



Test Plan for 2005 Voluntary Voting System Guidelines Certification Testing to be Performed on Election Systems & Software Voting System 5.2.0.4

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U.S. Election Assistance Commission

VSTL

EAC Lab Code 0704

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REVISIONS

Revision	Reason for Revision	Date
NR	Initial Release	04/01/2016
A	Pg 14 Section 2.3 – Added a statement that the known field issue was not mitigated in this release and reference the technical bulletin.	04/08/2016
A	Pg 27 Section 6.3.3 – Added a sentence to clarify that there was a single contest with 295 candidates present.	4/08/2016
A	Pg 28 Section 6.3.3 – Added a sentence to clarify that there was a single contest with 296 candidates present.	4/08/2016
A	Added Appendix D – ES&S Technical Bulletin #FYIEWR0026	4/08/2016
A	Updated TDP version numbers to reflect the as-run versions.	4/08/2016

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1.0 INTRODUCTION

Election Systems & Software (ES&S), herein referred to as manufacturer, submitted the Election Systems & Software Voting System 5.2.0.4 (EVS 5.2.0.4) to the Election Assistance Commission (EAC), for certification testing to the 2005 Voluntary Voting System Guidelines Standards (2005 VVSG). EVS 5.2.0.4 is a modification to the previously 2005 VVSG certified EVS 5.2.0.0 voting system (Certification number: ESSEVS5200), and as such, will be tested by National Technical Systems Huntsville (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. This National Certification Test Plan, hereafter referred to as the Test Plan, documents the process and test methods that will be used to validate 2005 VVSG compliance of EVS 5.2.0.4.

1.1 Description and Overview of EAC Certified System Being Modified

The following subsections describe 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

EVS 5.2.0.0 is certified by the U.S. Election Assistance Commission to the 2005 Voluntary Voting System Guidelines (Certification number: ESSEVS5200). Tables 1-1 and 1-2 describe the hardware and software/firmware versions that were previously tested and certified. For a complete description of the configuration 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>.

Table 1-1. Previously Certified Software

Software	Software/Firmware Version
Proprietary Software	
ElectionWare	4.6.0.0
Election Reporting Manager (ERM)	8.11.0.0
ES&S Event Log Service (ELS)	1.5.5.0
Removable Media Service (RMS)	1.4.5.0
VAT Previewer	1.8.6.0
ExpressVote Previewer	1.4.0.0
COTS Software	
Adobe Acrobat Standard	11
Cerberus FTP	6.0.7.1
Microsoft Server 2008	R2 w/ SP1
Microsoft Windows 7, SP1	5.1 w/ SP1
WSUS Microsoft Windows Offline Update Utility	8.8
Symantec Endpoint Protection Intelligent Updater	20131227-002-v5i64.exe
Micro Focus RM/COBOL Runtime	12.06
Symantec Endpoint Protection - Small Business Edition 2013	12.1.4

1.1.1 Baseline Certified System (Continued)

Table 1-2. Previously Certified Voting System Equipment

Component	Hardware Version	Firmware Version
<i>Proprietary Hardware</i>		
ExpressVote Accessible Voting Station	1.0	1.4.0.0
DS200 Precinct Count Scanner	1.2.1, 1.2.3, & 1.3	2.12.0.0
DS850 Central Count Scanner	1.0	2.10.0.0
AutoMARK A100	1.0	1.8.6.0
AutoMARK A200 (SBC 2.0 & SBC 2.5)	1.1	1.8.6.0
AutoMARK A300 (SBC 2.0 & SBC 2.5)	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
<i>COTS Hardware</i>		
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	512MB, 1, 2, 4, & 8GB	N/A
Delkin Compact Flash	1GB	N/A
DS850 Report Printer	OKI B430dn & B 431dn	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

1.1.2 Description of Submitted Modifications

Election Reporting Manager has been modified to increase the maximum number of candidates supported in a single contest from 200 to 295 to accommodate customers with a statewide Presidential Delegate contest which exceeded the previous limitation.

1.1.3 Initial Assessment

An initial assessment was performed to determine the scope of testing for the submitted modification. The results of this assessment are presented in three categories: functional, software, and technical data package (TDP).

Functional Assessment:

Based on the assessment of submitted change, it was determined that a limited Functional Configuration Audit will be required to verify that the voting system continues to meet 2005 VVSG requirements. “Limited”, in this instance, refers to only functional changes that were made in this modification (new features, changes to functions, etc.) or functions that have not changed but may be impacted by the modification. In addition, the voting system shall be subjected to a system integration test to ensure all components interact properly and to verify that the modification to the voting system did not introduce any nonconformities or instabilities.

1.1.3 Initial Assessment (Continued)

Software Assessment:

All added or modified Lines of Code (LOC) will require a source code review to ensure the 2005 VVSG requirements are met and that changes to the software do not introduce any new functions or features outside of the modification described in section 1.1.2. In determining the extent of the required source code review, the submitted source code for EVS 5.2.0.4 was compared to the EAC certified EVS 5.2.0.0 source code. Table 1-3 provides the software comparison results. Only the products listed in Table 1-3 were modified.

Table 1-3. Software Comparison Results

Product	Baseline	New Version	Lines of Code Changed	
			Files	Lines
ERM	8.11.0.0	8.11.0.1	80	291
Totals			80	291

TDP Assessment:

The submitted TDP is constructed with the certified EVS 5.2.0.0 TDP and the EVS 5.2.0.4 changes to the certified documents. NTS Huntsville personnel determined that the following documents are impacted by this modification:

- EVS 5204_C_D_0100_SysOvr
- EVS 5204_DOC_SOP_ERM
- EVS5204_D_SDS00_ERM01_Appendices
- EVS 5204_D_SDS00_ERM
- EVS 5204_DOC_D_1200_ChangeNotes

A review of these documents shall ensure that all EVS 5.2.0.4 changes are properly documented and compliant with 2005 VVSG.

1.1.4 Regression Test

Regression testing shall be conducted on ERM to establish assurance that the modifications have no adverse impact on the compliance, integrity, or performance of the system as outlined in the 2005 VVSG.

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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, expiration date June 30, 2018
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 2.0, expiration date June 30, 2018
- 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"
- NTS Quality Assurance Program Manual, Revision 7
- ANSI/ISO/IEC 17025:2005 and ANSI/NCSL Z540.3, "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 5.2.0.4 Technical Data Package

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1.3 Terms and Abbreviations

Table 1-4 defines all terms and abbreviations applicable to this Test Plan.

Table 1-4. 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.
Deficiency	--	Any repeatable test result that was not the expected result or violates a requirement of the 2005 VVSG.
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 5.2.0.4 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	Identified manufacturer dotting the equipment under test as part of this test plan.
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	Proprietary equipment owned by ES&S.
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.
Institute of Electrical and Electronics Engineers	IEEE	--
Intelligent Mark Recognition	IMR	Visible light scanning technology to detect completed ballot targets.

1.3 Terms and Abbreviations (Continued)

Table 1-4. Terms and Abbreviations (Continued)

Term	Abbreviation	Definition
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.
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 5.2.0.4 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 (2005 VVSG) standard.
System Under Test	SUT	Refers to the system as a whole (all components).
Technical Data Package	TDP	Manufacturer documentation related to voting system required to be submitted as a precondition of 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	Electronic ballot marking device component is the ES&S AutoMARK
National Technical Systems, Inc.	NTS	Identified VSTL hosting the testing of the equipment listed in this test plan; facilities located in Huntsville, Alabama.
National Voluntary Laboratory Accreditation Program	NVLAP	Program which 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

1.3 Terms and Abbreviations (Continued)

Table 1-4. Terms and Abbreviations (Continued)

Term	Abbreviation	Definition
Virtual Review Tool	VRT	Test campaign management software used by the EAC and manufacturers applying for qualification testing.
Voting System Test Laboratory	VSTL	NTS
Voluntary Voting System Guidelines	VVSG	EAC Voluntary Voting System Guidelines Version 1.0

1.4 Project Schedule

The project schedule for the test campaign is in Appendix C – Project Schedule.

1.5 Scope of Test

The scope of testing is limited to the modification to the previously certified EVS 5.2.0.0 voting system.

1.5.1 Block Diagram

Figure 1-1 provides a visual system overview of the submitted voting system.

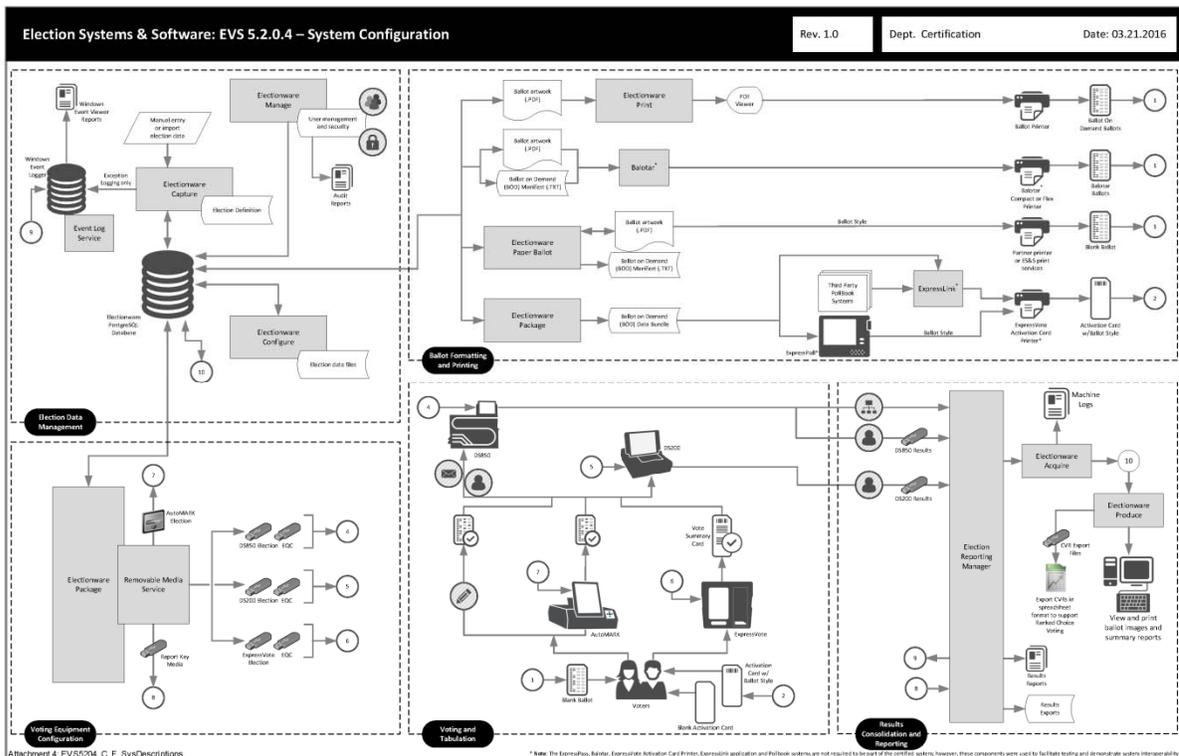


Figure 1-1. System Overview Diagram

1.5.2 System Limits

The system limitation for the maximum number of candidates per contest has been increased to 295. All other limitations remain unchanged for all previously certified components of the EVS 5.2.0.0 voting system.

1.5.3 Supported Languages

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

1.5.4 Supported Functionality

Table 1-5 list the functionality supported by the submitted voting system.

Table 1-5. Supported Functionality

Functionality	Description
Election Data Management	Managing election data supports all tasks related to the creation of the election database, precinct, office, and candidate information required to configure a jurisdiction’s elections. Once an election database exists, ElectionWare can recall the same data for any following election. Event log management includes a series of programs that track user and equipment actions throughout the election process
Ballot Formatting and Printing	Ballot formatting and printing includes activities required for defining the image of a paper ballot, populating that ballot with information imported from the election database, and printing the ballot with ballot style code.
Voting Equipment Configuration	Configuring voting equipment converts election database information into ballot definition parameters for ES&S voting equipment. Within this functional subsystem, software users transfer the election rules specific to an election to the memory devices used to program voting equipment.
Voting and Tabulation	Voting and tabulation includes the following: <ul style="list-style-type: none"> • Accessible ballot marking includes all tasks related to preparing, testing and implementing assistive voting devices for use in a polling place environment. • All tasks related to preparing, testing and implementing universal voting devices for use in a polling place environment with the option of precinct vote summary card tabulation. • Precinct ballot tabulation covers the activities required to prepare, test and scan official ballots and/or vote summary cards at a precinct location. • Central ballot tabulation includes all tasks required to prepare, test and scan official ballots and/or vote summary cards at a central count location.
Results Consolidation and Reporting	Results consolidation and reporting encompasses the functions necessary to gather and combine results from ballot scanners and use that data to generate paper and electronic reports for election workers, candidates and the media.

2.0 PRE-CERTIFICATION TESTING AND ISSUES

This section describes testing performed by either VSTL or the manufacturer prior to submitting the voting system to the EAC.

2.1 Evaluation of Prior VSTL Testing

No prior VSTL testing was submitted for re-use consideration.

2.2 Evaluation of Prior Non-VSTL Testing

No Non-VSTL testing was submitted for re-use consideration.

2.3 Known Field Issues

The EVS 5.2.0.0 voting system has one identified field issue. The RSA Crypto suite used by ElectionWare to generate RSA keys will sometimes create a key that is too short. This causes a key mismatch issue when loading the keys into ExpressVote. This issue is present in the submitted EVS 5.2.0.4 system. A detailed description of this issue is provided in Appendix D – ES&S Technical Bulletin #FYIEWR0026.

3.0 MATERIAL REQUIRED FOR TESTING

The following sections list the materials required to be delivered to facilitate testing of the submitted system.

3.1 Software

Proprietary software and COTS identified in Table 3-1 will be provided by the manufacturer as part of this test campaign.

Table 3-1. Required Voting System Software

Software	Software/Firmware Version
Proprietary Software	
ElectionWare	4.6.0.0
Election Reporting Manager (ERM)	8.11.0.1
ES&S Event Log Service (ELS)	1.5.5.0
Removable Media Service (RMS)	1.4.5.0
VAT Previewer	1.8.6.0
ExpressVote Previewer	1.4.0.0
COTS Software	
Adobe Acrobat Standard	11
Cerberus FTP	6.0.7.1
Microsoft Server 2008	R2 w/ SP1
Microsoft Windows 7	5.1 w/ SP1
WSUS Microsoft Windows Offline Update Utility	8.8
Symantec Endpoint Protection Intelligent Updater	20131227-002-v5i64.exe
Micro Focus RM/COBOL Runtime	12.06
Symantec Endpoint Protection - Small Business Edition 2013	12.1.4

3.2 Hardware

Proprietary equipment and COTS identified in Table 3-2 will be provided by the manufacturer as part of this test campaign.

Table 3-2. Required Voting System Equipment

Component	Hardware Version	Firmware Version
Proprietary Hardware		
ExpressVote Accessible Voting Station	1.0	1.4.0.0
ExpressVote Rolling Kiosk	1.0	N/A
DS200 Precinct Count Scanner	1.2.1, 1.2.3, & 1.3	2.12.0.0
DS850 Central Count Scanner	1.0	2.10.0.0
AutoMARK A100	1.0	1.8.6.0
AutoMARK A200 (SBC 2.0 & SBC 2.5)	1.1	1.8.6.0
AutoMARK A300 (SBC 2.0 & SBC 2.5)	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
Zebra QR Code Scanner	DS457-SR20009	N/A
Delkin USB Flash Drives	512MB, 1, 2, 4, & 8GB	N/A
Delkin Compact Flash	1GB	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
Delkin CF Card Reader	6381	N/A

3.3 Test Materials

Table 3-3 describes the test materials required to execute the required testing.

Table 3-3. Required Test Materials

Test Material	Quantity	Make	Model
Ballot on Demand Printer	1	OKI Data	C9650
ES&S Pens	20	BIC	Grip Roller
Ethernet Switch	1	Dell	HNC67M1
CF Card Reader	1	SanDisk	018-6305
		Delkin	6381

3.4 Deliverables

The materials listed in Table 3-4 are identified by the manufacturer as materials deliverable to the end users.

Table 3-4. Voting System Deliverables

Deliverable Material	Version	Description
Electionware	4.6.0.0	EMS
ERM	8.11.0.1	EMS
ES&S Event Log Service	1.5.5.0	EMS
Removable Media Services	1.4.5.0	EMS
VAT Previewer	1.8.6.0	EMS
ExpressVote	Firmware 1.4.1.0; Hardware 1.0	Accessible Voting Station
ExpressVote Rolling Kiosk	Hardware 1.0	Stand
DS200	Firmware 2.12.0.0; Hardware 1.2.1 or 1.2.3 or 1.3	Precinct Ballot Scanner
AutoMARK A100 or A200 or A300	Firmware 1.8.6.0; Hardware 1.0 or 1.1 or 1.3	Voter Assist Terminal
DS850	Firmware 2.10.0.0; Hardware 1.0	Central Ballot Scanner
OKI Printer	B430dn or B431dn	Laser Report Printer
OKI Printer	Microline 420	Dot Matrix Printer
Headphones	Avid FV 60	Stereo Headphones
EVS 5.2.0.4 Voting System Overview	1.2	TDP Document
EVS 5.2.0.4 System Functionality Description	1.0	TDP Document
ES&S ElectionWare Volume I: Administrator's Guide	1.0	TDP Document
ES&S ElectionWare Volume II: Define User's Guide	1.1	TDP Document
ES&S ElectionWare Volume III: Design User's Guide	1.0	TDP Document
ES&S ElectionWare Volume IV: Deliver User's Guide	1.0	TDP Document
ES&S ElectionWare Volume V: Results User's Guide	1.0	TDP Document
Election Reporting Manager User's Guide	1.0	TDP Document
ExpressVote Operator's Guide	1.0	TDP Document
DS200 Operator's Guide	1.0	TDP Document
DS850 Operator's Guide	1.0	TDP Document
AutoMARK System Operator's Guide	1.0	TDP Document

3.4 Deliverables (Continued)

Table 3-4. Voting System Deliverables (Continued)

Deliverable Material	Version	Description
Voting System Security Specification	1.0	TDP Document
Security Script Description	1.0	TDP Document
Network Setup Guide	1.0	TDP Document
Hardening Procedures for the Election System	1.0	TDP Document
AutoMARK System Security Specification	7	TDP Document
ES&S EVS Event Logging Service User's Guide	1.0	TDP Document

3.5 Proprietary Data

All data considered by the manufacturer to be proprietary is marked as such.

4.0 TEST DESIGN AND SPECIFICATIONS

NTS Huntsville personnel shall ensure that all certification testing conducted on the manufacturer's voting system follows NTS Huntsville's procedures for testing, the requirements of the EAC 2005 VVSG, and Program Manual.

4.1 Requirements

To evaluate the modification test requirements, each section of the EAC 2005 VVSG was analyzed to determine the applicable tests required. The following subsections detail the results of this analysis.

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4.1.1 Requirements Mapping

Table 4-1 maps the submitted modifications as detailed in section 1.1.2 to the 2005 VVSG Requirements. In addition, NTS Huntsville will verify and validate that the manufacturer is in compliance with stated QA and CM plans.

Table 4-1. Modification Requirements Mapping

Change ID	Changed Component	Change Description	Impacted 2005 VVSG Requirement
ENH35514	ERM	Increased the maximum number of candidates supported in a single contest from 200 to 295 to accommodate customers with a statewide Presidential Delegate contest which exceeded the previous limitation.	Vol II Section 6.7
N/A	TDP	Voting System Overview	Vol II Section 2.2
N/A	TDP	ERM System Operation Procedures	Vol II Section 2.5
N/A	TDP	Software Design and Specification	Vol II Section 2.5
N/A	TDP	System Change Notes	Vol II Section 2.13

4.1.2 Rationale for Excluded Requirements

NTS Huntsville determined all requirements excluded from the previous test campaign were not applicable to the submitted modifications listed in Section 1.1.2 based on one or more of the following criteria:

- The submitted modification will not impact the specific requirement.
- It was previously determined that the specific requirement was not applicable to the baseline system.
- A NOC or RFI made the specific requirement not applicable.

4.1.3 NOCs

There are no applicable NOCs released by the EAC as of the date of the Test Plan.

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4.1.4 RFIs

Applicable RFIs the EAC has released as of the date of the Test Plan pertaining to this test campaign are listed in Table 4-3.

Table 4-3. Applicable RFIs

RFI ID	Name
2007-02	EAC Decision on Variable Names
2009-04	EAC Decision on Audit Log Events
2010-02	EAC Decision on Coding Conventions
2010-03	EAC Decision on Database Coding Conventions
2010-05	EAC Decision on Testing of Modifications to a Certified System
2010-07	EAC Decision on Module Length
2010-08	EAC Decision on Calling Sequence
2012-04	EAC Decision on Software Setup Validation
2013-03	EAC Decision on Timestamps

4.2 Hardware Configuration and Design

EVS 5.2.0.4 is an electronic voting system consisting of one precinct paper-based voting system, one central count voting system, and a voting system application software package. The paper-based system is comprised of four voter assistance terminals, AutoMark A100, AutoMark A200, AutoMark A300, and ExpressVote. The AutoMark is a ballot marking device that prints the voter's choices on to a ballot that is digitally scanned for tabulation by either the DS200 or the DS850. The ExpressVote produces an independent voter-verifiable paper record that is digitally scanned for tabulation by either the DS200 or the DS850. The voting System Application Software Package, Election Management System (EMS), is an application suite consisting of ElectionWare, Election Reporting Manager (ERM), Removable Media Service (RMS), ES&S Event Log Service (ELS), ExpressVote Previewer, and VAT Previewer.

4.3 Software System Functions

The required software system functions as described in Volume I Section 2.0 remain unchanged for all previously certified components of the EVS 5.2.0.0 voting system.

4.4 Test Case Design

Test cases are designed around specifications and requirements, i.e., what the voting system is supposed to do (per the manufacturers design specifications) and what the voting system is required to do (per the guiding standards document). The test cases used are primarily functional in nature; however, in certain cases non-functional tests may also be used. The test designer selects both valid and invalid inputs and determines the correct output without any knowledge of the test object's internal structure. The acceptable range for system performance and the expected results for each test case are derived from the manufacturer's documentation and the 2005 VVSG. All test cases are validated and approved by the project lead or other qualified VSTL personnel, i.e., VSTL QA Representative.

4.4.1 Software Module Test Case Design and Data

NTS Huntsville personnel implements component level testing during the Functional Configuration Audit (FCA) for each component and subcomponent exercising the functionality of each as designed and documented. NTS Huntsville will utilize limited structural-based techniques (white-box testing) mainly in the area of Source Code Review and Security Testing. NTS Huntsville will depend heavily on specification-based techniques (black-box testing) for the individual software components. The most common specification-based techniques applied to the voting system during software testing will be “equivalence partitioning”, “boundary value”, and “pairwise” testing.

- “Equivalence Partitioning” will be used to evaluate specific software functions and data entry points of the voting system for valid and invalid data during the FCA. For software functions and data entry points, an entry will be made for a valid data requirement and at least one invalid data requirement to test for normal and abnormal conditions.
- “Boundary Value” testing will be used to evaluate specific software functions and data entry points for minimums and maximums during the FCA. For software functions and data entry points, an entry will be made for all minimum and all maximum documented requirements to test for normal and abnormal conditions. This technique will be used for numeric ranges as well as non-numeric ranges.
- “Pairwise” testing is a combinatorial method of software testing that, for each pair of input parameters to a system, tests all possible discrete combinations of those parameters. NTS Huntsville uses combinatorial test design to identify the minimum number of tests needed to get the coverage required to exercise the functionality. Combinatorial test design enables testers to get greater test coverage with fewer tests. Note that "coverage", as used here, is referring to functional combinatorial coverage, not requirements coverage.

4.4.2 Software Functional Test Case Design and Data

NTS Huntsville personnel shall perform the specification-based technique used at the functional test case level entitled “Use Case.” The identified actors and their responsibilities are listed in Table 4-4.

Table 4-4. “Use Case” Identified Roles and Responsibilities

Role/Actor	Responsibility
Election Administrator	Enters the election definition with translation and audio Maintains EMS users and the election database
Warehouse Technician	Loads the election definition onto the voting equipment Runs diagnostic test and maintains the units
Poll Worker	Sets up and closes down the voting equipment on election-day at the precinct location
Voter	Physically casts the ballot on election-day
ADA Voter	Votes unassisted on election-day with special needs
Election Official	Reports and audits the election result post-election day

4.4.2 Software Functional Test Case Design and Data (Continued)

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

4.4.3 System-level Test Case Design

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 2005 VVSG.

4.5 Test Specifications

The following subsections provide a brief description of the testing to be performed.

4.5.1 Physical Configuration Audit

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

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

4.5.2 Functional Configuration Audit

The functional configuration audit encompasses an examination of manufacturer's tests, and the conduct of additional tests, to verify that the system hardware and software perform all the functions described in the manufacturer's documentation submitted in the TDP. In addition to functioning according to the manufacturer's documentation, tests will be conducted to ensure that requirements of Volume II section 6.7 and all other applicable EAC 2005 VVSG requirements are met. This testing is accomplished through a process called sequencing.

Sequencing is the act of navigating through the user interface to verify that the system performs as described by the manufacturer and does not violate any of the 2005 VVSG requirements. The path that the tester navigates follows the logical flow of accomplishing task required to conduct an election. For example, a task in conducting an election is to add a candidate. The tester will follow the flow of the user interface to add the candidate to a contest. If there are multiple ways to achieve this, then each method will be tested. This process will continue until all tasks for conducting an election are completed. Any paths, or combination of paths, that are determined to be at risk for failure that are outside of the normal flow of the interface will be tested on an individual basis.

4.5.3 System Integration Test Specifications

The system integration test addresses the integration of both hardware and software, along with any telecommunication capabilities. This includes connecting all supporting equipment and peripherals including ballot boxes, voting booths (regular and accessible), and any physical security equipment such as locks and ties. The testing process utilizes functional testing to execute the operations required to design an election, facilitate voting, and tabulate results.

4.5.4 TDP Evaluation Specifications

NTS Huntsville qualified personnel utilize a TDP Review Matrix which lists every EAC 2005 VVSG requirement pertaining to TDP review. NTS Huntsville will review the modified documents listed in section 1.1.3 and other documents required to execute testing. NTS Huntsville will record the results of the review of each document to the applicable requirements listed in the TDP Review Matrix.

During the TDP review process, each document will be reviewed for completeness, clarity, correctness, and continuity. The review results will be formally reported to manufacturer. If a revised document is received, it will be re-reviewed as discussed in this section. The TDP will be continued to be reviewed during the entire testing process as these documents will be utilized to set up the systems, verify correct operational results and in other tests as needed. At the end of the TDP review process, a Deficiency Report will be issued listing the non-compliant items on a document-by-document basis, if applicable.

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4.5.5 Source Code Review

Upon receipt of the source code, a SHA256 hash value will be created for each file. NTS Huntsville will verify that every line of modified source code is compliant to the 2005 VVSG coding requirements. In circumstances where the coding language facilitates the use of automated tools, NTS will develop a process for conducting the source code review with an automated tool. In addition, NTS Huntsville personnel will perform a manual 10% review of all automated source code review to verify that the automated tool was configured properly.

A technical report of all identified violations will be sent to the manufacturer for resolution per review / re-review basis. All revised source code will be checked for compliance until all issues are resolved. All iterative review results shall be included in the final test report.

Unmodified non-voting COTS software (e.g., operating systems, programming language compilers, database management systems, and web browsers) is not subject to the detailed review process specified in this section. However, NTS Huntsville personnel will use one of the following methods to verify that the COTS software has not been modified; independently download an original copy of the COTS software from a 3rd party site, obtain an original OEM disc(s), or receive an original COTS software package sent from the 3rd party manufacturer directly to NTS. Utilizing binary comparison or sha256 hash values the COTS software shall be verified as unmodified.

COTS software that has been modified by the manufacturer in any manner is subject to review. Source code generated by a COTS package and embedded in software modules for compilation or interpretation will be provided in human readable form to NTS Huntsville personnel to enable review.

4.6 Source Code Build Process

NTS Huntsville utilizes two build processes, a compliance build and a trusted build. Compliance builds for all software builds that are not required to be witnessed by the manufacturer. This build process follows the documented procedures of a "Trusted Build" in the Program Manual, with two exceptions: The image products will not be submitted to the EAC, and no manufacturer representative shall be required to be present or on-site for these builds. The "Trusted Build" process is described in section 5.6 of the EAC Program Manual.

4.7 QA & CM System Review

The manufacturer submitted QA Plan and CM Plan will be reviewed. The review will be limited to only the changes within this modification to determine compliance with EAC 2005 VVSG Volume II Section 2, and Volume I Sections 8 and 9, EAC stated requirements, and with the requirements of the internal manufacturer documentation. In addition, the manufacturer TDP documentation package will be reviewed to determine if the manufacturer's QA Plan and the CM Plan are being followed. The results of the TDP review shall be entered on a spreadsheet as previously described in Section 4.6 of this test plan. The results of the TDP review, including the QA and CM compliance results of the Technical Data Package Review, will be included in the final test report.

5.0 TEST DATA

5.1 Test Data Recording

All equipment utilized for test data recording shall be identified in the test data package. For hardware environmental and operational testing, the equipment shall be listed on the Instrumentation Equipment Sheet for each test. The output test data shall be recorded in an appropriate manner as to allow for data analysis. For source code and TDP reviews, results shall be compiled in output reports and submitted to the manufacturer for resolution.

Additionally, all test results, including functional test data, will be recorded on the relevant NTS Huntsville Operating Procedures and Test Cases. Results will also be recorded real-time in engineering log books. Incremental reports will be submitted to the manufacturer and the EAC at the completion of major test areas to communicate progress and results as deemed necessary by the stakeholders.

5.2 Test Data Criteria

NTS Huntsville will evaluate all test data against the manufacturer provided TDP and the requirements set forth in the EAC 2005 VVSG. Per the EAC 2005 VVSG, these parameters shall encompass the test tolerances and samples to define the minimum number of combinations or alternatives of input and output conditions that can be exercised to constitute an acceptable test of the parameters involved. The parameters will also include events with criteria defining the maximum number of interrupts, halts, or other system breaks that may occur due to non-test conditions (excluding events from which recovery occurs automatically or where a relevant status message is displayed).

6.0 TEST PROCEDURES AND CONDITIONS

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

- ISO-9001:2000
- 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)

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6.1 Test Facilities

All testing will be conducted at the NTS Huntsville, AL facility unless otherwise noted. Environmental non-operating (storage) and operating hardware testing will be conducted utilizing an adequately sized environmental test chamber or dynamic vibration (shaker) system equipped with the required data gathering support equipment. All remaining operating hardware tests will be conducted at the appropriate test site with the required support equipment. All instrumentation, measuring, and test equipment used in the performance of this test program will be listed on the Instrumentation Equipment Sheet for each test and shall be calibrated in accordance with NTS Quality Assurance Program, which complies with the requirements of ANS/ISO/IEC 17025:2005 and ANSI/NCSL Z540.3 and ISO 10012:2003.

Standards used in performing all calibrations are traceable to the National Institute of Standards and Technology (NIST) by report number and date. When no national standards exist, the standards are traceable to international standards or the basis for calibration is otherwise documented.

Unless otherwise specified herein, all remaining tests, including system level functional testing, shall be performed at standard ambient conditions outlined in Table 6-1.

Table 6-1. Standard Ambient Conditions

Event	Ambient Range
Temperature	68 to 75 degrees (°) Fahrenheit (F)
Relative Humidity	Local Site Humidity
Atmospheric Pressure	Local Site Pressure

The following tolerances listed in Table 6-2 shall be used unless otherwise specified herein.

Table 6-2. Test Tolerances

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

Deviations to the above tolerances may be submitted by the responsible test laboratory with sufficient engineering information to substantiate the deviation request, but only when best effort technique and system limitations indicate the need for a deviation.

6.2 Test Set-up

All voting system components (hardware and software), shall be received and documented utilizing NTS Huntsville Receiving Ticket (QP HSV-150, 05/04/15) and proper QA procedures. When voting system hardware is received, each test article will be unpacked and inspected for obvious signs of degradation and/or damage that may have occurred during transit. Noticeable degradation and/or damage, if present, shall be recorded, photographed, and the manufacturer shall be notified. NTS Huntsville VSTL personnel will notify NTS Huntsville QA personnel that the equipment is ready for receipt inspection. QA personnel shall record the serial numbers and part numbers. Comparison shall be made between those numbers recorded and those listed on the shipper's manifest. Any discrepancies noted shall be brought to the attention of the manufacturer representative for resolution. All TDP and source code modules received will be inventoried and maintained by the Project Lead assigned to testing.

For test setup, the system will be configured as it would for normal field use. This includes connecting all supporting equipment and peripherals. NTS Huntsville will properly configure and initialize the system, and verify that it is ready to be tested by following the procedures detailed in the voting system TDP.

6.3 Test Sequence and Description

The components of the voting system will undergo testing to verify that the modification performs as described by the manufacturer and meets the requirements of the 2005 VVSG. The required functional tests are outlined in the subsections below. The sequence will follow the schedule in Appendix C – Project Schedule.

6.3.1 Physical Configuration Audit

NTS Huntsville will perform a physical configuration audit on the submitted hardware to verify that it is unmodified from the certified EVS 5.2.0.0 hardware.

6.3.2 Functional Configuration Audit

The FCA for the EVS 5.2.0.4 campaign will include review of modified elements of ERM. The FCA tests will be designed per the specifications in section 4.5.3. During the FCA, both normal and abnormal data will be input into the system to attempt to introduce errors and test for error recovery.

6.3.3 System Integration

All submitted hardware and software components will be included in the system integration test. A total of one election will be delivered for testing the systems' ability to function as an integrated system. The design parameters of the election are included in this section.

6.3.3 System Integration (Continued)

Primary Election: Kanawha County West Virginia

The Kanawha County is a primary election held in 163 precincts containing 47 contests. There are 430 total candidates in four parties. The Delegate to the National Convention – At large contest contains 295 candidates. There are 185 polling locations.

This election functionally tests the increase of the maximum number of candidates supported in a single contest from 200 to 295.

The Kanawha County election will be installed on a certified network configuration running EVS 5204. All precincts will be run on the DS850 and DS200. The first precinct, middle precinct and last precinct ballots will be run on the ExpressVote and Automark.

The test deck will consist of ballots voted in the first position, last position, and a vote for 22 contests.

The parameters of this election are listed below:

- Closed Primary: Yes
- Open Primary: No
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: Yes
- Straight Party voting: No
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No

In addition to the parameters listed above, the following will also be tested:

- Audio input for basic voting pattern using an ADA device
- Audio input for write-in voting using an ADA device

6.3.3 System Integration (Continued)

Primary Election: Kanawha County West Virginia Over Limit

The Kanawha County is a primary election held in 163 precincts containing 47 contests. There are 430 total candidates in four parties. The Delegate to the National Convention – At large contest contains 296 candidates. There are 185 polling locations.

This election functionally tests the ability to include an additional candidate over the stated maximum number of candidates supported in a single contest.

The Kanawha County election will be installed on a certified network configuration running EVS 5204 and edited to add an additional candidate to the multiple Vote For contest in question. Precinct one will be run on the DS850, DS200, ExpressVote and Automark.

The test deck will consist of ballots voted in the first precinct and a vote for 22 contests.

The parameters of this election are listed below:

- Closed Primary: Yes
- Open Primary: No
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: Yes
- Straight Party voting: No
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No

In addition to the parameters listed above, the following will also be tested:

- Audio input for basic voting pattern using an ADA device
- Audio input for write-in voting using an ADA device

6.3.4 TDP

NTS Huntsville will ensure that all submitted modifications are accurately documented and that the documents adhere to the requirements of the 2005 VVSG. A complete listing of the EVS 5.2.0.4 TDP is located in Appendix B – Technical Data Package.

6.3.5 Source Code Review

The source code review of EVS 5.2.0.4 will be based on the source code changes from EVS 5.2.0.0.

6.4 Test Operations Procedure

These subsections address the procedures that NTS will follow during this modification testing campaign.

6.4.1 Pass/Fail Criteria

The PASS/FAIL criteria at the Component Level will be based on the expected result. If the System Under Test (SUT) performs as expected, the test is considered as passed. If the SUT does not perform as expected, the test will be evaluated for tester, test procedure, or test equipment errors. If it is determined there were no tester, test procedure, or test equipment errors, the test will be repeated in an attempt to reproduce the results. If the results cannot be reproduced, the anomaly will be logged and monitored throughout the test campaign and subsequent testing efforts. If the results can be reproduced and the expected results are not met, the SUT will have failed the test. NTS Huntsville personnel will document the error and track the error through resolution.

The PASS/FAIL criterion for System Level testing is whether the system can continue to operate as expected. The System Level test is considered as passed if either 1) no errors are found, or 2) an error is encountered but the system continues to operate and engineering analysis determines that the root cause does not affect system level testing. The system level test is considered failed when an error is encountered and the system is too unstable to continue or engineering analysis determines the root cause could affect further testing. If an error occurs during system level testing, the error shall be documented. If the voting system is able to recover and continue, the test will continue. If the error causes the system to become unstable, the test shall be halted. All errors documented during System Level Testing shall be tracked through resolution.

6.4.2 Anomalies

NTS Huntsville defines an anomaly as any unexpected result and/or event that deviates from what is standard, normal, or expected in which no root cause has been determined. All anomalies are logged and monitored throughout the test campaign and subsequent testing efforts. Anomalies may become deficiencies when a root cause is established.

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6.4.3 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. The manufacturer will be required to submit a root cause analysis and correct any deficiency before testing can be resumed. Engineering analysis will be performed to determine what effect the resolution has on the component. A determination will be made whether Regression Testing will be sufficient or a complete re-test is necessary. All deficiencies and their resolutions will be documented on the NTS Huntsville Deficiency tracking system and the EAC Virtual Review Tool.

6.4.4 Test Results and Assessment

NTS Huntsville personnel will test every EAC 2005 VVSG requirement impacted by the submitted modification. NTS Huntsville personnel will report all deficiencies discovered during this test campaign to the manufacturer and the EAC. If NTS Huntsville determines there is not enough data to ensure a requirement was met, the test plan will be altered and further testing will be done.

6.4.5 Terms of NTS Huntsville Recommendation for Certification

The EAC has the final decision as to whether the system meets all the requirements for an EAC-certified system. NTS Huntsville will recommend approval, if the system meets all applicable sections of the 2005 VVSG, or report that the system does not meet all applicable sections of the 2005 VVSG.

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APPENDIX A – ADDITIONAL TESTING

A.1 Manufacturer Requested Additional Testing

No additional testing was requested by the manufacturer.

APPENDIX B – TECHNICAL DATA PACKAGE

B.1 Technical Data Package

The documents listed in Table B-1 comprise the EVS 5.2.0.4 Voting System TDP.

Table B-1. EVS 5.2.0.4 TDP

EVS 5.2.0.4 TDP Documents	Version	Doc No.	Document Code
System Overview			
Voting System Overview	1.1	01-01	EVS5204_C_D_0100_SysOvr
System Functionality Description			
System Functionality Description	1.0	02-01	EVS5204_C_D_0200_SFD
System Hardware Specification			
AutoMARK System Hardware Overview	8	03-01	AutoMARK_ESS_System_Hardware_Overview_AQS-18-5002-000-S
AutoMARK System Hardware Specification	6	03-02	AutoMARK_ESS_System_Hardware_Specification_AQS-18-5000-001-F
System Hardware Specification – DS200 HW Rev 1.2	3.0	03-03	DS200HW_M_SPC_0312_HWSpec
System Hardware Specification – DS200 HW Rev 1.3	4.0	03-04	DS200HW_M_SPC_0313_HWSpec
System Hardware Specification – DS850 HW Rev 1.0	1.1	03-05	DS850HW_M_SPC_0310_HWSpec
System Hardware Specification – ExpressVote HW Rev 1.0	3.4	03-06	ExpressVoteHW_M_SPC_0310_HWSpec
Software Design and Specification			
ES&S Coding Standards	3.0	04-01	ESSSYS_D_P_0400_CodingStandards
ES&S System Development Program	2.0	04-02	ESSSYS_SG_P_0400_SystemDevProgram
Software Design Specifications DS200	1.0	04-03	EVS5204_D_SDS00_DS200
Software Design Specifications DS850	1.0	04-04	EVS5204_D_SDS00_DS850
Software Design Specifications Electionware	1.0	04-05	EVS5204_D_SDS00_Electionware
Software Design and Specification – ELS	1.0	04-06	EVS5204_D_SDS00_ELS
Software Design and Specification – ERM	2.0	04-07	EVS5204_D_SDS00_ERM
Software Design and Specification – ERM Appendices	1.0	04-08	EVS5204_D_SDS00_ERM01_Appendices
Software Design and Specification – ExpressVote	1.0	04-09	EVS5204_D_SDS00_ExpressVote
AutoMark Software Design and Specifications	--	04-02	01_AutoMARK Software Design and Specification (Folder)
AutoMARK Ballot Image Processing Specifications	6	04-02-01	AutoMARK ESS Ballot Image Processing Specification AQS-18-5002-003-S
AutoMARK Ballot Scanning and Printing Specification	5	04-02-02	AutoMARK ESS Ballot Scanning and Printing Specification AQS-18-5002-007-S
AutoMARK Driver API Specification	5	04-02-03	AutoMARK ESS Driver API Specification AQS-18-5000-002-F
AutoMARK Embedded Database Interface Specifications	5	04-02-04	AutoMARK ESS Embedded Database Interface Specifications AQS-18-5002-005-S
AutoMARK GUI Design Specifications	6	04-02-05	AutoMARK ESS GUI Design Specifications AQS-18-5001-005-R
AutoMARK Operating Software Design Specifications	5	04-02-06	AutoMARK ESS Operating Software Design Specifications AQS-18-5001-002-R
AutoMARK Operations and Diagnostic Log Specifications	5	04-02-07	AutoMARK Operations and Diagnostic Log Specs AQS-18-5002-004-S
AutoMARK Programming Specifications Details	5	04-02-08	AutoMARK ESS Programming Specifications Details AQS-18-5001-011-R
AutoMARK Software Design Specifications	5	04-02-09	AutoMARK ESS Software Design Specs AQS-18-5001-004-S
AutoMARK Software Design Specification Overview	1.8	04-02-10	AutoMARK ESS Software Design Spec Overview

B.1 Technical Data Package (Continued)
Table B-1. EVS 5.2.0.4 TDP (Continued)

EVS 5.2.0.4 TDP Documents	Version	Doc No.	Document Code
AutoMARK Software Development Environment	5	04-02-11	AutoMARK ESS Software Development Environment AQS-18-5001-006-R
AutoMARK Software Diagnostics Specifications	5	04-02-12	AutoMARK ESS Software Diagnostics Specifications AQS-18-5000-004-F
AutoMARK Software Standards Specification	5	04-02-13	AutoMARK ESS Software Standards Specification AQS-18-4000-000-S
ElectionWare PostgreSQL Table and Field Descriptions	--	04-03	EVS5204_D_SDS00_ElectionWare04_PostgreSQL Table and Field Descriptions (Folder)
Readme Election_ware_4_7_1_0	--	04-03-01	Election_ware_4_7_1_0
Readme Election_ware_admin_4_7_1_0	--	04-03-02	Election_ware_admin_4_7_1_0
System Test/Verification Specification			
Voting System Test Plan ES&S Voting System 5.2.0.4	1.0	05-01	EVS5204_QA_D_0500_SysTestPlan
Usability Test	--	05-02	Usability Test Reports (folder)
Common Industry Format ES&S AutoMARK Voter Assist Terminal (VAT)	1.0	05-02-01	AMVATHW_P_D_0510_CIFRptAMVAT
CIF Usability Test Report – DS200 1.2.1	1.2.1	05-02-02	DS200HW_P_D_0512_CIFRptDS200
CIF Usability Test Report – ExpressVote 1.0	N/A	05-02-03	ExpressVoteHW_P_D_0509_CIFRptExpressVote
System Security Specification			
AutoMARK System Security Specification	7	06-01	AutoMARK ESS System Security Specification AQS-18-5002-001-S
Network Setup Guide	1.0	06-03	EVS5204_CM_SOP_NetworkConfigGuide
Hardening Procedures for the Election System	1.0	06-04	EVS5204_CM_SPC01_HardeningProcedures
System Security Specification	1.0	06-05	EVS5204_CM_SPC00_SysSecuritySpec
Security Script Description	1.0	06-06	EVS5204_CM_SPC02_SecScriptDesc
System Operations Procedure			
AutoMARK System Operator’s Guide	1.0	07-01	EVS5204_DOC_SOP_AMVAT
DS200 Operator’s Guide	1.0	07-02	EVS5204_DOC_SOP_DS200
DS850 Operator’s Guide	1.0	07-03	EVS5204_DOC_SOP_DS850
ES&S EVS Event Logging Service User’s Guide	1.0	07-04	EVS5204_DOC_SOP_ELS
Election Reporting Manager User’s Guide	1.0	07-05	EVS5204_DOC_SOP_ERM
Electionware Volume I: Administrator’s Guide	1.0	07-06	EVS5204_DOC_SOP_EW01Admin
Electionware Volume II: Define User’s Guide	1.1	07-07	EVS5204_DOC_SOP_EW02Define
Electionware Volume III: Design User’s Guide	1.0	07-08	EVS5204_DOC_SOP_EW03Design
Electionware Volume IV: Deliver User’s Guide	1.0	07-09	EVS5204_DOC_SOP_EW04Deliver
Electionware Volume V: Results User’s Guide	1.0	07-10	EVS5204_DOC_SOP_EW05Results
ExpressPass Operator’s Guide	1.0	07-11	EVS5204_DOC_SOP_ExpressPass
ExpressVote Operator’s Guide	1.0	07-12	EVS5204_DOC_SOP_ExpressVote

B.1 Technical Data Package (Continued)

Table B-1. EVS 5.2.0.4 TDP (Continued)

EVS 5.2.0.4 TDP Documents	Version	Doc No.	Document Code
<i>System Maintenance Manuals</i>			
ES&S AutoMARK System Maintenance Manual	1.0	08-1	EVS5204_DOC_SMM_AMVAT
DS200 Maintenance Guide	1.0	08-2	EVS5204_DOC_SMM_DS200
DS850 Maintenance Guide	1.0	08-3	EVS5204_DOC_SMM_DS850
ExpressVote Maintenance Guide	1.0	08-4	EVS5204_DOC_SMM_ExpressVote
<i>Personnel Deployment and Training</i>			
Personnel Deployment and Training Program	3.0	09-01	ESSSYS_T_D_0900_TrainingProgram
<i>Configuration Management Plan</i>			
Configuration Management Program	2.0	10-1	ESSSYS_CM_P_1000_CMProgram
Technical Documentation Program	5.0	10-2	ESSSYS_DOC_P_1000_TDProgram
<i>QA Program</i>			
Manufacturing Quality Assurance Plan	2.0	11-01	ESSSYS_M_P_1100 _MNFQualityAssurancePlan
Software Quality Assurance Program	2.0	11-02	ESSSYS_QA_P_1100 _SoftwareQualityAssuranceProgram
Software/Firmware Acceptance	2.0	11-03	ESSSYS_QA_L_1100 _SoftwareFirmwareAcceptance
Acceptance Checklists	--	11-02	Acceptance Checklists (folder)
ES&S 1.3 Hardware DS200 Acceptance Checklist	1.3	11-02-01	1 3 Hardware DS200_AcceptChklist_001RevA
DS850 Acceptance Checklist	--	11-02-02	850_AcceptChklist_revD
DS850 Onsite Acceptance Checklist	--	11-02-03	850_OAcceptChklist_revB
AutoMARK VAT Acceptance Checklist	--	11-02-04	AutoMark_AcceptChklist_001Rev.A
AutoMARK QC Checklist	--	11-02-05	AutoMark_QC_Chklist_001Rev.A
ES&S DS200 Acceptance Checklist	--	11-02-06	DS200_AcceptChklist_001RevD
ES&S ExpressVote Acceptance Checklist	--	11-02-07	ExpressVote_AcceptChklist_001Rev B
<i>System Change Notes</i>			
System Change Notes	1.2	12-01	EVS5204_DOC_D_1200_ChangeNotes
<i>Other TDP Documents</i>			
ES&S Ballot Production Handbook	2.0	13-01	BPG_2'0_SOP

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APPENDIX C – PROJECT SCHELDULE

C.1 - Project Schedule

Table C-1 provides the project schedule based on the estimated time to complete each task.

Table C-1. Project Schedule

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Mar 27, '16													
							W	T	F	S	S	M	T	W	T					
1		EAC Application Approval Process	2 days	Thu 3/24/16	Fri 3/25/16															
2		TDP	10 days	Mon 3/28/16	Fri 4/8/16	1														
3		Test Plan	39 days	Mon 3/28/16	Thu 5/19/16	1														
4		Test Plan Creation	3 days	Mon 3/28/16	Wed 3/30/16															
5		ES&S Review	2 days	Thu 3/31/16	Fri 4/1/16	4														
6		NTS Corrections/Submission	1 day	Mon 4/4/16	Mon 4/4/16	5														
7		EAC Review	20 days	Tue 4/5/16	Mon 5/2/16	6														
8		NTS Test Plan Revision	3 days	Tue 5/3/16	Thu 5/5/16	7														
9		EAC Re-Review	10 days	Fri 5/6/16	Thu 5/19/16	8														
10		Source Code Review	1 day	Mon 3/28/16	Mon 3/28/16	1														
11		Compliance Build	1 day	Tue 3/29/16	Tue 3/29/16	10														
12		Receipt Inspection	1 day	Mon 3/28/16	Mon 3/28/16	1														
13		FCA	5 days	Mon 4/4/16	Fri 4/8/16															
14		Trusted Builds	1 day	Mon 4/11/16	Mon 4/11/16	13														
15		Test Report	36 days	Fri 5/20/16	Fri 7/8/16															
16		ES&S Review	2 days	Fri 5/20/16	Mon 5/23/16	3,13														
17		NTS Corrections/Submission	1 day	Tue 5/24/16	Tue 5/24/16	16														
18		EAC Review	20 days	Wed 5/25/16	Tue 6/21/16	17														
19		NTS Test Report Revision	3 days	Wed 6/22/16	Fri 6/24/16	18														
20		EAC Re-Review	10 days	Mon 6/27/16	Fri 7/8/16	19														
21		Job Closeout	1 day	Mon 7/11/16	Mon 7/11/16	15														

Project: EVS 5204 3-31-16 Date: Thu 3/31/16	Task		Inactive Task		Start-only	
	Split		Inactive Milestone		Finish-only	
	Milestone		Inactive Summary		Deadline	
	Summary		Manual Task		Progress	
	Project Summary		Duration-only		Manual Progress	
	External Tasks		Manual Summary Rollup			
	External Milestone		Manual Summary			

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APPENDIX D - ES&S TECHNICAL BULLETIN #FYIEWR0026



Loading ExpressVote Media: "Manifest Signature Verification Failed"

Technical Bulletin #FYIEWR0026

Product: Electionware

Publication Date: May 11, 2015

Version: EVS4500, EVS520x, EVS5300

Distribution: External

QUESTION:

When loading ExpressVote media, how do I avoid the error "Manifest signature verification failed"?

ANSWER:

Finalize the ballot layout, regenerate Accessible data, and re-burn the election media.

Loading ExpressVote Media: "Manifest Signature Verification Failed"
Technical Bulletin #FYIEWR0026

Background

All files on the media device are digitally signed by Electionware. The equipment uses the digital signatures for security reasons to validate that the files came from a trusted source, and were not changed or modified after being created.

For the Express Vote, these files are signed using the RSA digital signature algorithm. That algorithm can occasionally generate a digital signature with a leading zero byte, and the leading zero is not written to the media device for that file. Therefore, if the leading zero is not written, the ExpressVote will not consider the file valid. This causes a signature mismatch on the ExpressVote.

The likelihood of this occurrence is less than 1 in 250.

Caution



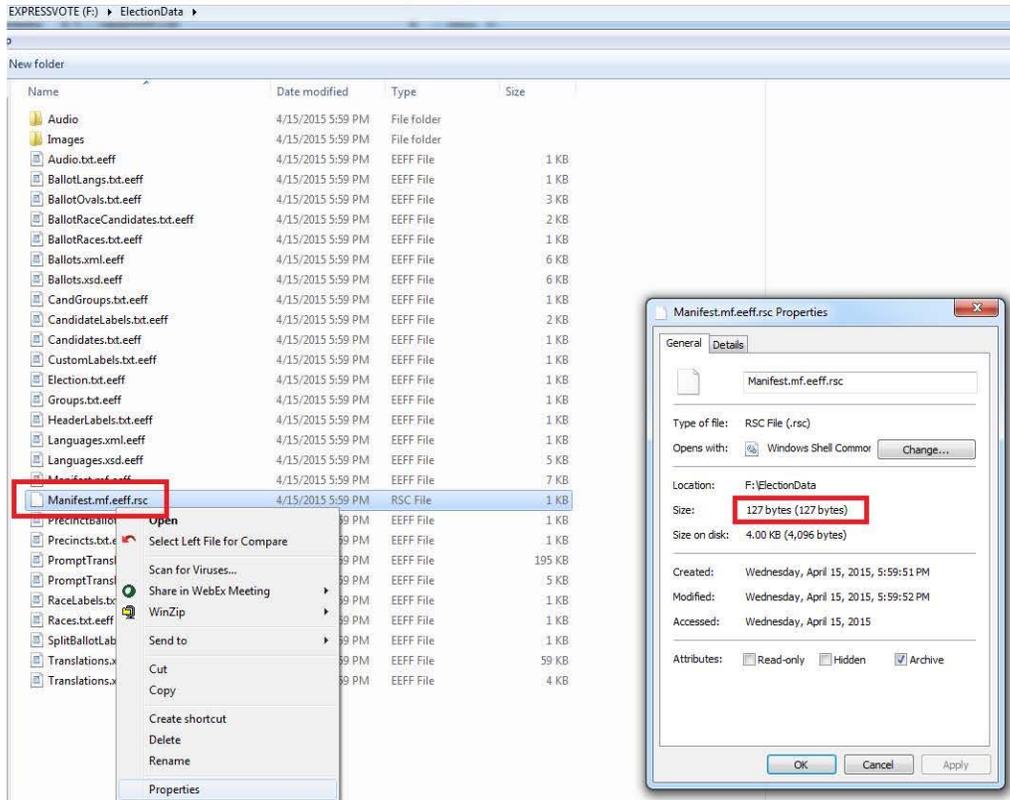
If the error occurs while loading ExpressVote Qualification media, call ES&S Technical Support for assistance as soon as possible.

Check Media Prior to Loading ExpressVote

To check for a mismatch before loading the media on the ExpressVote, first examine two data files in Windows:

1. Insert the media on your computer.
2. In the root folder of the media is a file named Readme.txt.rsc.
In the ElectionData folder is a file named Manifest.mf.eeff.rsc.
Right-click each of these files (see the figure on the following page) and select **Properties**.
3. In the Properties window, on the General tab, check the size of the file. If the size of either file is less than 128 bytes, there is a mismatch.

Loading ExpressVote Media: "Manifest Signature Verification Failed"
Technical Bulletin #FYIEWR0026



If a mismatch is discovered (either by checking the file or while loading ExpressVote Election media), perform the following procedure.

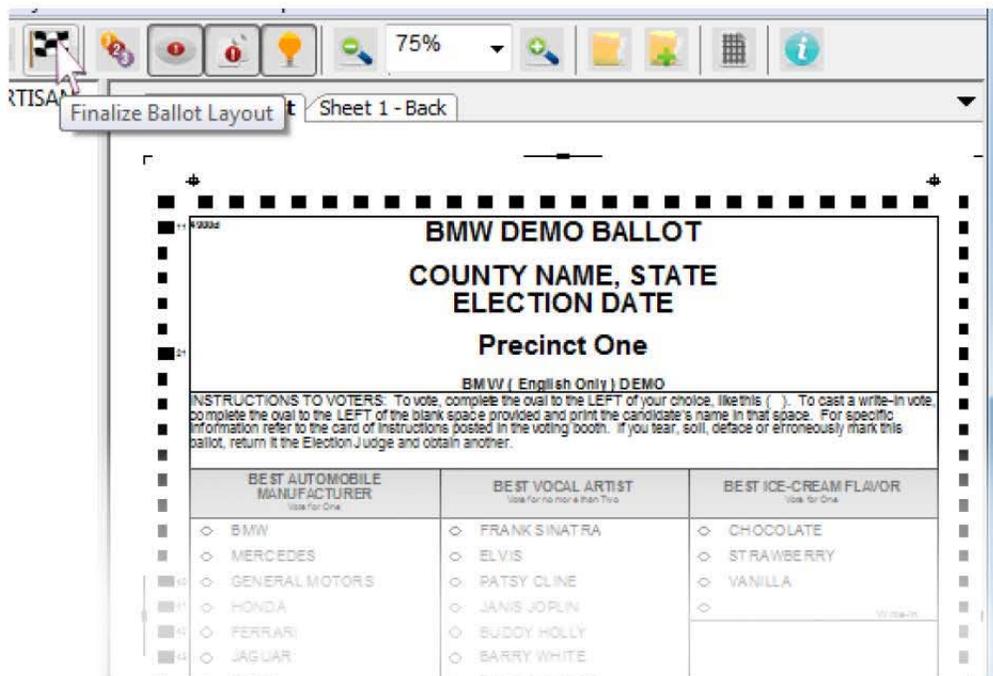
Loading ExpressVote Media: "Manifest Signature Verification Failed"
 Technical Bulletin #FYIEWR0026

Steps in Electionware



Caution The following procedure takes place after you have finished printing ballots. The only Paper Ballot task in this procedure is to finalize the ballot layout. Do not do anything else in Paper Ballot.

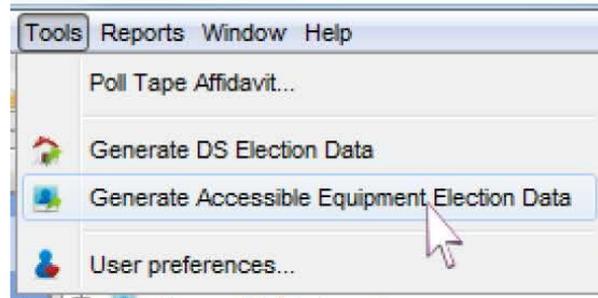
1. In Paper Ballot, finalize the ballot layout.



Warning If you have made formatting changes in Accessible Ballot (i.e. Format Headings, Format Contests, Format Contest Summary, Format Candidates, Format Ballot Styles), these tasks must be repeated after each time you Finalize Ballot Layout in Paper Ballot.

Loading ExpressVote Media: "Manifest Signature Verification Failed"
Technical Bulletin #FYIEWR0026

2. In Configure, from the **Tools** menu, regenerate Accessible Equipment Election Data.



3. In Package, recreate the ExpressVote election media for the affected poll.
4. Load the ExpressVote election media. If the error appears again, repeat the steps in Electionware.

Caution

This procedure will cause the error "Inconsistent Data Version" to appear in ERM.

When this message appears, you should always check the version of the data. There is normally only one Electionware data version, but the manifest issue will cause multiple data versions. To bypass the error message when processing media, select **Update**.

However, if there is only one data version, then make sure you have the most up-to-date ERM election loaded.

This issue will be corrected with a new release upon certification. Once available, ES&S will provide the update.

ES&S Support

If you require additional technical support for ES&S products, contact information is provided below.

Contact an ES&S Support Representative	
Telephone:	877-377-8683 (USA & Canada)
Fax:	402-593-8107
Write:	Election Systems & Software 11208 John Galt Blvd Omaha, NE 68137 USA

ES&S support services are subject to the prices, terms, and conditions in place at the time of service.





END OF TEST PLAN