Tabulator 2.0. This evaluation revealed problems with the grounding schemes of the Printed Circuit Boards, the shielding and composition of several of the cables, and deficient connections to the chassis of the unit, causing ESD energy to be improperly routed through the ExpressVote. As a result of this substantial redesign of the grounding scheme for the ExpressVote 2.0 hardware configuration, ExpressVote 2.0 has been eliminated from future production plans and replaced by ExpressVote 2.1 for all future production.

3.2 Details of Hardware Modifications (Continued)

The modifications required for the ExpressVote 2.1 system consisted of the following:

1. Isolate Earth Ground from Voltage Reference/Return on PC Boards
   a. The USB ports of the SPE and the USB hub (which then goes to the report printer and 2D scanner) had their shield tied to both Earth ground and board voltage reference/return going through the mounting hole closest to those connectors. Being tied to board voltage reference/return allows noise to propagate through the PC board, instead of just leaving the board. All boards were modified according to IPC-A-610 industry standards through a contract manufacturer.
2. Improve Mechanical Connections to Earth Ground to Allow More Favorable Charge Flow Path
   a. The USB cables from the IOB to the side panel showed a small air gap between the connector shell and the panel they are mounted to. This resulted in a flow path that was not controlled. Modifications were made to the cables to force solid contact of the USB cables' connector shield to the panel and to extend the actual cables shield further into the connector.
3. Component Protection (chip level)
   a. Individual devices are susceptible to damage with large current and voltage spikes. These spikes can cause a large voltage differential on the conductors in a cable. ES&S demonstrated ExpressVote 2.0 exhibited vulnerabilities with USB communication and took steps to protect these devices driving the USB communication. A modification was made to tie the isolated USB voltage reference to the shield of the USB cable/connector.
4. Increase Isolation by Physical Separation or Material Change
   a. The ExpressVote 2.0 exhibited issues with the side door lock and ESD. The cover over the USB sticks in the side compartment was metallic. For ExpressVote 2.1, ES&S replaced the original cover with one produced from a non-conductive material.
5. Reduced Impedance from Earth Ground Path
   a. In the chassis power cable assembly to the report printer and USB hub, ExpressVote 2.0 had the earth ground wires routed through a ferrite to protect the power delivered to the UBS hub and printer. In ExpressVote 2.1, the ferrite was relocated to address USB and power individually instead of earth ground return.
6. Twisted Pair Cable
   a. Good practice is to use twisted pair cables. It allows noise that is induced on a cable to be shared between both conductors. In the ExpressVote 2.1, twisted cables were used between the IOB and the USB hub and the report printer.
7. Paper Path Module
   a. The ExpressVote 2.0 Paper Path Module exhibited susceptibility to ESD from the front door lock and the anti-static brushes. With ExpressVote 2.1, the earth to ground resistance was reduced by adding a ground strap cable to the Paper Path Module to eliminate the prior ESD issues.

All testing was performed on the ExpressVote 2.0 units. EAC requested that NTS conduct the EMC tests on 5 ExpressVote 2.1 units; therefore, only the EMC tests were performed on the ExpressVote 2.1 units.

3.3 Additional Hardware Testing

Additional hardware testing of the modified systems was performed as specified in Table 3-1. The additional hardware testing of five components was to ascertain the manufacturability of the ExpressVote 2.1. See Table 3-1.

Table 3-1. Additional Hardware Testing

Equipment Under Test	Requested Testing	Result
ExpressVote 2.1 (with Rolling Kiosk)	Electrical Supply 4.1.2.4	Pass
	Electrical Power Disturbance 4.1.2.5	Pass
	Electrical Fast Transient 4.1.2.6	Pass
	Lightning Surge 4.1.2.7	Pass
	Electrostatic Disruption 4.1.2.8	Pass
	Electromagnetic Emissions (Radiated and Conducted) 4.1.2.9	Pass
	Electromagnetic Susceptibility 4.1.2.10	Pass
	Conducted RF Immunity 4.1.2.11	Pass
	Magnetic Field Immunity 4.1.2.12	Pass

Summary Findings

The testing listed in Table 3-1 established that the modified EUT functioned as described and did not introduce any errors into the system. NTS asserts that the ExpressVote 2.1 has eliminated the EMI/EMC concerns of its predecessor, ExpressVote 2.0, and can now be reproduced/manufactured in a consistent and reliable manner. In addition, the ExpressVote 2.1 software was found to comply with the source code requirements of the 2005 VVSG.

3.4 Additional Security Testing

Additional security testing pertaining to the RSA encryption library was performed as specified in Table 3-2.

Table 3-2. Additional Security Testing

Equipment Under Test	Requested Testing	Result
EMS	RSA Crypto testing	Pass

Summary Findings

The testing listed in Table 3-2, testing was performed to analyze use of the RSA encryption library. The EMS components were found to be in compliance with the security requirements of the EAC 2005 VVSG.

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3.5 Hardware Testing

Hardware requirements and environmental condition categories applicable to the design and operation of voting systems are detailed in Table 3-3. For applicable hardware versions, reference Table 2-3.

Table 3-3. Voting Systems Hardware Requirements and Environmental Conditions

Hardware Requirements	Environmental Conditions (Applicable to Design and Operation)
Shelter	Natural environment: Including temperature, humidity, and atmospheric pressure
Space	Induced environment: Including proper and improper operation and handling of the system and its components during the election processes
Furnishings and fixtures	
Supplied energy	Transportation and storage
Environmental control	Electromagnetic signal environment: Including exposure to and generation of radio frequency energy
External telecommunications services	

Procedural summaries and summary test results within this report verify that the Equipment Under Test (EUT) submitted for certification testing meets the hardware requirements of the 2005 VVSG.

Receipt inspection and evaluation of voting system documentation was conducted prior to the start of the testing sequence. Operational tests/checks to verify system performance and function were performed throughout testing. Environmental tests were conducted to ensure that climatic and physical occurrences would not affect system structure or functionality. Electromagnetic Compatibility (EMC) tests were conducted to ensure continued system operation and reliability in the presence of abnormal electrical conditions.

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3.5.1 Temperature Power Variation/Data Accuracy

Temperature and Power Variation testing was performed in accordance with Volume I Section 4.1.2.13 and Volume II Section 4.7.1 of the 2005 VVSG, including considerations for RFI 2008-01 and RFI 2009-06. This test is similar to the procedure of MIL-STD-810D, Method 502.2 and 501.2.

The purpose of this test was to simulate stresses associated with operating the EUT at varying temperatures and voltages. EUT were placed inside a walk-in environmental test chamber and connected to a variable voltage power source. Operational functions were continuously exercised during the test by the casting of ballots.

The Temperature Power Variation test was conducted on the ExpressVote 2.0 (3 units). For each test, the EUT was utilized for a period of 64 hours, as described in EAC RFI 2008-01 to achieve the cumulative duration of at least 163 hours. The first 48 hours were conducted in the environmental test chamber where hardware was subjected to temperatures inside the chamber ranging from 50°F to 95°F and voltage varied from 105 VAC to 129 VAC. The remaining 16 hours were operated in ambient conditions.

In addition, the Data Accuracy Test was conducted for ExpressVote 2.0 (3 units) and was run in conjunction with the Temperature Power Variation Test. The Data Accuracy test was performed in accordance with the requirements of Section 4.7.1.1 of the Volume II of the VVSG. Per the 4.7.1.1, 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. Table 3-4 details the ballots cast and their total ballot positions.

Table 3-4 Accuracy Test

Ballot/Session Type	No. of times cast	No Ballot Positions	No. of EUT	No. Times Voted per EUT	Total ballot Positions	Documented Error Count
Pre-Voted Ballot	20	133	3	64	510,720	0
Manual Voted	20	133	3	64	510,720	0
QR Code	22	133	3	64	561,792	0
			Total Ballot Positions		1,583,232	

Summary Findings

The ExpressVote 2.0 met the requirements of the Temperature Power Variation Test without any degradation to structure and/or performance capability. In addition, the ExpressVote 2.0 met the Accuracy requirements of the 2005 VVSG.

3.5.2 Low Temperature

Low Temperature testing was performed in accordance with Volume I Section 4.1.2.14 and Volume II Section 4.6.4 of the 2005 VVSG and is equivalent to MIL-STD-810D, Method 502.2, Procedure I-Storage. The purpose of this test was to simulate stresses associated with the storage of voting machines and ballot counters with a minimum temperature of -4°F.

The Low Temperature test was conducted on the ExpressVote 2.0 (1 unit). For each test, the EUT was placed inside an environmental test chamber and the temperature was adjusted to maintain standard ambient conditions to stabilize the EUT and the environment. The environmental chamber temperature was then decreased to -4°F at a rate that did not exceed 10°F per minute. Once temperature stabilization was reached, the required test environment was maintained for the required interval of four hours. At the conclusion of four hours, environmental chamber temperature was then increased to standard ambient conditions at a rate that did not exceed 10°F per minute.

Summary Findings

The ExpressVote 2.0 met the requirements of the Low Temperature Test without any degradation to structure and/or performance capability.

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3.5.3 High Temperature

High Temperature testing was performed in accordance with Volume I Section 4.1.2.14 and Volume II Section 4.6.5 of the 2005 VVSG and is equivalent to the procedure of MIL-STD-810D, Method 501.2, Procedure I-Storage. The purpose of this test was to simulate stresses associated with the storage of voting machines and ballot counters with a maximum temperature of 140°F.

The High Temperature test was conducted on the ExpressVote 2.0 (1 unit). For each test, the EUT was placed inside an environmental test chamber and the temperature was adjusted to maintain standard ambient conditions to stabilize the EUT and the environment. The environmental chamber temperature was then increased to 140°F at a rate that did not exceed 10°F per minute. Once temperature stabilization was reached, the required test environment was maintained for the required interval of four hours. At the conclusion of four hours, environmental chamber temperature was then increased to standard ambient conditions at a rate that did not exceed 10°F per minute.

Summary Findings

The ExpressVote 2.0 met the requirements of the High Temperature Test without any degradation to structure and/or performance capability.

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3.5.4 Humidity

Humidity testing was performed in accordance with Volume I Section 4.1.2.14 and Volume II Section 4.6.6 of the 2005 VVSG and is similar to the procedure of MIL-STD-810D, Method 507.2, Procedure I-Natural Hot-Humid. The purpose of this test was to simulate stresses associated with the storage of voting machines and ballot counters with an uncontrolled temperature and humidity environment during storage.

The Humidity test was conducted on the ExpressVote 2.0 (1 unit). For each test, the EUT was placed inside an environmental test chamber and was subjected to a humidity cycle for the required interval of 240-hours (10-days) in accordance with the 24-hour cycle values as shown in Table 3-5.

Table 3-5 Humidity Test Cycle Values

Time	Hot-Humid (Cycle 1)		
	Temperature		RH
	ºF	ºC	%
0000	88	31	88
0100	88	31	88
0200	88	31	88
0300	88	31	88
0400	88	31	88
0500	88	31	88
0600	90	32	85
0700	93	34	80
0800	96	36	76
0900	98	37	73
1000	100	38	69
1100	102	39	65
1200	104	40	62
1300	105	41	59
1400	105	41	59
1500	105	41	59
1600	105	41	59
1700	102	39	65
1800	99	37	69
1900	97	36	73
2000	94	34	76
2100	97	33	85
2200	90	32	85
2300	89	32	88

Summary Findings

The ExpressVote 2.0 met the requirements of the Humidity test without any degradation to structure and/or performance capability.

3.5.5 Vibration

Vibration testing was performed in accordance with Volume I Section 4.1.2.14 and Volume II Section 4.6.3 of the 2005 VVSG and is equivalent to the procedure of MIL- STD-810D, Method 514.3, Category 1- Basic Transportation, Common Carrier. This test simulated stresses faced during the transport of voting machines and ballot counters between storage locations and polling places.

The Vibration test was conducted on the ExpressVote 2.0. The EUT was secured to an electrodynamics shaker with one control accelerometer affixed to the shaker table. The EUT was subjected to a frequency ranging from 10 to 500 Hz and overall rms levels of 1.04, 0.74, and 0.20 G for durations of 30 minutes in each orthogonal axis.

Summary Findings

The ExpressVote 2.0 met the requirements of the Vibration Test without any degradation to structure and/or performance capability.

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3.5.6 Bench Handling

Bench Handling testing was performed in accordance with Volume I Section 4.1.2.14 and Volume II Section 4.6.2 of the 2005 VVSG and is equivalent to the procedure of MIL-STD-810D, Method 516.3, Procedure VI. This test simulated impacts faced during maintenance and repair of voting machines and ballot counters.

The Bench Handling test was conducted on one ExpressVote 2.0. The EUT was placed on a standard workbench and each edge of the base was raised to a height of four inches above the surface and allowed to drop freely. This was performed six times per edge, for a total of 24 drops.

Summary Findings

The ExpressVote 2.0 met the requirements of the Bench Handling Test without any degradation to structure and/or performance capability.

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3.5.7 Electrical Power Disturbance

Electrical Power Disturbance testing was performed in accordance with Volume I Section 4.1.2.5 and Volume II Section 4.8 of the 2005 VVSG. This testing was performed to ensure that the EUT is able to withstand electrical power line disturbances (dips/surges) without disruption of normal operation or loss of data.

The Electrical Power Disturbance test was conducted on the ExpressVote 2.1 (5 units). For each test, the EUT was subjected to the voltage dips and surges detailed in Table 3-6. The power input line was subjected to voltage dips ranging from 30% to more than 95% for periods of 10 milliseconds up to 5 seconds and surges of ±15% for up to 8 hours. Table 3-6 lists power line disturbance dip and surge detail.

Table 3-6. Power Line Disturbances

Type	Percentage	Duration
Dip	30%	10 ms
Dip	60%	100 ms and 1 sec
Dip	>95%	5 sec
Surge	± 15%	8 Hours (4 Each Polarity)

Summary Findings

The ExpressVote 2.1 met the requirements of the Electrical Power Disturbance test without any degradation to structure and/or performance capability.

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3.5.8 Electrical Fast Transient

Electrical Fast Transient (EFT) testing was performed in accordance with Volume I Section 4.1.2.6 and Volume II Section 4.8 of the 2005 VVSG and RFI 2008-10. This testing was performed to ensure that, should an electrical fast transient event occur on a power line, the EUT would continue to operate without disruption of normal operation or loss of data.

The EFT test was conducted on the ExpressVote 2.1 (5 units). For each test, electrical fast transients of ± 2 kV were applied to external AC power lines and the pulse characteristics are listed in Table 3-7.

Table 3-7. EFT Pulse Characteristics

Pulse Description	Requirements	Units
Pulse Amplitude	+/-2.0	kV peak to peak
Pulse Rise Time	5 ±30%	nanoseconds
Pulse Width	50 ±30%	nanoseconds
Pulse Repetition Rate	100	kHz
Pulse Shape	Double exponential	--
Burst Duration	15	milliseconds
Burst Period	300	milliseconds
Test Duration	60	seconds

Summary Findings

The ExpressVote 2.1 met the requirements of the Electrical Fast Transient Test without any degradation to structure and/or performance capability.

The ExpressVote 2.0 deficiencies were identified and the details of the discrepancies and subsequent resolutions are described in Appendix B – Deficiency Report, NOD 1.

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3.5.9 Lightning Surge

Lightning Surge testing was performed in accordance with Volume I Section 4.1.2.7 and Volume II Section 4.8 of the 2005 VVSG. This testing was performed to ensure that, should a surge event occur on a power line due to a lightning strike, the EUT would continue to operate without disruption of normal operation or loss of data.

The Lightning Surge test was conducted on: ExpressVote 2.1 (5 units) and DS850 (1 unit). For each test, the power input line was subjected to lightning surge testing at levels of ±0.5, ±1.0 and ±2.0 kV applied to its AC power line per the surge characteristics listed in Table 3-8.

Table 3-8. Surge Characteristics

Pulse Description	Test Level			Units
	A	B	C	
Pulse Amplitude	±0.5	±1.0	±2.0	kV
Pulse Rise Time	1.2 ±30%			microseconds
Pulse Width	50 ±20%			microseconds
Pulse Repetition Rate	1			Per minute
Phase Synchronization (Points)	AC Line at zero-crossing of (0°), (90°), (180°) and (270°).			Degrees
Total Pulse to be Injected	± 5			At each point

Summary Findings

The ExpressVote 2.1 and DS850 met the requirements of the Lightning Surge Test without any degradation to structure and/or performance capability.

Note: The DS850 was included in this Lightning Surge Test at the request of the EAC to test the APC Power Saving Back UPS Pro 1500.

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3.5.10 Electrostatic Disruption

Electrostatic Disruption (ESD) testing was performed in accordance with Volume I Section 4.1.2.8 and Volume II Section 4.8 of the 2005 VVSG and RFI 2010-01. This testing was performed to ensure that should an electrostatic discharge event occur during equipment setup and/or ballot casting, the EUT would continue to operate normally. Momentary interruption is allowed so long as normal operation is resumed without human intervention or loss of data.

The Electrostatic Disruption test was conducted on the ExpressVote 2.1 (5 units). For each test, the EUT was subjected to electrostatic discharges, contact, and air as shown in Table 3-9.

Table 3-9. Electrostatic Discharge Test Levels

Characteristic	Resistance				Capacitance						Unit
Pulse Wave Shape (RC Network)	330				150						Ω / pf
Discharge Types	Air Gap				Direct Contact			Indirect Coupling			
Test Levels	A	B	C	D	A	B	C	A	B	C	
	±2	±4	±8	±15	±2	±4	±8	±2	±4	±8	kV
Number of Discharges	20	20	20	20	20	20	20	20	20	20	10 Discharges each polarity

The EUT was raised approximately 10 cm from the ground using isolated stand-offs. Signal/control test cables were positioned approximately 5 cm (2 in.) above the ground. Discharges were performed at areas typical of those that might be touched during normal operation, including the touch screen, user buttons, cables, connectors, and other points of contact used by the voter or poll worker.

Summary Findings

The ExpressVote 2.1 met the requirements of the Electrostatic Disruption Test without any degradation to structure and/or performance capability.

The ExpressVote 2.0 deficiencies were identified and the details of the discrepancies and subsequent resolutions are described in Appendix B – Deficiency Report, NOD 5, NOD 6, NOD 7, and NOD 8. Upon correction and retest, the EUT met the requirements of the Electrostatic Disruption Test without any degradation to structure and/or performance capability.

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3.5.11 Electromagnetic Emissions: Radiated and Conducted

Electromagnetic Emissions testing was performed in accordance with Volume I Section 4.1.2.9 and Volume II Section 4.8 of the 2005 VVSG. This testing was performed to ensure that emissions emanating from the EUT do not exceed the limits of 47 CFR Part 15, Subpart B, Class B Limits. Testing was performed at the NTS Huntsville Open Air Test Site 2 (OATS-2) located in Huntsville, AL. The OATS-2 is fully described in reports provided to the Federal Communication Commission (FCC) (FCC Reference 98597) and the site complies with the requirements of ANSI C63.4-2003.

The Electromagnetic Emissions test was conducted on the ExpressVote 2.1 (5 units). For each test, the EUT was scanned during normal operation to determine the levels of radiated emissions the EUT emitted. Table 3-10 list the conducted and radiated emission limits of FCC Part 15, Class B emissions.

Table 3-10. Conducted and Radiated Emissions Requirements

Conducted Emissions			Radiated Emissions	
Frequency Range (MHz)	Limits (dBµV)		Frequency Range (MHz)	3 Meter Test Limit (dBµV)
	Quasi-peak[1]	Average		
0.15 to 0.50	66 to 56	56 to 46	30 to 88	40.0
0.50 to 5.0	56	46	88 to 216	43.5
5.0 to 30.0	60	50	216 to 960	46.0
			960 to 1000	54.0

Summary Findings

The ExpressVote 2.1 met the requirements of the Electromagnetic Emissions test without any degradation to structure and/or performance capability.

[1]Agencies governing the electromagnetic interference (EMI) from commercial products require quasi-peak detection to be used. Even if the emission from a device is over a test limit when measured with peak detection, the device will be considered to pass if the quasi-peak level is below the test limit.

Quasi-peak detection is a form of detection where the result of a quasi-peak measurement depends on the repetition rate of the signal. Signals can be classified into two general categories based upon their repetition rate: narrowband or broadband. A narrowband signal is a signal that can be resolved by the spectrum analyzer. An example of a narrowband signal is a continuous wave (CW) signal. A CW signal is one signal at a fixed frequency. A broadband signal is a signal that cannot be resolved by the spectrum analyzer. An example of a broadband signal is a pulse signal. Peak, quasi-peak, and average detection will yield the same amplitude level for a narrowband signal. A broadband signal will yield a quasi-peak level lower than the peak level. The weighting (accounted for through specific charge and discharge time constants in the quasi-peak detector circuit), is a function of the repetition frequency of the signal being measured. The lower the repetition frequency, the lower the quasi-peak level.

3.5.12 Electromagnetic Susceptibility

Electromagnetic Susceptibility testing was performed in accordance with Volume I Section 4.1.2.10 and Volume II Section 4.8 of the 2005 VVSG. This testing was performed to ensure that the EUT was able to withstand a moderate level of ambient electromagnetic fields without disruption of normal operation or loss of data.

The Electromagnetic Susceptibility test was conducted on the ExpressVote 2.1 (5 units). For each test, the EUT was subjected to ambient electromagnetic fields at 10 V/m with an 80% modulated 1 kHz sine wave over a range of 80 MHz to 1000 MHz, as shown in Table 3-11. Testing was conducted utilizing both horizontally and vertically polarized waves. The limits were measured with a maximum scan rate of 1% of the fundamental frequency and the dwell duration was three seconds.

Table 3-11. Electromagnetic Susceptibility Test Levels

EN61000-4-3 Radiated Immunity				
Frequency (Hz)	**Polarity**		**Dwell Duration**	**Angle (Degree)**
80 MHz – 1 GHz (80% modulated 1 kHz sine wave)	Vertical	Horizontal	3 seconds	0
				90
				180
				270

Summary Findings

The ExpressVote 2.1 met the requirements of the Electrostatic Disruption Test without any degradation to structure and/or performance capability.

The ExpressVote 2.0 deficiencies were identified and the details of the discrepancies and subsequent resolutions are described in Appendix B – Deficiency Report, NOD 3. Upon correction and retest, the ExpressVote 2.0 met the requirements of the Electromagnetic Susceptibility Test without any degradation to structure and/or performance capability.

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3.5.13 Conducted RF Immunity

Conducted RF Immunity testing was performed in accordance with Volume I Section 4.1.2.11.a and Volume II Section 4.8 of the 2005 VVSG. Section 4.1.2.11.b of Volume I was not applicable because the EUT did not have signal/control lines greater than three meters. This testing was performed to ensure that the EUT was able to withstand conducted RF energy onto its power lines without disruption of normal operation or loss of data.

The Conducted RF Immunity test was conducted on the ExpressVote 2.1 (5 units). For each test, the EUT was subjected to conducted RF energy of 10 V_{RMS} applied to its power lines over a frequency range of 150 kHz to 80MHz.

Summary Findings

The ExpressVote 2.1 met the requirements of the Conducted RF Immunity Test without any degradation to structure and/or performance capability.

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3.5.14 Electrical Supply

Electrical Supply testing was performed in accordance with Volume I Section 4.1.2.4 of the 2005 VVSG including considerations for RFI 2008-02 and RFI 2008-06.

The test was performed to ensure that the EUT would continue to operate a minimum of two hours when power is lost. It was required that the voting system perform a successful shutdown without loss or degradation of the voting and audit data and allow voters to resume voting once the voting system had reverted back to primary power.

The Electrical Supply test was conducted on the ExpressVote 2.1 (5 units). The EUT were then operated as designed for fifteen minutes prior to the removal of the AC input power. Once AC power was interrupted, the EUT was continuously operated for a minimum period of two hours. At the conclusion of two hours, the EUT was powered down. The AC power was restored and the EUT was operated for an additional fifteen minutes.

Summary Findings

The ExpressVote 2.1 met the requirements of the Electrical Supply Test without any degradation to structure and/or performance capability.

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3.6 System Level Testing

System-level testing examines the ability of proprietary software, hardware, and peripherals in addition to the COTS software, hardware, and peripherals to operate as a complete system. NTS Huntsville utilizes test cases designed to ensure that integrated components function as specified by the manufacturer's documentation and meet the requirements of the VVSG.

3.6.1 Technical Data Package Review

The EVS 5.4.0.0 TDP was reviewed to the 2005 VVSG. This review was performed as part of the testing activities. The TDP review only included the revised and new documents submitted for this testing campaign. The documents were reviewed for accuracy, completeness, and compliance to the 2005 VVSG.

The review results were recorded in a worksheet that provided the pass/fail compliance to each applicable VVSG requirement. The discovered deficiencies were reported to the manufacturer and internally tracked by NTS Huntsville as test exceptions until verified that the applicable documents had been corrected. The manufacturer corrected nonconformance observations and resubmitted the associated documents for review. This process continued until the TDP complied with the applicable TDP standards in the EAC 2005 VVSG.

Summary Findings

There were sixty-three TDP deficiencies discovered during this test campaign. A summary of the TDP issues encountered is provided below:

- Some descriptive information included was inconsistent with descriptions in other TDP documents.
- Some documents included functionality that was not supported in the voting system.
- Some of the individual user guides included information which conflicted with the actual information encountered when verified during the testing process.

All TDP deficiencies were resolved by ES&S prior to completion of testing.

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3.6.2 Volume and Stress Test

The ExpressVote 2.0 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 was to investigate the system's response to conditions that tend to overload the system's capacity to process, store, and report data. The Volume Test parameters were dependent upon the maximum number of active voting positions and the maximum number of ballot styles that the TDP claims the system can support. Testing was performed by exercising election definitions developed specifically to test for volume and stress (Election Definitions: Elections A, C, D, and E contained in Table 3-12 of this document). Elections B and F were excluded from this campaign based on no changes within the ERM limits from the previously certified EVS 5.2.0.0 system. All vote summary cards were cast and tabulated on the DS200. All totals were verified within ERM against the expected results matrix to verify accuracy and the system's ability to handle the TDP stated limits.

Table 3-12 Volume and Stress

Voting Pattern	**Election A**: **Limits Tested:** ▪ Maximum Precincts in an election (9900)* ▪ Maximum Ballot Styles in an Election (9900)* ❑ **ExpressVote 2.0 Test Deck: Marked 99 vote summary cards *** ▪ Voted each contest on a vote summary card ❑ **ExpressVote 2.0: Marked first candidate in each contest on a vote summary card** *All 9900 ballot styles were loaded on the ExpressVote 2.0 and the DS200. 99 out of the 9900 ballot styles were selected and printed by the ExpressVote 2.0. The DS200 was then used to cast the 99 vote summary cards. **Election C:** **Limits Tested:** ▪ Maximum candidate counters/election (21,000) ▪ Maximum candidates/contest (175) ▪ Maximum "Vote for"/contest (98) ▪ Maximum number of parties in a General Election **(75)** ❑ **ExpressVote 2.0 Test Deck: Marked 15 randomly selected vote summary cards** **Election D:** **Limits Tested:** ▪ Maximum number of parties in a Primary Election (20 including nonpartisan party) ❑ **ExpressVote 2.0 Test Deck: 20 vote summary cards** ▪ Each candidate was marked **Election E:** **Limits Tested:** ▪ Maximum district types (20) ▪ Maximum district names (40) ❑ **ExpressVote 2.0 Test Deck: 8 vote summary cards** ▪ Each candidate was marked

3.6.2 Volume and Stress Test (Continued)

Summary Findings

At the conclusion of the Volume and Stress Test, the ExpressVote 2.0 unit successfully exercised the stated system limits. One ExpressVote 2.0 was used for the duration of Volume and Stress performance testing. One hundred and forty-two vote summary cards were processed without issue upon the completion of the test.

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3.6.3 System Integration Test

System Integration Testing was performed to test the complete voting system, including all proprietary and COTS software, hardware, and peripherals configured as described in the manufacturer-submitted TDP for the EVS 5.4.0.0. To perform the System Integration Testing, NTS developed specific procedures and test cases designed to test the system as a whole. These procedures demonstrated compliance to Sections 2, 3, 4, 5, and 6 of Volume I of the VVSG.

In order to verify compatibility with the system in scope, ballots were presented across the system and all results verified against the expected results matrix. The created test deck for system integration included hand marked ballots and ADA generated ballots.

The six election definitions exercised during the System Integration Testing are listed below:

- Gen-01 is a basic election held in four precincts, one of which is a split precinct, containing nineteen contests compiled into four ballot styles. Five of the contests are in all four ballot styles. The other fourteen contests are split between at least two of the precincts with a maximum of four different contests spread across the four 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.
- Gen-02 is a basic election held in three precincts. This election contains fifteen contests compiled into three ballot styles. Ten of the contests are in all three ballot styles with the other five split across the three 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.
- Gen-03 is a basic election held in two precincts. This election contains eight contests compiled into two ballot styles. Four of the contests are in both ballot styles. The other four 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.
- Prim-01 is a closed primary election in two precincts (one precinct is a split), containing thirty contests compiled into five ballot styles. Each ballot style contains six contests. This election was designed to functionally test an open primary with multiple ballot styles, support for two languages, and support for common voting variations.
- Prim-02 is a basic election held in two precincts. This election contains thirteen contests compiled into three ballot styles. One contest is in all three ballot styles and 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.
- Prim-03 is a basic election held in two precincts. This election contains ten contests and is compiled into two ballot styles. Two of the contests are in both ballot styles. The other eight contests are split between the two party 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.

Summary Findings

Through System Integration Testing, it was demonstrated that the system performed as documented with all components performing their intended functions.

3.6.4 Data Accuracy

The ExpressVote was subjected to a Data Accuracy Test in accordance with the requirements of Section 4.7.1.1 of the Volume II of the VVSG. Per the 4.7.1.1, 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. The accuracy test utilized a combination of hand marked (70%) and pre-marked (30%) ballots to achieve accuracy rate greater than 1,549,703 correct ballot positions.

Summary Findings

The ExpressVote successfully met the requirements of the Data Accuracy Test by scanning and processing a minimum of 1,549,703 ballot positions.

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3.6.5 Physical Configuration Audit (PCA)

A Physical Configuration Audit (PCA) of the EVS 5.4.0.0 voting system was performed as part of the testing activities in accordance with Volume II, Section 6.6 of Volume II of the EAC 2005 VVSG. The PCA compares the voting system components submitted for certification with the vendor's technical documentation and confirms that the documentation submitted meets the requirements of the Guidelines. The PCA included the following activities:

- Establishing 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;
- Verifying 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;
- Reviewing drawings, specifications, technical data, and test data associated with system hardware, and to establish system baseline;
- Reviewing 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.

Summary Findings

A PCA was performed to baseline the system's hardware and software components that were used during the test campaign. One discrepancy was discovered during PCA. The details of the discrepancy and subsequent resolution are described in Appendix B – Deficiency Report, NOD 4. Upon correction and re-examination, the EUT met the requirements of the PCA without any degradation to structure and/or performance capability.

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3.6.6 Functional Configuration Audit (FCA)

A Functional Configuration Audit of the EVS 5.4.0.0 was performed in accordance with Section 6.7 of Volume II of the VVSG. The purpose of the FCA was to verify that the submitted modifications listed in section 2.2.1 performed as documented in the manufacturer supplied technical documentation and to validate that the modifications met the requirements of the EAC 2005 VVSG.

Summary Findings

Any deficiencies were reported to and resolved by ES&S. Each deficiency was then re-evaluated by NTS and found to be in compliance. A summary of the deficiencies encountered are provided below:

- Performed verification of the ExpressVote System's Administrator 'Menu/Set Time Zone/Date/Time Menu' with election USB flash drive inserted into the ExpressVote running as a Tabulator, per the TDP and the VVSG Requirements. The 'Date/Time' was changed, then the ExpressVote was rebooted, after rebooting it was identified that the change to the 'Date/Time' was not saved properly. Upon installing the applicable firmware update, the test was performed again, for which the 'Date/Time' was successfully saved, as expected.
- Performed verification of the ExpressVote System's Administrator/Override 'Authorization Boxes Menu' with Election USB flash drive inserted into the ExpressVote running as a Tabulator, per the TDP and the VVSG Requirements. During testing the 'override authorization boxes' failed to function properly. Upon installing the applicable firmware update, the test was performed again, for which the 'Authorization Boxes Menu' functioned properly. Note: Use the Override Authorization Boxes to determine whether the ExpressVote overrides the following card handling options specified in the Electionware settings: Always reject vote summary cards with blank initials boxes and Always return vote summary cards with a marked review box.
- Performed verification of the ExpressVote System's 'Reset AutoCast Count on the System Administration Menu', per the TDP and the VVSG Requirements. During testing, the AutoCast counter failed to count properly. Upon installing the applicable firmware update, the test was performed again, for which the AutoCast counter successfully counted properly. Note: AutoCAST® references the action of rear ejecting a marked vote summary card into the secure card container instead of returning the vote summary card via the front card slot. AutoCAST® vote summary cards must be scanned for tabulation on a compatible ES&S tabulator.

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3.6.7 Security Testing

The EVS 5.4.0.0 security tests were performed on both the ExpressVote 2.0 and the ExpressVote 2.1.

EMS components were subjected to a Security Content Automation Protocol (SCAP), which consists of security review and vulnerability assessment. The review was conducted to verify that the operating environment (Windows Server 2008 R2 and Windows 7) was configured to match industry recognized security protocol and that no vulnerabilities were present. The ES&S TDP was utilized during this portion of testing to ensure the proper configuration of the operating environment.

In addition, Security Testing as mentioned in Section 3.4 of this test report, was performed to analyze the implementation of the RSA encryption library. This analysis was executed by using a combination of source code review and a dynamic analysis, which is the testing and evaluation of a program by executing data in real-time. The objective is to find errors in a program while it is running, rather than by repeatedly examining the code offline.

Summary Findings

One deficiency was discovered during security testing. It was determined that the Windows patches were not current. The details of the discrepancy and subsequent resolution are described in Appendix B – Deficiency Report, NOD 10. ES&S corrected this and upon retest, the EMS components were found to be in compliance with the security requirements of the EAC 2005 VVSG.

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3.7 Source Code Review

Prior to submitting EVS 5.4.0.0, ES&S submitted EVS 5.2.0.0 for source code review. This source code review was performed in accordance with the 2005 VVSG and EAC Testing and Certification Program Manual, Version 2.0. All code modified or added subsequent to the EVS 5.2.0.0 source code reviews was reviewed as part of the 5.4.0.0 test campaign.

Summary Findings

A total of 404,894 lines of code were reviewed for the EVS 5.4.0.0 test campaign. 708 source code deficiencies were discovered during testing. All identified source code deficiencies were resolved prior to the conclusion of the source code review process. The deficiencies are summarized in Table 3-13.

Table 3-13. Source Code Review Deficiencies

System Name	Deficiency (Type)	Deficiency (QTY)
AutoMARK	Header File References	4
	Non Initialized Variables	2
	Header Inputs or Outputs	9
	No Parameter Validation	35
DS200	Header Purpose	3
	Header Inputs or Outputs	15
	Header or File Name Missing	12
	Header Return	3
	Header Revision History	34
	Inconsistent Indenting	4
	Line Too Long	7
	Object/Datatype/Variable Comments	79
	Over 6 Levels Of Indenting	1
	Unit Size Too Large	3
	Units Called	74
	Header File References	6
	Pointer Values Not Protected	6
	Non Enumerated Constant	1
	Illegal Name	1
DS850	Header Inputs or Outputs	3
	Over 6 Levels Of Indenting	1
	Unit Size Too Large	1
	Units Called	5
Electionware	Header Inputs or Outputs	6
ElectionWarePaperBallot	Header Revision History	4
	Units Called	13
ERM	N/A	0
ERMXMLConvDLL	Header Globals Missing	1
ExpressVote 2.0	Header File References	13
	Header Globals Missing	13
	Header Inputs or Outputs	23
	Header or File Name Missing	2
	Header Return	9
	Header Revision History	4

3.7 Source Code Review (Continued)

Table 3-13. Source Code Review Deficiencies (Continued)

System Name	Deficiency (Type)	Deficiency (QTY)
ExpressVote 2.0 (Continued)	Inconsistent Indenting	2
	Line Too Long	35
	Multiple Entry Exit	1
	No Case Default	3
	Non Enumerated Constant	41
	Non Permissible Constructs	1
	Object/Datatype/Variable Comments	8
	Over 6 Levels Of Indenting	6
	Pointer Values Not Protected	5
	Unit Size Too Large	1
	Units Called	71
InputOutputBoard	Header Globals Missing	13
	Header Return	2
	Header Revision History	1
	Inconsistent Indenting	1
	Non Enumerated Constant	4
	Records in Table	2
	Records With Comments	2
	Unit Size Too Large	2
	Units Called	14
libCoNG	Header File References	10
	Header or File Name Missing	4
	Header Parameter	3
	Header Purpose	4
	Header Return	4
	Header Revision History	4
	In-Line Comments	4
	Unit Size Too Large	1
	Units Called	1
RSACrypto	Units Called	1
	Header File References	1
RSACryptoDLL	Header Inputs or Outputs	1
	Units Called	3
ScannerPrinterEngine	Header Globals Missing	15
	Header Inputs or Outputs	3
	Header Revision History	4
	In-Line Comments	2
	Line Too Long	1
	Non Enumerated Constant	4
	Object/Datatype/Variable Comments	5
	Over 6 Levels Of Indenting	1
	Records in Table	3
	Records With Comments	3
	Unit Size Too Large	1
	Units Called	13

4.0 RECOMMENDATION FOR CERTIFICATION

NTS Huntsville performed conformance testing on the Election Systems & Software Voting System 5.4.0.0 to the EAC 2005 VVSG. Additional testing on the ExpressVote was requested by the EAC to prove ES&S' ability to reliably manufacture these (See Table C-1. As-Run Test Plan Changes). NTS determined that the modifications met the requirements of the EAC 2005 VVSG and the manufacturer's technical documentation. Based on test findings, NTS Huntsville recommends the EAC grant the EVS 5.4.0.0 certification to the EAC 2005 VVSG. This report is valid only for the equipment identified in Section 2.0 of this report. Due to the varying requirements of individual jurisdictions, it is recommended, by the EAC 2005 VVSG, that local jurisdictions perform acceptance tests on all systems prior to implementation within their jurisdiction.

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APPENDIX A. – ADDITIONAL FINDINGS

A.1 ADDITIONAL FINDINGS REPORT

The following tests were performed by NTS Huntsville at the request of the manufacturer. These modifications or additions represent functionality or tools that are outside the scope of the certification.

A.1.2 Election Support Software and Hardware

The following software and hardware components were used during certification tests to support the operations of the EMS and ExpressVote 2.0:

- ExpressLink – ExpressLink is a Windows PC application that can run in either a standalone mode, or in a monitor mode, where the application monitors requests from a voter registration (VR) system over a shared network folder. The application imports an election definition from Electionware, accepts requests to print a voter's ExpressVote activation card, determines the voter's ballot style and then prints the activation card on the ExpressVote Activation Card Printer.
- ExpressVote Activation Card Printer – The ExpressVote Activation Card Printer is a small, thermal, on demand printer used to print the ballot activation code on the ExpressVote activation card.
- Electionware Toolbox – Electionware Toolbox is a set of utilities that can be integrated into the Electionware EMS to enhance the software usability experience and streamline various processes. These add-on utilities include Test Deck and Text-to-Speech.
- Ballot Online ExpressPass – Ballot Online ExpressPass is an optional system that allows a user to access their ballot online and make sample ballot selections on any device connected to the Internet. When finished, the output from this system is the ExpressPass – a selection summary with scannable QR code that the user can either print or save in an electronic format on their mobile device. The voter operates the ExpressVote to scan, review and validate vote selections. The vote summary card may then be submitted for tabulation on an ES&S tabulator: ExpressVote Tabulator, DS200 or DS850.

NTS Huntsville performed limited testing as requested by the manufacturer. Table A-1 outlines the requested testing.

Table A-1. Manufacturer Requested Testing Outside of Certification

Component	Version	Requested Testing
ExpressLink	1.2.0.0	2005 VVSG Source code Compliance, Functional Integration Test
ExpressVote Activation Card Printer	N/A	Functional Integration Test
Electionware Toolbox	2.4.0.0	Functional Integration Test
Ballot Online ExpressPass	N/A	Functional Integration Test

A.1.3 Summary Findings

The limited testing by NTS determined that the components listed in Table A-1 functioned as described and did not introduce any errors into the certified system. In addition, the ExpressLink software was found to comply with the source code requirements of the 2005 VVSG.

APPENDIX B. – DEFICIENCY REPORT

B.1 DEFICIENCY REPORT

Table B-1 describes the functional deficiency and resolution discovered during the EVS 5.4.0.0 test campaign.

Table B-1. Functional Deficiency Report

NTS NOD ID	EAC VRT ID[2]	Test/Requirement	Deficiency Summary	Resolutions
NOD 1	177	Electrical Fast Transient/ Vol. I Sec 4.1.2.6	During the -2 kV Line to Ground cycle the printer on the ExpressVote 2.0 Kiosk stopped responding.	ES&S added a ferrite to the printer ribbon cable.
NOD 2	174	Acoustical/ Vol. I Sec 3.2.2.2.c.vi	The ExpressVote 2.0 could only reach a maximum of 81 dB SPL. Volume 1 Section 3.2.2.2.c.vi requires the maximum volume to be 100 dB SPL.	ES&S made a software change to correct the deficiency.
NOD 3	176	Electromagnetic Susceptibility/ Vol. I Sec 4.1.2.10	The ExpressVote 2.0 was found to be Susceptible at 110 MHz, Vertical Antenna Polarization with the EUT oriented at 270 degrees.	ES&S added ferrites to USB lines and power line.
NOD 4	181	PCA/ Vol. II Sec 6.6	Two of the seven ExpressVote 2.0 units examined during PCA did not match the manufacturer's hardware specifications (missing ferrites).	The missing ferrites were added to the EUT.
NOD 5	182	Electrostatic Disruption/ Vol. I Sec 4.1.2.8	When a -8 kV Contact discharge applied to On/Off door keyhole, ExpressVote 2.0 displayed a System Failure error screen.	Applied copper tape to failure areas and replaced power cord.
NOD 6	185	Electrostatic Disruption/ Vol. I Sec 4.1.2.8	The ExpressVote 2.0 Rolling Kiosk external printer failed when 8 kV Contact discharge is applied to 'Top of Stand' test point.	Replaced BOL scanner and Innodisk.

[2] The EAC VRT ID numbers may not be sequential. The deficiency tracking system (VRT) that is utilized by the EAC creates unique ID numbers based on overall entries within the database and not within individual projects.

NTS NOD ID	EAC VRT ID[3]	Test/Requirement	Deficiency Summary	Resolutions
NOD 7	183	Electrostatic Disruption/ Vol. I Sec 4.1.2.8	During Post-Op, tester discovered that the BOL scanner was non-functional.	Removed ballot latch spacers. Added copper tape and mesh gaskets to ballot latch assembly.
NOD 8	184	Electrostatic Disruption/ Vol. I Sec 4.1.2.8	During the test, the EUT suffered a disruption of normal operation, when +8 kV was applied by ESD gun to the bottom of the ballot insertion slot.	No modification was made. Testing was halted. ExpressVote 2.0 was ultimately removed from certification and replaced with ExpressVote 2.1.
NOD 9	N/A	Electrostatic Disruption/ Vol. I Sec 4.1.2.8	During Post-op, the Zero Totals report could not be generated. In accordance with TDP recommendation, the only option was to reboot the EUT. Following reboot of the EUT, the Zero Totals report could now be generated. This occurrence could not be replicated and was therefore, classified as an anomaly.	Recommended to customer that, since the machine required human intervention to function properly after the ESD test, the machine should undergo ESD and post operational status check again to see if the anomaly repeated. Unit underwent ESD testing again on 10/24/16. After the ESD test and during the post operational status check the anomaly was not repeated.
NOD 10	N/A	Testing Interfaces of System Components/Vol. II Sec 6.3 and Security Testing/ Vol. II 6.4	Voting System that use public telecommunications networks may become vulnerable, by virtue of their system components, to external threats to the accuracy and integrity of vote recording, vote counting and vote consolidation and reporting process. Therefore, vendors of such systems shall document how they plan to monitor and respond to known threats to which their voting systems are vulnerable.	The critical windows updates were applied. Security testing was performed and found to be in compliance.

[3] The EAC VRT ID numbers may not be sequential. The deficiency tracking system (VRT) that is utilized by the EAC creates unique ID numbers based on overall entries within the database and not within individual projects.

Table B-2. Notice of Deviation

NTS
WE ENGINEER SUCCESS
HUNTSVILLE OPERATIONS

NOTICE OF DEVIATION | **DATE:** 10/30/2015

NOTICE NO: 1 **P.O. NUMBER:** ES&S-MSA_TA046 **CONTRACT NO:** CON028566
CUSTOMER: ES&S **NTS JOB NO:** PR032474
NOTIFICATION MADE TO: Sue McKay **NOTIFICATION DATE:** 10/30/2015
NOTIFICATION MADE BY: Ryan Chambers **VIA:** E-mail

CATEGORY: ☑ SPECIMEN ☐ PROCEDURE ☐ TEST EQUIPMENT **DATE OF DEVIATION:** 10/30/2015
PART NAME: ExpressVote System (Kiosk Case) **PART NO:** HW 2.0 FW 2.1.0.0
TEST: 2005 VVSG Vol. I § 4.1.2.6 EN 61000-4-4 (Electrical Fast Transient) **I.D. NO:** EV0214390021
SPECIFICATION: 2005 VVSG Vol. I **PARA. NO:** § 4.1.2.6 (Electrical Fast Transient)

REQUIREMENTS:
Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand, without disruption of normal operation or loss of data, electrical fast transients of:
a. + 2 kV and - 2 kV on External Power lines (both AC and DC)
b. + 1 kV and - 1 kV on Input/Output lines (signal, data, and control lines) longer than 3 meters
c. Repetition Rate for all transient pulses will be 100 kHz

CONTROLLED DOCUMENT
Copy 2 of 3

DESCRIPTION OF DEVIATION:
During test the EUT suffered a disruption of normal operation, whereby the printer located in the ExpressVote Kiosk Case, ceased to output the expected periodic printout. The EUT was power cycled, subjected to the susceptibility level, and the disruption of normal operation was replicated.

DISPOSITION • COMMENTS • RECOMMENDATIONS:
The results were documented and the customer informed of the deficiency. The test was halted and the customer performed a root cause analysis. Additional details and information regarding the root cause analysis should be provided by the customer.

SAFETY RELATED: ☐ YES ☑ NO POTENTIAL 10 CFR PART 21: ☐ YES ☐ NO ☑ N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☑ CUSTOMER ☐ NTS HUNTSVILLE

CPAR REQUIRED: ☐ YES ☑ NO CPAR NUMBER: N/A

VERIFICATION:
PROJECT ENGINEER: N/A
CLIENT TEST WITNESS: N/A (IF APPLICABLE) **PROJECT MANAGER:** Ryan Allmon 10/30/2015
GOV. QAR: N/A (IF APPLICABLE) **DEPT. MANAGER:** Robert Hamby 10/30/15
NTS QUALITY REPRESENTATIVE: Patricia Newright **DATE:** 11/4/15

FOR NTS QA USE **Tracking Code:** 3

1. Employee Error	2. Test Equipment Problem	3. Customer Item Problem	4. Weather	5. Power Failure	6. Equipment Limitations	7. Other

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Table B-2. Notice of Deviation (Continued)

NTS
WE ENGINEER SUCCESS
HUNTSVILLE OPERATIONS

NOTICE OF DEVIATION | **DATE:** 1/27/2017

NOTICE NO: 2 Rev-2 **P.O. NUMBER:** ESS-MSA-TA046 **CONTRACT NO:** CON028566

CUSTOMER: ES&S **NTS JOB NO:** PR032474

NOTIFICATION MADE TO: Toby Dingbaum **NOTIFICATION DATE:** 5/14/2015

NOTIFICATION MADE BY: James Long **VIA:** Verbal / Onsite Rep.

CATEGORY: ☑ SPECIMEN ☐ PROCEDURE ☐ TEST EQUIPMENT **DATE OF DEVIATION:** 5/14/2015

PART NAME: ExpressVote Tabulator **PART NO:** EV0214390022 (H/W v2.0)

TEST: Blindness **I.D. NO:** OP 22 Usability – Acoustic Test

SPECIFICATION: 2005 VVSG Vol. I **PARA. NO:** 3.2.2.2

REQUIREMENTS:
2005 VVSG Volume I, Section 3.2.2.2 (c) vi-vii:
vi. The voting machine shall provide a volume control with an adjustable volume from a minimum of 20dB SPL up to a maximum of 100 dB SPL, in increments no greater than 10 dB.
vii. The audio system shall be able to reproduce frequencies over the audible speech range of 315 Hz to 10 KHz.

DESCRIPTION OF DEVIATION:
EUT failed Frequency Response Measurement (FRM) test, by not reaching the 100 dB level. FRM results show that the EUT could only reach a maximum output of 81 dB SPL.

DISPOSITION • COMMENTS • RECOMMENDATIONS:
ES&S Software developers adjusted the output volume of system sounds, via software modifications, to the maximum levels of output. Unit passed testing after modifications were made. Additional detailed information regarding the root cause analysis shall be provided by the customer.
Rev-1: Updated Part No. to include hardware version.
Rev-2: Corrected Test, Specification, I.D. No, Para. No. Changed 'SUT' to 'EUT'. Answered 'N/A' for CPAR No. and Gov. QAR. Corrected formatting. Updated Revision notes.

SAFETY RELATED: ☐ YES ☑ NO POTENTIAL 10 CFR PART 21: ☐ YES ☑ NO ☐ N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER ☑ NTS HUNTSVILLE

CPAR REQUIRED: ☐ YES ☑ NO CPAR NUMBER: N/A

VERIFICATION:

CLIENT TEST WITNESS: Toby Dingbaum (IF APPLICABLE) **PROJECT ENGINEER:** 1/27/17

GOV. QAR: N/A (IF APPLICABLE) **DEPT. MANAGER:** 01/27/2017

NTS QUALITY REPRESENTATIVE: Lisa Johnson **DATE:** 1/30/17

FOR NTS QA USE **Tracking Code:** 3.Customer Item Problem

1. Employee Error	2. Test Equipment Problem	3. Customer Item Problem	4. Weather	5. Power Failure	6. Equipment Limitations	7. Other

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Table B-2. Notice of Deviation (Continued)

NTS
WE ENGINEER SUCCESS
HUNTSVILLE OPERATIONS

NOTICE OF DEVIATION | **DATE:** 1/27/2017

NOTICE NO: 3 Rev-2 **P.O. NUMBER:** ESS-MSA-TA046 **CONTRACT NO:** CON028566

CUSTOMER: ES&S **NTS JOB NO:** PR032474

NOTIFICATION MADE TO: Sue McKay **NOTIFICATION DATE:** 6/14/2015

NOTIFICATION MADE BY: James Long **VIA:** Email

CATEGORY: ☑ SPECIMEN ☐ PROCEDURE ☐ TEST EQUIPMENT **DATE OF DEVIATION:** 6/14/2015

PART NAME: ExpressVote Tabulator **PART NO:** EV0214390015 (H/W v2.0)

TEST: Electromagnetic Susceptibility **I.D. NO:** IEC 61000-4-9

SPECIFICATION: 2005 VVSG Vol. I **PARA. NO:** 4.1.2.10

REQUIREMENTS:
2005 VVSG Volume I Section 2.1.4 c, 4.1.2.10, Volume II, Section 4.8.d
Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand an electromagnetic field of 10 V/m modulated by a 1 kHz 80% AM modulation over the frequency range of 80 MHz to 1000 MHz, without disruption of normal operation or loss of data.

DESCRIPTION OF DEVIATION:
Observed Blue Screen: ***STOP:0x000000F4 (0x00000003…)
EUT in 270 ° orientation with antenna in vert. pol. @ 110MHz @ 10 V/m
This failure repeated twice, after initial failure.

DISPOSITION • COMMENTS • RECOMMENDATIONS: The results were documented and the customer informed of the deficiency. The test was halted and the customer performed a root cause analysis. Additional detailed information regarding the root cause analysis shall be provided by the customer. ExpressVote 2.0 was ultimately removed from certification and replaced with ExpressVote 2.1.
Rev-1: Updated Part No. to include hardware version.
Rev-2: Corrected Specification. Changed 'SUT' to 'EUT'. Answered 'N/A' for CPAR No. and Gov. QAR. Corrected formatting. Updated Revision notes.

SAFETY RELATED: ☐ YES ☑ NO POTENTIAL 10 CFR PART 21: ☐ YES ☑ NO ☐ N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER ☑ NTS HUNTSVILLE

CPAR REQUIRED: ☐ YES ☑ NO CPAR NUMBER: N/A

VERIFICATION:

CLIENT TEST WITNESS: Toby Dingbaum (IF APPLICABLE) **PROJECT ENGINEER:** 1/27/17

GOV. QAR: N/A (IF APPLICABLE) **DEPT. MANAGER:** 01/27/2017

NTS QUALITY REPRESENTATIVE: Lisa Johnson **DATE:** 1/30/17

FOR NTS QA USE **Tracking Code:** 3.Customer Item Problem

1. Employee Error	2. Test Equipment Problem	3. Customer Item Problem	4. Weather	5. Power Failure	6. Equipment Limitations	7. Other

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Table B-2. Notice of Deviation (Continued)

NTS
WE ENGINEER SUCCESS
HUNTSVILLE OPERATIONS

NOTICE OF DEVIATION | **DATE:** 1/27/2017

NOTICE NO: 4 Rev-2 **P.O. NUMBER:** ESS-MSA-TA046 **CONTRACT NO:** CON028566

CUSTOMER: ES&S **NTS JOB NO:** PR032474

NOTIFICATION MADE TO: Vincent Wingate **NOTIFICATION DATE:** 6/14/2015

NOTIFICATION MADE BY: James Long **VIA:** Verbal / Onsite Rep.

CATEGORY: ☑ SPECIMEN ☐ PROCEDURE ☐ TEST EQUIPMENT **DATE OF DEVIATION:** 6/14/2015

PART NAME: ExpressVote Tabulator **PART NO:** EV0214390016 (H/W v2.0)

TEST: Physical Configuration Audit **I.D. NO:** OP 25 Physical Config Audit

SPECIFICATION: 2005 VVSG Vol. I **PARA. NO:** 9.7.1

REQUIREMENTS:
2005 VVSG Volume I Section 9.7.1
The Physical Configuration Audit is conducted by the accredited test lab to compare the voting system components submitted for certification to the vendor's technical documentation. For the PCA, a vendor shall provide:…
…h. Complete descriptions of its procedures and related conventions used to support this audit by:
i. Establishing a configuration baseline of the software and hardware to be tested…

DESCRIPTION OF DEVIATION:
Two (2) of the seven (7) ExpressVote systems examined during PCA did not match the manufacturer's hardware specifications (missing ferrites).

DISPOSITION • COMMENTS • RECOMMENDATIONS:
On 6/16/2015, ES&S disassembled EV0214390016, and pointed out copper tape additions and grounding modifications (missing ferrites), and submitted the rear ejection tabulator modification document. Additional detailed information regarding the root cause analysis shall be provided by the customer.
Rev-1: Updated Part No. to include hardware version.
Rev-2: Corrected I.D. No. Corrected Client Test Witness. Answered 'N/A' for CPAR No. and Gov. QAR. Corrected formatting. Updated Revision notes.

SAFETY RELATED: ☐ YES ☑ NO POTENTIAL 10 CFR PART 21: ☐ YES ☑ NO ☐ N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER ☑ NTS HUNTSVILLE

CPAR REQUIRED: ☐ YES ☑ NO CPAR NUMBER: N/A

VERIFICATION:

CLIENT TEST WITNESS: Vincent Wingate (IF APPLICABLE) **PROJECT ENGINEER:** 1/27/17

GOV. QAR: N/A (IF APPLICABLE) **DEPT. MANAGER:** 01/27/2017

NTS QUALITY REPRESENTATIVE: Lesi Johnson **DATE:** 1/30/17

FOR NTS QA USE **Tracking Code:** 3.Customer Item Problem

1. Employee Error	2. Test Equipment Problem	3. Customer Item Problem	4. Weather	5. Power Failure	6. Equipment Limitations	7. Other

Table B-2. Notice of Deviation (Continued)

NTS
WE ENGINEER SUCCESS
HUNTSVILLE OPERATIONS

NOTICE OF DEVIATION | **DATE:** 1/27/2017

NOTICE NO: 5 Rev-2 **P.O. NUMBER:** ESS-MSA-TA046 **CONTRACT NO:** CON028566

CUSTOMER: ES&S **NTS JOB NO:** PR032474

NOTIFICATION MADE TO: Vincent Wingate **NOTIFICATION DATE:** 11/3/2015

NOTIFICATION MADE BY: James Long **VIA:** Verbal / Onsite Rep.

CATEGORY: ☑ SPECIMEN ☐ PROCEDURE ☐ TEST EQUIPMENT **DATE OF DEVIATION:** 11/3/2015

PART NAME: ExpressVote Tabulator **PART NO:** EV0214390021 (H/W v2.0)

TEST: Electrostatic Disruption **I.D. NO:** IEC 61000-4-2

SPECIFICATION: 2005 VVSG Vol. I **PARA. NO:** 4.1.2.8

REQUIREMENTS:
2005 VVSG Volume I Section 4.1.2.8
Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand ±15 kV air discharge and ±8 kV contact discharge without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.

DESCRIPTION OF DEVIATION:
During ESD Testing, the External printer failed when ±8kV was applied to on/off door keyhole. After discharge, unit rebooted on its own. After mitigation attempts, unit continued to fail for the external printer failure.

DISPOSITION • COMMENTS • RECOMMENDATIONS:
The results were documented and the customer informed of the deficiency. The test was halted and the customer performed a root cause analysis. Additional detailed information regarding the root cause analysis shall be provided by the customer. ExpressVote 2.0 was ultimately removed from certification and replaced with ExpressVote 2.1.
Rev-1: Updated Part No. to include hardware version.
Rev-2: Corrected Test, Specification, Client Test Witness. Answered 'N/A' for CPAR No. and Gov. QAR. Corrected formatting. Updated Revision notes.

SAFETY RELATED: ☐ YES ☑ NO POTENTIAL 10 CFR PART 21: ☐ YES ☑ NO ☐ N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER ☑ NTS HUNTSVILLE

CPAR REQUIRED: ☐ YES ☑ NO CPAR NUMBER: N/A

VERIFICATION:

CLIENT TEST WITNESS: Vincent Wingate (IF APPLICABLE) **PROJECT ENGINEER:** 1/27/17

GOV. QAR: N/A (IF APPLICABLE) **DEPT. MANAGER:** 01/27/2017

NTS QUALITY REPRESENTATIVE: Lori Johnson **DATE:** 1/30/17

FOR NTS QA USE **Tracking Code:** 3.Customer Item Problem

1. Employee Error	2. Test Equipment Problem	3. Customer Item Problem	4. Weather	5. Power Failure	6. Equipment Limitations	7. Other

Table B-2. Notice of Deviation (Continued)

NTS
WE ENGINEER SUCCESS
HUNTSVILLE OPERATIONS

NOTICE OF DEVIATION | **DATE:** 1/27/2017

NOTICE NO: 6 Rev-2 **P.O. NUMBER:** ESS-MSA-TA046 **CONTRACT NO:** CON028566

CUSTOMER: ES&S **NTS JOB NO:** PR032474

NOTIFICATION MADE TO: Vincent Wingate **NOTIFICATION DATE:** 11/4/2015

NOTIFICATION MADE BY: James Long **VIA:** Verbal / Onsite Rep.

CATEGORY: ☑ SPECIMEN ☐ PROCEDURE ☐ TEST EQUIPMENT **DATE OF DEVIATION:** 11/3/2015

PART NAME: ExpressVote Tabulator **PART NO:** EV0214390021 (H/W v2.0)

TEST: Electrostatic Disruption **I.D. NO:** IEC 61000-4-2

SPECIFICATION: 2005 VVSG Vol. I **PARA. NO:** 4.1.2.8

REQUIREMENTS:
2005 VVSG Volume I Section 4.1.2.8
Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand ±15 kV air discharge and ±8 kV contact discharge without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.

DESCRIPTION OF DEVIATION:
Unit previously failed ESD testing. Replaced power cord and added copper tape to shield/on-off door which covered the INNO disk. Repeated scanner and printer error messages. BOL scanner failure upon receiving ±8kV discharge. Testing could not complete with a nonfunctional EUT.

DISPOSITION • COMMENTS • RECOMMENDATIONS:
The results were documented and the customer informed of the deficiency. The test was halted and the customer performed a root cause analysis. Additional detailed information regarding the root cause analysis shall be provided by the customer. ExpressVote 2.0 was ultimately removed from certification and replaced with ExpressVote 2.1.
Rev-1: Updated Part No. to include hardware version.
Rev-2: Corrected Test, Specification, Client Test Witness. Changed 'SUT' to 'EUT'. Answered 'N/A' for CPAR No. and Gov. QAR. Corrected formatting. Updated Revision notes.

SAFETY RELATED: ☐ YES ☑ NO POTENTIAL 10 CFR PART 21: ☐ YES ☑ NO ☐ N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER ☑ NTS HUNTSVILLE

CPAR REQUIRED: ☐ YES ☑ NO CPAR NUMBER: N/A

VERIFICATION:

CLIENT TEST WITNESS: Vincent Wingate (IF APPLICABLE) **PROJECT ENGINEER:** 1/27/17

GOV. QAR: N/A (IF APPLICABLE) **DEPT. MANAGER:** 01/27/2017

NTS QUALITY REPRESENTATIVE: Lori Johnson **DATE:** 1/30/17

FOR NTS QA USE **Tracking Code:** 3.Customer Item Problem

1. Employee Error	2. Test Equipment Problem	3. Customer Item Problem	4. Weather	5. Power Failure	6. Equipment Limitations	7. Other

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Table B-2. Notice of Deviation (Continued)

NTS
WE ENGINEER SUCCESS
HUNTSVILLE OPERATIONS

NOTICE OF DEVIATION | **DATE:** 1/27/2017

NOTICE NO: 7 Rev-2 **P.O. NUMBER:** ESS-MSA-TA046 **CONTRACT NO:** CON028566

CUSTOMER: ES&S **NTS JOB NO:** PR032474

NOTIFICATION MADE TO: Vincent Wingate **NOTIFICATION DATE:** 3/1/2016

NOTIFICATION MADE BY: James Long **VIA:** Verbal / Onsite Rep.

CATEGORY: ☑ SPECIMEN ☐ PROCEDURE ☐ TEST EQUIPMENT **DATE OF DEVIATION:** 3/1/2016

PART NAME: ExpressVote Tabulator **PART NO:** EV0216310072 (H/W v2.0)

TEST: Electrostatic Disruption **I.D. NO:** IEC 61000-4-2

SPECIFICATION: 2005 VVSG Vol. I **PARA. NO:** 4.1.2.8

REQUIREMENTS:
2005 VVSG Volume I Section 4.1.2.8
Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand ±15 kV air discharge and ±8 kV contact discharge without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.

DESCRIPTION OF DEVIATION:
IOB system error; -8kV applied to front keyhole above ballot slot. After mitigation, test was restarted. All ESD points were successfully tested. However, EUT failed post-op, as the BOL scanner was non-functional after ESD. This ExpressVote system was utilizing the Kiosk Chassis H/W v1.0.

DISPOSITION • COMMENTS • RECOMMENDATIONS:
The results were documented and the customer informed of the deficiency. The test was halted and the customer performed a root cause analysis. Additional detailed information regarding the root cause analysis shall be provided by the customer. ExpressVote 2.0 was ultimately removed from certification and replaced with ExpressVote 2.1.
Rev-1: Updated Date of Notification and Part No. to include hardware version. Kiosk chassis information was added to the Description.
Rev-2: Corrected Test, Specification, Client Test Witness. Answered 'N/A' for CPAR No. and Gov. QAR. Corrected formatting. Updated Revision notes.

SAFETY RELATED: ☐ YES ☑ NO POTENTIAL 10 CFR PART 21: ☐ YES ☑ NO ☐ N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER ☑ NTS HUNTSVILLE

CPAR REQUIRED: ☐ YES ☑ NO CPAR NUMBER: N/A

VERIFICATION:

CLIENT TEST WITNESS: Vincent Wingate (IF APPLICABLE) **PROJECT ENGINEER:** 1/27/17

GOV. QAR: N/A (IF APPLICABLE) **DEPT. MANAGER:** 01/27/2017

NTS QUALITY REPRESENTATIVE: Lori Johnson **DATE:** 1/30/17

FOR NTS QA USE **Tracking Code:** 3.Customer Item Problem

1. Employee Error	2. Test Equipment Problem	3. Customer Item Problem	4. Weather	5. Power Failure	6. Equipment Limitations	7. Other

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Table B-2. Notice of Deviation (Continued)

NTS
WE ENGINEER SUCCESS
HUNTSVILLE OPERATIONS

NOTICE OF DEVIATION | **DATE:** 1/27/2017

NOTICE NO: 8 Rev-2 **P.O. NUMBER:** ESS-MSA-TA046 **CONTRACT NO:** CON028566

CUSTOMER: ES&S **NTS JOB NO:** PR032474

NOTIFICATION MADE TO: Kevin Lisner **NOTIFICATION DATE:** 3/18/2016

NOTIFICATION MADE BY: James Long **VIA:** Verbal / Onsite Rep.

CATEGORY: ☑ SPECIMEN ☐ PROCEDURE ☐ TEST EQUIPMENT **DATE OF DEVIATION:** 3/18/2016

PART NAME: ExpressVote Tabulator **PART NO:** EV0216310050 (H/W v2.0)

TEST: Electrostatic Disruption **I.D. NO:** IEC 61000-4-2

SPECIFICATION: 2005 VVSG Vol. I **PARA. NO:** 4.1.2.8

REQUIREMENTS:
2005 VVSG Volume I Section 4.1.2.8
Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand ±15 kV air discharge and ±8 kV contact discharge without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.

DESCRIPTION OF DEVIATION:
During the test the EUT suffered a disruption of normal operation, when +8kV was applied by ESD gun to the bottom of the ballot insertion slot. The failure was annotated in the Engineering Logbook and the NTS Project Lead was notified. The EUT was power cycled, subjected to the same test where the disruption of normal operation was duplicated, when the printer once again failed to continue normal operation.

DISPOSITION • COMMENTS • RECOMMENDATIONS:
The results were documented and the customer informed of the deficiency. The test was halted and the customer performed a root cause analysis. Additional detailed information regarding the root cause analysis shall be provided by the customer. ExpressVote 2.0 was ultimately removed from certification and replaced with ExpressVote 2.1.
Rev-1: Updated Date of Notification and Part No. to include hardware version.
Rev-2: Corrected Notification Made To, Test, and Specification. Answered 'N/A' for CPAR No. and Gov. QAR. Corrected formatting. Updated Revision notes.

SAFETY RELATED: ☐ YES ☑ NO POTENTIAL 10 CFR PART 21: ☐ YES ☑ NO ☐ N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER ☑ NTS HUNTSVILLE

CPAR REQUIRED: ☐ YES ☑ NO CPAR NUMBER: N/A

VERIFICATION:

CLIENT TEST WITNESS: Kevin Lisner (IF APPLICABLE) **PROJECT ENGINEER:** 1/27/17

GOV. QAR: N/A (IF APPLICABLE) **DEPT. MANAGER:** 01/27/2017

NTS QUALITY REPRESENTATIVE: Lisa Johnson **DATE:** 1/30/17

FOR NTS QA USE **Tracking Code:** 3.Customer Item Problem

1. Employee Error	2. Test Equipment Problem	3. Customer Item Problem	4. Weather	5. Power Failure	6. Equipment Limitations	7. Other

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Table B-2. Notice of Deviation (Continued)

NTS
WE ENGINEER SUCCESS
HUNTSVILLE OPERATIONS

NOTICE OF DEVIATION | **DATE:** 1/27/2017

NOTICE NO: 9 Rev-2 **P.O. NUMBER:** ESS-MSA-TA046 **CONTRACT NO:** CON028566

CUSTOMER: ES&S **NTS JOB NO:** PR032474

NOTIFICATION MADE TO: Sue McKay **NOTIFICATION DATE:** 10/12/2016

NOTIFICATION MADE BY: Richard Arends **VIA:** Verbal / Onsite Rep.

CATEGORY: ☑ SPECIMEN ☐ PROCEDURE ☐ TEST EQUIPMENT **DATE OF DEVIATION:** 10/12/2016

PART NAME: ExpressVote Tabulator **PART NO:** EV0216310071 (H/W v2.1)

TEST: Electrostatic Disruption **I.D. NO:** IEC 61000-4-2

SPECIFICATION: 2005 VVSG Vol. I **PARA. NO:** 4.1.2.8

REQUIREMENTS:
2005 VVSG Volume I Section 4.1.2.8
Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand ±15 kV air discharge and ±8 kV contact discharge without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.

DESCRIPTION OF DEVIATION:
After completing the Electrostatic Discharge test at the Longmont facility, the unit underwent a post operational status check/election, to verify functionality. When tester attempted to print a Zero Totals report from the unit's attached printer, the report would not generate. After troubleshooting (per the customer's TDP), the only option was to reboot the machine (human intervention). Once the machine rebooted, it functioned properly.

DISPOSITION • COMMENTS • RECOMMENDATIONS:
Recommended to customer that, since the machine required human intervention to function properly after the ESD test, the machine should undergo ESD and post operational status check, again, to see if the anomaly repeated. Unit underwent ESD testing, again, on 10/14/2016. After the ESD test, and during the post operational status check, the anomaly was not repeated.
Rev-1: Updated Part No. to include hardware version.
Rev-2: Corrected Notification Made By, Notification Date, Via, Part No., Test, and Specification. Answered 'N/A' for CPAR No. and Gov. QAR. Corrected formatting. Updated Revision notes.

SAFETY RELATED: ☐ YES ☑ NO POTENTIAL 10 CFR PART 21: ☐ YES ☑ NO ☐ N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER ☑ NTS HUNTSVILLE

CPAR REQUIRED: ☐ YES ☑ NO CPAR NUMBER: N/A

VERIFICATION:

CLIENT TEST WITNESS: Sue McKay (IF APPLICABLE) **PROJECT ENGINEER:** 1/27/17

GOV. QAR: N/A (IF APPLICABLE) **DEPT. MANAGER:** 01/27/2017

NTS QUALITY REPRESENTATIVE: Lori Johnson **DATE:** 1/30/17

FOR NTS QA USE **Tracking Code:** 3.Customer Item Problem

1. Employee Error	2. Test Equipment Problem	3. Customer Item Problem	4. Weather	5. Power Failure	6. Equipment Limitations	7. Other

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Table B-2. Notice of Deviation (Continued)

NTS
WE ENGINEER SUCCESS
HUNTSVILLE OPERATIONS

NOTICE OF DEVIATION | **DATE:** 1/27/2017

NOTICE NO: 10 Rev-1 **P.O. NUMBER:** ESS-MSA-TA046 **CONTRACT NO:** CON028566

CUSTOMER: ES&S **NTS JOB NO:** PR032474

NOTIFICATION MADE TO: Sue McKay **NOTIFICATION DATE:** 1/19/2017

NOTIFICATION MADE BY: Ryan Chambers **VIA:** Email

CATEGORY: ☑ SPECIMEN ☐ PROCEDURE ☐ TEST EQUIPMENT **DATE OF DEVIATION:** 10/17/2016

PART NAME: EVS 5.4.0.0 - EMS **PART NO:** See description below

TEST: Security **I.D. NO:** See description below

SPECIFICATION: 2005 VVSG Vol. I **PARA. NO:** 7.5.3

REQUIREMENTS:
2005 VVSG Volume I Section 7.5.3
Voting systems that use public telecommunications networks may become vulnerable, by virtue of their system components, to external threats to the accuracy and integrity of vote recording, vote counting, and vote consolidation and reporting processes. Therefore, vendors of such systems shall document how they plan to monitor and respond to known threats to which their voting systems are vulnerable.

DESCRIPTION OF DEVIATION:
Several critical Windows updates were not present on:
Standalone – Dell Latitude E6410 – 2FDG5Q1;
Client – Dell OptiPlex 7010 – GGBXH02;
ERM Server – Dell PowerEdge T710 – JPZ6VR1

DISPOSITION • COMMENTS • RECOMMENDATIONS:
The critical windows updates are known and expected findings; due to the fact that this system was submitted for testing, in its current state, before these vulnerabilities were known and/or updates were available.
Rev-1: Corrected Part Name, Test, Specification, Para. No., and Requirements. Answered 'N/A' for CPAR No. and Gov. QAR. Corrected formatting. Updated Disposition for clarity. Updated Revision notes.

SAFETY RELATED: ☐ YES ☑ NO POTENTIAL 10 CFR PART 21: ☐ YES ☑ NO ☐ N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER ☑ NTS HUNTSVILLE

CPAR REQUIRED: ☐ YES ☑ NO CPAR NUMBER: N/A

VERIFICATION:

CLIENT TEST WITNESS: Sue McKay (IF APPLICABLE) **PROJECT ENGINEER:** 1/27/17

GOV. QAR: N/A (IF APPLICABLE) **DEPT. MANAGER:** 01/27/2017

NTS QUALITY REPRESENTATIVE: Lisa Johnson **DATE:** 1/30/17

FOR NTS QA USE **Tracking Code:** 3.Customer Item Problem

1. Employee Error	2. Test Equipment Problem	3. Customer Item Problem	4. Weather	5. Power Failure	6. Equipment Limitations	7. Other

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APPENDIX C. – AS-RUN TEST PLAN

C.1 AS-RUN TEST PLAN

Table C-1 details the changes made to the test plan during the course of testing. For a complete description, see NTS Test Plan PR032474-01 Rev C.

Table C-1. As-Run Test Plan Changes

Test Plan Section	Description of Change	Justification
6.3	Additional EMI testing of 5 ExpressVote units to ascertain manufacturability of the ExpressVote 2.1.	Additional testing required by the EAC
6.3.7	RSA Crypto testing	Additional testing required by the EAC

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APPENDIX D. – TECHNICAL DATA PACKAGE

D.1 EVS 5.4.0.0 TECHNICAL DATA PACKAGE

The documents listed in Table D-1 comprise the EVS 5.4.0.0 TDP.

Table D-1. EVS 5.4.0.0 TDP

EVS 5.4.0.0 TDP Documents	Version	Doc No.	Document Code
System Overview			
Voting System Overview	2.4	01-01	ESSSYS_5'4'0'0_D_SysOvr
System Functionality Description			
System Functionality Description	1.3	02-01	ESSSYS_5'4'0'0_D_SFD
AutoMARK System Functionality Description	2.0	02-02	AutoMARK_ESS_System_Functionality_AQS-18-5001-001-R
System Hardware Specification			
AutoMARK System Hardware Specification	6	03-05-01	AutoMARK_System Hardware Specification AQS-18-5000-001-F
AutoMARK System Hardware Overview	8	03-05-02	AutoMARK_System_Hardware_Overview_ AQS-18-5002-000-S
DS200 Hardware Specification HW Rev 1.2	3.2	03-02	DS200_1'2_SPC_HWSpec
DS200 System Hardware Specification HW Rev 1.3	4.3	03-03	DS200_1'3_SPC_HWSpec
DS850 System Hardware Specification HW Rev 1.0	1.4	03-01	DS850_1'0_SPC_HWSpec
ExpressVote Hardware Specification HW Rev 2.1	1.0	03-04	EVOTE_2'1_SPC_HWSpec
Software Design and Specification			
AutoMARK Software Design and Specifications	--	04-07	01_AutoMARK Software Design and Specifications (folder)
AutoMARK Ballot Image Processing Specifications	6	04-07-10	AutoMARK ESS Ballot Image Processing Specification AQS-18-5002-003-S
AutoMARK Ballot Scanning and Printing Specification	5	04-07-13	AutoMARK ESS Ballot Scanning and Printing Specification AQS-18-5002-007-S
AutoMARK Driver Application Programming Interface (API) Specifications	5	04-07-03	AutoMARK ESS Driver API Specification AQS-18-5000-002-F
AutoMARK Embedded Database Interface Specification	5	04-07-12	AutoMARK ESS Embedded Database Interface Specifications AQS-18-5002-005-S
AutoMARK Graphical User Interface (GUI) Design Specifications	6	04-07-07	AutoMARK ESS GUI Design Specifications AQS-18-5001-005-R
AutoMARK Operating Software Design Specifications	5	04-07-05	AutoMARK ESS Operating Software Design Specifications AQS-18-5001-002-R
AutoMARK Operations and Diagnostic Log Specifications	6	04-07-11	AutoMARK ESS Operations and Diagnostic Log Specs AQS-18-5002-004-S
AutoMARK Programming Specifications Details	5	04-07-09	AutoMARK ESS Programming Specifications Details AQS-18-5001-011-R
AutoMARK Software Design Specifications	6	04-07-06	AutoMARK ESS Software Design Spec AQS-18-5001-004-S
Software Design and Specifications Overview AutoMARK Voter Assist Terminal (VAT)	--	4-07-01	AutoMARK ESS Software Design Spec Overview
AutoMARK Software Development Environment	5	04-07-08	AutoMARK ESS Software Development Environment AQS-18-5001-006-R
AutoMARK Software Diagnostic Specifications	5	04-07-04	AutoMARK ESS Software Diagnostics Specifications AQS-18-5000-004-F
AutoMARK Software Standards Specification	5	04-07-02	AutoMARK ESS Software Standards Specification AQS-18-4000-000-S

D.1 EVS 5.4.0.0 TECHNICAL DATA PACKAGE (Continued)

Table D-1. EVS 5.4.0.0 TDP (Continued)

EVS 5.4.0.0 TDP Documents	Version	Doc No.	Document Code
Software Design and Specification (continued)			
Electionware Postgres SQL Descriptions	--	04-02-01	EWARE_99'3_D_PostGreSQLDescriptions
Electionware XML Schema Documentation	--	04-02-02	EWARE_99'5_D_XMLDiagrams
DS200 – Software Design Specification	1.3	04-05	DS200_2'14'0'0_SDS
DS850 – Software Design Specification	1.1	04-04	DS850_2'11'0'0_SDS
Software Design Specifications Event Log Service	1.2	04-01	ELS_1'5'6'0_SDS
Election Reporting Manager (ERM)	1.1	04-03	ERM_8'13'0'0_SDS
Software Design Specifications ERM Appendices	1.0	04-03-01	ERM_8'13'0'0_SDS_Appendices
Coding Standards	1.1	04-09	ESSSYS_1'0_P_CodingStandards
System Development Program	1.3	04-08	ESSSYS_1'0_P_SysDevProgram
ExpressVote – Software Design Specification	1.4	04-13	EVOTE_2'1'0'0_SDS
Electionware – Software Design Specification	1.2	04-14	EWARE_4'8'0'0_SDS
System Test/Verification Specification			
System Test Plan	1.1	05-01	ESSSYS_5'4'0'0_D_TestPlan
Common Industry Format Usability Test Reports	--	05-02	Usability Test Reports (Folder)
Common Industry Format Usability Test Report – ExpressVote 1.0	N/A	05-02-01	EVOTE_1'0_D_CIFRpt
Common Industry Format Usability Test Report – AutoMARK 1.8.7.0	1.x	05-02-02	AMVAT_1'X_D_CIFRpt
Common Industry Format Usability Test Report – DS200 1.2.1	1.2.1	05-05-03	DS200_1'2'1_D_CIFRpt
System Security Specification			
AutoMARK System Security Specification	7	06-06	AutoMARK ESS System Security Spec AQS-18-5002-001-S
Voting System Security Specification	1.5	06-01	ESSSYS_1'0_SPC_SystemSecurity_Local
EMS Client Workstation Secure Setup & Configuration Guide	1.10	06-03	ESSSYS_5'4'0'0_SPC_ClientWorkstation SetupConfigGuide
EMS Server Secure Setup & Configuration Guide	1.7	06-04	ESSSYS_5'4'0'0_SPC_EMSServer SetupConfigGuide
Security Script Description	1.2	06-02	ESSSYS_5'4'0'0_SPC_SecurityScriptDesc
Standalone EMS Workstation Secure Setup & Configuration Guide	1.7	06-05	ESSSYS_5'4'0'0_SPC_Standalone WorkstationSetupConfigGuide
Verification Procedures & Scripts	--	--	01_VerificationProcedures&Scripts (folder)
EVS 5.4.0.0 Verification Pack	--	--	Verification Pack
Verification Procedure, AutoMARK Ballot Marking Device	2.0		AMVAT_A300_D_VerProc
Verification Procedure, DS200 Precinct Tabulator	2.0	06-01-04	DS200_1'3_D_VerProc
Verification Procedure, DS850 Central Tabulator	2.0	06-01-03	DS850_1'0_D_VerProc
Verification Procedure, Election Management System Workstation	2.0	06-01-01	EMS_1'0_D_VerProc
Verification Procedure, ExpressVote	1.2	06-01-05	EVOTE_2'1_D_VerProc
Validation File Lists	--	--	02_ValidationFileLists (folder)
Validation File List: AutoMARK	1.2	06-02-01	AMVAT_1'8_L_ValFileList
Validation File List: AutoMARK Previewer	1.2	06-02-02	AMVATP_1'8_L_ValFileList
Validation File List: DS200	1.1	06-02-03	DS200_2'14_L_ValFileList

D.1 EVS 5.4.0.0 TECHNICAL DATA PACKAGE (Continued)

Table D-1. EVS 5.4.0.0 TDP (Continued)

EVS 5.4.0.0 TDP Documents	Version	Doc No.	Document Code
System Security Specification (continued)			
Validation File List: DS850	1.1	06-02-04	DS850_2'11_L_ValFileList
Validation File List: Event Log Service	1.1	06-02-05	ELS_1'5_L_ValFileList
Validation File List: Election Reporting Manager	1.2	06-02-06	ERM_8'13_L_ValFileList
Validation File List: ExpressVote	1.3	06-02-07	EVOTE_2'1_L_ValFileList
Validation File List: ExpressVote Previewer	1.2	06-02-08	EVOTEP_2'1_L_ValFileList
Validation File List: Electionware	1.3	06-02-09	EWARE_4'8_L_ValFileList
Validation File List: RMS	1.1	06-02-10	RMS_1'4_L_ValFileList
System Operations Procedure			
AutoMARK Operator's Guide	1.3	07-01	AMVAT_1'8'7'0_SOP
DS200 Operator's Guide	1.7	07-02	DS200_2'14'0'0_SOP
DS200 Operator's Guide Appendices	1.0	07-02-01	DS200_2'14'0'0_SOP_Appendices
DS850 Operator's Guide	1.7	07-03	DS850_2'11'0'0_SOP
DS850 Operator's Guide Appendices	1.0	07-03-01	DS850_2'11'0'0_SOP_Appendices
EVS Event Logging Service User's Guide	1.2	07-04	ELS_1'5'6'0_SOP
Election Reporting Manager User's Guide	1.6	07-05	ERM_8'13'0'0_SOP
Election Reporting Manager User's Guide Appendices	1.2	07-05-01	ERM_8'13'0'0_SOP_Appendices
ExpressVote Operator's Guide	2.0	07-12	EVOTE_2'1'0'0_SOP
ExpressVote Operator's Guide Appendices	1.1	07-12-01	EVOTE_2'1'0'0_SOP_Appendices
Electionware Vol. I: Administrator Guide	4.0	07-06	EWARE_4'8'0'0_SOP_01Admin
Electionware Vol. II: Define User Guide	4.1	07-07	EWARE_4'8'0'0_SOP_02Define
Electionware Vol. III: Design User Guide	4.0	07-08	EWARE_4'8'0'0_SOP_03Design
Electionware Vol. IV: Deliver User Guide	4.2	07-09	EWARE_4'8'0'0_SOP_04Deliver
Electionware Vol. V: Results User Guide	3.0	07-10	EWARE_4'8'0'0_SOP_05Results
Electionware Vol. VI: Appendices	2.0	07-10-01	EWARE_4'8'0'0_SOP_06Appendices
System Maintenance Manuals			
AutoMARK Maintenance Manual	1.3	08-01	AMVAT_1'8'7'0_SMM
DS200 Maintenance Manual	1.3	08-02	DS200_2'14'0'0_SMM
DS850 Maintenance Manual	1.3	08-03	DS850_2'11'0'0_SMM
ExpressVote Maintenance Manual	2.1	08-04	EVOTE_2'1'0'0_SMM
Personnel Deployment and Training			
Personnel Deployment and Training Program	1.0	09-01	ESSSYS_1'0_P_TrainingProgram
Configuration Management Plan			
Configuration Management Program	1.1	10-1	ESSSYS_1'0_P_CMProgram
Technical Documentation Program	1.1	10-2	ESSSYS_1'0_P_TDProgram
QA Program			
Manufacturing Quality Assurance Program	1.3	11-01	ESSSYS_1'0_P_MNFQAProgram
Software Quality Assurance Program	1.2	11-02	ESSSYS_1'0_P_SWQAProgram
System Change Notes			
System Change Notes	1.3	12-01	ESSSYS_5'4'0'0_D_ChangeNotes
System Change Notes with QA Test Notes	1.0	12-02	ESSSYS_5'4'0'0_D_ChangeNotes_QA
Other TDP Documents			
Ballot Production Guide for EVS	2.4	13-01	BPG_2'4_SOP

APPENDIX E. – DETAILS OF SUBMITTED MODIFICATIONS

E.1 SUBMITTED MODIFICATIONS

Table E.1. Submitted Modification

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
BUG30689	DS200	Changed DS200 implementation layer to use the candidate type flag sent from Electionware to not reject or query marginal marks for oval locations for text-only contests	2.3.3.2 e, f, g, and h 3.1.2 a, b, c, d, and e 4.1.5.1 d i, iii and iv 4.1.5.2 b	6.7
ENH23027	DS200	Capture and display the write-in text on the report tape	N/A	6.7
ENH30966	DS200	Added new log entries to document actions within the new write in report features: Entered View Write-Ins Viewed image X of X Exited View Write-Ins	N/A	6.7
BUG31901	DS200	For text only candidates the results on the zero and results reports was removed	6.7	6.7
BUG31953	DS200	Resolved an issue whereby a missing column mark on the trailing edge of the ballot can cause a false positive for enhanced write-ins	N/A	6.7
BUG32093	DS200	Correct typo in wording of undervote query screen	2.3.3.2 e, f, g, and h 3.1.2 a, b, c, d, and e 4.1.5.1 d i, iii, and iv	6.7
BUG32662	DS200	Resolved issue with results report printing after reopening polls on a different machine when the time is set earlier than the report generated from the previous machine	2.1.7.1.b; 2.1.8 d & e 2.2.3 b & c 2.2.4 a, b, c, d, e, g, & h 2.2.5 a, b, c, d, e, g ,h, & i 2.3.1.2 d & e; 5.4.2 a, b, & c	6.7
BUG32784	DS200	Resolve issue where the user can inadvertently be allowed to clear ballot data when recovering from a hardware failure during the close process	N/A	6.7
Multiple	DS200	Implement write-in review report	N/A	6.7
ENH31085	DS200	Implement use of Electionware Configure flag indicating all ballots are to be stamped	4.1.5.1 d ii	6.7

E.1 SUBMITTED MODIFICATIONS (CONTINUED)

Table E.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ENH31091	DS200	Update Welcome screen graphic to simplify wording, provide a clearer insertion image, and account for standard ballots and ExpressVote card	N/A	6.7
ENH31092	DS200	Updated splash screens to new branding style	4.3.4.2 f ; 7.4.1 a, b, c, d, &e	6.7
ENH31205	DS200	Updated DS200 Admin screen to remove old product name	2.1.4 j; 4.3.4.1 b, c, & d; 4.3.4.2 a, b, & c	6.7
ENH31450	DS200	Design change to generate a single CVR for an ExpressVote card from a multi-page election	N/A	6.7
ENH31500	DS200	Added the Diagnostic Ballot View functionality to allow the scanned images to be viewed on the screen in diagnostic mode.	2.1.4 j; 4.3.4.1 b, c, & d; 4.3.4.2 a, b, & c	6.7
ENH31507	DS200	Implement Diagnostic Ballot Viewer's File Export feature to allow the images to be exported to the election media.	2.1.4 j; 4.3.4.1 b, c, & d; 4.3.4.2 a, b, & c	6.7
Multiple	DS200	Implement Judge's Initial/Review Box feature to reject ballot based on various settings from Electionware	N/A	6.7
ENH32217	DS200	Remove support for EOL or non-recommended USB media	N/A	6.7
ENH32256	DS200	Add vote session ID to write-in image viewer	N/A	6.7
ENH32258	DS200	Have ExpressVote images display first in Write-in review viewer	N/A	6.7

E.1 SUBMITTED MODIFICATIONS (CONTINUED)

Table E.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
BUG33020	DS200	Increased write-in capacity.	2.3.1.2 f; 4.1.5.1 b ii; 4.1.6.1 a i, ii, iii, & iv	6.7
BUG35030	DS200	LibCoNG Sync for DS200	2.3.1.2 f; 4.1.5.1 b ii; 4.1.6.1 a i, ii, iii, & iv	6.7
BUG31543	DS850	Minor wording change on bin report for unsaved batch	2.3.1.2 f; 4.1.5.1 b ii; 4.1.6.1 a i, ii, iii, & iv	6.7
BUG31708	DS850	Change to allow proper viewing of ExpressVote card images in Electionware Produce	2.1.7.1 d; 2.1.8 b, c, & e; 2.3; 4.1.5.2 c	6.7
Multiple	DS850	Implement Judge's Initial/Review Box feature to reject ballot based on settings from Electionware	2.1.10; 2.1.7.1 b	6.7
ENH26847	DS850	Add additional improvements to IMR to reduce the number of ballots rejected due to skew	5.3 a	6.7
ENH31183	DS850	Improve Results generation times by performing a data summary for each batch after each batch is saved instead of processing all ballots to generate results	2.1.7.1 d; 2.1.8 b, c, & e; 2.3; 4.1.5.2 c	6.7
ENH31184	DS850	Improve Export Results performance by packaging each batch at Save time instead of packaging all data at export time	5.4.2 c	6.7
ENH31759	DS850	If the image retention settings are changed within the election, this regenerates the batch-level data packages to reflect those changes	N/A	6.7
ENH31789	DS850	Integrate common changes needed to support generation of a single CVR for ExpressVote cards in multi-page elections	N/A	6.7
ENH31918	DS850	Report changes needed to account for changes to generate a single CVR for and ExpressVote card in a multi-page election	2.1.7.1 d; 2.1.7.2; 4.1.5.1 b I & c; 4.1.5.2 b & e	6.7
ENH32218	DS850	Removed support for uncertified USB sticks	2.3.1.2 f; 4.1.5.1 b ii; 4.1.6.1 a i, ii, iii, & iv	6.7
ENH32266	DS850	Updated startup and shutdown screens to reflect current color scheme and branding	2.1.7.1 d; 2.1.8 b, c, & e; 2.3; 4.1.5.2 c	6.7
ENH32486	DS850	Updated name of middle bin in log entries to be consistent with overall naming conventions	2.1.10; 2.1.7.1 b	6.7
ENH31647	AutoMARK	Provided a configurable option for users to set voting targets to either checkboxes or ovals	3.2.5	6.7

E.1 SUBMITTED MODIFICATIONS (CONTINUED)

Table E.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
BUG30642	Electionware-Accessible Ballot	Made changes to refresh the Navigator lists more quickly	2.1.6; 2.2.1.2; 3.1.4	6.7
BUG31629	Electionware-Accessible Ballot	Incorrect name for Cantonese Chinese causes problems when importing script updates	3.1.3; 3.2.7	6.7
ENH31595	Electionware-Accessible Ballot	Support both Oval and Checkmark images on AutoMARK for the voting session based on customer preference	2.3.3.3 b & d	6.7
BUG30848	Electionware-Acquire	Optimized the loading of DS200 Results sticks with large volumes by removing the additional ballot image zip file parsing	N/A	6.7
ENH32084	Electionware-Acquire	The Icon for the Master Media entry in the Navigator will update based on the Master Media status	N/A	6.7
BUG31254	Electionware-Capture	Clicking the Contest Language Tabs will focus on the selected language	N/A	6.7
BUG32131	Electionware-Capture	Alternate ID fields are now being carried forward for imported Questions	2.2.1.2 b & e	6.7
BUG32308	Electionware-Capture	If a user attempts to generate ballot styles with a contest with no candidates in the election, Electionware will now show an error instead of a warning	2.2.1.1 a, bii 2.2.2 a	6.7
BUG32802	Electionware-Capture	If a user imported elections into Electionware, the <NUM> variable was not showing correctly in Paper Ballot. This has been corrected so that this variable (and others) will work correctly	2.2.1.2 e	6.7
ENH31713	Electionware-Capture	The Hindi language cannot be added to the election through an import if the AutoMARK has been selected as a piece of equipment used in the election	2.2.1.3 a 3.1.3 3.2.7	6.7
ENH31976	Electionware-Capture	Corrected an issue where ERM couldn't handle logical ballot style IDS with more than seven digits by reducing the ID size limit to 7 digits	2.1.6	6.7
Multiple	Electionware-Configure	Implement Judge's Initial/Review Box feature to reject ballot based on settings from Electionware	4.1.4.2 a.i	6.7

E.1 SUBMITTED MODIFICATIONS (CONTINUED)

Table E.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ENH29022	Electionware-Configure	The module name has been changed from Configure Equipment to Configure	N/A	6.7
ENH31360	Electionware-Configure	Automatic Printing of the Write-in Entry report can now be set in Configure for the DS200	2.4.3 c	6.7
ENH31362	Electionware-Configure	Include Write-In Review Report setting will appear on the DS200 Settings Report	N/A	6.7
ENH31536	Electionware-Configure	The option to Stamp All ballots has been added to the DS200 settings screen. Additionally, the stamping and diverting functions have been separated and the screen has been reorganized to allow for the setting of one, the other, or both	4.1.5.1 b, d	6.7
ENH31538	Electionware-Configure	The DS200 Settings Report will now show the Stamp All and Divert settings	N/A	6.7
ENH31539	Electionware-Configure	If either Stamp or Divert is checked, and no criteria are also checked, an alert will show	N/A	6.7
ENH31591	Electionware-Configure	The Vote Target selection for the AutoMARK can now be set from Configure	2.3.3.3 b & d	6.7
ENH31592	Electionware-Configure	The AutoMARK settings report will now show the selected Vote Target setting	N/A	6.7
BUG31528	Electionware-Element Library	Add font size specification for all items in translation script for database	2.2.1.2 c, 3.1.5 d, 3.2.2.1 b	6.7
BUG31666	Electionware-Element Library	Add new AutoMARK system prompts to script	2.2.1.3 a, 3.1.3, 3.2.7	6.7
BUG32535	Electionware-Element Library	Use new image on DS200 when screen definition is changed	N/A	6.7
BUG32748	Electionware-Element Library	Modify wording for two AutoMARK prompts	2.2.1.3 a, 3.1.3, 3.2.7	6.7
Multiple	Electionware-Element Library	Provide navigation buttons for voter in Hindi language	2.2.1.3 a, 3.1.3, 3.2.7	6.7
ENH31127	Electionware-Element Library	Added system prompts to support new functional Judges initials requirements	2.2.1.3 a, 3.1.3, 3.2.7	6.7

E.1 SUBMITTED MODIFICATIONS (CONTINUED)

Table E.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ENH31593	Electionware-Element Library	Provided support for use of oval or checkmark on AutoMARK vote screens	2.3.3.3 b & d	6.7
ENH32670	Electionware-Element Library	Limit audio prompt instructions at end of voting session to speed up voting	2.2.1.3 a, 3.1.3, 3.2.7	6.7
ENH32800	Electionware-Element Library	Adjust default prompt script in Electionware database	2.2.1.3 a, 3.1.3, 3.2.7	6.7
BUG31179	Electionware-Framework	Updated login panel to show CapsLock message correctly	N/A	6.7
BUG31277	Electionware-Framework	Updated shortcut to ensure application launches consistently	N/A	6.7
Multiple	Electionware-Framework	Updated SysObjects to be imported into Electionware for Special Frames	N/A	6.7
ENH30460	Electionware-Framework	Update Electionware installer to support Paper Ballot migration to Visual C++ 2013	N/A	6.7
ENH30492	Electionware-Framework	Update Table Library to new version of Citra Table	N/A	6.7
ENH30532	Electionware-Framework	Upgraded JasperReports	N/A	6.7
ENH31139	Electionware-Framework	Use Java Buffering for file reading and writing to increase speed	N/A	6.7
ENH31187	Electionware-Framework	Hindi language enabled for EVS5400	2.2.1.3 a, 3.1.3, 3.2.7	6.7
ENH31373	Electionware-Framework	Bengali language disabled for EVS5400	2.2.1.3 a, 3.1.3, 3.2.7	6.7
ENH31574	Electionware-Framework	Re-enabled 64-bit launcher to start Electionware	N/A	6.7
ENH31642	Electionware-Framework	Hindi language cannot be used with AutoMARK equipment. Validation added to prohibit both options to be enabled	2.2.1.3 a, 3.1.3, 3.2.7	6.7
ENH31917	Electionware-Framework	Updated SysObjects to be imported into Electionware for Hindi language	N/A	6.7
ENH32252	Electionware-Framework	Only support certified media (Delkin 512MB through 16GB)	4.1.7.1	6.7

E.1 SUBMITTED MODIFICATIONS (CONTINUED)

Table E.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ENH32691	Electionware-Framework	New User Guide PDFs, Web Help Files, and Quick Help files have been created for Electionware 4.8.0.0 and added to the system to be accessible by users	N/A	6.7
BUG32143	Electionware-Home	Make sure the Customer Portal link is correct	N/A	6.7
BUG31726	Electionware-Package	Ensure the ExpressVote icon is properly appearing in the toolbar	N/A	6.7
BUG31734	Electionware-Package	AutoMARK status is reported in Media Not Created Report	N/A	6.7
BUG31969	Electionware-Package	Writeable area coordinates to remain as decimal values when being packaged	N/A	6.7
BUG32031	Electionware-Package	Issue when generating Pollbook export	N/A	6.7
BUG32056	Electionware-Package	Received error when resetting media	N/A	6.7
BUG32060	Electionware-Package	Ensure DS200 sticks are properly formatting before burning	N/A	6.7
BUG32108	Electionware-Package	Ensure ExpressVote cards with a Marked Review box are being rejected when set to reject in Electionware	4.1.4.2 a.i	6.7
BUG32785	Electionware-Package	Warn user before burning ExpressVote Tabulator media that the EQC has not been created	N/A	6.7
BUG32581	Electionware-Package	Ellipse incomplete in Package > Tools menu	N/A	6.7
Multiple	Electionware-Package	Implement Judge's Initial/Review Box feature to reject ballot based on settings from Electionware	4.1.4.2 a.i	6.7
ENH31540	Electionware-Package	Pass stamp and diverter options to DS200 for the stamp all ballots option	4.1.5.1 b, d	6.7
ENH31562	Electionware-Package	Package the ExpressVote card font sizes with the DS200	N/A	6.7
ENH31594	Electionware-Package	Package the Oval/Checkmark options to the AutoMARK	2.3.3.3 b & d	6.7
ENH32190	Electionware-Package	Warn user when re-burning media, that if it was input into Acquire, all Acquire information will be erased	N/A	6.7

E.1 SUBMITTED MODIFICATIONS (CONTINUED)

Table E.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ENH32597	Electionware-Package	Warn user if they are re-creating the same poll when burning media	N/A	6.7
BUG31258	Electionware-Paper Ballot	Paper Ballot ensures that users can only have one styling method for each response (content-formatted or style-sheet)	2.2.1.2; 3.1.4	6.7
BUG31477	Electionware-Paper Ballot	Corrected non-panel Content line placement when paneled content lines are included in style sheets along with Vertically Center Content checkbox	2.2.1.2 a, b	6.7
BUG31611	Electionware-Paper Ballot	Paper Ballot allows a user to delete a Panel with Content lines included. Once a Panel is deleted, the Content line will not appear on the ballot	2.2.1.2 a, b	6.7
BUG31722	Electionware-Paper Ballot	Graphics files load consistently from a template	2.2.1.2 a, b, e	6.7
BUG31725	Electionware-Paper Ballot	Flow Candidate option now prevents contests from floating from one page to the next page	2.2.1.2 a, b	6.7
BUG32009	Electionware-Paper Ballot	Created validation that each Question Response has at least one "Default" language Content item for Accessible Ballot	N/A	6.7
Multiple	Electionware-Paper Ballot	Implement Judge's Initial/Review Box feature to reject ballot based on settings from Electionware	4.1.4.2 a.i	6.7
ENH31218	Electionware-Paper Ballot	Hindi language enabled for EVS5400	2.2.1.3 a, 3.1.3, 3.2.7	6.7
ENH31478	Electionware-Paper Ballot	Removed Gutters since new measurements for Panels (inches, auto-height) were added. Instead of Gutters, users can use Panel margins for safer spacing	2.2.1.2 a, b	6.7
BUG31643	Electionware-Produce	Handle image rotation	N/A	6.7
BUG32505	Electionware-Produce	Corrected a situation where the printing of a ballot facsimile could cause an error	N/A	6.7
BUG32508	Electionware-Produce	The file type for CVR export now defaults to .xls for enhanced usability	2.1.6; 2.1.7.2; 4.1.7.2	6.7
BUG32590	Electionware-Produce	Exporting ballot images for a large number of districts causes a failure; user should be advised of the limitations	N/A	6.7

E.1 SUBMITTED MODIFICATIONS (CONTINUED)

Table E.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
BUG32609	Electionware-Produce	The issue was the Results XML export file created by Electionware was not populating the total ballots cast attribute correctly in the "Jurisdiction" and "Election" elements. These fields incorrectly contained zeroes. The fix is to correctly populate the total ballots cast attribute in these two elements of the Results XML export file. The count that was incorrect was the total ballots cast attribute in the "Jurisdiction" and Election" elements of the Results XML export file. The VSTL created a test case to verify the issue was resolved.	N/A	6.7
ENH32264	Electionware-Produce	Updated the copyright for reports to show the current year	2.1.6; 2.1.7.2; 4.1.7.2	6.7
BUG31082	ERM	Corrected a situation where the ERM XML Results file reported Precincts Counted incorrectly	N/A	6.7
BUG31099	ERM	Corrected user inability to select "Update Precinct counted" checkbox when ERM is configured with only one reporting group	2.4.4 a, b, & c; 2.4.3.b & e; 4.1.7.2 a, b, & c; 5.4.4	6.7
BUG31469	ERM	If no backup of the results database is available, the election results media would need to be re-read to collect all results from the various voting devices. Corrected loss of ERM results when converting prior ERM results file format to current ERM results file format	N/A	6.7
BUG32429	ERM	Disabled user option to "Exclude Absentee Precincts". Option is no longer supported	2.4.4 a, b, & c; 2.4.3.b & e; 4.1.7.2 a, b, & c; 5.4.4	6.7
ENH31149	ERM	Added a check box, "Skip Precincts with 0 Ballots Cast", on the "Select Current Group to be Updated" screen, allowing the user to not process (skip) precincts with zero votes when uploading tabulator results	N/A	6.7

E.1 SUBMITTED MODIFICATIONS (CONTINUED)

Table E.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ENH31370	ERM	In the ERM Change Control File menu option, added support for auto-creation of the ERM Results XML file with a user defined lapse time interval (in minutes) or number of precincts processed interval. During the Process DS200 Memory Device results upload function, the ERM Results XML file is created at the user defined interval	ENH31370	ERM
ENH32553	ERM	Enhanced ERM to allow validation of ExpressVote sticks. This enhancement caused the existing menu path to change from: Tabulators | DS200 | Post Election Audit | "Validate Results Media" or "Print Results Validation Media Log" to: Tabulators | Post Election Audit | "Validate Results Media" or "Print Results Validation Media Log", eliminating the portion of the path that specifies "DS200"	2.4.4 a, b, & c; 2.4.3.b & e; 4.1.7.2 a, b, & c; 5.4.4	6.7

END OF TEST REPORT